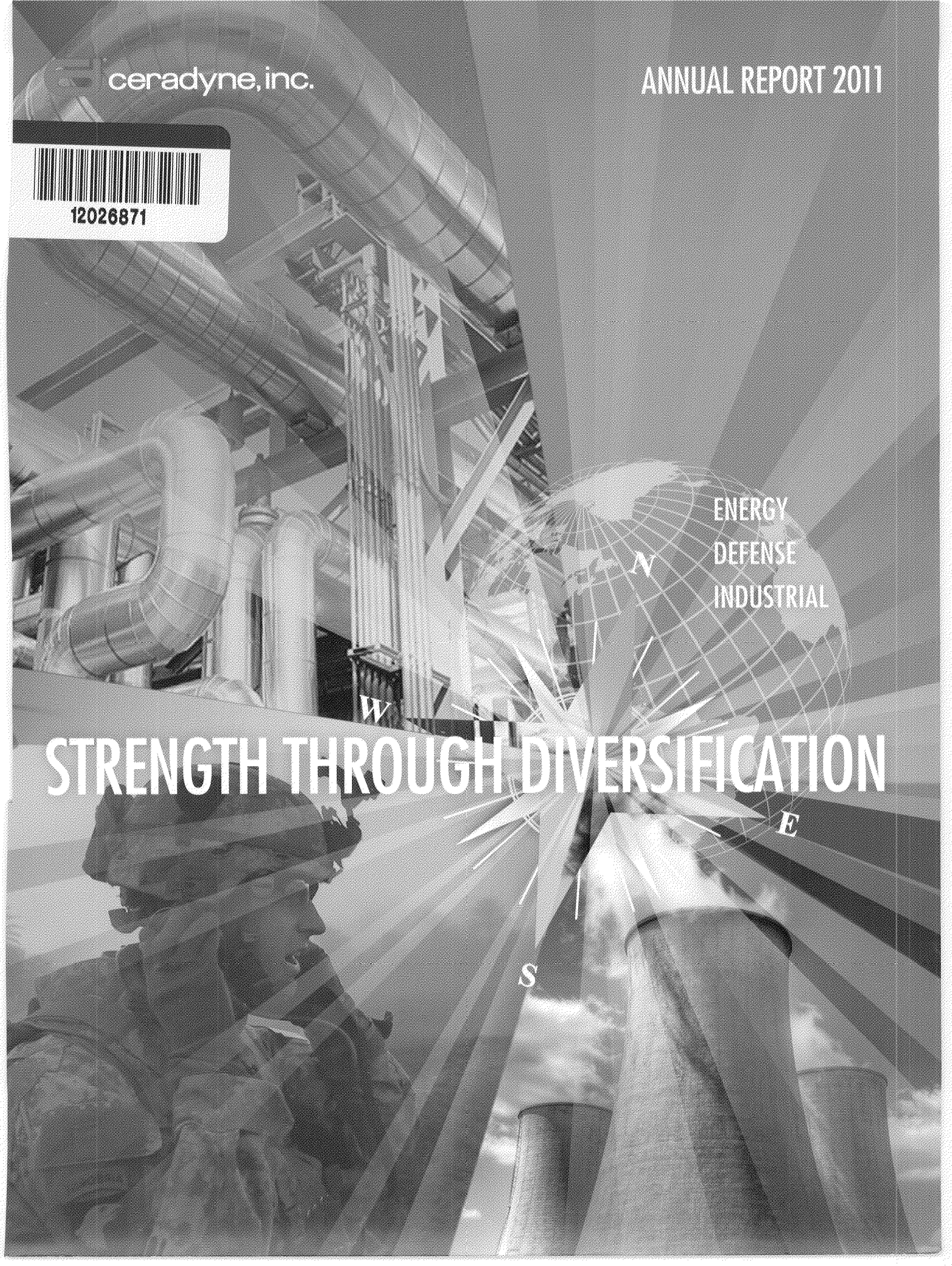
ceradyne, inc.

ANNUAL REPORT 2011



STRENGTH THROUGH DIVERSIFICATION

CORPORATE PROFILE

Ceradyne, Inc. is a vertically integrated developer and manufacturer of advanced technical ceramic products and components for solar, industrial, defense, nuclear power, oil and gas, electronic, automotive/transportation and healthcare markets.

The Company's expertise in ceramic material science contributes to a range of lean processes from key equipment design, to raw material powder production, to on-time delivery of high-quality products. Research and development scientists ensure product innovation at two R&D locations. Integration of the complete process provides Ceradyne divisions with the ability to produce custom precision parts that meet demanding specifications. The Company markets its advanced technical ceramic products to a broad range of industries around the world.

Products include PetroCeram® ceramic sand screens and thrust bearings for oil and gas extraction, lightweight ceramic body armor, Seamless Ballistic® combat helmets, missile radomes, ceramic crucibles for the solar industry, neutron absorbing chemicals and structural composites, specialty glass and bioactive materials, diesel engine components, EKagrip® friction coatings, microwave tube parts, industrial seals, fluid handling components, and materials used in precision investment casting (PIC).

Ceradyne is poised to further expand its diverse product portfolio and markets. There are growth opportunities in energy, defense, and industrial markets from domestic and international manufacturing and sales locations. Exciting opportunities also exist with potential acquisitions and ongoing business development.

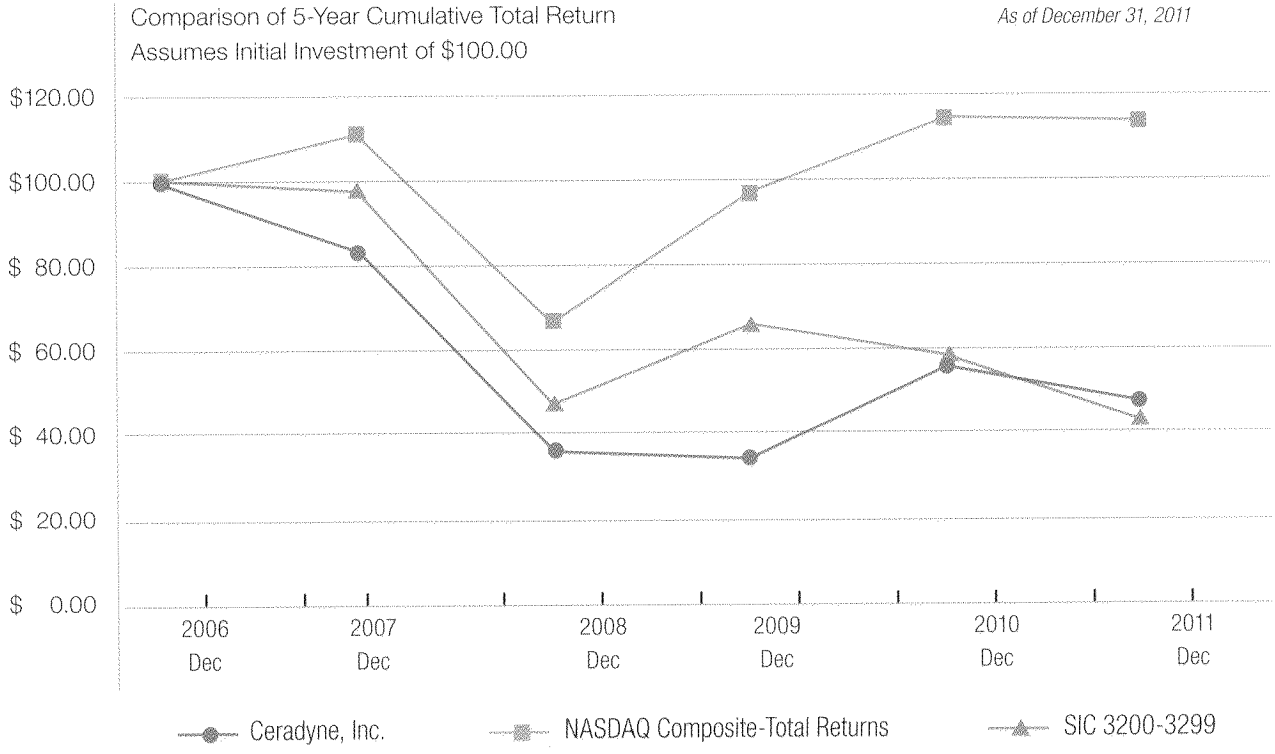
FINANCIAL HIGHLIGHTS

Years Ended December 31,

Amounts in thousands, except per share data	2011	2010	2009
Net sales	$571,982	$402,938	$400,575
Income from operations	128,461	29,156	7,730
Net income	83,888	29,276	8,515
Fully diluted income per share	3.38	1.15	0.33
Cash, cash equivalents and short-term investments	275,047	246,296	239,820
Working capital	379,154	414,414	406,207
Total assets	948,131	865,313	849,704
Total short-term debt at stated amount*	89,294	-	-
Total long-term debt at stated amount*	-	85,599	82,163
Stockholders' equity	$708,698	$652,209	$649,717

** The total long-term debt consisted of an outstanding convertible bond amounting to $93.1 million for both 12/31/2010 and 12/31/2009. The bond was classified as short-term debt as of 12/31/2011 but the total outstanding amount remained at $93.1 million. The difference from these amounts and the above stated amounts of long-term debt of $85.6 million and $82.2 million at 12/31/2010 and 12/31/2009, respectively, and the short-term debt of $89.3 milion at 12/31/2011 is the unamortized discount.*

COMPANY STOCK / PERFORMANCE GRAPH



The above graph shows a comparison of the cumulative total return to stockholders of the Company, the Nasdaq Stock Market (U.S. Companies), and the Nasdaq stocks (SIC 3200-3299 U.S. Companies, stone, clay, glass and concrete products) from December 31, 2006 to December 31, 2011.

DEAR FELLOW SHAREHOLDERS,

Your company continued with its growth and diversification plans in 2011 achieving significant success in both its short-term tactical objectives as well as its five-year goal (announced last year) of achieving revenues of $1 billion in 2016 – "**CERADYNE $1 BILLION**." Perhaps the most significant observation that could be made of our diversification strategy in 2011 is that it is relevant and when given a stress test, our diversification of products, markets and geography came through with flying colors.

In late 2010, based on information we had at that time, we issued our initial guidance for 2011. Our projected earnings of $1.35 to $1.75 per fully diluted share on revenues ranging from $445 million to $515 million seemed reasonable and represented a growth from 2010 of approximately 17%. However, early in 2011 we received several unexpected lightweight ceramic body armor orders from the U.S. Department of Defense, and the demand for our photovoltaic solar-related ceramic crucibles skyrocketed. We became increasingly confident that we would surpass our original projections and revised our guidance upwards several times. In April 2011, we issued our final 2011 guidance of $3.10 to $3.50 per fully diluted share on net sales of $570 million to $600 million.

Sometime late in the second quarter 2011, our solar-related sales began declining and by the fourth quarter 2011, shipments of solar crucibles were a fraction of what they had been less than six months earlier. Our customers (principally Chinese solar module manufacturers) had increased production capacity to double that required to meet demand which increased silicon wafer inventory. Not only were our shipments reduced, but our customers demanded lower unit pricing leading to contracting margins for Ceradyne.

I remain very optimistic regarding our future solar business. The worldwide demand for solar power is still increasing and is expected to reach 100 to 200 gigawatts annually by 2020 from its current level of 25 gigawatts.

As this demand increases and our customers "work off" their inventory, our Tianjin, China facilities have the capacity and quality to meet the anticipated future demand. Even as international government subsidies are reduced or eliminated, solar power will approach grid parity, and it is clean energy.

No matter how positive I and other senior members of Ceradyne's staff are about the solar market, the facts are that by late 2011 the demand for crucibles had sunk precipitously and as of early 2012, there has been little recovery.

Yet, in spite of all this, we had a terrific year and made our guidance. Why?

JOEL P. MOSKOWITZ

Chief Executive Officer, President,
Chairman of the Board

It was due in good part, I believe, to our implementing a strategy of product, market, and geographical diversification. These are some highlights:

- Our lightweight ceramic body armor business which had peaked in 2007 at $535 million and declined steadily to $70 million in 2010, recovered to $194 million in 2011. We won 50% of the government's multi-year ESAPI (Enhanced Small Arms Protective Inserts) sustainment contract which is anticipated to be $127 million per year for three years. Furthermore, we may be selected as the supplier of the ceramic strike face for the two companies that will make the remaining 50% of the ESAPI sustainment contract.
- Our ESK Ceramics operation in Kempten, Germany, had a banner year, primarily in industrial ceramics for its widespread customer base. Their industrial technical ceramic segment is a "smooth" reliable flow of business and is expected to continue to grow along with the world economy. Additionally, ESK Ceramics provides its parent, Ceradyne, with the raw starting powder (boron carbide) for our state-of-the-art military lightweight ceramic body armor, allowing us to be the sole vertically integrated supplier in the business.
- Several of our smaller operations performed excellently. Our nuclear businesses set records with profitable shipments of BORAL® and BORTEC® components for spent fuel rod containment vessels manufactured by Ceradyne Canada. Our Ceradyne Boron Products subsidiary in Quapaw, Oklahoma had a record year. Their record revenues and profit margins exceeded Ceradyne's average. The utilization of enriched boric acid (EBA) as a cooling water additive results in radiation control and increased safety margins at nuclear power plants.
- Our ceramic dispenser cathode operation, Semicon Associates in Lexington, Kentucky, had record growth in sales and earnings and made significant progress on its strategy to become a value-added supplier of the total assembled electron gun which contains our cathodes. An adoption of Semicon's electron gun assembly by our customers could result in a threefold increase in revenue.
- By the end of 2011, we had successfully negotiated an agreement to license our SemEquip subsidiary's ClusterIon® implant hardware technology to a long-time partner of SemEquip, Nissin Ion Equipment Co. Ltd of Japan. This strategy is intended to accelerate the adoption of cluster boron ion implementation equipment by major semiconductor manufacturers, creating a demand for SemEquip's proprietary ClusterBoron® materials.
- All of these factors filled the gap created by the solar crucible downturn, resulting in the following 2011 operating results:
  - Sales in 2011 rose 42% to $572 million from 2010's $403 million.
  - Net income in 2011 rose 186% to $83.9 million, or $3.38 per fully diluted share, from 2010's $29.3 million, or $1.15 per fully diluted share. On a non-GAAP basis, net income was $78.1 million, or $3.15 per fully diluted share, compared to 2010's $27.6 million, or $1.09 per fully diluted share.
  - New orders in 2011 increased to $670.6 million from $455.3 million in 2010.
  - Backlog at the end of 2011 increased to $284.9 million, compared to $185.8 million at the end of 2010.
  - Cash, cash equivalents and short-term investments increased to $275.0 million from $246.3 million at the end of 2010.

THIS YEAR'S ANNUAL REPORT

In the following pages, we have focused on our diversification and growth strategy with more of an emphasis on Ceradyne leaders who make everything possible. The technical nature of Ceradyne and its pragmatic, entrepreneurial and growth culture requires uniquely qualified and motivated individuals. Since its inception almost 45 years ago, the leaders of our Company, coupled with the constant vision to focus efforts on advanced technical ceramics, have been the drivers of Ceradyne's success.

Whether our leaders are relatively new to Ceradyne, often as the result of acquisitions, or seasoned veterans of the Company (on average possessing over 20 years' experience in their respective fields), they are uniform in their determination to further Ceradyne's success and for this I say "thank you."

A REVIEW OF SELECTED 2011 EVENTS

DEFENSE

ESAPI

The significant return of the lightweight ceramic body armor business was a major positive change in direction in 2011 and laid the groundwork for continuing ESAPI production through 2014.

On September 26, 2011, Ceradyne received an award of $127 million for sustainment of the government's ESAPI requirements. This base award included two one-year options of a similar nature. This volume of armor business will be sufficient to support our extensive Lexington, Kentucky ceramic hot pressing facility.

We will continue to pursue additional armor business, which will include:

- R&D related to weight reduction
- International sales
- Other U.S. requirements for sustainment and other military fielding

ECH

In 2009, Ceradyne acquired the business and assets of Diaphorm Technologies, LLC (a helmet developer and manufacturer) with proprietary technology known as Seamless Ballistic® in order to create and bring to market the Enhanced Combat Helmet (ECH). This military helmet provides ballistic protection superior to currently fielded advanced combat helmet (ACH) units, with no weight penalty.

In 2011, The U.S. Marine Corps and the U.S. Army selected Ceradyne from among four competitors as the only qualified supplier for the ECH. Exhaustive testing and evaluation of the Ceradyne ECH occupied much of our 2011 efforts.

We anticipate several ECH awards early in 2012, which could generate helmet revenues exceeding $55 million per year for at least the next three years.

Summary: The combination of the ESAPI sustainment award and the anticipated ECH multi-year procurement should provide a base of close to $200 million per year for the next three years for military armor and helmets.

NUCLEAR POWER PLANTS

We believe that the use of our thermal neutron (radioactivity) absorbing materials containing the enriched ^{10}B isotope will be an important growth market for Ceradyne. The nature of the proprietary isotope separation process and the extensive facility in Quapaw, Oklahoma, will provide us with a major market advantage for many years.

Our metal plate shielding materials BORAL® and BORTEC®, used for the construction of spent fuel rod containment structures, are produced at Ceradyne Canada. A series of ceramic chemical powders and ceramic components incorporating the ^{10}B isotope are manufactured by Ceradyne Boron Products. These include enriched boric acid (EBA) for nuclear reactor water systems, ceramic sputtering targets, BoroBond® containment cement, and other specially formulated materials.

We believe the worldwide market for nuclear power plants is a sizeable opportunity for us and we are particularly focused on China where estimates for new nuclear power plants range up to 200 new facilities over the next 25 years.

In 2011, the Company initiated a significant marketing effort in China, including a successful seminar in Beijing which conveyed the technical and economic attractiveness of enriched ^{10}B materials.

ESK CERAMICS

ESK Ceramics continued its growth in 2011 with increased sales and earnings across multiple product lines. As ESK approaches 30% of Ceradyne's revenues, we are increasingly comfortable that the market for its industrial-related technical ceramics will provide a reliable base as our more niche-focused products in solar and defense experience greater swings in revenue.

Improved manufacturing processes coupled with some pricing strengths led to these widening margins. Long-standing "mature" markets, such as fluid handling seals and bearings, EKagrip® friction components, and boron nitride compositions continued to grow.

Furthermore, newer products developed at ESK's R&D center, such as PetroCeram® ceramic sand screens and ceramic microreactors, achieved technical breakthroughs upon their successful initial implementation in the field.

CERADYNE'S R&D / ACQUISITION PIPELINE

Reviewing our sales and product diversification, it becomes clear that Ceradyne, as it exists today, is the result of new product development and acquisitions, primarily since the acquisition of ESK Ceramics in 2004.

Ceradyne's R&D centers in Kempten, Germany and Costa Mesa, California contribute both new products and improvements to more mature products. Our acquisition strategy has resulted in nine acquisitions which account for almost 50% of 2011 Ceradyne sales.

Our product pipeline is active and will be a major contributor to our future growth.

Products in development or early stage market introduction include:

- **PetroCeram® Ceramic Sand Screens.** A proprietary, patented ceramic system designed to prevent sand and other loose particulates, such as proppants, from entering oil as it is recovered. This product was developed by ESK Ceramics and was initially fielded over two years ago with continuing outstanding results.
- **PetroCeram® Thrust Bearings.** This product is used to stabilize the drilling shaft in downhole oil drilling. We took ownership of the patented technology in 2008 through an acquisition and have made substantial modification to this proprietary ceramic product during the last two years.

  In 2011, several oil drilling and oil service companies began using the PetroCeram® thrust bearing with outstanding results.
- **High-Temperature Electrical Insulators.** Ceradyne has a long history of high-performance ceramic insulators for state-of-the-art spark plugs and igniters. This includes ceramic insulators for the Space Shuttle main engine igniters and many ongoing jet engine programs. Our R&D group is developing an advanced ceramic insulator for next-generation engine applications.
- **Ceramic Missile Radomes.** As America's defensive missile systems are required to operate at increasing velocities and under hostile environmental conditions, they will require ceramic missile radomes (nose cones). Ceradyne Thermo Materials in Atlanta, Georgia, is in full production of several missile radomes including Lockheed Martin's PAC-3 and Raytheon's anti-missile system. In our R&D facility in Costa Mesa, California, we are developing through funded programs next-generation missile nose cones.
- **Ceramic Microreactors.** ESK Ceramics has developed a patented ceramic component for the continuous mixing and reaction of pharmaceutical compounds, fine chemicals, and fragrances, improving throughput forty-fold to one hundredfold. The unusual construction of our ceramic microreactor makes it significantly superior to competing technologies such as glass and metal alloys.

IN CONCLUSION

Another successful year is behind us. An exciting and challenging 2012 lies ahead. Questions involving the timing of a solar industry comeback, full-volume production of ECH, further PetroCeram® field placements, new long-term agreements with nuclear power plant customers, acquisitions, and introduction of new advanced technical ceramic products from our R&D labs in Germany and California – all lie ahead.

I look forward to writing to you next year at this time.

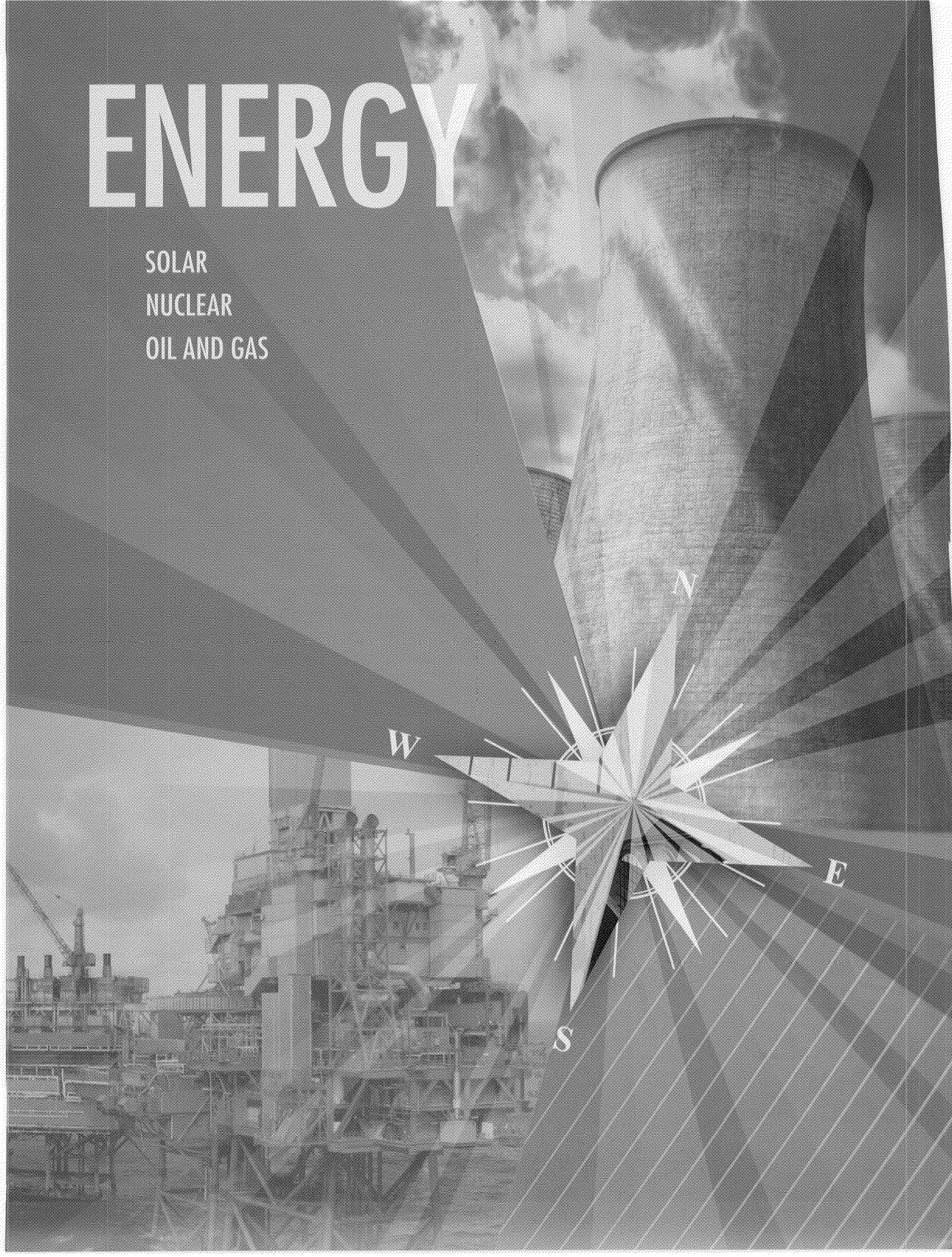
Very truly yours,

CERADYNE, INC.

Joel P. Moskowitz
Chief Executive Officer, President,
Chairman of the Board

ENERGY

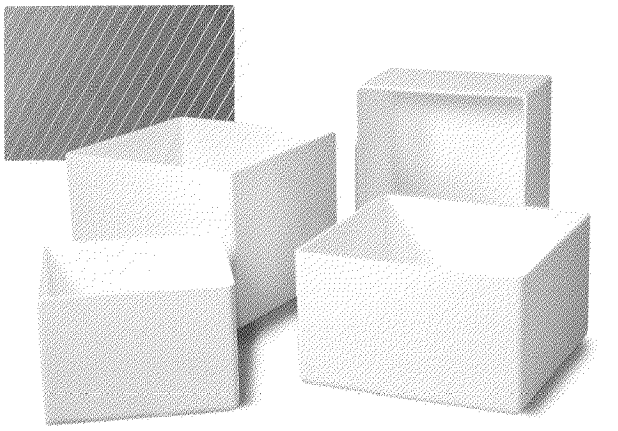
SOLAR
NUCLEAR
OIL AND GAS

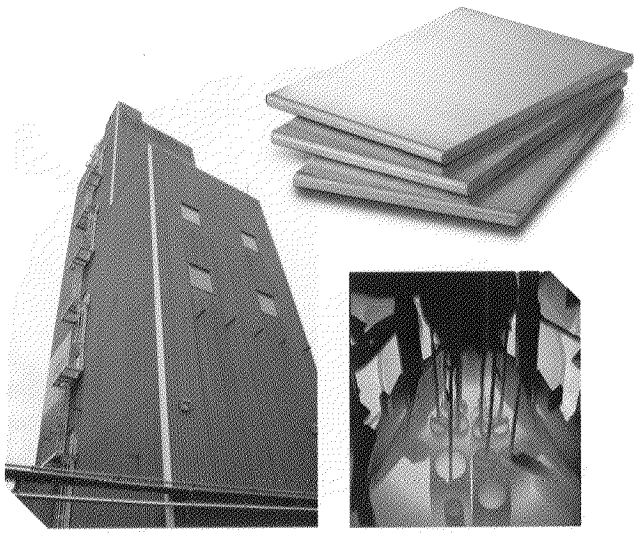


SOLAR AND NUCLEAR

As part of Ceradyne's energy strategy, we are focusing on two niche markets – solar energy and nuclear power plants. When producing silicon wafers for use in photovoltaic solar energy systems, it is necessary to form high-quality, high-purity silicon wafers. In order to do this, ingots of silicon weighing one thousand pounds are melted in Ceradyne's non-reusable high-purity fused silica ceramic crucibles (see photo right).

Another significant focus is the use of the thermal neutron (radioactivity) absorbing element Boron and the key isotope of boron, ^{10}B, which is made at Ceradyne Boron Products in Quapaw, Oklahoma. We believe that these proprietary products will gain increasing market share in nuclear power reactors anticipated to be built in the near future.





Shown (top) are Ceradyne Thermo Materials' crucibles and an example of the photovoltaic silicon wafer that is produced.

Also shown (bottom) is the large isotope separation tower in Quapaw, Oklahoma as well as the shielding BORTEC® and BORAL® that is produced by Ceradyne Canada.

BRUCE LOCKHART *(left)*

President
Ceradyne Thermo Materials
27 Years Industry Experience

"Fused silica crucibles used to melt silicon metal for solar applications have been and will continue to be a significant growth opportunity for Ceradyne. With engineering expertise in Atlanta, Georgia and two production facilities in Tianjin, China, we are well positioned to meet the global demand for high-quality, cost-effective crucibles. This, in turn, helps drive the overall solar energy system costs toward grid parity."

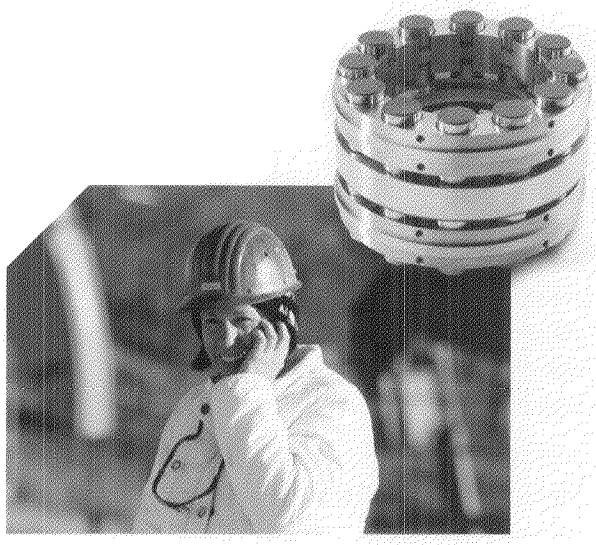
DENNIS MANNING *(right)*

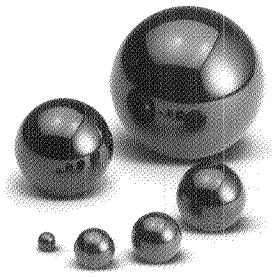
General Manager
Ceradyne Boron Products
24 Years Industry Experience

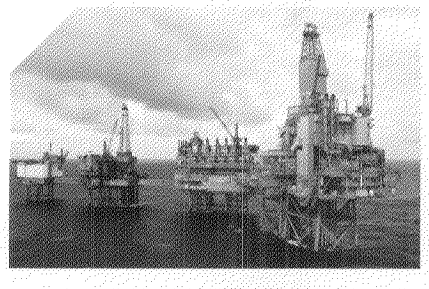
"The rise in global energy consumption has generated unique opportunities for Ceradyne. By leveraging cooperative technology with industry leaders, our market position has been designed into the solution. This alignment strategy has resulted in 225% business growth since 2008 and will be sustained as part of the 'Ceradyne $1 Billion' goal."

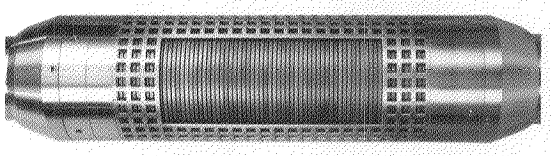
PETROCERAM®– OIL AND GAS

Ceradyne's erosion and corrosion resistant advanced technical ceramics are finding uses in oil and gas exploration and recovery. We have developed two patented products which are currently in use in the oil field. Our PetroCeram® ceramic sand screens have been in place for several years insuring that sand does not enter the oil recovery pipeline. In difficult areas, such as the North Sea, the PetroCeram® ceramic sand screen may determine the success or failure of a producing well. Our second major product is the PetroCeram® thrust bearing. The use of precision sliding ceramic elements rather than conventional ball bearings permit longer life of the drilling rig, particularly in horizontal drilling.









Shown (above right) is a PetroCeram® stacked thrust bearing. Also shown (center) is ESK's Dr. Stefanie Wildhack at a drilling rig site (in Austria) that is using our PetroCeram® ceramic sand screen. A cutaway view (bottom) shows the ceramic rings which filter the sand from the oil.

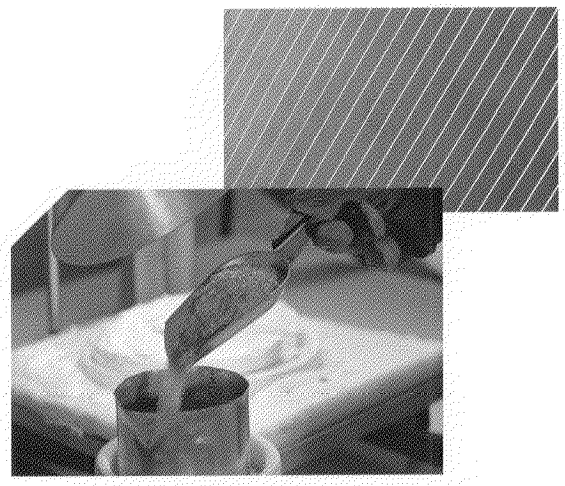
JEFF WALDAL

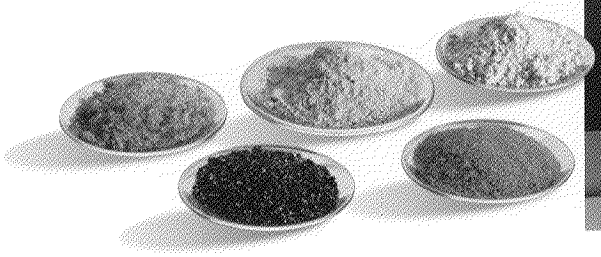
President
Semicon Associates
16 Years Industry Experience

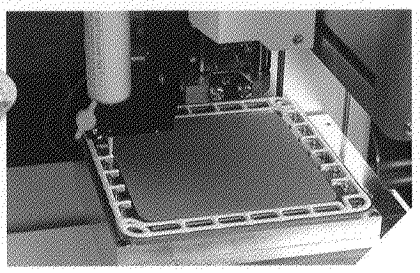
"The tooling used in the oil and gas industry is increasingly challenged while drilling and extracting oil and gas from deeper and more difficult geologic reservoirs. Ceradyne has responded to this demand by developing PetroCeram® Systems that capitalize on our advanced ceramic expertise and outperform conventional solutions."

VIOX – SOLAR/HEALTHCARE

The Ceradyne Viox operation produces over 900 proprietary compositions of specialty glass and ceramic formulations. These are generally sold to a wide variety of customers in electronics, solar, healthcare and other markets. The form of our end product is well characterized fine powders (see photo middle left). The two major markets which form the majority of Ceradyne Viox sales are photovoltaic solar silicon wafer conductive paste ingredients, and bioactive compositions for use in healthcare products such as special toothpaste formulations.







Shown above (top right) Solar wafer with electrically conductive lines

(Middle left) Compositions are formulated in precision, aerospace environments

(Middle right) Fuel cell sealant

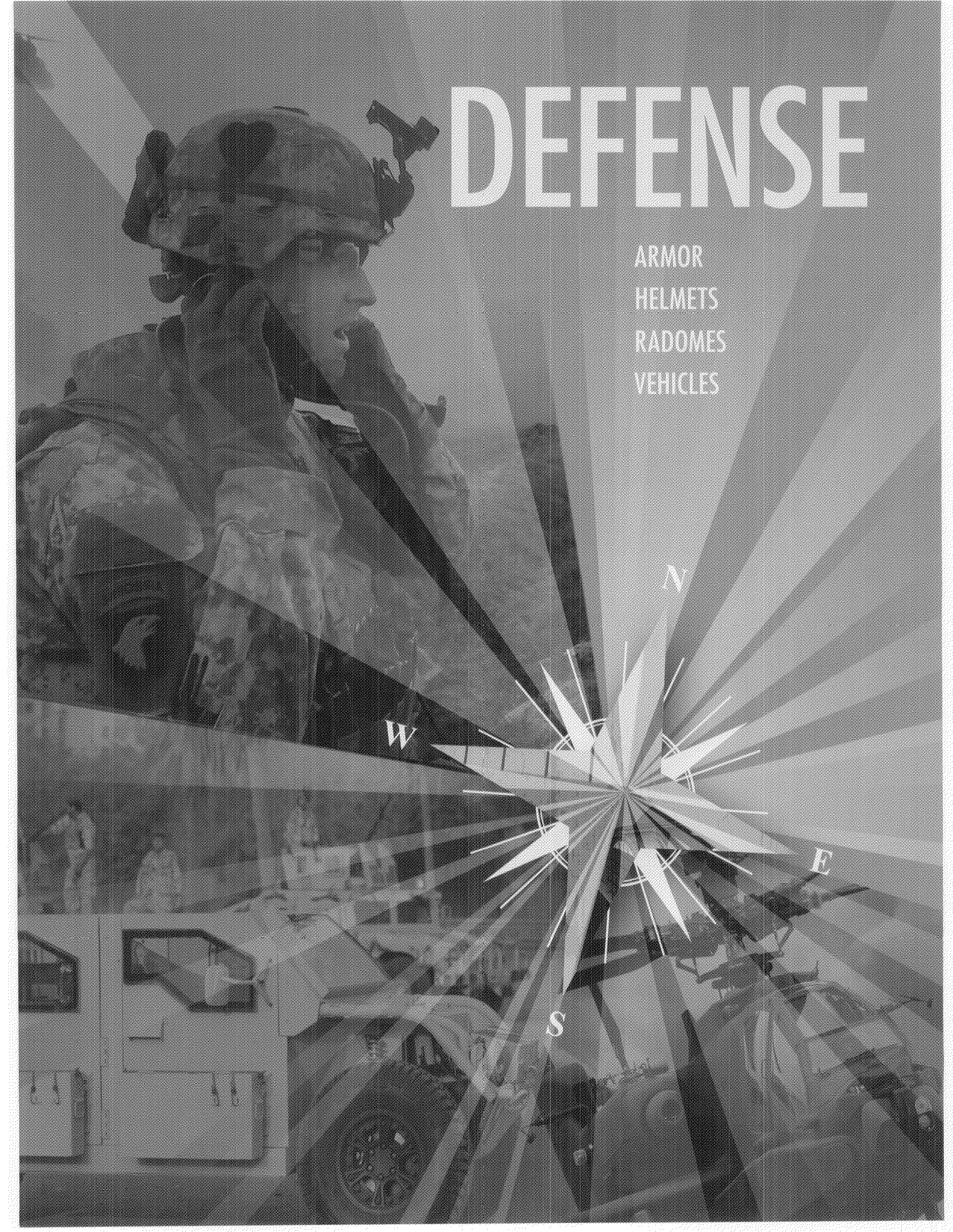
(Middle left) Various compositions (often colored) meet specific customer requirements

(Bottom left) GlaxoSmithKline's new Sensodyne® (Repair & Protect) toothpaste incorporates Ceradyne Viox's bioactive materials

REYNOLD HAGEL

President
Ceradyne Viox, Inc.
30 Years Industry Experience

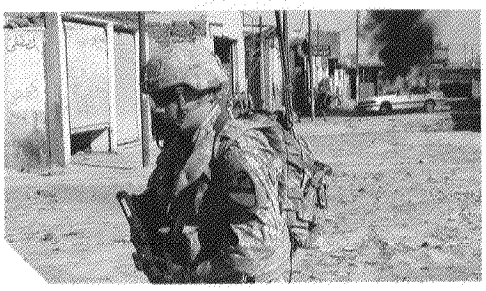
"We expect our design, development and volume manufacturing of proprietary glass compounds to continue their aggressive growth in the wide array of technical sectors we serve. While our bioactive materials improve quality of life through bone and tooth enhancement, our energy-related products help improve efficiencies in Solar Cell, Fuel Cell, Capacitor, Voltage Regulation and Battery applications."


DEFENSE
ARMOR
HELMETS
RADOMES
VEHICLES
N
W
E
S

ADVANCED CERAMIC OPERATIONS (ACO)

Ceradyne's Advanced Ceramic Operations is the "heart" of the Company's defense efforts. Our factories in California and Kentucky have produced over $2 billion worth of lightweight ceramic armor in the past 10 years, protecting American warfighters in Iraq and Afghanistan. The Company's track record of quality and on-time delivery, coupled with its in-house vertical integration, has resulted in Ceradyne being the lightweight ceramic leader by a wide margin.

After the 2009 acquisition of the New Hampshire military helmet manufacturer, Diaphorm Technologies, LLC, Ceradyne installed a modern new factory in Irvine, California to produce large volumes of its Enhanced Combat Helmet (ECH). Early in 2012, we received our initial ECH award for the U.S. Marine Corps and U.S. Army.



Shown above are Ceradyne lightweight ceramic armor systems such as its Enhanced Small Arms Protective Inserts (ESAPI)

DAVE REED

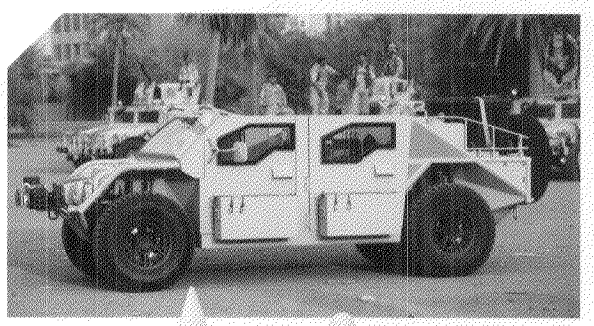
President
North American Operations
34 Years Industry Experience

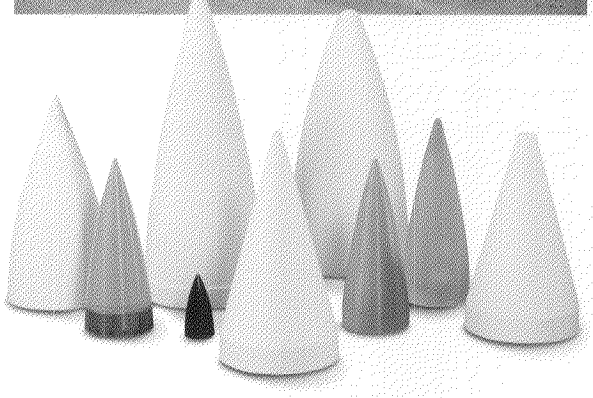
"The Department of Defense will continue to focus on a lighten-the-load strategy for personnel and vehicles which will allow Ceradyne's advanced lightweight technologies to capture new requirements as they emerge."

DEFENSE

From our earliest days in the 1970s, Ceradyne has been involved in developing state-of-the-art military systems for a wide variety of applications. The need to develop a replacement for unacceptable heavy steel armor led to Ceradyne's development of the extremely hard, lightweight B_4C material boron carbide (at 2.5 gms/cm^3 boron carbide weighs less than 1/3 the weight of steel). We have built high-volume ceramic armor facilities in Lexington, Kentucky and Costa Mesa, California, which have produced millions of armor components and will stay active for years to come because of the government's decision to "sustain the industrial base" even in peace time.

In addition to lightweight ceramic armor, Ceradyne produces ceramic radomes (nose cones) for the U.S. defensive missiles. We have established a production volume, cutting edge ceramic radome facility at our Ceradyne Thermo Materials facility in Atlanta, Georgia.





Shown above is a Ceradyne armored vehicle prototype produced at our Wixom, Michigan military vehicle development and manufacturing facility. Ceradyne's lightweight armor and blast resistant systems are being evaluated for next-generation lighter weight vehicles.

Utilizing Ceradyne's technical ceramic science, our prototype and production experience, and precision diamond machining capability, we have teamed with America's leading missile manufacturers, Raytheon and Lockheed, on the development of a wide variety of compositions and radome configurations.

MARC KING

President
Ceradyne Armor Systems
22 Years Industry Experience

"The continuation of our defense sector business at a relatively high performance level is an unmistakable recognition by our customers of the importance these products play assuring the safety of our warfighters. Soldiers and Marines train fully outfitted for war, even in peace time, which ensures the need for protective equipment in the foreseeable future."

VASILIOS BRACHOS *(right)*

General Manager
Ceradyne Diaphorm
16 Years Industry Experience

"Ceradyne Diaphorm has been a technology leader in the development of one of the most significant advancements of soldier protection since the introduction of firearms to the battlefield – a helmet that will defeat a rifle bullet. The Enhanced Combat Helmet (ECH) will launch significant opportunities for Ceradyne Diaphorm and the 'Ceradyne $1 Billion' goal."

ENHANCED COMBAT HELMET (ECH)

In 2009, Ceradyne bought the assets and technology of a small New Hampshire based company, Diaphorm Technologies, LLC. The prime purpose of this acquisition was to acquire the technology to produce the next generation of military helmets, designated ECH. Ceradyne Diaphorm had developed proprietary technology known as Seamless Ballistic® which resulted in a helmet with significantly improved ballistic properties, yet no increase in weight.

In order to demonstrate production capability and in anticipation of a production order, we had a full complement of proprietary production equipment designed and produced to Ceradyne specifications. This equipment was installed in a dedicated space in our Irvine, California armor assembly facility and produced all ECH helmets required for testing and evaluation by the U.S. Marines and U.S. Army.

On March 12, 2012, Ceradyne announced its initial ECH award for low rate initial production.

Shown above are several of Ceradyne Diaphorm's state-of-the-art Seamless Ballistic® helmets including the ECH. Ceradyne Diaphorm produces a wide variety of Seamless Ballistic® military helmets that are designed for enhanced fighting features related to communications, night vision and target illumination.

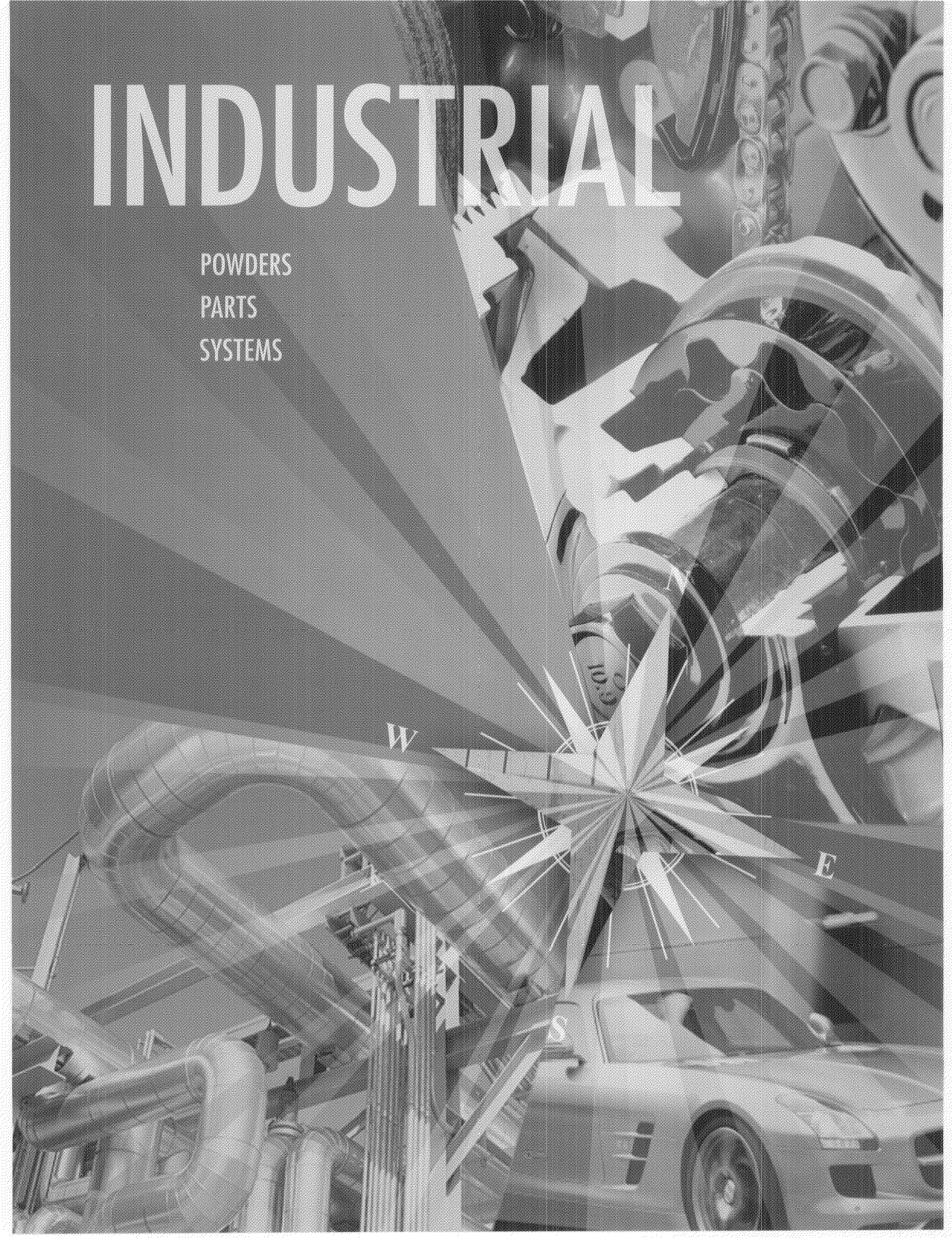
KENT MOELLER

Armor Program Manager
Ceradyne, Inc.
26 Years Industry Experience

"The Ceradyne Defense Division continues to be a key corporate component of the overall 'Ceradyne $1 Billion' goal. Our strong presence with body armor and helmets will keep Ceradyne on the cutting edge of this type of threat protection giving the user a product that takes them well into this coming decade."

INDUSTRIAL

POWDERS
PARTS
SYSTEMS

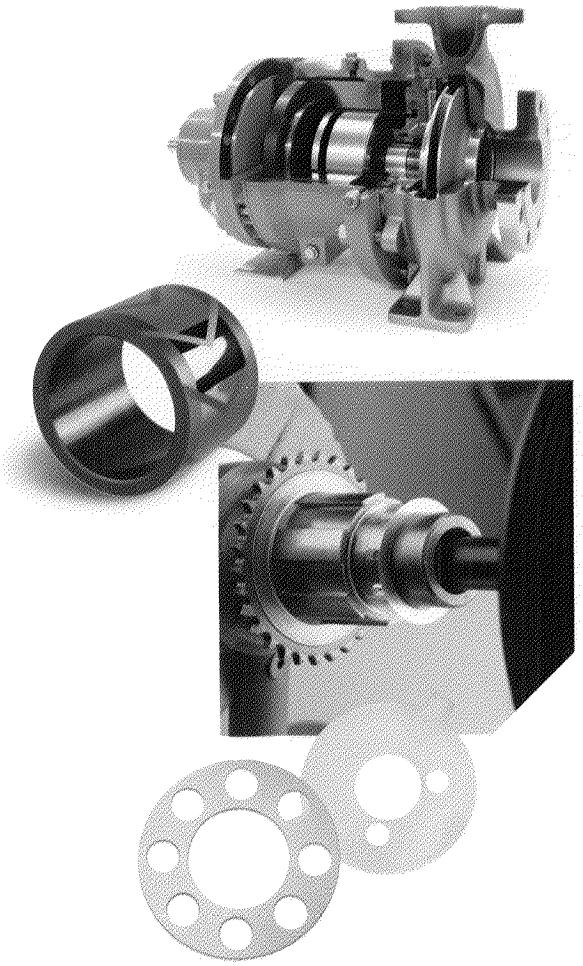


ESK CERAMICS

The 2004 acquisition of ESK Ceramics, Kempten, Germany was a positive inflection point for Ceradyne and represented an important product diversification for us as well as a significant expansion of our non-military, industrial product line. ESK has been producing world class industrial ceramics since its founding by Max Van Schaidhauf in 1922.

ESK ceramic products are used where corrosion and erosion resistance are required and often where either friction fastening surfaces or, in contrast, sliding high-lubricity faces are demanded. Since the 2004 acquisition, we have invested $63.4 million to expand what we believe will be steady growth into new markets as well as above-average growth in its current, more mature markets such as seals and bearing surfaces for fluid handling pumps.

Much of the Ceradyne new product pipeline is due, in good part, to the extensive R&D facility in Kempten. Products such as the PetroCeram® ceramic sand screen, silicon carbide microreactors, solar crucible coating system and many other patented products are a consequence of ESK's R&D efforts.



Shown above is a fluid handling pump and an ESK ceramic bushing. Fluid handling components are the largest ESK industrial sector and are expected to grow with ESK's recently established Tianjin, China factory. Also shown above are EKagrip® patented friction components exhibiting substantial growth in the automotive market.

DR. THOMAS JUENGLING

President
ESK Ceramics
22 Years Industry Experience

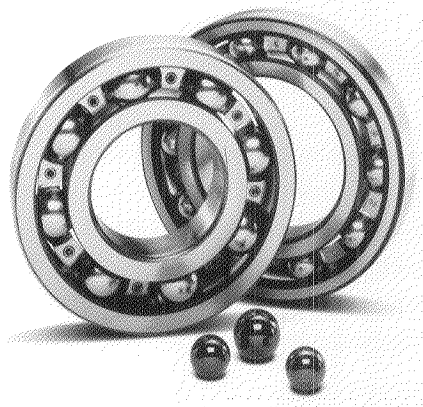
"ESK's target markets include Equipment Engineering, Automotive/Transportation, Chemistry, Energy, Metallurgy and Defense Technology. We are focused on building long-term, strategic partnerships with globally active customers to strengthen our market position and enable more profitable growth as a system supplier. Our product portfolio has been expanded in oil and gas production industries, silicon carbide flow reactors and heat exchangers, ceramic-filled polymers, and ceramic-based coating systems."

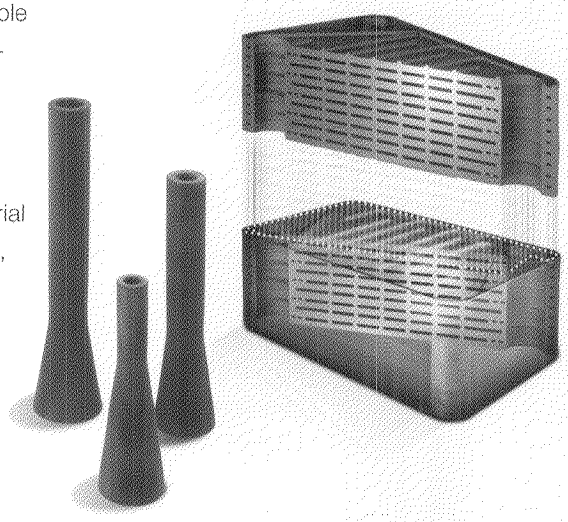
INDUSTRIAL CERAMICS

Ceradyne's industrial advanced technical ceramic products are growing at the fastest pace within our company. Although ESK's German operation is the leading driver of our industrial markets, Ceradyne's U.S.A. operations in Lexington, Kentucky and Costa Mesa, California are also contributing to these efforts, primarily with its proprietary silicon nitride components focused on the automotive and diesel engine markets.

The "**Ceradyne $1 Billion**" strategy is, in part, based on steady, reliable, industrial advanced technical ceramic growth. Lighter weight, more durable technical ceramics (compared to metals) are being recognized as a material of choice for next-generation automotive and diesel components, and certain manufacturing processes requiring harder, more rugged materials.

In contrast to our historic reliance on periodic large defense contracts, we are increasing our focus and resources on current and future industrial ceramics. Several new products, such as ESK's ceramic microreactors, are in early prototype production for pharmaceutical production with future markets estimated to be in excess of $100 million.





Shown above are selected Ceradyne industrial ceramics for bearings (wind turbine), abrasive grit blasting nozzles (bottom left) and ESK's patented silicon carbide microreactor (cross sections), depicting multiple, precision "vias" used to manufacture certain pharmaceuticals, fine chemicals and fragrances at breakthrough throughput speeds.

CHRISTOPH NITSCHE *(left)*

Vice President, Sales & Marketing
ESK Ceramics
25 Years Industry Experience

"The quest for diversified business has enabled a win-win working relationship with international leaders in different market segments. We have experienced the values of true partnership and have built up strong interdisciplinary project management skills and tools. These competencies are a core value of the Ceradyne group which create an environment for developing new opportunities such as recently in oil and gas production and flow chemistry."

CHERYL BRAYMAN

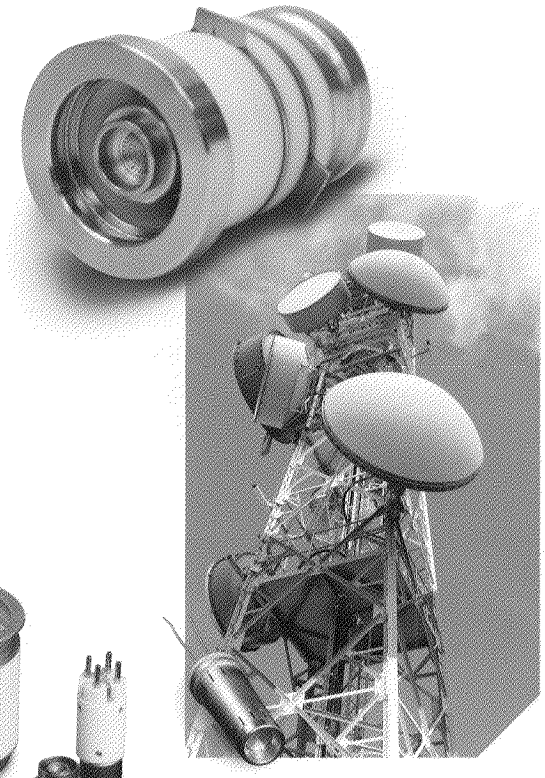
Director of Sales
Ceradyne Commercial Products
22 Years Industry Experience

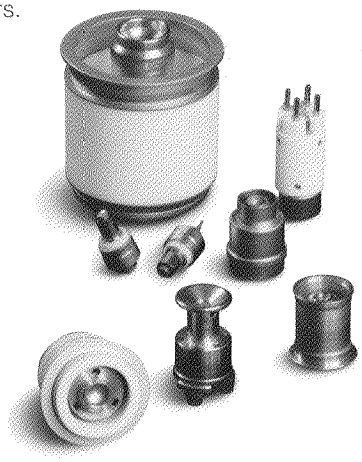
"The unique properties of our advanced materials have qualified Ceradyne technology for components exposed to erosion in oil and gas exploration and recovery, increased fuel efficiencies in engines, improved thermal properties in electronic microchips, better production efficiencies in environmental technologies, and both enhanced functionality and aesthetics in consumer products."

COMMUNICATION – ELECTRONIC COUNTERMEASURES
CERAMIC DISPENSER CATHODES

The successful acquisition of Semicon Associates, Lexington, Kentucky in 1986 put Ceradyne in the ceramic dispenser cathode business servicing its microwave tube customers. This modern 40,000 square foot facility produces a niche ceramic cathode product that is used to drive high-power microwave tubes. These tubes are used for satellite and military communications, electronic countermeasures, and other military applications.

The company has grown and steadily increased productivity and yields resulting in a profit structure greater than Ceradyne's average. Our strategy going forward is to continue to increase market share and to increase revenues by producing the customer end product of assembled electron guns (see top right) through our value added process at a cost structure attractive to our customers.





Shown above are various Ceradyne Semicon Associates ceramic dispenser cathode assemblies.

MIKE EFFGEN

General Manager
Semicon Associates
49 Years Industry Experience

"The hallmark of our success is in bringing together both good and great minds; people who thoroughly understand their roles and what they bring to the venture; people who understand their individual responsibilities and who act as responsible citizens within the group; and finally people who are empowered with the freedom to serve the Company and the goal."

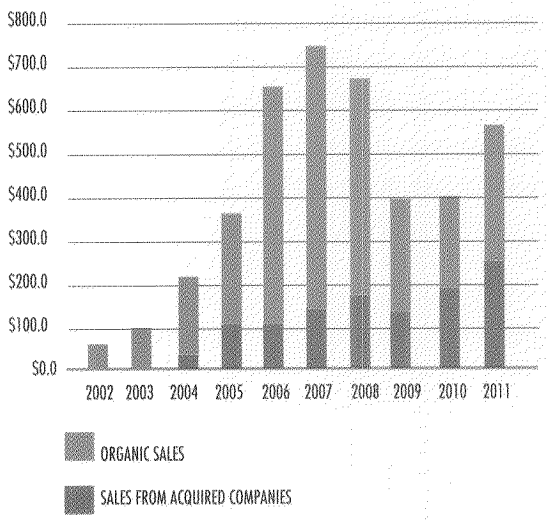
AQUISITIONS

Ceradyne's acquisition strategy has resulted in over 40% of 2011 revenues (see chart) originating from acquisitions over the past 10 years. We have established guidelines related to these acquisitions that we closely follow, adjusted to our pragmatic, entrepreneurial culture when "targets of opportunity" appear on our radar.

Generally, our acquisitions are related to the advanced technical ceramic field, are synergistic, accretive and meet our criteria of "not betting the farm" on a single deal. What may be overlooked by Ceradyne investors is our focus on the quality of the acquired management who, shortly after an acquisition, become Ceradyne management. A clear example of this is Bob Miller (see below). Prior to his recent promotion to Vice President Acquisitions and Corporate Development, Bob was the General Manager of Diaphorm Technologies, LLC which was acquired by Ceradyne in 2009. With our success related to the Enhanced Combat Helmet (developed by Ceradyne Diaphorm), Bob can now turn his attention to Ceradyne corporate goals.

Our "**Ceradyne $1 Billion**" strategy will rely primarily on organic growth coupled with appropriate acquisitions. Our plans are to use the Company's strong cash position to seek out acquisitions while at the same time balancing increased shareholder value efforts, such as our 2012 quarterly dividend initiation, stock buyback and growth-focused capital expenditures.

Organic Sales vs. Sales by Acquired Companies



BOB MILLER

Vice President Acquisitions & Corporate Development
Ceradyne, Inc.
10 Years Industry Experience

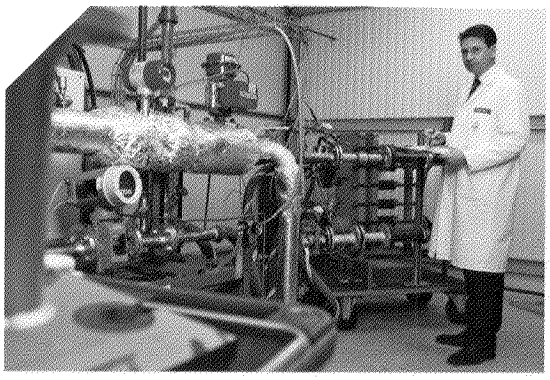
"Ceradyne's technology portfolio and diversified product lines provide a significant platform for accelerated growth. The Company is well positioned to capitalize on strategic opportunities for acquisition of associated add-on technologies or growth enterprises. I am excited about the opportunity to broaden the portfolio in this way ensuring increasingly diversified, balanced and accelerated revenue growth."

RESEARCH & DEVELOPMENT

Led by Dr. Christoph Lesniak (Kempten, Germany) and Dr. Biljana Mikijelj (Costa Mesa, California), Ceradyne has developed two primary R&D centers focused on innovation and the development of totally new product lines, as well as incremental improvements and modifications on existing products, all relying on our advanced technical ceramic technology base.

The Ceradyne new product pipeline consists mostly of products developed in our R&D laboratories. Examples of Ceradyne innovations that are in early stage prototype or limited initial production include:

- Next-generation high-speed ceramic missile radomes
- PetroCeram® ceramic sand screens
- Automotive and diesel engine ceramic components
- Continuous-flow ceramic microreactors
- Improved lubricity bearing and bushing fluid handling pump parts



Dr. Christoph Lesniak is the head of the research efforts in Germany.

DR. CHRISTOPH LESNIAK *(left)*

Vice President, Technology & Innovation
ESK Ceramics
20 Years Industry Experience

"Innovation activities at ESK are mainly focused on major growth markets like Oil and Gas (with our proprietary PetroCeram® sand screen technology), thermal management in plastics (tailored Boron Nitride fillers with excellent heat conductivity) and advanced seal and bearing technology for energy efficient pumps (with our proprietary abrasion resistant polymer/ceramic bearings). Our cross industry and open innovation culture allows ESK to generate breakthrough solutions for prospective future markets."

DR. BILJANA MIKIJELJ *(right)*

Director, Research & Development
Ceradyne, Inc.
25 Years Industry Experience

"Major innovation activities at Ceradyne are focused on growth markets: Alternative Energy (solar), Oil and Gas drilling and exploration components requiring improved erosion resistance, and ceramics for gas economy improvements in automotive engines. Additionally, materials development activities for ceramic radomes and mobile phone components are under way."

FINANCE

The Finance team's primary goal is to maximize shareholder value. The discipline needed to achieve this goal involves many factors from managing the complex financial aspects of both domestic and international businesses, overseeing and improving cash flows, guiding the operations side of the business on how they can improve profitability, to participating in strategy development to promote the profitable growth of the Company. It also includes implementing and managing a complex SAP system that produces quick and accurate financial data, negotiating important contracts and acquisitions, complying and dealing with complex regulations and tax laws, overseeing foreign currency exposure, and integrating our internal controls to not only comply with Sarbanes Oxley laws but to produce value for the business.

This year among our goals is to improve Ceradyne's Business Intelligence and Analytics by implementing software that will help with faster data analytics, easier data discovery, and data visualization combined with interactive reporting dashboards. We continue to focus on the utilization of technology to advance the Company's productivity and to insure that timely data is generated to facilitate better business decisions.

CARY OKAWA *(right)*

Corporate Controller
Ceradyne, Inc.
11 Years Industry Experience

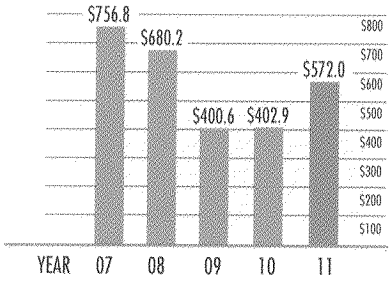
"One of Joel's favorite sayings is 'numbers are the language of business.' We utilize a standardized SAP infrastructure to ensure "one version of the truth" within Ceradyne and to support the Company's growth. Ceradyne has embraced SOX through enhanced reliance on systems controls and workflow technology. On occasion we will use SOX to simply get things done, which we like."

JERROLD J. PELLIZZON *(left)*

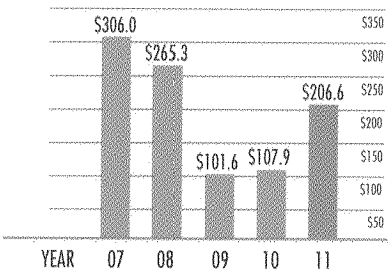
Chief Financial Officer
Ceradyne, Inc.
26 Years Industry Experience

"CFOs combine financial expertise and business acumen to achieve sustainable business success. They understand how the different parts of a business need to come together. They are trusted and expected to guide critical business decisions and drive strong business performance. Whether it's managing people, cash flows, a negotiation or a strategic process, today's CFOs must be great strategic thinkers, strong managers, have keen business sense and excellent finance skills in an ever more complex and international operating environment."

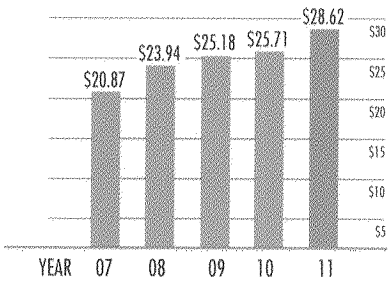
SALES
($ in Millions)



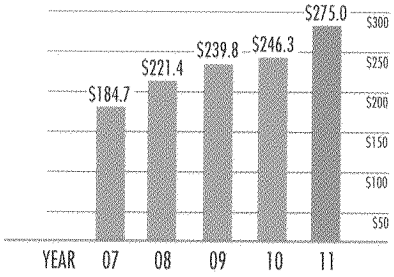
GROSS PROFIT
($ in Millions)



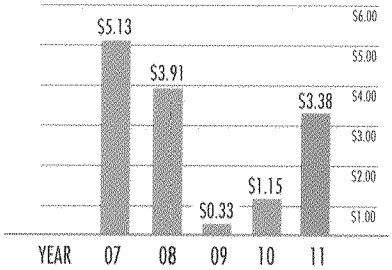
BOOK VALUE
(Per Fully Diluted Shares)



CASH & SHORT TERM INVESTMENTS
($ in Millions)



EARNINGS PER SHARE
($ in Millions)



TERRY HART *(left)*

Vice President, Human Resources
Ceradyne, Inc.
19 Years Industry Experience

"When I joined the company in 1998 Ceradyne consisted of 3 divisions with 175 primarily English speaking employees. Today our team supports 2,000+ employees across 11 divisions in 5 countries speaking 6 languages in a systemized and centralized corporate environment. Seasoned in change and committed to our lean and entrepreneurial philosophy, we will continue to attract, retain, and motivate our most valuable assets, our employees."

CLEMENS KIPPES *(right)*

Executive Vice President
ESK Ceramics
20 Years Industry Experience

"We support the growth of the company by compliant, reliable, timely and customer-oriented financial and administrative processes. Our continuous improvement is based on many years of business expertise and a commitment to business excellence."

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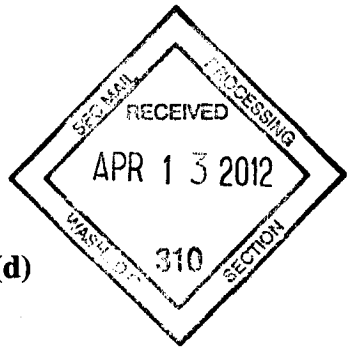
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K



(Mark One)

☑ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the fiscal year ended December 31, 2011

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the transition period from _____ to _____

Commission file number 000-13059

CERADYNE, INC.
(Exact name of registrant as specified in its charter)

Delaware	**33-0055414**
(State or other jurisdiction of Incorporation or organization)	*(I.R.S. Employer Identification No.)*
3169 Red Hill Avenue, Costa Mesa, California	**92626**
(Address of principal executive offices)	*(Zip Code)*

(714) 549-0421
(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class:	**Name of Each Exchange on Which Registered:**
Common Stock, par value $0.01 per share	**The NASDAQ Stock Market LLC**

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark whether the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act of 1933. YES ☑ NO ☐

Indicate by check mark whether the registrant is not required to file reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934. YES ☐ NO ☑

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports); and (2) has been subject to such filing requirements for the past 90 days. YES ☑ NO ☐

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes ☑ No ☐

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ☑

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer", "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer ☑ Accelerated filer ☐ Non-accelerated filer ☐ Smaller reporting company ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☑

The aggregate market value of registrant's common stock held by non-affiliates as of June 30, 2011 (the last business day of registrant's most recently completed second fiscal quarter) was approximately $910.1 million.

As of February 5, 2012, there were 24,194,539 shares of registrant's Common Stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE: Portions of registrant's definitive proxy statement for its annual meeting of stockholders to be held on May 16, 2012 are incorporated by reference into Part III of this Form 10-K.

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PART I

NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K includes forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. Forward-looking statements are those that predict or describe future events or trends and that do not relate solely to historical matters. You can generally identify forward-looking statements as statements containing the words "believe," "expect," "will," "anticipate," "intend," "estimate," "project," "plan," "assume" or other similar expressions, or negatives of those expressions, although not all forward-looking statements contain these identifying words. All statements contained in this report regarding our future strategy, future operations, projected financial position, estimated future revenues, projected costs, future prospects, the future of our industries and results that might be obtained by pursuing management's current plans and objectives are forward-looking statements.

You should not place undue reliance on our forward-looking statements because the matters they describe are subject to known and unknown risks, uncertainties and other unpredictable factors, many of which are beyond our control. Our forward-looking statements are based on the information currently available to us and speak only as of the date of the filing of this report. New risks and uncertainties arise from time to time, and it is impossible for us to predict these matters or how they may affect us. Over time, our actual results, performance or achievements will likely differ from the anticipated results, performance or achievements that are expressed or implied by our forward-looking statements, and such difference might be significant and materially adverse to our security holders.

We have identified some of the important factors that could cause future events to differ from our current expectations and they are described in this report in Item 1A under the caption "Risk Factors," in Item 7 under the caption "Management's Discussion and Analysis of Financial Condition and Results of Operations," and in Item 7A under the caption "Quantitative and Qualitative Disclosures About Market Risk," all of which you should review carefully.

ITEM 1. BUSINESS

Introduction

We develop, manufacture and market advanced technical ceramic products, ceramic powders and components for defense, industrial, energy, automotive/diesel and commercial applications.

In many high performance applications, products made of advanced technical ceramics meet specifications that similar products made of metals, plastics or traditional ceramics cannot achieve. Advanced technical ceramics can withstand extremely high temperatures, combine hardness with light weight, are highly resistant to corrosion and wear, and often have excellent electrical capabilities, special electronic properties and low friction characteristics.

Our products include:

- lightweight ceramic armor for soldiers and other military applications;
- ceramic industrial components for erosion and corrosion resistant applications;
- ceramic powders, including boron carbide, boron nitride, titanium diboride, calcium hexaboride, zirconium diboride and fused silica, which are used in manufacturing armor and a broad range of industrial products and consumer products;
- evaporation boats for metallization of materials for food packaging and other products;
- durable, reduced friction, ceramic diesel engine components;
- functional and frictional coatings primarily for automotive applications;
- translucent ceramic orthodontic brackets;
- ceramic crucibles for melting silicon in the photovoltaic solar cell manufacturing process;
- ceramic-impregnated dispenser cathodes for microwave tubes, lasers and cathode ray tubes;

- specialty glass compositions for solar, electronic, industrial and health care markets;
- ceramic missile radomes (nose cones) for the defense industry;
- fused silica powders for precision investment casting (PIC);
- neutron absorbing materials, structural and non-structural, in combination with aluminum metal matrix composite that serve as part of a barrier system for spent fuel wet and dry storage in the nuclear industry, and non-structural neutron absorbing materials for use in the transport of nuclear fresh fuel rods;
- nuclear chemistry products for use in pressurized water reactors and boiling water reactors;
- boron dopant chemicals for semiconductor silicon manufacturing and for ion implanting of silicon wafers;
- ceramic bearings and bushings for oil drilling and fluid handling pumps;
- ceramic micro-reactors used to process chemicals;
- PetroCeram® ceramic sand filters for oil and gas recovery; and
- enhanced combat helmets for soldiers.

Our customers include the U.S. government, prime government contractors, companies engaged in solar energy, oil and natural gas exploration and nuclear energy, and industrial, automotive, diesel and commercial manufacturers in both domestic and international markets.

The principal factor contributing to our growth in sales from 2002 through 2007 was increased demand by the U.S. military for ceramic body armor that protects soldiers, which was driven primarily by military conflicts such as those in Iraq and Afghanistan. This demand was driven by recognition of the performance and life saving benefits of utilizing advanced technical ceramics in lightweight body armor. Our sales declined in 2008 primarily because of a reduction in shipments of body armor. Our sales declined in 2009 primarily because of a continued reduction in shipments of body armor and also due to a decline in sales of our industrial, automotive/diesel and commercial market product lines due to the severe economic recession. In 2010, sales of body armor continued to decline. However, sales from energy related products grew by 61.6% in 2010 when compared to 2009. Most of this growth in energy sales was generated by sales of our ceramic crucibles used in the production of photovoltaic cells for solar panels. Our sales increased in 2011, due to additional shipments of body armor, an increase of sales to the nuclear industry and the reporting of operating results from VIOX Corporation which we acquired on January 3, 2011. Additionally, sales of industrial products continued to increase, particularly at our ESK Ceramics subsidiary.

Commencing in 2004, several strategic acquisitions also have contributed to our sales growth. These include our acquisition of ESK Ceramics in August 2004, our acquisition of Minco, Inc. in July 2007, our acquisition of EaglePicher Boron, LLC in August 2007, which we renamed Boron Products, LLC, and our acquisition of VIOX Corporation on January 3, 2011.

To illustrate the impact of body armor, energy-related products, and our acquisitions, the following table shows our sales from body armor, energy-related products, from our acquisitions, and from all other sources for each of the years 2002 through 2011 (in millions).

	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002
Sales from body armor	$193.8	$ 70.4	$170.0	$385.0	$535.3	$479.4	$199.5	$120.3	$ 58.2	$26.2
Sales from energy products:										
Gross sales from energy products	129.0	99.9	62.2	57.7	20.9	11.9	9.8	5.3	2.5	1.7
Less sales from energy products included in acquired companies	(66.2)	(28.5)	(24.5)	(11.4)	(4.5)	(3.2)	(3.2)	(0.7)	—	—
Sales from energy products due to organic growth	62.8	71.4	37.7	46.3	16.4	8.7	6.6	4.6	2.5	1.7
Sales from acquired companies	254.5	191.1	136.8	177.1	142.6	110.2	109.8	36.0	—	—
All other sales	60.9	70.0	56.1	71.8	62.5	64.6	52.4	54.7	40.8	33.3
Total sales	$572.0	$402.9	$400.6	$680.2	$756.8	$662.9	$368.3	$215.6	$101.5	$61.2

Sales of ceramic body armor represented the majority, and most volatile, portion of our defense business, rising from approximately $26.2 million, or 42.8% of our total sales in 2002, to a peak of approximately $535.3 million, or 70.7% of our total sales in 2007, and then declining to approximately $193.8 million, or 33.9% of our total sales in 2011. Shipments of the first generation of ceramic body armor, known as small arms protective inserts, or SAPI, began before 2002 and accelerated rapidly with the onset of the war in Afghanistan in 2002 and thereafter the war in Iraq. Shipments of the second generation of ceramic body armor, known as enhanced small arms protective inserts, or ESAPI, began in 2005. The military's subsequent decision to deploy ESAPI body armor "full fleet," that is, to replace all SAPI body armor with the new ESAPI body armor, and the introduction in 2006 of enhanced side ballistic inserts, known as ESBI, which protect the sides of the soldier's torso, resulted in continued growth in our sales of ceramic body armor, ultimately reaching our peak sales of body armor in 2007. Once "full fleet" was achieved, our sales of body armor began a steady decline which continued through 2010.

In October 2008, we were awarded an Indefinite Delivery/Indefinite Quantity, or ID/IQ, contract by the U.S. Army for the next ballistic threat generation of ceramic body armor plates, called XSAPI, as well as for the current generation ESAPI plates. This five-year contract has a maximum value of $2.37 billion and allows the U.S. Army to order either XSAPI or ESAPI body armor from us.

In March 2011, we announced the receipt of a delivery order for approximately $56.6 million for ESAPI ceramic body armor plates and the receipt of a delivery order for approximately $36.0 million for XSAPI ceramic body armor plates. In July 2011, we announced the receipt of a delivery order for approximately $36.2 million for ESAPI ceramic body armor plates. All three of these delivery orders were issued under the October 2008 ID/IQ contract. Through December 31, 2011, we have received delivery orders under the October 2008 ID/IQ contract totaling $278.4 million. Of this amount, we have shipped $258.3 million of body armor through December 31, 2011 and we expect to ship the balance of approximately $20.1 million in 2012. With less than two years remaining under this ID/IQ contract, the war in Iraq concluded, and the war in Afghanistan winding down, we expect that the total amount of body armor that we ultimately ship under this contract will be substantially less than the maximum amount.

In September 2011, we were awarded a three-year ID/IQ contract for ESAPI ceramic armor plates from Defense Logistics Agency Troop Support group. This purchasing group services the United States Army, Navy, Air Force and Marine Corps. This award was in response to our bid to the Defense Supply Center Philadelphia (DSCP) in response to their requirement for a three-year sustainment order for the replacement of body armor inserts. Simultaneously with the receipt of this award, we received an initial delivery order for $127.3 million for ESAPI ceramic body armor plates with the initial delivery in the first quarter of 2012, continuing through the remainder of 2012 with estimated completion by March 31, 2013. This ID/IQ contract includes options for additional deliveries of up to $127.3 million in each of the second and third years. Initial comments from the contracting officer of the U.S. Military indicate that the 2013 ESAPI order will be similar to the 2012 order, but this is a preliminary estimate with no guarantee.

In October 2011, we announced the receipt of a delivery order for approximately $6.9 million for ceramic body armor plates from the United States Special Operations Command. We expect to ship this order during 2012 and complete the delivery of it during the third quarter of 2012.

For 2012 and for the next several years, we expect that our sales of body armor will continue, but generally at more moderate levels than in the past. We will continue to bid on Foreign Military Sales (FMS) for the first generation of SAPI body armor through our existing ID/IQ contract with Aberdeen Proving Grounds.

Although we believe that demand for ceramic body armor will continue for many years, the quantity and timing of government orders depends on a number of factors outside of our control, such as the amount of U.S. defense budget appropriations, positions and strategies of the current U.S. government, the level of international conflicts and the deployment of armed forces. Moreover, ceramic armor contracts generally are awarded in an open competitive bidding process and may be cancelled by the government at any time without penalty. Therefore, our future level of sales of ceramic body armor will depend on our ability to successfully compete for and retain this business.

The following acquisitions resulted from a strategy to grow and expand our non-defense business through the selective acquisition of companies and product lines closely related to our core competency in advanced

technical ceramics and materials, as well as to expand our defense business with complementary product lines on an opportunistic basis.

We acquired ESK Ceramics in August 2004. Based in Kempten, Germany, ESK Ceramics manufactures industrial technical ceramic powders and advanced technical ceramic products. This acquisition provided us with both a broad line of non-defense products, and it assured us of a supply of boron carbide powder, which serves as a starter ceramic powder in the manufacture of our lightweight ceramic body armor. ESK Ceramics also produces evaporation boats for metallization, functional and frictional coatings utilized in the automotive and textile industries, high performance pump seals, fluid handling, refractory products, ceramic micro-reactors used to process chemicals, ceramic powders used in cosmetics, and ceramic sand filters used in oil and natural gas recovery.

In June 2006, we purchased the assets and technology related to the Boral® line of aluminum metal matrix composites that serve as part of a barrier system for spent fuel storage in the nuclear industry. We moved these assets to our Ceradyne Canada facility in Chicoutimi, Quebec, Canada. This product line is now included in our Boron operating segment.

Minco, Inc., which we acquired in July 2007, is included in our Thermo Materials operating segment. Based in Midway, Tennessee, Minco manufactures fused silica powders for a wide range of industrial applications. The fused silica powder manufactured by Minco is a key raw material that our Thermo Materials division uses to manufacture missile radomes (nose cones) and ceramic crucibles that our customers use for melting silicon in the photovoltaic solar cell manufacturing process. Minco's fused silica powders are also used by its customers for precision investment casting applications.

We acquired EaglePicher Boron, LLC in August 2007. This subsidiary, which we renamed Boron Products, LLC, is included in our Boron operating segment and produces the boron isotope ^{10}B. This isotope is a strong neutron absorber and is used for both nuclear waste containment and nuclear power plant neutron radiation critical control. Boron Products also produces complementary chemical isotopes used in the normal operation and control of nuclear power plants. The boron isotope ^{11}B is used in the semiconductor manufacturing process as an additive to semiconductor grade silicon as a "doping" agent and where ultra-high purity boron is required.

In June 2008, we purchased certain assets and technology related to proprietary technical ceramic bearings used for "downhole" oil drilling and for coal bed methane pumps and steam assisted oil extraction pumps. This technology and product line, which we include in our Advanced Ceramic Operations operating segment, are located in our Lexington, Kentucky, facility. These bearings incorporate ceramic parts supplied by our ESK Ceramics subsidiary.

In August 2008, we acquired SemEquip, Inc., a late-stage startup technology company located in Billerica, Massachusetts. SemEquip develops and markets "cluster molecules" such as $B_{18}H_{22}$ for use in the ion implantation of boron (B) in the manufacture of semiconductors. SemEquip, which we include in our Boron operating segment, owns a portfolio of 37 issued and 22 pending U.S. patents, and corresponding issued and pending patents in several foreign countries.

In June 2009, we acquired substantially all of the business and assets and all technology and intellectual property related to ballistic combat and non-combat helmets of Diaphorm Technologies, LLC, based in Salem, New Hampshire. Based on this technology, we submitted a proposal to the U.S. Marine Corps Systems Command in June 2009 in response to a solicitation for the procurement of Enhanced Combat Helmets (ECH), which are intended to provide substantially increased levels of protection compared to combat helmets now in use. In late July 2009, in response to our proposal, the U.S. Marine Corps System Command awarded us a contract for up to a maximum of 246,840 helmets. After an extended period of testing, we received an order for First Article Test helmets, which we delivered in January and February 2011. Upon additional testing it was determined by the Government that further testing needed to occur due to variations discovered in its test procedures and protocols. Ceradyne received a second order for First Article Test helmets, which we delivered in October 2011. Those helmets are now in the final stages of First Article Testing by the U.S. Government.

Our strategy regarding this acquisition is to combine our successful track record in body armor programs with the proprietary helmet-forming technologies acquired from Diaphorm to create a world class manufacturer of Enhanced Combat Helmets.

We acquired VIOX Corporation on January 3, 2011. Located in Seattle, Washington, VIOX develops, manufactures and markets specialty glass compositions for a wide range of electronic, industrial and health care markets. VIOX is included in our Advanced Ceramic Operations operating segment. VIOX has developed a specialty glass formulation for polycrystalline silicon photovoltaic solar applications. VIOX customers add electrically conducting powdered metals such as silver or aluminum to the VIOX powdered specialty glass. Many of the ultimate solar users of VIOX glass are also customers for Ceradyne's high purity ceramic solar crucibles.

To meet increasingly higher performance standards, advanced technical ceramics have stringent technical manufacturing requirements. We have designed and customized our facilities and capital equipment to enhance our advanced technical ceramic manufacturing processes. We have also implemented lean manufacturing initiatives to lower costs and drive further efficiencies in our manufacturing processes, and have expanded our facilities in China to add manufacturing capacity for the production of ceramic crucibles.

We conduct our operations through four operating segments: our Advanced Ceramic Operations division, our ESK Ceramics subsidiary, our Thermo Materials division, and our Boron segment. Our assets are managed by segment regardless of their physical location and are not reviewed on a geographic basis by our chief operating decision maker. Prior to October 2010, we reported our operations through six operating segments. To more accurately reflect our current operations, executive reporting structure and organization, and internal reporting we modified our segment structure and reporting to reflect that we operate through four operating segments each led by a different senior executive who reports directly to our Chief Executive Officer. The changes made to arrive at the four segments from the six previous segments were that the former Semicon Associates segment is now included in the Advanced Ceramics Operations segment and the former Ceradyne Canada segment is now included in the Boron segment. All of the financial data for 2010 and 2009 have been changed to reflect four segments. For additional financial information concerning our segments, please refer to Note 8 of the Notes to Consolidated Financial Statements that are included in this report.

Advanced Technical Ceramics

Evolving customer requirements in solar cell manufacturing, industrial processing, military systems, oil and natural gas exploration, microwave electronics, automotive/diesel engine products and orthodontics have generated a demand for high performance materials with properties not readily available in metals, plastics or traditional ceramics. The following table compares favorable typical properties of selected advanced technical ceramics with those of other selected materials.

Materials	Melting Point (Degrees Fahrenheit)	Hardness (Vickers Scale)	Chemical Resistance to Acids	Electrical Properties	Density (Grams per Cubic Centimeter)
Advanced technical ceramics	2,500 to 6,900	Up to 3,200	Excellent	From excellent insulators to conductors	2.5 to 4.5
High strength alloy steel	2,500 to 2,700	Up to 900	Fair	Conductors	7.0 to 9.0
High performance plastics	275 to 750	Up to 10	Good to Excellent	Good to excellent insulators	1.0 to 2.0

Ceramics such as earthenware, glass, brick and tile have been made for centuries and are still in common use today. The inertness and lasting qualities of ceramics are illustrated by artifacts uncovered intact in modern times. Almost all traditional ceramics, including those of ancient times, were based on clay. In the last fifty years, significant advances have been made in ceramic technology by applying specialized manufacturing processes to produce synthetic ceramic powders. Developments in aluminum oxide and other oxides resulted in ceramics that were excellent electrical insulators and were capable of withstanding high temperatures. In addition, industry advancements in ceramic material science have led to the development of a class of ceramics that are generally non-oxides, such as carbides, borides and nitrides. These non-oxide ceramics generally have mechanical properties that exceed those of oxide ceramics developed in prior periods. Collectively, these developments resulted in the ability to manufacture ceramics with great strength at elevated temperatures and reduced fragility, historically a primary limitation of ceramics. The products that have emerged from these advances are known as advanced technical (or structural) ceramics.

The properties of advanced technical ceramics present a compelling case for their use in a wide array of modern applications. However, to meet increasingly higher performance standards, advanced technical ceramics

have stringent technical manufacturing requirements. First, manufacturers must start with fine synthetic ceramic powders of very high and consistent quality that are produced using a highly technical and specialized manufacturing process. Few suppliers of these high quality starting powders exist today and not all of these suppliers can consistently produce starting powders of the necessary quality and consistency in the volumes required by ceramic manufacturers. Second, the specialized equipment required to manufacture advanced technical ceramics must often be custom designed and is not readily available, requiring a significant investment in capital equipment and facilities to allow volume production. Manufacturing costs associated with the production of these ceramics are higher than those of the materials they replace. A portion of these costs is related to the need for diamond grinding finished components to exacting tolerances. To accelerate the use of advanced technical ceramics as a direct replacement for metals, plastics or traditional ceramics, these manufacturing costs need to be reduced. Cost reduction efforts include the production of blanks or feed stock to "near net shape" configurations in order to reduce the amount of diamond grinding needed. Manufacturers are also seeking to reduce costs through the use of high volume automated processing and finishing equipment and techniques, and to achieve economies of scale in areas such as powder processing, blank fabrication, firing, finishing and inspection.

Our Solution

We develop, manufacture and market advanced technical ceramic products, ceramic powders and components for defense, industrial, energy, automotive/diesel and commercial applications. The table on the following pages illustrates some of the solutions we have designed to meet market opportunities and demands.

Market Opportunity	Demands of the Market	Our Solution
	Defense	
Lightweight ceramic body armor and boron carbide powders	Due to the proliferation of automatic weapons in tactical operations and terrorist conflicts, it has become necessary for vests or other armor to stop machine gun bullets while being light enough in weight to allow freedom of movement without undue fatigue.	We have developed lightweight bullet resistant ceramic body armor solutions, including SAPI (small arms protective inserts), ESAPI (enhanced small arms protective inserts), ESBI (enhanced side ballistic inserts) and other systems. These products generally consist of hot pressed Ceralloy® 546 (boron carbide) or hot pressed Ceralloy® 146 (silicon carbide) and other ceramic coupled with backings such as Dyneema®, Spectra Shield® or Kevlar® purchased from third parties. Our subsidiary, ESK Ceramics, is a major manufacturer of boron carbide powders, which are used by us and our competitors to manufacture lightweight ceramic body armor.
Lightweight ceramic armor for military ground-based vehicles, boats and aircraft	Military ground-based vehicles, boats and aircraft require protection against automatic weapons. Weight, cost and vehicle compatibility are critical technical parameters.	We have developed a series of lightweight, cost effective ceramic armor systems and attachment mechanisms that have multi-hit protection at various threat levels and can be added to an existing vehicle or designed into new vehicles, boats and aircraft.
Missile radomes (nose cones)	Defensive tactical missile systems such as the PAC-3 (Patriot Advanced Capability) are designed to fly at extremely high velocities, survive tight turning radii and operate in severe weather conditions. These operating conditions preclude the use of conventional polymer materials for radomes.	We have developed advanced technical ceramic radomes made of fused silica ceramics which meet certain specifications of these tactical defensive missile systems, and have developed a modified silicon nitride radomes for more demanding requirements. We have also established a precision diamond grinding capability to finish these radomes.

Market Opportunity	Demands of the Market	Our Solution
Lightweight ballistic rated helmets that provide increased protection for our troops.	In order to meet survivability goals without affecting the soldier's functionality, improvements in head gear are needed for soldiers. Unfortunately, combat helmets have only seen small incremental improvements during the last twenty years. The ballistic material, generally thermo-set Aramid based, used in these legacy helmets have remained very similar and have reached their maximum performance.	We are manufacturing and demonstrating the new ECH (Enhanced Combat Helmet) that offers over a 35% improvement against fragmentation threats for the U.S. Marines and Army. This is accomplished by utilizing new thermoplastic UHMWPE (Ultra High Molecule Weight Poly Ethylene) materials recently developed by both DSM and Honeywell which offer improved ballistic performance at lighter weights vs. thermo-set Aramids. Our proprietary Seamless Ballistic™ processing technique enhances the performance of the ballistic material while cost effectively manufacturing it to the required protective helmet shape and meeting other legacy specifications of the U.S. military for head gear protection.
	Industrial	
Advanced ceramic structural parts	Applications such as high performance pump seals, blast nozzles, chemical processing, and pulp and paper manufacturing, require components with corrosion and wear resistant properties, mechanical strength, hardness, favorable friction properties and the ability to withstand extreme temperature fluctuations.	We have developed products for each of these applications which have excellent wear resistant properties, lightness, hardness and the ability to withstand extremely high temperatures. We manufacture these products using primarily our EKasic® silicon carbide, silicon nitride and boron carbide ceramic.

Market Opportunity	Demands of the Market	Our Solution
Boron compounds and metallurgy	Increasing productivity requirements in primary industries are met with boron nitride powders, which are used as high temperature lubricants and release agents. As filler material in polymers and silicones, boron nitride is used for heat conducting and insulating films in the electronic industry. Aluminum and steel foundries increasingly require consumables with longer lifetimes to improve their overall efficiencies.	In the aluminum extrusion industry, boron nitride powder, spray or suspension is used as a release agent to keep the hot metal away from the extrusion die. In furnace and high temperature applications it is used as an insulation sleeve or support for graphite heaters. Boron nitride's largely inert behavior towards molten metals makes it an ideal material for applications in direct contact with such materials. We supply break rings for horizontal continuous casting and side-dams for thin strip casting. We also supply high density and high purity silicon nitride products for aluminum foundries worldwide.
Evaporation boats	Packaging materials used for snack and other food products are often lined with an aluminum coating to preserve shelf life. The coating, or metallization, process requires a tool, called an evaporation boat, which can withstand the high temperature and corrosiveness of molten aluminum.	We have developed evaporation boats, typically made using boron nitride/ titanium diboride, that can withstand direct contact with highly corrosive liquids, such as melted aluminum. These evaporation boats are used in the metallization of various surfaces, including paper, plastic and glass.
Industrial equipment requiring critical protection against severe wear or corrosion	Failure of industrial equipment is often caused by premature wearing out of surfaces due to abrasive action. An example is paper making equipment where the pulp slurry runs at 5,000 feet per minute.	Sintered reaction bonded silicon nitride (SRBSN) industrial wear parts are designed to replace hard metal or oxide ceramic wear surfaces, resulting in greater productivity, quality and longer uptime. Our proprietary advanced technical ceramic side dams are used in the production of steel in the continuous casting process.
Materials for precision investment casting	The precision metal casting market is demanding lower cost, thinner molds and faster mold build times.	We have developed fused silica refractory blends that enable the production of highly efficient, single-use mold systems for precision investment casting (PIC).

Market Opportunity	Demands of the Market	Our Solution
Ceramic bearings, bushings and seals for fluid handling	In order to make an effective transition in fluid handling pumps from the pump itself to the exterior, it is necessary to have an interface with excellent friction and erosion and corrosion properties.	We have developed a number of primarily silicon carbide compositions and shapes for a wide variety of precision components for use in contact with rotational elements in fluid handling pumps. These are produced primarily by our ESK Ceramics subsidiary in Kempten, Germany.
In converting silicon wafers to semiconductors, it is necessary to introduce atoms of the element boron into the silicon matrix	The market has developed and generally utilizes technology known as ion implantation. Starting materials used in ion implantation such as BF_3 have been generally utilized for many years. However, as the requirements for higher current semiconductor chips increase and the number of chips per unit area on the silicon wafer increases, there is a need for ion implantation which improves the manufacturing throughput of high boron content in semiconductor chips.	Our acquisition of SemEquip, Inc. in August 2008 brought to Ceradyne the intellectual property for the "cluster" molecule $B_{18}H_{22}$ as well as other cluster molecules. These materials are designed to increase the productivity of the ion implantation technology in part due to the large numbers of atoms such as boron.
	Energy	
Photovoltaic (solar cell) manufacturing requiring crucibles for melting silicon	In order to produce cost effective solar cell components, it is necessary to melt silicon in a crucible or vessel that will be able to contain the molten silicon yet not allow unwanted chemicals to contaminate the melt.	We have developed a high purity fused silica ceramic crucible (receptacle) which is being used by many photovoltaic cell manufacturers in their silicon melting operation in order to produce polycrystalline silicon. We also manufacture the fused silica powders that are a key material for the production of our ceramic crucibles.
Specially designed heavy duty sand screens	It is necessary to filter sand grains, small particles and proppants during oil and natural gas drilling operations.	We developed a series of proprietary designs for heavy duty ceramic sand screens which increase the productivity of an oil or natural gas drill site by reducing premature failures during operations.

Market Opportunity	Demands of the Market	Our Solution
Specially designed heavy duty bearings	It is necessary to maintain the position and integrity of heavy duty rotational shafts in downhole oil drilling and/or water pumps in severe environments.	In June 2008, we acquired a series of proprietary designs for heavy duty "stacked bearings" and bushings which utilize our advanced technical ceramic sliding surface interface.
Specialty glass compounds for photovoltaic solar applications.	Solar Cell surfaces require metallization coatings which contain glass compounds to improve the efficiency of free electron transport.	We have designed a series of proprietary glass compounds for solar cell surface paste coating used by photovoltaic cell manufacturers to improve the efficiency of their cells.
Radioactive waste management and nuclear chemistry products	Increasing stockpiles of radioactive nuclear waste require materials that can be used to safely transport and store items such as spent nuclear fuel rods. New and existing nuclear power plants also require materials capable of containing neutron radiation during day-to-day operations.	The boron atom in boron carbide powder is able to capture neutrons, thus reducing the radioactive risk associated with transportation and storage of nuclear waste. Our Boral® product line, which consists of a hot-rolled sheet containing a core of uniformly distributed boron carbide and aluminum particles that are enclosed within layers of pure aluminum, forms a solid and effective barrier for the storage of nuclear waste. We also manufacture the boron isotope ^{10}B in its pure form. This isotope is a strong neutron absorber and is used for both nuclear waste containment and nuclear power plant neutron radiation critical control. We also produce complementary chemical isotopes used in the normal operation and control of nuclear power plants.
	Automotive/Diesel	
Heavy-duty diesel truck engines	In order to achieve diesel engine life of 500,000 miles or more without major maintenance, and to meet current environmental requirements, it may be necessary to replace metal engine components with longer lasting, lighter weight, lower friction ceramic parts at acceptable unit costs.	Our SRBSN ceramic cam rollers replace conventional steel cam rollers in order to allow diesel engines to run at higher internal pressures and thus meet environmental and other requirements.

Market Opportunity	Demands of the Market	Our Solution
Wear-resistant functional and frictional coatings, surface engineered components	Engines generate extreme vibration during operation that can cause components joined by nuts and bolts to loosen. Traditionally, locknut washers have been used for this application.	Our wear-resistant functional and frictional coatings utilizing entrapped hard particles, primarily diamonds, are applied to shims in lieu of using locknut washers. These coatings increase the static friction coefficient and minimize the effects of vibration and allow more economic and efficient designs of engines, particularly in the auto industry.
	Commercial	
Orthodontic brackets	Traditional stainless steel orthodontic brackets are often considered unsightly. Substitute clear plastic materials can be weak and may stain. Some orthodontic patients prefer aesthetically pleasing brackets which can be affixed to each tooth to support the arch wire.	Our translucent ceramic orthodontic brackets are inert, reveal the color of the patient's teeth, and allow the orthodontist to correct the patient's bite. Our marketing partner, 3M Unitek, sells this translucent ceramic bracket under the brand name Clarity™.
BORONEIGE® boron nitride powder	The cosmetic industry utilizes very fine, white, silky, smooth powders as a base for a wide range of products including lipstick, eye shadow, facial creams, rouge and other related products. There is an increasing demand for these base materials which can make up to forty percent of the end product. Generally, the requirements include white color, controlled chemistry and surface area.	Boron nitride, which is made by our ESK Ceramics subsidiary, is a well-controlled micro structure white powder. The use of our unique boron nitride called BORONEIGE® is anticipated to grow as the availability of the base powders and the use of various cosmetic products increase.
Specialty glass compounds for health care applications	Bioactive glass compounds in orthopedic, wound care and various oral applications greatly enhance the body's natural growth and healing processes.	We produce bioactive glass compounds used for bone growth, tooth strengthening and wound care.

Our Competitive Strengths

We believe that several aspects of our company provide us a competitive advantage in the markets we serve, including the following:

Broad Technical Expertise in Ceramic Material Science. Since the founding of our company in 1967, our core business has been researching, developing, designing, manufacturing and marketing advanced technical ceramic products. Specifically, our expertise is in a class of ceramics known as non-oxide structural ceramics. Many of our staff are technically trained, including 148 employees with degrees in ceramic engineering or related sciences, of which 32 have Ph.D. degrees. We have continuously sought to develop and manufacture innovative ceramic products not only for the markets that we currently serve but to identify and apply our

experience and capabilities to emerging markets and applications. For example, our expertise allows us to develop ceramic armor products expeditiously and manufacture them on a significant scale.

Proprietary Equipment and Manufacturing Processes. The specialized equipment required to manufacture ceramic powders and advanced technical ceramics must often be custom designed and is not readily available. Over the past several decades, we have designed and constructed a substantial array of highly specialized and customized equipment and manufacturing processes, including our hot press lines and furnaces. We believe our custom equipment and manufacturing processes allow us to meet the high volume demands of our customers in the markets that we serve.

Vertically Integrated Manufacturer. We are a vertically integrated manufacturer of lightweight ceramic body armor and other ceramic products such as crucibles for photovoltaic solar cell manufacturing. Our ESK Ceramics subsidiary manufactures boron carbide powder — the key raw material used in the production of our body armor. ESK Ceramics has been a supplier of boron carbide powder to us for over 30 years. We form the boron carbide powder into ceramic armor plates using our own furnaces and hot presses. We then apply backing materials purchased from third parties to the plates to complete a ceramic body armor system ready to ship to our customers. Owning a source of our principal raw material, together with our manufacturing capacity at our Lexington, Kentucky plant, should allow us to fulfill current and anticipated demand for our ceramic body armor, while enabling us to manage our costs, product yields and high quality standards. Our acquisition of Minco, Inc. in 2007 provided Ceradyne with its own source of fused silica ceramic powders, which are the primary raw material in the manufacturing of crucibles (receptacles) used in the manufacturing of photovoltaic solar cells. The crucibles are used as the container for melting large (450 kilogram) ingots of silicon. Recently, we internally developed a proprietary hard ceramic coating designed to act as a barrier between the molten silicon and the Ceradyne crucible.

Strong Position in Multiple Markets. We maintain a strong position in many of the markets that we serve. We believe that we are the leading supplier of lightweight ceramic personnel armor products to the U.S. government based on the history of orders that the U.S. government has issued. We further believe that we supply a significant portion of products in many of the markets we serve including: boron carbide powders; translucent ceramic orthodontic brackets; ceramic missile radomes, commonly known as nose cones for the PAC-3 missile program; sintered reaction bonded silicon nitride, which we call SRBSN, for industrial and automotive applications; evaporation boats used to apply the metallic coating to packaging materials; and wear resistant functional and frictional coatings for the automotive industry. We believe that our leadership position in ceramic body armor and in many of the other markets that we serve provides us with a key advantage in securing new and continuing business. Additionally, we believe that our EKasic® (silicon carbide) product line of industrial pump seals and bearings allows us to be a leader in fluid handling products.

Key Customer Relationships. We have longstanding relationships with many of our significant customers in the defense, industrial, energy, automotive/diesel and commercial markets that we serve, which have enhanced our ability to obtain business over time. For example, for more than 20 years we have sold our advanced technical ceramic products to various agencies of the U.S. government. Since 2003, we have derived a significant portion of our revenues from the Army, Marines, Air Force and other branches of the U.S. military. We possess significant knowledge of the applicable purchasing requirements and product specifications within each of the branches of the U.S. military that we serve, and we believe that we have established an excellent reputation with key individuals within each branch.

Experienced Management Team and Entrepreneurial Culture. Our success is attributable in large part to the extensive knowledge and experience of our management team and key personnel. Our executive management team has substantial experience in advanced technical ceramic materials science and our Chief Executive Officer and our President of North American Operations each has more than 30 years of experience in the ceramics industry. Our management team has demonstrated its ability to identify, execute and integrate strategic acquisitions. Moreover, we believe that the entrepreneurial culture that has been fostered at Ceradyne since 1967 enhances our ability to develop innovative products for the markets that we serve.

Our Business Strategy

Our goal is to create value for our stockholders by profitably developing, manufacturing and selling advanced technical ceramic components to customers in existing and new markets where there is a need for new

materials that will increase the efficiency, productivity and life of our customers' end products. Key elements of our strategy for achieving this goal include:

Capitalizing on Opportunities in the Defense Market. The current geopolitical climate, terrorist threats and heightened international conflicts such as those in Iraq and Afghanistan, have been the primary factors driving demand for our defense products. Our defense marketing and sales efforts emphasize sales of ceramic body armor for military personnel to the U.S. government and, with the authorization of the U.S. government, to foreign allies of the United States. We also intend to expand our lightweight ceramic armor products to address additional body armor applications, such as enhanced combat helmets as well as new defense applications in vehicles, boats and aircraft.

Continuing to Increase our Non-Defense Revenue Base. We plan to continue to grow our non-defense customer base, primarily through promoting existing products to new customers, developing new products for new and existing customers and through strategic acquisitions. We focus on educating our current and potential customers on the advantages of our advanced technical ceramics compared to alternative solutions, and assisting them in developing advanced technical ceramic components for existing or new products and applications. Our technical and marketing staff educates our customers through direct sales visits, by preparing technical papers and product literature, and by participating in technical conferences, trade shows and exhibitions. Based on these efforts, we believe there is an opportunity to further expand the use of advanced technical ceramic products. For example, we are working with companies in the aluminum industry on utilizing ceramic materials in their next generation smelting production processes that have the potential to reduce the cost of producing aluminum. We also intend to further increase our customer, product and market base by converting certain advanced technical ceramics, originally developed for defense applications, to industrial and commercial applications. In addition to organically growing our product portfolio and market reach, we plan to continue to identify strategic acquisition opportunities that broaden our product lines within industrial and commercial markets. For example, a key strategic reason for our acquisitions of ESK Ceramics, the Boral® product line, Minco, Inc., EaglePicher Boron, LLC. SemEquip, Inc., and VIOX Corporation, as well as the expansion of our operations into Canada and China, were to further increase our non-defense revenue base.

Our acquisition of SemEquip, Inc. in August 2008 is intended to allow us to broaden our participation and position us to participate in future semiconductor markets. SemEquip's development of cluster molecules such as $B_{18}H_{22}$ may be a key in the manufacture of next generation high current semiconductor devices. Our acquisition in June 2008 of certain assets and intellectual property related to heavy duty "stacked bearings" and bushings provides Ceradyne with a new product line of relatively large, rugged ceramic bearings and bushings. These components will be used in severe environments such as "downhole" oil drilling and submersible fluid handling pumps. Our acquisition of VIOX Corporation in January 2011 is intended to broaden our product offerings in the solar energy market. Manufacturers of polycrystalline silicon photovoltaic solar cells use VIOX' specialty glass formulation to increase the energy efficiency of the solar wafer.

Identifying New Products and Markets. We intend to identify new products and markets to meet evolving customer requirements for high performance materials. Due to the special properties of the advanced technical ceramics we produce, we believe there are numerous applications and markets for such materials. Our research and development efforts have identified several new applications for advanced technical ceramics in both existing markets, such as the defense industry, and new markets, including the energy, metals production and chemical industries. Such new applications include lightweight ceramic armor for military vehicles, boats and aircraft; ceramic components that have the potential to facilitate extraction of oil from oil sands on a cost-effective basis; ceramic materials that have the potential to reduce significantly the cost of producing molten aluminum; chemical micro reactors, heat exchangers and hydraulic trim valves produced with our proprietary technology that have the potential to provide an economical substitute for steel in extreme environments; storage containers made with our boron carbide powder that have the potential to be used for long-term containment of nuclear waste from nuclear power plants; and small complicated ceramic components made using our injection molding technology that have the potential to be used as medical implants. We also expect to continue to benefit from the addition of ESK Ceramics' expertise in ceramic powders and products, which has expanded the scope and scale of our product development efforts.

Investing to Improve our Gross Margins and Manufacturing Efficiencies. We focus on cost containment, productivity enhancements and manufacturing efficiencies as a means to drive earnings growth. We have implemented lean manufacturing initiatives, such as Demand Flow® Technology and 5-S plus Safety in order to reduce inventories, scrap and queue times and to increase productivity. Additionally, we continue to evaluate opportunities to employ automation and dedicated work cells to expand our in-line production efficiency. We also continue to seek ways to reduce our manufacturing costs by evaluating opportunities to relocate or expand manufacturing operations within the United States as well as internationally. For example, in 2004, we began expanding our high energy-utilization manufacturing processes at our new Lexington, Kentucky facility, where the cost of electricity, which comprises a significant portion of our cost of product sales, is substantially lower than in California. We plan to evaluate strategic manufacturing relationships in international markets, including joint ventures or acquisitions, particularly in low cost manufacturing areas such as China. We completed the construction in June 2007, of a new approximately 98,000 square foot facility in Tianjin, China for the manufacture of ceramic crucibles which are used for melting silicon in the photovoltaic solar cell manufacturing process. We increased this capacity by constructing a second approximately 218,000 square foot facility in Tianjin, China for the manufacture of ceramic crucibles, which was completed in January 2011. We also plan to develop strategic relationships with other manufacturing companies or key customers whose expertise or financial resources can assist us in accomplishing our objectives. We initiated a major improvement to our data and information technology systems with the implementation of SAP enterprise software applications. It is our intention to integrate the use of SAP software throughout our Company with a target completion date of December 2012.

Market Applications and Products

Our products are sold into five principal markets or sectors of the economy: defense, industrial, energy, automotive/diesel and commercial. The following is a description of our principal products by market application:

Defense

Lightweight Ceramic Armor. We have developed and currently manufacture lightweight ceramic armor capable of protecting against threats as great as 12.7 millimeter armor piercing machine gun bullets. Compared to traditional steel armor plates, our ceramic armor systems offer weight savings as great as 40%. Using hot pressed Ceralloy® ceramic, our armor plates are laminated with either Spectra Shield®, Dyneema®, Kevlar™, fiberglass, custom hybrid laminates or aluminum, and formed into a wide variety of shapes, structures and components. Initially, our manufactured ceramic armor was used principally for military helicopter crew seats and airframe panels. We are now also a major supplier of lightweight ceramic body armor for the U.S. military, and lightweight ceramic armor for military helicopters. We are also a supplier of armor systems for military vehicles.

ECH Helmets. We manufacture a new enhanced combat helmet (ECH) that offers over 35% improvement compared to existing helmets. By utilizing new thermoplastic UHMWPE (Ultra High Molecule Weight Poly Ethylene) materials with our proprietary Seamless Ballistic™ processing technique we offer a helmet with much improved ballistic performance at lighter weights.

Boron Carbide Powders. We manufacture boron carbide powder, which is the principal raw material used in the production of our lightweight ceramic body armor. Our ESK Ceramics subsidiary is one of the world's leading manufacturers of this material. ESK Ceramics has been a supplier of boron carbide powder to us for over 30 years and periodically supplies our ceramic body armor competitors.

Missile Radomes (Nose Cones). We manufacture conical shaped, precision machined ceramic radomes which are designed for the front end of defensive missiles. These radomes are used where missile velocities are high and operating environments are severe, and the thermal shock and erosion resistance, high strength and microwave transparency properties of advanced technical ceramics are required. Our ceramic radomes are used on the PAC-3 (Patriot Advanced Capability) missile and various future missile system prototypes.

Industrial

Fluid Handling/Wear Parts. We supply products made primarily of our EKasic® silicon carbide, silicon nitride and boron carbide, which have excellent wear resistant properties, lightness, hardness, and can withstand

extremely high temperatures. Products furnished are used in high performance pump seals, bearings for fluid handling, blast nozzles and chemical processing.

Boron Compounds and Metallurgy Ceramics. Boron nitride powders have excellent release properties and are highly resistant to wear and corrosion. These powders are used in the forming and bending of glass, as an additive in refractory materials, and as a lubricant for aluminum extrusion. Our silicon nitride products have excellent thermal shock resistance and temperature stability up to 2,200° Fahrenheit. These products are used for transportation of liquid aluminum, for use in low and high pressure casting and in liquid aluminum processes.

Evaporation Boats. Our evaporation boats are used in the metallization of various surfaces such as plastic, paper or glass. Metallization is a process based on the deposition of a metallic vapor under vacuum to coat a substrate surface with a thin layer of aluminum, zinc, copper or silver. The preferred metal for the metallizing process is aluminum. Evaporation boats have direct contact with highly corrosive molten metal alloys and are made out of a boron nitride/titanium diboride composite material. These products provide packaging manufacturers the ability to apply vaporized aluminum to packaging material that as a finished product helps to preserve and maintain the shelf life of food products.

Industrial Wear Components. Our industrial wear components are made primarily of our Ceralloy® 147 sintered reaction bonded silicon nitride (SRBSN). These SRBSN ceramic components are generally incorporated in high wear areas of industrial machinery where severe abrasive conditions would otherwise wear out vital components. Our wear resistant parts are used to replace parts made of materials such as tungsten carbide or ceramics such as aluminum oxide. Applications include paper making equipment, abrasive blasting nozzles, metal cutting tool inserts as well as custom products.

Ceramic-Impregnated Dispenser Cathodes. We manufacture ceramic-impregnated dispenser cathodes for microwave tubes used in radar, satellite communications, electronic countermeasures and other applications. Dispenser cathodes, when heated, provide a stream of electrons which are magnetically focused into an electron beam. Microwave dispenser cathodes are primarily composed of a porous tungsten matrix impregnated with ceramic oxide compounds. The use of ceramic-impregnated cathodes reduces the amount of energy necessary to create a high level of electron emissions. Our ceramic-impregnated cathodes are also used in ion lasers and cathode ray tubes.

Tempered Glass Furnace Components and Metallurgical and Industrial Tooling. Fused silica ceramic does not, to any material extent, expand when heated or contract when cooled. This material is therefore used for industrial tooling components and molds where complicated shapes and dimensions are maintained over a wide range of temperatures. Such applications include forming and shaping titanium metal used in aircraft manufacture. Other applications take advantage of fused silica's excellent thermal shock resistance and inertness when in contact with glass. We have the capability to make fused silica ceramic rollers up to 14 feet in length used in glass tempering furnaces.

Precision Ceramics. We manufacture a variety of hot pressed Ceralloy® ceramic compositions that are precision diamond ground to exacting tolerances, primarily for microwave tube applications. The interior cavities of microwave tubes often require microwave absorbing ceramic components capable of operating at elevated temperatures and in high vacuums.

Boron Isotopes for Semiconductors. We produce the boron isotope ^{11}B, which is used in the semiconductor manufacturing process as an additive to semiconductor grade silicon as a "doping" agent and where ultra-high purity boron is required. With our acquisition of SemEquip, Inc. in August 2008, we now produce the cluster boron molecule $B_{18}H_{22}$ for next generation semiconductor devices.

Precision Investment Casting Products. We manufacture fused silica grains and powder products that are used in precision investment casting (PIC), a highly sophisticated manufacturing process used to make a wide range of precision dimensioned castings for a broad base of different industries. The process requires low expansion materials for one time use in the casting process. Our products include proprietary blends that reduce our customers' cast and cycle time.

Energy

Fused Silica Ceramic Crucibles. We manufacture fused silica ceramic crucibles, or receptacles, which are used in the fabrication of polycrystalline silicon for photovoltaic solar cells that convert sunlight into electricity.

These crucibles are designed to withstand high temperatures and thermal shock when in contact with molten silicon, without contaminating the melt. In 2008, we introduced a proprietary hard ceramic coating to line the crucible's interior.

Boron Isotopes and Molecules for the Nuclear Industry. We enrich and manufacture the boron isotope ^{10}B which is a material that is used by the nuclear power industry. The ^{10}B isotope is critical to the safe operations of the U.S. nuclear power industry, waste storage, and the stability and safe-keeping of nuclear weapons.

Radioactive Waste Management. Boron carbide powder has a high cross-section for capturing neutrons, making it an ideal material for the management of radioactive nuclear waste from nuclear power plants. Typical applications include use in neutron absorbing parts, such as control rods in nuclear power plants, and nuclear shielding in the storage and transportation of nuclear waste materials. Our Boral® product line, which consists of a rolled sheet containing a core of uniformly distributed boron carbide and aluminum particles that is enclosed within layers of pure aluminum, forms a solid and effective barrier for the storage of nuclear waste. We also produce the boron isotope ^{10}B. This isotope is a strong neutron absorber and is used for both nuclear waste containment and nuclear power plant neutron radiation critical control.

Sand Screens. We have developed and manufacture ceramic sand screens for heavy duty rugged ceramic screen for downhole oil and gas drilling. The unique designs are intended to extend the life of sand screen equipment by reducing premature failures during operations. The sand screens filter out sand, small particles and proppants during drilling operations.

Heavy Duty Bearings. In June 2008, we acquired the proprietary rights for a series of heavy duty rugged ceramic bearing components for downhole oil drilling and various water pump applications. The unique designs are intended to extend the life of drilling equipment by reducing premature failures during operations.

Specialty Glass Compounds. We have designed a series of proprietary glass compounds for solar cell surface paste coating used by photovoltaic cell manufacturers to improve the efficiency of their cells.

Automotive/Diesel

Wear-Resistant Functional and Frictional Coatings. We manufacture our EKagrip® Foils for wear-resistant functional and frictional coatings for fastener applications utilizing entrapped hard particles, primarily diamonds. This product line increases the static friction coefficient, minimizes the effects of vibration and allows more economic and efficient designs of engines, particularly in the auto industry.

Diesel Engine Components. We have been manufacturing ceramic cam rollers for heavy-duty diesel engines since 1999, and now have production contracts to supply cam rollers to several major engine companies. We expect that sales of these cam rollers will begin to decline in 2013 when new U.S. environmental regulations take effect for off-highway applications. We also supply fuel system manufacturers with components for diesel fuel pumps. In addition, we are engaged in development projects with a number of other diesel engine and fuel pump systems manufacturers worldwide for various ceramic components.

Commercial

Ceramic Orthodontic Brackets. In orthodontics, to correct a patient's tooth alignment, usually a small stainless steel bracket is attached to each tooth. These brackets provide a guide to the archwire, which is the wire that sets into each bracket. The cosmetic appearance of this metal is often considered unattractive. Together with 3M Unitek, we have developed a ceramic bracket which 3M Unitek markets to orthodontists under the brand names Clarity™ and Clarity SL™. The translucency of this ceramic bracket, together with the classic ceramic properties of hardness, chemical inertness and imperviousness, result in a cosmetic substitute for traditional stainless steel brackets. These brackets reveal the natural color of the patient's teeth while performing the structural functions of traditional stainless steel brackets.

BORONEIGE® Boron Nitride Powder. We manufacture and market to the cosmetic industry a very fine, white, silky, smooth powder called *BORONEIGE* which is used as a base for a wide range of products including lipstick, eye shadow, facial creams, rouge and other related products.

Specialty glass compounds. We produce bioactive glass compounds used for bone growth, tooth strengthening and wound care.

Operating Segments and Facilities

We serve our markets through four segments with manufacturing facilities in several locations across the United States, one in Canada, two in China, one in Europe, and one in India. The following table includes a summary of our facilities and products comprising our four operating segments. For financial information concerning our segments, please refer to Note 8 of the Notes to Consolidated Financial Statements.

Operating Segment and Facility Location	Products
Ceradyne Advanced Ceramic Operations Costa Mesa and Irvine, California[1] Approximately 216,000 square feet Lexington, Kentucky[2] Approximately 150,000 square feet Wixom, Michigan[3] Approximately 29,000 square feet Salem, New Hampshire[4] Approximately 16,000 square feet Mountain Green, Utah[5] Approximately 18,000 square feet Bangalore, India[6] Approximately 21,000 square feet Seattle, Washington[7] Approximately 40,000 square feet	*Defense Applications:* • Lightweight ceramic armor • Enhanced combat helmets *Industrial Applications:* • Ceralloy® 147 SRBSN wear parts • Precision ceramics • Ceramic-impregnated dispenser cathodes for microwave tubes, lasers and cathode ray tubes *Energy Applications* • Ceramic bearings and bushings • Specialty glass compounds for photovoltaic solar applications *Automotive/Diesel Applications:* • Ceralloy® 147 SRBSN automotive/diesel engine parts *Commercial Applications:* • Ceramic orthodontic brackets • Components for medical devices • Specialty glass compounds for health care products
ESK Ceramics Kempten, Germany[8] Approximately 599,000 square feet	*Defense Applications:* • Boron carbide powders for body armor *Industrial Applications:* • Ceramic powders: boron carbide, boron nitride, titanium diboride, calcium hexaboride and zirconium diboride • Silicon carbide parts • Evaporation boats for the packaging industry • High performance fluid handling pump seals *Automotive/Diesel Applications:* • EKagrip® functional and frictional coatings *Commercial Applications:* • BORONEIGE® boron nitride powder for cosmetics *Energy Applications:* • PetroCeram® sand filters • TETRABOR® nuclear powders

Operating Segment and Facility Location	Products
Ceradyne Thermo Materials	*Defense Applications:* • Missile radomes (nose cones) • High purity fused silica used to manufacture missile radomes (nose cones)
Scottdale and Clarkston, Georgia[9] Approximately 225,000 square feet	
Tianjin, China[10] Approximately 316,000 square feet	*Industrial Applications:* • Glass tempering rolls • Metallurgical tooling • Castable and other fused silica products • Turbine components used in aerospace applications
Midway, Tennessee[11] Approximately 105,000 square feet	
	Energy Applications • Crucibles for photovoltaic solar cell applications • High purity fused silica used to manufacture crucibles
Boron	*Energy Applications:* • Nuclear chemistry products for use in pressurized water reactors and boiling water reactors • Radioactive containment for use in spent fuel transport and storage • Burnable poisons for coating of uranium fuel pellets • Boral® structural neutron absorbing materials • Metal matrix composite structures
Quapaw, Oklahoma[12] Approximately 128,000 square feet	
Chicoutimi, Quebec, Canada[13] Approximately 86,000 square feet	*Industrial Applications:* • Cluster molecules such as $B_{18}H_{22}$ for ion implantation for next generation P-dopants • Advanced ion source materials for the manufacture of logic and memory chips

(1) We have leases on our facilities in Costa Mesa, California, aggregating approximately 99,000 square feet, all of which expire in October 2012, with an option to renew it for one additional year. We own our 40,000 square foot facility in Irvine, California. Also in Irvine, California, we lease a 76,000 square foot facility under a lease that expires in October 2012, with an option to renew it for one additional year.

(2) We own two facilities, containing 35,000 square feet and 115,000 square feet, in Lexington, Kentucky.

(3) We have a lease on our Wixom, Michigan facility which expires in April 2014.

(4) We have a lease on our Salem, New Hampshire facility which expires in March 2015.

(5) We have a lease on our Mountain Green, Utah facility which expires in March 2012. We do not intend to renew it. These operations will be transferred to our Salem, New Hampshire facility.

(6) We have a lease on our Bangalore, India facility which expires in June 2014.

(7) We have a lease on our Seattle, Washington facility which expires in December 2013.

(8) We own our facility in Kempten, Germany, as well as the 28-acre property on which our facility is located.

(9) We own an 85,000 square foot facility in Scottdale, Georgia, as well as the five-acre property on which our facility is located. We lease facilities totaling approximately 140,000 square feet in Clarkston, Georgia. The leases on two of these facilities expire in June 2013. We are currently in negotiations to extend the leases on the other facilities.

(10) We own two facilities in Tianjin, China, one containing approximately 98,000 square feet, as well as the four-acre property on which our facility is located, and the second containing approximately 218,000 square feet, as well as the thirteen-acre property on which this facility is located.

(11) We own our facility in Midway, Tennessee as well as the 40-acre property on which our facility is located.

(12) We own our facility in Quapaw, Oklahoma as well as the 155-acre property on which our facility is located.

(13) We own our facility in Chicoutimi, Quebec, Canada, as well as the seven-acre property on which our facility is located.

Sales, Marketing and Customers

Each of our four operating segments maintains a separate sales and marketing force promoting its individual products. As of December 31, 2011 we had 103 employees directly involved in sales and marketing, including 52 sales and marketing personnel located outside the United States. We also have agreements with manufacturers' representatives in foreign countries who are compensated as a percent of sales in their territory. We distribute our principal products directly to our customers using our own sales force and independent manufacturers' representatives. Sales to customers located outside the United States represented approximately 45.4% of our net sales in 2011, 51.7% in 2010, and 33.9% in 2009.

We continue to explore various domestic and international relationships to increase our sales and market penetration. We seek long-term relationships such as multi-year agreements or exclusive relationships with our customers to achieve a more consistent and predictable flow of orders and shipments.

We sell products and components to the U.S. government and government agencies, as well as to government contractors, original equipment manufacturers and to end users. The U.S. government and government agencies collectively represented approximately 37.6% of our net sales in 2011, 17.5% in 2010 and 40.8% in 2009. As of December 31, 2011 and 2010, there were no other external customers that accounted for 10% or more of our revenue.

We sell our translucent ceramic orthodontic brackets, commonly known as braces, only to 3M Unitek. Sales to 3M Unitek represented approximately 1.6% of our net sales in 2011, 2.1% in 2010 and 2.4% in 2009. In December 2005, we entered into a new supply agreement with 3M Unitek that expires in December 2013. This new agreement replaced our original, March 1986 joint development and supply agreement with 3M Unitek. 3M Unitek is a major manufacturer of stainless steel orthodontic brackets and, early in our relationship, shared with us the functional specifications and properties which ceramic brackets would be required to satisfy. With this information and our experience with translucent ceramics in defense applications, we developed, and in 1987 began manufacturing, translucent ceramic brackets. Under the original supply agreement, 3M Unitek was required to purchase ceramic orthodontic brackets exclusively from Ceradyne until September 2007. Under the terms of the new agreement, 3M Unitek will continue to purchase 100% of their Clarity and Transcend brand ceramic orthodontic product lines exclusively from us for as long as 3M Unitek continues to sell such products. The new agreement further stipulates that 3M Unitek must purchase from Ceradyne at least 50% of the ceramic orthodontic brackets 3M Unitek requires for next generation designs, which it introduced in 2007.

Manufacturing Processes

We employ a number of advanced technical ceramic manufacturing processes that enable us to deliver high quality products designed to meet specific customer requirements. The processes used to manufacture our principal products are described below.

Hot Pressing. Our hot pressing process is generally used to fabricate ceramic shapes for lightweight ceramic armor. We have designed and constructed induction heated furnaces capable of operating at temperatures exceeding 4,000°F in inert atmospheres at pressures up to 5,000 pounds per square inch. With this equipment, we can fabricate parts more than 26 inches in diameter, which is considered large for advanced technical ceramics. Using multiple cavity dies and special tooling, we can produce a number of parts in one furnace during a single heating and pressing cycle.

Our raw materials are fine powders procured from our ESK Ceramics subsidiary, as well as from several outside suppliers. After we process them, the powders are either loaded directly into the hot pressing molds or are shaped into pre-forms prior to loading into the hot pressing molds. The powders are placed in specially prepared graphite tooling, most of which we machine to shape. Heat and pressure are gradually applied to the desired level, carefully maintained and finally reduced. The furnace is then removed from the press and allowed to cool, permitting the press to be used with another furnace. For most products, this cycle takes approximately 20 hours. The resultant ceramic product generally has mechanical, chemical and electrical properties of a quality approaching theoretical limits. Almost all products, other than armor, are then finished by diamond grinding to meet precise dimensional specifications.

Ceramic Powders (Boron Carbide TETRABOR®, Boron Nitride, Titanium Diboride, Calcium Hexaboride, Zirconium Diboride). We purchase raw materials like carbon, boric acid and oxides from outside vendors. These raw materials are converted into the final formulation in large high temperature processes using an arc furnace. After the resultant material is cooled, it is broken down into fine particulates that are then purified through a chemical treatment. The next process is the production and classification of various grain sizes. The manufacturing processes result in a very high and consistent quality powder. The resulting finished ceramic powder products are used in a wide range of applications, such as ceramics and powders for abrasives, armor, neutron absorption and refractories.

Sintering and Reaction Bonding of Silicon Nitride (SRBSN). The sintering of reaction bonded silicon nitride results in our Ceralloy® 147 SRBSN, which is used in industrial and automotive/diesel applications. This SRBSN process begins with relatively inexpensive high purity elemental silicon (Si) powders, which contrasts sharply with some other competitors' manufacturing techniques which start with relatively more expensive silicon nitride (Si_3N_4) powders.

After additives are incorporated by milling and spray drying, the silicon powders are formed into shapes through conventional ceramic processing such as dry pressing. These shapes are then fired in a nitrogen atmosphere which converts the silicon part to a silicon nitride part. At this step (reaction bonding), the silicon nitride is pressure sintered in an inert atmosphere increasing the strength of the component threefold. As a result of SRBSN processing, the ceramic crystals grow in an intertwining "needle-like" fashion which we have named NeedleLok™. The NeedleLok™ structure results in a strong, tough, high fracture energy part. This process can be used to produce extremely high production volumes of parts due to the use of conventional pressing processes.

Manufacture of Translucent Ceramics (Transtar®). We produce translucent aluminum oxide (Transtar®) components primarily for use as orthodontic ceramic brackets. We purchase the high purity powders from outside vendors and process them using dedicated conventional ceramic mechanical dry presses. The formed blanks are then fired in a segregated furnace in a hydrogen atmosphere at over 3,000°F until the ceramics enter into a mechanically strong, translucent condition. These fired translucent brackets then have certain critical features diamond ground into them. The next step is a proprietary treatment of the bonding side in order to permit a sound mechanical seal when bound to the patient's teeth. In the final step we furnace braze a stainless steel channel into each archwire slot which has been previously diamond ground into the bracket.

Functional Coatings (Surface Engineered). Our functional coatings are formed by the deposition of hard particles, primarily diamonds, in a nickel layer on steel, aluminum or titanium. We purchase the hard particles—sized between nanometers and 60μm — from outside vendors and customize these raw materials through chemical treatment. Before being coated, the metal parts are chemically cleaned and deburred. The final product is manufactured by an electroless nickel coating process with simultaneous embedding of hard particle grains. The final step is the hardening of the nickel surface by a heat treatment process up to 660°F.

Evaporation Boats (LaserMet®, DiMet®, TriMet®, FlashMet®). Evaporation boats are ceramic sintered parts consisting of titanium diboride/boron nitride and other nitride compositions for our TriMet® product. These components, in the form of ceramic powders, are milled and conditioned. The key forming process is hot pressing, which results in solid sintered billets. From these sintered billets, the evaporation boats are machined with proprietary processes to various types and shapes.

Sintered Parts. For the production of sintered parts, we either buy raw materials like silicon carbide from outside vendors or use our own ceramic powders. With our specific developed processes, we condition the ceramic powders by incorporating additives, milling, and spray drying into ready-to-press powders. We then utilize the processing steps of forming, green machining, sintering and final machining as the materials are transformed into various shapes. We utilize a broad range of technological processes and equipment to accomplish this. Examples of these processes include cold isostatic pressing, axial dry pressing, injection molding, extrusion molding, pressure sintering, hot pressing, hot isostatic pressing and pressureless sintering.

Diamond Grinding. Many of our advanced technical ceramic products must be finished by diamond grinding because of their extreme hardness. Our finished components typically are machined to tolerances of ±.001 inch and occasionally are machined to tolerances up to ±.0001 inch. To a very limited extent, we also perform diamond grinding services for customers independent of our other manufacturing processes to specifications provided by the customer. Our diamond grinding facilities can perform surface grinding, diameter grinding, ultrasonic diamond grinding, diamond lapping, diamond slicing and honing. The equipment includes manual, automatic and computer numerically controlled, or CNC, grinders. We have specially adapted the CNC grinders for precision grinding of ceramic contours to exacting tolerances.

Sintering of Fused Silica Ceramics. Sintering of fused silica ceramics is the process we use to fabricate fused silica ceramic shapes for applications in crucibles for use in the manufacturing of photovoltaic solar cells, metallurgical tooling, missile radomes (nose cones) and other industrial uses. To fabricate fused silica ceramic shapes, fused silica powders are made into unfired shapes through slip casting or other ceramic forming processes. These unfired "green" shapes are fired at temperatures up to 2,500°F. The final shapes are often marketed in the "as fired" condition or, in some cases, precision diamond ground to achieve specific dimensional tolerances or surface finishes required by certain customers.

Injection Molding. Certain markets, like medical device components, require ceramic shapes that are small, highly configured and held to tight dimensional tolerances. Many of these can only be produced by the injection molding process. At the present time these powders tend to be oxide ceramics, primarily zirconia, alumina and/or blends thereof that we mix in house. The ceramic powder is then blended with organic ingredients that constitute a proprietary binder system. The resultant feedstock allows us to process the material through a standard injection-molding machine into a precision mold designed by us.

Boron Carbide and Aluminum Metal Matrix Composites. For the production of metal matrix composite materials, we hot press relatively large ingots of aluminum and boron carbide. These ingots are subsequently either extruded or rolled and then cut into the final configuration. For the production of Boral®, we acquire an extruded aluminum material into which we place a proprietary mixture of aluminum and boron carbide powder. We roll this material into thin sheets of shield material, which can then be cut into numerous sizes.

Boron Isotopes. We use gravity to separate natural boron material into the two isotopes of boron, ^{10}B and ^{11}B through the use of a large tower. We then convert these isotopes into specific molecules requested by our customers, such as boric acid, zirconium diboride, boron trifluoride or boron metal. We employ a broad range of technological equipment and processes to produce the isotopically enriched molecule of choice.

High Purity Fused Silica. To produce our fused silica powder products, we melt washed quartz sand into large ingots using an electric arc melting process and then crush the ingots into powder products using various crushing, grinding, milling, and size separation equipment. The melting process transforms the quartz raw material into fused silica glass. The phase transformation that occurs during the melting process results in a finished product whose thermal expansion is much less than that of the quartz sand raw material.

Raw Materials

The starting raw materials for our manufacturing operations are generally fine, synthetic powders available from several domestic and foreign sources, including our subsidiary, ESK Ceramics. ESK Ceramics supplied 704 tons of boron carbide powder and silicon carbide to us in 2011, 340 tons in 2010 and 670 tons in 2009. We have owned ESK Ceramics since August 23, 2004. Our Minco, Inc. subsidiary, which we acquired on July 10, 2007, supplies us with high purity fused silica powders. Other raw materials, such as the backing material for ceramic armor, graphite, and metal components are readily available from several commercial sources.

Quality Control

We make our products to a number of exacting specifications. In order to meet both internal quality criteria and customer requirements, we implement a number of quality assurance programs such as in-process statistical process control (SPC). We implement these quality programs separately at each of our manufacturing locations and in different ways depending on the processes. The results of these well deployed programs assist us in understanding and predicting limited exposure to non-conforming products.

Our Advanced Ceramic Operations, ESK Ceramics, Boron Products, Minco and Thermo Materials facilities have received ISO 9001 Certification. Semicon Associates and SemEquip, Inc. are ISO 9000 compliant.

Engineering and Research

Our engineering and research efforts consist of application engineering in response to customer requirements, in addition to new materials and product development aimed at creating demand for new products. Our efforts create new products, modify existing products to fit specific customer needs and result in developing enhanced ceramic processes.

We allocate costs associated with application engineering and research between cost of product sales and research and development expense. Application engineering efforts devoted to specific customer orders generally are recognized as cost of product sales, while the balance of engineering and research costs is included in research and development and expensed as incurred. Our research and development expenses were approximately $12.4 million in 2011, $11.7 million in 2010, and $12.3 million in 2009.

Competition

Our products compete with advanced technical ceramic products and powders from other companies, as well as with high strength steel alloys and plastic products. When competing with other advanced technical ceramic products and powders, we believe the principal competitive factors are manufacturing capacity and the ability to deliver products, price, product performance, material specifications, application engineering capabilities, customer support and reputation. Some of our competitors include ArmorWorks, The Protective Group, Ceramtec, the Armor Holdings and Cercom subsidiaries of BAE Systems, CoorsTek, Denka, Momentive Performance Materials, Hitachi, HC Starck, Kyocera's Industrial Ceramics Group, Morgan, Saint Gobain, Kennametal, Spectra-Mat, UK Abrasives, Vesuvius, C-E Minerals, NHTC, Holtec, Nukem and General Electric. Many of our current or potential competitors have greater financial, marketing and technical resources than we do. We cannot guarantee that we will be able to compete successfully against our current or future competitors. If we fail to compete successfully, there could be material adverse effects on our business, financial condition and results of operations. In many applications we also compete with manufacturers of non-ceramic materials. When competing with high strength steel alloys and plastic products, we may not be able to compete effectively when price is a primary consideration, because our products are typically more expensive as a result of higher manufacturing costs associated with the production of advanced technical ceramics.

Backlog

We record an item as backlog when we receive a contract, purchase order or other notification indicating the number of units to be purchased, the purchase price, specifications, delivery requirements and other customary terms and conditions. Our backlog was approximately $284.9 million as of December 31, 2011 and approximately $185.8 million as of December 31, 2010. We expect that substantially all of our backlog as of December 31, 2011 will be shipped during 2012.

Patents, Licenses and Trademarks

We rely primarily on trade secrecy to protect compositions and processes that we believe are proprietary. In certain cases, the disclosure of information concerning such compositions or processes in issuing a patent could be competitively disadvantageous. However, our management believes that patents are important for

technologies where trade secrecy alone is not a reliable source of protection. Accordingly, we have applied for, or have been granted, several U.S. patents relating to compositions, products or processes that our management believes are proprietary, including lightweight ceramic armor.

We have been issued two U.S. patents relating to translucent ceramics for orthodontic brackets. The first of these two patents expired in September 2007, and the second patent expires in October 2013. We co-invented and co-own these patents with 3M Unitek. Together with 3M Unitek, we have granted licenses to companies whose ceramic orthodontic brackets infringe our joint patents. These companies pay both of us royalties based on sales of their orthodontic ceramic brackets for the remaining life of the patents.

In addition to the above, we have been issued 61 U.S. patents, 140 foreign patents and have 138 patents pending and have applied for corresponding foreign patents in various foreign countries. Of the number of patents indicated above, our ESK Ceramics subsidiary has 10 U.S. patents pending and 48 foreign patents pending, and our SemEquip subsidiary has 37 U.S. patents and 22 U.S. patents pending, as well as corresponding issued and pending patents in several foreign countries. The proprietary coarse grained silicon carbide materials, including silicon carbide materials with graphite inclusions, are protected by patents in Europe, the United States, Canada and Japan. These patents expire in 2017. Other patents also relate to sintered silicon carbide materials, the earliest expiring in 2014. Another patent for evaporation boats has been issued in Europe, the United States, Canada and Japan. This patent expires in 2019. Other patents relate to Ekagrip® friction enhancing coatings, the earliest expiring in 2018. Other patents relate to titanium diboride materials, boron nitride materials and coatings and composite ceramic materials.

The patents issued to our SemEquip subsidiary relate to its ion source and method of making semiconductor devices. SemEquip's pending patent applications relate to its ion source, semiconductor devices and synthesis of the molecular cluster source feed material, octadecaborane, $B_{18}H_{22}$, used in its ion source.

The patents we acquired from Diaphorm Technologies, LLC in June 2009 include the apparatus and methods for producing helmets.

"Ceralloy®," the name of our technical ceramics, "Ceradyne®" and the Ceradyne logo, comprising the stylized letters "CD®," are our major trademarks registered in the United States and various foreign countries. We also have other trademarks, including "Transtar®," "Semicon®," "Thermo®," "Defender®," "NeedleLok®," "Thermo-Sil®," "BORAL®," "BoroBond®," "BorAluminum®," "BORTEC™," "Mohawk™," "Design (Defender) ®, " "R.A.D.A.R. ™," and "Ramtech®". The ESK Ceramics logo, and ESK Ceramics' major product trademarks, including "TETRABOR®", "EKasic®", "DiMet®", "TriMet®", "MYCROSINT®", "EKagrip®", "BORONID®", PetroCeram®, "EKamold®", "LaserMet®", "EllipsoMet®", "EKatherm®", "BORONEIGE®" and "EKathemis®"are registered in Germany and many countries worldwide. The Minco logo, consisting of an ingot design featuring the word "Minco" in the center of the ingot, is registered in the United States. "SEMEQUIP®", "CLUSTERION®", "CLUSTERCARBON®", and "CLUSTERBORON®", are registered trademarks in the United States; "CLUSTERION®" is also registered in Taiwan and China; and "CLUSTERBORON®" is also registered in Japan, South Korea and Taiwan and China. "Diaphorm®" and "Fiber-Tuned®" are registered trademarks in the United States and "Seamless Ballistic®" is registered in the United States, Madrid and Singapore and pending registration has been applied for in many countries worldwide. "Max Pro-Armor", Application Number 77/306,318 has been allowed. PetroCeram®, the trademark for our products marketed to the oil and natural gas exploration industry, is registered in the U.S., Saudi Arabia, Russia, Iran, China, Canada, UAE, Norway, Algeria and the European Union.

Employees

As of December 31, 2011 we had 2,112, employees, including 148 employees with undergraduate or graduate degrees in ceramic engineering or related sciences. Of these total employees, 1,595 were in manufacturing, 212 were in engineering and research, 103 were in sales and marketing, and 177 were in general management, finance and administration. We also use temporary labor in some of our production operations. We

generally consider our relationship with employees to be excellent. None of our U.S.-based employees are represented by labor unions. The employees of ESK Ceramics have elected a work council, an entity which represents employees and is entitled to information and co-determination rights under German law. We consider our relationship with the work council to be good.

Availability of SEC Filings

We file annual, quarterly and special reports, proxy statements and other information with the Securities and Exchange Commission. You can read our SEC filings over the Internet at the SEC's website at http://www.sec.gov. We also make our SEC filings available free of charge through our Internet website as soon as reasonably practicable after we electronically file them with, or furnish them to, the SEC. Our website address is www.ceradyne.com. The reference to our website address does not constitute incorporation by reference into this report of the information contained at that site.

EXECUTIVE OFFICERS OF CERADYNE

Our executive officers and their ages as of February 16, 2012 are as follows:

Name	Age	Position
Joel P. Moskowitz	72	Chairman of the Board, Chief Executive Officer and President
David P. Reed	57	Vice President, and President of North American Operations and Assistant Corporate Secretary
Jerrold J. Pellizzon	58	Chief Financial Officer and Corporate Secretary
Thomas Jüngling	48	Vice President, and President of ESK Ceramics
Bruce R. Lockhart	49	Vice President, and President of Thermo Materials
Jeffrey J. Waldal	47	Vice President, and President of Semicon Associates
Thomas A. Cole	65	Vice President, Business Development
Terry M. Hart	55	Vice President, Human Resources

Joel P. Moskowitz co-founded our predecessor company in 1967. He served as our President from 1974 until January 1987, and has served as our President since September 1987. In addition, Mr. Moskowitz has served as our Chairman of the Board and Chief Executive Officer since 1983. Mr. Moskowitz currently serves on the Board of Trustees of Alfred University. Mr. Moskowitz obtained a B.S. in Ceramic Engineering from Alfred University in 1961 and an M.B.A. from the University of Southern California in 1967.

David P. Reed joined us in November 1983, and has served as a Vice President since January 1988. In February 2005, Mr. Reed was appointed to the newly created position of President of North American Operations, with responsibility for all the company's business units located in North America. Mr. Reed's focus has been and will continue to be on lightweight ceramic armor systems. Prior to joining us, Mr. Reed served as Manager, Process Engineering for the Industrial Ceramic Division of Norton Co. from 1980 to 1983. Mr. Reed obtained a B.S. in Ceramic Engineering from Alfred University in 1976 and an M.S. in Ceramic Engineering from the University of Illinois in 1977.

Jerrold J. Pellizzon joined us in September 2002 and serves as our Chief Financial Officer and Corporate Secretary. Prior to joining us, Mr. Pellizzon was Chief Executive Officer of DrSoy Nutrition, Inc., a developer of

soy protein based food products, from 2000 until 2002. From 1994 through 2000, Mr. Pellizzon served as Chief Operating Officer and Chief Financial Officer of Met-Rx Substrate Technologies. From 1984 to 1993, Mr. Pellizzon was Chief Financial Officer for Breton Construction, Inc., and served on their executive committee and board of directors. Prior to 1984, Mr. Pellizzon held executive and management positions at Duke Timber Construction/Tobin Steel Company and was employed as a C.P.A. in public accounting. Mr. Pellizzon obtained his B.S. in Economics from UCLA in 1975.

Thomas Jüngling joined us in July 2005 as Director of Business Development and Technology Integration and has served as Chief Technology Officer since January 2006. In September 2007, Mr. Jüngling was promoted to President of our ESK Ceramics subsidiary, and he was appointed a Vice President of Ceradyne in December 2007. Prior to joining us, Mr. Juengling was Business Unit Manager at Inovan GmbH & Co. KG, Germany. From 1996 to 2004, Mr. Jüngling held various positions at Elektroschmelzwerk, Kempten GmbH (ESK Ceramics) and Wacker-Chemie GmbH, Germany. Mr. Jüngling obtained his Diploma in Mechanical Engineering in 1988 and his PhD in Engineering (Material Science) in 1992, both from the University of Karlsruhe, Germany.

Bruce R. Lockhart joined our Thermo Materials division as its President in September of 2001, and was appointed a Vice President of Ceradyne in February 2003. Prior to joining us, Mr. Lockhart had 16 years of varied experience in the ceramic industry, the majority of which was with Thermal Ceramics Inc., a provider of products for engineered heat management solutions. Mr. Lockhart received a B.S. in Ceramic Engineering from Clemson University in 1985 and an M.B.A. from Clemson University in 1990.

Jeffrey J. Waldal joined our Semicon Associates division in 1995 as a quality manager, and was promoted to manufacturing manager in 1997 and to President of Semicon in 1999. Mr. Waldal was elected as a Vice President in February 2003. He is currently responsible for the operations, finances and marketing at Semicon Associates. Mr. Waldal began his career as senior materials technician at United Technologies — Pratt & Whitney Aircraft. He was employed for eight years at Ladish Company, Inc. as quality supervisor and quality manager. Mr. Waldal currently serves on the board of directors as Chairman for Kentucky Manufacturing Assistance Center and is a member of the University of Kentucky College of Engineering Dean's Advisory Council. Mr. Waldal obtained a degree in Non-Destructive Testing from Hutchinson Technology Institute in 1984, a B.A. in Business Management from the University of Kentucky in 1995, and an M.B.A. from Eastern Kentucky University in 1998.

Thomas A. Cole joined Ceradyne when we acquired Minco, Inc. in July 2007. He had been serving as Minco's President and Chief Executive Officer since 2000. He was appointed Ceradyne's Vice President of Business Development in March 2008. Mr. Cole's early career was with Corning Inc. for 17 years in various manufacturing and operating roles mostly in technical ceramics and advanced refractories. He left Corning in 1987 when he participated in a buyout of Corning's Corhart Refractories Division and since then was engaged in fixing troubled businesses and selling them. He successfully completed the cycle with seven companies over the last twenty years before joining Ceradyne. Mr. Cole received a B.S. from the College of Ceramics at Alfred University in 1969 and an M.B.A. from the University of Buffalo in 1971.

Terry M. Hart joined Ceradyne in 1998 as manager, Human Resources and was promoted to Director of Human Resources in 2007 and subsequently to Corporate Vice President in 2010. She is currently responsible for all Human Resource functions. Ms. Hart began her career as a workers compensation/payroll administrator at Sears for eight years. She continued as a payroll/personnel administrator at C.A.R.E. Systems, Inc. and was employed there for three years. She was employed for six years at Lockheed-Martin as manager, Human Resources/Payroll and Administrative Services. She was employed for three years at PCI as manager, Human Resources. Ms. Hart obtained a certificate of Human Resources Management from the University of California, Irvine in 1992, and attended the California State University, Fullerton in 1998 with an emphasis in Business Administration.

Our officers are appointed by and serve at the discretion of our Board of Directors.

ITEM 1A. *RISK FACTORS*

This Annual Report on Form 10-K contains forward-looking statements, as described at page 3 of this report under the caption "Note Regarding Forward-Looking Statements." We believe that the risks described below are the most important factors which may cause our actual future results of operations to differ materially from the results projected in the forward-looking statements.

Risks Related to Our Business

A substantial portion of our revenues is derived from the sale of defense related products, primarily ceramic body armor. If demand for ceramic body armor declines, if federal budget appropriations involving our products are reduced, if we fail to obtain new government contracts or delivery orders under existing contracts, or if existing government contracts or orders are cancelled, our revenues, profit and cash flow will be materially and adversely affected.

In recent years, a substantial portion of our revenues has been derived from the sale of defense related products, particularly ceramic body armor, either directly or indirectly to the U.S. government. The sale of defense related products represented 39.4% of our revenues in 2011, 29.1% in 2010 and 49.6% in 2009. We anticipate that a substantial portion of our revenues for the foreseeable future will continue to come from sales of defense related products. Our dependence on defense related business, and on sales of ceramic armor in particular, entails several risks, including those described below.

Our defense business is highly sensitive to changes in national and international defense and budget priorities. For example, in the years 2003 through 2007, our revenues from the sale of ceramic body armor increased significantly due to the U.S. military's acceleration of its program to equip its soldiers with ceramic body armor systems, in part, because of the war in Iraq. In 2008, however, demand for ceramic body armor began to decline due in part to the reduction in hostilities in Iraq and because most combat troops were already equipped with the current generation of ceramic body armor, known as ESAPI. The outlook for ceramic body armor in 2012 is favorable because in September 2011, we were awarded a three-year ID/IQ contract for ESAPI ceramic armor plates from Defense Logistics Agency Troop Support group with a first year order for 300,000 ESAPI. The outlook beyond 2012 is uncertain for several reasons, including uncertainty regarding the rate at which U.S. troops will be withdrawn from Afghanistan, and the rate at which the U.S. military will proceed with implementing the next ballistic threat generation of ceramic body armor plates, known as XSAPI (discussed further below) or a generation that will be lighter than the current version. Demand for ceramic body armor could decline further from 2012 levels for a variety of reasons, including a lessening of conflicts in the Middle East and other high risk areas, or a reduction in U.S. defense budget appropriations. If that were to occur, our revenues from the sale of defense related products would be reduced and our profit and cash flow could be materially and adversely affected.

Many defense contracts are awarded in an open competitive bidding process, and our past success in winning government contracts does not guarantee that we will win any new contracts in the future. Our success depends upon our ability to successfully compete for and retain such government contracts. If we, or if prime contractors for which we are a subcontractor, fail to win any future bids, or if we are unable to replace business lost upon cancellation, expiration or completion of a contract, our revenues, profit and cash flow from the sale of defense related products would be reduced.

Moreover, government contracts typically may be cancelled by the government at any time without penalty, other than our right to be reimbursed for certain expenses and inventory. If the U.S. government were to cancel any of our government contracts, our revenues, profit and cash flow would be reduced.

In October 2008, we were awarded an Indefinite Delivery/Indefinite Quantity (ID/IQ) contract by the U.S. Army for the next ballistic threat generation of ceramic body armor plates, known as XSAPI, as well as for the current generation of ESAPI plates. This five-year contract has a maximum value of $2.3 billion. However, we anticipate that the government will order either XSAPI or ESAPI, but not both. Therefore, the total amount of this ID/IQ award likely will not exceed $1.1 billion over the life of the contract. One of our competitors was awarded a similar ID/IQ contract. We expect that government orders under these contracts will be split among

ourselves and our competitor, so our sales under our contract will likely be less than the $1.1 billion possible total amount.

Moreover, we believe we will not receive significant additional delivery orders for XSAPI as the U.S. has shown more interest in procuring body armor that weighs less than the current ESAPI and XSAPI body armor inserts while being able to defeat similar ballistic threats. We are currently developing ESAPI and XSAPI designs that weigh 10% to 15% less than the current designs and will offer these to the U.S. Army and other Department of Defense users once these designs meet the current requirements. There is no assurance that we will be successful with these lighter weight designs.

For the next several quarters, demand for ceramic body armor is likely to be the most significant factor affecting our sales.

Although we believe that demand for ceramic body armor will continue for many years, the quantity and timing of government orders depends on a number of factors outside of our control, such as the amount of U.S. defense budget appropriations, positions and strategies of the current U.S. government, the level of international conflicts and the deployment of armed forces. Our future level of sales of ceramic body armor will depend on our ability to successfully compete for and retain this business.

If we are not successful in obtaining and retaining sufficient new body armor business to keep our manufacturing capacity utilized, we may be required to record impairment charges for the reduction in value of our fixed assets devoted to manufacturing body armor. If this were to occur, our earnings would be reduced in the period we incur the impairment charge.

If the performance requirements for ceramic body armor are modified by the U.S. military, we may incur delays or additional costs to change the design of our product, or we may not be able to satisfy the new requirements with our existing ceramic materials and processes. If this were to occur, our costs could increase and our revenues, profit and cash flow would decline.

The ceramic body armor we manufacture must comply with stringent performance specifications established by the U.S. military, such as weight and the level of ballistic protection it must provide, and these specifications may be modified by the military in new procurements, as well as under existing contracts. For example, during the quarter ended March 31, 2005, the U.S. military directed us to modify the specifications of the lightweight ceramic body armor that we had been manufacturing, from the version commonly referred to as SAPI (small arms protective insert), to a revised requirement commonly referred to as ESAPI (enhanced small arms protective insert). The revised requirement is more difficult to manufacture than the SAPI version. The change to this new design resulted in production delays and increased costs to us during the first quarter of 2005 as we developed new designs to meet the revised requirement and experienced manufacturing inefficiencies. In the future, the U.S. military may make additional changes to the performance requirements for body armor, and we may experience delays or additional costs to satisfy the new requirements, or we may be unable to meet the new requirements at all with our existing ceramic materials and processes. If this were to occur, our revenues from ceramic body armor would decline and our profitability would suffer.

If demand for our products declines, we may have inefficient or under-utilized capacity, and our gross margins, profit and cash flow may suffer.

In response to the increased demand for ceramic body armor for military personnel and cam rollers for diesel engines, as well as our other products, we added significant manufacturing capacity since early 2002.

Demand for our products, particularly ceramic armor and cam rollers, may not remain at levels sufficient to utilize all of our manufacturing capacity. Much of our manufacturing facilities and production equipment, such as our furnaces and hot presses, are special purpose in nature and cannot be adapted easily to make other products. Also, a substantial amount of the boron carbide powder produced by ESK Ceramics is currently used by us and our competitors to make ceramic body armor. If the demand for ceramic body armor declines substantially from current levels, ESK Ceramics may have significant under-utilized capacity for boron carbide powder. Therefore, a substantial decline in demand for our ceramic body armor or cam rollers could result in significant excess manufacturing capacity, which would result in under absorption of overhead expense and reduced profit, and we may be required to record impairment charges for the reduction in value of our fixed

assets devoted to manufacturing these products. If this were to occur, our earnings would be reduced in the period we incur the impairment charge.

We have been manufacturing ceramic cam rollers for heavy-duty diesel engines since 1999, and now have production contracts to supply cam rollers to several major engine companies. We expect that sales of these cam rollers will begin to decline in 2013 when new U.S. environmental regulations take effect for off-highway applications. Additionally the costs to produce cam rollers has increased over the years, one reason being the decline in sales. However in 2010 several efforts were successfully made to increase pricing of these components.

If we fail to increase our non-defense revenue, and if the demand for ceramic body armor decreases, our revenues, profit and cash flow will be materially and adversely affected.

In 2011, 39.4% of our revenues were from sales of defense-related products. Because our dependence on defense-related products exposes us to significant risks, part of our business strategy is to continue to increase our non-defense revenue base by identifying new products and markets for our advanced technical ceramics, and by increasing sales to our existing non-defense customers. Our ability to execute this strategy successfully depends, in part, on our ability to increase market acceptance of our advanced technical ceramics as a replacement for materials such as metals, plastics and traditional ceramics. While advanced technical ceramics have certain advantages over other materials, such as the ability to withstand extremely high temperatures and combining hardness with light weight, they are more expensive to produce. As a result, the market for advanced technical ceramic products may be limited to high-end applications where price is not a critical competitive factor, where the characteristics of advanced technical ceramics may justify the higher costs compared to other materials or where other materials are not suitable. Due to these limitations on the market for advanced technical ceramics, the market for our products may not grow as we anticipate and we may not be able to increase our non-defense revenue base. If we are unable to execute this strategy, and if the demand for ceramic body armor decreases, our revenues, profit and cash flow will be materially and adversely affected.

A significant reduction or elimination of government subsidies and economic incentives or change in government policies may have a material adverse effect on our ceramic crucible business and prospects.

Our ceramic crucibles are used by several photovoltaic cell manufacturers for melting silicon in order to produce polycrystalline silicon wafers used in photovoltaic solar cells. Demand for our ceramic crucibles depends substantially on government incentives aimed to promote greater use of solar power. In many countries in which we currently sell our ceramic crucibles, the solar power markets, particularly the market of on-grid photovoltaic solar systems, would not be commercially viable without government incentives. This is because the cost of generating electricity from solar power currently exceeds, and we believe will continue to exceed for the foreseeable future, the costs of generating electricity from conventional or non-solar renewable energy sources. The scope of the government incentives for solar power depends, to a large extent, on political and policy developments relating to environmental concerns in a given country, which could lead to a significant reduction in or a discontinuation of the support for renewable energies in those countries. Federal, state and local governmental bodies in many of our customers' key markets, most notably Germany, Italy, Spain, the United States, France, South Korea, Taiwan, India, Japan and China have provided subsidies and economic incentives in the form of rebates, tax credits and other incentives to end users, distributors, system integrators and manufacturers of solar power products to promote the use of solar energy in on-grid applications and to reduce dependency on other forms of energy. Policy shifts could reduce or eliminate these government economic incentives altogether. If that were to occur, sales of our ceramic crucibles could decline substantially.

Growth in our operations may strain our resources, and if we fail to successfully manage potential future growth, we could incur higher operating costs and delays in the production of our products, which could result in reduced revenues, profit and cash flow.

The introduction of new products and recent acquisitions of other businesses, are placing, and will continue to place, a significant strain on our operational, financial and managerial resources and personnel. To effectively manage potential future growth, we must continue to:

- add manufacturing capacity and personnel;

- implement and improve our operational, financial and management information systems;
- develop the management skills of our managers and supervisors;
- add new management personnel; and
- train, motivate and manage our employees.

Any failure to effectively manage growth could result in increased operating costs and delays in the development and production of our products. If this occurs, our revenues, profit and cash flow could decline.

We may generate less profit than expected or even lose money on our fixed price government contracts.

Most of our government contracts provide for a predetermined, fixed price for the products we sell regardless of the costs we incur. When making proposals for fixed-price contracts, we must rely on our ability to accurately estimate our costs and ability to manufacture and deliver the products on time and at a reasonable profit. Our actual production costs may, however, exceed forecasts due to unanticipated delays or increased cost of materials, components, labor, capital equipment or other factors. As a result, we may incur losses on fixed price contracts that we had expected to be profitable, or such contracts may be less profitable than we expected, which could have a material adverse effect on our business, financial condition and results of operations.

Our business is subject to various laws and regulations favoring the U.S. government's contractual position, and our failure to comply with such laws and regulations could harm our operating results and prospects.

As a contractor to the U.S. government, we must comply with laws and regulations relating to the formation, administration and performance of federal government contracts that affect how we do business with our customers and may impose added costs on our business. These rules generally favor the U.S. government's contractual position. For example, these regulations and laws include provisions that allow unsuccessful bidders to protest or challenge contracts we have been awarded, and allow the government to unilaterally terminate, reduce or modify our government contracts.

The accuracy and appropriateness of certain costs and expenses used to substantiate our direct and indirect costs for the U.S. government under fixed-price contracts are subject to extensive regulation and audit by the Defense Contract Audit Agency, an agency of the U.S. Department of Defense. Responding to governmental audits, inquiries or investigations may involve significant expense and divert management's attention. Our failure to comply with these or other laws and regulations could result in contract termination, suspension or debarment from contracting with the federal government, civil fines and damages and criminal prosecution and penalties. Any of these consequences could have a material adverse effect on our business, financial condition, results of operations and liquidity.

We currently depend entirely on 3M Unitek for sales of our ceramic orthodontic brackets. If we are unable to maintain our existing level of business with 3M Unitek our revenues, profit and cash flow from this product line will decline.

We sell our ceramic orthodontic brackets exclusively to 3M Unitek under a supply agreement with 3M Unitek that expires in December 2013. Under the terms of this agreement, 3M Unitek is required to purchase their Clarity and Transcend brand ceramic orthodontic product lines exclusively from us for as long as 3M Unitek continues to sell those products. This agreement further stipulates that 3M Unitek must purchase from Ceradyne at least 50% of the ceramic orthodontic brackets 3M Unitek requires for next generation designs, which it introduced in 2007. Except under limited circumstances, Ceradyne is not permitted to sell ceramic orthodontic brackets to any other customers under this agreement. As a result of our agreement with 3M Unitek, our revenue from ceramic orthodontic brackets is dependent entirely upon 3M Unitek. 3M Unitek also offers traditional stainless steel orthodontic brackets. We cannot guarantee that 3M Unitek will devote substantial marketing efforts to the sale of our ceramic orthodontic brackets, or that 3M Unitek will not reassess its commitment to our product. If 3M Unitek fails to actively market our ceramic orthodontic brackets or decides to promote a competing product over ours, this could cause the sales of our ceramic orthodontic brackets to decline.

Moreover, the first of our two patents for our ceramic orthodontic brackets, which we jointly own with 3M Unitek, expired in September 2007; the second one expires in October 2013. Consequently, we may not be able to prevent third parties from manufacturing and selling competitive ceramic orthodontic brackets. Ceramic orthodontic brackets manufactured and sold by third parties may be less expensive than ours and may cause sales of our ceramic orthodontic brackets to decline either as a result of pricing pressure or loss of market share.

In addition, the future success of our ceramic orthodontic brackets depends on our ability to maintain and increase market acceptance for our product compared to other competitive solutions, including traditional stainless steel brackets and newer products such as transparent plastic orthodontic aligners, synthetic sapphire brackets and other ceramic brackets. If 3M Unitek reduces its purchases of ceramic orthodontic brackets from us or if competitive products gain market share, the sales of our ceramic orthodontic brackets may decline, resulting in a decrease in our revenues, profit and cash flow.

Our business is subject to risks associated with doing business outside the United States.

Shipments to customers outside of the United States accounted for approximately 45.4% of our sales in 2011, 51.7% of our sales in 2010 and 33.9% of our sales in 2009. Our ESK Ceramics subsidiary is located in Germany. Its sales to customers located outside of the United States represented approximately 77.4% of its total sales during 2011, approximately 95.6% of its total sales during 2010, and approximately 74.7% of its total sales during 2009.

We anticipate that international shipments will account for a significant portion of our sales for the foreseeable future. Therefore, the following risks associated with international business activities could have material adverse effects on our performance:

- burdens to comply with multiple and potentially conflicting foreign laws and regulations, including export requirements, tariffs and other barriers, health and safety requirements, and unexpected changes in any of these factors;
- difficulty in staffing and managing international operations;
- differences in intellectual property protections;
- difficulty in obtaining export licenses from the U.S. government for sales of our defense-related products;
- potentially adverse tax consequences due to overlapping or differing tax structures;
- fluctuations in currency exchange rates especially the Euro; and
- risks associated with operating a business in a potentially unstable political climate.

We have traditionally invoiced our sales from the United States to customers in foreign countries in U.S. dollars. Consequently, if the U.S. dollar becomes more expensive relative to the currencies of our foreign customers, the price of our products that we export from the United States to those countries will rise and our sales into those countries may fall. In addition, in the future, we may be required to denominate foreign sales in the local currencies of our customers. In that case, if the U.S. dollar were to become more expensive relative to the currencies of our foreign customers, we would receive fewer U.S. dollars for each unit of foreign currency that we receive when our customers pay us. Therefore, a more expensive U.S. dollar would cause us to incur losses upon the conversion of accounts receivable denominated in foreign currencies. Such losses could harm our results of operations.

Our ESK Ceramics subsidiary, located in Kempten, Germany invoices approximately 76.3% of its sales in Euros. ESK Ceramics' sales to customers located in the United States are invoiced in U.S. dollars. If the Euro becomes more expensive relative to the currencies of ESK Ceramics' customers located outside the European Union, the price of its products sold to customers in those countries will rise and its sales into those countries may fall.

We may make future acquisitions which may be difficult to integrate, divert management resources, result in unanticipated costs, or dilute our stockholders.

Part of our continuing business strategy is to make acquisitions of, or investments in, companies, products or technologies that complement our current products, enhance our market coverage, technical capabilities or

production capacity, or offer growth opportunities. Future acquisitions could pose numerous risks to our operations, including:

- we may have difficulty integrating the purchased operations, technologies or products;
- we may incur substantial unanticipated integration costs;
- assimilating the acquired businesses may divert significant management attention and financial resources from our other operations and could disrupt our ongoing business;
- acquisitions could result in the loss of key employees, particularly those of the acquired operations;
- we may have difficulty retaining or developing the acquired businesses' customers;
- acquisitions could adversely affect our existing business relationships with suppliers and customers;
- we may fail to realize the potential cost savings or other financial benefits and/or the strategic benefits of the acquisitions; and
- we may incur liabilities from the acquired businesses for infringement of intellectual property rights or other claims, and we may not be successful in seeking indemnification for such liabilities or claims.

In connection with these acquisitions or investments, we could incur debt, amortization expenses related to intangible assets, large and immediate write-offs, assume liabilities, or issue stock that would dilute our current stockholders' percentage of ownership. We may not be able to complete acquisitions or integrate the operations, products or personnel gained through any such acquisition without a material adverse effect on our business, financial condition and results of operations.

The cost of electricity is a significant portion of our cost of product sales. An increase in the cost of electricity may cause our profit margins to decline.

Electricity is essential for the production of our products and comprises a significant portion of our cost of product sales. The cost of electricity for our manufacturing operations in the United States, Europe and China was approximately $19.2 million during 2011, approximately $14.7 million during 2010, and approximately $12.7 million during 2009. Over the last several years, the cost of electricity from utility companies has increased, particularly in California. During the fourth quarter of 2010, we closed our hot press manufacturing operation in Costa Mesa, California as a result of reduced demand for ceramic body armor solutions and the high cost of doing business in the State, especially the high cost of electricity, which is integral to our manufacturing operations. We consolidated all hot press operations into our existing manufacturing plant in Lexington, Kentucky. We recognized a restructuring charge of $3.5 million during the year ended December 31, 2010 to write down the value of long-lived assets associated with the closure of the hot press manufacturing operation in Costa Mesa, California.

Management utilizes utility industry specialists and consultants to help manage and implement strategies to minimize annual price increases at its Advanced Ceramic Operations' facilities located in California. For other locations in the United States and Germany, management's strategy is to enter into long term contracts to obtain fixed price increases in order to increase its ability to accurately forecast future energy costs and ensure a stable cost structure. Fluctuations in the cost of electricity affect our ability to accurately forecast future energy costs and consequently our profitability. If the cost of electricity were to increase substantially, our gross profit margins may decline.

We may not be able to adequately safeguard our intellectual property rights and trade secrets from unauthorized use, and we may become subject to claims that we infringe on others' intellectual property rights.

We rely on a combination of patents, trade secrets, trademarks, and other intellectual property laws, nondisclosure agreements with employees and customers and other protective measures to preserve our proprietary rights to our products and production processes. These measures afford only limited protection and may not preclude competitors from developing products or processes similar or superior to ours. Moreover, the laws of certain foreign countries do not protect intellectual property rights to the same extent as the laws of the United States.

Although we implement protective measures and intend to defend our proprietary rights, these efforts may not be successful. From time to time, we may litigate within the United States or abroad to enforce our issued or licensed patents, to protect our trade secrets and know-how or to determine the enforceability, scope and validity of our proprietary rights and the proprietary rights of others. Enforcing or defending our proprietary rights could be expensive, requires management's attention and might not bring us timely or effective relief.

Furthermore, third parties may assert that our products or processes infringe their patent rights. Our patents may be challenged, invalidated or circumvented. Although there are no pending or threatened intellectual property lawsuits against us, we may face litigation or infringement claims in the future. Infringement claims could result in substantial costs and diversion of our resources even if we ultimately prevail. A third party claiming infringement may also obtain an injunction or other equitable relief, which could effectively block the distribution or sale of allegedly infringing products. Although we may seek licenses from third parties covering intellectual property that we are allegedly infringing, we may not be able to obtain any such licenses on acceptable terms, if at all.

Our ability to operate effectively could be impaired if we were to lose the services of our key personnel, or if we are unable to recruit qualified managers and key personnel in the future.

Our success depends on the continued service of our management team and key personnel, including Joel P. Moskowitz, our Chairman and Chief Executive Officer and President; David P. Reed, our Vice President, and President of North American Operations; Jerrold J. Pellizzon, our Chief Financial Officer and Corporate Secretary; and Thomas Jüngling, the President of our ESK Ceramics subsidiary. Mr. Moskowitz was diagnosed with non-Hodgkin's lymphoma in October 2004. He completed chemotherapy treatments in January 2005, and his current diagnosis indicates that the non-Hodgkin's lymphoma is in remission.

If Mr. Moskowitz becomes unable to continue working due to health reasons, or if one or more of these individuals were to resign or otherwise terminate their employment with us, we could experience a loss of sales, delays in new product development and diversion of management resources, and we may have difficulty replacing any of these individuals. We do not have employment agreements or key person insurance on any of our executive employees.

Competition for qualified managers and key personnel is intense and we may not be able to recruit and retain such personnel. If we are unable to retain our existing managers and employees or hire and integrate new personnel, we may experience operating inefficiencies, production delays and reduced profitability.

Our manufacturing facilities are subject to a number of operational risks, including hazards associated with ceramic manufacturing and natural disasters, any of which could have a material adverse impact on our productivity and results of operations.

Due to the nature of our business, we are exposed to hazards associated with ceramic manufacturing, such as:

- accidents or mechanical failure;
- fires or explosions of furnaces; and
- employee exposure to extreme temperatures or hazardous substances.

In addition, the location of our facilities exposes us to potential earthquakes and other natural disasters. These hazards may cause personal injury, loss of life and damage to property, which could lead to a substantial interruption or suspension of operations, potential loss of customers and sales, government fines and lawsuits by injured persons. Any such consequences could have an adverse effect on the productivity and profitability of a particular manufacturing facility or on us as a whole.

Defects in our products could harm our reputation for quality products, increase our operating expenses, reduce sales of our products and impact cash flow.

Our products have in the past contained, and may in the future contain, errors or defects that may be detected at any point in the life of the products. Such errors could result in delays in shipping and sales during the period required for their correction and additional expense associated with their reworking or replacement. Our

ability to receive additional shipment orders from the U.S. government is reliant on our ability to pass first article testing of new designs. Real or perceived defects in our products may result in product returns, loss of sales, delays in market acceptance, injury to our reputation and increased warranty costs, which could reduce our sales and profit. For example, in March 2002, the U.S. government notified us that several lots of our SAPI lightweight ceramic body armor failed to pass ballistics re-verification tests. As a result, we stopped production of our SAPI product, modified the design of our product and resumed shipping approximately four months later. In addition, we agreed to correct or replace at our expense all supplies of our SAPI product sales that did not meet the original contractual requirements.

If we are unable to compete successfully against current and future competitors, our revenues could decline.

Our products compete with advanced technical ceramic products from other companies, as well as with high strength steel alloys and plastic products.

When competing with other advanced technical ceramic products, we believe the principal competitive factors are:

- manufacturing capacity and the ability to deliver products;
- price;
- product performance;
- material specifications;
- application engineering capabilities;
- customer support; and
- reputation.

When competing with high strength steel alloys and plastic products, we may not be able to compete effectively when price is a primary consideration, because our products are typically more expensive as a result of higher manufacturing costs associated with the production of advanced technical ceramics.

Some of our competitors include Armor Works, The Protective Group, Ceramtec, the Armor Holdings and Cercom subsidiaries of BAE Systems, CoorsTek, Denka, Momentive Performance Materials, Hitachi, HC Starck, Kyocera's Industrial Ceramics Group, Morgan, Saint Gobain, Kennametal, Spectra-Mat, UK Abrasives, Vesuvius, C-E Minerals, NHTC, Holtec, Nukem and General Electric. Many of our current or potential competitors have greater financial, marketing and technical resources than we do. If we fail to compete successfully against our current or future competitors, our revenues, profit and cash flow could decline.

Uninsured losses arising from third party claims brought against us could result in payment of substantial damages, which would decrease our cash reserves and could harm our profit and cash flow.

Our products are used in applications where the failure to use our products properly or their malfunction could result in serious bodily injury or death. We may not have adequate insurance to cover the payment of any potential claim related to such injuries or deaths. Insurance coverage may not continue to be available to us or, if available, may be at a significantly higher cost.

We are subject to extensive government regulation, and our failure or inability to comply with these regulations could subject us to penalties and result in a loss of our government contracts, which could reduce our revenues, profit and cash flow.

We must comply with and are affected by various government regulations that impact our operating costs, profit margins and our internal organization and operation of our business. Furthermore, we have production contracts with governmental entities and are subject to additional rules, regulations and approvals applicable to government contractors. We are also subject to routine audits to assure our compliance with these requirements. Our failure to comply with these regulations, rules and approvals could result in the imposition of penalties and the loss of our government contracts and disqualification as a U.S. government contractor. As a result, our revenues, profit and cash flow could be reduced.

In addition, a number of our employees involved with defense related business are required to obtain security clearances from the U.S. government. Our business may suffer if we or our employees are unable to obtain the security clearances that are required.

Like other companies operating internationally, we are subject to the Foreign Corrupt Practices Act and other laws which prohibit improper payments to foreign governments and their officials by U.S. and other business entities. Violations of the Foreign Corrupt Practices Act may result in severe criminal penalties, which could have a material adverse effect on our business, financial condition, results of operations and liquidity.

If we fail to comply with environmental laws and regulations, we could incur an increase in our operating costs and a decrease in our profit and cash flow.

We are subject to a variety of environmental regulations relating to the use, storage, discharge and disposal of hazardous materials used to manufacture our products. Authorities could impose fines, suspend production, alter our manufacturing processes, or stop our operations if we do not comply with these regulations.

Until 1997, we produced certain products using beryllium oxide, which is highly toxic in powder form. This powder, if inhaled, can cause chronic beryllium disease in a small percentage of the population. We have been sued in the past by former employees and by employees of one of our customers and by their family members alleging that they had contracted chronic beryllium disease as a result of exposure to beryllium oxide powders used in our products. The last of these claims was settled in 2002, and all of these claims have been dismissed without our incurring material liability. We may not, however, be able to avoid future liability to persons who may allege that they contracted chronic beryllium disease as a result of exposure to the beryllium oxide we used in prior years.

Any failure to comply with current or subsequently enacted environmental statutes and regulations could subject us to liabilities, fines or the suspension of production. Furthermore, any claims asserted against us in the future related to exposure to beryllium oxide powder may not be covered by insurance. Even if covered, the amount of insurance may be inadequate to cover any adverse judgment.

Fines and other punishments imposed on us for environmental violations and expenses we incur to remedy or comply with environmental regulations and future liability for incidences of chronic beryllium disease contracted by employees or employees of customers would decrease our cash reserves and could harm our profitability.

Our long term investments are subject to risks which may cause losses and affect the liquidity of these investments.

Our long term investments at December 31, 2011 included $15.0 million of auction rate securities which is net of the cumulative to date pre-tax impairment and pre-tax other than temporary impairment charges. Cumulatively to date, we have incurred $4.7 million in pre-tax charges due to other-than-temporary reductions in the value of our investments in auction rate securities, realized losses of $8.8 million from sales of auction rate securities and pre-tax temporary impairment charges of $3.0 million reflected in other comprehensive income. Our investments in auction rate securities represent interests in insurance securitizations collateralized by pools of residential and commercial mortgages, asset backed securities and other structured credits relating to the credit risk of various bond guarantors that mature at various dates from June 2021 through July 2052. These auction rate securities were intended to provide liquidity via an auction process which is scheduled every 28 days, that resets the applicable interest rate, allowing investors to either roll over their holdings or gain immediate liquidity by selling such interests at par. Interest rates are capped at a floating rate of one month LIBOR plus additional spread ranging from 1.25% to 4.00% depending on prevailing rating. During the second half of the year 2007, through 2011, the auctions for these securities failed. As a result of current negative conditions in the global credit markets, auctions for our investment in these securities have recently failed to settle on their respective settlement dates. Consequently, investments are not currently liquid through the normal auction process and may be liquidated if a buyer is found outside the auction process. Although the auctions have failed, we continue to receive underlying cash flows in the form of interest income from the investments in auction rate securities. As of December 31, 2011, the fair value of our investments in auction rate securities was below cost by approximately $7.8 million. The fair value of the auction rate securities has been below cost for more than one year. If they remain illiquid and a buyer is not found outside the auction process, the value of these securities may decline further.

We review impairments associated with our auction rate securities each reporting period to determine the classification of the impairment as "temporary" or "other-than-temporary." A temporary impairment charge results in an unrealized loss being recorded in the other comprehensive income component of stockholders' equity. Such an unrealized loss does not reduce net income for the applicable accounting period because the loss is not viewed as other-than-temporary. We believe that a portion of the impairment of our auction rate securities investments is temporary and a portion is other-than-temporary.

Risks Related to our Common Stock

Our stock price has been volatile, and the value of an investment in our common stock may decline.

The market price and trading volume of our common stock has been subject to significant volatility, and this trend may continue. The value of our common stock may decline regardless of our operating performance or prospects. Factors affecting our market price include:

- initiation of coverage by securities analysts, securities analysts' buy/sell recommendations and any expressed beliefs of securities analysts regarding our business prospects or estimated trading multiples;
- our perceived prospects;
- variations in our operating results and whether we have achieved our key business targets;
- the limited number of shares of our common stock available for purchase or sale in the public markets;
- sales or purchases of large blocks of our stock;
- changes in, or our failure to meet, our earnings estimates;
- differences between our reported results and those expected by investors and securities analysts;
- decreases in our trading multiples on an absolute basis or relative to comparable companies;
- announcements of new contracts by us or our competitors;
- market reaction to any future acquisitions, joint ventures or strategic investments announced by us or our competitors;
- developments in the financial markets;
- market reaction to any adverse publicity or news stories; and
- general economic, political or stock market conditions.

Recent events have caused stock prices for many companies, including ours, to fluctuate in ways unrelated or disproportionate to their operating performance. The general economic, political and stock market conditions that may affect the market price of our common stock are beyond our control. The market price of our common stock at any particular time may not remain the market price in the future. In the past, securities class action litigation has been instituted against companies following periods of volatility in the market price of their securities. Any such litigation, if instituted against us, could result in substantial costs and a diversion of management's attention and resources.

Delaware law may delay or prevent a change in control, and may discourage bids for our common stock at a premium over its market price.

We are subject to the provisions of section 203 of the Delaware General Corporation Law. These provisions prohibit large stockholders, in particular a stockholder owning 15% or more of the outstanding voting stock, from consummating a merger or combination with a corporation unless this stockholder receives board approval for the transaction or 66 2/3% of the shares of voting stock not owned by the stockholder approve the merger or transaction. These provisions of Delaware law may have the effect of delaying, deferring or preventing a change in control, and may discourage bids for our common stock at a premium over its market price.

ITEM 1B. *UNRESOLVED STAFF COMMENTS*

Not applicable.

ITEM 2. *PROPERTIES*

We serve our markets through four operating segments with manufacturing facilities in several locations across the United States, one in Canada, two in China, one in Europe and one in India. Please see the table under the caption "Operating Segments and Facilities" in Item 1 of this report for a summary of our facilities and products comprising our four operating segments.

ITEM 3. *LEGAL PROCEEDINGS*

Ceradyne is from time to time involved in various legal proceedings that are incidental to its business. However, to management's knowledge, there currently are no material pending legal proceedings involving Ceradyne of any of its subsidiaries.

ITEM 4. *MINE SAFETY DISCLOSURES*

Not applicable.

PART II

ITEM 5. *MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES*

Our common stock is traded on the NASDAQ Stock Market under the symbol "CRDN." The following table shows the high and low closing sale prices for our common stock as reported by the NASDAQ Stock Market during the calendar quarters indicated:

	High	Low
Year Ended December 31, 2010		
First Quarter	$24.21	$19.25
Second Quarter	$23.58	$19.97
Third Quarter	$25.71	$19.85
Fourth Quarter	$31.79	$22.63
Year Ended December 31, 2011		
First Quarter	$46.04	$31.61
Second Quarter	$49.40	$36.22
Third Quarter	$38.44	$24.91
Fourth Quarter	$35.48	$26.32

As of February 9, 2012, there were 333 holders of record of our common stock.

Prior to 2012, we had not declared or paid any cash dividends on our common stock. On February 16, 2012, we announced that our Board of Directors had declared our initial cash dividend in the amount of $0.15 per share of common stock, payable on March 20, 2012 to shareholders of record as of the close of business on March 6, 2012. It is our current intention that we will declare and pay a similar cash dividend on a quarterly basis, although our Board reserves discretion to suspend or discontinue cash dividends at any time.

We did not sell any equity securities during the year ended December 31, 2011 that were not registered under the Securities Act of 1933.

On March 4, 2008, we announced that our board of directors had authorized the repurchase and retirement of up to $100 million of our common stock in open market transactions, including block purchases, or in privately negotiated transactions. We completed the $100 million of purchases under this authorization in September 2011. On August 31, 2011, we announced that our board of directors had authorized the repurchase and retirement of up to an additional $100 million of our common stock in open market transactions, including block purchases, or in privately negotiated transactions. We did not set a time limit for completion of this repurchase program, and we may suspend or terminate it at any time. We did not repurchase any shares of our common stock during the quarter ended December 31, 2011. Consequently we have $100.0 million remaining under this authorization.

ITEM 6. *SELECTED FINANCIAL DATA*

The following selected consolidated financial data as of December 31, 2007, 2008 and 2009 and for the years ended December 31, 2007 and 2008 are derived from our audited consolidated financial statements for those periods, which are not included in this report. The selected consolidated financial data as of December 31, 2010 and 2011 and for the years ended December 31, 2009, 2010 and 2011 are derived from our audited consolidated financial statements which are included in this report beginning on page F-1. The following data is qualified in its entirety by and should be read in conjunction with "Management's Discussion and Analysis of

Financial Condition and Results of Operations," and our consolidated financial statements and the related notes included elsewhere in this report.

	Year Ended December 31,				
	2011[1]	2010	2009[2]	2008[3]	2007[4]
	(amounts in thousands, except per share data)				
Statement of Income Data:					
Net sales	$571,982	$402,938	$400,575	$680,197	$756,835
Cost of product sales	365,337	295,078	298,956	414,885	450,787
Gross profit	206,645	107,860	101,619	265,312	306,048
Operating expenses:					
Selling, general and administrative	74,325	61,940	65,643	75,120	67,718
Research and development	12,446	11,692	12,258	14,782	17,552
Restructuring — plant closure and severance	914	3,505	12,924	—	—
Acquisition related (credits) charges	(17,298)	1,567	(768)	9,824	—
Goodwill impairment	7,797	—	3,832	—	—
Total operating expenses	78,184	78,704	93,889	99,726	85,270
Income from operations	128,461	29,156	7,730	165,586	220,778
Other income (expense):					
Interest income	3,991	5,355	4,091	7,553	12,394
Interest expense	(6,620)	(6,247)	(7,119)	(7,876)	(7,618)
Gain on early extinguishment of debt	—	—	1,881	—	—
Gain (loss) on auction rate securities	630	(978)	(5,187)	(5,870)	(2,114)
Miscellaneous, net	1,494	1,085	(979)	1,511	(311)
Total other income (expense)	(505)	(785)	(7,313)	(4,682)	2,351
Income before provision (benefit) for income taxes	127,956	28,371	417	160,904	223,129
Provision (benefit) for income taxes	44,068	(905)	(8,098)	56,424	80,946
Net income	$ 83,888	$ 29,276	$ 8,515	$104,480	$142,183
Net income per share:					
Basic	$ 3.41	$ 1.16	$ 0.33	$ 3.95	$ 5.22
Diluted	$ 3.38	$ 1.15	$ 0.33	$ 3.91	$ 5.13
Weighted average number of common shares outstanding:					
Basic	24,614	25,191	25,684	26,446	27,252
Diluted	24,786	25,370	25,802	26,689	27,732

	As of December 31,				
	2011	2010	2009	2008	2007
Balance Sheet Data:					
Cash, cash equivalents and short term investments	$275,047	$246,296	$239,820	$221,422	$184,685
Working capital	379,154	414,414	406,207	400,835	353,923
Total assets	948,131	865,313	849,704	854,527	782,654
Current portion of long-term debt	89,294	—	—	—	—
Total long-term debt	—	85,599	82,163	102,631	98,748
Stockholders' equity	708,698	652,209	649,717	638,994	591,817

(1) The operations of VIOX Corporation have been consolidated with ours since January 3, 2011.

(2) The operations of Diaphorm have been consolidated with ours since June 1, 2009.

(3) The operations of SemEquip, Inc. have been consolidated with ours since August 11, 2008.

(4) The operations of Minco, Inc. have been consolidated with ours since July 10, 2007. The operations of Ceradyne Boron Products have been consolidated with ours since September 1, 2007.

ITEM 7. *MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS*

The following discussion and analysis of our financial condition and results of operations should be read together with "Selected Consolidated Financial Data," and our consolidated financial statements and related notes included elsewhere in this report. This discussion and analysis contains forward-looking statements that involve risks and uncertainties. We base these statements on assumptions that we consider reasonable. Our actual results could differ materially from those anticipated in these forward-looking statements as a result of certain factors discussed in "Note Regarding Forward-Looking Statements," "Item 1A — Risk Factors," and elsewhere in this report.

Overview

We develop, manufacture and market advanced technical ceramic products, ceramic powders and components for defense, industrial, energy, automotive/diesel and commercial applications. Our products include:

- lightweight ceramic armor for soldiers and other military applications;
- ceramic industrial components for erosion and corrosion resistant applications;
- ceramic powders, including boron carbide, boron nitride, titanium diboride, calcium hexaboride, zirconium diboride and fused silica, which are used in manufacturing armor and a broad range of industrial products and consumer products;
- evaporation boats for metallization of materials for food packaging and other products;
- durable, reduced friction, ceramic diesel engine components;
- functional and frictional coatings primarily for automotive applications;
- translucent ceramic orthodontic brackets;
- ceramic-impregnated dispenser cathodes for microwave tubes, lasers and cathode ray tubes;
- specialty glass compositions for solar, electronic, industrial and health care markets;
- ceramic crucibles for melting silicon in the photovoltaic solar cell manufacturing process;
- ceramic missile radomes (nose cones) for the defense industry;

- fused silica powders for precision investment casting (PIC);
- neutron absorbing materials, structural and non-structural, in combination with aluminum metal matrix composite that serve as part of a barrier system for spent fuel wet and dry storage in the nuclear industry, and non-structural neutron absorbing materials for use in the transport of nuclear fresh fuel rods;
- nuclear chemistry products for use in pressurized water reactors and boiling water reactors;
- boron dopant chemicals for semiconductor silicon manufacturing and for ion implanting of silicon wafers;
- ceramic bearings and bushings for oil drilling and fluid handling pumps;
- ceramic micro-reactors used to process chemicals;
- PetroCeram® sand filters for oil and gas recovery; and
- enhanced combat helmets for soldiers.

Our customers include the U.S. government, prime government contractors, companies engaged in solar energy, oil and natural gas exploration and nuclear energy, and large industrial, automotive, diesel and commercial manufacturers in both domestic and international markets.

Prior to October 2010, we reported our operations through six operating segments. To more accurately reflect our current operations, executive reporting structure and organization, and internal reporting we modified our segment structure and reporting to reflect that we operate through four operating segments, each led by a different senior executive who reports directly to our Chief Executive Officer. The changes made to arrive at the four segments from the six previous segments were that the former Semicon Associates segment is now included in the Advanced Ceramic Operations segment and the former Ceradyne Canada segment is now included in the Boron segment. All of the financial data for 2010 and 2009 have been changed to reflect four segments.

The following table includes a summary of our products by applications and locations as of December 31, 2011 for our four segments:

Operating Segment and Facility Location	Products
Ceradyne Advanced Ceramic Operations Costa Mesa and Irvine, California Approximately 216,000 square feet Lexington, Kentucky Approximately 150,000 square feet Wixom, Michigan Approximately 29,000 square feet Salem, New Hampshire Approximately 16,000 square feet Mountain Green, Utah Approximately 18,000 square feet Bangalore, India Approximately 21,000 square feet Seattle, Washington Approximately 40,000 square feet	*Defense Applications:* • Lightweight ceramic armor • Enhanced combat helmets *Industrial Applications:* • Ceralloy® 147 SRBSN wear parts • Precision ceramics • Ceramic-impregnated dispenser cathodes for microwave tubes, lasers and cathode ray tubes *Energy Applications:* • Ceramic bearings and bushings • Specialty glass compounds for photovoltaic solar applications *Automotive/Diesel Applications:* • Ceralloy® 147 SRBSN automotive/diesel engine parts Commercial Applications: • Ceramic orthodontic brackets • Components for medical devices • Specialty glass compounds for health care products

Operating Segment and Facility Location	Products
ESK Ceramics Kempten, Germany Approximately 599,000 square feet	*Defense Applications:* • Boron carbide powders for body armor *Industrial Applications:* • Ceramic powders: boron carbide, boron nitride, titanium diboride, calcium hexaboride and zirconium diboride • Silicon carbide parts • Evaporation boats for the packaging industry • High performance fluid handling pump seals *Energy Applications:* • PetroCeram® sand filters • TETRABOR® nuclear powders *Automotive/Diesel Applications:* • EKagrip® functional and frictional coatings *Commercial Applications:* • BORONEIGE® boron nitride powder for cosmetics
Ceradyne Thermo Materials Scottdale and Clarkston, Georgia Approximately 225,000 square feet Tianjin, China Approximately 316,000 square feet Midway, Tennessee Approximately 105,000 square feet	*Defense Applications:* • Missile radomes (nose cones) • High purity fused silica used to manufacture missile radomes (nose cones) *Industrial Applications:* • Glass tempering rolls • Metallurgical tooling • Castable and other fused silica products • Turbine components used in aerospace applications *Energy Applications:* • Crucibles for photovoltaic solar cell applications • High purity fused silica used to manufacture crucibles
Boron Quapaw, Oklahoma Approximately 128,000 square feet Chicoutimi, Quebec, Canada Approximately 86,000 square feet	*Energy Applications:* • Nuclear chemistry products for use in pressurized water reactors and boiling water reactors • Radioactive containment for use in spent fuel transport and storage • Burnable poisons for coating of uranium fuel pellets • Boral® structural neutron absorbing materials • Metal matrix composite structures *Industrial Applications:* • Cluster molecules such as B18H22 for ion implantation for next generation P-dopants • Advanced ion source materials for the manufacture of logic and memory chips

The tables below show, for each of our four segments, revenues and income before provision for income taxes in the periods indicated.

Segment revenues (in millions):

	Year Ended December 31,		
	2011	2010	2009
Advanced Ceramic Operations	$277.5	$152.6	$221.8
ESK Ceramics	163.6	130.7	105.1
Thermo Materials	98.9	98.8	66.1
Boron	55.4	35.0	29.0
Inter-segment elimination	(23.4)	(14.2)	(21.4)
Total revenue from external customers	$572.0	$402.9	$400.6

Segment income (loss) from operations and income before taxes (in millions):

	Year Ended December 31,		
	2011	2010	2009
Advanced Ceramic Operations	$ 60.3	$(23.1)	$ 25.0
ESK Ceramics	30.8	21.1	(21.5)
Thermo Materials	20.0	34.0	14.7
Boron	16.9	(2.4)	(11.0)
Inter-segment elimination	0.5	(0.4)	0.5
Total segment income from operations	128.5	29.2	7.7
Other expense	(0.5)	(0.8)	(7.3)
Total income before provision for taxes	$128.0	$ 28.4	$ 0.4

We categorize our products into five market applications or sectors of the general economy. The tables below show the amount of sales (in millions) and the percentage contribution of our total sales to external customers of each market application or sector of the economy in the different time periods.

Sales by Market Application (in millions):

	Year Ended December 31,		
	2011	2010	2009
Defense	$225.3	$117.3	$198.7
Industrial	163.2	138.6	102.7
Energy	129.0	99.9	62.2
Automotive/Diesel	40.1	35.9	25.2
Commercial	14.4	11.2	11.8
Total	$572.0	$402.9	$400.6

Percentage Contribution of Sales by Market Application:

	Year Ended December 31,		
	2011	2010	2009
Defense	39.4%	29.1%	49.6%
Industrial	28.6	34.4	25.6
Energy	22.5	24.8	15.5
Automotive/Diesel	7.0	8.9	6.3
Commercial	2.5	2.8	3.0
Total	100.0%	100.0%	100.0%

The principal factor contributing to our growth in sales from 2002 through 2007 was increased demand by the U.S. military for ceramic body armor that protects soldiers, which was driven primarily by military conflicts such as those in Iraq and Afghanistan. This demand was driven by recognition of the performance and life saving benefits of utilizing advanced technical ceramics in lightweight body armor. Our sales declined in 2008 primarily because of a reduction in shipments of body armor. Our sales declined in 2009 primarily because of a continued reduction in shipments of body armor and also due to a decline in sales of our industrial, automotive/diesel and commercial market product lines due to the severe economic recession. In 2010, sales of body armor continued to decline. However, sales from energy related products grew by 61.6% in 2010 when compared to 2009. Most of this growth in energy sales was generated by sales of our ceramic crucibles used in the production of photovoltaic cells for solar panels. Additionally, sales of industrial and automotive/diesel products rebounded sharply, particularly at our ESK Ceramics subsidiary. In 2011, our sales increased due to higher shipments of body armor due to the increased demand for ESAPI body armor, an increase of sales to the nuclear industry, and continuing growth of sales at our ESK Ceramics subsidiary. Commencing in 2004, several strategic acquisitions, which are described below, have also contributed to our sales growth.

To illustrate the impact of body armor, energy-related products and our acquisitions, the following table shows our sales from body armor, from energy-related products, from our acquisitions, and from all other sources for each of the years 2002 through 2011 (in millions).

	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002
Sales from body armor	$193.8	$ 70.4	$170.0	$385.0	$535.3	$479.4	$199.5	$120.3	$ 58.2	$26.2
Sales from energy products:										
Gross sales from energy products	129.0	99.9	62.2	57.7	20.9	11.9	9.8	5.3	2.5	1.7
Less sales from energy products included in acquisitions	(66.2)	(28.5)	(24.5)	(11.4)	(4.5)	(3.2)	(3.2)	(0.7)	—	—
Sales from energy products due to organic growth	62.8	71.4	37.7	46.3	16.4	8.7	6.6	4.6	2.5	1.7
Sales from acquisitions	254.5	191.1	136.8	177.1	142.6	110.2	109.8	36.0	—	—
All other sales	60.9	70.0	56.1	71.8	62.5	64.6	52.4	54.7	40.8	33.3
Total sales	$572.0	$402.9	$400.6	$680.2	$756.8	$662.9	$368.3	$215.6	$101.5	$61.2

Sales of ceramic body armor represented the majority, and most volatile, portion of our defense business, rising from approximately $26.2 million, or 42.8% of our total sales in 2002, to a peak of approximately $535.3 million, or 70.7% of our total sales in 2007, and then declining to approximately $193.8 million, or 33.9% of our total sales in 2011.Shipments of the first generation of ceramic body armor, known as small armed protective inserts, or SAPI, began before 2002 and accelerated rapidly with the onset of the war in Afghanistan in 2002 and thereafter the war in Iraq. Shipments of the second generation of ceramic body armor, known as enhanced small armed protective inserts, or ESAPI, began in 2005. The military's subsequent decision to deploy ESAPI body armor "full fleet," that is, to replace all SAPI body armor with the new ESAPI body armor, and the introduction in 2006 of enhanced side ballistic inserts, known as ESBI, which protect the sides of the soldier's torso, resulted in continued growth in our sales of ceramic body armor, ultimately reaching our peak sales of body armor in 2007. Once "full fleet" was achieved, our sales of body armor began a steady decline which continued through 2010.

In October 2008, we were awarded an Indefinite Delivery/Indefinite Quantity, or ID/IQ, contract by the U.S. Army for the next ballistic threat generation of ceramic body armor plates, called XSAPI, as well as for the current generation ESAPI plates. This five-year contract has a maximum value of $2.37 billion and allows the U.S. Army to order either XSAPI or ESAPI body armor from us. Through December 31, 2011, we have shipped $258.3 million of body armor against delivery orders received by us under this ID/IQ contract, and we expect to ship an additional $20.1 million under existing orders during 2012. With less than three years remaining under this ID/IQ contract and the war in Iraq concluded and the war in Afghanistan winding down, we expect that the total amount of body armor that we ultimately ship under this contract will be substantially less than the maximum amount.

For 2012 and for the next several years, we expect that our sales of body armor will continue, but at more moderate levels than in the past. We believe there will continue to be a viable replacement business for body armor inserts that is procured through the Defense Supply Center Philadelphia (DSCP) and directly through the Army. We will also continue to bid on Foreign Military Sales (FMS) for the first generation of SAPI body armor through our existing ID/IQ contract with Aberdeen Proving Grounds.

Although we believe that demand for ceramic body armor will continue for many years, the quantity and timing of government orders depends on a number of factors outside of our control, such as the amount of U.S. defense budget appropriations, positions and strategies of the current U.S. government, the level of international conflicts and the deployment of armed forces. Moreover, ceramic armor contracts generally are awarded in an open competitive bidding process and may be cancelled by the government at any time without penalty. Therefore, our future level of sales of ceramic body armor will depend on our ability to successfully compete for and retain this business.

The following acquisitions resulted from a strategy to grow and expand our non-defense business through the selective acquisition of companies and product lines closely related to our core competency in advanced technical ceramics and materials, as well as to expand our defense business with complementary product lines on an opportunistic basis.

We acquired ESK Ceramics in August 2004. Based in Kempten, Germany, ESK Ceramics manufactures industrial technical ceramic powders and advanced technical ceramic products. This acquisition provided us with both a broad line of non-defense products, and it assured us of a supply of boron carbide powder, which serves as a starter ceramic powder in the manufacture of our lightweight ceramic body armor. The lower demand for body armor in 2008 through 2010 has negatively impacted inter-segment sales of boron carbide powder by our ESK Ceramics subsidiary to our Advanced Ceramic Operations division.

In June 2006, we purchased the assets and technology related to the Boral® line of aluminum metal matrix composites that serve as part of a barrier system for spent fuel storage in the nuclear industry. We moved these assets to our Ceradyne Canada facility in Chicoutimi, Quebec, Canada. This product line is now included in our Boron operating segment.

Minco, Inc., which we acquired in July 2007, is included in our Thermo Materials operating segment. Based in Midway, Tennessee, Minco manufactures fused silica powders for a wide range of industrial applications. The fused silica powder manufactured by Minco is a key raw material that our Thermo Materials division uses to manufacture missile radomes (nose cones) and ceramic crucibles that our customers use for melting silicon in the photovoltaic solar cell manufacturing process.

We acquired EaglePicher Boron, LLC in August 2007. This subsidiary, which we renamed Boron Products, LLC, is included in our Boron operating segment and produces the boron isotope ^{10}B. This isotope is a strong neutron absorber and is used for both nuclear waste containment and nuclear power plant neutron radiation critical control. Boron Products also produces complementary chemical isotopes used in the normal operation and control of nuclear power plants. The boron isotope ^{11}B is used in the semiconductor manufacturing process as an additive to semiconductor grade silicon as a "doping" agent and where ultra-high purity boron is required.

In June 2008, we purchased certain assets and technology related to proprietary technical ceramic bearings used for "down hole" oil drilling and for coal bed methane pumps and steam assisted oil extraction pumps. This technology and product line, which we include in our Advanced Ceramic Operations operating segment, are located in our Lexington, Kentucky, facility. These bearings incorporate ceramic parts supplied by our ESK Ceramics subsidiary.

In August 2008, we acquired SemEquip, Inc., a late-stage startup technology company located in Billerica, Massachusetts. SemEquip develops and markets "cluster molecules" such as $B_{18}H_{22}$ for use in the ion implantation of boron (B) in the manufacture of semiconductors. SemEquip, which we include in our Boron operating segment, owns a portfolio of 37 issued and 22 pending U.S. patents, and corresponding issued and pending patents in several foreign countries. In November 2011, SemEquip licensed its cluster ion implant hardware technology on a non-exclusive basis to a key customer. In connection with the license, SemEquip transferred its hardware related assets to the licensee and reduced its workforce which included production,

research and development, and support staff in Billerica, Massachusetts. SemEquip will continue to market its cluster ion chemistry to the semiconductor industry. We recognized a restructuring charge of $0.9 million in 2011 primarily for severance and related compensation associated with the headcount reduction, most of which was paid in 2011.

In June 2009, we acquired substantially all of the business and assets and all technology and intellectual property related to ballistic combat and non-combat helmets of Diaphorm Technologies, LLC, based in Salem, New Hampshire. Based on this technology, we submitted a proposal to the U.S. Marine Corps Systems Command in June 2009 in response to a solicitation for the procurement of Enhanced Combat Helmets (ECH), which are intended to provide substantially increased levels of protection compared to combat helmets now in use. In late July 2009, in response to our proposal, the U.S. Marine Corps System Command awarded us a contract for up to a maximum of 246,840 helmets. After an extended period of testing, we received an order for First Article Test helmets, which we delivered in January and February 2011. Upon additional testing it was determined by the Government that further testing was needed due to variations discovered in its test procedures and protocols. Ceradyne received a second order for First Article Test helmets, which we delivered for testing in October 2011. Those helmets are now in the final stages of First Article Testing by the U.S. Government. Our strategy regarding this acquisition is to combine our successful track record in body armor programs with the proprietary helmet-forming technologies acquired from Diaphorm to create a world class manufacturer of Enhanced Combat Helmets.

We acquired VIOX Corporation on January 3, 2011. Located in Seattle, Washington, VIOX develops, manufactures and markets specialty glass compositions for a wide range of electronic, industrial and health care markets. VIOX is included in our Advanced Ceramic Operations operating segment. VIOX has developed a specialty glass formulation for polycrystalline silicon photovoltaic solar applications. VIOX' customers add electrically conducting powdered metals such as silver or aluminum to the VIOX powdered specialty glass. Many of the ultimate solar users of VIOX' glass are also customers for Ceradyne's high purity ceramic solar crucibles.

Our order backlog was $284.9 million as of December 31, 2011 and $185.8 million as of December 31, 2010. Orders for ceramic armor (encompassing body, vehicle and other miscellaneous armor) represented approximately $175.9 million, or 61.7% of the total backlog as of December 31, 2011 and $83.4 million, or 44.9% of the total backlog as of December 31, 2010. Of the total ceramic armor, orders for ceramic body armor amounted to approximately $168.5 million, or 59.1% of the total backlog as of December 31, 2011 and $78.4 million, or 42.2% of the total backlog as of December 31, 2010. We expect that substantially all of our order backlog as of December 31, 2011 will be shipped during 2012.

Our sales to customers located in the United States have varied in recent years, representing $312.4 million, or 54.6% of net sales in 2011, $194.5 million, or 48.3% of net sales in 2010, and $264.8 million, or 66.1% of net sales in 2009. Our sales to customers located outside of the United States represented $259.6 million, or 45.4% of net sales in 2011, $208.4 million, or 51.7% of net sales in 2010, and $135.8 million, or 33.9% of net sales in 2009. We currently have sales offices in Germany, China, England and Canada as well as commissioned independent sales representatives in other parts of Europe and Asia. Of our sales to customers located outside the United States, 41.2% were denominated in U.S. dollars during 2011.

Net Sales. Our net sales consist primarily of revenues from the sale of products, which we recognize when an agreement of sale exists, the product has been delivered according to the terms of the sales order and collection is reasonably assured. We may reduce revenue with reserves for sales returns. Allowances for sales returns, which are recorded at the time revenue is recognized, are based upon historical sales returns. We did not include a sales return provision at December 31, 2011, 2010 and 2009 because our historical experience with sales returns leads us to conclude that no allowance for sales returns is necessary.

We do not record a warranty reserve on the sale of our products. For our largest product line, body armor, all of which is sold to the U.S. government, each lot of body armor is tested at an independent laboratory and the lot cannot be released for shipment to the U.S. government until positive test results are received by both the U.S. government and us. For our non-body armor sales, we have experienced minimal claims from these types of sales. Additionally, due to the inherent nature, strength, durability and structural properties of ceramics, as well

as a rigid quality control program that includes, for some of our customers, having the customer accept quality test results prior to shipment, we do not believe a warranty reserve is necessary.

Cost of Product Sales. Our cost of product sales includes the cost of materials, direct labor expenses and manufacturing overhead expenses. Our business requires us to maintain a relatively high fixed manufacturing overhead. As a result, our gross profit, in absolute dollars and as a percentage of net sales, is greatly impacted by our sales volume and the corresponding absorption of fixed manufacturing overhead expenses. Additionally, because many of our products are customized, we are frequently required to devote resources to sustaining engineering expenses associated with production efforts, which we also include in cost of product sales.

The cost of electricity comprises a significant portion of our cost of product sales. Our high electricity utilization is a direct result of the use of high temperature furnaces to hot press ceramic body armor inserts and to produce sintered silicon nitride ("Si_3N_4") for industrial products. Several years ago, we recognized the need to mitigate the cost of electricity and in 2003 we embarked on a plan to move production from California to Lexington, Kentucky. To date, we have moved all of our Si3N4 furnaces to Kentucky and have established three new hot press lines in Kentucky. During the fourth quarter of 2010, we closed our hot press manufacturing operation in Costa Mesa, California as a result of reduced demand for ceramic body armor and the high cost of doing business in the State, especially the high cost of electricity, which is integral to our manufacturing operations. The electricity cost in Kentucky is more stable than California because of the presence of coal fired power plants. The price of electricity in Kentucky has been stable for the past three years and is projected by our supplier to continue to be stable over the next few years. We have a policy of locating new production facilities that require high levels of electricity in regions of the world that have either available hydroelectric or coal fired power plants.

The cost of electricity for our manufacturing operations in the United States, Canada, Europe, China and India was approximately $19.2 million, or 5.3% as a percentage of cost of product sales in 2011, $14.7 million, or 5.0% as a percentage of cost of product sales in 2010, and approximately $12.7 million, or 4.2% as a percentage of cost of product sales in 2009. Management utilizes utility industry specialists and consultants to help manage and implement strategies to minimize annual energy price increases at our all our facilities. These strategies may include entering into long term contracts to obtain fixed price increases in order to increase our ability to accurately forecast future energy costs and ensure a stable cost structure. Fluctuations in the cost of electricity affect our ability to accurately forecast future energy costs and consequently our profitability. If the cost of electricity were to increase substantially, our gross profit margins may decline.

With regard to significant costs for raw materials that impact our gross margins, we rely on two critical materials to make ceramic body armor: boron carbide powder, which is the principal raw material used in the production of ceramic armor plates, and an ultra-high molecular weight polyethylene textile material, which we laminate to the surface of the ceramic armor plates and is readily available from multiple suppliers. We obtain substantially all of our boron carbide powder from our subsidiary, ESK Ceramics, which has been a supplier of boron carbide powder to us for over 30 years. Boron carbide is made from borax and boric acid through a complicated furnace process. Historically, these raw material products have not experienced significant price and supply instability and consequently we have been able to obtain sufficient quantities of boron carbide material from ESK Ceramics. We have further identified a second source of boron carbide from a supplier that utilizes crude boron carbide from China and does the finishing in the United States. The crude boron carbide from China is inexpensive and offers a method to mitigate any internal cost increases at ESK Ceramics through the use of lower cost China material as part of the ESK Ceramics' raw material mix.

Selling, General and Administrative Expenses. Our selling expenses consist primarily of salaries and benefits for direct sales and marketing employees, commissions for direct sales employees and for independent sales representatives, trade show expenses, rent for our sales offices, product literature, and travel and entertainment expenses. Our general and administrative expenses consist primarily of employee salaries and benefits, employee bonuses, which are computed quarterly and accrued in the quarter earned, professional service fees, rent for facilities and expenses for information technology.

Research and Development Expenses. Our research and development expenses consist primarily of employee salaries and benefits, materials and supplies related to ongoing application engineering in response to customer requirements for future products, and the research and development of new materials technology and products. These costs are expensed as incurred.

Results of Operations

The following table sets forth certain income and expense items from our financial statements for the years ended December 31, 2011, 2010 and 2009 expressed as a percentage of net sales.

	Year Ended December 31,		
	2011	2010	2009
Net sales	100.0%	100.0%	100.0%
Cost of product sales	63.9	73.2	74.6
Gross profit	36.1	26.8	25.4
Operating expenses:			
Selling, general and administrative	13.0	15.4	16.4
Research and development	2.2	2.9	3.1
Restructuring — plant closure and severance	0.2	0.9	3.2
Acquisition related (credits) charges	(3.0)	0.4	(0.2)
Goodwill impairment	1.4	—	1.0
Income from operations	22.5	7.2	1.9
Other income (expense)	(0.1)	(0.2)	(1.8)
Income before provision for income taxes	22.4	7.0	0.1
Net income	14.7%	7.2%	2.1%

Year Ended December 31, 2011 Compared to Year Ended December 31, 2010

Net Sales

Our total net sales for the years ended December 31, 2011 and 2010 were as follows (dollars in millions):

	2011	2010
Net sales	$572.0	$402.9
Increase in net sales	$169.1	$ 2.3
Percentage change in net sales	42.0%	0.6%

Sales increased in 2011 in all five market applications, particularly in defense products. The principal factors contributing to this growth included renewed purchasing of ceramic body armor by the U.S. military, continued growth in sales of our ESK Ceramics operating segment, increased sales to the nuclear industry, the sales contribution from VIOX Corporation and the continued rebound of the economy in general.

Overall, net sales for the year ended December 31, 2011 of our defense related products were $225.3 million, an increase of $108.0 million, or 92.0%, from $117.3 million in the prior year as shipments of body armor were sharply higher due to increased demand from the U.S. military for ESAPI body armor. Sales for the year ended December 31, 2011 of energy products amounted to $129.0 million, an increase of $29.1 million, or 29.1%, from $99.9 million in the prior year as sales to the nuclear industry increased by $17.0 million and we included sales of $15.1 million to the energy markets from VIOX Corporation for the first time this year as they were acquired on January 3, 2011. These increases in sales to the energy markets were offset by a decline of $5.2 million in sales of ceramic crucibles to the solar energy industry. Sales for the year ended December 31, 2011 of industrial products amounted to $163.2 million, an increase of $24.6 million, or 17.8%, from $138.6 million in the prior year.

Sales of automotive/diesel products for the year ended December 31, 2011 were $40.1 million, an increase of $4.2 million, or 11.7%, from $35.9 million in the prior year. Sales to the automotive/diesel market represented 7.0% of sales for the year ended December 31, 2011 and 8.9% of sales for the year ended December 31, 2010.

Our net sales of commercial products for the year ended December 31, 2011 were $14.4 million, an increase of $3.2 million, or 28.8%, from $11.2 million in the prior year.

Our Advanced Ceramic Operations segment had net sales for the year ended December 31, 2011 and 2010 as follows (dollars in millions):

	2011	2010
Net sales	$277.5	$ 152.6
Increase (decrease) in net sales	$124.9	($ 69.2)
Percentage change in net sales	81.9%	(31.2%)

Contributing to the increase of $124.9 million in sales during for the twelve months ended December 31, 2011 were higher shipments of ceramic body armor that totaled $193.8 million, an increase of $123.4 million, or 175.2%, from $70.4 million in 2010. The primary reason for the increase was an increase in demand for shipments of ESAPI armor plates. This increase in body armor sales during the twelve month period ended December 31, 2011 was partially offset by a decrease in sales of vehicle armor. We shipped $2.6 million of vehicle armor for the twelve months ended December 31, 2011, a decrease of $19.9 million, or 88.2%, from $22.5 million in 2010. The decline was caused by a lack of orders of armor for the MRAP All Terrain Vehicle (M-ATV) and the High Mobility Multipurpose Wheeled Vehicle (HMMWV or Humvee) during the twelve months ended December 31, 2011 compared to 2010.

As of January 3, 2011, the date of acquisition, we began to include the financial results of VIOX Corporation in the Advanced Ceramic Operations segment. VIOX sales amounted to $20.3 million during the twelve months ended December 31, 2011.

Our ESK Ceramics segment had net sales for the year ended December 31, 2011 and 2010 as follows (dollars in millions):

	2011	2010
Net sales	$163.6	$130.7
Increase (decrease) in net sales	$ 32.9	$ 25.6
Percentage change in net sales	25.1%	24.4%

On a constant currency basis, sales for the year ended December 31, 2011 were $157.3 million, an increase of $26.6 million, or 20.3% from the prior year. We computed sales on a constant currency basis by calculating 2010 sales in actual Euros and applying a monthly average foreign exchange rate during 2010 of the Euro to the U.S. dollar sales during 2011, which was then compared to 2011 actual sales in U.S. dollars. Sales of industrial products for the year ended December 31, 2011 were $91.1million, an increase of $1.8 million, or 2.0%, from $89.3 million in the prior year. This increase was the result of a higher demand for fluid handling products, an increase in shipments of industrial parts for the packaging industry and an increase in shipments of composite coatings. Sales of defense products for the twelve months ended December 31, 2011 were $30.2 million, an increase of $17.5 million, or 137.1%, from $12.7 million in the prior year. Included in sales of defense products for the twelve months ended December 31, 2011 were inter-segment sales of $20.1 million compared to $12.0 million in the prior year. The increase of $8.2 million in inter-segment sales was due to an increase in demand for boron carbide powder used in body armor plates manufactured by our Advanced Ceramic Operations division. Sales of automotive/diesel products for the twelve months ended December 31, 2011 were $29.7 million, an increase of $3.9 million, or 15.0%, from $25.8 million in the prior year. Increased demand from automotive original equipment manufacturers accounted for the increase in sales. Sales of oil and gas products for the twelve months ended December 31, 2011 were $6.5 million, an increase of $2.3 million, or 54.4%, from $4.2 million in the prior year as we gained additional distribution to new customers in the oil services industry.

Our Thermo Materials segment had net sales for the year ended December 31, 2011 and 2010 as follows (dollars in millions):

	2011	2010
Net sales	$98.9	$98.8
Increase (decrease) in net sales	$ 0.1	$32.7
Percentage change in net sales	0.1%	49.5%

Sales were approximately unchanged for the twelve months ended December 31, 2011 compared to 2010. Sales of ceramic crucibles used in the manufacture of photovoltaic cells for the solar industry were $62.0 million, a decrease of $5.2 million, or 7.8%, from $67.2 million in the prior year. Sales during the first half of 2011 were strong but declined significantly over the course of the year. The decrease was due to a pronounced slowdown of demand in the solar energy market due to a reduction of government subsidies for the installation of solar panels and a buildup of an inventory of solar cells and solar wafers in distribution channels. Sales to the defense industry for the twelve months ended December 31, 2011 were $12.1 million, an increase of $0.9 million, or 8.1%, from $11.2 million when compared to the prior year. The increase was due to higher shipments of ceramic missile radomes. Sales of precision investment casting products were $36.5 million, an increase of $6.4 million, or 21.3%, from $30.1 million in the prior year. The increase was the result of the recovery of the domestic market for precision investment casting and price increases to customers.

Our Boron segment had net sales for the year ended December 31, 2011 and 2010 as follows (dollars in millions):

	2011	2010
Net sales	$55.4	$35.0
Increase (decrease) in net sales	$20.4	$ 6.0
Percentage change in net sales	58.3%	20.9%

The primary reasons for this increase in 2011 net sales were sales to the nuclear industry that totaled $41.7 million, an increase of $18.9 million, or 82.9% compared to $22.8 million in the prior year. Of the $18.9 million increase in sales to the nuclear industry, $8.7 million was in connection with the construction of two nuclear power plants located in Finland and France. Sales to the semiconductor industry were $10.4 million, an increase of $1.1 million, or 12.0%, from $9.3 million in the prior year.

Gross Profit

Our total gross profit for the years ended December 31, 2011 and 2010 were as follows (dollars in millions):

	2011	2010
Gross profit	$206.6	$107.9
Increase (decrease) in gross profit	$ 98.7	$ 6.3
Gross profit percentage	36.1%	26.8%

The increase in gross profit and gross profit as a percentage of net sales in the year ended December 31, 2011 were caused primarily by an improved sales mix, especially by increased sales of body armor, an increase in gross profit at our ESK segment due to increased sales and operating leverage and the pass through of price increases on certain industrial product lines at our ACO and ESK segments, and an increase in gross profit at our Boron segment due to increased sales to the nuclear industry and resulting increase in operating leverage. Our body armor product line was responsible for $68.9 million, or 69.7% of the total increase in gross profit during the year ended December 31, 2011.

Our Advanced Ceramics Operation segment had total gross profit for the years ended December 31, 2011 and 2010 as follows (dollars in millions):

	2011	2010
Gross profit	$90.6	$ 16.0
Increase (decrease) in gross profit	$74.6	($45.6)
Gross profit percentage	32.6%	10.6%

The primary reasons for the increase in gross profit and gross profit as a percentage of net sales in 2011 were higher volumes of production of body armor and industrial products resulting in increased absorption of manufacturing overhead expenses.

Our ESK Ceramics segment had total gross profit for the years ended December 31, 2011 and 2010 as follows (dollars in millions):

	2011	2010
Gross profit	$54.4	$39.7
Increase (decrease) in gross profit	$14.7	$25.2
Gross profit percentage	33.2%	30.4%

The increase in gross profit and gross profit as a percentage of net sales in 2011 were the result of price increases to customers for certain product lines, a favorable sales mix, a decrease in unabsorbed manufacturing overhead expenses caused by higher production volumes, and higher sales of all product lines due to increased demand for our products as a result of the recent slight economic rebound.

Our Thermo Materials segment had total gross profit for the years ended December 31, 2011 and 2010 as follows (dollars in millions):

	2011	2010
Gross profit	$ 37.6	$44.5
Increase (decrease) in gross profit	($ 6.9)	$22.0
Gross profit percentage	38.0%	45.1%

Gross profit decreased during the twelve month period ended December 31, 2011 primarily because of the decrease in unit sales and production of crucibles and a decline in unit sales prices due to pricing pressure from customers. Gross profit from the sales of crucibles during the first half of 2011 was strong but declined significantly over the course of the year due to a pronounced slowdown of demand in the solar energy market. During the twelve month period ended December 31, 2011, we incurred temporary quality issues relating to the production of our ceramic crucibles that resulted in increased scrap charges which reduced gross profit by $6.3 million and also reduced gross profit as a percentage of sales. These temporary quality issues were corrected as of mid-June 2011. We opened a new plant in China for the production of crucibles during February 2011 and incurred start-up expenses of approximately $1.1 million during the twelve month period ended December 31, 2011.

Our Boron segment had total gross profit for the years ended December 31, 2011 and 2010 as follows (dollars in millions):

	2011	2010
Gross profit	$23.6	$ 8.0
Increase (decrease) in gross profit	$15.6	$ 5.6
Gross profit percentage	42.6%	22.9%

The increases in gross profit and gross profit as a percentage of sales during the twelve month period ended December 31, 2011, were the result of higher sales to the semiconductor and nuclear industries, a favorable sales mix and improved absorption of fixed manufacturing costs.

Selling, General and Administrative Expenses. Our selling, general and administrative expenses for the years ended December 31, 2011 and 2010 were as follows (dollars in millions):

	2011	2010
Selling, general and administrative expenses	$74.3	$ 61.9
Increase (decrease) in selling, general and administrative expenses	$12.4	($ 3.7)
Percentage change in selling, general and administrative	20.0%	(5.6%)
Selling, general and administrative expenses; percentage of net sales	13.0%	15.4%

For the twelve months ended December 31, 2011, the increase of $12.4 million over the same period last year was caused by an increase of $1.3 million in information technology expenses, an increase of $2.0 million

due to the acquisition of VIOX Corporation which we included in our results beginning in 2011, an increase of $6.4 million in personnel expenses caused by a larger headcount of employees and employee bonuses due to the improved financial performance, increased selling expenses of $2.3 million and an increase of $2.9 million of general and administrative expenses associated with our new plant in China.

Research and Development Expenses. Our research and development expenses for the years ended December 31, 2011 and 2010 were as follows (dollars in millions):

	2011	2010
Research and development expenses	$12.4	$ 11.7
Increase (decrease) in research and development expenses	$ 0.8	($ 0.6)
Percentage change in research and development expenses	6.4%	(4.6%)
Research and development as a percentage of net sales	2.2%	2.9%

The primary reasons for the increase in research and development expenses were the addition in headcount and related personnel and travel expenses.

Restructuring — Plant Closure and Severance. Our restructuring — plant closure and severance expenses for the years ended December 31, 2011 and 2010 were as follows (dollars in millions):

	2011	2010
Restructuring — plant closure and severance	$ 0.9	$ 3.5
Increase (decrease) in restructuring — plant closure and severance	($ 2.6)	($ 9.4)
Percentage change in restructuring — plant closure and severance	(73.9%)	(72.9%)
Restructuring — plant closure and severance as a percentage of net sales	0.2%	0.9%

We recorded pre-tax restructuring and severance charges of $0.9 million for the year ended December 31, 2011 in connection with the closing of our SemEquip facility in Billerica, Massachusetts. We made this decision to close this facility in connection with a strategic decision to change SemEquip's business model from developing and marketing both cluster ion implant hardware and the cluster ion chemistry, to licensing the ion implant hardware and marketing only the cluster ion chemistry. In November 2011, SemEquip licensed its cluster ion implant hardware technology on a non-exclusive basis to a key customer and reduced its workforce which included production, research and development, and support staff in Billerica, Massachusetts. Accordingly, the Company recognized a restructuring charge of $0.9 million in 2011 primarily for severance and related compensation associated with the headcount reduction. This decision was consistent with our ongoing objective to lower the costs of our operations.

Acquisition Related Charges. Our acquisition related charges for the years ended December 31, 2011 and 2010 were as follows (dollars in millions):

	2011	2010
Acquisition related charges	($17.3)	$1.6
Increase (decrease) in acquisition related charges	($18.9)	$2.3
Percentage change in acquisition related charges	n/m*	n/m
Acquisition related charges as a percentage of net sales	(3.0%)	0.4%

* Not meaningful

We incurred an acquisition-related credit of $17.3 million for the year ended December 31, 2011 associated with the adjustment of economic assumptions regarding our purchase of the assets of Diaphorm, LLC in 2009, and our acquisitions of SemEquip in 2008 and VIOX in January 2011. During the fourth quarter of 2011, we revised the estimated future sales and earnings of Diaphorm, which caused an increase to the estimated acquisition liability and a charge to pre-tax earnings for the year ended December 31, 2011 of $1.1 million. Also during the fourth quarter of 2011, we revised the estimated future sales and earnings of SemEquip and VIOX,

which caused a decrease to the estimated acquisition liability and a credit to pre-tax earnings for the year ended December 31, 2011 of $6.9 million and $11.5 million, respectively for a net credit of $17.3 million. For additional information regarding Acquisition related charges and credits, refer to the discussion of acquisitions contained in Note 3 of Notes to Consolidated Financial Statements commencing at page F-17 of this report.

Goodwill Impairment. Our goodwill impairment expenses for the years ended December 31, 2011 and 2010 were as follows (dollars in millions):

	2011	2010
Goodwill impairment	$7.8	$ 0.0
Increase (decrease) in goodwill impairment	$7.8	($3.8)
Percentage change in goodwill impairment	n/m	n/m
Goodwill impairment as a percentage of net sales	1.4%	0.0%

We incurred a goodwill impairment charge of $7.8 million in the fourth quarter of 2011 for the goodwill associated with our VIOX Corporation business unit that is included in our ACO operating segment. The charge was a result of a sharp contraction during the fourth quarter of 2011 in the solar industry, which is a material part of VIOX' business and negatively impacted its 2011 business performance and future prospects. For additional information regarding this impairment charge and our annual test of goodwill for impairment, refer to the discussion of goodwill impairment contained in Note 2 of Notes to Consolidated Financial Statements commencing at page F-9 of this report.

Other Income (Expense). Our other income (expense) for the years ended December 31, 2011 and 2010 were as follows (dollars in millions):

	2011	2010
Other income (expense)	($ 0.5)	($ 0.8)
Increase (decrease) in other income (expense)	$ 0.3	$ 6.5
Percentage change in other income (expense)	(35.7%)	(89.3%)
Other income (expense) as a percentage of net sales	(0.1%)	(0.2%)

We earned $4.0 million in interest income compared to $5.4 million in the prior year because of the decline in interest rates and our strategy of shortening the maturity of our investments. We were reimbursed $0.8 million for legal fees during this fiscal year concerning a workers compensation matter. We earned additional early discounts on our accounts payable payments of $0.4 million in this fiscal year compared to last year when we did not earn any discounts. During the year ended December 31, 2010, we incurred losses on sales of securities of $0.3 million compared to this year when we had no losses on sales of securities. We incurred $1.0 million in losses on sales of auction rate securities during 2010 compared to a $0.6 million gain in 2011. We recorded gains on foreign currencies of $0.4 million during 2011 compared to $2.1 million in the prior year and we received $0.3 million of manufacturing incentive credits during 2011 for the operation of our Canadian business unit.

Income Taxes. Our (benefit) provision for income taxes for the years ended December 31, 2011 and 2010 were as follows (dollars in millions):

	2011	2010
(Benefit) provision for income taxes	$44.1	($ 0.9)
Increase (decrease) in (benefit) provision for income taxes	$45.0	$ 7.2
Percentage change in (benefit) provision for income taxes	n/m	n/m
Provision (benefit) for income taxes as the effective tax rate	34.4%	(3.2%)

Income taxes increased during the year ended December 31, 2011 because pre-tax income was higher in 2011 compared to 2010. The tax benefit in 2010 resulted from a net benefit of $5.4 million resulting from the settlement of a refund claim with the State of California and a $484,000 reversal of the liability for uncertain tax positions.

Year Ended December 31, 2010 Compared to Year Ended December 31, 2009

Net Sales

Our total net sales for the years ended December 31, 2010 and 2009 were as follows (dollars in millions):

	2010	2009
Net sales	$402.9	$ 400.6
Increase (decrease) in net sales	$ 2.3	$(279.6)
Percentage change in net sales	0.6%	(41.1)%

Sales increased due to higher shipments of crucibles to the solar energy market, an increase of industrial sales at our ESK Segment which were offset by a reduction in body armor shipments. Overall, net sales for the year ended December 31, 2010 of our defense related products were $117.3 million, a decrease of $81.4 million, or 41.0%, from $198.7 million in the prior year as shipments of body armor were sharply lower due to reduced demand from the U.S. military. Sales for the year ended December 31, 2010 of energy products amounted to $99.9 million, an increase of $37.6 million, or 60.6%, from $62.3 million in the prior year as sales of ceramic crucibles to the solar industry continued to grow. Sales for the year ended December 31, 2010 of industrial products amounted to $138.6 million, an increase of $35.9 million, or 35.0%, from $102.7 million in the prior year

Sales of automotive/diesel products for the year ended December 31, 2010 were $35.9 million, an increase of $10.8 million, or 42.7%, from $25.1 million in the prior year. Sales to the automotive/diesel market represented 8.9% of sales for the year ended December 31, 2010 and 6.3% of sales for the year ended December 31, 2009. The recent events in the automotive industry have not had a material impact on our results of operations or liquidity. We have not experienced any modifications to payment terms due to issues involving customer liquidity in this industry segment.

Our net sales of commercial products for the year ended December 31, 2010 were $11.2 million, a decrease of $0.6 million, or 5.2%, from $11.8 million in the prior year.

Our Advanced Ceramic Operations segment had net sales for the year ended December 31, 2010 and 2009 as follows (dollars in millions):

	2010	2009
Net sales	$ 152.6	$ 221.8
Increase (decrease) in net sales	($ 69.2)	($237.2)
Percentage change in net sales	(31.2)%	(51.7)%

The primary reason for lower 2010 net sales was that shipments of ceramic body and other armor components for defense customers amounted to $105.0 million, a decrease of $83.6 million, or 44.3%, from $188.6 million of net sales in the prior year. The primary reason for the decline in shipments was a reduction in demand for XSAPI and ESAPI body armor from us by the U.S. Army and our unsuccessful bid during the year ended December 31, 2010 for additional XSAPI body armor. Net sales of XSAPI body armor for the twelve months ending December 31, 2010 were $28.6 million. Offsetting the decline in body armor were sales of combat vehicle armor amounting to $21.3 million, an increase of $8.1 million, or 61.4%, from $13.2 million and an increase in 2010 sales of automotive/diesel products to $7.7 million, an increase of $4.2 million, or 119.0%, from $3.5 million due primarily to the increase in production of heavy-duty diesel trucks. In addition, sales of industrial wear products increased by $4.2 million in 2010, due to the slight rebound in general economic conditions.

Our ESK Ceramics segment had net sales for the year ended December 31, 2010 and 2009 as follows (dollars in millions):

	2010	2009
Net sales	$130.7	$ 105.1
Increase (decrease) in net sales	$ 25.6	($ 47.1)
Percentage change in net sales	24.4%	(31.0)%

On a constant currency basis, sales for the year ended December 31, 2010 were $135.7 million, an increase of $30.6 million from the prior year. We computed sales on a constant currency basis by calculating 2009 sales in actual Euros and applying a monthly average foreign exchange rate of the Euro to the U.S. dollar during 2010, which was then compared to 2010 actual sales in U.S. dollars. Sales of industrial products for the year ended December 31, 2010 were $89.3 million, an increase of $25.0 million, or 39.0%, from $64.3 million in the prior year. Sales of automotive/diesel products for the year ended December 31, 2010 were $25.8 million, an increase of $5.7 million, or 28.3%, from $20.1 million in the prior year. The increases in sales for industrial and automotive/diesel products were the result of our achieving increase in unit prices of several product lines and a slight rebound in general economic conditions during 2010. Sales of defense products for the year ended December 31, 2010 were $12.7 million, a decrease of $5.7 million, or 30.8%, from $18.4 million in the prior year. Included in sales of defense products for the year ended December 31, 2010 were inter-segment sales of $12.0 million compared to $16.0 million in the prior year, a decrease of $4.0 million of shipments to our Advanced Ceramic Operations segment. The balance of the decrease was due to a reduction in sales of boron carbide powder to third parties in the defense industry for the year ended December 31, 2010, because their sales of ceramic body armor declined.

Our Thermo Materials segment had net sales for the year ended December 31, 2010 and 2009 as follows (dollars in millions):

	2010	2009
Net sales	$98.8	$ 66.1
Increase (decrease) in net sales	$32.7	($ 14.1)
Percentage change in net sales	49.5%	(17.5%)

The primary reasons for this increase were sales of ceramic crucibles to the solar industry totaling $67.2 million, an increase of $31.6 million, or 88.5%, from $35.6 million of sales in the prior year. Average unit selling prices of ceramic crucibles were constant during the year ended December 31, 2010 compared to the year ended December 31, 2009. Selling prices declined slightly in the first quarter of 2009 year due to increased price competition. Also contributing to the increase were sales to the precision investment casting and refractory industries of $30.1 million, an increase of $10.8 million, or 55.8%, from $19.3 million in the prior year, due to a slight rebound in the industrial sector of the economy. Sales to the defense industry for the year ended December 31, 2010 were $11.2 million, an increase of $2.9 million, or 34.5%, from $8.3 million in the prior year due to an increase in shipments of ceramic missile radomes.

Our Boron segment had net sales for the year ended December 31, 2010 and 2009 as follows (dollars in millions):

	2010	2009
Net sales	$35.0	$29.0
Increase (decrease) in net sales	$ 6.0	$ 4.7
Percentage change in net sales	20.9%	19.5%

The primary reasons for this increase in 2010 net sales were sales to the nuclear industry that totaled $22.8 million, an increase of $1.7 million, or 8.3%, from $21.1 million in the prior year and sales to the semiconductor industry of $10.3 million, an increase of $3.3 million, or 45.9%, from $7.0 million in the prior year.

Gross Profit

Our total gross profit for the years ended December 31, 2010 and 2009 were as follows (dollars in millions):

	2010	2009
Gross profit	$107.9	$ 101.6
Increase (decrease) in gross profit	$ 6.3	($163.7)
Gross profit percentage	26.8%	25.4%

The increase in gross profit and gross profit as a percentage of net sales in the year ended December 31, 2010 were caused primarily by an improved sales mix, especially by increased sales of ceramic crucibles, an increase in gross profit at our ESK segment due to increased operating leverage and the pass through of price increases on certain industrial product lines at our ACO and ESK segments.

Also contributing to the increase in gross profits were higher sales and production volumes of most of our industrial product lines caused by increased demand brought on by the recent slight economic rebound.

Our Advanced Ceramics Operation segment had total gross profit for the years ended December 31, 2010 and 2009 as follows (dollars in millions):

	2010	2009
Gross profit	$ 16.0	$ 61.6
Increase (decrease) in gross profit	($45.6)	($128.9)
Gross profit percentage	10.6%	27.8%

The primary reasons for the decrease in gross profit and gross profit as a percentage of net sales in 2010 were lower volumes of production of body armor and industrial products resulting in an increase of unabsorbed manufacturing overhead expenses, higher scrap rates incurred in the production of body armor especially in XSAPI, and poorer sales mix caused by increased shipments of XSAPI body armor which have lower gross margins than our other body armor products.

Our ESK Ceramics segment had total gross profit for the years ended December 31, 2010 and 2009 as follows (dollars in millions):

	2010	2009
Gross profit	$39.7	$ 14.5
Increase (decrease) in gross profit	$25.2	($23.7)
Gross profit percentage	30.4%	13.8%

The increase in gross profit and gross profit as a percentage of net sales in 2010 were the result of price increases to customers for certain product lines, a favorable sales mix, a decrease in unabsorbed manufacturing overhead expenses caused by higher production volumes, and higher sales of all product lines due to increased demand for our products as a result of the recent slight economic rebound. Gross profit in 2009 was adversely impacted by the $1.9 million of charge for accelerated depreciation of fixed assets in connection with the closing of the facility in Bazet, France. Additional information regarding this plant closure is provided below under the caption "Restructuring — Plant Closure and Severance."

Our Thermo Materials segment had total gross profit for the years ended December 31, 2010 and 2009 as follows (dollars in millions):

	2010	2009
Gross profit	$44.5	$ 22.5
Increase (decrease) in gross profit	$22.0	($ 9.8)
Gross profit percentage	45.1%	34.9%

Gross profit increased in 2010 due to higher production rates of our crucibles allowing more absorption of manufacturing costs per unit produced. Also contributing to the increase in gross profit was increased sales of industrial and refractory products due to the recent economic expansion resulting in a decrease of unabsorbed manufacturing overhead expenses compared to the prior year.

Our Boron segment had total gross profit for the years ended December 31, 2010 and 2009 as follows (dollars in millions):

	2010	2009
Gross profit	$ 8.0	$2.4
Increase (decrease) in gross profit	$ 5.6	$0.6
Gross profit percentage	22.9%	8.4%

The increase in gross profits in 2010 was the result of higher sales to the semiconductor and nuclear industries, and a favorable sales mix. Of the $5.6 million increase in gross profit, $4.6 million was from additional gross profit from sales of products to the nuclear and semiconductor industries and improved absorption of fixed manufacturing costs. This increase was partially offset by an increase of $1.0 million in negative gross profit from SemEquip, Inc. to a negative $3.6 million gross profit in the year ending December 31, 2010, from a negative $2.6 million in the prior year.

Selling, General and Administrative Expenses. Our selling, general and administrative expenses for the years ended December 31, 2010 and 2009 were as follows (dollars in millions):

	2010	2009
Selling, general and administrative expenses	$ 61.9	$ 65.6
Increase (decrease) in selling, general and administrative expenses	($ 3.7)	($ 9.5)
Percentage change in selling, general and administrative	(5.6%)	12.6%
Selling, general and administrative expenses; percentage of net sales	15.4%	16.4%

The decrease in selling, general and administrative expenses was due to a reduction in headcount and related personnel and travel expenses. During the year ended December 31, 2010, we incurred $0.5 million in transaction expenses in connection with our acquisition of VIOX Corporation that was closed in January 2011.

Research and Development Expenses. Our research and development expenses for the years ended December 31, 2010 and 2009 were as follows (dollars in millions):

	2010	2009
Research and development expenses	$ 11.7	$ 12.3
Increase (decrease) in research and development expenses	($ 0.6)	($ 2.5)
Percentage change in research and development expenses	(4.6%)	(17.1%)
Research and development as a percentage of net sales	2.9%	3.1%

The primary reasons for the decrease in research and development expenses were the reduction in headcount and related personnel and travel expenses.

Restructuring — Plant Closure and Severance. Our restructuring — plant closure and severance expenses for the years ended December 31, 2010 and 2009 were as follows (dollars in millions):

	2010	2009
Restructuring — plant closure and severance	$ 3.5	$12.9
Increase (decrease) in restructuring — plant closure and severance	($ 9.4)	$12.9
Percentage change in restructuring — plant closure and severance	(72.9%)	n/m
Restructuring — plant closure and severance as a percentage of net sales	0.9%	3.2%

We recorded pre-tax restructuring and severance charges of $3.5 million for the year ended December 31, 2010 in connection with the closing of our hot pressing lines at our facility in Costa Mesa, California. We made this decision to close this facility as a cost-cutting measure to reduce our capacity due to the reduction in body armor demand from peak levels of the past several years. We recorded pre-tax restructuring and severance changes of $12.9 million for the year ended December 31, 2009 in connection with the closing of our facility in Bazet, France. These decisions were consistent with our ongoing objective to lower the costs of our manufacturing operations.

Acquisition Related Charges. Our acquisition related charges for the years ended December 31, 2010 and 2009 were as follows (dollars in millions):

	2010	2009
Acquisition related charges	$1.6	($ 0.8)
Increase (decrease) in acquisition related charges	$2.3	($10.6)
Percentage change in acquisition related charges	n/m	n/m
Acquisition related charges as a percentage of net sales	0.4%	(0.2%)

We incurred an acquisition-related charge of $1.6 million for the year ended December 31, 2010 associated with the adjustment of economic assumptions regarding our purchase of the assets of Diaphorm, LLC in 2009. During the fourth quarter of 2010, we revised the estimated future sales and earnings of Diaphorm, which caused an increase to the estimated acquisition liability and a charge to pre-tax earnings for the year ended December 31, 2010.

Goodwill Impairment. Our goodwill impairment expenses for the years ended December 31, 2010 and 2009 were as follows (dollars in millions):

	2010	2009
Goodwill impairment	$ 0.0	$3.8
Increase (decrease) in goodwill impairment	($3.8)	$3.8
Percentage change in goodwill impairment	n/m	n/m
Goodwill impairment as a percentage of net sales	0.0%	1.0%

We incurred a goodwill impairment charge of $3.8 million in the second quarter of 2009 for the goodwill associated with our Ceradyne Canada operating segment, which is now included in our Boron operating segment. For additional information regarding this impairment charge and our annual test of goodwill for impairment, refer to the discussion of goodwill impairment contained in Note 2 of Notes to Consolidated Financial Statements commencing at page F-6 of this report.

Other Income (Expense). Our other income (expense) for the years ended December 31, 2010 and 2009 were as follows (dollars in millions):

	2010	2009
Other income (expense)	($ 0.8)	($ 7.3)
Increase (decrease) in other income (expense)	$ 6.5	($ 2.6)
Percentage change in other income (expense)	89.3%	(56.3%)
Other income (expense) as a percentage of net sales	(0.2%)	(1.8%)

We incurred losses from auction rate securities of $5.2 million in 2009 and $1.0 million in 2010. We also had a $1.9 gain on the early extinguishment of debt in 2009 and we had none in 2010. Interest expense for the year ended December 31, 2010 was $6.2 million, a decrease of $0.9 million, or 12.2%, from $7.1 million because we bought back $27.9 million of the total $121.0 million principal of our convertible bond in 2009. Interest income increased by $1.3 million in 2010 because we slightly increased the maturity of our investments.

Income Taxes. Our (benefit) provision for income taxes for the years ended December 31, 2010 and 2009 were as follows (dollars in millions):

	2010	2009
(Benefit) provision for income taxes	($ 0.9)	($ 8.1)
Increase (decrease) in (benefit) provision for income taxes	$ 7.2	($64.5)
Percentage change in (benefit) provision for income taxes	n/m	n/m
(Benefit) provision for income taxes as a percentage of net sales	(0.2%)	(2.0%)

The tax benefit in 2010 resulted from a net benefit of $5.4 million resulting from the settlement of a refund claim with the State of California and a $484,000 reversal of the liability for uncertain tax positions. The tax benefit in 2009 resulted from a reversal of liability for uncertain tax positions as well as the tax benefits from the expenses and losses due to the closure of our Bazet, France manufacturing facility. We also had a significant part of our pre-tax income originating from our operations in China where we were granted a full tax holiday for 2009 and a reduced statutory tax rate of 12.5% in 2010.

Liquidity and Capital Resources

We generally have met our operating and capital requirements with cash flow from operating activities and proceeds from the sale of shares of our common stock.

The following table presents selected financial information and statistics as of and for the two years ended December 31, 2011 and 2010 (in thousands):

	2011	2010
Cash, cash equivalents and short term investments	$275,047	$246,296
Accounts receivable, net	73,646	53,019
Inventories, net	117,273	94,258
Working capital	379,154	414,414
Annual operating cash flow	108,692	76,135

During the year ended December 31, 2011, we generated $108.7 million of cash from operations compared to $76.1 million for the year ended December 31, 2010. The $108.7 million of cash flow from operations during 2011 is primarily comprised of net income totaling $83.9 million, with $71.4 million of non-cash charges included therein, offset by an increase in net operating assets and liabilities of $46.6 million, mostly due to increases in accounts receivables and inventory.

Investing activities consumed $83.3 million of cash during the year ended December 31, 2011. We invested $78.6 million for the purchase of marketable securities as we shortened the maturities of our investments in an attempt to decrease principal risk. We also spent $31.3 million for the purchase of property, plant and equipment. Included in this amount are $12.4 million for improvements in the production of ceramic crucibles at our China and Atlanta facilities. These expenditures for investing activities were partially offset by $52.5 million of proceeds from sales and maturities of marketable securities. We spent $27.7 million for the acquisition of VIOX.

Financing activities during the year ended December 31, 2011 consumed $23.9 million. During the year ended December 31, 2011, we purchased and retired 842,934 shares of our common stock at an aggregate cost of $25.8 million under a stock repurchase program authorized by our Board of Directors in March 2008. To date, we have purchased and retired a cumulative total of 3,842,305 shares at an aggregate cost of $100.0 million. This completed our board of directors' first authorization to repurchase shares. On August 31, 2011, we announced that our board of directors had authorized the repurchase and retirement of up to an additional $100.0 million of our common stock in open market transactions, including block purchases, or in privately negotiated transactions. We did not set a time limit for completion of this repurchase program, and we may suspend or terminate it at any time.

The negative effect of exchange rates on cash and cash equivalents of $4.7 million during the year ended December 31, 2011 was due to our investment in our German subsidiary, ESK Ceramics, in our two Chinese subsidiaries, Ceradyne (Tianjin) Technical Ceramics, Ltd. and Ceradyne (Tianjin) Advanced Materials Co., Ltd and our Indian subsidiary, Ceradyne Ceramics India, Private Limited.

As a result of the above items, our net cash at December 31, 2011 declined by $3.2 million as compared to a $68.7 million decrease during the year ended December 31, 2010.

The following table presents selected financial information and statistics as of and for the two years ended December 31, 2010 and 2009 (in thousands):

	2010	2009
Cash, cash equivalents and short term investments	$246,296	$239,820
Accounts receivable, net	53,019	53,269
Inventories, net	94,258	100,976
Working capital	414,414	406,207
Annual operating cash flow	76,135	67,773

During the year ended December 31, 2010, we generated $76.1 million of cash from operations compared to $67.8 million for the year ended December 31, 2009. The $76.1 million of cash flow from operations during 2010 is primarily comprised of net income totaling $29.3 million, with $58.1 million of non cash charges included therein, offset by a reduction in net operating assets and liabilities of $11.3 million, mostly due to an increase in prepaid taxes as we have applied for tax refunds by amending previous years' income tax returns. We invested $44.2 million to expand manufacturing capacity in selected product lines, of which $22.8 million was spent for the expansion of our facilities in China. We also used $19.8 million to buy back 854,134 shares of our stock. In an effort to increase yield, as of December 31, 2010 we had invested a net additional $83.4 million in marketable securities as compared to the end of 2009. As a result, our net cash at December 31, 2010 declined by $68.7 million as compared to a $93.1 million decrease during the year ended December 31, 2009.

Investing activities consumed $123.6 million of cash during the year ended December 31, 2010. We invested $122.9 million for the purchase of marketable securities as we extended the maturities of our investments in an attempt to increase our return. We also spent $44.2 million for the purchase of property, plant and equipment. Included in this amount are $30.9 million for improvements in the production of ceramic crucibles at our China and Atlanta facilities and $2.5 million for the ongoing implementation of our SAP software system. These expenditures for investing activities were partially offset by $39.5 million of proceeds from sales and maturities of marketable securities.

Financing activities during the year ended December 31, 2010 consumed $19.9 million. During the year ended December 31, 2010, we purchased and retired 854,134 shares of our common stock at an aggregate cost of $19.8 million under a stock repurchase program authorized by our Board of Directors in March 2008. Through December 31, 2010, we had purchased and retired a cumulative total of 2,999,371 at an aggregate cost of $74.2 million.

The negative effect of exchange rates on cash and cash equivalents of $1.4 million during the year ended December 31, 2010 was due to our investment in our German subsidiary, ESK Ceramics, and in our two Chinese subsidiaries, Ceradyne (Tianjin) Technical Ceramics, Ltd. and Ceradyne (Tianjin) Advanced Materials Co., Ltd.

During December 2005, we issued $121.0 million principal amount of 2.875% senior subordinated convertible notes due December 15, 2035. As referenced above, we purchased and retired an aggregate of $27.9 million principal amount of our convertible debt for $23.2 million during 2009, reducing the outstanding balance of the Notes to $93.1 million. Interest on the notes is payable on December 15 and June 15 of each year, commencing on June 15, 2006. The notes are convertible into 17.1032 shares of our common stock for each $1,000 principal amount of the notes (which represents a conversion price of approximately $58.47 per share), subject to adjustment. The notes contain put options, which may require us to repurchase in cash all or a portion of the notes on December 15, 2012, December 15, 2015, December 15, 2020, December 15, 2025, and December 15, 2030 at a repurchase price equal to 100% of the principal amount of the notes to be repurchased plus accrued and unpaid interest, including contingent interest, if any, to but excluding the repurchase date. We reclassified our long term debt consisting of our outstanding Notes, as short-term debt because the Note holders have the right to demand repayment on December 15, 2012.

For further information regarding the Notes, refer to Note 4 of Notes to Consolidated Financial Statements commencing at page F-6 of this report.

In December 2005, we established an unsecured $10.0 million line of credit ("2005 LOC") which will expire on May 1, 2014. As of December 31, 2011, there were no outstanding amounts on the 2005 LOC. However, the available line of credit at December 31, 2011 has been reduced by outstanding letters of credit in the aggregate amount of $4.2 million. The fixed interest rate on the 2005 LOC was 2.9% as of December 31, 2011. In June 2011, we established a separate unsecured $5.0 million line of credit ("2011 LOC") that was increased to $7.0 million on December 19, 2011 and will mature on April 1, 2013. We expect to renew the 2011 LOC at that time for multiple years. As of December 31, 2011, there were no outstanding amounts on the 2011 LOC. However, the available line of credit at December 31, 2011 has been reduced by outstanding letters of credit in the aggregate amount of $1.9 million. The interest rate on the 2011 LOC was 1.3% as of December 31, 2011 which was based on the LIBOR rate for a period of one month, plus a margin of 1.0% percent. In the first quarter of 2012, we will finalize the transfer of the outstanding letters of credit under the 2005 LOC to the 2011 LOC and close the 2005 LOC.

Pursuant to the line of credit agreements, we are subject to certain covenants, which include, among other things, the maintenance of specified minimum amounts of net income and liquidity. We were in compliance with all covenants at December 31, 2011.

Our cash, cash equivalents and short-term investments totaled $275.0 million at December 31, 2011, compared to $246.3 million at December 31, 2010. At December 31, 2011, we had working capital of $379.2 million, compared to $414.4 million at December 31, 2010. We reclassified our long term debt consisting of our outstanding convertible notes, as short-term debt because the convertible note holders have the right to demand repayment on December 15, 2012. This reclassification caused a decrease in working capital of $89.3 million during December 2011. Our cash position includes amounts denominated in foreign currencies, and the repatriation of those cash balances from our ESK Ceramics subsidiary or our China subsidiary does not result in additional tax costs. We believe that our current cash and cash equivalents on hand and cash available from the sale of short-term investments, and cash we expect to generate from operations will be sufficient to finance our anticipated capital and operating requirements for at least the next 12 months. Our anticipated capital requirements for 2012 primarily relate to normal replacements of equipment and the expansion of a third production tower for our manufacturing facilities in Quapaw, Oklahoma for our Ceradyne Boron Products business unit anticipated to cost $9.3 million and for an expansion of our boron nitride production capacity in Kempten, Germany for our ESK Ceramics subsidiary at an anticipated cost of $6.1 million. We expect to complete both of these expansions by the end of 2012. To finance these expansions, we will use existing cash balances held in our bank accounts in Germany and the balance will be funded from our existing cash balances in the United States. We also may utilize cash, and, to the extent necessary, borrowings from time to time to acquire other businesses, technologies or product lines that complement our current products, enhance our market coverage, technical capabilities or production capacity, or offer growth opportunities. We have no present agreements for any material acquisitions.

Our material contractual obligations and commitments as of December 31, 2011 are as follows (amounts in thousands):

	Payments Due by Period				
	Total	Less than 1 Year	2-3 Years	4-5 Years	After 5 Years
Debt, principal amount	$ 93,100	$ 93,100	$ —	$ —	$ —
Capital lease obligations	101	32	49	20	—
Non-cancelable leases	8,539	3,372	3,518	888	761
Pension benefits	9,212	860	1,944	2,123	4,285
Information technology systems	3,053	1,442	1,611	—	—
Cash commitments for interest expense	2,208	2,208	—	—	—
Utility contract	5,868	4,789	1,079	—	—
Total contractual obligations	$122,081	$105,803	$8,201	$3,031	$5,046

As of December 31 2011, we have $1.8 million of uncertain tax positions. We are unable to make a reasonable estimate regarding settlement of these uncertain tax positions, and as a result, they have been excluded from the table.

Off-Balance Sheet Arrangements

The only off-balance sheet arrangement is the conversion feature of our 2.875% convertible senior subordinated notes discussed above.

Critical Accounting Policies and Estimates

Management's discussion and analysis of financial condition and results of operations, as well as disclosures included elsewhere in this report are based upon our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States of America. Preparing these consolidated financial statements requires our management to make estimates and judgments that affect the reported amounts of assets, liabilities, revenues, expenses and related disclosure of contingencies. Management has not determined how reported amounts would differ based on the application of different accounting policies. Management has also not determined the likelihood that materially different amounts could be reported under different conditions or using different assumptions. We believe that the critical accounting policies that most impact the consolidated financial statements are as described below. A summary of our significant accounting policies is included in Note 2 to our consolidated financial statements which begin on page F-6 of this report.

The application of accounting policies requires the use of judgment and estimates. As it relates to the Company, estimates and forecasts are required to determine sales returns and reserves, rebate reserves, allowances for doubtful accounts, reserves for excess and obsolete inventory, investments in unconsolidated affiliates, workers' compensation liabilities, employee benefit related liabilities, income taxes, any temporary or other than temporary impairment of assets, forecasted transactions to be hedged, litigation reserves and contingencies.

These matters that are subject to judgments and estimates are inherently uncertain, and different amounts could be reported using different assumptions and estimates. Management uses its best estimates and judgments in determining the appropriate amount to reflect in the financial statements, using historical experience and all available information. The Company also uses the assistance of outside experts where appropriate. The Company applies estimation methodologies consistently from year to year.

The Company believes the following are the critical accounting policies which could have the most significant effect on the Company's reported results and require subjective or complex judgments by management.

Sales Recognition. Sales are recorded when all of the following have occurred: an agreement of sale exists, the product has been delivered according to the terms of the sales order, title has been transferred and collection is reasonably assured. Management is required to make judgments about whether or not collection is reasonably assured. We may reduce revenue with reserves for sales returns. Allowances, which are recorded at the time revenue is recognized, are based upon historical sales returns. We did not include a sales return provision at December 31, 2011 and 2010 because our historical experience with sales returns leads us to conclude that no allowance for sales returns is necessary.

We do not record a warranty reserve on the sale of our products. For our largest product line, body armor, all of which is sold to the U.S. government, each lot of body armor is tested at an independent laboratory and the lot cannot be released for shipment to the U.S. government until positive test results are received by both the U.S. government and us. For our non-body armor sales, we have experienced minimal claims from these types of sales. Additionally, due to the inherent nature, strength, durability and structural properties of ceramics, as well as a rigid quality control program that includes, for some of our customers, having the customer accept quality test results prior to shipment, we do not believe a warranty reserve is necessary.

Accounts Receivable. We review our trade accounts receivables and our estimates of the allowance for doubtful accounts each period. The allowance for doubtful accounts is determined by analyzing specific customer accounts and assessing the risk of uncollectibility based on insolvency, disputes or other collection issues. In

addition, we routinely analyze the different aging categories and establish allowances based on the length of time receivables are past due (based on contractual terms). A write-off will occur if the settlement of the account receivable is less than the carrying amount or we ultimately determine the balance will not be collected. The amounts we will ultimately realize could differ materially from the amounts assumed in arriving at the allowance for doubtful accounts in the financial statements included in this report beginning on page F-1.

Inventories. Inventories are valued at the lower of cost (first-in, first-out) or market. The write-down of inventory for obsolete items is based on our estimate of the amount considered obsolete based on specific reviews of inventory items. In estimating the allowance, we rely on our knowledge of the industry as well as our current inventory levels. The amounts we will ultimately realize could differ from the estimated amounts. Inventory costs include the cost of material, labor and manufacturing overhead.

Accounting for Long-Lived Assets. Long-lived assets and intangible assets with definite lives are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. Impairment indicators include, among other conditions, cash flow deficits, historic or anticipated declines in revenue or operating profit and adverse legal or regulatory developments. If it is determined that such indicators are present and the review indicates that the assets will not be fully recoverable, based on undiscounted estimated cash flow over the remaining amortization periods, their carrying values are reduced to estimated fair market value. Estimated fair market value is determined primarily using the anticipated cash flow discounted at a rate commensurate with the risk involved. For the purposes of identifying and measuring impairment, long-lived assets are grouped with other assets and liabilities at the lowest level for which identifiable cash flow are largely independent of the cash flow of other assets and liabilities.

Goodwill and Intangible Assets. Goodwill is not amortized, but instead goodwill and indefinite lived assets are required to be tested for impairment annually and under certain circumstances. The Company performs such testing of goodwill in the fourth quarter of each year at year end, or as events occur or circumstances change that would more likely than not reduce the fair value of a reporting unit below its carrying amount. During the fourth quarter of 2011, the Company early adopted new accounting guidance which simplifies goodwill impairment testing. The new accounting guidance allows the Company to conduct an assessment of qualitative factors to determine whether it is more likely than not that the fair value of a reporting unit is less than its carrying amount. If the Company determines that it is more likely than not that the fair value of a reporting unit is less than its carrying amount, it then conducts a two-step test for impairment of goodwill. The first step of the test for goodwill impairment compares the fair value of the applicable reporting unit with its carrying value. The Company conducts the test for impairment of goodwill at the reporting unit level. The Company's reporting units engage in business activities for which discrete financial information is available. The Company's reporting units are: Advanced Ceramic Operations, VIOX, Thermo Materials, ESK Ceramics, and Boron. Fair value is determined using a discounted cash flow method and/or prevailing earnings multiples for each reporting unit. The use of discounted cash flows requires the use of various economic, market and business assumptions in developing the Company's internal forecasts, the useful life over which cash flows will occur, and determination of the Company's weighted average cost of capital that reflect the Company's best estimates when performing the annual impairment test.

If the fair value of a reporting unit is less than the reporting unit's carrying value, the Company will perform the second step of the test for impairment of goodwill. During the second step of the test for impairment of goodwill, the Company will compare the implied fair value of the reporting unit's goodwill with the carrying value of that goodwill. If the carrying value of the goodwill exceeds the calculated implied fair value, the excess amount will be recognized as an impairment loss. We believe the methods we use to determine these underlying assumptions and estimates are reasonable. However, our assumptions and estimates may differ significantly from actual results, or circumstances could change in the future which may then cause us to later conclude that an impairment exists, or with hindsight, it may appear that we could have understated the extent of impairment based on new information that was unknown at the prior testing date. We may incur a goodwill impairment charge in the future, if for example, the market price of our stock materially declines, if the financial results of our operations deteriorate or other circumstances require an impairment charge. Intangible assets with definite lives are amortized over their estimated useful lives based on the economic consumption method.

During the fourth quarter of 2011, the Company observed a continuing sharp contraction in the solar industry, which is a material part of the VIOX reporting unit business that the Company believed would negatively impact its current and future business performance. In performing the step one analysis, the Company used a discounted cash flow analysis which reflected estimates of cash flows which had decreased significantly since those estimated at the time of the VIOX acquisition in January 2011. Accordingly, as of December 31, 2011, the VIOX reporting unit failed step one of the impairment test. The Company performed step two of the impairment test which resulted in no implied value of goodwill for VIOX. Accordingly the Company recognized a charge for goodwill impairment of $7.8 million during 2011.

Pension. The Company provides pension benefits to its employees of its subsidiaries of ESK Ceramics and Ceradyne Boron Products. For the pension plans of both subsidiaries, we make several assumptions that are used in calculating the expense and liability of the plans. These key assumptions include the expected long-term rate of return on plan assets and the discount rate. In selecting the expected long-term rate of return on assets, we consider the average future rate of earnings expected on the funds invested or to be invested to provide for the benefits under the pension plans. This includes considering the plans' asset allocations and the expected returns likely to be earned over the life of this plan. A hypothetical 50 basis point change in the expected long-term rate of return on assets would not be material. The discount rate reflects the estimated rate at which an amount that is invested in a portfolio of high-quality debt instruments would provide the future cash flows necessary to pay benefits when they come due. A hypothetical 50 basis point change in the discount rate would change the pension obligation by approximately $2.2 million. The impact on pension expense from a hypothetical 50 basis point change in the discount rate would not be material. In addition the expense and liabilities of the plan were determined using other assumptions for future experience, such as mortality rates. The actuarial assumptions used by us may differ materially from actual results due to changing market and economic conditions or longer or shorter life spans of the participants. Our actual results could differ materially from those we estimated, which could require us to record a greater amount of pension expense.

Recent Accounting Pronouncements

Please refer to Note 2 of the Notes to Consolidated Financial Statements for recent accounting pronouncements which could have an impact on our consolidated financial statements and related disclosures.

ITEM 7A. *QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK*

Interest Rate Risk

Our exposure to market rate risk for changes in interest rates relates primarily to our investment portfolio and our debt. We have not used derivative financial instruments in our investment portfolio. We place our investments with high-quality issuers and, by policy, limit the amount of credit exposure to any one issuer. We protect and preserve our invested funds by limiting default, market and reinvestment risk. Our investments in marketable securities consist primarily of high-grade corporate and government securities with maturities of less than two years. Investments purchased with an original maturity of three months or less are considered cash equivalents. Our long term investments at December 31, 2011, included $15.0 million of auction rate securities, net of a pre-tax temporary impairment charge of $3.0 million against accumulated other comprehensive income and a pre-tax other than temporary impairment charge of $4.7 million against earnings.

The Company's investments in auction rate securities represent interests in insurance securitizations collateralized by pools of residential and commercial mortgages, asset backed securities and other structured credits relating to the credit risk of various bond guarantors that mature at various dates from June 2021 through July 2052. These auction rate securities were intended to provide liquidity via an auction process which is scheduled every 28 days, that resets the applicable interest rate, allowing investors to either roll over their holdings or gain immediate liquidity by selling such interests at par. Interest rates are capped at a floating rate of one month LIBOR plus additional spread ranging from 1.25% to 4.00% depending on prevailing rating. During the second half of the year 2007, through December 31, 2011, the auctions for these securities failed. As a result of current negative conditions in the global credit markets, auctions for our investment in these securities are inactive. Consequently, the investments are not currently liquid through the normal auction process and may be liquidated if a buyer is found outside the auction process. Although the auctions have failed and are currently inactive, the Company continues to receive underlying cash flows in the form of interest income from the investments in auction rate securities. As of December 31, 2011, the fair value of the Company's investments in auction rate securities was below cost by approximately $7.8 million. The fair value of the auction rate securities has been below cost for more than two years.

With respect to our investments in auction rate securities, we categorized the investments into three main categories for analytical purposes which comprised (1) "insurance wrapped" securities, (2) "put right" securities and (3) "credit derivative product company" securities. The insurance wrapped category comprised auction rate securities where the payments are guaranteed by an insurance company, such as a "monoline" financial guaranty insurance company. The put right category comprised an auction rate security that was created to provide capital to the issuer in the event that the issuer exercised the put right. The credit derivative product company category comprised auction rate securities where the issuer is a financial services company that offers credit risk protection of structured financial assets in the form of credit derivatives. The auction rate securities issued by these financial services companies were created as a way to provide collateral for the issuers to use for entering into credit default swaps. During 2010, we sold all of our investments in the credit derivative product company category.

As part of our evaluation as to whether the decline in fair value of the auction rate securities was other-than-temporary, where it was probable that the Company would not collect all contractual cash flows and the remaining balance was not recoverable, we considered factors which included, but were not limited to, general market conditions, the length of time and extent to which the market value has been less than cost, the financial condition and near-term prospects of the issuer of the securities, and our intent and ability to hold the investment for a period of time to allow for any anticipated recovery in market value. If the decline in fair value is judged to be other than temporary, the cost basis of the individual security is written down to fair value as a new cost basis and the amount of the write-down is included in earnings. The new cost basis is not changed for subsequent recoveries in fair value. Subsequent increases in the fair value of available-for-sale securities are included in other comprehensive income; subsequent decreases in fair value, if not an other-than-temporary impairment, are included in other comprehensive income. Also, due to the illiquid market for the auction rate securities and limited availability of public information on these securities, we engaged a third party investment banking firm to assist us in performing the valuation of the securities. Our valuation analysis used a trinomial discount model where the compilations of future cash flows were priced by summing the present values of the future principal

and interest payments. We then forecasted probabilities of default, auction failure, and a successful auction at par or repurchase at par for each period, as well as forecasted recovery rates in default for each of the securities. Finally, we discounted the weighted average cash flow for each period back to present value at the determined discount rate for each of the securities.

Based on the information included in prospectuses and other data compiled for each of the auction rate securities for the years ended December 31, 2011 and 2010, we determined that the decline in fair values of the put right securities and credit derivative product company securities categories were other-than-temporary. This determination considered the terms of guarantees associated with the securities, the quality of the underlying collateral, external ratings and other relevant available market information compiled with the assistance of the third party investment banking firm. Quantitative data reviewed and analyzed by us also indicated that the cumulative probability of default at some point in the future was more than 30% for the insurance wrapped company securities at the high end of the value range as of December 31, 2011. We believed it was probable that we would collect all contractual cash flows and the carrying value of the securities in the insurance wrapped category as of December 31, 2011 was determined to be recoverable based on the valuation of the securities which considered the terms of certain guarantees, quality of underlying collateral, external ratings and other relevant market information.

For the quarter ended June 30, 2009, we adopted new accounting guidance issued by the FASB Staff on the effective date of April 1, 2009. In accordance with the new guidance, when an other-than-temporary impairment has occurred, the amount of the other-than-temporary impairment recognized in earnings depends on whether an entity intends to sell the security or more likely than not will be required to sell the security before recovery of its amortized cost basis less any current-period credit loss. Based on our evaluation of the auction rate securities as of December 31, 2011, we determined that it was more likely than not that we would be required to sell the put right securities before recovery of our amortized cost, accordingly, we recognized other-than-temporary impairment charges for the decline in fair value during the year ended December 31, 2011.

In addition to the above, during the year ended December 31, 2011, we also recognized an other-than-temporary impairment charge for the credit risk associated with the insurance wrapped securities. In determining whether a credit loss existed, we used our best estimate of the present value of cash flows expected to be collected from the debt security. We then discounted the expected cash flows at the effective interest rate implicit in the security at the date of acquisition. The difference between the present value of the cash flows expected to be collected and amortized cost represented the impairment charge for credit risk. We believe that the carrying value of the securities in the insurance wrapped category, after the adjustment for credit risk, as of December 31, 2011 was determined to be recoverable based on the valuation of the securities which considered the terms of certain guarantees, quality of underlying collateral, external ratings and other relevant market information.

We classify all of our investments as available-for-sale. Available-for-sale securities are carried at fair value, with unrealized gains and losses, net of tax, reported in a separate component of stockholders' equity. Average maturity of our investment portfolio is 413 days; therefore, the movement of interest rates should not have a material impact on our balance sheet or income statement.

At any time, a significant increase/decrease in interest rates will have an impact on the fair market value and interest earnings of our investment portfolio. We do not currently hedge this interest rate exposure. We have performed a sensitivity analysis as of December 31, 2011 and 2010, using a modeling technique that measures the change in the fair values arising from a hypothetical 50 basis points and 100 basis points adverse movement in the levels of interest rates across the entire yield curve, which are representative of historical movements in the Federal Funds Rate with all other variables held constant. The analysis covers our investment and is based on the weighted-average maturity of our investments as of December 31, 2011 and 2010. The sensitivity analysis indicated that a hypothetical 50 basis points adverse movement in interest rates would result in a loss in the fair values of our investment instruments of approximately $1.0 million at December 31, 2011 and approximately $1.1 million at December 31, 2010. Similarly a hypothetical 100 basis points adverse movement in interest rates would result in a loss in the fair values of our investments of approximately $2.0 million at December 31, 2011 and approximately $2.2 million at December 31, 2010.

Actual maturities may differ from contractual maturities because the issuer of the securities may have the right to repurchase such securities. We classify short-term investments in current assets, as all such investments are available for current operations.

We are not exposed to market risks related to fluctuations in interest rates on our debt as it is fixed rate debt. Consequently, we do not utilize interest rate swaps or other types of derivative financial instruments regarding our debt.

Foreign Currency Fluctuations

We enter into foreign exchange forward contracts to reduce earnings and cash flow volatility associated with foreign exchange rate changes to allow our management team to focus its attention on its core business operations. Accordingly, we enter into contracts which change in value as foreign exchange rates change to economically offset the effect of changes in value of foreign currency assets and liabilities, commitments and anticipated foreign currency denominated sales and operating expenses. We enter into foreign exchange forward contracts in amounts between minimum and maximum anticipated foreign exchange exposures, generally for periods not to exceed one year. These derivative instruments are not designated as accounting hedges.

We measure the financial statements of our foreign subsidiaries using the local currency as the functional currency. Assets and liabilities of these subsidiaries are translated at the exchange rate on the balance sheet date. Revenues, costs and expenses are translated at the rates of exchange prevailing during the year. Translation adjustments resulting from this process are included in stockholders' equity. Gains and losses from foreign currency transactions are included in other income miscellaneous.

ITEM 8. *FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA*

The Consolidated Financial Statements and Supplementary Data commence at page F-1 of this report and an index thereto is included in Part IV, Item 15 of this report.

ITEM 9. *CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE*

Not applicable.

ITEM 9A. *CONTROLS AND PROCEDURES*

Evaluation of Disclosure Controls and Procedures

As of the end of the period covered by this report, we carried out an evaluation, under the supervision and with the participation of our principal executive officer and principal financial officer, of the effectiveness of the design and operation of our disclosure controls and procedures. Based on this evaluation, our principal executive officer and principal financial officer concluded that our disclosure controls and procedures (as defined in Rules 13a-15(e) and Rule 15d-15(e) under the Securities Exchange Act of 1934) were effective.

Changes in Internal Control over Financial Reporting

Our management evaluated our internal control over financial reporting and there have been no changes during the fiscal quarter ended December 31, 2011 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Management's Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting. Our internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of

effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate. Our management assessed the effectiveness of our internal control over financial reporting as of December 31, 2011. In making this assessment, it used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in Internal Control — Integrated Framework. Based on our assessment, we have concluded that, as of December 31, 2011, our internal control over financial reporting was effective based on those criteria.

Ceradyne's independent registered public accounting firm, PricewaterhouseCoopers LLP, issued a report on the effectiveness of our internal control over financial reporting as of December 31, 2011, which appears herein.

ITEM 9B. ***OTHER INFORMATION***

Not applicable.

PART III

ITEM 10. ***DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE***

Information in response to this item (except for certain information concerning executive officers included in Part I of this report) is incorporated by reference from the registrant's definitive proxy statement to be filed with the Commission within 120 days after the close of registrant's fiscal year.

ITEM 11. ***EXECUTIVE COMPENSATION***

Information in response to this item is incorporated by reference from the registrant's definitive proxy statement to be filed with the Commission within 120 days after the close of registrant's fiscal year.

ITEM 12. ***SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS***

Information in response to this item is incorporated by reference from the registrant's definitive proxy statement to be filed with the Commission within 120 days after the close of registrant's fiscal year.

ITEM 13. ***CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE***

Information in response to this item is incorporated by reference from the registrant's definitive proxy statement to be filed with the Commission within 120 days after the close of registrant's fiscal year.

ITEM 14. ***PRINCIPAL ACCOUNTANT FEES AND SERVICES***

Information in response to this item is incorporated by reference from the registrant's definitive proxy statement to be filed with the Commission within 120 days after the close of registrant's fiscal year.

PART IV

ITEM 15. *EXHIBITS AND FINANCIAL STATEMENT SCHEDULES*

(a) List of documents filed as part of this report:

Financial Statements:

(b) List of Exhibits

Exhibit Number	Description
3.1	Restated Certificate of Incorporation of Ceradyne, Inc., as filed with the Secretary of State of Delaware on May 25, 1987. Incorporated herein by reference to Exhibit 3.1 to the Registrant's Form 10-Q Report for the quarter ended June 30, 2006.
3.2	Certificate of Amendment of Restated Certificate of Incorporation of Ceradyne, Inc., as filed with the Secretary of State of Delaware on June 8, 2006. Incorporated herein by reference to Exhibit 3.2 to the Registrant's Form 10-Q Report for the quarter ended June 30, 2006.
3.3	Bylaws of Registrant. Incorporated herein by reference to Exhibit 3.3 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2007.
3.4	Amendment to Bylaws of Registrant, adopted April 29, 1996. Incorporated herein by reference to Exhibit 3.4 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2007.
3.5	Amendment to Bylaws of Registrant, adopted December 18, 2007. Incorporated herein by reference to Exhibit 3.5 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2007.
4.1	Indenture dated December 19, 2005, between Ceradyne, Inc. and Union Bank of California, N.A., as Trustee. Incorporated herein by reference to Exhibit 4.1 of Registrant's Form 8-K Current Report dated December 13, 2005, filed with the Commission on December 19, 2005.
4.2	First Supplemental Indenture dated December 19, 2005, between Ceradyne, Inc. and Union Bank of California, N.A., as Trustee. Incorporated herein by reference to Exhibit 4.2 of Registrant's Form 8-K Current Report dated December 13, 2005, filed with the Commission on December 19, 2005.
4.3	Form of 2.875% Senior Subordinated Convertible Note due 2035. Incorporated herein by reference to Exhibit 4.3 of Registrant's Form 8-K Current Report dated December 13, 2005, filed with the Commission on December 19, 2005.
10.1*	Ceradyne, Inc. 1994 Stock Incentive Plan. Incorporated herein by reference to Exhibit 10.31 to the Registrant's Annual Report on Form 10-K for the fiscal year ended December 31, 1994.
10.2*	Amendment No. 1 to the Ceradyne, Inc. 1994 Stock Incentive Plan. Incorporated herein by reference to Exhibit 4.2 to Registrant's Registration Statement on Form S-8 (File No. 33-61675).
10.3*	Amendment No. 2 to the Ceradyne, Inc. 1994 Stock Incentive Plan. Incorporated herein by reference to Exhibit 10.36 to the Registrant's Annual Report on Form 10-K for the fiscal year ended December 31, 1996.

Exhibit Number	Description
10.4*	Amendment No. 3 to the Ceradyne, Inc. 1994 Stock Incentive Plan. Incorporated herein by reference to Exhibit 4.4 to Registrant's Registration Statement on Form S-8 (File No. 333-31679).
10.5*	Amendment No. 4 to the Ceradyne, Inc. 1994 Stock Incentive Plan. Incorporated herein by reference to Exhibit 10.29 to the Registrant's Annual Report on Form 10-K for the fiscal year ended December 31, 1998.
10.6*	Amendment No. 5 to the Ceradyne, Inc. 1994 Stock Incentive Plan. Incorporated herein by reference to Exhibit 10.29 to the Registrant's Annual Report on Form 10-K for the fiscal year ended December 31, 2000.
10.7*	Amendment No. 6 to the Ceradyne, Inc. 1994 Stock Incentive Plan. Incorporate herein by reference to Exhibit 4.7 to the Registrant's Registration Statement on Form S-8 (File No. 333-64094).
10.8*	Amendment No. 7 to the Ceradyne, Inc. 1994 Stock Incentive Plan. Incorporated herein by referenced to Exhibit 10.34 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2002.
10.9*	Ceradyne, Inc. 2003 Stock Incentive Plan, as Amended and Restated as of March 23, 2010. Incorporated herein by reference to Exhibit 10.1 to the Registrant's Form 8-K Current Report dated June 8, 2010, filed with the Commission on June 11, 2010.
10.10*	Form of Stock Option Agreement for use under the 2003 Stock Incentive Plan. Incorporated herein by reference to Exhibit 10.2 to the Registrant's Form 8-K Current Report dated May 23, 2005, filed with the Commission on May 26, 2005.
10.11*	Form of Restricted Stock Unit Award Agreement for use under the 2003 Stock Incentive Plan. Incorporated herein by reference to Exhibit 10.3 to the Registrant's Form 8-K Current Report dated May 23, 2005, filed with the Commission on May 26, 2005.
10.12*	Clawback Policy, as adopted June 8, 2010. Incorporated herein by reference to Exhibit 10.2 to the Registrant's Form 8-K Current Report dated June 8, 2010, filed with the Commission on June 11, 2010.
10.13*	Change in Control and Severance Agreement, dated March 11, 2011, between Ceradyne, Inc. and Joel P. Moskowitz. Incorporated herein by reference to Exhibit 10.1 to the Registrant's Form 8-K Current Report dated March 11, 2011, filed with the Commission on March 17, 2011.
10.14*	Change in Control and Severance Agreement, dated March 11, 2011, between Ceradyne, Inc. and Jerrold J. Pellizzon. Incorporated herein by reference to Exhibit 10.2 to the Registrant's Form 8-K Current Report dated March 11, 2011, filed with the Commission on March 17, 2011.
10.15*	Change in Control and Severance Agreement, dated March 11, 2011, between Ceradyne, Inc. and David P. Reed. Incorporated herein by reference to Exhibit 10.3 to the Registrant's Form 8-K Current Report dated March 11, 2011, filed with the Commission on March 17, 2011.
12.1	Computation of Ratio of Earnings to Fixed Charges.
14.1	Code of Business Conduct and Ethics as amended and restated on March 18, 2008. Incorporated herein by reference to Exhibit 14.1 to the Registrant's Form 8-K Current Report dated March 18, 2008, filed with the Commission on March 24, 2008.
21.1	Subsidiaries of the Registrant.
23.1	Consent of Independent Registered Public Accounting Firm, PricewaterhouseCoopers LLP.
31.1	Certification of Chief Executive Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2	Certification of Chief Financial Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1	Certification of Chief Executive Officer pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.

Exhibit Number	Description
32.2	Certification of Chief Financial Officer pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.CAL	XBRL Taxonomy Extension Calculation Linkbase.
101.DEF	XBRL Taxonomy Extension Definition Linkbase.
101.INS	XBRL Instance Document.
101.LAB	XBRL Taxonomy Extension Label Linkbase.
101.PRE	XBRL Taxonomy Extension Presentation Linkbase.
101.SCH	XBRL Taxonomy Extension Schema Linkbase.

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* Each of these exhibits constitutes a management contract, compensatory plan, or arrangement.

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CERADYNE, INC.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To Board of Directors and Stockholders of Ceradyne, Inc.

In our opinion, the consolidated financial statements listed in the accompanying index appearing under Part IV, Item 15(a), present fairly, in all material respects, the financial position of Ceradyne, Inc. and its subsidiaries at December 31, 2011 and 2010, and the results of their operations and their cash flows for each of the three years in the period ended December 31, 2011 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2011, based on criteria established in *Internal Control — Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). The Company's management is responsible for these financial statements, for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in Management's Report on Internal Control over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on these financial statements and on the Company's internal control over financial reporting based on our integrated audits. We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the financial statements are free of material misstatement and whether effective internal control over financial reporting was maintained in all material respects. Our audits of the financial statements included examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ PricewaterhouseCoopers LLP
Orange County, California
February 16, 2012

CERADYNE, INC.

CONSOLIDATED BALANCE SHEETS
(In thousands, except for share data)

	December 31, 2011	December 31, 2010
ASSETS		
Current assets:		
Cash and cash equivalents	$ 50,275	$ 53,436
Short term investments	224,772	192,860
Accounts receivable, net of allowances for doubtful accounts of $1,547 and $685 in 2011 and 2010, respectively	73,646	53,019
Other receivables	6,040	17,553
Inventories	117,273	94,258
Production tooling, net	11,792	10,037
Prepaid expenses and other	43,860	38,653
Deferred tax asset	5,782	6,808
Total current assets	533,440	466,624
Property, plant and equipment, net	243,376	243,681
Long term investments	15,026	26,187
Intangible assets, net	100,690	83,475
Goodwill	42,926	43,219
Other assets	12,673	2,127
Total assets	$948,131	$865,313
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 29,191	$ 25,738
Accrued expenses and other liabilities	30,470	24,603
Income taxes payable	5,331	1,869
Short-term debt	89,294	—
Total current liabilities	154,286	52,210
Long-term debt	—	85,599
Employee benefits	24,462	22,269
Other long term liabilities	37,224	41,902
Deferred tax liability	23,461	11,124
Total liabilities	239,433	213,104
Commitments and contingencies (Note 7)		
Stockholders' equity:		
Common Stock, $0.01 par value: 100,000,000 authorized; 24,175,051 and 24,713,126 shares issued and outstanding at December 31, 2011 and 2010, respectively	242	247
Additional paid in capital	121,940	141,973
Retained earnings	583,420	499,532
Accumulated other comprehensive income	3,096	10,457
Total stockholders' equity	708,698	652,209
Total liabilities and stockholders' equity	$948,131	$865,313

The accompanying notes are an integral part of these consolidated statements

CERADYNE, INC.

CONSOLIDATED STATEMENTS OF INCOME
(In thousands, except for per share data)

	Years ended December 31,		
	2011	2010	2009
Net sales	$571,982	$402,938	$400,575
Cost of product sales	365,337	295,078	298,956
Gross profit	206,645	107,860	101,619
Operating expenses:			
Selling, general and administrative	74,325	61,940	65,643
Research and development	12,446	11,692	12,258
Restructuring — plant closure and severance	914	3,505	12,924
Acquisition related (credit) charge	(17,298)	1,567	(768)
Goodwill impairment	7,797	—	3,832
Total operating expenses	78,184	78,704	93,889
Operating income	128,461	29,156	7,730
Other income (expense)			
Interest income	3,991	5,355	4,091
Interest expense	(6,620)	(6,247)	(7,119)
Gain on early extinguishment of debt	—	—	1,881
Gain (loss) on auction rate securities	630	(978)	(5,187)
Miscellaneous, net	1,494	1,085	(979)
	(505)	(785)	(7,313)
Income before provision (benefit) for income taxes	127,956	28,371	417
Provision (benefit) for income taxes	44,068	(905)	(8,098)
Net income	$ 83,888	$ 29,276	$ 8,515
Net income per common share:			
Basic	$ 3.41	$ 1.16	$ 0.33
Diluted	$ 3.39	$ 1.15	$ 0.33
Shares used in computing per common share amounts:			
Basic	24,614	25,191	25,684
Diluted	24,786	25,370	25,802

The accompanying notes are an integral part of these consolidated statements

CERADYNE, INC.

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY AND COMPREHENSIVE INCOME

(In thousands, except for share data)

	Common Stock		Retained Earnings	Accumulated Other Comprehensive Income (Loss)	Total Stockholders' Equity
	Number of Shares	Amount			
Balance, December 31, 2008	25,830,374	$163,550	$461,741	$ 13,703	$638,994
Comprehensive income:					
Net income	—	—	8,515	—	8,515
Net unrealized gain on available-for-sale securities	—	—	—	3,612	3,612
Net change in pension liability	—	—	—	(936)	(936)
Cumulative translation adjustment	—	—	—	5,149	5,149
Total comprehensive income	—	—	—	—	16,340
Impact of repurchase of convertible debt	—	(829)			(829)
Issuance of common stock	129,131	944	—	—	944
Repurchases and retirements of common stock	(567,000)	(9,753)	—	—	(9,753)
Exercise of stock options	8,500	33	—	—	33
Tax benefit from exercise of stock options	—	149	—	—	149
Stock based compensation	—	3,839	—	—	3,839
Balance, December 31, 2009	25,401,005	$157,933	$470,256	$ 21,528	$649,717
Comprehensive income:					
Net income	—	—	29,276	—	29,276
Net unrealized gain on available-for-sale securities	—	—	—	79	79
Net change in pension liability	—	—	—	(782)	(782)
Cumulative translation adjustment	—	—	—	(10,368)	(10,368)
Total comprehensive income	—	—	—	—	18,205
Issuance of common stock	140,755	319	—	—	319
Repurchases and retirements of common stock	(854,134)	(19,766)	—	—	(19,766)
Exercise of stock options	25,500	362	—	—	362
Tax shortfall from exercise of stock options	—	(472)	—	—	(472)
Stock based compensation	—	3,844	—	—	3,844
Balance, December 31, 2010	24,713,126	$142,220	$499,532	$ 10,457	$652,209
Comprehensive income:					
Net income	—	—	83,888	—	83,888
Net unrealized loss on available-for-sale securities	—	—	—	(3,035)	(3,035)
Net change in pension liability	—	—	—	(1,591)	(1,591)
Cumulative translation adjustment	—	—	—	(2,735)	(2,735)
Total comprehensive income	—	—	—	—	76,527
Issuance of common stock	304,859	851	—	—	851
Repurchases and retirements of common stock	(842,934)	(25,775)	—	—	(25,775)
Tax benefit from exercise of stock options	—	740	—	—	740
Stock based compensation	—	4,146	—	—	4,146
Balance, December 31, 2011	24,175,051	$122,182	$583,420	$ 3,096	$708,698

The accompanying notes are an integral part of these consolidated statements

CERADYNE, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS
(In thousands)

	Years ended December 31		
	2011	2010	2009
Cash flows from operating activities:			
Net income	$ 83,888	$ 29,276	$ 8,515
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	38,750	36,148	35,146
Amortization of bond premium	985	620	—
Non cash interest expense on convertible debt	3,695	3,436	3,643
Gain on early extinguishment of debt	—	—	(1,881)
Payments of accreted interest on repurchased convertible debt	—	—	(2,957)
Deferred income taxes	16,209	9,773	(1,572)
Stock compensation	4,146	3,844	3,839
(Gain) losses on auction rate securities	(630)	978	5,187
Losses on other securities	80	328	—
Goodwill impairment	7,797	—	3,832
Loss on equipment disposal	382	2,992	514
Changes in operating assets and liabilities, net of assets acquired:			
Accounts receivable, net	(18,038)	814	12,170
Other receivables	11,875	(1,724)	(5,973)
Inventories	(21,284)	(611)	2,513
Production tooling, net	3,640	1,952	2,587
Prepaid expenses and other	(19,557)	(18,541)	3,731
Accounts payable and accrued expenses	8,702	1,789	3,946
Income tax payable	2,932	1,193	(213)
Other long term liability	(17,048)	2,280	(7,357)
Employee benefits	2,168	1,588	2,103
Net cash provided by operating activities	108,692	76,135	67,773
Cash flows from investing activities:			
Purchases of property, plant and equipment	(31,262)	(44,220)	(14,534)
Changes in restricted cash	—	3,130	(428)
Purchases of marketable securities	(78,622)	(122,927)	(179,194)
Proceeds from sales and maturities of marketable securities	52,466	39,489	73,170
Acquisition of businesses, net of cash acquired	(27,673)	—	(9,654)
Proceeds from sale of equipment	1,781	969	72
Net cash used in investing activities	(83,310)	(123,559)	(130,568)
Cash flows from financing activities:			
Proceeds from issuance of stock due to exercise of stock options	1,163	362	33
Tax benefit due to exercise of stock options	740	(472)	149
Shares repurchased and retired	(25,775)	(19,766)	(9,753)
Reduction on long term debt	—	—	(20,239)
Net cash used in financing activities	(23,872)	(19,876)	(29,810)
Effect of exchange rates on cash and cash equivalents	(4,671)	(1,418)	(523)
Decrease in cash and cash equivalents	(3,161)	(68,718)	(93,128)
Cash and cash equivalents, beginning of period	53,436	122,154	215,282
Cash and cash equivalents, end of period	$ 50,275	$ 53,436	$ 122,154
Supplemental disclosures of cash flow information:			
Interest paid	$ 2,709	$ 3,251	$ 2,952
Income taxes paid	$ 23,685	$ 820	$ 733
Supplemental schedule of non-cash financing activities:			
Fulfillment of 401(k) obligations through the issuance of stock	$ 1,499	$ 1,319	$ 1,507

The accompanying notes are an integral part of these consolidated statements

1. Description of Business

Ceradyne, Inc. ("Ceradyne" or "the Company") develops, manufactures and markets advanced technical ceramic products and components for defense, industrial, energy, automotive/diesel and commercial applications. The Company's expertise in ceramic material science as well as a vertically integrated approach of designing much of its key equipment and controlling the manufacturing process from raw material powders to finished product allows the Company to design and manufacture precision, high quality advanced technical ceramic products to meet demanding customer specifications. The Company markets its products to a broad range of industries in approximately 63 countries. The Company's customers include the U.S. government, prime government contractors and large industrial and commercial manufacturers.

In many high performance applications, products made of advanced technical ceramics meet specifications that similar products made of metals, plastics or traditional ceramics cannot achieve. Advanced technical ceramics can withstand extremely high temperatures, combine hardness with light weight, are highly resistant to corrosion and wear, and often have excellent electrical insulation capabilities, special electronic properties and low friction characteristics.

2. Summary of Significant Accounting Policies

a. Principles of Consolidation and Nature of Operations

The consolidated financial statements include the financial statements of Ceradyne, Inc. (a Delaware Corporation), and its subsidiaries. Ceradyne, Inc. and its subsidiaries are collectively referred to herein as the "Company". All significant intercompany accounts and transactions have been eliminated.

b. Cash and Cash Equivalents

The Company considers all highly liquid investments with an initial maturity of three months or less when purchased to be cash equivalents.

c. Investments

The Company's short term investments consist of marketable securities, primarily high-grade corporate and government securities. The Company's long term investments consist of auction rate securities ("ARS") and other marketable securities. The Company classifies its investments as available-for-sale based on the Company's intent.

d. Foreign Exchange Risk Management

The Company measures the financial statements of its foreign subsidiaries using the local currency as the functional currency. Assets and liabilities of these subsidiaries are translated at the exchange rate on the balance sheet date. Revenues, costs and expenses are translated at the rates of exchange prevailing during the year. Translation adjustments resulting from this process are included in stockholders' equity. Net results from foreign currency transactions for the years ended December 31, 2011, 2010 and 2009 were a $0.4 million gain, a $2.1 million gain and a $0.5 million loss, respectively, and are included in other income, miscellaneous.

The Company enters into foreign exchange forward contracts to reduce earnings and cash flow volatility associated with foreign exchange rate changes to allow management to focus its attention on its core business operations. Accordingly, the Company enters into contracts which change in value as foreign exchange rates change to economically offset the effect of changes in value of foreign currency assets and liabilities, commitments and anticipated foreign currency denominated sales and operating expenses. The Company enters into foreign exchange forward contracts in amounts between minimum and maximum anticipated foreign exchange exposures, generally for periods not to exceed one year. These derivative instruments are not designated as accounting hedges. As of December 31, 2011, the Company had an outstanding forward exchange contract for 50.0 million Euros and a forward exchange contract for 108.8 million Indian Rupees. As of December 31, 2010, the Company had an outstanding forward exchange contract for 30 million Euros.

e. Accounts Receivable, Net

Trade accounts receivable are recorded at the invoiced amount and do not bear interest. The allowance for doubtful accounts is determined by analyzing specific customer accounts and assessing the risk of uncollectibility based on insolvency, disputes or other collection issues. In addition, the Company routinely analyzes the different aging categories and establishes allowances based on the length of time receivables are past due (based on contractual terms). A write-off will occur if the settlement of the account receivable is less than the carrying amount or the Company ultimately determines the balance will not be collected. We do not have any off-balance-sheet credit exposure related to our customers.

The following are changes in the allowance for doubtful accounts for the years ended December 31, 2011, 2010 and 2009 (in thousands):

	Balance at Beginning of Year	Additions	Write-offs and Recoveries	Balance at End of Year
December 31, 2011	$685	$1,091	$229	$1,547
December 31, 2010	$851	$ 260	$426	$ 685
December 31, 2009	$686	$ 740	$575	$ 851

f. Inventories

Inventories are stated at the lower of cost (determined on a standard cost basis which approximates first-in, first-out (FIFO) or market. The write-down of inventory for obsolete items is based on management's estimate of the amount considered obsolete based on specific reviews of inventory items. In estimating the write-down, management relies on its knowledge of the industry as well as its current inventory levels. The amounts the Company will ultimately realize could differ from amounts estimated by management. Inventory costs include the cost of material, labor and manufacturing overhead. The following is a summary of inventories by component (in thousands):

	December 31,	
	2011	2010
Raw materials	$ 8,533	$ 9,459
Work-in-process	65,645	49,825
Finished goods	43,095	34,974
	$117,273	$94,258

g. Production Tooling

The Company's production tooling primarily consists of graphite tooling used in the manufacturing and furnace processes. This tooling is being amortized over three to nine months and is included in the cost of the products produced and expensed through cost of product sales in the income statement. The production tooling expense for the years ended December 31, 2011 and 2010 was $23.5 million and $12.4 million, respectively.

h. Property, Plant and Equipment, Net

Property, plant and equipment is recorded at cost and consists of the following (in thousands):

	December 31,	
	2011	2010
Land and land improvements	$ 18,550	$ 18,902
Buildings and improvements	117,961	97,076
Machinery and equipment	233,702	209,334
Leasehold improvements	8,482	8,401
Office equipment	37,906	32,269
Construction in progress	11,961	37,286
	428,562	403,268
Accumulated depreciation and amortization	(185,186)	(159,587)
	$ 243,376	$ 243,681

Depreciation and amortization of property, plant and equipment are provided using the straight-line method over the following estimated useful lives:

Buildings and improvements	30 years
Machinery and equipment	3 to 12 years
Office equipment	3 to 5 years
Leasehold improvements	Shorter of 10 years or the term of lease

Maintenance, repairs and minor renewals are charged to expense as incurred. Repairs and maintenance expense approximated $11.2 million, $10.8 million, and $10.9 million in 2011, 2010, and 2009, respectively. Additions and improvements are capitalized. When assets are disposed of, the applicable costs and accumulated depreciation and amortization are removed from the accounts and any resulting gain or loss is included in the results of operations. Depreciation expense was approximately $32.0 million, $30.4 million, and $34.6 million in 2011, 2010, and 2009, respectively.

i. Goodwill and Intangible Assets, Net

Goodwill is not amortized, but instead goodwill and indefinite lived assets are required to be tested for impairment annually and under certain circumstances. The Company performs such testing of goodwill in the fourth quarter of each year at year end, or as events occur or circumstances change that would more likely than not reduce the fair value of a reporting unit below its carrying amount. During the fourth quarter of 2011, the Company early adopted new accounting guidance which simplifies goodwill impairment testing. The new accounting guidance allows the Company to conduct an assessment of qualitative factors to determine whether it is more likely than not that the fair value of a reporting unit is less than its carrying amount. If the Company determines that it is more likely than not that the fair value of a reporting unit is less than its carrying amount, it then conducts a two-step test for impairment of goodwill. The first step of the test for goodwill impairment compares the fair value of the applicable reporting unit with its carrying value. The Company conducts the test for impairment of goodwill at the reporting unit level. The Company's reporting units engage in business activities for which discrete financial information is available. Fair value is determined using a discounted cash flow method and/or prevailing earnings multiples for each reporting unit. The use of discounted cash flows requires the use of various economic, market and business assumptions in developing the Company's internal forecasts, the useful life over which cash flows will occur, and determination of the Company's weighted average cost of capital that reflect the Company's best estimates when performing the annual impairment test. However, the Company's assumptions and estimates may differ significantly from actual results. If the fair value of a reporting unit is less than the reporting unit's carrying value, the Company will perform the second step of the

test for impairment of goodwill. During the second step of the test for impairment of goodwill, the Company will compare the implied fair value of the reporting unit's goodwill with the carrying value of that goodwill. If the carrying value of the goodwill exceeds the calculated implied fair value, the excess amount will be recognized as an impairment loss.

Goodwill Impairment

During the second quarter of 2009, the Company determined that the demand for its Boral® product line, which was a large part of the revenue of the Company's operations in Canada, which formerly was classified as the Ceradyne Canada operating segment, but which now is included in the Boron operating segment (see Note 8), continued to decline due to competitive market forces causing a decline in demand for this product line and that this condition required a goodwill impairment test before the annual test for this reporting unit. To complete the test for impairment, the Company utilized several valuation techniques in making the determination, including a discounted cash flow methodology, which requires the forecasting of cash flows and requires the selection of discount rates. Management used available information to make these fair value estimates, including discount rates, commensurate with the risks relevant to the Company's business. Based on the goodwill impairment test performed on the Ceradyne Canada reporting unit, the Company recorded a $3.8 million impairment charge, which was recognized during the second quarter of 2009.

During the second quarter of 2009, the Company also conducted a test on the forecasted undiscounted cash flows to determine whether there was an impairment of its long lived assets in the Ceradyne Canada reporting unit. Based on the analysis of the forecasted undiscounted cash flows for this reporting unit, the Company determined that there was no impairment of the long lived assets for the Ceradyne Canada reporting unit.

The valuation methodologies and the underlying financial information that are used to determine fair value require significant judgments to be made by management. These judgments include, but are not limited to, long-term projections of future financial performance, terminal growth rate and the selection of an appropriate discount rate used to calculate the present value of the estimated future cash flows. The long-term projections used in the valuation were developed as a part of the Company's annual budgeting and forecasting process. The discount rate used in the valuation was selected based upon an analysis of comparable companies and included adjustments made to account for the Company's specific attributes such as size and industry. During the fourth quarter of 2011, the Company observed a continuing sharp contraction in the solar industry, which is a material part of the VIOX reporting unit business that the Company believed would negatively impact its current and future business performance. In performing the step one analysis, the Company used a discounted cash flow analysis which reflected estimates of cash flows which had decreased significantly since those estimated at the time of the VIOX acquisition in January 2011. Accordingly, as of December 31, 2011, the VIOX reporting unit failed step one of the impairment test. The Company performed step two of the impairment test which resulted in no implied value of goodwill for VIOX. Accordingly the Company recognized a charge for goodwill impairment of $7.8 million during 2011.

The roll forward of the goodwill balance by segment for the years ended December 31, 2011 and 2010 is as follows (in thousands):

	ACO	Thermo	ESK	Boron	Total
Goodwill	$ 5,311	$10,331	$9,987	$22,083	$ 47,712
Accumulated impairment losses	—	—	—	(3,832)	(3,832)
Balance at December 31, 2009	5,311	10,331	9,987	18,251	43,880
Translation and other	—	—	(661)	—	(661)
Goodwill	5,311	10,331	9,326	22,083	47,051
Accumulated impairment losses	—	—	—	(3,832)	(3,832)
Balance at December 31, 2010	5,311	10,331	9,326	18,251	43,219
Acquisition of VIOX	7,797				7,797
Goodwill impairment	(7,797)				(7,797)
Translation and other	—	—	(293)	—	(293)
Goodwill	$13,108	10,331	9,033	22,083	54,555
Accumulated impairment losses	(7,797)	—	—	(3,832)	(11,629)
Balance at December 31, 2011	$ 5,311	$10,331	$9,033	$18,251	$ 42,926

Intangible assets with definite lives are amortized over their estimated useful lives based on the economic consumption method. The components of intangibles assets were as follows (in thousands):

	December 31, 2011			December 31, 2010		
	Gross Amount	Accumulated Amortization	Net Amount	Gross Amount	Accumulated Amortization	Net Amount
Amortizing Intangible Assets						
Backlog	$ 1,808	$ 1,808	$ —	$ 1,826	$ 1,826	$ —
Developed technology	70,590	7,233	63,357	50,530	5,387	45,143
Trade name	4,110	698	3,412	1,110	571	539
Customer relationships	47,604	16,212	31,392	47,604	12,087	35,517
Non-compete agreement	1,100	775	325	500	500	—
Non-amortizing tradename	2,204	—	2,204	2,276	—	2,276
Total	$127,416	$ 26,726	$100,690	$103,846	$ 20,371	$83,475

Amortization of definite-lived intangible assets will be approximately $9,806 in 2012, $9,023 in 2013, $12,114 in 2014 and $15,384 in 2015. Amortization expense was $6,465 in 2011, $5,676 in 2010 and $4,749 in 2009.

All of the intangible assets were acquired in the years 2004 through 2011 (see Note 3).

The estimated useful lives for intangible assets are:

Identified Intangible Asset	Estimated Useful Life in Years or Months
Developed technology	10 years — 12.5 years
Tradename	10 years
Customer relationships	10 years — 12.5 years
Backlog	1 month — 3 months
Non-compete agreement	15 months

j. Other Assets

Other assets primarily consist of precious metals, primarily platinum and rhodium, that are used as molds in the Company's production of specialty glass products and small amounts are consumed in the production process. The molds are periodically refurbished to maintain their metallurgical qualities required in the

production process. In connection with the refurbishment process, approximately 5-10% of the platinum per mold is replaced per year and expensed. The Company expensed $0.7 million during the year ended December 31, 2011 to refurbish platinum molds. There was no expense in 2010 because this expense is associated with VIOX Corporation, who we acquired in January 2011.

k. Accrued expenses

The following is a summary of the accrued expenses at December 31, 2011 and 2010, respectively (in thousands):

	December 31, 2011	December 31, 2010
Payroll and benefits	$18,107	$16,051
Workers compensation reserve	3,642	3,469
Foreign currency contract settlements	4,314	—
Purchase price liability, current portion	—	1,205
Professional fees	969	919
Property and value added taxes	497	947
Other	2,941	2,012
	$30,470	$24,603

l. Sales Recognition

Sales are recorded when all of the following have occurred: an agreement of sale exists, the price is fixed and determinable, the product has been delivered according to the terms of the sales order and collection is reasonably assured. Management is required to make judgments about whether or not collection is reasonably assured. The Company reduces revenue with allowances for sales returns. Allowances for sales returns, which are recorded at the time revenue is recognized, are based upon historical sales returns which are minimal and immaterial. There were allowances for sales returns of $0.2 million as of December 31, 2011 and none as of December 31, 2010. The amount is immaterial since the Company typically does not experience a significant amount of sales returns from year to year because most of its products are produced and sold on a made to order basis. Therefore, as of December 31, 2011 and 2010, the Company did not anticipate any material sales returns for products shipped to customers.

The Company does not record a warranty reserve on the sale of its products. For its largest product line, body armor, all of which is sold to the U.S. Government, each lot of body armor is tested at an independent laboratory and the lot cannot be released for shipment to the U.S. Government until positive test results are received by both the U.S. Government and the Company. For its non-body armor sales, the Company has experienced minimal claims from these types of sales. Additionally, due to the inherent nature, strength, durability and structural properties of ceramics, as well as a rigid quality control program that includes, for some of our customers, having the customer accept quality test results prior to shipment, management does not believe a warranty reserve is necessary.

m. Net Income Per Share

Basic net income per share is computed by dividing income available to common stockholders by the weighted average number of common shares outstanding. Diluted net income per share is computed by dividing income available to common stockholders by the weighted average number of common shares outstanding plus the effect of any dilutive stock options and restricted stock units using the treasury stock method and the net share settlement method for the convertible debt.

The following is a summary of the number of shares entering into the computation of net income per common and common equivalent share:

	December 31,		
	2011	2010	2009
Weighted average number of shares outstanding	24,613,825	25,190,985	25,683,963
Dilutive stock options	125,462	179,244	118,281
Dilutive restricted stock units	46,819	—	—
Number of shares used in dilutive computation	24,786,106	25,370,229	25,802,244

Potentially dilutive shares representing 163,620 shares, 192,982 shares and 363,924 shares for 2011, 2010 and 2009, respectively, were excluded from the computation of diluted earnings per common share for these periods because their effect would have been anti-dilutive.

n. Accounting for Long-Lived Assets

Long-lived assets and intangible assets with definite lives are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. Impairment indicators include, among other conditions, cash flow deficits, historic or anticipated declines in revenue or operating profit and adverse legal or regulatory developments. If it is determined that such indicators are present and the review indicates that the assets will not be fully recoverable, based on undiscounted estimated cash flows over the remaining amortization periods, their carrying values are reduced to estimated fair market value. Estimated fair market value is determined primarily using the anticipated cash flows discounted at a rate commensurate with the risk involved. For the purposes of identifying and measuring impairment, long-lived assets are grouped with other assets and liabilities at the lowest level for which identifiable cash flows are largely independent of the cash flows of other assets and liabilities.

o. Use of Estimates

The preparation of financial statements in accordance with accounting principles generally accepted in the United States requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements. Actual results could differ from those estimates.

p. Research and Development

Costs associated with research and development were $12.4 million, $11.7 million, and $12.3 million for years ended December 31, 2011, 2010 and 2009, respectively. In addition, the Company historically has and continues to engage in application engineering and internally funded research to improve and reduce the cost to manufacture existing products, which is reflected in cost of sales and to develop new products which is expensed to research and development.

q. Income Taxes

The Company accounts for income taxes using the asset and liability approach. Under this approach, deferred taxes are determined based on the differences between the financial statements and the tax bases using rates as enacted in tax laws. A valuation allowance is established if it is "more likely than not" that all or a portion of the deferred tax asset will not be realized. The Company also has a liability for uncertain tax positions which must meet a more likely than not recognition threshold at the end of each reporting period.

r. Share-Based Compensation

The Company recognizes compensation expense for all share-based payment awards made to employees and directors, including employee stock options, based on estimated fair values on the grant date, over the requisite vesting period.

The Company followed the simplified method to establish the beginning balance as of January 1, 2006 of the additional paid-in capital pool ("APIC pool") related to the tax effects of employee share-based compensation, and uses this method to determine the subsequent impact on the APIC pool and Consolidated Statements of Cash Flows of the tax effects of employee share-based compensation awards.

s. Comprehensive Income

Comprehensive income encompasses all changes in equity other than those arising from transactions with stockholders, and consists of net income, currency translation adjustments, pension liability changes and unrealized net gains and losses on investments classified as available-for-sale. As of December 31, 2011, 2010 and 2009, accumulated other comprehensive income is as follows (in thousands):

	December 31,		
	2011	2010	2009
Unrealized gain (loss) on available-for-sale securities, net	$(4,947)	$(1,912)	$(1,991)
Net change in pension liability	(6,432)	(4,841)	(4,059)
Cumulative translation adjustment	14,475	17,210	27,578
	$ 3,096	$10,457	$21,528

The tax effect related to the change in unrealized gain (loss) on available-for-sale securities was $1.9 million, $3.3 million and $(2.4) million in 2011, 2010 and 2009, respectively. The tax effect related to the net change in pension liability was $0.8 million, $345,000 and $301,000 in 2011, 2010 and 2009, respectively.

t. Fair Value Measurements

The Company measures fair value and provides required disclosures about fair value measurements as it relates to financial and nonfinancial assets and liabilities in accordance with a framework specified by GAAP. This framework addresses how companies should measure fair value when they are required to use a fair value measure for recognition or disclosure purposes under GAAP. In 2009, the Company adopted new recognition and disclosure requirements for nonfinancial assets and liabilities that are recognized or disclosed at fair value in the financial statements on a nonrecurring basis. This adoption in 2009 did not have a significant impact on the financial statements.

The fair value framework requires that assets and liabilities carried at fair value be classified and disclosed in one of the following three categories:

Level 1: quoted market prices in active markets for identical assets and liabilities

Level 2: observable market based inputs or unobservable inputs that are corroborated by market data

Level 3: unobservable inputs that are not corroborated by market data

The carrying value of cash and cash equivalents, accounts receivable and trade payables approximates the fair value due to their short-term maturities.

For recognition purposes, on a recurring basis, the Company measures available for sale short-term and long-term investments at fair value. The fair value of the following investments is determined using quoted prices in active markets (Level 1):

	Level 1 Investments at December 31, 2011			
(In thousands)	Amortized Cost	Unrealized Gains	Unrealized Losses	Fair Value
Short term investments:				
Investment funds — debt securities	$220,778	$30	$(4,881)	$215,927
Corporate bonds	8,851	1	(7)	8,845
Total short term investments	$229,629	$31	$(4,888)	$224,772

	Level 1 Investments at December 31, 2010			
(In thousands)	Amortized Cost	Unrealized Gains	Unrealized Losses	Fair Value
Short term investments:				
Investment funds — debt securities	$172,081	$379	$ (998)	$171,462
Corporate bonds	21,437	19	(58)	21,398
Total short term investments	$193,518	$398	$(1,056)	$192,860
Long term investments:				
Corporate bonds	$ 10,384	$ 18	$ (4)	$ 10,398

The fair value of long-term investments in auction rate securities is based on a Level 3 valuation technique that includes the present value of future cash flows (principal and interest payments), review of the underlying collateral, and considers relevant probability weighted and risk adjusted observable inputs and minimizes the use of unobservable inputs. The fair values of auction rate securities at December 31, 2011 and December 31, 2010 were $15.0 million and $15.8 million, respectively.

On April 1, 2009, the Company adopted new recognition principles for additional guidance to provide greater clarity about the credit and noncredit component of an other-than-temporary impairment event. Adoption of the new recognition principles resulted in a pre-tax other-than-temporary impairment charge of $2.9 million in 2009. This other-than-temporary impairment adjustment related to the credit risk component of certain auction rate securities which were previously recognized in other comprehensive income prior to the adoption of the new recognition principles. Total other than temporary impairment losses from auction rate securities were $1.0 million in 2010 and $5.2 million in 2009. The Company recognized a gain from the sale of auction rate securities of $0.6 million in 2011. The Company also recognized pre-tax temporary gains (losses) of ($0.8) million in 2011, $211,000 in 2010 and $6.1 million in 2009 which have been recorded in other comprehensive income due to temporary changes in the value of its investments in auction rate securities.

Cumulatively to date, the Company has incurred $4.7 million in pre-tax charges due to other-than-temporary reductions in the value of its investments in auction rate securities, realized losses of $8.8 million from sales of auction rate securities and pre-tax temporary impairment charges of $3.0 million reflected in other comprehensive income. The Company's investments in auction rate securities represent interests in insurance securitizations collateralized by pools of residential and commercial mortgages, asset backed securities and other structured credits relating to the credit risk of various bond guarantors that mature at various dates from June 2021 through July 2052. These auction rate securities were intended to provide liquidity via an auction process which is scheduled every 28 days, that resets the applicable interest rate, allowing investors to either roll over their holdings or gain immediate liquidity by selling such interests at par. Interest rates are capped at a floating rate of one month LIBOR plus additional spread ranging from 1.25% to 4.00% depending on prevailing rating. During the second half of the year 2007, through 2011, the auctions for these securities failed. As a result of

current negative conditions in the global credit markets, auctions for the Company's investment in these securities have recently failed to settle on their respective settlement dates. Consequently, the investments are not currently liquid through the normal auction process and may be liquidated if a buyer is found outside the auction process. Although the auctions have failed, the Company continues to receive underlying cash flows in the form of interest income from the investments in auction rate securities. As of December 31, 2011, the fair value of the Company's investments in auction rate securities was below cost by approximately $7.8 million. The fair value of the auction rate securities has been below cost for more than one year.

Beginning in the third quarter of 2008 and at December 31, 2011, the Company determined that the market for its investments in auction rate securities and for similar securities continued to be inactive since there were few observable or recent transactions for these securities or similar securities. The Company's investments in auction rate securities were classified within Level 3 of the fair value hierarchy because the Company determined that significant adjustments using unobservable inputs were required to determine fair value as of December 31, 2011 and December 31, 2010.

An auction rate security is a type of structured financial instrument where its fair value can be estimated based on a valuation technique that includes the present value of future cash flows (principal and interest payments), review of the underlying collateral and considers relevant probability weighted and risk adjusted observable inputs and minimizes the use of unobservable inputs. Probability weighted inputs included the following:

- Probability of earning maximum rate until maturity
- Probability of passing auction at some point in the future
- Probability of default at some point in the future (with appropriate loss severity assumptions)

The Company determined that the appropriate risk-free discount rate (before risk adjustments) used to discount the contractual cash flows of its auction rate securities ranged from 0.1% to 3.0%, based on the term structure of the auction rate security. Liquidity risk premiums are used to adjust the risk-free discount rate for each auction rate security to reflect uncertainty and observed volatility of the current market environment. This risk of nonperformance has been captured within the probability of default and loss severity assumptions noted above. The risk-adjusted discount rate, which incorporates liquidity risk, appropriately reflects the Company's estimate of the assumptions that market participants would use (including probability weighted inputs noted above) to estimate the selling price of the asset at the measurement date.

In determining whether the decline in value of the ARS investments was other-than-temporary, the Company considered several factors including, but not limited to, the following: (1) the reasons for the decline in value (credit event, interest related or market fluctuations); (2) the Company's ability and intent to hold the investments for a sufficient period of time to allow for recovery of value; (3) whether the decline is substantial; and (4) the historical and anticipated duration of the events causing the decline in value. The evaluation for other-than-temporary impairments is a quantitative and qualitative process, which is subject to various risks and uncertainties. The risks and uncertainties include changes in the credit quality of the securities, changes in liquidity as a result of normal market mechanisms or issuer calls of the securities, and the effects of changes in interest rates.

Assets measured at fair value on a recurring basis include the following as of December 31, 2011 and 2010 (in thousands):

(In thousands)	Fair Value Measurements at December 31, 2011 Using: Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Total Carrying Value at December 31, 2011
Cash equivalents	$ 50,275	$—	$ —	$ 50,275
Short term investments:				
Investment funds — debt securities	215,927	—	—	215,927
Corporate bonds	8,845	—	—	8,845
Total short term investments	224,772	—	—	224,772
Long term investments:				
Auction rate securities	—	—	15,026	15,026
Corporate bonds	—	—	—	—
Total long term investments	—	—	15,026	15,026
Other long-term financial assets	655	—	—	655
Derivative financial instrument	$ (925)	$—	$ —	$ (925)

(In thousands)	Fair Value Measurements at December 31, 2010 Using: Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Total Carrying Value at December 31, 2010
Cash equivalents	$ 53,436	$—	$ —	$ 53,436
Short term investments:				
Investment funds — debt securities	171,462	—	—	171,462
Corporate bonds	21,398	—	—	21,398
Total short term investments	192,860	—	—	192,860
Long term investments:				
Auction rate securities	—	—	15,789	15,789
Corporate bonds	10,398	—	—	10,398
Total long term investments	10,398	—	15,789	26,187
Other long-term financial assets	1,335	—	—	1,335
Derivative financial instrument	$ 49	$—	$ —	$ 49

Activity in long term investments (Level 3) was as follows (in thousands):

	Year Ended December 31,	
	2011	2010
Balance at beginning of year	$ 15,789	$ 20,019
Proceeds from sale of auction rate securities	(630)	(3,463)
Realized gain included in net earnings	630	1,052
Unrealized loss included in net earnings	—	(2,030)
Unrealized gain (loss) included in other comprehensive income	(763)	211
Balance at end of year	$ 15,026	$ 15,789

Additionally, on a nonrecurring basis, the Company uses fair value measures when analyzing asset impairment. Long-lived tangible assets and definite-lived intangible assets are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. If it is determined such indicators are present and the review indicates that the assets will not be fully recoverable, based on undiscounted estimated cash flows over the remaining amortization periods, their carrying values are reduced to estimated fair value. Estimated fair value is determined primarily using the anticipated cash flows discounted at a rate commensurate with the risk involved. During the fourth quarter of each year, the Company evaluates goodwill and indefinite-lived intangibles for impairment using the income and other valuation approaches. The income approach is a valuation technique under which estimated future cash flows are discounted to their present value to calculate fair value. When analyzing indefinite-lived intangibles for impairment, the Company uses a relief from royalty method which calculates the cost savings associated with owning rather than licensing the intangible asset, applying an assumed royalty rate within the Company's discounted cash flow calculation.

The Company is also required to test goodwill for impairment before the annual test if an event occurs or circumstances change that would more likely than not reduce the fair value of a reporting unit below its carrying amount, such as a significant adverse change in the business climate. Goodwill in the VIOX reporting unit, which included in the ACO operating segment, with a carrying amount of $7.8 million was written down in full as there was no implied fair value as of December 31, 2011, the effective date of the impairment test, resulting in an impairment charge of $7.8 million, which was included in earnings during the fourth quarter of 2011. Goodwill in the Ceradyne Canada reporting unit segment, which included in the Boron operating segment, with a carrying amount of $3.8 million was written down in full as there was no implied fair value as of June 30, 2009, the effective date of the impairment test, resulting in an impairment charge of $3.8 million, which was included in earnings during the second quarter of 2009. There was no goodwill impairment charge in 2010.

For disclosure purposes, the Company is required to measure the fair value of outstanding debt on a recurring basis. The fair value of outstanding debt is determined using quoted prices in active markets. Long-term debt is reported at amortized cost. The fair value of long-term debt, based on quoted market prices, was $93.5 million at December 31, 2011 and $93.1 million at December 31, 2010. The carrying value of the Company's unused line of credit is considered to approximate fair market value, as the interest rates of these instruments are based predominantly on variable reference rates.

The carrying value of accounts receivable and trade payables approximates the fair value due to their short-term maturities.

u. Recent Accounting Pronouncements

In January 2010, the FASB issued revised authoritative guidance that requires more robust disclosures about the different classes of assets and liabilities measured at fair value, the valuation techniques and inputs used, the activity in Level 3 fair value measurements, and the transfers between Levels 1, 2 and 3. This guidance was

adopted on January 1, 2010 except for the disclosures about purchases, sales, issuances, and settlements in the roll forward activity in Level 3 fair value measurements. Those disclosure requirements were adopted on January 1, 2011. The adoption of this guidance did not have a material impact on the Company's consolidated financial position, results of operations and cash flows.

In December 2010, the FASB issued authoritative guidance that amended the disclosure requirements for supplementary pro forma related to business combinations. The amendments specify that if a public entity presents comparative financial statements, the entity should disclose revenue and earnings of the combined entity as though the business combination(s) that occurred during the current year had occurred as of the beginning of the comparable prior annual reporting period only. The amendments also expand the supplemental pro forma disclosures to include a description of the nature and amount of material, nonrecurring pro forma adjustments directly attributable to the business combination included in the reported pro forma revenue and earnings. The amendments are effective prospectively for business combinations for which the acquisition date is on or after the beginning of the first annual reporting period beginning on or after December 15, 2010. The Company adopted this guidance on January 1, 2011 and the amended disclosure requirements are included in the consolidated financial statements as applicable for the year ended December 31, 2011.

In May 2011, the FASB issued new guidance which changes the wording used to describe many of the requirements in U.S. GAAP for measuring fair value and for disclosing information about fair value measurements to ensure consistency between U.S. GAAP and International Financial Reporting Standards ("IFRS"). This new guidance also expands the disclosures for fair value measurements that are estimated using significant unobservable (Level 3) inputs. This new guidance is to be applied prospectively. The Company anticipates that the adoption of this standard in the first quarter of 2012 will not materially expand its consolidated financial statement footnote disclosures.

In June 2011, the FASB issued new guidance which eliminates the option to report other comprehensive income and its components in the statement of changes in equity. This new guidance requires that all nonowner changes in stockholders' equity be presented in either a single continuous statement of comprehensive income or in two separate but consecutive statements. This new guidance is to be applied retrospectively. The Company anticipates that the adoption of this standard in the first quarter of 2012 may materially change the presentation of its consolidated financial statements.

In September 2011, the FASB issued Accounting Standards Update No. 2011-09, "Compensation — Retirement Benefits — Multiemployer Plans (Subtopic 715-80)," ("ASU 2011-09"). ASU 2011-09 requires that employers provide additional separate disclosures for multiemployer pension plans and multiemployer other postretirement benefit plans. The additional quantitative and qualitative disclosures will provide users with more detailed information about an employer's involvement in multiemployer pension plans. The Company adopted this standard and has expanded its footnote disclosures in the consolidated financial statements. This adoption did not have a material impact on its consolidated financial statements for the year ending December 31, 2011.

In September 2011, the FASB issued Accounting Standards Update No. 2011-08, "Intangibles — Goodwill and Other (Topic 350)," ("ASU 2011-08"). ASU 2011-08 allows entities to first assess qualitatively whether it is necessary to perform the two-step goodwill impairment test. If an entity believes, as a result of its qualitative assessment, that it is more likely than not that the fair value of a reporting period is less than its carrying amount, the quantitative two-step goodwill impairment test is required. An entity has the unconditional option to bypass the qualitative assessment and proceed directly to performing the first step of the goodwill impairment test. The Company adopted this standard and it did not have a material impact on its consolidated financial statements and footnote disclosures.

3. Acquisitions

Acquisition of VIOX Corporation

On January 3, 2011, the Company acquired 100% of Seattle, Washington based specialty glass company, VIOX Corporation ("VIOX"). The purchase price consists of $26.0 million in cash paid at closing, plus a post-closing adjustment of $1.7 million that was paid in March 2011. In addition, the Company is obligated to pay contingent consideration of up to a maximum of $22.0 million, based on VIOX achieving certain sales diversification and earnings targets during the 30-month period following the closing. As of the acquisition date, the estimated value of the contingent consideration was $11.5 million which was accrued as additional purchase consideration. During the fourth quarter of 2011, due to the sharp contraction in the solar industry which negatively impacted VIOX' 2011 business performance and future prospects, the Company determined that VIOX would not achieve the sales diversification and earnings targets that were required for them to earn the contingent consideration during the specified period, accordingly, the contingent consideration of $11.5 million was recorded as a net credit in the consolidated statements of operations for the year ended December 31, 2011.

VIOX is a 40-year-old corporation that develops, manufactures and markets specialty glass compositions for a wide range of electronic, industrial and health care markets. The Company has recorded the purchase of VIOX using the acquisition method of accounting and recognized the assets acquired and liabilities assumed at their fair values as of the date of the acquisition. The results of operations of VIOX have been included in the Company's consolidated results of operations beginning with the date of the acquisition. The Company has made an election to treat the acquisition as an asset purchase for income tax purposes under Internal Revenue Code Section 338 ("Section 338 Election"). As a result of the Section 338 Election, the Company accrued an additional liability of $0.8 million which is payable to the former stockholders of VIOX.

This transaction has been accounted for under the acquisition method of accounting. Under this method, assets acquired and liabilities assumed are recorded at the date of acquisition at their respective fair values.

The total purchase price of the VIOX acquisition on January 3, 2011 was as follows (in thousands):

Cash consideration paid	$ 27,673
Accrued contingent purchase consideration	11,521
Section 338 Election liability to former VIOX stockholders	775
Total purchase price	$ 39,969

The above purchase price has been allocated based on the fair values of assets acquired and liabilities assumed as follows (in thousands):

Accounts receivable, net	$ 2,385
Inventories	2,702
Other current assets	706
Property, plant and equipment	3,490
Intangible assets	23,600
Goodwill	7,797
Other noncurrent assets	1,269
Accounts payable and other liabilities	(1,980)
	$39,969

The purchase price allocation is based on a fair market valuation of acquired intangible assets, inventory and property, plant and equipment. Of the $23.6 million of acquired intangible assets, $20.0 million was assigned to technology-based intangible assets that have a useful life of approximately 20 years, non-amortizable trade name

of $3.0 million and $0.6 million was assigned to non-compete agreements with a useful life of three years. The amounts assigned to intangible assets were based on management's estimate of the fair value. The technology-based intangible assets comprise trade secrets used in manufacturing process and related customer relationships which have been valued together as complementary assets with similar useful lives due to the long-term nature of the manufacturing processes inherent in the trade secrets, VIOX' historical pattern of customer retention and VIOX' ability to attract new customers with its manufacturing processes. The technology-based intangible assets are both transferable and separable from the acquired assets.

Identification and allocation of value to the identified intangible assets was based on the acquisition method of accounting. The fair value of the identified intangible assets was estimated by performing a discounted cash flow analysis using the "income" approach. This method includes a forecast of direct revenues and costs associated with the respective intangible assets and charges for economic returns on tangible and intangible assets utilized in cash flow generation. Net cash flows attributable to the identified intangible assets are discounted to their present value at a rate commensurate with the perceived risk. The projected cash flow assumptions considered contractual relationships, customer attrition, eventual development of new technologies and market competition.

The estimates of expected useful lives take into consideration the effects of competition, regulatory changes and possible obsolescence. The useful lives of technology-based intangible assets were based on the number of years in which net cash flows have been projected.

Assumptions used in forecasting cash flows for each of the identified intangible assets included consideration of VIOX' historical operating margins and performance of comparable publicly traded entities; number of customers and VIOX' market share; contractual and non-contractual relationships with large customers and patents held.

The goodwill resulting from the VIOX acquisition is included with the Advanced Ceramic Operations segment and resulted primarily from intellectual property and other intangibles acquired that do not qualify for separate recognition. Based on an assessment of goodwill as of December 31, 2011, there was no implied value and accordingly, the total amount of goodwill of $7.8 million was impaired during the fourth quarter of 2011 (see Note 2.i above). For tax purposes, the goodwill will not be tax deductible.

As of January 3, 2011, the date of acquisition, the Company began to include the financial results of VIOX Corporation in the Advanced Ceramic Operations segment. VIOX sales amounted to $20.3 million in 2011.

The historical results of the operations acquired from VIOX were not material to the Company's consolidated results of operations in current and prior periods. Therefore, proforma disclosures are not necessary.

Acquisition of Assets of Diaphorm Technologies, LLC

On June 1, 2009, the Company acquired substantially all of the business and assets and all technology and intellectual property related to ballistic combat and non-combat helmets of Diaphorm Technologies, LLC ("Diaphorm"), based in Salem, New Hampshire. The purchase price consisted of $9.7 million in cash paid at closing, the assumption of $274,000 of liabilities, plus contingent consideration not to exceed $10 million over the next 5 years based upon performance milestones and revenues achieved during that period from Diaphorm's existing products and new products developed using Diaphorm technology. The Company originally accrued contingent purchase consideration of $5.1 million based on probability weighted expected future cash flows as of the acquisition date. The Company accrued $1.1 million during 2011 and $1.6 million during 2010 to reflect the change in the probability weighted expected cash flows. The Company incurred transaction and related costs of approximately $340,000 which were expensed in 2009. Contingent consideration of $1.0 million, $0.3 million and $0.5 million was earned and paid in September 2009, September 2010 and August 2011, respectively. The acquisition has been accounted for under the purchase method of accounting. Under this method, assets acquired and liabilities assumed are recorded at the date of acquisition at their respective fair values. The goodwill

resulting from the Diaphorm acquisition is included with the ACO segment and resulted primarily from intellectual property acquired. Goodwill will not be amortized but is subject to an ongoing assessment for impairment. The goodwill from the Diaphorm acquisition is tax deductible. The historical results of the operations acquired from Diaphorm were not material to the Company's consolidated results of operations in current and prior periods.

Acquisition of SemEquip, Inc.

On August 11, 2008, the Company completed the acquisition of SemEquip, Inc. ("SemEquip") pursuant to a merger of SemEquip with a wholly-owned subsidiary of Ceradyne. SemEquip is a leader in the development of cluster ion implantation sub-systems and advanced ion source materials for the manufacture of logic and memory chips. SemEquip's technologies enable the utilization of cluster beam ion implantation for manufacturing advanced integrated circuits at low cost and high throughput rates. Ceradyne paid $25.0 million in cash at closing, of which $1.7 million was distributed as incentive compensation to several SemEquip employees and advisors as described below, and incurred direct transaction fees and expenses of $2.0 million. Ceradyne used a portion of its existing cash to make these payments. In addition, Ceradyne will pay contingent consideration of up to $100.0 million in cash during the 15-year period following completion of the merger based upon revenues achieved over that period by SemEquip. The net fair value of assets acquired and liabilities assumed exceeded the total amount of the purchase price paid. As the Company may be required to pay contingent consideration in the future, the Company accrued an additional $25.2 million of purchase consideration to represent the difference between the net fair value of assets acquired and liabilities assumed and the purchase price paid.

The $1.7 million portion of the closing date consideration paid to SemEquip employees and advisors and a portion of the contingent consideration to be paid by Ceradyne over 15 years relates to a pre-closing commitment by SemEquip to pay incentive compensation to several of its employees and advisors. This incentive compensation will not increase the total consideration Ceradyne will pay for the acquisition, but it required Ceradyne to record a $9.8 million pre-tax compensation charge during the year ended December 31, 2008. The liability for the contingent incentive compensation is reevaluated each reporting period. Accordingly, the Company reduced the liability and recognized a corresponding non-cash credit of $0.8 million in the Consolidated Statements of Income during the year ended December 31, 2009. In November 2011, SemEquip entered into a non-exclusive licensing arrangement with a key customer which changed SemEquip's business model and reduced expected future cash flows associated with the future contingent consideration. In connection with the license, SemEquip transferred the hardware related assets to the licensee and reduced its workforce which included production, research and development, and support staff in Billerica, Massachusetts. Approximately half of the workforce was transitioned to the licensee. Accordingly, the estimated liability associated with the incentive compensation plan was reduced by $6.9 million and has been reflected as a credit in acquisition related charges in the consolidated statements of operations for the year ended December 31, 2011.

4. Debt and Bank Borrowing Arrangements; Convertible Note and Common Stock Offerings

During December 2005, the Company completed a public offering of 2,070,000 shares of common stock at a price to the public of $43.31 per share. The Company received net proceeds of approximately $84.6 million from this offering after deducting offering expenses and underwriting discounts of $5.0 million. Concurrent with the common stock offering, during December 2005, the Company issued $121.0 million of 2.875% senior subordinated convertible notes ("Notes") due December 15, 2035.

During the year ended December 31, 2009, the Company purchased an aggregate of $27.9 million principal amount of the Notes on the open market at a purchase price of $23.2 million. The carrying amount of the Notes purchased was $24.1 million and the estimated fair value of the Notes exclusive of the conversion feature was $21.8 million. The difference between the carrying amount of $24.1 million and the estimated fair value of $21.8 million was recognized as a gain of $2.3 million upon early extinguishment of debt, which was partially

offset by write off of associated unamortized debt issuance costs of $392,000, resulting in a net gain of $1.9 million. The difference between the estimated fair value of $21.8 million and the purchase price of $23.2 million was $1.4 million and was charged to additional paid-in capital. The Company has $26.8 million remaining of the original $50.0 million authorization to repurchase and retire part of the outstanding Notes. Cash flow from operating activities in the statement of cash flows for the year ended December 31, 2009 includes $3.0 million of the purchase price that was attributable to the payment of accreted interest on the convertible debt discount and the remaining $20.2 million is presented as repayments of convertible debt in cash flow from financing activities. There were no repurchases during the years ended December 31, 2011 and December 2010.

As of December 31, 2011 and 2010, long-term debt and the equity component (recorded in additional paid in capital, net of income tax benefit), determined in accordance with the accounting guidance for convertible debt, comprised the following (in thousands):

	December 31, 2011	December 31, 2010
Long-term debt		
Principal amount	$93,100	$93,100
Unamortized discount	(3,806)	(7,501)
Net carrying amount	89,294	85,599
Current portion of long-term debt	89,294	—
Noncurrent portion of long-term debt	$ —	$85,599
Equity component, net of income tax benefit	$16,399	$16,399

The discount on the liability component of long-term debt is being amortized using the effective interest method based on an annual effective rate of 7.5%, which represented the market interest rate for similar debt without a conversion option on the issuance date, through December 2012, which coincides with the first date that holders of the Notes can exercise their put option as discussed below.

Interest expense on the Notes, excluding capitalized interest, for the years ended December 31, 2011, 2010 and 2009 included the following (in thousands):

	For the Years Ended December 31,		
	2011	2010	2009
Contractual interest coupon	$ 2,676	$ 2,677	$ 3,058
Non-cash amortization of discount on the liability component	3,694	3,436	3,641
Non-cash amortization of debt issuance costs	380	364	399
	$ 6,750	$ 6,477	$ 7,098

Interest on the Notes is payable on December 15 and June 15 of each year, commencing on June 15, 2006. The Notes are convertible into 17.1032 shares of Ceradyne's common stock for each $1,000 principal amount of the Notes (which represents a conversion price of approximately $58.47 per share), subject to adjustment. The conversion rate will be adjusted upon the occurrence of events that affect Ceradyne's outstanding common stock, such as the issuance of our common stock or other securities as a dividend distribution to holders of our common stock, a subdivision or combination of our common stock, a recapitalization, reclassification or change of our common stock, or a consolidation or merger involving Ceradyne, as a result of which our common stock would be converted into, or exchanged for, stock, other securities or other property. Generally, the conversion rate would be adjusted as of the effective time of such transaction, such that the Notes would then be convertible into

the kind and amount of shares of stock, other securities or other property, that a holder of a number of shares of common stock equal to the conversion rate prior to such transaction would have owned or been entitled to receive upon such transaction. The conversion rate will also be adjusted under certain circumstances to provide for a make whole premium, as described below.

The Notes are convertible only under certain circumstances, including (a) during a calendar quarter if the closing price of the Company's common stock for at least twenty trading days in the thirty consecutive trading days ending on the last trading day of the preceding calendar quarter is more than 120% of the then effective conversion price, (b) during the five business day period after any five consecutive trading day period in which the trading price per $1,000 principal amount of Notes for each day of that period was less than 98% of the product of the closing price for our common stock for each day of that period and the then applicable conversion rate, (c) if the Notes are called for redemption, (d) if specified corporate transactions or fundamental changes occur, or (e) during the ten trading days prior to maturity of the Notes.

With respect to each $1,000 principal amount of the Notes surrendered for conversion, the Company will deliver the conversion value to holders as follows: (1) an amount in cash equal to the lesser of (a) the aggregate conversion value of the Notes to be converted and (b) $1,000, and (2) if the aggregate conversion value of the Notes to be converted is greater than $1,000, an amount in shares or cash equal to such aggregate conversion value in excess of $1,000.

The Notes contain put options, which may require the Company to repurchase in cash all or a portion of the Notes on December 15, 2012, December 15, 2015, December 15, 2020, December 15, 2025, and December 15, 2030 at a repurchase price equal to 100% of the principal amount of the Notes to be repurchased plus accrued and unpaid interest, including contingent interest (as described below), if any, up to but excluding the repurchase date. The Company reclassified its long term debt consisting of its outstanding Notes, as short-term debt because the Note holders have the right to demand repayment on December 15, 2012.

The Company is obligated to pay contingent interest to the holders of the Notes during any six-month period from June 15 to December 14 and from December 15 to June 14, commencing with the six-month period beginning December 20, 2010 and ending on June 14, 2011, if the average trading price of the note for the five trading day period ending on the third trading day immediately preceding the first day of the relevant contingent interest period equals $1,200 (120% of the principal amount of a note) or more. The amount of contingent interest payable per note for any relevant contingent interest period shall equal 0.25% per annum of the average trading price of a note for the five trading day period ending on the third trading day immediately preceding the first day of the relevant contingent interest period. This contingent interest payment feature represents an embedded derivative. However, based on the de minimus value associated with this feature, no value has been assigned at issuance or at December 31, 2011. There has been no contingent interest obligation for any applicable six-month period through December 31, 2011.

On or prior to the maturity date of the Notes, upon the occurrence of a fundamental change, under certain circumstances, the Company will provide for a make whole amount by increasing, for the time period described herein, the conversion rate by a number of additional shares for any conversion of the Notes in connection with such fundamental change transactions. The amount of additional shares will be determined based on the price paid per share of Ceradyne's common stock in the transaction constituting a fundamental change and the effective date of such transaction. This make whole premium feature represents an embedded derivative. Since this feature has no measurable impact on the fair value of the Notes and no separate trading market exists for this derivative, the value of the embedded derivative was determined to be de minimus. Accordingly, no value has been assigned at issuance or at December 31, 2011.

The Company utilizes a convertible bond pricing model and a probability weighted valuation model, as applicable, to determine the fair values of the embedded derivatives noted above.

In December 2005, the Company established an unsecured $10.0 million line of credit ("2005 LOC") which will expire on May 1, 2014. As of December 31, 2011, there were no outstanding amounts on the 2005 LOC. However, the available line of credit at December 31, 2011 has been reduced by outstanding letters of credit in the aggregate amount of $4.2 million. The fixed interest rate on the 2005 LOC was 2.9% as of December 31, 2011. In June 2011, the Company established a separate unsecured $5.0 million line of credit ("2011 LOC") that was increased to $7.0 million on December 19, 2011 and will mature on April 1, 2013. The Company expects to renew the 2011 LOC at that time for multiple years. As of December 31, 2011, there were no outstanding amounts on the 2011 LOC. However, the available line of credit at December 31, 2011 has been reduced by outstanding letters of credit in the aggregate amount of $1.9 million. The interest rate on the 2011 LOC was 1.3% as of December 31, 2011 which was based on the LIBOR rate for a period of one month, plus a margin of 1.0% percent. In the first quarter of 2012, the Company will finalize the transfer of the outstanding letters of credit under the 2005 LOC to the 2011 LOC and close the 2005 LOC.

Pursuant to the line of credit agreements, the Company is subject to certain covenants, which include, among other things, the maintenance of specified minimum amounts of net income and liquidity. The Company was in compliance with all covenants at December 31, 2011.

During the year ended December 31, 2010, the Company capitalized interest of approximately $445,000 in connection with the construction of its new manufacturing plant in Tianjin, China.

On February 16, 2012, the Company announced that our Board of Directors had declared our initial cash dividend in the amount of $0.15 per share of common stock, payable on March 20, 2012 to shareholders of record as of the close of business on March 6, 2012. It is the Company's current intention that it will declare and pay a similar cash dividend on a quarterly basis, although its Board reserves discretion to suspend or discontinue cash dividends at any time.

5. Income Taxes

The provision (benefit) for income taxes comprised the following for each of the years ended December 31 (in thousands):

	2011	2010	2009
Current, domestic	$17,060	$(15,663)	$(5,995)
Current, foreign	10,799	4,985	(531)
Current, total	27,859	(10,678)	(6,526)
Deferred, domestic	17,620	5,895	1,904
Deferred, foreign	(1,411)	3,878	(3,476)
Deferred, total	16,209	9,773	(1,572)
Provision (benefit) for income taxes	$44,068	$ (905)	$(8,098)

The components of the Company's deferred tax asset (liability) as of December 31, 2011 and 2010 are as follows (in thousands):

	December 31, 2011	December 31, 2010
Deferred tax asset:		
Inventory	$ 4,452	$ 7,094
Vacation accrual	1,119	1,009
Bad debt allowance	366	235
Employee compensation	2,624	1,878
Foreign taxes	422	425
Other	415	638
Total current deferred tax asset, before valuation allowance	9,398	11,279
Valuation allowance	(441)	(717)
Current deferred tax asset, net of valuation allowance	$ 8,957	$ 10,562
Current deferred tax (liability):		
State taxes	(2,442)	(3,093)
Prepaid expenses	(733)	(661)
Total current deferred tax (liability):	(3,175)	(3,754)
Net current deferred tax asset	$ 5,782	$ 6,808
Non current deferred tax assets:		
Deferred compensation	$ 5,026	$ 4,000
Employee compensation	1,456	1,793
Acquisition related compensation	159	2,819
State taxes	674	808
Net operating loss carryforwards	12,202	18,155
Research credits	3,139	2,965
Unrealized investment loss	5,005	4,723
Pension liability	3,137	2,308
Capital loss carryforwards	3,344	1,908
Foreign tax credit carryforwards	693	2,806
Asset writedowns and other	1,918	1,798
Total non current deferred tax assets	36,753	44,083
Valuation allowance	(4,372)	(4,301)
Non current deferred tax assets, net of valuation allowance	32,381	39,782
Non current deferred tax (liabilities):		
Depreciation and amortization	(16,444)	(13,581)
Intangible asset step up	(21,394)	(19,971)
Convertible debt	(17,950)	(16,701)
Other	(54)	(653)
Total non current deferred tax (liabilities)	(55,842)	(50,906)
Net non current deferred tax (liability)	$(23,461)	$(11,124)

The Company had net operating loss ("NOL") carryforwards at December 31, 2011, of $24.5 million, $47.8 million and $1.7 million for federal, state and foreign income tax purposes, respectively. The federal and state NOL carryforwards were primarily attributable to the acquisition of SemEquip, Inc. in August 2008 and the foreign NOL carryforward was attributable to the Company's second China plant which commenced production activities in 2011. The NOL carryforwards from the acquisition of SemEquip are subject to potential utilization restrictions on an annual basis as a result of the ownership change. The federal NOL carryforwards will begin to expire in 2021 if not utilized. The state NOL carryforwards have begun to expire, however the Company has established full valuation allowances for amounts that are expected to expire unused.

At December 31, 2011, the Company had approximately $1.2 million and $1.9 million in federal and state research and development credit carryforwards, respectively, which will begin to expire in 2016. These credits were attributable to the acquisition of SemEquip, Inc. These credits are subject to potential utilization restrictions on an annual basis as a result of the ownership change.

At December 31, 2011, the Company had a valuation allowance of $4.8 million for state NOLs and state research credits as the ultimate utilization of these items were less than "more likely than not". The valuation allowance decreased by $0.2 million during 2011 primarily due to the change in utilization of NOL carryforwards.

The effective income tax rate for the years ended December 31, 2011, 2010 and 2009 differs from the Federal statutory income tax rate due to the following items (in thousands):

	December 31,		
	2011	2010	2009
Income (loss) before taxes, domestic	$ 84,760	$ (8,914)	$ 24,178
Income (loss) before taxes, foreign	43,196	37,285	(23,761)
Income before taxes, total	$127,956	$28,371	$ 417
Provision for income taxes at federal statutory rate (35%)	44,785	9,930	146
State income taxes, net of federal benefit	3,302	(8,148)	(3,572)
Non deductible items	752	146	242
Worthless stock deduction	—	—	(410)
Foreign tax provision (credits)	1,517	2,385	(1,059)
Manufacturing deduction	(2,022)	—	—
State apportionment refund claim	(37)	2,900	—
Foreign earnings not taxed at federal rate	(4,549)	(6,872)	(2,031)
Contingency reserve	816	(484)	(3,697)
SemEquip NOL adjustment	—	—	(392)
Valuation allowance	(205)	(346)	2,675
Other	(291)	(416)	—
Provision (benefit) for income taxes	44,068	(905)	$ (8,098)

During the year ended December 31, 2010, the Company settled a claim with the State of California to change the apportionment formula that was previously used during the years 2005 through 2008 and received approval to use the new apportionment formula in subsequent years through 2015. Accordingly, the Company recorded a current state tax benefit to recognize a refund of approximately $8.3 million for the years 2005 through 2009, offset by the federal tax impact of $2.9 million, which resulted in a net tax benefit of $5.4 million during the year ended December 31, 2010.

The exercise of stock options and vesting of restricted stock units result in a tax benefit when the tax deduction exceeds share-based compensation expense recognized under generally accepted accounting principles and is recorded as a reduction of taxes payable with corresponding increase to the additional paid-in capital account. Conversely, a tax shortfall occurs when the share-based compensation expense recognized under

generally accounting principles exceeds the associated tax deduction and is recorded as an increase of income taxes payable with a corresponding reduction to the additional paid-in capital account as the Company has accumulated sufficient tax benefits in the past. Tax (shortfall) benefit of ($0.7) million, ($472,000) and $149,000 were recognized for the years ended December 31, 2011, 2010 and 2009, respectively.

The Company's effective tax rate considers the impact of undistributed earnings of subsidiary companies outside of the U.S. The Company does not provide for U.S. federal income taxes or tax benefits on the undistributed earnings or losses of its international subsidiaries because such earnings are reinvested and, in the opinion of management, will continue to be reinvested indefinitely. As of December 31, 2011, the Company had not provided federal income taxes on earnings of approximately $51.3 million from its international subsidiaries. Should these earnings be distributed in the form of dividends or otherwise, the Company would be subject to both U.S. income taxes and withholding taxes in various international jurisdictions. These taxes would be partially offset by U.S. foreign tax credits. Determination of the related amount of unrecognized deferred U.S. income taxes is not practicable because of the complexities associated with this hypothetical calculation. However, from time to time and to the extent that the Company can repatriate overseas earnings on a tax-free basis, the Company's foreign subsidiaries will pay dividends to the U.S. Material changes in the Company's working capital and long-term investment requirements could impact the decisions made by management with respect to the level and source of future remittances and, as a result, the Company's effective tax rate.

Effective January 1, 2008, the Company was granted an income tax holiday for a manufacturing facility in China. The tax holiday allows for tax-free operations through December 31, 2009, followed by operations at a reduced income tax rate of 12.5% on the profits generated in 2010 through 2012, with a return to the full statutory rate of 25% for periods thereafter. As a result of the tax holiday in China, income tax expense was reduced by approximately $1.7 million, $2.7 million and $2.3 million in 2011, 2010 and 2009, respectively.

The Company recorded a liability for unrecognized tax benefits ("UTBs") at December 31, 2011, 2010 and 2009. A reconciliation of the beginning and ending amount of UTBs is as follows (in thousands):

	2011	2010	2009
Balance at January 1,	$ 806	$ 1,817	$ 7,227
Additions based on tax positions related to the current year	793	603	777
Additions for tax positions of prior years	129	—	—
Reclassification of deferred tax assets	132	—	—
Reductions for settlements with taxing authorities	—	(416)	(1,675)
Reductions of tax positions of prior years	(69)	(1,198)	(4,512)
Balance at December 31,	$1,791	$ 806	$ 1,817

It is the Company's policy to classify accrued interest and penalties as part of the income tax provision. The Company recognized $10,000 of interest expense for the year ended December 31, 2011 and reversed $75,000 of interest expense related to UTBs for the year ended December 31, 2010. The accrued interest on the UTBs at December 31, 2011 and December 31, 2010 was $80,000 and $144,000, respectively. It is anticipated that any change in the above UTBs will impact the effective tax rate. At December 31, 2011, the 2007 through 2011 years are open and subject to potential examination in one or more local jurisdictions. During the year ended December 31, 2010, the Company settled the federal income tax examination of the 2008 tax year, accordingly, the 2009 through 2011 years are open for federal income tax purposes. The Company does not expect any significant release of UTBs within the next twelve months.

The Company has recorded certain deferred tax assets relating to capital losses the realization of which is dependent upon the implementation of tax strategies to which management is committed and deems prudent and feasible.

6. Employee Retirement and Other Benefit Plans

Supplemental Retirement Plan

In December 1988, the Board of Directors of the Company approved the adoption of a supplemental retirement plan, the Ceradyne SMART 401(k) Plan (the Plan), in which substantially all employees are eligible to participate after completing 90 days of employment. Participation in the Plan is voluntary. An employee may elect to contribute up to the maximum deferred tax amount of $16,500 in 2011 as a basic contribution. The Company may contribute any amount which the Board of Directors annually determines appropriate. Company contributions fully vest and are non-forfeitable after the participant has completed five years of service. The Company's related contributions for the years ended December 31, 2011, 2010 and 2009 were $1.5 million, $1.3 million and $1.5 million, respectively.

Pension and Other Postretirement Benefit Plans

The Company has defined benefit pension and benefit plans for employees in its ESK Ceramics and Ceradyne Boron Products subsidiaries. The overfunded or underfunded status of the defined benefit pension and benefit plans are recognized as an asset or liability in the statement of financial position and changes in that funded status in the year in which the changes occur are recognized through other comprehensive income.

German Pension and Benefit Plans

The Company provides pension benefits to the employees of its ESK Ceramics subsidiary in Germany. These pension benefits are rendered for the time after the retirement of the employees by payments into legally independent pension and relief facilities. They are generally based on length of service, wage level and position in the company. The direct and indirect obligations comprise obligations for pensions that are already paid currently and expectations for those pensions payable in the future. The Company has four separate plans in Germany: a) Pensionskasse — Old; b) Pensionskasse — New; c) Additional Compensation Plan; and d) Deferred Compensation plan. For financial accounting purposes, the Additional and Deferred Compensation Plans are accounted for as single-employer defined benefit plans, Pensionskasse — Old is a multiemployer defined benefit plan and the Pensionskasse — New is a defined contribution plan.

The measurement date for the Company's pension plan assets and obligations, including Pensionskasse—Old, is December 31. The measurement date for the Company's net periodic pension cost is January 1. Assumed discount rates and rates of increase in remuneration used in calculating the projected benefit obligation together with long-term rates of return on plan assets vary according to the economic conditions of Germany, where the pension plans are situated.

As noted above the Pensionskasse — Old is a multi employer defined benefit pension plan. ESK Ceramics is one of numerous employers who participate in the plan. Therefore, the Company has recognized as net pension benefit cost the required contribution for the period. However, due to the current development of the financial markets and the overall decrease of the return on pension plan assets, the pension facility ("WACKER-Pensionskasse") requested a one-off payment in 2008 from its members to further ensure its risk-bearing capacity and in addition requested that future pension adjustments from 2009 onwards have to be paid by the employers. Management believes, based on the bylaws of WACKER-Pensionskasse and its expected future performance, that this obligation will exist only for a limited period of time. The projected benefit obligation for those future pension adjustments which management believes the Company will have to pay was accrued as an additional liability.

The following table outlines the plan information for the year ended December 31, 2011.

Legal Name of the plan	Pensionskasse der Wacker Chemie Versicherungsverein auf Gegenseitigkeit		
Employer Identification Number / Plan number	N/A		
Funded Status	The plan was more than 80% funded as of December 31, 2011		
Expiration date(s) of the collective bargaining agreement(s) requiring contributions to the plan	N/A (no expiration date)		
Contributions to the plan by year These contributions did not represent more than five percent of total contributions to the plan.	For the year ended December 31,		
	2009	2010	2011
	$1.3 million	$1.3 million	$1.4 million
As of the end of the most recent annual period:	December 31, 2011		
1. Whether a funding improvement plan or a rehabilitation plan had been implemented	No		
2. Whether the employer paid surcharge to the plan	No		
3. Description of any minimum contributions(s), required for future periods by collective bargaining agreement(s), statutory obligations, or other contractual obligations, if applicable	The majority of the employers' contributions depend on the employees' contributions. The relation between the employers' and the employees' contribution can either decrease or increase in the future. Until 2011 the employer paid 250% of the employees' contribution. For the future – starting with 2012 – the employer has to pay 350% of the employees' contribution.		

Additional information of the Pensionskasse der Wacker Chemie VVaG is available in the public domain. In particular, the annual report as published by the Pensionskasse can be accessed at www.ebundesanzeiger.de. However, since the information is available in German only, ESK Ceramics provides this information hereafter.

Description of the nature of plan benefits	The Pensionskasse der Wacker Chemie VVaG provides monthly payments in case of retirement, disability or death (spouse or children). The benefits depend mainly on the employees' contributions.	
Qualitative description of the extent to which the employer could be responsible for the obligations of the plan, including benefits earned by employees during employment with another employer	The plan is under very strict supervision by the German authorities. Therefore, in normal course it is very unlikely that the Pensionskasse der Wacker Chemie VVaG fails to fulfill its obligations. In this unlikely event, by law, the employer is responsible for the obligations of the plan. The employer is liable for the benefits of its employees who participate in the plan.	
Other quantitative information, to the extent available, as of the most recent data available	December 31, 2010 (in thousand EUR)	
	Fair value of plan assets	1,395.3
	Actuarial present value of accumulated plan benefits (The actuarial present value of accumulated plan benefits was calculated according to German GAAP. The interest rate used according to German GAAP equals about 4.0%. As a result the actuarial present value of accumulated plan benefits according to US-GAAP would be less than the amount shown.)	1,317.7
	Total contributions received by the plan	47.1

The accumulated benefit obligations and projected benefit obligations are computed utilizing the same methods and assumptions as those used in the Additional and Deferred Compensation Plans noted above and are solely based on the ESK Ceramics employees participating in the plan. However, the assets of the plan are allocated based upon the relative percentage of the projected benefit obligation to the total for all participating employers. The long-term asset structure of the Pensionskasse is determined significantly by asset-liability-studies conducted regularly calculating an optimal investment portfolio based on the known business in force and the actuarial assumptions. Input parameters are assumed risk and return rates as well as specific correlation samples of the respective asset categories. The priority objective of the asset allocation is to achieve a rate of return compensating the benefit commitments within the limits of a justifiable risk and volatility. The operative investment policy has to conform to legal requirements (insurance control and investment law) as well as to internal investment guidelines and restrictions. The use of derivatives is permitted within the legally allowed scope. The expected overall rate of return is based on numerous factors like the portfolio selection and the anticipated long-term rate of return of the respective asset categories determined by the Black-Litterman Market Equilibrium Model. The expected long-term rate of return therewith is approximated to long-term historical averages, future expectations are also covered by the Black-Litterman Model. In certain cases assumptions in expected long-term rates of return are modified marginally by the responsible manager of the WACKER Pensionskasse in order to consider personal experience and different medium-term market expectations respectively. The projected benefit obligations for the pension plan "continuation of payments in case of death" were $125,971 and $126,001 for the years ended December 31, 2011 and 2010, respectively.

The Pensionskasse — New covers all German employees with membership as of January 1, 2005. Contributions and costs are determined as 2.0 percent of each covered employee's salary and totalled $207,603 in 2011, $130,173 in 2010 and $134,346 in 2009.

Components of net periodic benefit costs under the Additional and Deferred Compensation Plans for the years ended December 31, 2011, 2010 and 2009 were as follows (in thousands):

	2011	2010	2009
Service cost	$ 757	$ 675	$ 592
Interest cost	850	727	681
Amortization of actuarial loss	229	164	88
Net periodic benefit cost	$1,836	$1,566	$1,361

The weighted-average assumptions used to determine net periodic benefit cost were as follows:

	2011	2010	2009
Discount rate	5.10 %	5.40%	6.25%
Rate of long-term compensation increase	3.00%	3.00%	3.00%

The funded status and components of the change in benefit obligations of the Additional and Deferred Compensation Plans for December 31, 2011 and 2010 were as follows (in thousands):

	2011	2010
Funded status at end of year:		
Projected benefit obligation	$(18,323)	$(16,109)
Assets at fair value	—	—
Funded status	$(18,323)	$(16,109)
Net amounts recognized in consolidated balance sheet:		
Current liabilities	$ (275)	$ (238)
Non-current liabilities	$(18,048)	$(15,871)
Change in projected benefit obligation:		
Projected benefit obligation at beginning of year	$(16,109)	$(14,657)
Foreign currency exchange rate changes	712	944
Service costs	(757)	(675)
Interest costs	(850)	(727)
Actuarial gains (losses)	(1,495)	(1,146)
Benefits paid	176	152
Projected benefit obligation at end of year	$(18,323)	$(16,109)
Accumulated benefit obligation	$(16,656)	$ 14,576)

The weighted-average assumptions used to determine pension benefit obligations were as follows:

	2011	2010
Discount rate	4.60%	5.10%
Rate of long-term compensation increase	3.00%	3.00%

Components of the related tax effects for each component of other comprehensive income follows related to the Additional and Deferred Compensation Plans for December 31, 2011 and 2010 are as follows (in thousands):

	2011		
	Before-Tax Amount	Tax (Expense) or Benefit	Net-of-Tax Amount
Accumulated other comprehensive (loss) income at beginning of year	$(4,938)	$1,448	$(3,490)
Net actuarial (loss) gain arising during current year	(1,495)	440	(1,055)
Amortization of actuarial loss	229	(67)	162
Foreign currency effect	71	(21)	50
Accumulated other comprehensive (loss) income at end of year(1)	$(6,133)	$1,800	$(4,333)

(1) Approximately $276 of net actuarial loss included in accumulated other comprehensive loss will be amortized into income in 2012.

	2010		
	Before-Tax Amount	Tax (Expense) or Benefit	Net-of-Tax Amount
Accumulated other comprehensive income (loss) at beginning of year	$(3,956)	$1,160	$(2,796)
Net actuarial (loss) gain arising during current year	(1,146)	336	(810)
Amortization of actuarial loss	163	(48)	115
Foreign currency effect	1	—	1
Accumulated other comprehensive (loss) income at end of year	$(4,938)	$1,448	$(3,490)

The Company expects to contribute to its defined benefit plans in 2012 (in thousands):

Pensionkasse — old	$ 1,744
Additional compensation	1,370
Deferred compensation	214
Total contributions expected in 2012	$ 3,328

The following estimated future benefit payments are expected to be paid in the years indicated (in thousands):

2012	$ 274
2013	303
2014	369
2015	412
2016	459
2017 — 2021	3,667

Assumed discount rates and rates of increase in remuneration used in calculating the projected benefit obligation together with long-term rates of return on plan assets vary according to the economic conditions of Germany in which pension plans are situated. The discount rate is typically changed at least annually. The interest rate used is comparable to long-term corporate bonds with an AA rating.

Ceradyne Boron Products Pension Plans

The Company provides pension benefits to employees in its Ceradyne Boron Products subsidiary. The plans cover employees who meet specified eligibility requirements. The measurement date for the Company's pension plan assets and obligations is December 31.

The Company expects to make a contribution at least as great as the minimum required by the IRS funding rules to the plan during the upcoming year. Funding requirements for subsequent years are uncertain and will significantly depend on the assumptions used to calculate plan funding levels, the actual return on plan assets, changes in the employee groups covered by the plan, and any legislative or regulatory changes affecting plan funding requirements. For tax planning, financial planning, cash flow management or cost reduction purposes the Company may increase, accelerate, decrease or delay contributions to the plan to the extent permitted by law.

Components of the net periodic pension (benefit) for the years ended December 31, 2011, 2010 and 2009 were as follows (in thousands):

	2011	2010	2009
Service costs	$ 8	$ 63	$ 86
Interest costs	478	506	513
Amortization of actuarial loss	116	146	202
Expected return on assets	(556)	(520)	(490)
Net periodic pension (benefit)	$ 46	$ 195	$ 311

The weighted-average assumptions used to determine net periodic benefit costs were as follows:

	2011	2010	2009
Discount rate	5.28%	5.75%	5.74%
Rate of long-term compensation increase	3.00%	3.00%	4.00%
Expected return on plan assets	8.00%	8.00%	8.00%

The funded status and components of the change in benefit obligations and changes in plan assets for the years ended December 31, 2011 and 2010 were as follows (in thousands):

	2011	2010
Funded status at end of year:		
Projected benefit obligation	$(10,425)	$(9,599)
Assets at fair value	7,150	7,125
Funded status	$ (3,275)	$(2,474)
Net amount recorded in consolidated balance sheet:		
Noncurrent liabilities	$ (3,275)	$(2,474)
Change in projected benefit obligation:		
Benefit obligation at beginning of year	$ (9,599)	$(9,088)
Service costs	(8)	(63)
Interest costs	(478)	(506)
Actuarial losses	(909)	(521)
Benefits paid	569	579
Projected benefit obligation at end of year	$(10,425)	$(9,599)
Changes in plan assets:		
Fair value of plan assets at beginning of year	$ 7,125	$ 6,857
Actual return on plan assets	123	749
Employer contributions	471	98
Benefits paid	(569)	(579)
Fair value of plan assets at end of year	$ 7,150	$ 7,125

The fair value of plan assets was determined based on observable inputs (Level 2) using the net asset value of the investment funds. The net asset value represents price per share and is calculated by dividing the total

value of all securities in the portfolio, less any liabilities, by the number of fund shares outstanding. Plan assets as of December 31, 2011 and 2010 comprised the following:

	2011	2010
Investment fund — equity securities	$ 4,622	$ 4,618
Investment fund — fixed income securities	2,528	2,507
Fair value of plan assets at end of year	$ 7,150	$ 7,125
Accumulated benefit obligation at end of year	$(10,425)	$(9,596)

The weighted-average assumptions used to determine pension benefit obligation were as follows:

	2011	2010
Discount rate	4.39%	5.28%
Rate of long-term compensation increase	3.00%	3.00%

Components of the related tax effects for each component of other comprehensive income follows related to the plan for the years ended December 31, 2011 and 2010 are as follows (in thousands):

	2011		
	Before-Tax Amount	Tax (Expense) or Benefit	Net-of-Tax Amount
Accumulated other comprehensive income (loss) at beginning of year	$(2,217)	$ 864	$(1,353)
Net actuarial loss arising during current year	(1,125)	478	(747)
Accumulated other comprehensive income (loss) at end of year(1)	$(3,442)	$1,342)	$(2,100)

(1) Approximately $236 of actuarial net loss included in accumulated other comprehensive loss will be amortized into income in 2012.

	2010		
	Before-Tax Amount	Tax (Expense) or Benefit	Net-of-Tax Amount
Accumulated other comprehensive income (loss) at beginning of year	$(2,072)	$807	$(1,265)
Net actuarial gain arising during current year	(145)	57	(88)
Accumulated other comprehensive income (loss) at end of year	$(2,217)	$864)	$(1,353)

The change in unrecognized net gain/loss is one measure of the degree to which important assumptions have coincided with actual experience. The company changes important assumptions whenever changing conditions warrant. The discount rate and the expected long term return on plan asset assumptions are assessed annually. Other material assumptions include the compensation increase rates, rates of employee termination, and rates of participant mortality. The discount rate was determined by projecting the plan's expected future benefit payments as defined for the projected benefit obligation, discounting those expected payments using a theoretical zero-coupon spot yield curve derived from a universe of high-quality bonds as of the measurement date, and solving for the single equivalent discount rate that resulted in the same projected benefit obligation. The expected return on plan assets was determined based on historical and expected future returns of the various asset classes, using the target allocations as follows: equity securities (65%), debt securities (25%) and other (10%). The plan's investment policy includes a mandate to diversify assets and invest in a variety of asset classes to achieve that

goal. The plan's assets are currently invested in a variety of funds representing most standard equity and debt security classes. While no significant changes in the asset allocation are expected during the coming year, the Company may make changes at any time.

The following estimated future benefit payments are expected to be paid in the years indicated (in thousands):

2012	$ 587
2013	644
2014	627
2015	618
2016	635
2017 — 2021	3,371

7. Commitments and Contingencies

a. Operating Lease Obligations

The Company leases certain of its manufacturing facilities under noncancelable operating leases expiring at various dates through December 2016. The Company incurred rental expense under these leases of $3.7 million, $3.3 million and $3.3 million for the years ended 2011, 2010 and 2009, respectively. The approximate minimum rental commitments required under existing noncancelable leases as of December 31, 2011 are as follows (in thousands):

2012	$ 3,328
2013	2,381
2014	1,137
2015	524
2016	364
Thereafter	761
	$ 8,495

b. Legal Proceedings

A Ceradyne is from time to time involved in various legal proceedings that are incidental to its business. However, to management's knowledge, there currently are no material pending legal proceedings involving Ceradyne of any of its subsidiaries.

8. Disclosure About Segments of Enterprise and Related Information

Prior to October 2010, the Company reported that it conducted its operations primarily through six operating segments. To more accurately reflect current operations, executive reporting management structure and organization, and internal reporting the Company modified its segment structure and reporting to reflect that it operates through four operating segments, each led by a different senior executive who reports directly to the Company's Chief Executive Officer. The changes made to arrive at the four segments from the six previous segments were that the former Semicon Associates segment is now included in the Advanced Ceramic Operations segment and the former Ceradyne Canada segment is now included in the Boron segment. All of the financial data for 2010 and 2009 have been changed to reflect four segments. The Company's assets are managed by segment regardless of their physical location and are not reviewed on a geographic basis by our chief operating decision maker. Additionally, in the current year, the Company reallocated $8.5 million of inter-

company corporate charges from the Advanced Ceramic Operations segment to all its other operating segments. The charges to the other segments were $4.2 million to the Thermo Materials segment, $1.8 million to the ESK Ceramics segment and $2.5 million to the Boron segment. This allocation had no impact on the consolidated statement of income for the year ended 2011. In prior years, the amounts allocated from the Advanced Ceramic Operations segment to the other operating segments were immaterial.

The Company serves its markets and manages its business through four operating segments, each of which has its own manufacturing facilities and selling functions and each has a senior executive who reports directly to the Company's Chief Executive Officer. The Company's Advanced Ceramic Operations, with operations located in Costa Mesa and Irvine, California, Lexington, Kentucky, Wixom, Michigan, Salem, New Hampshire, Mountain Green, Utah, Seattle, Washington and Bangalore, India primarily produces armor, orthodontic products, diesel engine parts, components for semiconductor equipment, cathodes, specialty glass compositions for solar, health care and other applications, and houses the Company's SRBSN research and development activities. Fused silica products, including missile radomes and crucibles, for photovoltaic solar cell applications are produced at the Company's Thermo Materials division located in Scottdale and Clarkston, Georgia. The Company's manufacturing facilities in Tianjin, China manufactures fused silica crucibles, and are part of the Thermo Materials operating segment. Minco, Inc., which Ceradyne acquired in July 2007, also is included in the Thermo Materials operating segment. Minco, located in Midway, Tennessee, manufactures fused silica, which is a primary raw material used in products manufactured by our Thermo Materials division. The Company's ESK Ceramics subsidiary is located in Kempten, Germany. This subsidiary produces ceramic powders, including boron carbide powder for ceramic body armor, evaporation boats for metallization, functional and frictional coatings utilized in the automotive and textile industries, high performance pump seals, fluid handling, refractory products and ceramic powders used in cosmetics. The Company's remaining segment is Boron. This segment is comprised of three subsidiaries, Boron Products, Ceradyne Canada and SemEquip, Inc. Boron Products owns certain assets, including approximately 155 acres and several buildings, equipment and technology, related to the production of the boron isotope ^{10}B. This isotope is a strong neutron absorber and is used for both nuclear waste containment and nuclear power plant neutron radiation control. Boron Products also produces complementary chemical isotopes used in the normal operation and control of nuclear power plants. SemEquip, Inc., which the Company acquired in August 2008, develops and markets cluster ion source materials for the manufacture of logic and memory semiconductor chips. SemEquip is included in the Boron operating segment. The Company's Ceradyne Canada subsidiary acquired certain assets in June 2006, including a building, equipment and technology, related to the production of structural neutron absorbing materials for use in the storage of spent nuclear rods. The building and operations of Ceradyne Canada are located in Chicoutimi, Quebec, Canada.

The U.S. government and government agencies collectively represented approximately 37.6% of our net sales in 2011, 17.5% in 2010 and 40.8% in 2009. As of December 31, 2011 and 2010, there were no other external customers that accounted for 10% or more of our revenue.

SEGMENT INFORMATION FOR THE YEARS ENDED DECEMBER 31, 2011, 2010 AND 2009
(amounts in thousands)

	2011	2010	2009
Revenue			
Advanced Ceramic Operations	$277,541	$152,578	$221,751
ESK Ceramics	163,592	130,747	105,117
Thermo Materials	98,895	98,770	66,116
Boron	55,430	35,010	28,951
Inter-segment elimination	(23,476)	(14,167)	(21,360)
Total revenue from external customers	$571,982	$402,938	$400,575
Depreciation and Amortization			
Advanced Ceramic Operations	$ 9,790	$ 9,238	$ 10,389
ESK Ceramics	12,742	12,625	11,686
Thermo Materials	8,015	6,176	4,878
Boron	8,203	8,109	8,193
Total	$ 38,750	$ 36,148	$ 35,146
Segment Income (Loss) from Operations and Income before Provision for Income Taxes			
Advanced Ceramic Operations	$ 60,253	$(23,113)	$ 25,031
ESK Ceramics	30,865	21,133	(21,501)
Thermo Materials	20,029	33,951	14,712
Boron	16,822	(2,385)	(11,048)
Inter-segment elimination	492	(430)	536
Total segment income from operations	$128,461	$ 29,156	$ 7,730
Other expense	(505)	(785)	(7,313)
Total income before provision for income taxes	$127,956	$ 28,371	$ 417
Segment Assets			
Advanced Ceramic Operations	$474,633	$414,425	$406,866
ESK Ceramics	170,193	173,387	207,733
Thermo Materials	172,806	149,960	105,332
Boron	130,499	127,541	129,773
Total	$948,131	$865,313	$849,704
Expenditures for PP&E			
Advanced Ceramic Operations	$ 6,276	$ 6,811	$ 4,880
ESK Ceramics	5,278	2,497	426
Thermo Materials	13,780	32,087	7,952
Boron	5,928	2,825	1,276
Total	$ 31,262	$ 44,220	$ 14,534

SEGMENT INFORMATION FOR THE YEARS ENDED DECEMBER 31, 2011, 2010 AND 2009

	2011	2010	2009
Percentage of U.S. net sales from external customers			
Advanced Ceramic Operations	43%	34%	53%
ESK Ceramics	3%	5%	3%
Thermo Materials	4%	5%	6%
Boron	5%	5%	4%
Total percentage of U.S. net sales from external customers	55%	49%	66%
Percentage of foreign net sales from external customers			
Advanced Ceramic Operations	6%	4%	2%
ESK Ceramics	22%	26%	20%
Thermo Materials	13%	19%	9%
Boron	4%	2%	3%
Total percentage of foreign net sales from external customers	45%	51%	34%
Percentage of total net sales from external customers			
Advanced Ceramic Operations	49%	38%	55%
ESK Ceramics	25%	31%	23%
Thermo Materials	17%	24%	15%
Boron	9%	7%	7%
Total percentage of net sales from external customers	100%	100%	100%

The following is revenue by market application for the Advanced Ceramic Operations segment for the years ended December 31, 2011, 2010 and 2009 (amounts in thousands):

	December 31,		
	2011	2010	2009
Defense	$203,058	$105,362	$189,028
Industrial	35,067	26,684	16,177
Energy	17,858	2,117	2,053
Automotive	10,364	10,057	5,006
Commercial	11,194	8,358	9,487
	$277,541	$152,578	$221,751

9. Share Based Compensation

Share-based compensation expense is based on the value of the portion of share-based payment awards that is ultimately expected to vest. Guidance for share-based compensation requires forfeitures to be estimated at the time of grant in order to estimate the amount of share-based awards that will ultimately vest. The forfeiture rate is based on historical rates. Share-based compensation expense recognized in the Company's Consolidated Statements of Income for the years ended December 31, 2011, December 31, 2010 and December 31, 2009 includes (i) compensation expense for share-based payment awards granted prior to, but not yet vested as of January 1, 2006, based on the grant-date fair value estimated in accordance with the guidance for share-based

compensation and (ii) compensation expense for the share-based payment awards granted subsequent to December 31, 2005, based on the grant date fair value estimated in accordance with guidance for share-based compensation. As share-based compensation expense recognized in the Consolidated Statement of Income for the years ended December 31, 2011, December 31, 2010 and December 31, 2009 is based on awards ultimately expected to vest, it has been reduced for estimated forfeitures.

The Company maintains the 1994 Stock Incentive Plan and 2003 Stock Incentive Plan. The Company was authorized to grant options for up to 2,362,500 shares under its 1994 Stock Incentive Plan. The Company has granted options for 2,691,225 shares and has had cancellations of 397,811 shares through December 31, 2011. There are no remaining stock options available to grant under this plan. The options granted under this plan generally became exercisable over a five-year period for incentive stock options and six months for nonqualified stock options and have a maximum term of ten years.

The 2003 Stock Incentive Plan was amended in 2005 to allow the issuance of Restricted Stock Units (the "Units") to eligible employees and non-employee directors. The Units are payable in shares of the Company's common stock upon vesting. For directors, the Units vest annually over three years on the anniversary date of their issuance. For officers and employees, the Units typically vest annually over five years on the anniversary date of their issuance.

The Company's stockholders approved an amendment to the 2003 Stock Incentive Plan in 2010 to increase the number of shares authorized for issuance under the plan by 750,000. The Company may grant options and Units for up to 1,875,000 shares under the 2003 Stock Incentive Plan, as amended. The Company has granted options for 475,125 shares and Units for 869,865 shares under this plan through December 31, 2011. There have been cancellations of 122,409 shares associated with this plan through December 31, 2011. The options under this plan have a life of ten years.

During the years ended December 31, 2011 and 2010, the Company issued Units to certain directors, officers and employees with weighted average grant date fair values and Units issued as indicated in the table below. Pursuant to guidance of share-based compensation, the Company records compensation expense for the amount of the grant date fair value on a straight line basis over the vesting period. The Company incurred charges associated with the vesting of the Units of $4.1 million for the year ended December 31, 2011, $3.8 million for the year ended December 31, 2010, and $3.6 million for the year ended December 31, 2009.

Share-based compensation expense reduced the Company's results of operations as follows (in thousands, except per share amounts):

	2011	2010	2009
Share-based compensation expense recognized:			
General and administrative, options	$ —	$ 41	$ 214
General and administrative, Units	4,145	3,803	3,624
Related deferred income tax benefit	(1,652)	(1,532)	(1,529)
Decrease in net income	$ 2,493	$ 2,312	$ 2,309
Decrease in basic earnings per share	$ 0.10	$ 0.09	$ 0.09
Decrease in diluted earnings per share	$ 0.10	$ 0.09	$ 0.09

The amounts above include the impact of recognizing compensation expense related to non-qualified stock options.

As of December 31, 2011, there was no unrecognized compensation cost related to non-vested outstanding stock options. The aggregate intrinsic value of stock options exercised was $4.5 million and $190,000 for the years ended December 31, 2011 and 2010, respectively.

As of December 31, 2011, there was approximately $8.6 million of total unrecognized compensation cost related to non-vested Units granted under the 2003 Stock Incentive Plan. That cost is expected to be recognized over a weighted average period of 2.9 years.

The following is a summary of stock option activity:

	2011		2010		2009	
	Number of Options	Weighted Average Exercise Price	Number of Options	Weighted Average Exercise Price	Number of Options	Weighted Average Exercise Price
Outstanding, beginning of year	428,000	$12.28	454,400	$12.37	462,900	$12.22
Options granted	—	$ —	—	$ —	—	$ —
Options exercised	(168,850)	$ 6.89	(25,500)	$14.19	(8,500)	$ 3.96
Options cancelled	—	$ —	(900)	$ 3.62	—	$ —
Outstanding, end of year	259,150	$15.80	428,000	$12.28	454,400	$12.37
Exercisable, end of year	259,150	$15.80	428,000	$12.28	448,400	$12.28

The following is a summary of Unit activity:

	2011		2010		2009	
	Units	Weighted Average Grant Fair Value	Units	Weighted Average Grant Fair Value	Units	Weighted Average Grant Fair Value
Outstanding, beginning of year	399,684	$28.40	363,924	$32.47	271,264	$45.90
Granted	109,834	$42.12	166,205	$22.98	198,350	$19.35
Vested	(135,957)	$31.26	(118,245)	$33.25	(82,340)	$41.57
Forfeited	(10,834)	$30.33	(12,200)	$43.58	(23,350)	$44.98
Non-vested Units at end of year	362,727	$31.43	399,684	$28.40	363,924	$32.47

The following table summarizes information regarding options outstanding and options exercisable at December 31, 2011:

	Outstanding and Exercisable			
Range of Exercise Prices	Number of Options	Average Remaining Contractual Life (Years)	Weighted Average Exercise Price	Aggregate Intrinsic Value (000s)
$2.98 - $4.58	55,350	0.70	$ 3.42	$1,293
$16.90 - $18.80	114,450	1.84	$17.06	$1,113
$21.50 - $22.67	89,350	2.65	$21.85	$ 441
	259,150	1.87	$15.80	$2,847

The following table summarizes information regarding Units outstanding at December 31, 2011:

	Outstanding		
Range of Grant Prices	Number of Units	Average Remaining Contractual Life (Years)	Weighted Average Grant Fair Value
$16.53—$31.69	301,607	2.65	$29.30
$35.67—$39.43	32,400	1.44	$38.60
$40.73—$45.70	19,600	1.42	$44.59
$52.47—$62.07	3,900	0.22	$56.52
$66.35—$81.18	5,220	0.48	$70.42
	362,727	2.42	$31.84

The Black-Scholes option valuation model was developed for use in estimating the fair value of traded options that have no vesting restrictions and are fully transferable. In addition, option valuation models require the input of highly subjective assumptions, including the expected stock price volatility. The Company's options have characteristics significantly different from those of traded options, and changes in the subjective input assumptions can materially affect the fair value estimate.

The Company calculates expected volatility based on historical data of the Company's common stock. The risk-free interest rate assumption is based upon an observed interest rate appropriate for the term of the Company's employee stock options. The dividend yield assumption is based on the Company's intent not to issue a dividend under its dividend policy. The expected holding period assumption was estimated based on historical experience.

10. Restructuring — Plant Closure and Severance

2011 Restructuring Actions — Boron Segment

In November 2011, SemEquip granted a non-exclusive license for its hardware technology to a key customer. In connection with the license, SemEquip transferred its hardware related assets to the licensee and reduced its workforce which included production, research and development, and support staff in Billerica, Massachusetts. Accordingly, the Company recognized a restructuring charge of $0.9 million in 2011 primarily for severance and related compensation associated with the headcount reduction, most of which was paid in 2011.

2010 Restructuring Actions — Advanced Ceramics Operations Segment

During the fourth quarter of 2010, the Company closed its hot press manufacturing operation in Costa Mesa, California as a result of reduced demand for ceramic body armor solutions and the high cost of doing business in the State, especially the high cost of electricity, which is integral to its manufacturing operations. The Company has consolidated all hot press operations into its existing manufacturing plant in Lexington, Kentucky. Accordingly, the Company recognized a restructuring charge of $3.5 million during the year ended December 31, 2010 to write down the value of long-lived assets associated with the closure of the hot press manufacturing operation in Costa Mesa, California.

2009 Restructuring Actions — ESK Ceramics Segment

In May 2009, the Company announced that, in accordance with the French legal process, its ESK Ceramics France subsidiary ("ESK France") presented to the local employees' representatives a plan for closing its manufacturing plant in Bazet, France. The plant was closed in December 2009 and, as a result, ESK France

reduced its workforce by 97 employees, primarily composed of manufacturing, production and additional support staff at the plant. This action was implemented as a cost-cutting measure to eliminate losses that were incurred at this facility due to the recent severe economic contraction and is consistent with Ceradyne's ongoing objective to lower the costs of its manufacturing operations. This manufacturing facility was an 88,000 square foot building owned by ESK France that had been used to support the production of various industrial ceramic products. We transferred production of these products to our German subsidiary, ESK Ceramics GmbH & Co. KG ("ESK Ceramics") in Kempten, Germany. Affected employees were eligible for a severance package that included severance pay, continuation of benefits and outplacement services. Pre-tax charges relating to this corporate restructuring also included accelerated depreciation of fixed assets and various other costs to close the plant.

ESK Ceramics recorded pre-tax charges totaling $12.2 million in connection with the Bazet restructuring and plant closure, which comprised $10.3 million for severance, termination of contracts and other shutdown costs that was reported as Restructuring—plant closure and severance in Operating Expenses and $1.9 million for accelerated depreciation of fixed assets that was reported in Cost of Goods Sold in the year ended December 31, 2009. The severance charge was recognized as a postemployment benefit as the Company's obligation related to employees' rights to receive compensation for future absences was attributable to employees' services already rendered, the obligation relates to rights that legally vest, payment of the compensation is probable, and the amount could be reasonably estimated based on local statutory requirements. The Company also incurred other severance costs in connection with headcount reductions in the United States and Germany of $2.7 million during the year ended December 31, 2009.

11. Quarterly Financial Information (unaudited)

The results by quarter for 2011 and 2010 (amounts in thousands except per share data):

Quarter Ending

	March 31, 2010	June 30, 2010	September 30, 2010	December 31, 2010
Net sales	$110,038	$100,415	$91,766	$100,719
Gross profit	25,366	25,845	23,616	33,033
Net income	4,990	6,563	4,537	13,186
Basic income per share	$ 0.20	$ 0.26	$ 0.18	$ 0.53
Diluted income per share	$ 0.20	$ 0.26	$ 0.18	$ 0.53

Quarter Ending

	March 31, 2011	June 30, 2011	September 30, 2011	December 31, 2011
Net sales	$150,102	$145,376	$147,974	$128,530
Gross profit	58,088	52,957	53,726	41,874
Net income (loss)	23,595	19,131	20,409	20,753
Basic income (loss) per share	$ 0.95	$ 0.77	$ 0.83	$ 0.86
Diluted income (loss) per share	$ 0.94	$ 0.76	$ 0.82	$ 0.85

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

CERADYNE, INC.

By: /s/ JOEL P. MOSKOWITZ
Joel P. Moskowitz
Chief Executive Officer

February 16, 2012

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

/s/ JOEL P. MOSKOWITZ Joel P. Moskowitz	Chairman of the Board, Chief Executive Officer, President and Director (Principal Executive Officer)	February 16, 2012
/s/ JERROLD J. PELLIZZON Jerrold J. Pellizzon	Chief Financial Officer (Principal Financial and Accounting Officer)	February 16, 2012
/s/ RICHARD A. ALLIEGRO Richard A. Alliegro	Director	February 16, 2012
/s/ FRANK EDELSTEIN Frank Edelstein	Director	February 16, 2012
/s/ RICHARD A. KERTSON Richard A. Kertson	Director	February 16, 2012
/s/ MILTON L. LOHR Milton L. Lohr	Director	February 16, 2012
/s/ SIEGFRIED MŰSSIG Siegfried Müssig	Director	February 16, 2012

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COMPANY DIRECTORY

Directors

Joel P. Moskowitz	*Chairman of the Board, Chief Executive Officer and President*
Richard A. Alliegro	*Ceramic Technology Consultant*
Frank Edelstein	*Independent Consultant*
Richard A. Kertson	*Former CFO of Varco International, Inc.*
Milton L. Lohr	*Business and Defense Consultant*
Siegfried Mussig, Ph.D.	*Technology and Quality Manager, RAG (oil and gas production company) – Austria*

Management

Joel P. Moskowitz	*Chairman of the Board, Chief Executive Officer and President*
Robert M. Miller	*Vice President Acquisitions and Business Development*
Terry M. Hart	*Vice President Human Resources*
Thomas Juengling, Ph.D.	*Vice President, and President of ESK Ceramics*
Marc A. King	*President Ceradyne Armor Systems, Inc.*
Bruce R. Lockhart	*Vice President, and President of Ceradyne Thermo Materials*
Jerrold J. Pellizzon	*Chief Financial Officer and Corporate Secretary*
David P. Reed	*Vice President, and President of North American Operations*
Jeffrey J. Waldal	*Vice President, and President of Semicon Associates, a Ceradyne Company*

Transfer Agent and Registrar

American Stock Transfer and Trust Company, LLC
6201 15th Avenue
Brooklyn, NY 11219

General Counsel

Stradling Yocca Carlson & Rauth
660 Newport Center Drive, 16th Floor
Newport Beach, California 92660-6401

Independent Public Accountants

PricewaterhouseCoopers LLP
2020 Main Street, Suite 400
Irvine, California 92614

Corporate Office

Ceradyne, Inc.
3169 Red Hill Avenue
Costa Mesa, California 92626
(714) 549-0421
(800) 839-2189
www.ceradyne.com

Manufacturing Facilities

◆ **Advanced Ceramic Operations:**

Ceradyne, Inc.
Costa Mesa, CA
Irvine, CA
Lexington, KY

Ceradyne Bearing Technologies
Lexington, KY

Ceradyne Diaphorm
Salem, NH

Ceradyne Max Pro Armor
Salem, NH

Semicon Associates, a Ceradyne Company
Lexington, KY

Ceradyne Vehicle Armor Systems
Wixom, MI

Ceradyne Viox, Inc.
Seattle, WA

◆ **Boron:**

Ceradyne Boron Products LLC
Quapaw, OK

Ceradyne Canada ULC
Chicoutimi, Quebec, Canada

◆ **Ceradyne Thermo Materials:**

Ceradyne Thermo Materials
Scottdale, GA
Clarkston, GA

Minco, Inc., a Ceradyne Company
Midway, TN

Ceradyne Tianjin Technical Ceramics
Tianjin, China

Ceradyne Tianjin Advanced Materials
Tianjin, China

◆ **ESK Ceramics:**

Kempten, Germany

◆ *Denotes reporting segment*

Annual Meeting

The annual stockholders' meeting will be held at the Radisson Hotel, 4545 MacArthur Boulevard, Newport Beach, CA 92660 on Wednesday, May 16, 2012 at 10:00 A.M.

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