Morgan Technical Ceramics Manufacturing Site Locations

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For all enquiries, please contact your regional sales office
Morgan Technical Ceramics

Morgan Technical Ceramics is a business within the Morgan Ceramics Division of The Morgan Crucible Company plc.

We design and manufacture products for demanding applications in a variety of markets using a comprehensive range of advanced ceramic, glass, precious metal, Piezoelectric and Dielectric materials.

We are a world leader in the design and manufacture of ceramic implants and complex ceramic assemblies for surgical tools, medical instrumentation, therapeutic and diagnostic equipment. Our high quality ceramics are favoured by medical device manufacturers and the medical professions for their exceptional physical characteristics.

Products and Applications

With our world-class design expertise and specialist manufacturing capabilities, we work in partnership with medical device manufacturers to develop competitive custom solutions to meet their needs. Our ISO 13485 certified manufacturing facilities ensure the very high standards of reliability and repeatability required for human body implants and medical applications from prototype to volume production.

Our products go into an extensive range of applications including

- Prostheses
- Electronic Implants
- Surgical Instruments
- Electrophoresis
- Diagnostic Equipment
- Blood Flow
- Consumables
- Foetal Heart Monitors
- Instrumentation
- Medical Imaging
- Blood Separation
- Nebulisation
- X-Ray Equipment
- Catheters
- Pacemakers
- Cataract Removal
- Ultrasonic Tools
- DNA Testing
- Infusion
- Dialysis
- Implantable Pulse Generators (IPG)

We offer a range of capabilities from our sites across the globe and our products offer multiple benefits in their end use applications

Surgical Instruments

MTC’s superior Ceramic Injection Moulding (CIM) capability is ideal for the engineering of intricate features on small components. Diamonex® Diamond Like Carbon (DLC) coatings provide a biocompatible, sterilization-compatible, non-leaching, low friction and wear resistant surface for key pivot points and wear surfaces. Our braze alloys provide high strength joining of ceramics to metals and can be used in electrical structures. Piezoelectric ceramic materials and transducers provide solutions in many surgical applications such as scalpels, descalers and high intensity focused ultrasound (HIFU). Medical grade Aluminas and Zirconias can be used to manufacture ablation and probe tips. The unique thermal properties of our Silicon Nitride helps to control cooling and prevent cracking during the production of dental restorations.

Instrumentation and Diagnostic Equipment

MTC’s capabilities in complex assemblies allow our application engineers to develop robust solutions to meet challenging life science environments. Our X-Ray components feature ceramic-to-metal seal assembly technology with designs that ensure hermetic joints. MTC ceramic materials offer high thermal shock resistance for heightened durability and superior electrical properties that enable higher operating performance. Our Piezo products including Piezo Ceramic, Piezo Composite, ultrasonic sensors, and pressure sensors can be tailored for each application. Ceramic capacitors can be designed for precise tuning of MRI scanners.
Innovation in Materials Technology

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Orthopaedics

MTC offers HIP Vitox® Alumina and Zyranox® Zirconia for implantable medical device manufacture, made at our ISO 13485 Medical Devices Quality Management System certified facility. These materials have proven low wear rates and can greatly reduce metal ion release and polymeric wear debris - a proven source for osteolysis and implant revision. MTC’s unique manufacturing approach allows for custom development and with nearly 20 years clinical experience, MTC is well placed to offer expert technical engineering advice. HIP Vitox® Alumina and Zyranox® Zirconia femoral heads are available for hip replacements which use a Polyethylene cup (Zirconia offers greater design flexibility for smaller diameter and longer neck length heads). HIP Vitox® Alumina femoral heads and cup inserts are available for ceramic-on-ceramic bearings. Our spinal devices offer faster bone fusion, no allograft or autologous bone graft, anterior and posterior operative procedures and optimum biomechanical stability.

Surgical Implants

Survival in the demanding environment of the human body requires stringent quality control and consistent repeatability. MTC’s ceramic-to-metal seal assembly technology is used for implantable pacemakers, defibrillators, neurostimulators and housings for cochlear implants. These housings can be made of Vitox® AMC, Vitox® Alumina or Zyranox® Zirconia. Piezo Ceramic devices often serve as sensors for these implants.

Biocompatible, High Film Cohesion

The Diamonex® range of thin film medical coatings have been specifically developed to provide hermetic and biocompatible coatings with excellent cohesion properties and wear couples. Extreme applications have included artificial joints and heart-assist devices where coating integrity and adhesion, combined with the need for extended component life and the ability to interface with human body without degradation, are of paramount importance.

Blood Handling

Each year MTC produces millions of high-quality sealing ceramics. The high hardness and polished surfaces of our materials ensure exceptional liquid-tight sealing. Diamonex® DLC coatings increase durability of valves, plates and many other bearing surfaces and our innovative anti-wetting (AW) surface treatment helps reduce contaminant adherence during cleaning cycles. Arterial Pressure Transducers (APT) are designed and manufactured to meet the requirements of customer specifications. They can be used with blood pressure cuffs, work well as a microphone and come with a shielded cable.

In-Line Sensors

A range of standard products has been developed to protect patients whilst undergoing drug therapy, dialysis, infusions and enteral feeding. All sensors are non-invasive and are designed to detect the presence of air bubbles and blockages in liquid lines, liquid and gas flow rates, and accurate fluid level measurement. Arterial Pressure Transducers (APT) are designed and manufactured to meet the requirements of customer specifications. They can be used with blood pressure cuffs, work well as a microphone and come with a shielded cable. Our dedicated design teams have considerable expertise in developing custom solutions to customer specific designs, utilising a breadth of knowledge, sophisticated modeling packages and rapid prototyping.

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Innovation in Materials Technology

MTC has developed a new BioCeramic material for surgically implanted devices called Vitox® AMC. This Alumina Matrix Composite material can withstand high mechanical shock, without fracture and exhibits exceptionally low wear rates compared to Alumina, metal or Polyethylene alternatives. Vitox® AMC can be used to manufacture femoral heads with diameters close to the natural joint and thinner wall section acetabular cups. Designs using these features provide a more stable joint, offering recipients a wider range of motion and are proven to reduce the likelihood of dislocation (a common problem in patients who have undergone total hip arthroplasty).

Vitox® AMC is also being considered for a new form of arthroplasty developed for bone preservation. The new products are designed to be minimally invasive.

MTC offers ceramic injection moulding (CIM) which is a cost effective, innovative forming technique. CIM can be used to manufacture parts in medium to large volumes, with high geometric complexity, and to tight tolerances of ±0.5%, such as dental abutments and copings.

Surgical Implants

Internal sourcing of precious metal alloys and ceramics allow us to offer unique design capabilities. MTC offers ceramic injection moulding (CIM) which is a cost effective, innovative forming technique. CIM can be used to manufacture parts in medium to large volumes, with high geometric complexity, and to tight tolerances of ±0.5%, such as dental abutments and copings.
We have a large range of materials in our portfolio and will work with you to select the optimum one for your application.

Materials we work with:
- Alumina
- Braze Alloys (including ABA® Active Braze Alloys)
- Dielectrics
- DLC (Diamond-Like Carbon) Coating
- Glass Preforms (Seals)
- MACOR® (Machineable Glass Ceramic)
- PZT Piezoelectric Ceramics
- Silicon Carbide (SiC)
- Silicon Nitride (Si₃N₄)
- Single Crystal Piezoelectric
- Zirconia (TZP)
- Zirconia Toughened Alumina (ZTA)
- Piezo Composite (1-3 and 2-2)

Joining Alumina Ceramic:

- Alloy Moly-Manganese
- Metallizing Process
- Active Brazing Process
- Apply Moly-Manganese
- Paint
- Sinter in Reducing Atmosphere
- Nickel Plate
- Nickel Sinter in Reducing Atmosphere
- Kovar
- Ag.Cu Eutectic Foil
- Alumina Assembly Ready for Brazing
- Kovar Brazed Assembly
- Active Braze Alloy (ABA)
- Braze Filler Metal
- Alumina Assembly Ready for Brazing
- Biocompatible Sputtered Thin Film Metal
- Biocompatible Metal
- Gold Brazing
- Alumina Substrate Ready for Brazing
- Biocompatible Metal-to-Alumina Brazed Assembly
- Kovar-to-Alumina Brazed Assembly
- Alumina Substrate
- Implant Brazing Process
- ALUMINA

Implantable Feed-thrus

MTC’s experience in feed-thru design, including biocompatible metal-to-ceramic assemblies, allows our customers more flexibility in their product development. Our engineering capabilities in ceramics, braze alloys, precious metals and hermetic sealing technology allow us to continually reduce the dimensions of our feed-thrus. These are manufactured at our ISO:13485-2003 certified facility in New Bedford, USA.

Innovation in Materials Technology

Typical physical properties of medical grade materials:

- Coefficient of Friction
- 0.8
- 0.7
- 0.6
- 0.5
- 0.4
- 0.3
- 0.2
- 0.1
- 0

- Polycarbonate
- PEEK
- Teflon
- Cast Nylon
- Glass
- PEKK
- Mild Steel
- Stainless Steel
- Ti6AI4V
- DLC
- HIP Vitox Alumina
- Zyranox Zirconia
- MAC TG12 Alumina

- Hardness (kg/mm²)
- 4000
- 3500
- 3000
- 2500
- 2000
- 1500
- 1000
- 500
- 0

U.S. Patent No. 6,586,675 and European Patent No. 1107264 B1
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- Single Crystal Piezoelectric
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**Joining Alumina Ceramic**

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**Implantable Feed-thrus**

Innovation in Materials Technology

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<table>
<thead>
<tr>
<th>Material</th>
<th>Coefficient of Friction</th>
<th>Hardness (kg/mm$^2$)</th>
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<tbody>
<tr>
<td>Polycarbonate</td>
<td>0.8</td>
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<tr>
<td>PEEK</td>
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<td>DLC</td>
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<td>0</td>
</tr>
<tr>
<td>MAC TG12 Alumina</td>
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