Wear and corrosion resistant components for industrial use
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YOUR WEAR PARTS SOLUTIONS

Hyperion Materials & Technologies is an engineering company with more than six decades of experience in the development and manufacturing of innovative cemented carbides, diamonds, and cubic boron nitrides. In addition to innovative materials, Hyperion offers our extensive knowledge, unique services, and application development capabilities to support our customers’ competitive needs.

Our Commitment

We believe in partnering with our customers, and we focus on delivering effective and innovative solutions that help you meet the dynamic demands of your market. As a fully integrated supplier, we manage the full manufacturing life cycle of our products. Managing the entire process ensures that our products are of the highest quality - every time.

Hyperion’s technical expertise and global manufacturing facilities are a foundation from which a network of local sales and customer service teams support our customers in the development of effective solutions.

All Hyperion facilities have received ISO 9001:2015, ISO 14001:2015, and OHSAS 18001:2007 certification. In addition, our manufacturing facility in Barcelona also has IATF 16949:2016 certification and our manufacturing facility in Epinouze, France has EN 9100:2016 certification.
Hyperion Materials & Technologies has over 60 years of experience in the development, production, and application of cemented carbide wear components. We offer tailor-made wear resistant components, tailored services, and application development expertise to support our customers’ competitive needs. Our full line of wear components are your solutions for wear parts needs in industries from automotive to medical to oil & gas.
Hyperion cemented carbide components, thanks to our carbide properties of high stiffness and low thermal expansion coefficient, can work in demanding applications with pressures up to 2,500 bar, such as in injection systems.
Cemented carbide is one of the most successful composite engineering materials ever produced. Cemented carbide’s unique combination of strength, hardness, and toughness satisfies the most demanding applications. Hyperion Materials & Technologies has been a leader in the cemented carbide industry for over 60 years.

A key feature of the cemented carbide is the potential to vary its composition so that the resulting physical and chemical properties ensure maximum resistance to wear, deformation, fracture, corrosion, and oxidation. In addition, the wide variety of shapes and sizes that can be produced using modern powder metallurgical processing offers tremendous scope to design cost-effective solutions to many of the problems of component wear and failure encountered in both the engineering and domestic environment.

The most commonly used materials are shown schematically relative to their hardness and toughness properties. Polycrystalline diamond (PCD) is the hardest of all, followed by polycrystalline cubic boron nitride (PCBN), and ceramics (Al₂O₃, SiC, SIALON, etc.). The super-hard materials all suffer from lower toughness and poor resistance to sudden fracture. The cemented carbides have a unique combination of high hardness and good toughness within a wide range and thus constitute the most versatile hard materials group for engineering and tooling applications.

Hyperion’s cemented carbides and their properties can be customized by changing the binder content and tungsten carbide to achieve the highest resistance to wear, fracture, heat, corrosion, and oxidation.

For some applications where component design or manufacturing is challenging, cemented carbide can be assembled into a base material by means of press fitting, shrink fitting, brazing, and gluing.

Hyperion is a world leader in cemented carbide. By involving us in the early development stages, we can help you select the best material for your application and optimize the design of your component to improve the weight, efficiency, and cost.
CEMENTED CARBIDE
Comparison to Other Materials

General comparison of cemented carbide grades used for wear parts vs steel:

<table>
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<th></th>
<th>Density (g/cm³)</th>
<th>Hardness (HV30) (HRA)</th>
<th>Compressive Strength (MPa)</th>
<th>Fracture Toughness K1C (MN/m²)</th>
<th>Abrasion Resistance (b) (mm³)</th>
<th>Young’s Modulus (GPa)</th>
<th>Thermal Expansion (10⁻⁶/°C)</th>
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<tr>
<td>Cemented carbide</td>
<td>13 - 15.5 (a)</td>
<td>900 - 2200 (83.5 - 94)</td>
<td>3000 - 8000</td>
<td>7 - 25</td>
<td>7 - 120</td>
<td>430 - 690</td>
<td>4.8 - 6</td>
</tr>
<tr>
<td>Medium carbon steels (AISI 1045)</td>
<td>7.8 - 7.9</td>
<td>170 - 200 (converted)</td>
<td>585 - 600</td>
<td>12 - 90</td>
<td>206</td>
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(a) Titanium carbonitride grade has a density of 5 to 6 g/cm³.
(b) Volume loss in mm³ according ASTM B611 Abrasion wear resistance Fargo. Wet in slurry.

Comparison of cemented carbide properties with those of other materials:
Hyperion’s cemented carbide provide longer wear life and increased flow control accuracy.
CEMENTED CARBIDE
Corrosion Resistant Grades

Conventional cobalt bonded cemented carbides can be used in many applications facing extreme wear or high mechanical stress, but they offer limited corrosion resistance in working conditions where there are severe abrasive or corrosive requirements. Generally, straight WC-Co grades are resistant to corrosion down to pH 7.

In most corrosion-wear resistance situations, nickel (Ni) bonded cemented carbide grades that are resistant down to pH 2 to 3 are better choices. For applications with pH down to 1, alloyed TiC-Ni is a solution, but it is more brittle than WC-Co or WC-Ni grades.

Hyperion Materials & Technologies’ expertise gained over more than 60 years of developing corrosion resistant carbide grades gives us the unique ability to partner with you to select the optimum cemented carbide grade.

In addition to corrosion resistant grades, Hyperion offers cemented carbide grades that are compliant with certifications for food and pharmaceutical manufacturing processes. This includes the following:
- FDA
- EC 1935/2004
- USP 87.
One of the primary challenges associated with handling fluids is service life of the fluid handling and flow control components. Selection of component materials suitable for each application has a crucial role to play. Hyperion cemented carbide products provide outstanding material performance in corrosive and abrasive environments and help to increase reliability by reducing downtime due to material failure.

**Segments**

- Compressors
- Homogenizers
- Pumps and mechanical seals
- Separation (decanters and centrifuges)
- Spray systems.

**Applications**

- Water supply, wastewater pumping, and water treatment
- Food and liquid processing
- Pharmaceutical, chemical, and petrochemical processing
- Industrial fluids cleaning and treatment
- Mining and mineral processing
- Oil and gas extraction.
FLUID HANDLING, FOOD PROCESSING
Pump and Mechanical Seal Parts

Hyperion Products
- Bushings
- Plungers
- Seal rings.

Benefits
- Reduced maintenance costs as seal faces maintain flatness under high loads thus minimizing leakage due to the high mechanical strengths and stiffnesses of Hyperion’s specialty carbides
- Excellent material performance in water/food applications with Hyperion’s unique selection of alloyed binder grades
- Easy to assemble and resistant to handling wear
- Reliable and consistent material thanks to the more than 60 years of experience in developing cemented carbide grades for the pump industry
- Reduced delivery time resulting from Hyperion’s global distribution centers.

Solutions
- Complex shaped rings from small to large sizes
- FDA, EC 1935/2004, and USP 87 compliant materials
- Wide range of finishes from blank to ground:
  - Solid, press/shrink-fitted, and brazed
  - Grinding, polishing, and electrical discharge machining (EDM)
  - Laser groove pattern to minimize leakage.

Hyperion Products
www.hyperionmt.com
FLUID HANDLING, FOOD PROCESSING
Decanter and Centrifuge Parts

Hyperion Products
- Feed/discharge bushings
- Inserts
- Nozzles
- Sleeves
- Tiles
- Wear plates and wear liners.

Solutions
- Complex wear plates and liners
- Inner diameters below 1 mm for nozzles
- Tiles can be supplied as solid, brazed, or coated
- Materials compliant with EC 1935/2004 and FDA requirements.

Benefits
- Long service life for wetted parts thanks to the outstanding wear resistance of Hyperion’s cemented carbides
- Improved performance when working with abrasive media.

www.hyperionmt.com
FLUID HANDLING, FOOD PROCESSING
Homogenizer Components

Hyperion Products
- Discs
- Pistons/valves
- Seats.

Solutions
- Materials compliant with FDA requirements
- High corrosion-resistant tungsten carbides.

Benefits
- Efficiency of the valve gap can be maintained due to the high stiffnesses and low expansion coefficients of Hyperion’s cemented carbides
- Extended operation with abrasive products and at high pressures and temperatures.

www.hyperionmt.com
FLUID HANDLING, FOOD PROCESSING

Spray Systems

Hyperion Products
- Funnel shapes
- Nozzles
- Orifice inserts
- Swirl chamber designs.

Solutions
- Materials with hardness up to 2000 HV30 / 94 Rockwell
- Versimax™ - a silicon carbide and polycrystalline diamond (PCD) composite.

Benefits
- A stable and homogeneous spray pattern/angle thanks to the high wear and abrasion resistance properties of Hyperion’s cemented carbides
- Reliable performance and extended working life.
Hyperion cemented carbide burs increase the lifespan by reducing the risk of breakage due to the fine grain sizes in our cemented carbides.
MEDICAL
Dental Burs

Hyperion Products
- Blanks products
- Pellets
- Shank types FG and HP.

Applications
- Surgical procedures
- Laboratory manufacturing capabilities.

Benefits
- Reliable and consistent products resulting from Hyperion’s experience in developing cemented carbide grades for the medical industry
- Polished and ground finishes reduce the need for further manufacturing
- Reduced delivery time resulting from Hyperion’s global distribution centers
- Material knowledge of metal cutting applications.

www.hyperionmt.com
Hydrogen Products
- Bearings
- Bushings
- Pistons
- Rollers
- Shafts
- Vane pump bodies
- Wear pads.

Applications
- Helicopter rotors
- Aircraft engines
- Aircraft air conditioning systems
- Aircraft control systems.

Benefits
- Reliability resulting from manufacturing according to EN 9100:2016 and NADCAP systems (for some processes)
- Long service life over repetitive runs due to the high wear and abrasion resistances and high stiffnesses and low thermal expansion coefficients of Hydrogen’s cemented carbides
- Application development expertise gained over 30 years of experience in the aerospace industry.

www.hydrogenmt.com
ENGINEERED COMPONENTS
Automotive Components

Hyperion Products
- Actuators
- Bushings
- Needles
- Pins
- Valve balls
- Wear plates.

Applications
- Injector components
- High pressure pumps
- Valve trains
- Pumps
- Turbochargers.

Benefits
- Accuracy of the application by maintaining size and shape tolerance of microns without deformation, even under heavy loads and high temperatures, thanks to combination of its high stiffness and low thermal expansion coefficient
- Long service life over repetitive runs due to the high wear and abrasion resistances of Hyperion’s cemented carbides
- Reliability resulting from manufacturing according to IATF 16949:2016 systems (Barcelona).

www.hyperionmt.com
FORMING TOOLS
Fastener Die Blanks

Hyperion Products
- Die blanks tools
- Cemented carbide grades with hardness of HV30 900 to 1600.

Applications
- Cold heading processes
- Fastener manufacturing for construction, general, automotive, and aerospace industries.

Benefits
- Dependable cemented carbides with fracture toughnesses up to $K_{IC}$ 25 for heading and nut forming
- Long wearing cemented carbide grades that meet industry requirements for extrusion applications
- Higher yields resulting from Hyperion’s quality cemented carbides
- Higher output with tailor-made tolerance options.
FORMING TOOLS
Stamping Tool Blanks

Hyperion Products
- Blocks
- Rectangular plates
- Ultrafine to medium grain size grades
- Cemented carbide grades with hardness of HV30 1100 to 1700.

Applications
- Stainless steel processing
- Films/thin sheet metals
- Electronics stamping
- Abrasive materials
- General purpose.

Benefits
- High wear resistance for applications demanding sharp edge profiles
- Higher yields due to Hyperion’s controlled manufacturing processes creating cemented carbides with controlled grain sizes.

www.hyperionmt.com
CONSTRUCTION
Roof Tile Tooling

Hyperion Products
- Cheek plates
- Lock blocks
- Pusher tips
- Rollers
- Slippers.

Applications
- Complete roller supply
- Re-servicing and re-profiling of rollers.

Benefits
- Wear life increase of 40 to 90% resulting in less maintenance downtime and higher productivity
- Superior cemented carbide grades suitable for aggressive and high wear requirements.

www.hyperionmt.com
TIPS COMPONENTS

Hyperion Products
- Looper tips
- Tiles.

Applications
- Decanters
- Textiles
- Agriculture.

Benefits
- Reduced maintenance downtime where a long efficiency is required; for example, cutting related applications, due to high accuracies in sizes and shapes
- High accuracy on tolerances due to low thermal expansion coefficients
- Ready-to-braze components thanks to the wettability of cemented carbide.
BALLS

Hyperion Products
- Blanks
- Nickel coated balls.

Applications
- Bearings
- Valve balls
- Metrology.

Benefits
- High wear resistance
- Easy brazeability and welding using nickel coated balls.

www.hyperionmt.com
Versimax is Hyperion Materials & Technologies’ silicon carbide bonded polycrystalline diamond (PCD) composite with superior wear resistance and high strength and high temperature performance. Versimax has hardness, strength, and toughness approaching that of Co-sintered PCD but provides superior thermal stability. The ceramic bonded composite is impervious to most corrosives.

**Hyperion Products**
- Nozzles
- Grinding centers
- Dressing tools
- Wire bundling
- Tools with simple and complicated geometries
- Sizes available as large as 35 mm diameter and 35 mm overall thickness.

**Applications**
- Needs requiring thermal stability up to 1400°C, as Versimax does not contain the interstitial Co catalyst present in sintered PCD
- Needs requiring strength after high temperature exposure, as Versimax can retain 90% of its strength unlike PCD which cracks over 700°C
- Enhanced properties: excellent abrasion resistance and electrical conductivity.

*Comparison of wear on Versimax and boron carbide nozzles run for three months in an abrasive slurry atomizer. The boron carbide nozzle needs to be replaced while the Versimax is like new.*

www.hyperionmt.com
Hyperion Materials & Technologies has a foundation of pioneering research and development. We partner with our customers to create innovative technologies and materials solutions. Contact your Hyperion sales person to discuss the process for finding solutions to your wear parts needs:

- Develop tailored solutions to fit your needs
- Respond to market changes and trends
- Use of dedicated state-of-the-art laboratories
- Use of modeling center to simulate both the behavior of materials and components.

www.hyperionmt.com
Recycling used carbide is a critical activity, and Hyperion is a market leader. Hyperion Materials & Technologies, through our Carbide Recycling Program, purchases used carbide tools and products from our customers in order to convert them back into usable raw materials for future production. We use a controlled, certified chemical recycling process that ensures these “new” materials are identical to materials produced from mined ore.

**Why Recycle?**
Recycling creates several “win-win” situations for Hyperion and our customers.

**Customer Solution**
This is a customer-focused offering. We provide an easy-to-use service and guarantee that your cemented carbide is recycled in an environmentally friendly manner. Our offer prices are competitive, and transportation to the recycling facility is arranged and paid for.

**Corporate Responsibility**
Hyperion is committed to sustainability, and recycling is a great example of how we are reducing the company’s environmental footprint. Manufacturing new cemented carbide products from recycled material uses up to 70% less energy and emits up to 40% less carbon dioxide compared to using cemented carbide extracted from ore.

**Sustainable Supply**
Tungsten is a rare element. Consider that aluminum, another rare element, makes up about 8% of the world’s crust while tungsten accounts for less than 0.0001%! This tiny amount is also unevenly distributed across the globe, with 60 to 70% of the world’s known reserves in China. Thus, without recycling, the world’s tungsten supply is dependent on a small amount of ore from one country.

Please contact recycling@hyperionmt.com or your sales agent for more information.

www.hyperionmt.com