



GENERALCARBIDE®

SHAPING YOUR SUCCESS

APPLICATION DATA SHEET

Erosion/Corrosion Resistance in Flow Control



Application Background

Cemented carbide flow control components and trim sets are used extensively in the Power Generation, Oil/ Gas and Fluid Handling industries. These harsh applications involve a combination of corrosive and erosive wear that requires the highest quality cemented carbide with enhanced corrosion resistance.

General Carbide offers several grades that satisfy the demands of these industries. Not only are the physical properties of the material put to the test but the size capability of the manufacturer is also tested when it comes to the large plugs, seats and cages demanded by today's valve manufacturers.

The ability to machine, finish grind and assemble today's large tungsten carbide/ stainless steel/Inconel valve components requires machine tools capable of turning up to 28" (710 mm) diameter parts and cylindrical grinders that can hold extremely tight tolerances.

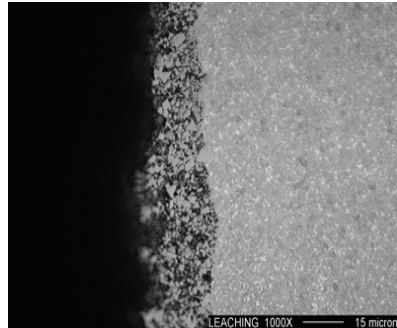
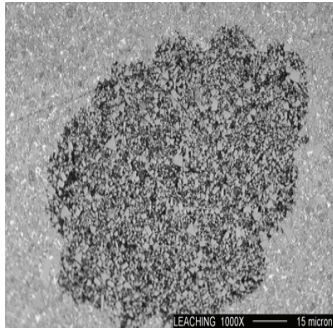
General Carbide not only possesses the equipment but also the knowledge and expertise to properly machine, grind, assemble and dye penetrant check all assemblies.

To ensure the highest metallurgical quality, General Carbide processes all carbide grades in sinter-HIP furnaces.

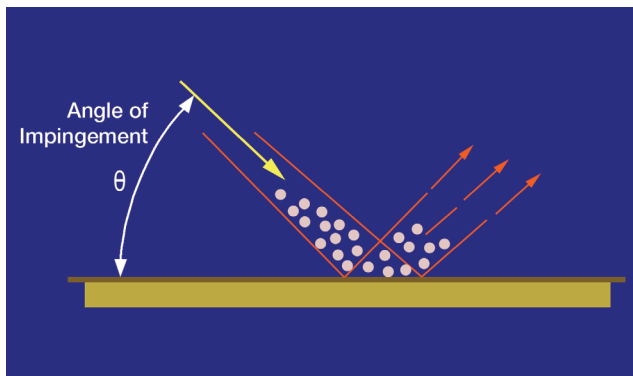




The Metallurgy Behind the Solution



The photomicrographs show how the surface appears when leaching occurs and a side view of the remaining skeletal structure.



Erosion is the degradation of the material surface due to mechanical action by impinging liquid, abrasive slurry or particles suspended in fast flowing liquid, gas or droplets.



Corrosion Resistance

Corrosion of cemented carbide is usually referred to as leaching, which is the removal of the binder metal phase leaving the grains “uncemented”. The skeletal structure will easily abrade away exposing more surface area to be affected by leaching.

General Carbide grade formulations such as the **Ni-Series**, **CR** and **CT grades** have enhanced corrosion-resistant additives that effectively resist this leaching action and allow the material to perform in the highly corrosive environments that straight tungsten carbide and cobalt (WC- Co) grades could not withstand.

Erosion Resistance

High speed particle impingement can cause severe abrasion of cemented carbide, especially in coarser grain carbide formulations where the larger grains are “blasted” out of the microstructure, leaving deep channels or dimples and smooth, rounded edges.

A finer grain structure and lower binder content is needed to resist the effects of erosive wear and General Carbide offers several grades to withstand this attack such as **GC-010** and **GC-206**.

Many times a combination of erosion and corrosion acts to cause premature wear on valve components. **GC-010CR** is used in severe service valve applications where both types of wear exist. **GC-010CR** and **GC-813CT** can extend the life of critical components in steam valves, severe service oil/gas valves and other severe service flow control and fluid handling devices.

