

Material Selection Guide *Ceramic vs. Metal*

In industry one thing is certain and that is the financial toll wear problems exact on profit margins. Without effective wear protection, expensive production systems quickly fall prey to abrasion, corrosion, and excessive heat, resulting in costly repairs and unnecessary downtime.

Kennametal specializes in solving specific wear problems by engineering and installing customized systems made of the world's toughest ceramic material including Durafrax™, Silicon Carbide, ROKIDE® (Thermal Ceramic Spray Coatings), and AZS (Fused Cast Alumina) ceramics.

Ceramic materials are lighter than steel, decreasing the overall weight of the equipment. The hardness of ceramic also provides exceptional performance over metal in wear systems.

Our superior Durafrax™ grade resists abrasion better than common wear-resistant solutions; is impervious to most corrosive substances; is non-brittle when applied with the exclusive Aero-tech bonding process; and is less expensive than traditional materials over the life-cycle of equipment when downtime, replacement costs, and equipment availability are considered.

Durafrax™ ceramic can be manufactured in a variety of geometries from simple to complex shapes. Combined with the appropriate attachment method, Durafrax™ ceramic can overcome temperature limitations, impact, and abrasion problems in many different environments.

Durafrax™

The industrial workhorse and most frequently specified ceramic is pre-engineered, custom-designed Durafrax™ alumina ceramic. This newly developed, fine-grain, high-grade alumina is made from exceptionally pure, uniformly controlled alpha aluminum oxide and is engineered to be one of the best wear materials available for fine particle abrasion. It offers excellent mechanical properties, superior wear resistance, and desirable corrosion performance.

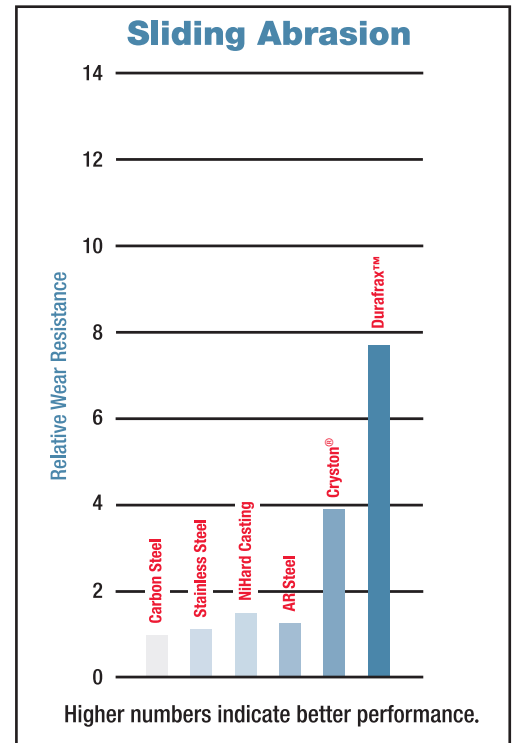
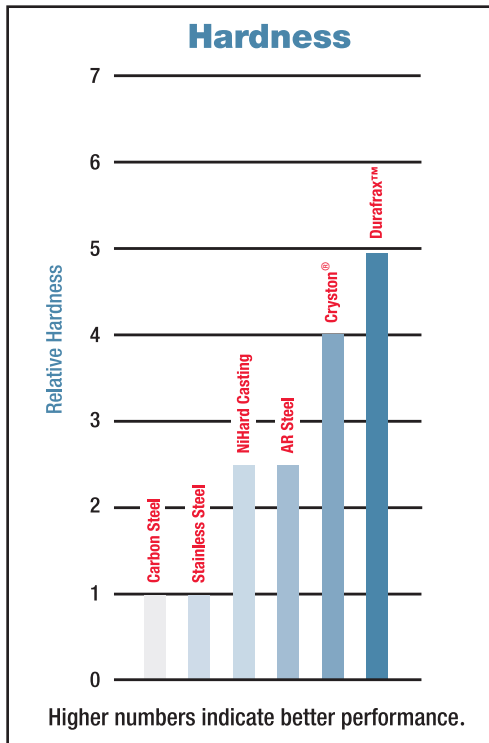
Hardness

The resistance of a material to indentation or scratching is a measure of hardness, and ceramics are among the hardest known materials. Although hardness is not the only factor in determining wear resistance, it is clearly a key factor in preventing equipment wear. Our harder wear resistant materials are specified for abrasive and erosive service.

Sliding Abrasion

Sliding abrasion is tested by subjecting a material to the effect of an applied load and alumina abrasive grit. The weight loss of a sample is measured. Actual wear resistant properties of ceramics are best represented by sliding abrasion tests.

Testing conditions are per industrial standards using either ASTM or military standards.



Kennametal is setting the standard in advanced ceramics!

Let us prove it.



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Impact Abrasion

Impact wear tests compare the performance of materials subject to high angle silicon carbide and fused alumina grit blast. The hardness of ceramic and its consistent composition make it suitable for abrasive environments.

Density

Ceramic materials are less than one-half the density of metallic alloys. This allows for equipment weight savings in addition to enhanced ceramic performance.

Maximum Temperature Service

Durafrax™ and Cryston® can withstand temperatures that would cause traditional materials to melt. Ceramics maintain their physical properties at temperatures above 2218°F or 1250°C.

Testing conditions are per industrial standards using either ASTM or military standards.

Cryston®

Cryston® nitride-bonded silicon carbide is a unique high performance ceramic with exceptional resistance to abrasion, erosion, high temperature, and harsh chemical environments. It is an effective solution to severe environments where conventional refractories wear out too fast or corrode at an unacceptable rate. Its durability far exceeds that of other ceramics, manganese steel, high chrome iron, rubber, or plastics. Cryston® ceramic is cast or pressed which offers a wide degree of design latitude. Large and complex shapes are entirely practical, and in every case, you can depend on dimensional tolerances well within design specifications.

The family of silicon carbide ceramics also includes Crystolon® ceramic, an oxi-nitride bonded silicon carbide and Crystar® ceramic, a siliconized silicon carbide. Both offer performance characteristics similar to those of Cryston®.

ROKIDE®

ROKIDE® thermal ceramic spray coating system is specified when the size or shape of a component limits the use of solid ceramic liners. In the ROKIDE® process, ceramic rods are heated beyond the melting point and applied with a patented spray unit. Eighteen different materials for wear, thermal, or electrical resistance can be applied with this technique.

AZS

AZS fused cast Alumina Zirconia Silica product offers exceptional performance in severe thermal environments where sliding abrasive wear or heavy impact protection is also required. Because AZS ceramic begins in a molten state and is cast into the desired shape, a number of joints can be eliminated. Over time, the AZS surface becomes smooth, decreasing the coefficient of friction and resulting in longer wear life.

