

TENMAT

ADVANCED MATERIALS



WEAR PARTS & BEARINGS

INNOVATION

TENMAT is a leading manufacturer of specialised, high performance engineering materials and components with over 100 years of experience.

SAFETY

TENMAT stands for innovation, safety-critical products, commitment to our customers and the latest quality standards worldwide.

SERVICE

QUALITY

A World of Materials

TENMAT's diversified product range includes composite wear parts and bearings, engineering ceramics, hard metals, high temperature resistant materials, passive fire protection solutions, and rotary vanes for pumps and compressors.

Commitment to Quality

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



ADVANCED MATERIALS

TENMAT's range of bearing materials include the world renowned composites FEROFORM®, FERONGLIDE™ and RAILKO™. **TENMAT** bearing materials are extremely versatile and uniquely suitable for the most demanding applications in the most arduous of environments.

FEROFORM



FEROFORM material grades are a range of proprietary **TENMAT** formulations, consisting of a friction-modified cured phenolic resin matrix with high performance fibre reinforcement.

FEROFORM grades are used as bearings in aggressive environments.

RAILKO

A **TENMAT** Brand



RAILKO bearings are high performance composite products made from a matrix of reinforced synthetic woven fibers which are impregnated with specially selected resins and friction modifiers.

RAILKO bearings excel in demanding rail, marine and industrial applications. **TENMAT** is the owner and sole manufacturer of RAILKO materials.

FERONGLIDE



FERONGLIDE bearings consist either of a PTFE fabric with strengthening fibers applied to a metal backing, or our innovative fabric-free design with special low friction coating.

FERONGLIDE bearings are typically used in high loads applications, like valves, hydro power equipment, lifting equipment, hydraulic pumps and many other applications.

FEROFORM

RAILKO
A **TENMAT** Brand

FERONGLIDE



MARINE

Key Features:

- Market-leading Wear Performance
- Significant Worldwide Stocks
- Doesn't Require Clean Water Systems
- Excellent Stability
- Shaft Friendly
- Approved by All Major Classification Societies



FEROFORM and RAILKO technical composite materials, exclusively manufactured by **TENMAT**, are widely recognised as the industry standard for demanding applications such as stern tube, rudder, and propeller bearings, deck equipment, steering gear and many other applications.

TENMAT bearings offer considerable benefits in terms of performance, price, reliability, design, ease of use and installation.

The innovative **TENMAT** FEROFORM and RAILKO material grades combine high strength with excellent wear resistance and durability, yielding high performance bearings for all types of service conditions, from the arctic to the tropics, from coastal waters to deep sea conditions. **TENMAT** bearings do not require clean water systems, and they perform with water lubrication as well as oil lubrication.

TENMAT marine bearings are proven not to support biofouling which can help avoid shaft damage due to organic growth on the bearing.

Applications:

- Rudder Bearings
- Stern Tube Bearings
- Tanker Pads
- Davit Bearings
- Hatch Cover Pads
- Cutter Head Bearings
- Steering Gear Bushes
- Bracket Bearings
- Stinger Roller Bearings
- Sheave Bushes
- Cargo Pump Bearings
- Deck Equipment Bearings





RAIL

Key Features:

- Protection Against Housing Ovalisation
- Excellent Impact and Vibration Absorption
- Lower Noise
- High Temperature Resistance
- Corrosion-free
- Zero Creep



TENMAT materials exhibit excellent wear resistance and long life even under the most arduous conditions with extreme temperature fluctuations and dusty environments.

FEROFORM F21, RAILKO NF21 and RAILKO NF22 are specified by all major transit authorities and railway companies in a variety of freight and passenger train cars, locomotives, metros, trams and light rail. RAILKO NF21 is specified for the European standardised UIC Y25 bogie family and other derivatives, including the Y33, Y39 and AM03 with full UIC approval.

FEROFORM and RAILKO materials are approved by all major Railway companies and are widely recognized as the industry standard for demanding applications within the railway industry. Since the 1980s RAILKO has supplied over 1 million side bearer liners and center pivot liners to railways worldwide.

Applications:

- Center Pivot Liners
- Side Bearer Liners
- Brake Linkage Bushes
- Friction Damper Bushes
- Suspension Bushes
- Secondary Suspensions
- Corridor & Face Plates
- Wear Plates
- Gangway Tread Plates & Stripes
- Axial Bushes





AUTOMOTIVE

Key Features:

- High Resistance to Abrasive Environments
- High Dimensional Stability
- Superior Protection from Wear
- Lower Noise Compared to Metal
- Corrosion-free
- Self-lubricating



TENMAT RAILKO self lubricating materials are used in cars and off road vehicles for applications including slip coats for glass run channels, pedal bushes, ball seats, suspension guides, steering column seals, and gear shift bushes.

RAILKO PV103 & RAILKO Xtra Glide slip coats have been specifically developed by **TENMAT** for the automotive industry to provide the contact surface for glass run channels. These innovative slip coats create a low friction surface that is durable and wear resistant.

Typically RAILKO PV103 is co-extruded onto blends of PP, EPDM (Ethylene Propylene Diene Monomer), and SEBS (Styrene Ethylene Butylene Styrene) to improve long-term performances of weather seals.

RAILKO PV80 is a self lubricating material with an acetal polymer base. It is injection molded to form precision components for the automotive industry and solves the problems of noise and friction that occur with conventional materials.

Applications:

- Slip Coats for Glass Run Channels
- Ball Joint Housings
- Steering Column Seals
- Gearshift Bushes
- Pedal Bushes
- Suspension Guides





HYDRO

Key Features:

- High Resistance to Abrasive Environments
- High Dimensional Stability
- Superior Protection from Wear
- Free from Stick-slip
- Corrosion-free
- Self-lubricating



The ability of **TENMAT** bearings to work in both dry and wet conditions without grease lubrication makes them the ideal choice for a wide variety of applications within the hydropower industry, such as Francis, Kaplan, and Pelton turbines and in associated mechanical equipment. FEROFORM and FEROGlide bearings have been providing reliable performance to the most prestigious water turbine manufacturers and end users worldwide for decades.

The inherent self-lubricating characteristics of FEROFORM and FEROGlide grades allow them to be used for all wicket gates in the upper, intermediate and lower positions, as well as in control linkages. **TENMAT** materials are resistant to abrasive conditions such as sand-laden water, confirmed by independent third party testing and highlighted through many years of uninterrupted service.

Proven in U.S. Army Corps of Engineers independent studies, **TENMAT** bearings are the best solution for Hydro Applications, achieving outstanding ratings in various applications.

Applications:

- Control Linkage Bearings
- Main Shaft Guide Bearing
- Operating Ring Bearing
- Guide Vane Bearings
- Segmental Shaft Seal
- Kaplan Blade & Hub Bearings
- Wicket Gates





VALVES

Key Features:

- High resistance to abrasive environments
- Low friction
- High temperature resistance
- Excellent chemical and corrosion resistance
- Self-lubricating
- Free from stick slip



TENMAT FEROGLIDE bearings are used extensively by valve manufacturers due to the material's ability to maintain low friction under heavy loads. FEROGLIDE bearings have a metal backing and a composite self lubricating liner. This gives a combination of high strength, excellent chemical resistance, and low coefficient of friction which means that FEROGLIDE is the material of choice for oil and gas valves in both sub-sea and platform applications.

Standard and special size FEROGLIDE bearings are supplied in Inconel and stainless steel. FEROGLIDE bearings are supplied as coiled bearings, thrust washers, and solid cylindrical bearings.

FEROGLIDE bearings are composite in nature and do not have cold flow tendencies of solid and filled PTFE resins. They excel even in application at temperatures beyond the range of most lubricants, -150°C to $+300^{\circ}\text{C}$, and exhibit exceptional strength.

Applications:

- Ball valves
- Butterfly Valves for the Trunnion Guide Bearings
- Stem Bearings





OFFSHORE

Key Features:

- Market-leading Wear Performance
- Doesn't Require Clean Water Systems
- Excellent Stability
- Approved by All Major Classification Societies



The ability of **TENMAT** bearings to perform in sea water and other difficult, dirty and abrasive environments gives design engineers robust bearing and wear pad solutions for the offshore industries.

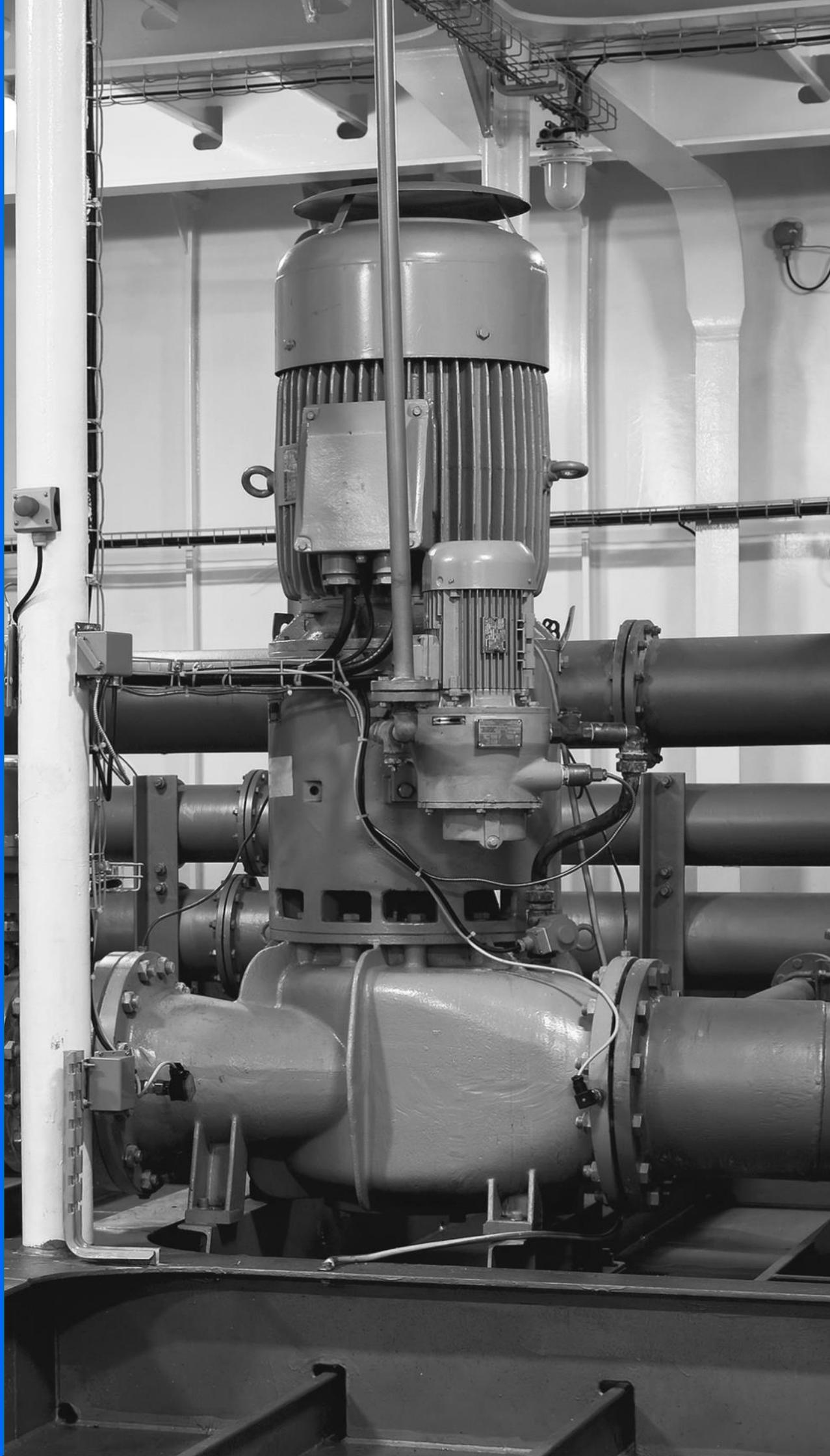
FEROFORM materials are used on Floating Production and Storage Operation (FPSO) turrets as horizontal and vertical slide pads due to their low level of friction and high resistance to wear. Other applications include stinger roller bearings, windlasses, drill string support pivots, fairleads, sheaves, mooring systems, fingerboard bushes, crane pivot point bearings, winches and many more.

FEROFORM material grades are non-metallic material that eliminate metal to metal corrosion, a common problem with traditional bearings. **TENMAT** self lubricating materials are often used in place of metal bearings, offering attractive cost savings to equipment manufacturers by eliminating complex lubrication systems.

Applications:

- Pipe-Laying Equipment
- Cable-Laying Rollers
- Dredging Applications
- Crane Applications
- Subsea Applications
- Riser Applications
- Mooring Systems
- Turret Systems
- Trunnion Ball Valves
- Jack Lift Guides





PUMPS

Key Features:

- High Resistance to Abrasive Environments
- High Dimensional Stability
- High Wear Resistance
- Increases Pump Life
- Corrosion-free
- Self-lubricating



FEROFORM and RAILKO composites are used as bushes, neck rings, wear rings, motor bushes and thrust discs in pumps conveying all manner of fluids. These durable materials have low coefficient of friction and high abrasion resistance giving long life performance, and high chemical resistance.

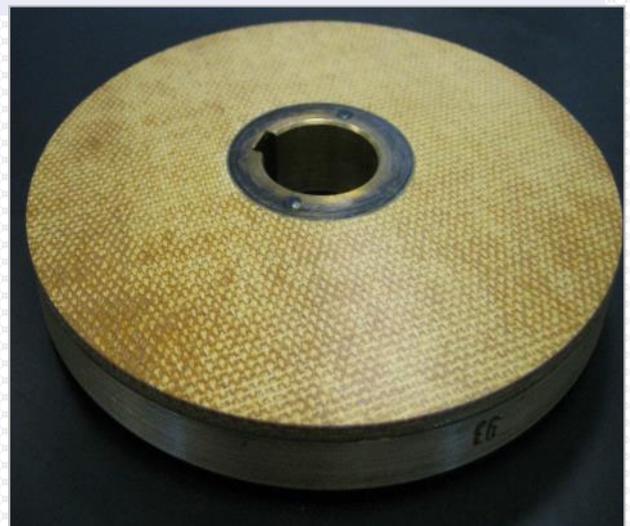
FEROFORM and RAILKO bushes and thrust washers are used in vertical turbine pumps for the seawater lift and cooling pumps for power stations. Other applications include horizontal pumps, submersible pumps and centrifugal pumps.

FEROFORM and RAILKO grades are a superior alternative to rubber bearings and PEEK bearings, offering superb wear resistance, improved pump performance and reliability, as well as greatly reducing stick slip. The materials can run dry at start up due to their strength and resistance to heat.

TENMAT materials can be machined to exact sizes, simplifying the pump refurbishment process at minimum cost.

Applications:

- Throat Bushings
- Lineshaft Bushings
- Bowl Bushings
- Thrust Discs
- Motor Bushes
- Wear Rings
- Neck Rings
- Impeller Rings

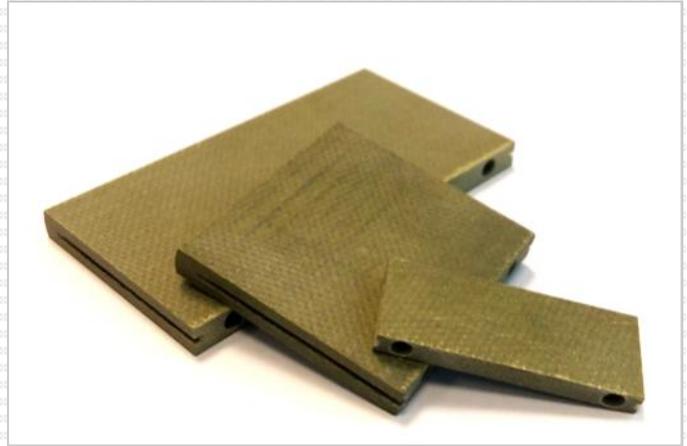




VACUUM PUMPS & COMPRESSORS

Key Features:

- Long Life
- Stability Under Vacuum
- High Flexural Strength
- Lower Noise
- Chemical & Corrosion Resistance
- High Pump Performance



TENMAT is the world's leading manufacturer of high performance rotor vanes for vacuum pumps and compressors. **TENMAT** FEROFORM rotor vanes are specified and used by more than 50 OEM's worldwide.

FEROFORM F57 has been developed using specially engineered resin with bespoke reinforcement. This makes it the ideal choice for heavy duty industrial pumps, vacuum trucks and milking pumps, slurry spreaders etc.

FEROFORM F43 is a unique blend of high temperature fibers and resins designed especially for the most demanding of high vacuum applications.

The material of choice for dry running pumps and compressors is FEROFORM F200A, a resin bonded graphite material of exceptional life and performance.

TENMAT rotor vanes are available in a wide range of dimensions to fit every possible application for vacuum pumps and compressors. Customized vanes can be supplied with lengths up to 1800mm (71") and thicknesses up to 25.4mm (1") .

Applications:

- Milking Pumps
- Blowers for Cement Plants
- Tanker Discharge Pumps
- Single Stage Vacuum Pumps
- High Vacuum Pumps
- Industrial Pumps





INDUSTRIAL ENGINEERING

Key Features:

- Long Life
- High Compressive Strength
- Wide Application Range
- High Chemical & Corrosion resistance
- Self-lubricating
- High Temperature Resistance



TENMAT manufactures a wide range of self-lubricating composite materials ideally suited for bushes, bearings, thrust washers, and sliding pads used in a variety of demanding applications.

FEROFORM and RAILKO material grades are high performance composite products, manufactured from a resin matrix reinforced with woven synthetic fibre and specially selected friction modifiers. These components are suitable for dry running applications, as well as for use with all common lubricants.

The diversity of applications for **TENMAT** materials nears being endless and includes slaughtering machines, packaging equipment, glass bottle cleaning equipment, waste water processing equipment, lock gates, hydraulic cylinders, cranes, crushers, agricultural bearings and sliding pads, and many more.

Applications:

- Slaughtering Machines
- Packaging Equipment
- Escalators
- Glass Bottle Cleaning Equipment
- Waste Water Processing Equipment
- Lock Gates
- Hydraulic Cylinders
- Cranes
- Crushers





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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