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Visit the web for immedate access to:

- *Product Application Assistance*
- *Material Safety Data Sheets*
- *Technical Data Sheets*
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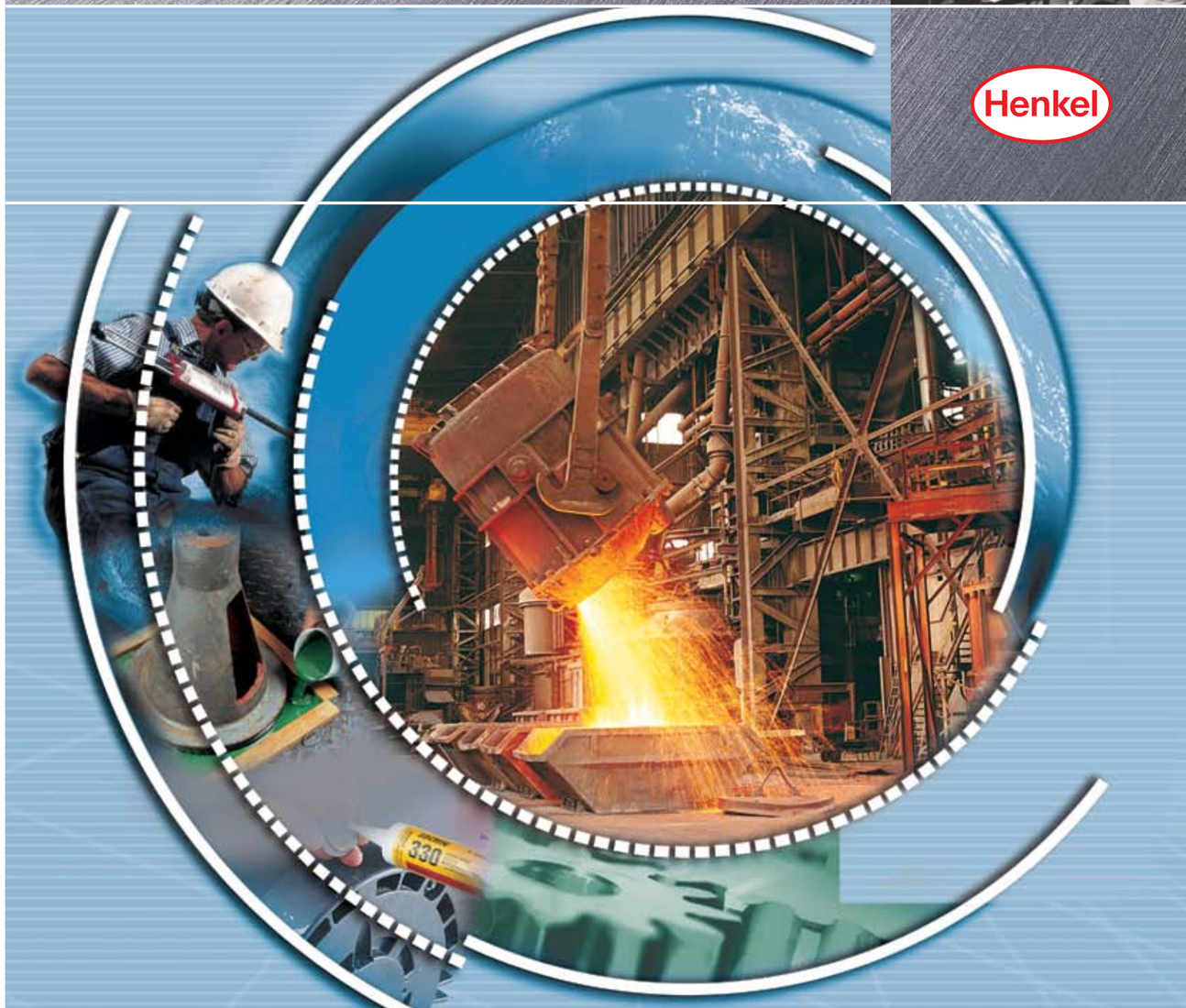
LOCTITE®

Loctite® Solutions for Steel Mills

Maintenance, Repair, Rebuild and Protect

Henkel



Loctite® Solutions for Steel Mills

Loctite® has the right solutions to various maintenance, repair and overhaul challenges steel mills face. Designed to prevent common failures, extend equipment life and increase production reliability, Loctite® product range is a maintenance professional's most valuable tool.

Loctite® Industrial Maintenance Solutions

Proven with over 50 years industrial experience, typical product applications include:

- Threadlocking - Securely lock any threaded fastener or fitting against vibration and shock load
- Thread Sealing - Seal and protect threaded joints and components
- Retaining - Retain bearings, bushes and cylindrical parts into housings or onto shafts – even if worn
- Gasketing - Instantly replace gaskets of any size or shape
- Anti-Seize Lubricants - Protect metal parts from corrosion, galling and seizing
- Instant & Structural Bonding - Permanently and quickly bond a wide variety of materials
- And much more…

Loctite® Repair, Rebuild & Protect Solutions

Under the Loctite® brand there are three key surface engineering and protective coating technologies known as Nordbak®, Fixmaster® and Big Foot. Tried and proven for over 50 years, these technologies offer proven solutions for the problems caused by wear, abrasion, chemical attack, erosion, corrosion, impingement, entrainment, mechanical damage and traction control.

- Loctite® Nordbak® - Utilises superior wear properties of ceramic and the convenience of two-part epoxies to seal and protect plant assets from wear and corrosion. Available in trowelable and brushable formulations with special fillers for tough conditions, Nordbak® is ideal for all repairs that have to last.
- Loctite® Fixmaster® - Designed to repair, reclaim, protect and maintain worn metal, rubber, and concrete surfaces, predominantly two-part composites, the range varies from metal filled putties to urethanes and quartz based concrete repair products.
- Loctite® Big Foot - Purpose designed to provide superior traction control in industrial envrironments, Loctite® Big Foot is resistant to harsh chemicals and tough enough to handle forklift and vehicular traffic.

With over 50 years' expertise and know-how, Loctite® brings steel mills numerous cost saving and energy conservation maintenance, repair, rebuild and protect solutions. Application cases introduced in this catalog only demonstrated a part of Loctite® capabilities. Please consult Loctite® for a customized application solution for you.

- Improved Efficiency, Reliability and Safety
- Reduced Downtime and Spare Parts Inventory
- Reduced Energy Costs
- Extended Equipment Life
- Minimized Maintenance Costs
- Global Network and Local Service

Table of Contents

Raw Materials
Coal Yard

The Catch Hopper is a commonly used machine in coal yard.

Challenges: Prevent hoppers on catch hoppers from wearing.

Loctite® Solutions: Loctite® Nordbak® Wearing Compound protects against sliding abrasion, can be used as preventive sacrificial coating on new hoppers or rebuild and restore worn hoppers.

The Bucket-Wheel Excavator is the heavy equipment used to remove coal materials from coal yard and load them onto the conveyor belt.

Challenges: The basement of ballessbearing was corroded by seawater and worn out by the coal powder between basement and ballessbearing.

Loctite® Solutions: Loctite® Fixmaster® Superior Metal Putty repaired the worn areas and extended equipment life by 2 years.

Conveyor Belts are widely used for bulk material handling, product distribution, and other material transportation needs. In steel mills, Conveyor Belts are used to transport raw materials such as coals, iron ores, and lime stones.

Challenges: Repair damaged coal conveyor belts.

Loctite® Solutions: Loctite® Fixmaster® Rapid Rubber Repair is extremely tough, flexible and fast curing, forms permanent bonds to rubber.

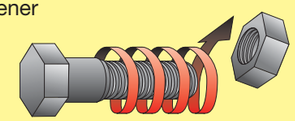
A conveyor belt consists of two or more Pulleys, with a continuous loop of material that rotates about them. The Pulleys are powered, moving the belt and the material on the belt.

Challenges: The shaft in the Pulley of the Conveyor Belt was damaged. The replacement cost is expensive.

Loctite® Solutions: Formulated with fine alloy particles, with high compressive strength and chemical resistance, Loctite® Fixmaster® Superior Metal rebuilt the worn areas in two hours.

Did You Know?

- #1 Reason for Catastrophic industrial equipment failure is the vibrational loosening of mechanical fasteners
- Just 2 drops of liquid or a swipe of the threadlockers stick is all it takes to ensure the reliability and performance of industrial equipment
- Once cured, threadlockers create a secure bond for any threaded fastener



Loctite® Threadlocking

Invented by Loctite Corporation, now Henkel Corporation, as a revolutionary method to lock and seal threaded fasteners, Loctite® threadlockers have a wide range of applications – from delicate electronic components to heavy construction equipment. Patented, revolutionary Loctite® semi-solid formulas in stick format offer added convenience and portability.

- Prevents loosening from shock and vibration
- Single component – clean and easy to apply
- Can be used on various sizes of fasteners – reduces inventory costs
- Seals threads
- Stops rust and corrosion
- Available in varying viscosities and strengths for any applications, including exposure to extreme environments

Raw Materials
Coking Plant

This Dust Blower transfers dust into dust collection cyclone.

Challenges: Impellers were abraded by dust particles, repair by welding steel plates brought inner stress and added weight thereby reduced efficiency and increased energy cost.

Loctite® Solutions: Loctite® Nordbak® Pneu Wear repaired the worn parts and Loctite® Nordbak® Brushable Ceramic Grey & White were coated as the base and top wear-resistant coating. When the top coat begins to wear, the base coat will show through, providing an accurate visual indicator of wear.

The COG Ducts transport Coke Oven Gas from Coke Oven to Coal Chemical Plant.

Challenges: The COG Duct leaked due to the abrasion by dust and corrosion by gas. Repair needed to be done without shutdown. Blasting, grinding or welding was not permitted due to the risk of explosion.

Loctite® Solutions: Loctite® Nordbak® High Temperature Wearing Compound protected equipment in high heat environments where conventional repair systems fail. Loctite® Nordbak® Chemical Resistant Coating protected equipment against extreme corrosion caused by chemical exposure. This saved EUR285,000 by eliminating the equipment replacement and repairing without shutdown.
For new COG Ducts, Loctite® Nordbak® Brushable Ceramic is used as protection coating against corrosion and abrasion from coking oven gas and dust.

The Tar Abstract Condensation Container absorbs coal tar, the by-product of the production of coke from coal.

Challenges: Interior of Tar Abstract Condensation Container was corroded. Previous method was to spray stainless steel to reclaim it.

Loctite® Solutions: Loctite® Nordbak® Brushable Ceramic Grey was brushed as the corrosion-resistant protection coating, easy and cost effective.

Pipes and Elbows are a common wear point in steel mills.

Challenges: The inside of all vacuum duct elbows were seriously worn due to severe abrasion.

Loctite® Solutions: Loctite® Nordbak® Pneu Wear was used as protection coating. The same pipe elbows remained in service for 3 years without need for further repairs.

The Coke Dry Quenching Cyclone was lined by abrasion-resistant tiles.

Challenges: Joints between tiles were worn by coke powder.

Loctite® Solutions: Loctite® Nordbak® High Temperature Brushable Ceramic filled the gaps between tiles as undercoating. Loctite® Nordbak® High Temperature Pneu-Wear was applied on the top and minimized peeling and cleavage load.

Did You Know?

- Leakage from threaded and flanged fittings cost industry, and ultimately us as consumers, millions of dollars annually
- Re-work of pipe sealing leads to further downtime and unnecessary expense
- When fully cured, Loctite® Thread Sealants seal to the burst strength of most piping systems

Loctite® Thread Sealing

Loctite® liquid thread sealants seal and secure metal pipes and fittings, filling the space between threaded metal parts, and hardening to prevent leakage. Designed for low and high pressure applications, liquid thread sealants seal instantly for low pressure testing. The new innovative semi-solid formula in stick format offers added convenience and portability for general maintenance and hard-to-reach applications.

- Replaces tapes and pastes
- Liquids ensure complete contact between threads for a 100% seal
- Liquids will not creep, shrink, shred, or block systems (including filters)
- Disassembly can be achieved easily with basic hand tools
- Prevents leaks, corrosion and galling in threads

Raw Materials
Sintering Plant

The Dust Collection Duct absorbs and collects dust produced from sintering process.

Challenges: Dust Collection Duct works under high temperature (70°C~150°C), and its inside surface was corroded and abraded. The traditional tiling was not abrasion resistant and its rubber joint was not temperature or abrasion resistant.

Loctite® Solutions: Loctite® Nordbak® High Temperature Pneu Wear and Loctite® Nordbak® Brushable Ceramic were used to line the inside surface. New fabrications later also adopted this protection coating and reapplied during normal maintenance.

At the upper end of the cooling area the cooling air traversing the shaft from bottom to top is aspirated into a recuperator wherein fresh combustion air is preheated by the cooling air and then supplied to the burner which heats the burning area. Cooling Air Pipes transport cooling air for sintering process.

Challenges: Prevent cooling air pipes from leaking.

Loctite® Solutions: Loctite® 567 PST Thread Sealant locks and seals tapered pipe threads and fittings, including high pressure applications. Can be disassembled with hand tools.

Downcomer (doun pipes) vacuums air to burn sintered steel on pallet efficiently. Dozens of Downcomers are located underneath of sinter pallet to main blower.

Challenges: Stop air leakage from welded areas on the Downcomers. Traditional patching or aluminum tape couldn't solve the problem.

Loctite® Solutions: Loctite® Fixmaster® Metal Magic Steel fills small gaps and holes of welded parts, and stops air leakage.

The Dust Catcher collects dusts for sintering process.

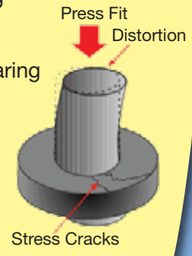
Challenges: Straight sections and elbows of the ducts were seriously worn. Super steel welding was used as a remedy, however the welded areas spread and the welding took great time and effort.

Loctite® Solutions: Loctite® Nordbak® Wearing Compound is coated on top of spot welding for sections already in service. For new pipes and elbows, Loctite® Nordbak® Wearing Compound is applied to the interior as sacrificial working surface. Re-repair can be carried out when Loctite® composites are worn away.

Did You Know?

Why Do Bearings Fail?

- Defective bearing seats on shafts and in housings
- Misalignment
- Faulty mounting practice
- Incorrect shaft and housing fits
- Inadequate sealing
- Ineffective sealing
- Vibration while bearing is not rotating
- Electrical current passage through bearing



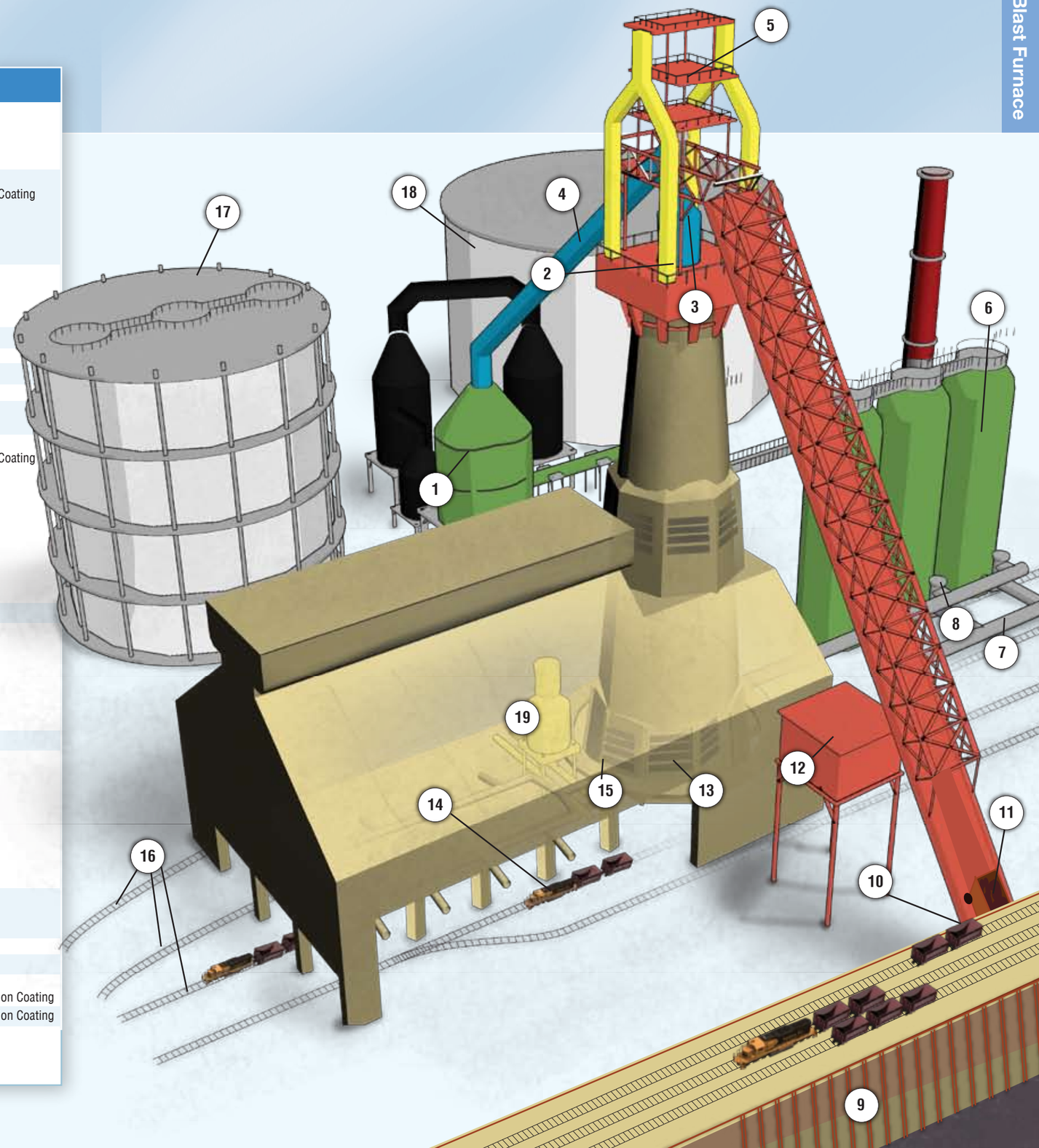
Loctite® Retaining

Pioneered anaerobic technology, Loctite® Retaining Compounds fill the "inner space" between components, cure to form a strong precision assembly, and increase the shear strength of cylindrical, non-threaded assemblies. Loctite® Retaining Compounds have gained wide acceptance as a standard method for assembling press and slip-fitted parts.

- Bond and secure non-threaded cylindrical metal assemblies
- High and moderate strength products – can carry high loads and eliminate fretting
- Fill all voids – prevent corrosion
- Reduce the need for close tolerances
- 100% contact – load and stress are distributed evenly over the joint

Iron Making
Blast Furnace

	Equipment	Challenges	Loctite® Solutions
1	Dustcatcher	Wear to dust collection pipes	Rebuilding and Wear Resistant Coating
		Flange sealing for gear box	Gasketing
		Preventing dust collection pipe bolts from seizure	Anti-Seize
		Wear and cavitation to dust collection hydraulic pump	Metal Rebuilding
2	Rotating Distributor	Flange sealing for gear box	Gasketing
		Wear and high temperature	Rebuilding and High Temperature Wear Resistant Coating
		Seizure of bolts	Anti-Seize
	Mixing and Discharging System	Preventing bolts from loosening	Threadlocking
		Flange sealing for gear box	Gasketing
		Assembling bearing for vibratory screen motor	Retaining
3	Receiving Hopper	Abrasion and galling of the chain	Anti-Abrasion and Anti-Seize
		Seizure of bolts	Anti-Seize
		Assembling bearing for balance beam	Retaining
		Flange sealing for winding machine reduction gear box	Gasketing
4	Downcomer	Wear to duct elbows	Rebuilding and Wear Resistant Coating
5	Bleeder Valve	Flange sealing for gear box	Gasketing
6	Hot Blast	Preventing steam pipes and fittings from leaks	Thread Sealing
7	Bustle Pipe	Preventing bolts from corrosion and seizure	Anti-Seize
8	Mixer Line	Preventing hot blast valve bolts from corrosion and seizure	Bolt protection
		Protecting the water gauging valve stem from galling	Anti-Seize
9	Coal Powder Blowing System	Wear to belt surface	Rubber and Belt Repair
		Wear to coal grinding machine internal plates	Rebuilding and High Temperature Wear Resistant Coating
		Flange sealing and secure bolts on housing and blades for coal transport pump	Gasketing and Threadlocking
		Wear and abrasion to dust collection ducts	Rebuilding and Wear Resistant Coating
		Wear to induction fan	Wear Resistant Protection Coating
		Wear to separator	Rebuilding and Wear Resistant Coating
		Wear to blowing tank walls	Wear Resistant Protection Coating
		Preventing blowing valve bolts from seizure	Anti-Seize
		Preventing coal powder pipe bolts from seizure	Anti-Seize
	Stockhouse	Prevent falls on the working floor	Anti-Slip Traction System
10	Storage Bin	Wear to storage slots	Wear Resistant Protection Coating
11	Skip Car / Conveyor	Preventing bolts from loosening	Threadlocking
		Bearing installation for axle	Bearing installation
		Wear to inner wall plates	Wear Resistant Protection Coating
		Wear to rubber or urethane linings on the conveyor	Rubber and Belt Repair
		Flange sealing for reduction gear	Flange sealing
		Bearing installation for motor	Bearing installation
		Flange sealing for winding engine gear box	Gasketing
12	Hoist House	Preventing oil leakage from hydrulic power pack	Gasketing
13	Slag Granulation & Disposal	Preventing slag notch cooling water pipes from leaking	Thread Sealing
		Wear to ducts inside slag separator	Wear Resistant Protection Coating
		Protecting slag notch flange from seizure	Anti-Seize
		Flange sealing for slag disposal hydraulic pump	Gasketing
		Wear to slag pump	Wear Resistant Protection Coating
		Wear to belt surface	Rubber and Belt Repair
		Wear to slag separator	Wear Resistant Protection Coating
		Wear to slag dewatering tank	Wear Resistant Protection Coating
	Slag water pump	Corrosion and abrasion to the casing and outlet	Rebuilding and Anti-Corrosion Coating
14	Torpedo Car	Protecting the bolts from seizure	Anti-Seize
		Flange sealing for dumping device	Gasketing
		Installing the supporting shaft	Retaining
15	Mudgun	Flange sealing for hydraulic mudgun furnace hearth	Gasketing
16	Rails	Repairing rail and protecting anchor bolts	Grouting
17	Gas Tank	Corrosion on the metal plates of gas tank	Rebuilding and Anti-Corrosion Coating
		Stopping and repairing the leaks on side walls	Emergency Repairing, Rebuilding and Anti-Corrosion Coating
18	Oil Tank	Stopping and repairing the leaks on tank roof	Emergency Repairing, Rebuilding and Anti-Corrosion Coating
19	Pulverized Coal Injection	Wear to the arms and ducts of PCI Mill	Wear Resistant Protection Coating
	(PCI) System	Wear to Inlet Cone in Blower	Wear Resistant Protection Coating
		Wear to panel joints and Bolt caps	Wear Resistant Protection Coating

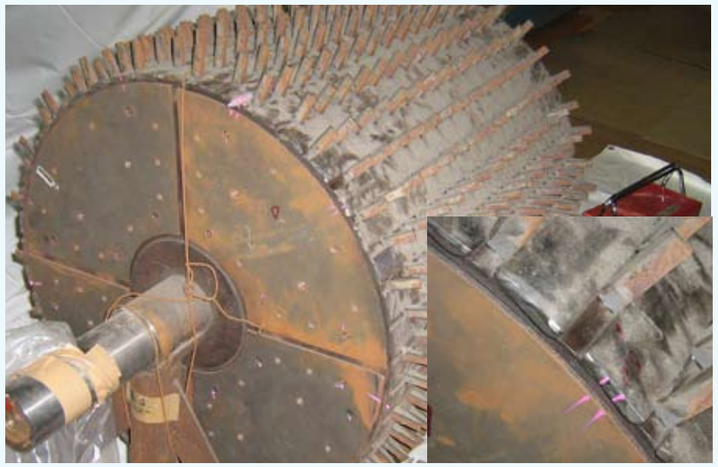


Iron Making
Blast Furnace

This Rock Fiber Julienning Machine processes blast furnace lime slags into rockwool which is an inorganic substance for insulation and filtering. The machine is made of super steel.

Challenges: Intensive wear on the roller of Julienning Machine. The teeth and the slots were worn and cracked.

Loctite® Solutions: Loctite® Nordbak® Pnue Wear rebuilt and protected the Rock Fiber Julienning Machine Roller from wear and abrasion.



The Oil Tank stores heavy oil which is used to fire Blast Furnace.

Challenges: Heavily corroded tank roof.

Loctite® Solutions: Loctite® Nordbak® Chemical Resistant Coating restored the heavy oil tank roof and prevented it from corrosion.

In steel mills, there are many Gas Towers holding coke oven gas and blast furnace gas. These gas supplies the energy needed by major equipment and power plant.

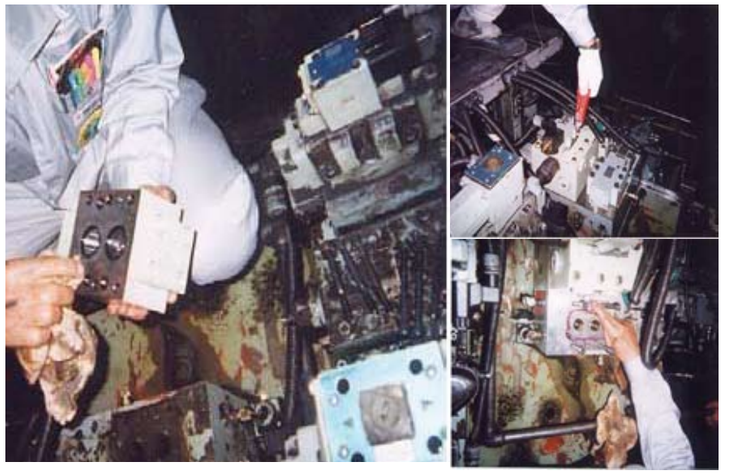
Challenges: The props of rivet and the joints between pillars and outer wall panels are often the areas with the problems of cracks. Traditional welding would cause fire and explosion.

Solutions: Loctite® E-05CL Hysol® Epoxy Adhesive seals the cracks in the leaking points, Loctite® Rapid Rubber Repair Urethane seals the welded edges between pillars and panels, Loctite® Nordbak® Brushable Ceramic acts as an anti-corrosion top coating.

All Hydraulic Cylinders face the challenge of reliable flange sealing.

Challenges: End cover oil leakage.

Loctite® Solutions: Loctite® 515 Gasket Eliminator Flange Sealant stopped Hydraulic Cylinder End Cover oil leakage.



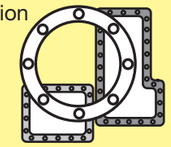
Did You Know?

What is the function of a Gasket?

- Maintains a seal
- Remains impervious to industrial fluids
- Compatible with the materials around the gasket

Why do Gaskets leak?

- Stress distortion is a primary cause of cork, paper, and cut gasketing products failure
- Causes of Stress Distortion:
  - Uneven and Localized stress causes leaks
  - Over-tightening bolts causes stress distortion
  - Pressure surges cause leaks
  - Different rates of thermal expansion cause leaks



Loctite® Gasketing

Loctite® anaerobic gasketing technology has revolutionized flange sealing in all industries. Anaerobic gasketing materials remain liquid when exposed to air, but cure when confined between mating flanges, are best suited for small gap applications and rigid metal-to-metal assemblies. With excellent fluid resistance, formulated for high operating temperatures, Loctite® silicone gasketing materials are best suited for large gap applications and stamped metal assemblies.

- No shimming effect – controlled tolerances, no need for re-torquing
- Fill all voids – reduce the need for a fine surface finish of flanges
- Parts can be disassembled easily even after extended service
- Resists high pressure when fully cured

Steel Making
Steel Rolling

Chain Transporter works in high temperature up to 800°C, and transports steel bars to next station.

Challenges: Prevent seizure of Chain Transporter at 800°C.

Loctite® Solutions: Heavy duty, temperature resistant, fortified with graphite and metallic flake, Loctite® Silver Grade Anti-Seize is general purpose and protects parts up to 871°C. Inert and will not evaporate or harden in extreme cold or heat.

The Roller Housing holds the roller for steel rolling.

Challenges: Mill Liner on the Housing was corroded and lost the substrate integrity. Mill Liner vibrated and, bolts were loosened and broken due to the shock.

Loctite® Solutions: Loctite® Fixmaster® Superior Metal repaired damaged areas on the Mill Liner, Loctite® Nordbak® Brushable Ceramic was applied as corrosion-resistant coating. Loctite® 243 Threadlocker was used to install the Mill Liner onto the Housing. Now the Mill Liner is corrosion and vibration proof.

Challenges: Restore the corroded water tank.

Loctite® Solutions: Loctite® Nordbak® Brushable Ceramic Grey repairs minor surface wear, Loctite® Fixmaster® Superior Metal Putty rebuilds worn areas, Loctite® Nordbak® Chemical Resistant Coating provides an anti-corrosion protective coating.

Steel mill Rollers work in the situations of heavy load and shock load and also high rotation speed.

Challenges: Prevent the roller escaping from the housing.

Loctite® Solutions: Loctite® 648 Retaining Compound is designed for the bonding of cylindrical fitting parts, high strength, prevents parts loosening from shock and vibration.

The Gas Pipe recycles mixed gas to heat the hot rolling mill.

Challenges: Reinforce the heavily corroded Gas Pipe against corrosion until next replacement.

Loctite® Solutions: Apply 0.5mm thickness of Loctite® Nordbak® High Temperature Brushable Ceramic as the base coat, and 6.35mm thickness of Loctite® Nordbak® High Temperature Pneu-Wear as the top coat. The repair was done in just 4 hours.

Did You Know?

HARD FACE WELD

STEP 1: Prepare surface
STEP 2: Preheat rods and substrate
STEP 3: Lay (6mm x 3mm beads) x 210mm long. Overlap each bead by 50%
STEP 4: Lay second pass of beads to achieve 6mm thickness. Total of 176 passes
STEP 5: Relieve stress caused by application of heat

TOTAL LABOR = 8 HOURS

Loctite® Nordbak® Wearing Compound

STEP 1: Prepare surface
STEP 2: Mix resin and hardener
STEP 3: Apply to surface with trowel

TOTAL LABOR = 1 HOUR
(NO flame, NO heat distortion of the substrate)

Loctite® Nordbak® Wear Resistant Coating

Loctite® Nordbak® Wearing Compounds utilize the superior wear properties of ceramic and the convenience of two-part epoxies to protect equipment like pumps, chutes, and augers in harsh industrial environments. Loctite® Nordbak® products stand up to almost any corrosion, abrasion and wear problems steel mills can encounter, and are ideal for all those large-scale repairs that have to last.

- Restores worn surfaces, uses on new parts to extend life
- Provides superior protection from environmental impact
- Eliminates and breaks corrosion/erosion cycle
- Non-shrinking and non-sag formulations. High compressive strength
- Broad chemical resistance, broad range tailored to specific applications

Pump Rebuild in Steel Mills

This water pump started its service in Year 1997.

Challenges: The shaft was worn out by 1.5mm depth in Year 2005 due to continuous abrasion. Pump casing and impeller were worn and corroded.

Loctite® Solutions:Restored by Loctite® Fixmaster® Superior Metal Putty and coated by Nordbak® Brushable Ceramic, pump efficiency has increased by 6.8%. 25,000 Kilowatt electricity is saved for pumping each 1,000 tons of water. This means a cost saving of CNY 100,000 (EUR 9,766) per year per pump.

This Screw Pump processes waste water for the steel mill.

Challenges: The screw pump has been in service for six years, corroded by acid and alkali, and abraded by impurities in the industry waste water it processed. Anti-rust lacquer was used in the third year, but the lacquer damaged the pump substrates and got peeled off easily.

Loctite® Solutions: Ultra-smooth, ceramic reinforced, Loctite® Nordbak® Brushable Ceramic Grey provides a high gloss, low friction coating to protect against turbulence, abrasion and cavitation. Loctite® solution extended the equipment work life by six years. The total cost saving brought to the customer is CNY 191,343 (EUR 18,686).

The (NH4)2SO4 circulation pump in the steel mill's desulfurization facility requires chemical resistance and wear-proof coating to protect it from abrasion.

Challenges: The pump was corroded and worn by the crystals of ammonium sulfate it discharges. Repair was performed once in 2 or 3 months using a Ceramics System Coating Agent which lacks adhesion and durability.

Loctite® Solutions: Loctite® Nordbak® Pneu-Wear filled the dents, Loctite® Nordbak® Brushable Ceramic Grey was applied as the chemical resistance and wear-proof top coating. Downtime and equipment scraps are now saved. Reliability has been improved in the customer's plant.

As a part of the cooling system for Electric Plant, the Seawater Pump pumps seawater to cool every heated facility and equipment in the steel mill.

Challenges: Prevent corrosion of pump casing and anchor bolts. The previous putty applied on pump casing was not water resistant, the previous epoxy paint covered the anchor bolts got cracked easily by shock and bolt started corroding.

Loctite® Solutions: The pump casing was reclaimed by Loctite® Fixmaster® Wet Surface Repair Putty which is extremely stable in water for long time.

Self-leveling, fast-curing, non-shrinking grout, Loctite® Fixmaster® Marine Chocking was poured into the dam, it cures into an outstanding chemical and vibration resistance and compressive strength to withstand maximum loads.

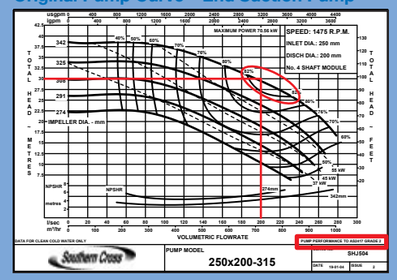
Did You Know?

- Most industrial pumps carry a significant capital value and therefore it is important to extend their useful lives and ensure that they run efficiently and reliably
- Proactive Maintenance can reduce the risk of breakdowns, increase pump reliability, efficiency and longevity, and extend the MTBF (Mean Time Between Failures)

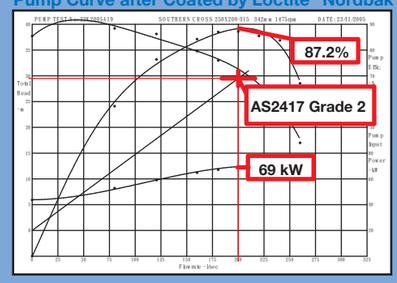
Loctite® Solutions for Industrial Pump Rebuild and Maintenance

- Used in all stages of pump assembly, installation, repairs, on-going maintenance, and disassembly, Loctite® solutions have improved effiency and reliability of industrial pumps, new and old
- The following test shows that after coated by Loctite® Nordbak® Brushable Ceramic, Pump Efficiency increased by +4.8% from 82.4% to 87.2%, Tot. Head increased by +4% from 29.5 mtr to 30.68 mtr, Power Input reduced from 72.31 kW to 69.00 kW.

Original Pump Curve – End Suction Pump



Pump Curve after Coated by Loctite® Nordbak®



Safety and Environment

There are oil spills and greases in many plant areas of steel mills. Oils and greases are flammable, which is the hidden safety problem.

Challenges: To degrease equipment in flammable areas and clean oil contaminants from stairs and floors for a safe working environment.

Loctite® Solutions: Non-toxic, non-flammable, Loctite® Natural Blue® is a concentrated, biodegradable cleaner/degreaser that contains no hazardous solvents to meet a wide range of industrial cleaning applications. Dilutes Loctite® Natural Blue® with warm or cold water. Soak or spray parts with Natural Blue® and wipe or rinse clean.

Many plant areas in a steel mill especially the cold rolling mill is oily and slippery. Slips and falls are serious safety concerns.

Challenges: Create anti-slip safe working environment for areas such as pedestrian passage in rolling mills and pipe plants, working table of cold rolling machine, shipping area in cold rolling mills, stairs, warehouse floors and so on.

Loctite® Solutions: Loctite® Big Foot Heavy Duty Pedestrian Grade works for areas with heavy pedestrian or light rolling traffic. Ideal for ramps, walkways, locker rooms, stairs, and assembly areas. Available in colors of yellow, tile red, green, black and grey.

Loctite® Big Foot Zero V.O.C. is 100% reactive, solvent-free epoxy, has the most aggressive profile in the Big Foot line. Use in odor-sensitive areas such as confined spaces. Available in colors of yellow, tile red, green and grey.

Transformer substation supplies power for the steel mill.

Challenges: Electric Cabinets were seriously corroded. Moisture had entered into the Cabinet, which might corrode the electric components and cause accidents such as short circuit.

Loctite® Solutions: Loctite® Fixmaster® Superior Metal Putty repaired corroded areas without shutting down the equipment. If otherwise, the downtime cost would be CNY 2 million (EUR 0.2 million) per hour. The repair guaranteed safe manufacturing and eliminated hidden troubles.

Tar is the byproduct of coke production, and stored in the Tar Pit before it is processed. Coal tar is considered toxic and carcinogenic because of its high benzene content, and has a pungent odor.

Challenges:To stop odor escaping from the Tar Pit for better and healthier working environment.

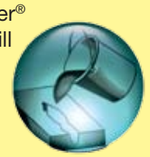
Loctite® Solutions: Loctite® Fixmaster® Metal Magic Steel filled the crevice between the bonded surfaces of metal cover and concrete pit wall, thus the odor leakage path is stopped. Loctite® Fixmaster® Floor Fill repaired and augmented the concrete pit wall.

Did You Know?

What is Polymer Composites?

- An epoxy or urethane (polymer) system that contains a reinforcement component such as fibers, beads, powders, etc. these added composites increase performance.

Loctite® Nordbak® and Fixmaster® Polymer Composites are formulated with 100% solids. This means that unlike solvent-based systems, Loctite® Nordbak® and Fixmaster® polymer composites will not shrink when cured.



Loctite® Fixmaster®
Metal Surface Repair & Rebuild

Loctite® Fixmaster® composites repair, rebuild and restore damaged machinery and equipment permanently and without the need for heat or welding. Technically advanced and manufactured with over 50 years' know-how, the range includes putty or pourable formulations, for aluminum, steel or stainless steel.

- Non-shrinking, high compressive strength, durable
- Can be drilled, tapped, or machined after cure
- Superior adhesion to metal, ceramic, wood, glass, and some plastics
- Excellent resistance to aggressive chemicals
- Choice of mild steel, aluminum, or nonmetallic fillers

TRAINED, MOTIVATED, AND EQUIPPED PERSONNEL, DRIVE COSTS DOWN!

In the world of industry, maintenance typically contributes to over a quarter of the total cost of finished goods. Loctite® has identified the taproot causes of failures on most mechanical equipment, and teaches proactive approaches to combat downtime and optimize productivity and reliability.

After Loctite® Maintenance Reliability Workshop, your work force will have the knowledge and the tools to do the following:

SAVE TIME
- Reduce routine maintenance tasks
- Reduce standard repair time
- Reduce redundant repairs
- Reduce extended repair times

REDUCE ENERGY COSTS
- Air leak 1.6 mm @ 100 psi @ €0.04 per kWh = €517 lost per year
- Loose connector on 480 volt, 30 amp, 3 phase motor = 13% more energy needed to run

IMPROVED SAFETY
- Improve safety by eliminating personal injury hazards

REDUCE FLUID CONSUMPTION
- Hydraulic leak @ 1 drop/second @ €0.81/liter = €1,243 lost per year
- Reduce disposal costs
- Reduce clean up time and materials

IMPROVE RELIABILITY
- Quality production
- Extend Mean Time Between Failure
- Reduce minor stoppages for adjustment
- Fewer needless variables for Planned Maintenance
- Enlarged reliability culture

Air Leak Cost Calculator

Diameter of Opening	Cubic Meter of Air Loss per Year at 100 psi	Cost per Year (Euro)
0.8 mm	24,045	€129
1.6 mm	96,328	€517
3.2 mm	385,907	€2,072
6.4 mm	1,543,626	€8,286
9.5 mm	3,473,159	€18,643
Cost per kWh	€ 0.04	

* Cubic Meter Air Loss may vary based on the shape of the opening and assumes facility maintains air pressure 8,760 hours per year.

Oil Leak Cost Calculator

Leakage Rate	Lite Lost per Year	Cost per Year (Euro)
One drop in 10 seconds	153	€124
One drop in 5 seconds	307	€249
One drop per second	1,533	€1,243
Three drops per second	5,110	€4,143
Stream breaks into drops	32,706	€26,518
Cost per Liter*	€ 0.81	

* In addition to oil costs, the costs associated to leaks need to be considered, such as: clean-up labor, absorbents, transaction, shipping, storage, recycling, and disposal.

Maintenance Reliability Workshop

The majority of unplanned downtime is caused by mechanical subcomponent failure. Some taproots reasons are: fastener loosening, key wallow, PTFE tape fouling control valves, fitting leakage and spun bearings. This workshop teaches how to prevent these from happening proactively.

Threadlocking
- How a threaded fastener works
- Advantages and disadvantages of mechanical locking devices
- Loctite® Threadlockers
  - How they work
  - Benefits
  - Application cases and application techniques
  - Product selection
- Hands-on demonstrations & practice

Thread Sealing
- Types of threads and fittings
- Causes of leaks
- Loctite® Thread Sealants
  - How they work
  - Benefits
  - Application cases and application techniques
  - Product selection
- Hands-on demonstrations & practice

Gasketing
- Why gaskets leak
  - Design and service factors
  - Gasket materials and dressings
  - Assembly problems
- Form-in-place gasketing basics
- Loctite® Anaerobic and Silicone (RTV) Gasketing
  - How they work & benefits
  - Application cases and application techniques
  - Product selection
- Hands-on demonstrations & practice

Retaining
- Types, classes, and typical uses of cylindrical fittings
- Potential fit problems and possible solutions
- Loctite® Retaining Compounds
  - How they work
  - Benefits
  - Application cases and application techniques
  - Product selection
- Hands-on demonstrations & practice

Need It Now!

Name: _____

Department: _____

☑ *Check the box for items you need*

Product/ Part #	Loctite® Product Name	Package Size
Threadlocking		
☐ 222	Loctite® 222 Threadlocker	50 ml
☐ 243	Loctite® 243 Threadlocker	50 ml
☐ 271	Loctite® 271 Threadlocker	50 ml
☐ 290	Loctite® 290 Threadlocker	50 ml
☐ 2440	Loctite® 2440 Threadlocker	50 ml
☐ 37773	Loctite® 248 Threadlocker – Stick	19 g stick
☐ 37775	Loctite® 268 Threadlocker – Stick	19 g stick
Thread Sealing		
☐ 545	Loctite® 545 Thread Sealant	50 ml
☐ 567	Loctite® 567 PST Thread Sealant with PTFE	50 ml
☐ 577	Loctite® 577 Thread Sealant	50 ml
☐ 581	Loctite® 581Thread Sealant	50 ml
☐ 31899	Loctite® 55 Pipe Sealing Cord	150 m
☐ 37776	Loctite® 561 PST Pipe Sealant with PTFE – Stick	19 g stick
Gasketing		
☐ 510	Loctite® 510 Gasket Eliminator Flange Sealant	50 ml
☐ 587	Loctite® 587 Blue RTV Silicone	370 g
☐ 596	Loctite® 596 Superflex Industrial Grade Silicone	300 ml
☐ 30507	Loctite® Instant Gasket – Can	7 oz.
☐ 40392	Loctite® 534 Hi-Tack Gasket Dressing – Stick	19 g stick
☐ 40393	Loctite® 548 Gasket Eliminator Flange Sealant – Stick	19 g stick
Retaining		
☐ 603	Loctite® 603 Retaining Compound	50 ml
☐ 609	Loctite® 609 Retaining Compound	50 ml
☐ 638	Loctite® 638 Retaining Compound	50 ml
☐ 641	Loctite® 641 Retaining Compound	50 ml
☐ 660	Loctite® 660 Retaining Compound	50 ml
☐ 680	Loctite® 680 Retaining Compound	50 ml
☐ 40391	Loctite® 668 Retaining Compound – Stick	19 g stick
Metal Surface Repair & Rebuild		
☐ 39917	Loctite® Fixmaster® Fast Set Steel Putty	1 lb. kit
☐ 97453	Loctite® Fixmaster® Aluminum Liquid	1 lb. kit
☐ 97463	Loctite® Fixmaster® Aluminum Putty	1 lb. kit
☐ 97473	Loctite® Fixmaster® Superior Metal Putty	1 lb. kit
☐ 97483	Loctite® Fixmaster® Steel Liquid	1 lb. kit
☐ 98853	Loctite® Fixmaster® Metal Magic Steel	4 oz. stick
☐ 99913	Loctite® Fixmaster® Steel Putty	1 lb. kit
Wear Prevention – Reclaim and Repair		
☐ 39918	Loctite® Nordbak® High Impact Wearing Compound	25 lb. kit
☐ 96092	Loctite® Nordbak® Chemical Resistant Coating	12 lb. kit
☐ 96392	Loctite® Nordbak® Ultra High Temperature Wearing Compound	25 lb. kit
☐ 42088	Loctite® Nordbak® High Temperature Brushable Ceramic	1 kg kit
☐ 42069	Loctite® Nordbak® Pneu-Wear	2 kg kit
☐ 42087	Loctite® Nordbak® Brushable Ceramic – Grey	1 kg kit
☐ 98742	Loctite® Fixmaster® Wear Resistant Putty – Grey	1 lb. kit
☐ 41783	Loctite® Nordbak® Wearing Compound	2 kg kit
Grouting, Floor and Concrete Repair		
☐ 39366	Loctite® Fixmaster® Concrete Repair Epoxy	4 oz. stick
☐ 39916	Loctite® Urethane Sealant	10.2 oz.
☐ 95551	Loctite® Fixmaster® Magna-Crete – Grey	1 gal. kit
☐ 96495	Loctite® Fixmaster® High Performance Quartz – Grey	42 lb. kit
☐ 97572	Loctite® Fixmaster® Marine Chocking – Green	2 gal. kit
☐ 99361	Loctite® Fixmaster® Floor Fill – Grey	10 lb. kit
☐ 99545	Loctite® Fixmaster® Deep Pour Grout – Black	5 gal. kit
Anti-Slip Traction System		
☐ 39020J	Loctite® Big Foot Heavy Duty Pedestrian Grade – Yellow	1 gal. kit
☐ 39021J	Loctite® Big Foot™ Heavy Duty Pedestrian Grade – Tile Red	1 gal. kit
☐ 39022J	Loctite® Big Foot Zero V.O.C. – Yellow	1 gal. kit
☐ 39023J	Loctite® Big Foot Zero V.O.C. – Tile Red	1 gal. kit
☐ 39915	Loctite® Big Foot Zero V.O.C. – Grey	1 gal. kit
☐ 96211	Loctite® Big Foot Heavy Duty Pedestrian Grade – Black	1 gal. kit
☐ 96211G	Loctite® Big Foot Heavy Duty Pedestrian Grade – Green	1 gal. kit
☐ 96231G	Loctite® Big Foot Zero V.O.C. – Green	1 gal. kit
☐ 96261	Loctite® Big Foot Heavy Duty Pedestrian Grade – Grey	1 gal. kit
☐ 96265	Loctite® Big Foot Heavy Duty Pedestrian Grade – Grey	5 gal. kit
Rubber Surface Repair & Rebuild		
☐ 37719	Loctite® Fixmaster® Instant Belt Repair – Amber	1 lb. kit
☐ 96677	Loctite® Fixmaster® Rapid Rubber Repair	400 ml kit
☐ 97423	Loctite® Fixmaster® Flex 80 Putty	1 lb. kit
Anti-Seize Lubricants		
☐ 34395	Loctite® Marine Grade Anti-Seize	8 oz.
☐ 37782	Loctite® C-5A® Copper Anti-Seize – Stick	20 g stick
☐ 37783	Loctite® Silver Grade Anti-Seize – Stick	20 g stick
☐ 39901	Loctite® Zinc Anti-Seize – Can	1 lb.
☐ 51168	Loctite® Food Grade Anti-Seize – Brushtop	8 oz.
☐ 51606	Loctite® Heavy Duty Anti-Seize – Brushtop	1.2 lb.
☐ 51007	Loctite® C5-A® Copper Based Anti-Seize Lubricant – Brushtop	1 lb.
☐ 76764	Loctite® Silver Grade Anti-Seize – Brushtop	1 lb.
☐ 77164	Loctite® Nickel Anti-Seize – Brushtop	1 lb.
Rust Treatments and Cleaning		
☐ 22355	Loctite® ODC-Free Cleaner & Degreaser – Aerosol	15 oz.
☐ 25791	Loctite® Electrical Contact & Parts Cleaner	11 oz.
☐ 36253	Loctite® Orange Lotion Hand Cleaner	4 L
☐ 36646	Loctite® Non-Flammable Electrical Contact & Parts Cleaner	14 oz.
☐ 75448	Loctite® Extend Rust Treatment – Bottle	1 gal.
☐ 79040	Loctite® Chisel Gasket Remover 790	18 oz.
☐ 82249	Loctite® Natural Blue® Biodegradable Cleaner & Degreaser – Spray Bottle	24 fl. oz.
☐ 82251	Loctite® Natural Blue® Biodegradable Cleaner & Degreaser – Bottle	1 gal.
Bonding		
☐ 330	Loctite® 330 Depend® Adhesive	25 ml syringe
☐ 380	Loctite® 380 Black Max® Instant Adhesive	1 oz.
☐ 401	Loctite® Fast 401 Prism® Instant Adhesive	20 g bottle
☐ 404	Loctite® 404 Quick Set Instant Adhesive	4 oz.
☐ 454	Loctite® 454 Prism® Instant Adhesive	20 g bottle
☐ 21426	Loctite® Fast Cure Epoxy – Mixer Cups	10 - 1 fl. oz. cups
☐ 81120	Loctite® Poxy Pak™ – Fast Cure Epoxy	1 oz syringe
☐ E-120HP	Loctite® Hysol® E-120HP Epoxy Adhesive	50 ml
Kits, Specialty and Emergency Repair Products		
☐ 00112	Loctite® O-Ring Making Kit	
☐ 28654	Loctite® Form-A-Thread Stripped Thread Repair Kit	
☐ 96321	Loctite® Pipe Repair Kit	5 x 182 cm
☐ 82093	Loctite® Fixmaster® Underwater Repair Epoxy – Stick	4 oz. stick
Accessories		
☐ 39633	Loctite® Fixmaster® Rapid Rubber Repair Static Mixers	6 / bag
☐ 39635	Loctite® Fixmaster® Rapid Rubber Repair Dispenser	
☐ 96121	Loctite® Phenolic Roller	
☐ 96131	Loctite® Mixing Blade	
☐ 97001	Loctite® Bottle Hand Pump	
☐ 983531	Loctite® Manual Applicator, Dual Cartridge	
Primers		
☐ 21348	Loctite® 7649 Primer N	4.5 oz.
☐ 94142	Loctite® Big Foot Water-Based Primer/Sealer	1 gal.
☐ 95581	Loctite® Big Foot Acrylic Primer	1 gal.
☐ 96132	Loctite® Big Foot Metal Primer	1 gal.

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LOCTITE®

Name: _____

Department: _____

Reliability Improvement Suggestion

1. Problem Equipment _____ Department _____

Describe problem including failing components: _____

_____

How often does this happen? _____ Times per month _____ Times per year

Describe negative impact: _____

_____

Describe your intended actions including Loctite® brand products to be used: _____

_____

Necessary products issued? ☐ Yes ☐ No Need Loctite® Engineer help? ☐ Yes ☐ No

2. Problem Equipment _____ Department _____

Describe problem including failing components: _____

_____

How often does this happen? _____ Times per month _____ Times per year

Describe negative impact: _____

_____

Describe your intended actions including Loctite® products to be used: _____

_____

Necessary products issued? ☐ Yes ☐ No Need Loctite® Engineer help? ☐ Yes ☐ No

Additional Training Needed

Topics (Check appropriate boxes) **Comments**

☐ Mechanical Basics & Failure Root Causes _____

☐ Rebuild/Resurface Shafts ☐ Wear Prevention _____

☐ Machine Base Grouting _____

☐ Belt Jointing & Repair _____

☐ Floor Repair & Resurface _____

☐ Anti-Slip Safety Flooring _____

☐ Corrosion Protection (tanks, decking, etc.) _____

Training Critique

Check appropriate boxes	**Great**	**O.K.**	**Poor**
I learned useful information and proactive techniques for my job	☐	☐	☐
The instructor was well informed and his style made it easy to learn	☐	☐	☐
The examples helped me to understand where I can help increase reliability	☐	☐	☐
The demos and visual aids were used effectively and helped me learn	☐	☐	☐
The reference handouts are on target and will be helpful reminders	☐	☐	☐

Length of class ☐ Too Long ☐ Just right ☐ Too Short

Pace of class ☐ Too Fast ☐ Just Right ☐ Too Slow

Comments: _____

_____

_____

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Henkel

Loctite® Nordbak® and Fixmaster® Polymer Composites

REBUILD, REPAIR and PROTECT

industrial equipment and surfaces, extend equipment life, improve efficiency, and minimize down time.

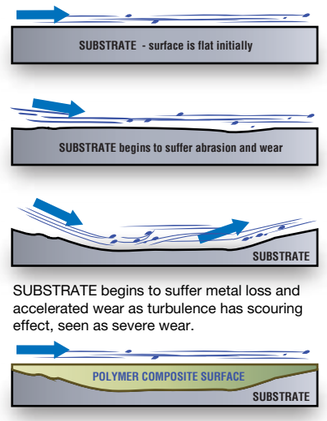
With extremely hard reinforcement fillers, Loctite® Nordbak® and Fixmaster® polymer composite products have excellent wear resistance and superior adhesion. They are designed to protect and extend the service life of a wide range of plant equipment. The composites act as a sacrificial and renewable working surface, protecting the structural integrity of the original substrate against the harshest industrial environments.

Wear / Abrasion

Over time, even a softer solid material in flow will eventually abrade and wear the hardest alloys. As the surface becomes weak it is then subject to being stripped from the parent substrate, therefore gradually reducing the thickness and structural integrity of the substrate.

Wear and Abrasion can be minimized and reduced by utilizing polymer composite materials. These act in a sacrificial capacity and therefore wear in the first instance rather than the original substrate.

Loctite® has developed specific formulations for a wide variety of applications. These formulations can be selected to match the environment for which they are suited, such as heavy wear / abrasion, corrosive fluids or high temperature service.



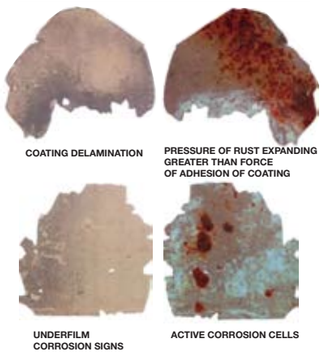
SUBSTRATE begins to suffer metal loss and accelerated wear as turbulence has scouring effect, seen as severe wear.

Corrosion / Erosion

As corrosion takes place it leaves a very weak and loose layer of oxide. As this oxide layer is continually stripped from the parent substrate this is often described as the Corrosion / Erosion Cycle.

Underfilm corrosion remains active below the surface of a high build coating and continually challenges the strength of the coating system to remain attached to the substrate.

Loctite® Polymer Composites, applied to the correctly prepared surface, will bond with a higher force of adhesion than any pressure exerted by oxidizing metal.



Surface Engineering Workshop

Despite the right coating systems are selected for the correct applications, it is often the lack of correct surface preparation and proper application procedures that will cause delamination and reduction of the coating's performance. Surface preparation is critical to enable the composite to stay fixed in place onto the substrate in order to perform at its designed specifications.

Loctite® Surface Engineering Workshop offers methods that can create correct Surface Profile, and provide Reduction in Equipment Replacement, Reduction of Energy Consumption and Increase in Equipment Efficiency and Reliability. The workshop covers the following subjects. Please call Loctite® today to arrange a Surface Engineering Workshop for your plant!

Wear / Abrasion

- Wear / abrasion
- Traditional methods to prevent and repair wear / abrasion
- Wear resistant polymer composites – dissected
- How wear and abrasion affect metal surfaces and surface dynamics
- Advantages of wear resistant polymer composites versus traditional

Corrosion / Erosion

- Corrosion / erosion cycle
- Reasons for and types of coating delamination
- Traditional methods for corrosion erosion / chemical attack
- Polymer composites and their role in Surface Engineering