Wear Applications



Your trusted partner for wear solutions



TABLE OF CONTENTS

HYPERION MATERIALS & TECHNOLOGIES	3
OUR HISTORY AND ACHIEVEMENTS	4
HYPERION - YOUR TRUSTED PARTNER FOR WEAR SOLUTIONS	5
OUR PARTNERSHIP / YOUR EXPERIENCE	6
HYPERION APPLICATION SPECIFIC ENGINEERED SOLUTIONS	7
HYPERION HIGH PERFORMANCE MATERIALS	10
HYPERION DIAMOND COATING SOLUTIONS	12
RESEARCH & DEVELOPMENT	14
GLOBAL SOLUTIONS	15

ABOUT US

Hyperion Materials & Technologies is over 1,600 people dedicated to creating solutions for your hard and super-hard material needs through partnership, innovation, and invention. Our exclusive cemented carbide, diamond, and cubic boron nitride (CBN) materials are the base for more than 50,000 products in our portfolio.

OUR EXPERTISE

Our extensive knowledge about hard and super-hard materials gained through more than 6 decades of experience and total control of our vertically integrated supply chain give us the unique ability to partner with our customers in the development of effective solutions specific for each need.

OUR DNA

Hyperion is born out of GE, Diamond Innovations, and Sandvik Hard Materials. Heavy investment in pioneering research & development is our foundation, and partnership with our customers to create innovative technologies and materials solutions are the building blocks for our continued growth.



GLOBAL PRESENCE

In additon to the production and customer service locations shown on the map, we have sales engineers in over 20 countries local to you and available to partner in development of your wear solutions needs





2020 Hyperion Materials & Te

Hyperion Materials & Technologies acquires AFC Hartmetall.

2013

Sandvik Hyperion forms through the merger of Sandvik Hard Materials and Diamond Innovations, which had been GE Superabrasives until 2004.



1983

Sandvik establishes Sandvik Hard Materials division.

1969

GE Superabrasives introduces its first cubic boron nitride (CBN) products.

Hyperion Materials & Technologies forms as an independent company when KKR acquires Sandvik's hard and super-hard materials business.

2018

2004

Diamond Innovations is established from what was previously the GE Superabrasives business.

1982

Sandvik introduces H10F tungsten carbide grade.

1972

GE Superabrasives introduces its first polycrystalline diamond (PCD) and polycrystalline cubic boron nitride (PCBN) products.

1955

GE Superabrasives invents diamond synthesis.

HYPERION - YOUR TRUSTED PARTNER FOR WEAR SOLUTIONS

At Hyperion Materials & Technologies, we manufacture tailor-made wear resistant components and offer tailored services and application development expertise for all of your wear parts needs. We have a wide range of experience in the development, production, and application of cemented carbide (also known as solid carbide or tungsten carbide (WC)) and diamond wear components to improve the performance, productivity, and lifetime of your products.

Hyperion's real strength comes from our engineering expertise. We partner with you to create a solution for your wear application need.

INNOVATIVE PARTNERSHIPS ARE A WAY OF LIFE

Application Mapping

With such a wide range of materials and manufacturing capabilities, we find it best to approach products from the perspective of your end application. Studying the end application allows us to work together with customers to select a material grade, design the solution, and identify process improvements that might be needed. Hyperion believes that a high level of involvement from both the customer's team and our team is the key to increasing productivity and performance.

Teamwork

At Hyperion, a cross-functional team approaches each customer's requirements and provides their input to create the most effective solution. Our customers are in contact with specialists who have the knowledge and ability to give valuable support and make the right decision without any delay. This business model allows us to support our customers with flexibility and efficiency.

Support Network

Our global footprint makes us unique in this industry. In addition to our product specialists and technical experts, our local offices and production sites are also supported by a global supply network. This network links production facilities from around the globe to share information and, more importantly, provide backup supply if necessary. Keeping involved and in contact with our colleagues around the world is essential for success.

Efficient performance is key for most of industries. On top of material behavior, knowledge of application and a close teamwork play also an important role to help in your business growth.

Industries Supported

Hyperion's wear resistant products have positioned our customers to win in a wide range of industries:



OUR PARTNERSHIP / YOUR EXPERIENCE

Hyperion Materials & Technologies partners with a wide range of companies in the following industries. Hear what our customers are saying about us:

⁴⁶ Very good and open cooperation/communication between all functions, i.e., Production, Quality, Technical department, Commercial etc.⁹⁹

Purchaser at a Swedish pump manufacturer

⁴⁶ The people I have dealt with make it extremely enjoyable to continue from Hyperion.⁹⁹

Purchaser at American precision balls manufacturer

Very competent and attentive advice and support by salesperson."

Engineer at a German locking systems manufacturer

⁴⁶ We have a strong and respectful relationship which will continue to benefit both companies into the future. ⁹⁹

Production employee at Australian sugar crane mill

[•] I have a long-time relationship with the people working for Hyperion and I really appreciate the cooperation we have. Hyperion is one of my preferred business partners.^{**}

Purchaser at a Danish pump manufacturer

"Hyperion has a great team."

CEO at an American precision parts manufacturer

Service is always reliable and do their best to accommodate any requests.

Engineer at Australian Turf/grass cutting machinery manufacturer

⁴⁴ Thanks to the relationship built by the sales representative and to a design that no other carbide manufacturer has ever produced, we were able to produce a high-efficiency jet grouting system that today is a cutting-edge product.⁹⁹

R&D Manager at an Italian soil drilling equipment manufacturer

⁴⁴Efficient and professional in all dealings. Helpful and knowledgeable.⁹⁹

Employee at Australian mineral processing equipment manufacturer

⁴⁶ Product of Hyperion is a premium product and have good quality and services.

Purchaser at Indonesian special tool manufacturer

Your sales team has shown that they hear and are engaged."

Purchaser at American precision machining manufacturer

HYPERION APPLICATION SPECIFIC ENGINEERED SOLUTIONS

Four examples of successful partnerships with Hyperion Materials & Technologies' wear solutions team are presented here. Hyperion is ready to study any other application that requires wear protection in addition to the examples below.

SUCCESSFUL PARTNERSHIPS DENTAL

Hyperion Materials & Technologies has been partnering with the medical and pharmaceutical industries for several decades creating tailor-made solutions. Our hard materials make your manufacturing processes run longer and more efficiently. We manufacture solid blanks, cone and bullet shaped burs, and carbide tips and pellets, but have the expertise to develop tailor-made solutions for your needs.

- Cemented tungsten carbide grade H10F has been tested as non-cytotoxic according to EN ISO 10993-5:2009 for biological evaluation of medical devices, Part 5: in vitro tests
- Reliable and consistent products resulting from Hyperion's experience in developing cemented tungsten carbides for the medical industry
- Our benchmark cemented tungsten carbide grade H10F gives a long lifespan and reduced risk of breakage
- Polished and ground finishes reduce the need for further manufacturing
- Reduced delivery time resulting from Hyperion's global distribution centers
- Multiple manufacturing locations with nearly unlimited capacity.



SUCCESSFUL PARTNERSHIPS

STAMPING

Hyperion Materials & Technologies' engineers have the materials and production expertise to partner with you to solve your needs, from harder materials to uniquely designed shapes. We manufacture tools and components used by the electronics industry for producing IC lead frames, electronic connectors, LED supports, etc.

- Ultra-fine grades of cemented tungsten carbide provide exceptional performance of sharp edge profiles
- Sub-micron grades of cemented tungsten carbide exhibit lifetimes twice those of competitor's grade in electronic connector production
- High accuracy on tolerances due to low thermal expansion coefficients of our cemented tungsten carbides
- Multiple manufacturing locations with nearly unlimited capacity.



SUCCESSFUL PARTNERSHIPS

FLUID HANDLING

Whether you need to separate solids from liquids, homogenize fluids, or spray challenging liquids, Hyperion Materials & Technologies is the partner with your solutions. We manufacture a wide range of wear and corrosion resistant carbide grades that help increase reliability by reducing downtime due to material failure.

- Decanter and centrifuge parts wear plates, wear liners, tiles, and feed and discharge bushings
- Homogenizer components discs, pistons, valves, and seats
- Spray systems funnels, nozzles, orifice inserts, and swirl chambers designs.

- Cemented tungsten carbides compliant with FDA and EC 1935/2004 requirements
- Cemented tungsten carbide and Versimax[®] grades that provide extended operation with abrasive products and at high pressures and temperatures
- Cemented tungsten carbides with outstanding wear resistance provide long service life for wetted parts
- Multiple manufacturing locations with nearly unlimited capacity.



SUCCESSFUL PARTNERSHIPS

AEROSPACE

Reliability and wear resistance are critical in aerospace components. Hyperion Materials & Technologies manufactures parts for a wide range of aerospace needs:

- Helicopter rotors bearings for tail rotor, ball joints for links, and ball joint hinge for assembly for scissor
- Jet engines wear pads for blades contact points
- Fan motors blades for fan motors in air conditioning systems.

- Application development expertise gained over 30 years of experience in the aerospace industry
- Reliability resulting from manufacturing in accordance with EN 9100:2018 and AS 9100:2016
- Long service life over repetitive runs due to the high wear and abrasion resistances and high stiffnesses and low thermal expansion coefficients of Hyperion's cemented tungsten carbides
- Multiple manufacturing locations with nearly unlimited capacity.



HYPERION HIGH PERFORMANCE MATERIALS

ONE COMPANY, MANY MATERIALS, ALL YOUR SOLUTIONS

Did you know that while we are one company, we manufacture a range of hard and super-hard materials that are the solutions for your wear and corrosion resistant needs?

The equipment and tools you use face aggressive environments that often include corrosive, abrasive, and impacting elements, and therefore require components that withstand these harsh conditions. Hyperion Materials & Technologies manufactures a range of hard and super-hard materials that can be engineered so that the resulting physical and chemical properties ensure maximum resistance to wear, deformation, fracture, corrosion, and oxidation:

Cemented Carbide

Hyperion has the widest range of tungsten carbide grades in the industry. We serve a range of industries and have successfully created high performance solutions unique to each need. We have the expertise to tailor the chemical and physical properties of tungsten carbide to create a cemented carbide precisely for our customer's applications. For additional information about cemented carbide visit www.allaboutcementedcarbide.com.

Composite Diamond Coating

We offer advanced protection through our proprietary Composite Diamond Coating (CDC), which is a high performance thin film. It can be applied to any complex shape with no line of sight limitation.

Polycrystalline Diamond

Hyperion manufactures a vast selection of engineered polycrystalline diamond (PCD). We have the capability to cut PCD into almost any shape specific to your needs. We also have the ability to partner with you and develop unique solutions involving combinations of PCD and tungsten carbide.

Versimax®

Hyperion's patented Versimax is a ceramic-bonded diamond composite with exceptional wear resistance, mechanical strength, and high temperature performance. Versimax may be attached to tungsten carbide, metal, or ceramic substrates using a range of joining techniques.



HYPERION HIGH PERFORMANCE MATERIALS

MATERIALS COMPARISON

General comparison of cemented carbide grades and Versimax[®] used for wear parts vs steel:

	Density (g/cm³)	Hardness (HV30) [HRA]	Compressive Strength (MPa)	Fracture Toughness K1C (MN/m ^{3/2})	Abrasion Resistance ^(b) (mm³)	Young's Modulus (GPa)	Thermal Expansion (10 ⁻⁶ /°C)
Cemented carbide	13 - 15.5 ^(a)	900 - 2200 [83.5 - 94]	3000 - 8000	7 - 25	7 - 120	430 - 690	4.8 - 6
Versimax	3.4	3500 - 4000	5200	9.4	1.6 - 2.3	890	1.7
Medium carbon steels (AISI 1045)	7.8 - 7.9	170 - 200 (converted)	585 - 600	12 - 90	144 - 180	206	11 - 15

(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:

HARDNESS

Cemented carbide hardness increases with decreasing binder content and decreasing grain size. Carbide is much harder than steel.



YOUNG'S MODULUS

Cemented carbide has a high resistance to elastic (recoverable) deformation under load.



TOUGHNESS

Different cemented carbides show large differences in toughness behavior. Toughness increases with increasing binder content and with increased grain size.



COMPRESSIVE STRENGTH

One of the most important properties of cemented carbides is their extremely high compressive strength under uniaxial loads. Strength increases with decreasing binder content and decreasing grain size.



HYPERION DIAMOND COATING SOLUTIONS

COMPOSITE DIAMOND COATING

Hyperion Materials & Technologies offers a unique composite diamond coating (CDC) solution. Our proprietary CDC retains intricate details unlike competitor products where non-conforming layers do not retain the shape or detail of substrate. Our CDC is a hard metal alloy with fine particles of diamond dispersed throughout the metal matrix. It is the premier wear coating protection available and can be applied to any shape with no line of sight.







WEAR RESISTANCE SECOND TO NONE

As shown below, Hyperion's CDC exhibits wear resistance far exceeding that of steel and chrome and even carbides. Given the unique properties of CDC, many customers are able to change the base material of their parts to one that is less expensive, lighter, or easier to manufacture, thereby creating cost savings.



TABER WEAR RESULTS

5000 4500 4000 Wear Rate (Cubic Mils per Hour) 3500 3478 3000 2500 2000 1500 967 1000 500 350 44 1.26 0 C9, Cemented WC Plated Hard Chrome CDC, As Plated SiC Tool Steel, RC 62 Composite

YARN LINE ABRASIVE WEAR TEST RESULTS

HYPERION DIAMOND SOLUTIONS

VERSIMAX®

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 cobalt-sintered PCD but provides superior thermal stability. The ceramic bonded composite is impervious to most corrosives.

Proven Solutions

- 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. Please contact your Hyperion salesperson if you need solutions in other sizes.

Our Expertise

- Needs requiring thermal stability up to 1400°C, as Versimax does not contain the interstitial cobalt catalyst present in sintered PCD
- Needs requiring strength after high temperature exposure, as Versimax can retain 90% of its strength unlike PCD which cracks in temperatures 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.



GLOBAL SOLUTIONS



Hyperion Materials & Technologies has a foundation of heavy investment in pioneering research & development that continues today. We have extensive experience in selecting the hard material best suited for your application. We have two dedicated R&D centers for new developments: in Barcelona (Spain) for cemented carbide and in Worthington (USA) for diamond. Our customers benefit from our accumulated expertise and can leverage our ability to help them improve their manufacturing processes.

Contact your Hyperion salesperson to discuss the process to create innovative technologies and material solutions. We can partner with you to:

- Develop tailored solutions to fit your needs
- Respond to market changes and needs
- Conduct research in our dedicated state-of-the-art laboratories
- Model behavior of both materials and components in our modeling center.



Hyperion can help you improve the availability of parts that are critical to your business:

- Our global distribution centers provide you consistent local support and a secure distribution footprint
- Our salespeople can partner with you to propose optimized inventory and stock levels
- Our fully integrated supply chain, from carbide and diamond powders production to finished products, guarantees consistent service and quality.



Through our local customer service teams in 17 different countries, Hyperion directly serves almost 100 countries guaranteeing you the best in service.



Recycling used carbide is a critical activity, and Hyperion is a market leader. Through our Carbide Recycling Program, we purchase used carbide tools and products from our customers in order to convert them back into usable raw materials for future production. The use of recycled material minimizes the mining activity of nonrenewable resources, mainly tungsten ore.

We make recycling easy for you. Please visit our web site, contact your salesperson, or email recycling@hyperionmt.com for more information.







www.HyperionMT.com