WEAR PARTS
HIGH PERFORMANCE SOLUTIONS FOR YOUR INDUSTRY
## WEAR PARTS
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SANDVIK HYPERION

A global, full-line provider of innovative cemented carbide, diamond and cubic boron nitride solutions. We enable our customers to improve business performance with effective and wear-resistant tools, applications and components in hard and super-hard materials.

OUR COMMITMENT

We believe in working as a business partner and we focus on delivering effective and innovative solutions that help you meet the dynamic demands of market. Our fully-integrated process, managing the entire process from cemented carbide or diamond powder to finished products or blanks, helps us on the continuous improvement of our service and quality performance.

Our worldwide footprint enables us to support you with a local network of sales and engineers that can find the best custom solution to your needs.

All Sandvik Hyperion facilities are approved to ISO 9001, ISO 14001, OHSAS 18001 standards and also we are approved to ISO TS 16949 and ISO 9100 standards.
WEAR PARTS

Efficient performance is key for most of industries. On top of material behavior, knowledge of application and a close team work play also an important role to give a better service for your products.

WEAR COMPONENTS FOR SEVERAL INDUSTRIES

Sandvik Hyperion offers tailor made wear resistant components, tailored services and application development expertise to support our customers’ competitive needs.

We have a wide experience in the development, production and application of cemented carbide wear components for several industries.
CEMENTED CARBIDE
A UNIQUE MATERIAL FOR UNIQUE NEEDS

Cemented carbide is one of the most successful composite engineering materials ever produced. Its unique combination of strength, hardness and toughness satisfies the most demanding applications. Cemented carbide is a fully dense material consisting of hard carbide particles bonded together by a metallic binder.

Cemented carbide can be harder than the hardest steel, but yet remain tougher than ceramics.

Grade material and its properties can be customized by changing the binder content and tungsten carbide to achieve highest resistance to wear, fracture, heat, corrosion, and oxidation.

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

Sandvik Hyperion is a world leader in cemented carbide and can help you select the best material for your application and optimize the design of your component to improve the weight, efficiency and cost by involving us in the early development stages.
CEMENTED CARBIDE
A UNIQUE MATERIAL FOR UNIQUE NEEDS

Comparison of main properties of carbide grades used for wear parts vs steel:

<table>
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<th>Density (g/cm³)</th>
<th>Hardness (HV30) (HRA)</th>
<th>Compressive strength (MPa)</th>
<th>Fracture toughness K1C (MN/m²/2)</th>
<th>Abrasion resistance a) (mm³)</th>
<th>Young’s modulus (GPa)</th>
<th>Thermal expansion (10⁻⁶/°C)</th>
</tr>
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<tr>
<td>Cemented carbide</td>
<td>13-15.5 (1)</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>
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<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>
<td>11-15</td>
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(1) Titanium carbonitride grade has a density of 5-6 g/cm³
(2) Volume loss in mm³ according ASTM B611 Abrasion wear resistance Fargo. Wet in slurry

Comparison of main properties with other materials:
Conventional cobalt bonded cemented carbides can be used in many applications facing heavy problems of wear or high mechanical stress, but they have a limited corrosion resistance for working conditions under severe abrasive or corrosive requirements. As a general rule, straight WC-Co grades are resistant to corrosion down to pH7.

In most corrosion-wear resistance situations, the better choice is a WC-Ni grade which is resistant down to pH 2-3. For applications with pH down to 1, alloyed TiC-Ni is a solution, but compared to WC-Co grades or WC-Ni it is more brittle.

Sandvik Hyperion’s expertise of more than 50 years developing corrosion carbide grades can support you to select the optimum cemented carbide grade within our corrosion resistant portfolio.

In addition to corrosion resistance, Sandvik Hyperion can provide several grades which are compliant with certifications related to food manufacturing process and similar processes. This includes regulations as follows:
- FDA
- EC1935/2004
- USP87
PRODUCTS
One of the main challenges with handling fluids is to achieve a long-lasting function. For that purpose, the selection of the highest standard material for each application has a crucial role to play.

Sandvik 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
• Pumps and Mechanical Seals
• Compressors
• Separation (decanter & centrifuges)
• Homogenizers
• Spray systems

APPLICATIONS
• Water supply, wastewater pumping, water treatment.
• Food and Liquid processing.
• Pharmaceutical, chemical, and petrochemical processing.
• Industrial fluids cleaning and treatment.
• Mining and Mineral processing.
• Oil & gas extraction.
FLUID HANDLING, FOOD PROCESSING
PUMPS AND MECHANICAL SEALS PARTS

PRODUCTS
• Seal Rings
• Bushings
• Plungers

SOLUTIONS
• Complex shaped rings from small to large sizes.
• Wide range of finish from blank to ground
  - Solid, press/shrink-fitted, brazed.
  - Grinding, Polishing, EDM.
  - Laser groove pattern to minimize leakage.

BENEFITS
• Lower maintenance costs as faces keep flat under high load minimizing the leakage thanks to the high mechanical strength and stiffness.
• Excellent material performance in water/food applications with alloyed binder grade range
• Easy to assemble and resistant to handling
• Reliability/consistency/material thanks to the more than 50 years’ experience of developing cemented carbide grades to pump industry.
• Developing cemented carbide grades to pump industry.
• Faster reaction to market by working with consignment stocks/VMIs.
FLUID HANDLING, FOOD PROCESSING
DECANTERS & CENTRIFUGES PARTS

PRODUCTS
• Wear plates and wear liners
• Tiles
• Feed/discharge bushings
• Sleeves
• Nozzles
• Inserts

SOLUTIONS
• Complex wear plates and liners.
• Inner diameter below 1mm for nozzles.
• Tiles can be supplied as solid, brazed or coated.
• Materials compliant with EC1935/2004 and FDA.

BENEFITS
• Long service life for wetted parts thanks to wear resistant properties.
• Improved performance when working with abrasive media.
FLUID HANDLING, FOOD PROCESSING
HOMOGENIZERS COMPONENTS

PRODUCTS
• Seat
• Disc
• Piston/Valve

SOLUTIONS
• Materials with FDA compliant materials.
• High corrosion-resistant tungsten carbides.

BENEFITS
• Controlled and a stable product as efficiency of the valve gap can be maintained thanks to the high stiffness and low expansion coefficient.
• Extended operation with abrasive products and high pressures and temperatures.
FLUID HANDLING, FOOD PROCESSING
NOZZLES

PRODUCTS
• Nozzles
• Swirl chamber design
• Orifice inserts
• Funnel shape

SOLUTIONS
• Material hardness up to 2000 HV30 / 94 Rockwell.
• Other harder solutions: Versimax

BENEFITS
• A stable and homogenous spray pattern/angle thanks to the high wear and abrasion resistance properties.
• Reliable performance and extended working life.
**PRODUCTS**
- Blanks products
- Shank type FG, HP
- Pellets

**APPLICATIONS**
- Surgical procedures
- Laboratory manufacturing

**BENEFITS**
- Product reliability with wide range of carbide grades used in medical industry.
- Reduced further manufacturing process with ground products.
- Flexible supply thanks to global footprint and stocks solutions.
- Material knowledge of metal cutting applications.
ENGINEERED COMPONENTS
AEROSPACE

PRODUCTS
• Bearings
• Vane pump body
• Shafts
• Pistons
• Rollers
• Wear Pads
• Bushings

APPLICATIONS
• Helicopter rotors
• Aircraft engines
• Aircraft air conditioning system
• Aircraft control system

BENEFITS
• Reliability thanks to high manufacturing quality processes according EN-9100 and NADCAP for some processes.
• Long service life product under repetitive runs thanks to its high wear and abrasion resistance and to high stiffness and low thermal expansion coefficient.
• Application development thanks to long experience in the industry since 80’s.
ENGINEERED COMPONENTS
AUTOMOTIVE

PRODUCTS
• Wear plates
• Needles
• Bushings
• Pins
• Valve balls
• Actuators

APPLICATIONS
• Injectors components
• High pressure pump
• Valve train
• 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 product under repetitive runs thanks to its high wear and abrasion resistance.
• Reliability thanks to high manufacturing quality processes according ISO TS 16949.
FORMING TOOLS
FASTENER DIE BLANKS

PRODUCTS
• Die blanks tools
• Grades with HV30 900 to 1600

APPLICATIONS
• Cold heading process
• Fastener manufacturing for construction, general industry, automotive, aerospace.

BENEFITS
• Dependable cemented carbide solutions for heading and nut forming thanks to high fracture toughness up to $K_{1c}$ 25.
• Long wearing grades that meet the industry requirements for extrusion applications.
• Higher yield thanks to material quality.
• Higher output with tailor made tolerance options.
FORMING TOOLS
STAMPING BLOCKS

PRODUCTS
- Blocks
- Rectangular plates
- Ultrafine to medium grain size grades
- Grades with HV30 900 to 1700

APPLICATIONS
- Stainless steel processing
- Films/thin sheet metal
- Electronics stamping
- Abrasive material
- General purpose

BENEFITS
- High wear resistance for applications demanding sharp edge profiles.
- Higher yield due to no chips during usage thanks to controlled carbide grain size manufacturing process.
CONSTRUCTION
ROOF TOOLING

PRODUCTS
• Roller
• Slipper
• Lock block
• Cheek plates
• Pusher tips

SOLUTIONS
• Complete roller supply
• Reservicing & reprofiling of rollers

BENEFITS
• Improved wear life (+40 to 90%) resulting in less maintenance downtime and higher productivity.
• Superior grades suitable for the aggressive and high wear requirements.
PRODUCTS
- Tiles
- Looper tips

APPLICATIONS
- Decanters
- Textile
- Agriculture

BENEFITS
- Reduced maintenance downtime where a long efficiency is required, for example cutting related applications, due to high accuracy in size and shape.
- High accuracy on tolerances due to low thermal expansion coefficient.
- Ready to braze components thanks to wetability of cemented carbide.
BALLS

PRODUCTS
• Blanks
• Nickel coated balls

APPLICATIONS
• Bearings
• Valve balls
• Metrology

BENEFITS
• High wear resistance.
• Easy brazeability and welding using nickel coated balls.
Versimax is a silicon carbide bonded diamond composite with superior wear resistance, 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.

**PRODUCTS**
- Nozzles
- Grinding center
- Dressing tool
- Wire bundling
- Tools, simple and complicated geometries
- Available as large as 35 mm diameter and 38mm overall thickness

**BENEFITS**
- Thermal stability up to temperatures of 1200°C as Versimax does not contain the interstitial Co catalyst present in sintered PCD.
- Versimax can retain 90% of its strength after high temperature exposure, unlike PCD which cracks over 700°C.
- Enhanced properties: excellent abrasion resistance, electrical conductivity.

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

• Develop tailored solutions to fit your needs.
• Response to market changes and trends.
• Dedicated state of the art laboratories.
• Use modelling centre to simulate both behaviour of material and components.
GLOBAL SOLUTIONS RECYCLING PROGRAM

Recycling used cemented carbide is a critical activity and we as industry leaders are helping to diminish our dependency on tungsten, a natural resource. Sandvik Hyperion purchases used cemented 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?
The program is based on four core objectives. Recycling creates several “win-win” situations for Sandvik 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 in the market and transportation to the recycling facility is arranged and paid for.

CORPORATE RESPONSIBILITY
Sandvik 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.

STRATEGIC 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 60-70% 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.

COST CONTROL
Creating a balance between recycling and mining sources leads to more predictability and stability in raw material costs. If one market fluctuates up or down significantly, the overall impact is minimized due to the other market’s influence. This is helpful to Sandvik and our customers.