



A bright future for LEDs

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NEWS RELEASE



As we close the first quarter 2010, there is improving momentum in our order book, with certain end markets showing signs of recovery

What a year 2009 turned out to be. I don't think anyone expected it would be quite so difficult. Virtually every one of our global markets turned down, with one notable exception, medical. In fact we grew our medical business 9% in 2009 compared to 2008. For me this is the clearest indication there is, that market position is the single most important determinant of likely success in business. We can all be very proud of the results we achieved; managing to maintain double digit margins and actually growing margins in the second half compared to the first half. During such a difficult time it was great to receive acknowledgement that our efforts to provide excellent customer satisfaction were noted when Grundfos announced MTC Stourport as their supplier of the year.

Revenues for 2009 were £206.0 million (2008: £212.2 million), a decrease of 3%. This included £45.9 million (2008: £41.4 million, for 9 months of ownership) of revenue contributed by the businesses acquired from Carpenter in 2008. The underlying year on year revenue decrease at constant currency (including Carpenter acquisition on a full 12 months basis) was 19.4%.

Despite the unprecedented economic conditions, the Division was in the main able to substantially protect profit margins which were 12.2% for the year (2008: 14.9%). EBITA for the year was £25.1 million (2008: £31.6 million) with the second half performance showing an improved EBITA margin of 13.4% (H1: 2009: 11.1%).

In response to the weaker global market conditions, we took early action to protect our margins and placed emphasis on our continuous operational improvement programme and cost reduction initiatives. We also maintained our focus on positive mix shift, moving towards higher margin, higher value-added end markets such as medical and aerospace. These actions all contributed to supporting operating margins in very difficult market conditions and delivered benefits in the second half of the year, driving the improved margins seen over the first half.

Although the overall market demand declined in 2009 there are some areas that are now showing positive signs of improvement. The most notable example of this is our initiation of a production ramp-up to meet demand for the next generation of components for Hard Disc Drive (HDD) products which is currently under way. Our European business had a difficult year in 2009 being consistently

challenged by weak market conditions in general industrial markets and construction. This principally affected our business in Germany, which supplies products for thermal processing applications. In both Europe and North America a highlight of 2009 was the continuing strength of our medical business. Increasing our exposure to this sector remains an important focus for the Division.

Work on consolidating our footprint continued in the second half of the year. In July we announced and started the move of business from our Auburn site into the Hayward location in California and expect to see the full year benefits of this coming through during 2010. In October we completed the sale of our small Metal Injection Moulding (MIM) business which was based in our New Bedford site, to make room to expand the medical business there. The Shanghai site, which produced mostly commodity products for domestic applications, was successfully closed on time and to plan during the first half of the year.

As we close the first quarter 2010, there is improving momentum in our order book, with certain end markets, particularly in the USA, showing signs of recovery. The principal challenge for us is to convert the strengthening order book into profitable sales and get back on our profitable growth road. To do that effectively we need to keep a close eye on costs to make sure we only add back what we absolutely need. There are several key projects for us to deliver this year. The HDD ramp at Bedford has begun and as that moves to full production we must replace it in the new business pipeline with more high quality opportunities. We will be continuing to work to develop our relationships in the important Japanese market and continuing work to deepen our understanding of the Indian market.

Training and development programmes will continue to be at the heart of our investment plan and we will maintain our focus on individual leadership development, linked to the needs identified in our business plans. I am also delighted to say as in previous years we will be supporting the recruitment of graduate engineers to strengthen the pool of talent available to grow our organization and to work on new ideas for our customers.

I'd like to thank all our employees for their dedication and hard work and our customers for their continued loyalty and support. Having risen to the challenge of 2009, I look forward to a better 2010 for us all.

Andrew Hosty CEO

The future's bright for LED's

Significantly improves yield in production of high brightness LED's

Morgan Technical Ceramics CVD Materials (MTC CVD Materials) introduced its Chemical Vapor Deposition Silicon Carbide (CVD SiC) wafer carriers for high temperature Metal Organic Chemical Vapor Deposition (MOCVD) processing. The pure CVD SiC wafer carriers significantly increase the yield for manufacturers of high brightness light emitting diodes (LEDs) using Gallium Nitride (GaN) deposition.

The CVD SiC is 99.999+ percent pure, and exhibits high thermal conductivity and thermal shock resistance. It is a solid monolithic material that achieves theoretical density, generating minimal particulates and exhibiting very high corrosion and erosion resistance. The material can vary opacity and electrical conductivity without introduction of metallic impurities. The wafer carriers are typically about 17 inches in diameter, holding up to 40 2-4 inch wafers.

MTC pure CVD SiC wafer carriers significantly outperform traditional GaN wafer carriers, which are made of Graphite, and then coated with a layer of CVD SiC. These coated Graphite-based carriers cannot stand up to the high temperatures (1100 to 1200°C) required in GaN deposition for today's high brightness blue and white LEDs. The high temperatures cause the coating to develop tiny pinholes through which process chemicals can attack the underlying Graphite. Graphite particles can then flake off and contaminate the GaN. A typical coated Graphite wafer carrier may have to be replaced as often as monthly, depending on usage conditions.



The pure CVD SiC wafer carriers transmit heat efficiently, with a very high thermal conductivity. For example, CVD SiC has a thermal conductivity of 250-300 watts per meter kelvin (W m⁻¹ K⁻¹). By comparison, sintered SiC's thermal conductivity is about 100-140 W m⁻¹ K⁻¹ and pure Graphite is only about 85 W m⁻¹ K⁻¹. CVD SiC's higher thermal conductivity results in a uniform temperature across the wafer's entire diameter, improving the GaN deposition process, and significantly increasing the yield of the target wavelength of LEDs compared to coated Graphite wafer carriers.

In addition to the increased LED yields with the use of the pure CVD SiC wafer carriers, the pure monolithic SiC is very long-lived, resists warpage, and only needs to be replaced when the carrier is broken, chipped, or damaged due to handling. This can result in real cost savings for Semiconductor manufacturers.

A SMART idea for utilities metering

MTC ElectroCeramics' in-house sensor test facilities ensure the best possible design solutions for specific customer needs

Morgan Technical Ceramics ElectroCeramics (MTC ElectroCeramics) introduced its Piezoelectric ceramic components and ultrasonic sensors for flow measurement of utilities, including gas, heat and water. Ultrasonic flow measurement devices can be a key component of 'smart meters' designed to display hour-by-hour real time information about energy usage and pricing, facilitating residential and commercial energy conservation efforts.

Smart meters are being promoted by a \$3.4 billion Smart Grid Investment Grant under the American Recovery and Reinvestment Act. It will be matched by industry, for a total investment worth more than \$8 billion. More than 40 million smart meters are expected to be deployed in American homes as part of this initiative.



MTC ElectroCeramics' Piezoceramic components for measuring flow, distance and level have excellent acoustic sensitivity and mechanical strengths to withstand high pressures. Their tightly controlled resonant frequencies are key to achieving consistently good sensitivity levels. MTC ElectroCeramics offers a range of electrode materials and geometries to help customers with efficient high volume manufacturing.

MTC ElectroCeramics also uses its Piezoceramic materials to design and manufacture ultrasonic sensors for metering both gas and liquid flow measurement, taking into consideration customer-specific requirements for sensor housing that operates reliably under high pressure and a wide range of temperatures. The sensors are supplied in custom designed housings complete with acoustic matching layers that enhance sensitivity and also provide the required protection from the environment. MTC ElectroCeramics' in-house sensor test facilities ensure the best possible design solutions for specific customer needs.

Ultrasonic flowmeters are a solid state technology with no moving parts, making them more reliable than conventional mechanical meters. They suffer no pressure loss, offer nearly maintenance-free operation and are more accurate than many competing systems. In addition, they are more adaptable to the type of useful electronic display of energy use envisioned by champions of smart meters.

MTC ElectroCeramics has been supplying Piezoelectric ceramic components and ultrasonic sensors to major utilities conducting ultrasonic measurement of hot and cold water, heat and natural gas flows for nearly 20 years. The use of ultrasonics for metering has been widely adopted, with more than 3 million meters installed annually in the European market.

New flow modelling technology improves manufacturing process

Morgan Technical Ceramics Certech (MTC Certech) has pioneered a new flow modelling technique for the design of ceramic cores used in the manufacturing process of high performance parts for the Aerospace, Automotive and Medical markets. The use of the software is a major breakthrough for the investment casting process and will significantly optimise injection moulding of ceramic cores and enable the design of parts with more complex geometries.

While flow simulation software is commonly used throughout the plastics manufacturing industry, to date it has not been used by the ceramics industry in this way.

MTC Certech is the first ceramics company to offer the software simulation as part of its service. The company has been innovating and investing

in the software for the past 12 months and is now working closely with its customers to enhance the design and manufacturing process of their products.

By using the software, MTC Certech's specialists are able to accurately predict how the ceramic core cavity will fill. Any areas of stress and potential breakage are highlighted early in the manufacturing process. The design of the core can then be refined to ensure it is filled in a controlled and uniform way, which improves the quality of the finished ceramic core and consequently the metal casting.

The whole process is more efficient than traditional methods because simulation is carried out before any metal is cast, saving precious time and resource.

Through better understanding of the way ceramic flows during injection moulding, engineers can design higher performance parts with more complex geometries, for example, turbine blades for aircraft engines or industrial gas turbines used in power generation. Tolerances of up to ± 0.1 mm can also be achieved.

"This breakthrough in investment casting will enable the design of parts that will exhibit increased performance and we're already pushing boundaries in the Aerospace and Automotive markets," says Dr Robert Oscrift, Technical Manager, MTC Certech. "Our customers can now realise the benefits of flow modelling simulation for the first time and we can offer them full technical engineering solutions and expertise to improve their whole manufacturing process, from design right through to production."

Underwater testing facility improves transducer design

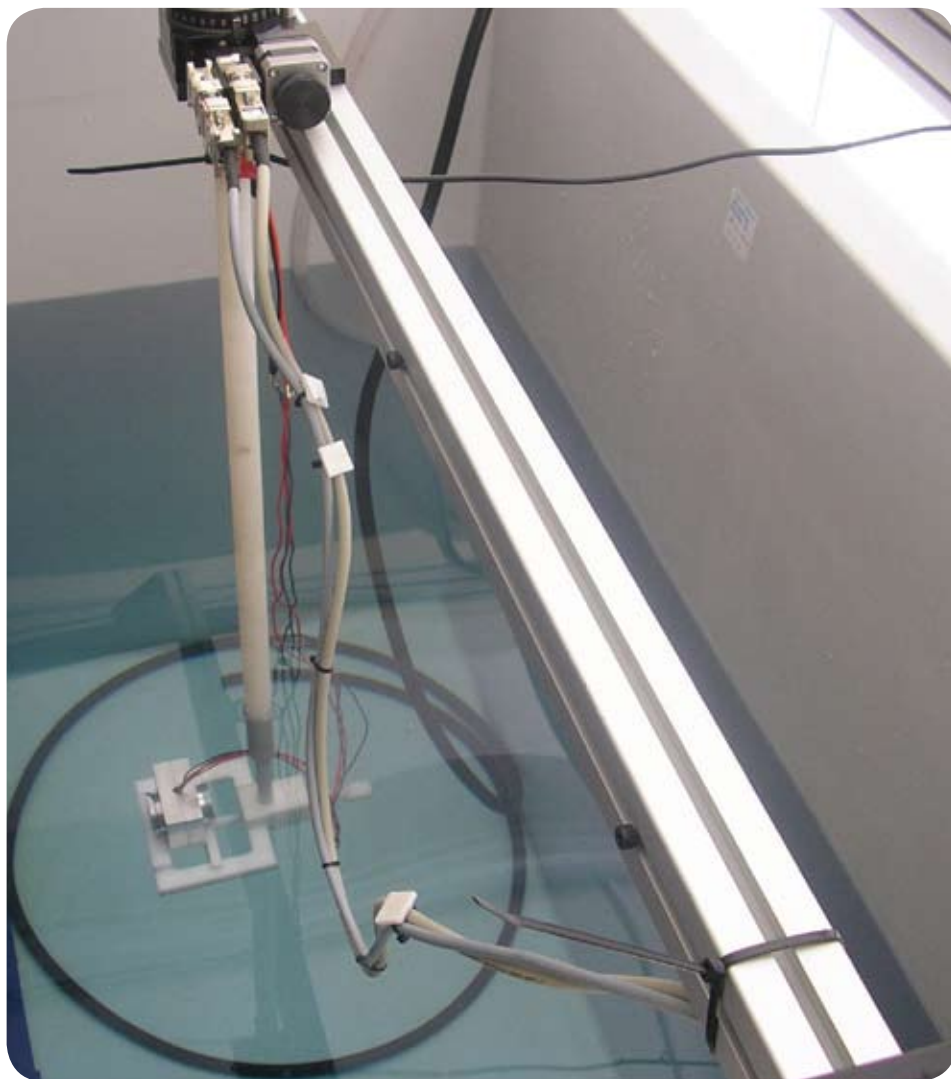
Morgan Technical Ceramics ElectroCeramics (MTC ElectroCeramics) has unveiled a new underwater acoustic testing laboratory at its manufacturing site in Southampton, UK. The laboratory allows the materials specialist to perform in-house testing and calibration of underwater transducers used in commercial and defence sonar applications, as well as the evaluation of the performance of medical ultrasound transducers.

"This investment shows our commitment to our facility and will help us to expand and grow the business in the region", says Tony Beswick, General Manager, MTC ElectroCeramics, Southampton, UK. "The new facility means we can work more closely with customers to develop customised transducers and offer a total solution - from initial concept design to end manufacture."

The facility includes a water tank approx 3m x 2m x 1.5m deep in size and positioning rigs and calibrated hydrophones where the company's transducer experts can test each component's acoustic characteristics.

The facility has been built as part of continued investment by the company to keep expanding its capabilities and product ranges. MTC ElectroCeramics has been supplying transducers to the commercial and defence industries for more than 20 years and the company's Piezoceramic materials are world-renowned for their excellent loss properties, high coupling and mechanical properties.

"We have a reputation for supplying products at a consistent, high-quality standard and having this in-house testing facility ensures that we maintain that reputation, and offer our customers a greater level of expertise as well as the finished component," explains Beswick.



Alumina fixtures offer first class solution for high temperature brazing

Ideal for high temperature brazing processes due to their insulation properties, flexibility in design and major economical advantages over other materials

Morgan Technical Ceramics Wesgo/Duramic (MTC Wesgo/Duramic) offers custom made Alumina fixtures used to isolate and insulate metal components during high temperature brazing processes. MTC Wesgo/Duramic fixtures have proven to be excellent options when brazing Medical and Laser industry components, High Electrical Field devices and Magnetic Resonance Imaging (MRI) equipment.

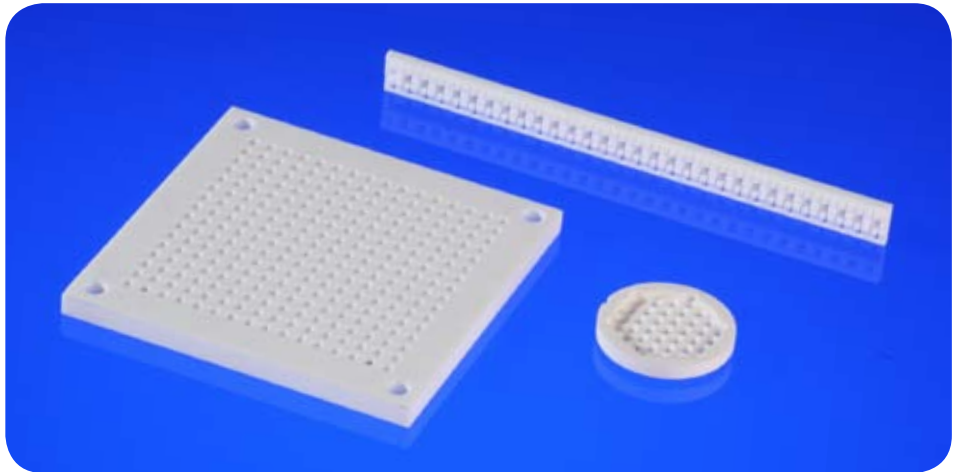
Design and configuration of MTC Wesgo/Duramic Alumina fixtures are highly flexible. Both simple and intricate features, including small diameter holes, can be machined to tight tolerances to meet customer requirements. Cleanliness is ensured through a specially designed air firing process. Also, during the brazing process, thermal expansion of the fixture is matched to that of the Alumina insulator used for ceramic-to-metal seals.

MTC Wesgo/Duramic Alumina fixtures hold distinct cost and cleanliness advantages over other materials used during the brazing process. Alumina is an economical alternative to Molybdenum or Tungsten. MTC Wesgo/Duramic Alumina has an excellent dimensional stability at higher temperatures (greater than 800°C) and a long service life, lasting years

rather than months. Also, braze material does not stick to Alumina as it does to other non-ceramic materials.

In addition, Alumina offers a clean solution compared to Graphite, which can contaminate surrounding surfaces. Unlike Graphite, which converts to Carbon Monoxide/Carbon Dioxide

over time, MTC Wesgo/Duramic Alumina shows no material degradation in a wet reducing atmosphere. If the MTC Wesgo/Duramic Alumina is contaminated with foreign materials, it is easier to see because of its inherent white color. Finally, there is no outgassing or material transfer to parts it is in contact with during vacuum brazing applications.



Piezoelectric composites give a new look to undersea exploration

Morgan Technical Ceramics ElectroCeramics (MTC ElectroCeramics) introduces its Piezoelectric composite components for use in a wide range of undersea applications, including conformal sensors and detectors for ships and deployable vehicles, as well as in large-area arrays for undersea exploration. Components manufactured with MTC ElectroCeramics' Piezocomposite materials offer significant improvements over traditional transducer materials.

MTC's Piezocomposite material consists of a Piezoelectric ceramic in an electrically-inactive Polymer matrix. It is specifically formulated with high coupling values and high dielectric properties. Combining the Piezoelectric ceramic with Polymer filler results in a material with an overall density that better matches the medium through which the sound waves travel. This results in lower acoustic impedance, higher efficiency and energy transfer through water, and reduced lateral mode coupling within the acoustic device. The arrays can be phased electrically, going from element to element, in a solid state, with no moving parts.

The Piezocomposite materials are being used in many different undersea vessels, including submarines and other manned vessels, as well as Autonomous Underwater Vehicles (AUVs), and Remotely Operated Underwater Vehicles (ROVs). AUVs are robots that travel underwater, and are typically used to conduct hydrographic surveys, and look for airplane wreckage, shipwrecks, and

antiquities. They are also widely used for military purposes, including mine hunting. The non-autonomous ROVs, powered from the surface by an operator or pilot using a control umbilical, are typically used for undersea exploration, checking on the condition of undersea pipelines, using optics, or other ultrasound modalities. Side-scan sonar using the Piezocomposites can obtain extremely high resolution images, at frequencies ranging from 200 to about 800 kilohertz (kHz).

The Piezocomposite materials reduce the cross coupling that typically occurs between different modes in the ceramic of conventional transducers, enabling sonar components to respond more precisely and predictably. In addition, components manufactured with MTC ElectroCeramics' Piezoelectric composite materials reduce spurious activity, offering higher transmit and receive efficiency. They also provide lower acoustic impedance and improved transducer bandwidth compared to those made only of conventional Piezoelectric ceramics.

Unlike traditional side-scan arrays, which must use various attenuative materials to suppress channel-to-channel interference or cross coupling, the Polymer fill in the Piezocomposites has attenuating properties that are maximized for each design, and does not need further suppression. Also, the traditional transducer manufacturing process involves placing thin bars of PZT material in a linear array pattern, much like the tines of a comb. Moving to Piezocomposite materials allows fabricators to make

one long plate of material that can be electroded with an array pattern, which greatly simplifies the transducer manufacturing process as well as improving their acoustic signal. The transducers exhibit better resolution, and a reduction of cross-talk (element to element interference). In addition, Piezocomposites tend to have less mass, and this weight reduction can be a significant benefit. The elimination of complexity in manufacturing can lower costs compared to traditional side-scan transducers.

MTC ElectroCeramics offers Piezoelectric composites in 1-3 and 2-2 architectures, in sizes up to 3" x 2" and frequencies from 100 kHz to 12 MHz. Piezoelectric volume fractions can be tailored for any application to enhance transmit and receive response rates. The Piezocomposites offer increased design flexibility, because they can be thermoformed to conform to curved, complex geometric surfaces to which conventional Piezoceramic materials often cannot be shaped. MTC ElectroCeramics offers Piezoelectric composites in both standard and custom materials, including Types I, II, VI and Single Crystal Lead Magnesium Niobate-Lead Titanate (PMN-PT).

MTC ElectroCeramics works with customers to integrate Piezocomposites into undersea applications on many levels. Our experts can outline design concepts, construct assemblies, or use finite element analysis to model a visual representation of the material in the design and development of our customer's product.

Our feedthroughs can take the pressure

Morgan Technical Ceramics Alberox (MTC Alberox) offers feedthrough technology for repeaters used in undersea fiber-optic cables. The feedthroughs can withstand high pressure and completely seal out seawater to a depth of 8,000 meters, where the cable may experience as much as 12,000 pounds per square inch (psi) of pressure. The joints remain hermetic even in the cold temperatures found on the ocean floor, which can be as low as 0°C.



The feedthrough technology provides an hermetic seal on both the incoming and outgoing side of the repeater. The basis for the seal is Molybdenum-Manganese (MoMn) refractory metallization which is applied to the ceramic and fired at high temperature in a Hydrogen atmosphere.

"The ceramic-to-metal seal on MTC Alberox's feedthroughs enable fiber optics to enter the repeater, while keeping out seawater," notes Steve Mueller, MTC Alberox's Hermetic Seal Business Unit Manager. "Other methods, like simple epoxy, mechanical seals with Elastomer o-rings, or glass seals, cannot withstand the ocean's low temperature or pressure as well as our feedthrough."

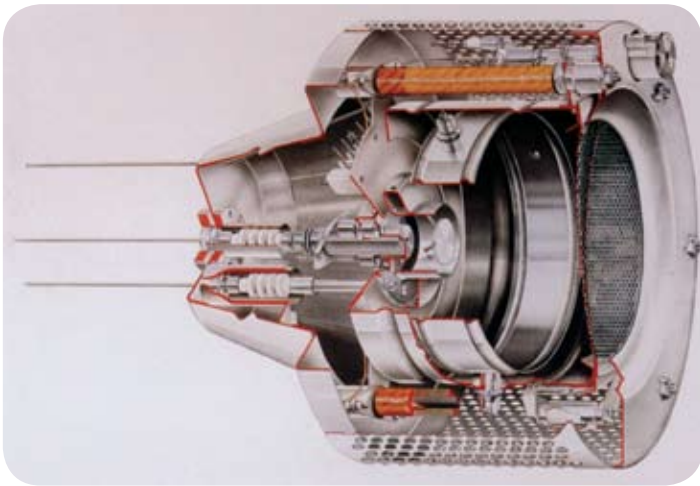
The undersea repeater feedthrough technology is used all over the world, and continues to be employed wherever undersea cables are installed.

In addition to repeaters for undersea fiber optic cables, MTC Alberox supplies similar feedthrough products for Lasers, Aerospace, Temperature Measuring and Fire Detection devices, the Power industry, as well as X-ray and CT Scanning machines.

MTC Alberox, located in New Bedford, Massachusetts, USA is a world leader in the manufacture of ceramic-to-metal assemblies. Focusing on on-time delivery and process expertise, MTC Alberox specializes in solving difficult application problems, usually involving extremes of temperature, pressure, or operating environment, or complicated geometries. The company ensures quality with certifications under ISO 9001, as well as ISO-14001:2004 International Environmental Management System standards.

Mercury Mission uses MTC Brazed Assemblies

Morgan Technical Ceramics (MTC) is supplying ceramic/metal assemblies for the solar-electric propulsion system used in BepiColombo, Europe's first spacecraft mission to Mercury, which is expected to launch in 2014



The propulsion system, which is being manufactured by QinetiQ for the European Space Agency's mission, uses brazed ceramic/metal assemblies to isolate components in the thrusters from extreme high voltage. Brazing is providing a much stronger and simpler solution compared to alternative methods of joining ceramic and metal resulting in a more reliable and robust system.

Mercury's distance to the Sun presents many technical challenges. The temperature can reach 470°C and solar radiation is ten times stronger on Mercury than on Earth. It will take six years for BepiColombo to reach the planet and a large amount of energy to brake the spacecraft against the Sun's gravitational pull is required.

An advanced propulsion system is an essential part of meeting this technical challenge and QinetiQ has designed a solar-electric propulsion system comprising four T6 ion thrusters, each of which consists of seventeen brazed isolator assemblies.

The thrusters work at an extremely high voltage of up to 1.85 kV and are around ten times more efficient than chemical thrusters, which have traditionally been used as propulsion systems on spacecraft. The brazed

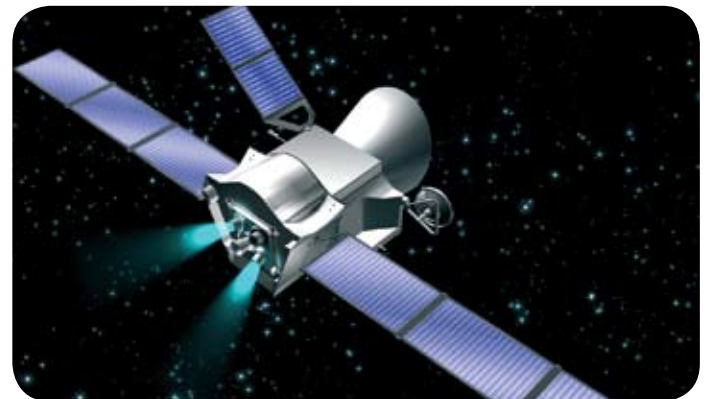
components are used to electrically isolate the propellant systems and spacecraft from the high voltage that the thrusters operate. The isolators are brazed into the feed pipeline using special Kovar expansion match fittings and they produce a gas tight seal.

"We are extremely pleased to be working with QinetiQ on their largest space-related contract to date," says Yannick Galais, Commercial Manager, MTC. "There are many components and sub-assemblies within the thrusters that operate at different voltages and need to be isolated from each other. Fitting the assemblies with isolators that have been brazed to a threaded termination or flange results in a stronger, rigid and more simplified joint."

Brazed isolator assemblies are less complicated than alternative methods, especially where parts need to be bolted together. Alternative assembly methods would require multiple isolators to isolate the bolt as well as the assemblies.

"We chose brazed isolator assemblies from MTC for their robustness and ability to withstand the harsh environments," says Mike Kelly, Electric Propulsion Engineer, QinetiQ. "We are confident in its brazing and manufacturing techniques, having worked with MTC previously."

The components are a key technology in the solar-electric propulsion unit, which will make deep space missions possible for the first time and offer significant efficiencies to enhance future communication satellite operations.



Innovative technology partnership with CERAM

CERAM

CERAM has announced a new Technology Partnership alliance with Morgan Technical Ceramics (MTC), a global leader in advanced ceramic materials and component innovations across many technology-led markets including Aerospace, Automotive and Medical.

CERAM is an internationally renowned materials expert in research, testing, consultancy and analysis. The Technology Partnership will enable MTC to take advantage of unrivalled ceramics and materials technology through CERAM's Information Services from around the world. This will support MTC as it continues to push boundaries and offer high-performance engineered components to its customers.

CERAM's information specialists and technology consultants are available to MTC for expert information gathering and analysis, identification of technology trends and literature tracking. Additionally, CERAM experts will assist with MTC's innovation activities and together the partners will develop joint innovation projects and technology foresight initiatives.

Keith Parker, Marketing Director for MTC, explains, "We have a longstanding relationship with CERAM and have seen the organisation develop over recent years into a cutting-edge technology facility with a global reach and broad capabilities. We are excited by the potential

to extend our relationship, and by sharing our wealth of knowledge we are better placed to serve our customers."

John Hines, Director of Consultancy at CERAM, concludes, "MTC is a global leader in ceramic materials technology and shares our perspectives in looking at the key materials challenges faced around the world. Partnerships are a vital aspect of our business and we are always keen to explore ways through which we can add more value to our clients and their customers. We are delighted to be working with MTC in partnership and are committed to helping them extend their technology lead through innovation and insight."

Looking after the environment

ISO 14001 to be integrated at Bedford Plant

Morgan Technical Ceramics ElectroCeramics (MTC ElectroCeramics), is proud to announce their new ISO 14001: 2004 certification. The new certification keeps MTC ElectroCeramics at the cutting edge of Environment Management Systems. As part of the certification, MTC ElectroCeramics has integrated the globally recognized standard for EMS into the Quality Management System at their Bedford, Ohio, USA plant.

Reaching the deadline for ISO 14001: 2004 certification with QMI-SAI Global required MTC ElectroCeramics to work aggressively and quickly. In just 3 months, MTC ElectroCeramics qualified for certification. The stage I audit was just completed in August of 2009, with stage II completed in October of 2009. Certification was quickly obtained later that month.

The new Environmental Management System involves a comprehensive structure for MTC ElectroCeramics. What is unique about this system is its ability to manage all systems associated with environmental issues and compliance. At the same time it allows for driving continual improvement and technology development.



Europe

Morgan Technical Ceramics
 Bewdley Road
 Stourport-on-Severn
 Worcestershire
 DY13 8QR
 United Kingdom
 T +44 (0) 1299 872 210
 F +44 (0) 1299 872 218
 Email: mtceusales@morganplc.com

USA

Morgan Technical Ceramics
 26 Madison Road
 Fairfield
 New Jersey
 07004-2309
 USA
 T +1 (800) 433 0638
 F +1 (973) 227 7135
 Email: mtcussales@morganplc.com

Asia

Morgan Technical Ceramics
 25 Hsin-Yeh Road
 Hsiao Kang
 Kaohsiung 81208
 Taiwan R.O.C.
 T +886 (07) 87 1 6131
 F +886 (07) 87 1 7494
 mtctwsales@morganplc.com

Morgan Technical Ceramics
 Dingshu Town
 Yixing City 214221
 Jiangsu Province, P. R. China
 Tel: +86 21 5990 6139
 Fax: +86 21 5416 5161
 Cell: +86 139 1739 6177
 mtccnsales@morganplc.com

Morgan Technical Ceramics
 Kunpo PO Box 37
 Kyungki-do
 Korea
 T +82 (0) 31 399 9331
 F +82 (0) 31 399 9332
 Email: mtckrsales@morganplc.com

Morgan Technical Ceramics
 Akihbara UDX, 13F 4-14-1
 Sotokanda, Chiyoda-ku
 Tokyo 101-0021, Japan
 Tel: +81 3 5207 7641
 Fax: +81 3 5207 7659
 Email: mtcjpsales@morganplc.com

Middle East

Morgan Technical Ceramics
 MKGS Morgan Karbon Grafit Sanayi AS
 Iktelli OSB
 Eskoop Sanayi Sitesi
 B2 Blok, N.156
 34670 Iktelli, Istanbul, Turkey
 T +90 212 671 3287
 F +90 212 549 4872
 Email: mtcmesales@morganplc.com