



TENMAT

ADVANCED MATERIALS



WELD-ON TUNGSTEN CARBIDE WEAR PROTECTION TILES

EXCEPTIONAL

PEOPLE

At **TENMAT**, we strongly believe that it takes exceptional people to invent, design and create the outstanding products necessary to constantly exceed industry standards and meet the demands of our customers' challenging applications.

Our highly skilled workforce is essential to **TENMAT**'s success, and through significant investment in recruitment, training, and personal development we continue to strengthen our position as one of the leading developers and manufacturers of advanced materials and components.

PRODUCTS

TENMAT's diversified range of exceptional materials and components includes composite wear parts and bearing materials, high temperature resistant materials, engineering ceramics, hard metals, and passive fire protection solutions.



PERFORMANCE

As a result of **TENMAT**'s engineering expertise and strong tradition of innovation, many of our products are market leaders in terms of wear performance and extreme temperature resistance.

TENMAT's advanced materials combine high strength with excellent wear characteristics and durability, delivering exceptional performance in even the most demanding applications.

FEROBIDE

The extreme wear protection for extreme working environments.



Ferobide Technical Features and Benefits

Tungsten Carbide / Hardened Steel Composite Material

The all-in-one solution to diverse wear types

More Information on Pages 3 & 4



Agriculture

Improve Yields by Protecting Soil Engaging Points

Machinery works for longer at optimum working depth

More Information on Page 5



Industrial Processing

Increase Output with Longer Operational Periods

Sharper leading edges for processing of challenging media

More Information on Page 6



Earthmoving & Energy

Reduce Maintenance Costs by Protecting Machinery

Design profile of working tools protected

More Information on Page 7



Construction

Increase Time Between Maintenance Periods

Superior long-term protection against high abrasion and impact

More Information on Page 8



TECHNICAL ADVANTAGES

Key Features:

- High Wear Resistance
- Fully Weldable Tiles
- Excellent Impact Strength
- Superior Resistance to Chipping
- Resistant to Acidic Environments
- Material can be Cut to Shape
- 8+ Years of R&D and Field Tests



TENMAT's proprietary *FEROBIDE* formulation is a durable tungsten carbide composite material, which combines high levels of wear resistance and toughness with the ease and reliability of a weldable material. *FEROBIDE* outlives and outperforms conventional wear resistant materials under even the harshest of conditions.

FEROBIDE achieves this by using a hardened steel matrix to efficiently bind together hard tungsten carbide particles. This innovative wear protection material consists of high quality tungsten carbide, with a typical hardness of 1,500 HV.

FEROBIDE distinguishes itself* through its:

- Resistance to abrasion 8 times better than 500 HB hardened boron steels
- Resistance to abrasion 4-5 times better than chromium carbide overlay plates
- Resistance to abrasion 3 times better than cast white iron
- Superior resistance to impact due to its composite nature
- Simple installation through welding

Moreover, 3rd party testing in UK lime quarries proves that *FEROBIDE* enjoys a significantly better impact toughness over brazed tungsten carbide.

*Technical advantages confirmed via universal G65 abrasion testing, 3rd party field testing and in-house research.



**Weldable
Tungsten Carbide**



**Excellent
Abrasion Resistance**



**Superior
Impact Resistance**

CUSTOMER BENEFITS

Key Benefits:

- Greatly Improve Yields and Efficiency
- Significantly Reduce Downtime
- Work Longer Between Maintenance
- Boost Efficiency, Outputs, Yields
- Customise Each Tile to Fit Any Tool
- Keep Working Depth
- Greatly Increase Wear Part Lifetime
- Maintain Hardness of Metal Tools
- Weld Direct to Wear Zone
- Preserve Sharp Leading Edges

FEROBIDE leads the way as the extreme wear protection for extreme conditions.

FEROBIDE has proven itself to be the ideal material choice by:

- combining superior technical properties with user-friendliness,
- allowing users to work harder and for longer between maintenance periods,
- offering full protection to working tools against abrasion and impact wear,
- preserving the design profile of tools for longer, maintaining working depth.

Through its long life and superior wear protection properties, *FEROBIDE* increases working uptime. Maintenance and downtime are greatly reduced, whilst installation is quick. This results in maximum process outputs and yields from quarries to farms.

Further highlighting its ease-of-application, *FEROBIDE* is cut to shape and welded where needed using standard workshop equipment. This allows for quick installation anywhere on-site, and greatly reduces stock holding as a single tile can be easily used to solve wear problems across a wide range of tools - new or pre-used alike.

Welding *FEROBIDE* creates a minimal heat affected zone, and this avoids softening of tools through excessive heating. This is in stark contrast to intensive brazing practices. By maintaining the tool hardness, the abrasion resistance of the tool itself is protected.



AGRICULTURE

Applications:

- Cultivation Points
- Drill Opener Tines
- Plough Points
- Power Harrow Tines
- Bed Former Tines
- Subsoiler Legs and Wings
- Packer Roller Scrapers



FEROBIDE wear protection increases farm yields by resolving major limitations of conventional brazed tungsten carbides. All-purpose *FEROBIDE* tiles ensure soil-engaging-points keep optimum cultivation/seeding depth through the season.

FEROBIDE excels across all soil types, from highly abrasive and sandy conditions to rocky soils. It continues to perform even after 500HB steels have worn down and brazed tungsten carbide tiles have failed due to impact. *FEROBIDE* offers superior protection across all machines, from heavy duty subsoilers to high speed/high impact power harrows.

Downtime is greatly reduced as *FEROBIDE* reduces maintenance requirements, and no time is wasted as the tiles are very quickly welded onto points. Stock holding is reduced as one tile can be customised to fit any point shape.

FEROBIDE is welded with standard workshop equipment, applied by farmers and OEMs exactly where needed. This puts control in the hands of the user, tailoring protection to match the individual soil conditions and wear patterns.



INDUSTRIAL PROCESSING

Applications:

- Decanter Centrifuge Scrolls
- Screw Conveyor Scrolls
- Mixer Paddles
- Chain Transporter Flights
- Shredder Teeth
- Dredging Pipes, Pumps and Heads
- Exhauster Fan Blades



Only *FEROBIDE* offers both the total peace-of-mind alongside the full protection against impact/abrasion required in the demanding applications of materials handling. *FEROBIDE* is corrosion-free and avoids delamination *via* its strong welding attachment. This is how *FEROBIDE* distinguishes itself ahead of traditional materials.

Low-profile *FEROBIDE* tiles keep leading edges sharper for longer, made possible through their superior wear resistance and tight manufacturing tolerances.

An exclusive specification from a leading Swedish snow plough OEM highlights this. *FEROBIDE* edges increase plough blade lifetime by as much as 20 times. The sharp *FEROBIDE* edges work for 2,260 km at 40 mph over uneven, rocky asphalt and ice roads, working the entire 2 month season in Northern Sweden with only 15 mm wear.

FEROBIDE is trusted not only due to its superior resistance to impact/abrasion, but also for its versatility. The durable composite material withstands aggressive, corrosive, high-impact environments. This is in contrast to standard carbides, which do not offer corrosion resistance and chip easily.



EARTH MOVING & ENERGY

Applications:

- Oil Sand Processing Equipment
- Vertical Shaft Impact Crushers
- Drill Pipe Stabilizers
- Grizzly Bars
- Cuttings Processing
- Conveyor Belt Scrapers
- Pulverised Fuel Pipes
- Chute Linings



FEROBIDE offers the all-in-one solution to the difficulties experienced in the earthmoving and energy industries. By installing *FEROBIDE*, end-users maintain high efficiency through protecting the design profile of cutting edges for longer.

This is of high value for belt-cleaning scrapers. *FEROBIDE* has a very low friction coefficient and as such offers a superior cleaning edge whilst also preserving belts. This reduces costs on-site and means minimal wastage.

FEROBIDE is the ideal lining material due to its superior resistance to impact and abrasion. This has been proven over a 15 week 3rd party field test in a German iron ore plant. After the 15 week period, *FEROBIDE* tiles only show 1 mm wear whilst cast carbide plates show 8 mm. Thus, *FEROBIDE* is highly valued as a chute liner.

Welding *FEROBIDE* yields a stronger attachment than brazing, meaning it is not vulnerable to delamination. *FEROBIDE*'s high impact strength means it continues to guarantee efficient separation of desired material fractions even in the most demanding of conditions.



CONSTRUCTION

Applications:

- Tunnel Boring Machines
- Tamping Tines
- Ballast Ploughs
- Bucket Teeth
- Bucket Side Liners
- Scarifier Teeth
- Truck Flatbeds



FEROBIDE comes in various thicknesses to suit “low drag profile” requirements while it can meet the demands in the most aggressive environments.

The extreme durability of *FEROBIDE* was proven on Tunnel Boring Machines. Field testing at the Hallandsasen Rail Tunnel spanned 120 km, where Ferobide increases the lifetime of cutter-head protection by 6-7 times. *FEROBIDE* exhibited a total life of 26 months under extreme forces and high speed cutting through highly abrasive granite rock. In comparison, previous 500HB steel protection gave 2-5 month life.

The toughness of *FEROBIDE* allows for use in high-impact applications such as ballast tamping and scarifying, avoiding chipping.

FEROBIDE prolongs the life of excavator buckets when used on bucket teeth tips and as side protection. It offers a high-performing alternative to chocky bars, buttons and other casted parts.



QUALITY



TENMAT operates an ISO 9001:2008 Quality Management System for the design, development and manufacture of specialised high performance engineering materials and components.

Here at **TENMAT**, we have always made the quality and consistency of our products a top priority and are working continuously on exceeding our customers' expectations.

TENMAT's product quality is consistently monitored by our in-house quality control engineers and regularly tested and qualified by independent third party testing facilities and classification authorities.

In 2012 and 2013 **TENMAT's** commitment to the development of high quality products and materials was awarded with the prestigious Queen's Awards.



LEADERS IN INNOVATION

TENMAT is committed to the ongoing development of new products and solutions in the field of composite and engineering materials. This dedication has been recognised in 2012 and 2013 by receiving the highest official award in Great Britain, the prestigious Queen's Award for Enterprise in the categories Innovation and International Trade.

Custom Component Manufacture

TENMAT materials can be supplied as semi-finished products or, if required by the customer, our ISO 9001-2008 certified machine shop can produce fully machined items to specification.

Materials Expertise

With over 100 years of experience in Composite Engineering Materials, **TENMAT** offers customers information on material developments, characteristics, suitability and applications.

Technical Ingenuity

TENMAT has been proven to consistently produce industry leading advanced composites, developed in our in-house R&D Technical Laboratories.

Problem Solvers

The diverse range of high performance composite materials manufactured by **TENMAT** offers the engineer a wide array of solutions to improve wear resistance, withstand extreme temperatures, resist high impacts and survive in harsh, corrosive environments.

Component Design

If design services, drawings and fitting instructions are required, **TENMAT** works with customers in developing the most suitable solution to their particular problem.





FEROFORM **RAILKO** *FEROGLIDE* *FEROBIDE*

REFRAVER **REFEL** **ARCLEX**

FIREFLY **NITRASIL** **SINDANYO**

TENMAT is committed to the highest standards in customer service and our international staff is looking forward to assist you.

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