

Diagnostic and Surgical



Ceradyne uses its unique ceramic injection molding (CIM) technology to fabricate small, intricately shaped components to high dimensional accuracy without the need for secondary operations. In general, this technology is used where other fabrication techniques are not feasible or cost effective.

Components can be produced using aluminum oxide, zirconium oxide, or oxides composite ZTA ceramics. These materials are strong, tough, wear resistant, biocompatible, electrical insulators that have the ability to withstand high temperatures without suffering from thermal shock.

Innovative CIM capabilities, combined with the unique material properties of ceramics, provide enabling technology for a number of medical applications. Examples of Ceradyne's surgical and diagnostic components are:

Endoscopic Surgical Components

Ceramics are the material of choice for their thermal and electrical insulation characteristics, especially for cauterization probes. Ceramics add compressive strength to load bearing parts and heat resistance to protect surrounding tissue.

Defibrillator Ring Frames

Ceradyne produces ring frames and housings that are used to electrically insulate the high voltage electronics in implantable cardioverter defibrillators (ICD's) from the titanium metal case. Ceradyne's zirconium oxide provides electrical insulation and heat resistance, together with the chemical and dimensional stability required to insure the safe operation of these devices while in the body.

Ultrasonic Imaging Devices

Transducer components for ultrasonic imaging devices have been manufactured by Ceradyne since 1992. The components are precision machined to tolerances of less than 0.002 mm from a proprietary material designed to act as an acoustic attenuator for clear, precise images.



Probe Tips
Hubs
End Effectors
Ring Frames

*Materials: Zirconium Oxide
and Aluminum Oxide*

Ceradyne's core competency of consistent ceramic manufacturing quality has allowed customers to improve manufacturing yields and product performance.

Medical components are designed to meet customer's specifications using a complete range of Ceradyne ceramic fabrication technologies including ceramic injection molding (CIM), dry pressing and isostatic pressing followed by green machining. Components can be fired by standard sintering processes or hot isostatic pressing (HIP) to achieve ultimate mechanical properties. A complete range of final machining options is also available when net shape fabrication techniques cannot achieve the required dimensional tolerances.

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Unique Benefits of Ceralloy® Advanced Ceramics

Ceralloy® Advanced Ceramic components set specification standards that cannot be met by similar products made from metals or plastics. Ceradyne's ceramics provide the medical industry the following superior benefits:

- Biocompatibility
- Electrical Insulation
- Temperature Resistance
- Dimensional Stability
- Flexural Strength
- Wear Resistance

Stringent Quality Standards

Ceradyne employs an ISO 9001:2000 quality system that is augmented by previous experience gained while meeting stringent military and automotive quality standards.

This performance history demonstrates that Ceradyne's products will meet or exceed the stringent requirements of the medical industry.

Contact Ceradyne's technical sales engineers to learn how you can benefit by using Ceradyne advanced technical ceramics in your application.

Property	Units	Aluminum Oxide		Zirconium Oxide	Oxides Composite
		Transtar®	AlCIM	YTZP	ZTA
Grade					
Process		Sinter	Sinter	Sinter	Sinter
Purity	%	99.9%	99.8%	97%	
Density	(g/cm ³)	3.99	3.94	6.05	4.21
Flexural Strength	(MPa)	300	415	1050	500
Fracture Toughness	(MPam ^{1/2})		3.8	12	5
Hardness	(Kg/mm ²)		1826	1300	1630
Elastic Modulus	(GPa)	395	352	211	324
Coefficient of Thermal Expansion	(x10 ⁻⁶ /K)	8.3	6.8	10.3	8
Thermal Conductivity	(W/mK)	35			
Electrical Resistivity	(Ohm-cm)	>10 ¹⁵			
Key Features		Translucent	Electrical Insulator, Wear Resistance	High Strength and High Fracture Toughness	Combination of Toughness and Hardness

Property values are typical and should not be considered specifications.



MEDICAL PRODUCTS

3169 Red Hill Avenue, Costa Mesa, CA 92626

714-549-0421 | Fax: 714-549-5787 | Email: info@ceradyne.com

www.ceradyne.com



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Ceradyne Advanced Technical Ceramics

Ceradyne, Inc. (NASDAQ:CRDN) is a publicly traded corporation specializing in development and vertically integrated production of advanced ceramic materials at facilities based in the North America, Europe and Asia. Ceradyne's advanced ceramics are sought for the most demanding applications in automotive/engine, industrial wear, medical/dental, electronic and defense industries.

Ceralloy components are produced in fully dedicated facilities using patented compositions and processing techniques. Plentiful raw materials are coupled with conventional, time-tested ceramic manufacturing processes that produce high quality, cost effective advanced ceramic solutions.