Neutron Absorber Materials

Ceradyne, Inc. offers BORAL® Composite, BORTEC® MMC, BorAluminum™, BoroBond®, Enriched Boron, and Boron Carbide in a full range of thermal neutron absorber materials for criticality control in wet and dry, used and fresh fuel transportation/ storage applications, and reactor control systems.

BORAL® Composite

Well suited to many neutron absorption applications, the BORAL® Composite is used for spent fuel storage pools, dry MPC casks and fresh fuel canisters in the United States, Europe and Asia. Since the late 1950's, BORAL® has been used in nuclear power plants, research reactors and spent fuel storage systems worldwide. It has the longest continuous service history of any neutron absorbing material, performing its intended function for very long periods in high gamma and neutron radiation fields, never failing to meet it's neutron absorption function.

BORAL® Composite is produced in our Ceradyne Canada ISO certified and NQA-1 qualified plant in a wide range of surface dimensions, areal densities and thicknesses. It is manufactured in flat sheets that can be cut, punched, bored and formed into shapes. Physical properties allow it to be designed into fabricated structures that form a solid and effective barrier against thermal neutrons.

Ceradyne is the owner, manufacturer, designer, and exclusive seller of BORAL® Composite. Since our acquisition of the BORAL® business in June 2006, we have been committed to improving and delivering BORAL® Composite products that meet or exceed service requirements.

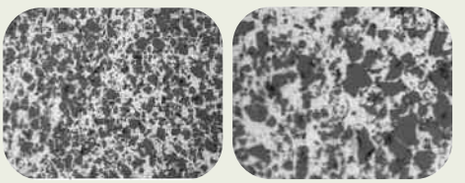
BORTEC® MMC

In October 2007, Ceradyne acquired the exclusive rights to fabricate and sell BORTEC® MMC. We manufacture BORTEC® MMC in our Canadian ISO certified and NQA-1 facility into rolled or extruded shapes with B_4C contents up to 40% by volume using various aluminum alloys. The resulting composites have outstanding properties for structural or non-structural design applications, and are lightweight and adaptable for neutron capture in both wet and dry environments.

BORTEC® MMC is used in high areal density neutron absorber applications and is known worldwide for its quality and high boron carbide content. It is available using 5000, 6000 and 1000 series aluminum alloys and has successfully passed a series of in-depth nuclear compatibility tests.

BORTEC® MMC is in use today worldwide in several end-user storage and transport systems.

- Uniform microstructure
- Excellent mechanical properties using structural Al alloys
- High thermal conductivity
- Virtually 100% dense
- High B_4C loaded MMC



Dense B_4C population combined with uniform distribution ensures a very high neutron-absorbing capability for both dry and wet SNF storage.

AA1100-30% B_4C BORTEC® MMC after Rolling

BorAluminum™

BorAluminum™ is an alloy material incorporating enriched Boron (^{10}B) in standard aluminum alloys. It has several superior properties, especially high thermal conductivity, and is in demand because of its unique combination of properties. Non-structural applications typically utilize 1100 Al + ^{10}B which permit very efficient thermal neutron capture. Applications with structural requirements most frequently are 6351 Al + ^{10}B which combine neutron absorption with strength and stiffness required for structural uses.

BorAluminum™ is currently in use in several spent fuel storage and transportation applications. Ceradyne Boron Products can supply materials in a variety of rolled sheet or plate and extruded forms.

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Neutron Absorber Materials

BoroBond®

BoroBond® is a chemically bonded phosphate ceramic useful for criticality control, solidification and neutron shielding. It exhibits excellent strength properties and ease of manufacture due to ambient production conditions. Formulations and additives can be customized to provide application specific characteristics. The castability of BoroBond® increases its ease of use and flexibility. BoroBond® is available with either naturally occurring or enriched isotope ratios of boron.

Enriched Boron

Enriched Boron (^{10}B) is produced by Ceradyne Boron Products to solve demanding neutron absorption requirements. We are the leading global supplier of boron isotopes having developed unparalleled expertise in the separation and analysis of boron isotopes (^{10}B and ^{11}B) and in the measurement of impurities in boron compounds. Ceradyne Boron Products has created advanced process technology to deliver the highest chemical purity boron products of tailored ^{10}B / ^{11}B atomic ratios which meet critical nuclear and electronic applications.

Boron Carbide

Boron carbide, both natural and enriched, is the most common material used to absorb and control thermal neutrons. Natural B_4C is the neutron absorber material in our BORAL® and BORTEC® products. Boron Carbide is also sold for use in reactor control rods, instrument shielding and as an emergency reactor shutdown material, e.g., scram balls.

Ceradyne Quality Program

The Ceradyne **ISO 9001:2000 and NQA-1 Quality Program** is fully qualified, audited, and approved by many worldwide customers. Ceradyne's unique advantage is that we control the entire value stream in the manufacture of these specialized materials. Whether using natural boron carbide from ESK Ceramics or enriched boron from Ceradyne Boron Products, we engineer and manufacture neutron absorber materials that meet or exceed stringent end user requirements. Under our **NQA-1** and **ISO** programs, we provide best-in-class service to our customers covering all steps of neutron absorber manufacturing and processing.

Ceradyne is the only vertically integrated manufacturer of neutron absorber materials that offers a diverse range of extruded and rolled BORTEC® MMC, BORAL® and BorAluminum™ products for spent and fresh nuclear fuel containment. These products provide market-leading performance for thermal neutron absorption in both wet and dry spent nuclear fuel storage/transport and fresh fuel transport applications.

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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 North America, Europe and Asia. Ceradyne's advanced ceramics are sought for the most demanding applications in automotive, industrial wear, medical, electronic, neutron absorption and defense industries.