



MAINTAINING ASSET INTEGRITY IN THE MINING AND QUARRYING INDUSTRY

Belzona Protective Coatings and Engineering Composites

OUR HISTORY

Established in 1952, Belzona has pioneered innovative polymer technology that has revolutionised industrial repair and maintenance procedures. Belzona has a long experience in mining dating back to the 1950s, with a proven track record of Belzona 1111 (Super Metal) that was first used for mechanical element repairs and shimming applications. Belzona solutions quickly solve maintenance problems with in-situ applications while simultaneously eliminating the need to strip down or disassemble equipment. These cold curing solutions are safe and long lasting with no risk to workers and distortion of equipment.

Belzona's experience, ongoing product innovation and unrivaled technical support continues to provide an undeniable edge.



Durable coatings for corrosion, erosion and cavitation protection



Barrier coatings for protection against chemical attack



Elastomeric polymers for impact protection



Abrasion resistant systems for protection against severe erosion

INNOVATIVE SOLUTIONS TO ACHIEVE SUCCESS

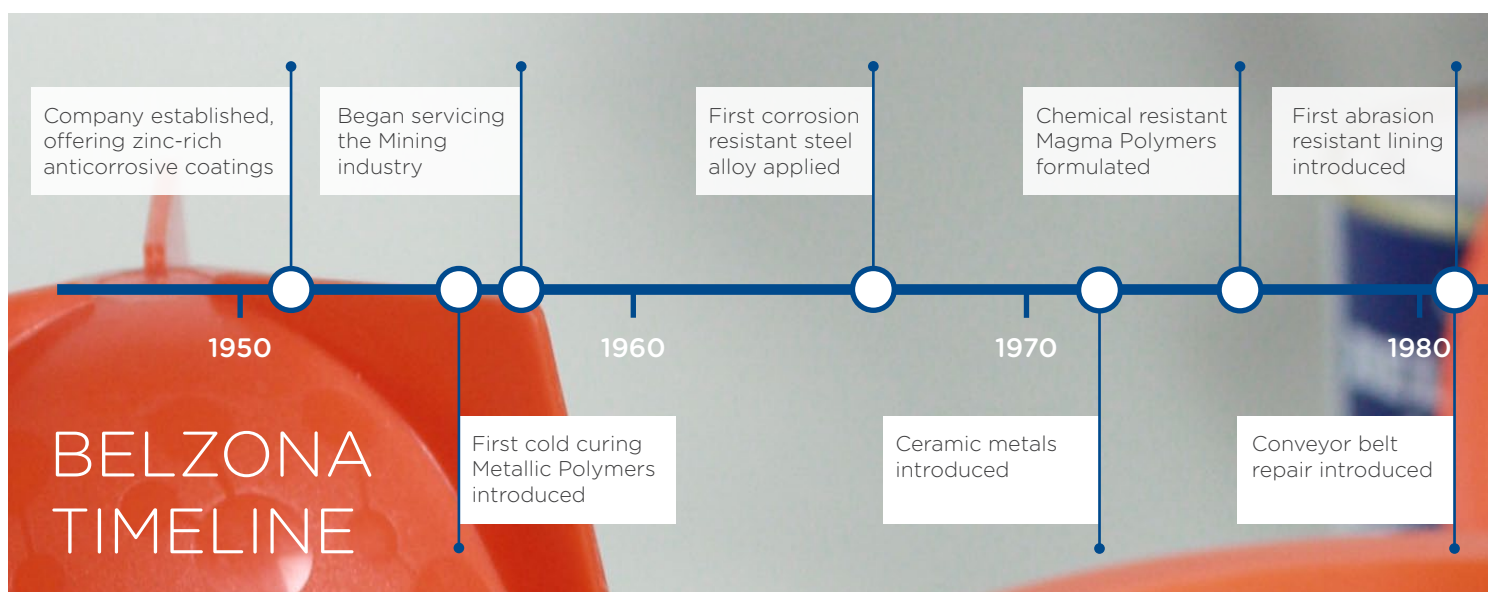
Each mining plant has its own unique set of challenges due to moisture, abrasion and the chemical environment. Mining equipment and structures are affected by highly aggressive environments, which may include:

- Abrasion is one of the major environmental conditions in mining that impacts the performance of equipment and structures. Equipment needs to move hard and abrasive material, from location to location, in processes, such as extraction, transportation, crushing and milling of metallic and non-metallic minerals;
- Exposure to corrosion due to the presence of water in wet, corrosive processes, such as flotation of the mineral and thickening of the concentrate;
- Exposure to harsh chemicals in the base-metal refining process that is conducted in acid environments, and the electrowinning process that is carried out in a very aggressive and corrosive sulfuric acid environment.

Belzona offers a wide range of repair composites, coatings and linings specifically formulated to withstand the harsh operating environments of the Mining and Quarrying industry. We provide quality products as well as expert know-how and application training to ensure the highest possible application standard.



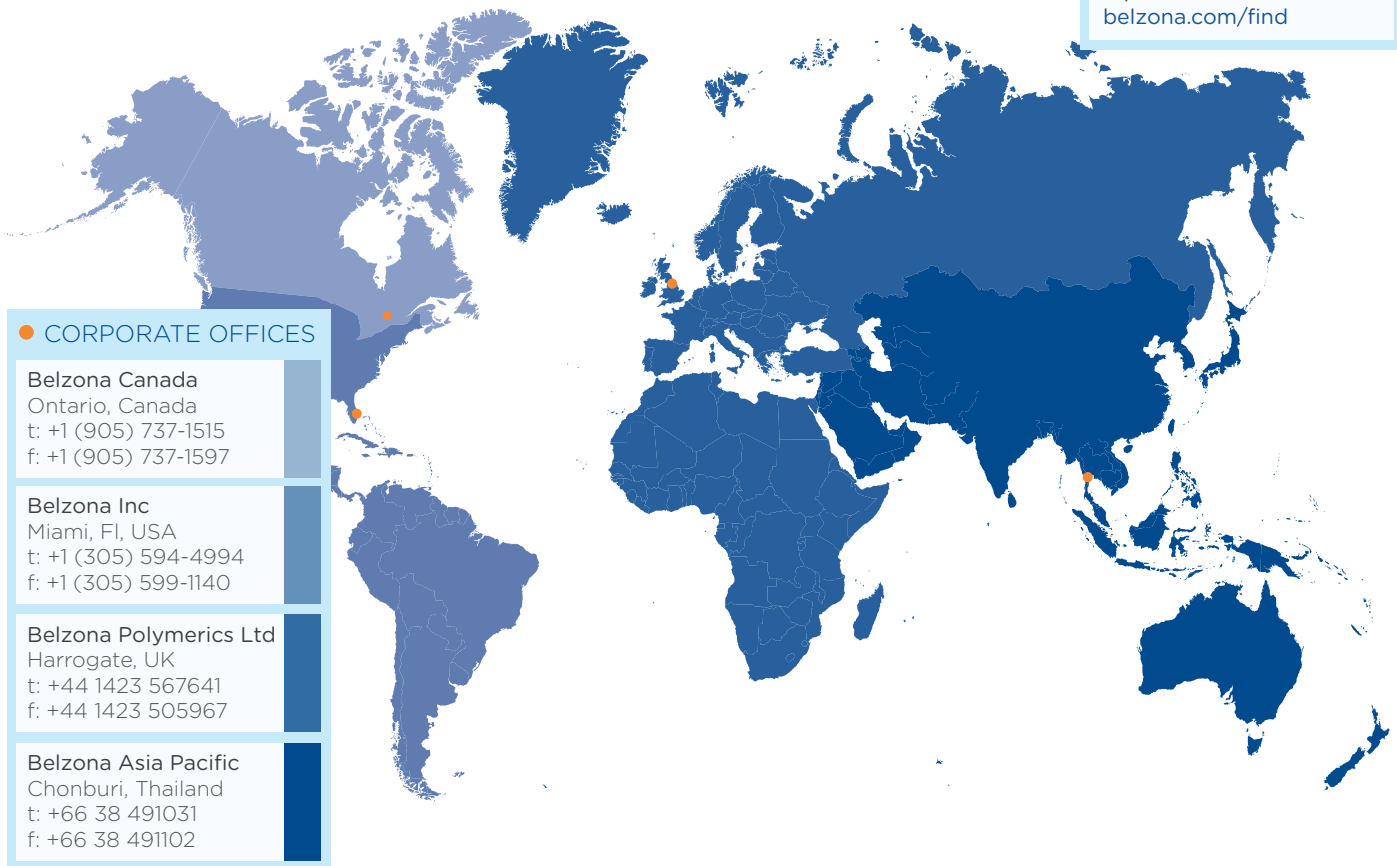
Video: Mining & Quarrying



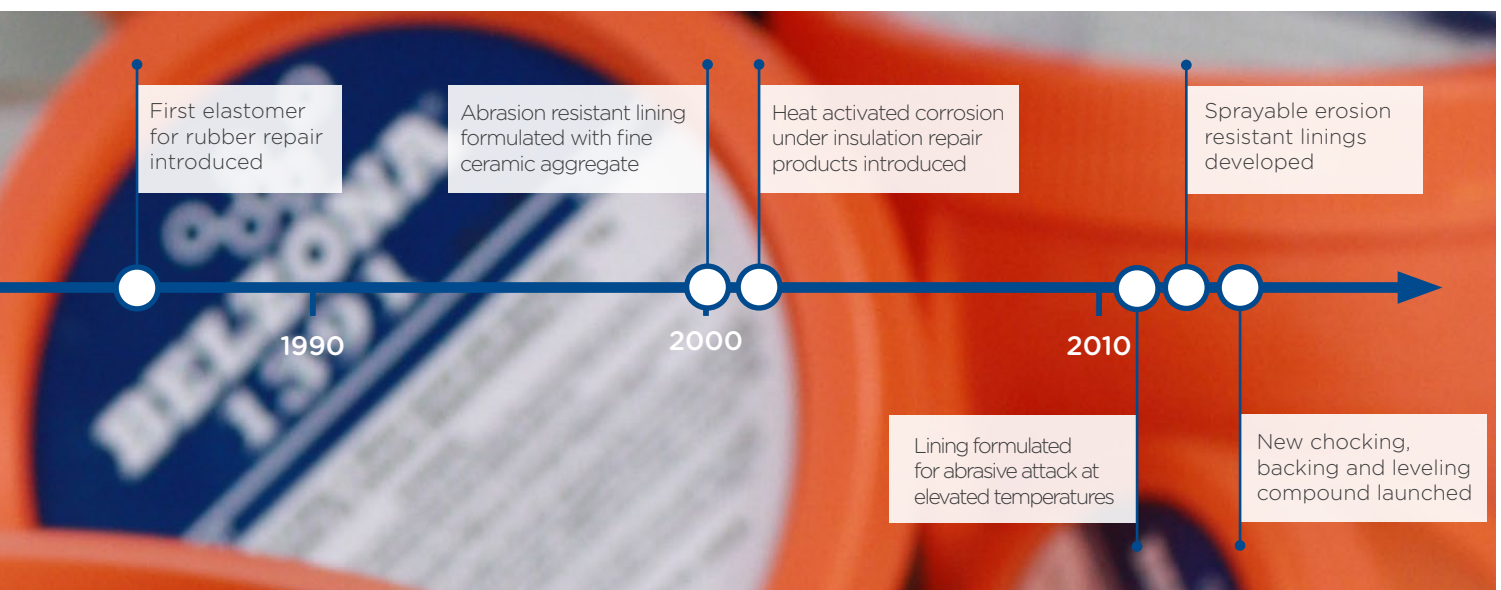
GLOBAL PRESENCE - LOCAL SUPPORT

Belzona has over 140 Distributors in more than 120 countries ensuring not only the availability of Belzona materials, but also specification support, project management, application and supervision services. Distributorships and their teams are supported by Belzona Corporate offices in Europe, North America and Asia.

To find your local Belzona representative visit belzona.com/find



Our expert Technical Consultants with years of field experience and advanced training are available to assist you every step of the way to: diagnose the problem, recommend a solution and provide on-site application support.



ABRASION RESISTANT MATERIALS FOR LONG-TERM PROTECTION

Cold cure composite materials for the repair and protection of materials handling equipment



When tested to ASTM standards, Belzona ceramic coatings for abrasion protection show minimum volume loss.

In the Mining and Quarrying industry, abrasion damages occur due to the friction and excessive wear from the rough sliding and impact of hard materials that are in contact with equipment surfaces.

Belzona abrasion resistant linings were first specified in 1981 to control the premature wear of machinery, a key culprit behind the downtime and financial losses in the Mining industry.

We supply a range of exceptional wear resistant lining options for dry abrasion and immersed situations. Our ceramic coatings and sprayable high molecular weight polymer composites have a proven track record of significantly slowing down erosion, while polyurethane coatings are designed to absorb and disperse the impact energy.

Belzona helps you to overcome the challenge of maintaining the plant in service during repairs, therefore reducing downtime. Our solutions allow in-situ labor without the need for hot work. As a result, loss of production and inconvenience are significantly decreased.

GRINDING MILL REPAIR AND PROTECTION

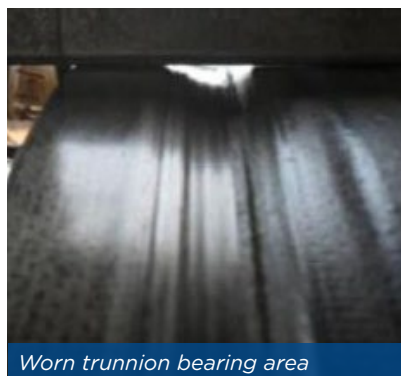
Severe wear occurs in different parts of grinding equipment, such as the liner, trunnion, trommel screen and external shell. Belzona has a wide array of products to withstand the friction and impact of grinding mechanisms. Belzona specifies the right solution for each problem area.



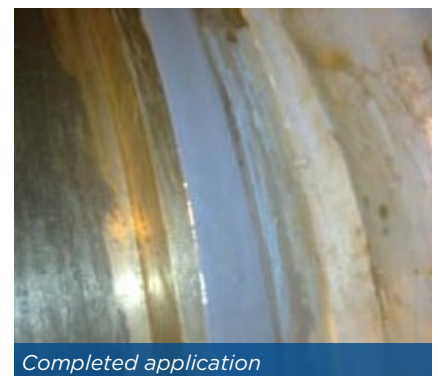
Damages to grinding mill lining



Lining areas rebuilt and protected



Worn trunnion bearing area



Completed application



Journal bearing ready to be sealed



Sealed journal bearing

RESURFACING MATERIAL TRANSFER SYSTEMS

Mining process materials can rapidly erode surfaces of bulk handling systems, such as hoppers, chutes, channels and feeders. The substrates are commonly constructed of erosion resistant alloys that are unsuitable for welding. Belzona abrasion resistant lining systems consisting of alumina tiles and epoxy polymers have been successfully utilized to withstand the effects of wear, thus avoiding welding procedures and minimizing downtime.



Damaged chute



Internal surface rebuilt



Abrasion resistant applied

REPAIRING PIPES AND DUCTS

Abrasive material can wear away pipes, typically occurring in the proximity of bends and T-junctions where material impinges on the pipe wall. Belzona ceramic polymers provide a seamless lining coupled with excellent abrasion and wear resistance against fine and coarse particles and high temperatures. Conventional methods or the replacement of pipes negatively affect plant operations by causing unpredicted shutdowns.



Torn pipe elbow



External plates bonded



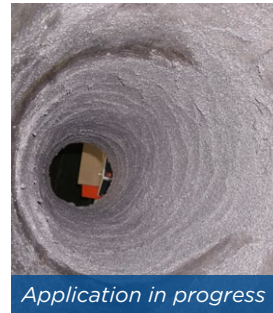
Application completed

LINING HYDROCYCLONES

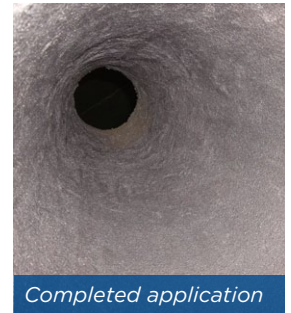
The particle size, percentage of solids, pressure and the intense flow of ore slurry cause high levels of abrasion to the linings of cyclone cones. Belzona materials are based on high molecular weight polymers and oligomers that incorporate abrasion resistant ceramic aggregates to withstand the aggressive environment.



Worn cyclone cone



Application in progress



Completed application

PROTECTING SCREW CONVEYORS

The constant abrasion due to the conveying of materials results in wear and corrosion to the auger and shaft can be minimized with the application of a Belzona abrasion resistant system. The troughs can also be rebuilt with a variety of Belzona products to extend the service life of the equipment and to eliminate the cost of replacement.



Eroded screw conveyor



Screw flights protection



Protection of the shaft



belzona.com/shm

ABRASION RESISTANT MATERIALS FOR LONG-TERM PROTECTION

Flexible rubber materials offer outstanding durability, elasticity, resilience, high abrasion and tear resistance

Rubber equipment and components commonly found in the Mining and Quarrying industry, such as conveyor belts, drive rollers, tyres and slurry pumps, will naturally wear away as a result of the exposure to heavy abrasion processes.

Belzona Elastomers were first introduced in 1985 to rebuild, seal and bond damaged rubber materials. Furthermore, these polyurethanes are used to fabricate custom or replacement parts when they are no longer available from the original manufacturer or in order to avoid spare parts inventory.

HEAVY DUTY TYRES

The tyres of off-road vehicles typically operate at low pressure, causing a great deal of compressive stress to the side wall of the tyre in contact with the ground. The stress enlarges splits and holes due to the stretching of the rubber. Belzona Elastomers quickly repair and prevent further deterioration, for that reason extending the life cycle of the tyres.

CONVEYOR SYSTEMS

Conveyor systems are exposed to heavy wear due to the abrasive nature of the materials that cause premature failure to its components, such as belts, fasteners and drive rollers. Replacement of the parts is an expensive alternative that also increases downtime. Belzona solutions have been found to provide economical in-situ repairs with minimum disruption to the plant operation.

For more information on rubber repair and protection visit belzona.com/2000



Belzona extends the life of mining truck tyres



Split on the tyres side wall



Tyre repaired with Belzona Elastomers

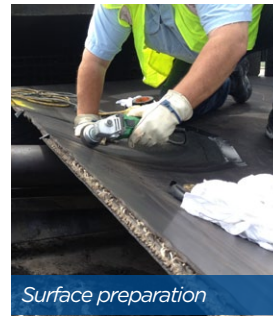


CONVEYOR BELT REPAIR

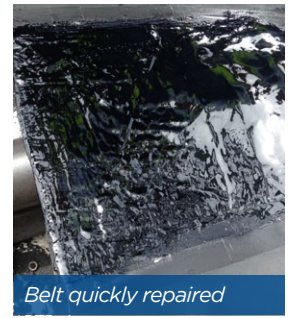
Conveyor belts constantly work under the demanding conditions of the mining environment, where the weight and abrasiveness of materials cause rips, tears, holes and slits. Belzona Elastomers provide outstanding abrasion and tear resistance, high elasticity and exceptional mechanical strength. Whether used for an emergency or planned maintenance, Belzona solutions provide long-term repair capabilities.



Damaged belt area



Surface preparation



Belt quickly repaired

DRIVE ROLLER GRIP

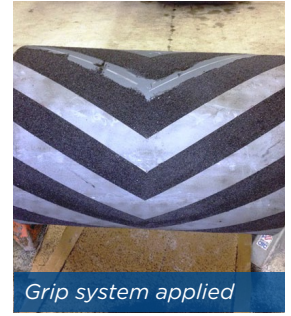
Loss of grip on the rollers cause belt slippages and reduce the loading capability. Belzona positive grip systems consisting of high strength metallic polymer composites and extreme durable aggregates, provide superior non-skid surfaces with outstanding and long-lasting adhesion. Conventional repairs would require complete dismantling of the rollers, causing unacceptable downtime to the plant.



Grip pattern applied



Application in progress



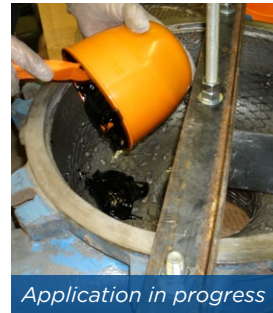
Grip system applied

SLURRY PUMP LININGS

Slurry pumps are widely used to transport corrosive and abrasive materials and are thus highly susceptible to damage from harsh operational environments. Belzona Elastomers and ceramic composites offer outstanding resistance against severe erosion to pump linings and impellers. A conventional approach to the repair would involve welding, resulting in distortion to the metal substrate.



Unprotected casing



Application in progress



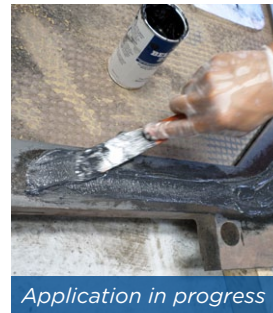
Casing protected

FILTER PRESS PLATE RESTORATION

The high pressure conditions and abrasive slurries in the mineral filtration process causes the filter plate edges to wear down, leading to an inefficient process. Belzona abrasion resistant materials restore the plate and allow the equipment to promptly return to service with its original filtering capacity.



Worn filter plate edges



Application in progress



Plate edges restored



Mining case study
database

EXCELLENT RESISTANCE AGAINST CHEMICAL ATTACK

Providing a durable barrier against a wide range of aggressive chemicals

Equipment in ore processing plants are under continuous contact with chemically aggressive materials. Belzona epoxy repair composites and coatings can rapidly repair and protect heavy duty machinery, providing chemical resistance against a broad range of substances and the ability to resist all concentrations of caustic solutions, 98% sulfuric acid and other acids.

Belzona products provide protection for surfaces damaged by chemical spillage or immersion as well as high adhesion to various substrates that include concrete, metals and tiles without specialist tools. The adhesion of Belzona magma polymers to concrete is stronger than the cohesive strength of concrete. Magma polymers can solidify within a few hours and achieve full chemical resistance properties in up to three days.

Magma polymer coatings were first used in the 1980s. These coatings are easily and seamlessly applied at a thickness of approximately 500 microns (20 mils), protecting and eliminating the risk of corrosion in the underlying substrate.

For more information visit
belzona.com/tanks



Flotation cells installation



Equipment under chemical attack



Thickeners in operation



Exposure to corrosive environments



FLOTATION CELLS

Damage in flotation cells is caused by the constant abrasion of the ore hitting the tanks walls. Galvanic corrosion occurs at the steel surfaces once abrasion starts. The sediment of the ore in flotation cells is very abrasive, thus affecting the tank floor. Belzona repair composites are used to fill the voids in the metal walls and Belzona erosion-corrosion resistant coatings are used to provide a seamless lining.

SX/EW TANKHOUSES

Most solvent extraction and electrowinning processes are carried out in a very aggressive and corrosive environment due to the presence of chemicals, such as alkalis, acids, and salts. Belzona magma polymers offer seamless coatings that protect tankhouses' walls and floors against chemical attack, assuring a long working life and minimising downtime.

THICKENERS

Solid components in thickeners begin to compress as they settle on the bottom of the tank. Chemical flocculants and coagulants are used to increase the performance of the process of thickeners. The combination of these chemicals plus the solids in the slurry are very aggressive to the thickener tank and its rake mechanism. Belzona immersion barrier coatings protect against chemical attack and prolong the working life of the equipment.

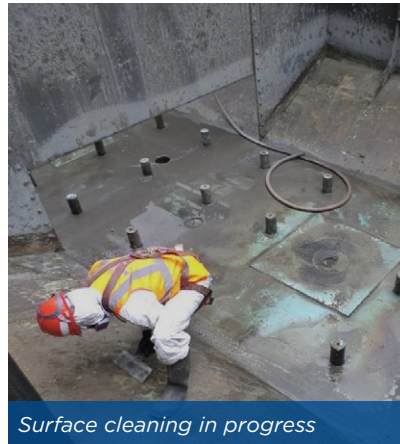
CONTAINMENT AREAS

Chemical spillage is inevitable and will corrode and deteriorate containment areas, such as bunds and sumps, that could lead to potentially catastrophic consequences and environmental pollution. The versatile application of Belzona's chemical linings, by brush or spray, can reduce both application time and downtime.

For more information visit
belzona.com/containment



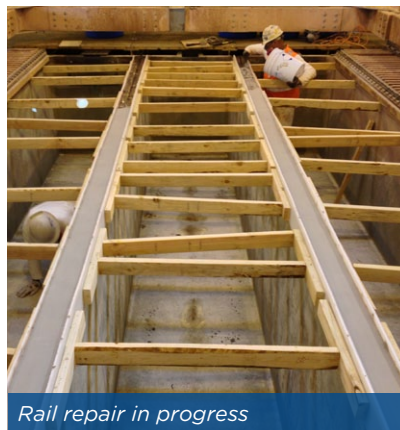
Video: Flexible
barrier coating



Surface cleaning in progress



Flotation cell protected with Belzona



Rail repair in progress



Completed lining application



Thickener with severe corrosion



Internal surface and rake protection



Unprotected containment area



Protection against chemical spillage

REINFORCED COMPOSITE REPAIRS TO RESTORE METAL PARTS

Belzona composite materials rebuild metal parts to their original profiles and exact dimensions



Traditional repair methods often offer welding, machining or replacement of parts, all of which can incur high costs and increase downtime.

Belzona can provide a wide variety of repairs, protection methods and performance enhancing systems for mechanical power transmission equipment, engines and casings in heavy equipment, such as loaders, excavators, crushers and mills.

Since its introduction in 1968, Belzona metallic polymers successfully repair metal components and offer excellent mechanical strength and longevity.

Our solutions deliver the durability required to withstand harsh industrial environments. Belzona cold cure epoxies are designed with the ability to bond to various metallic surfaces, including aluminum, cast iron and steel.

ENGINE REPAIRS

Water circulating through the engine block freezes and expands, or escapes from the system at the core plugs, causing the blocks to crack. The conventional repair by welding can cause deformation to the substrate or leave the welded area more brittle and susceptible to further cracking. Belzona metallic polymers safely seal cracked blocks with simple procedures while offering an inexpensive solution by avoiding costly engine substitutes.

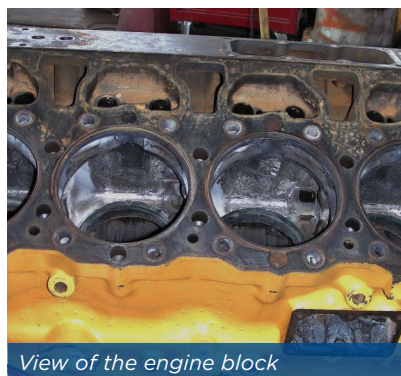
For more information visit
belzona.com/mechanical



Shimming application in progress



Shimming bucket teeth



View of the engine block



Engine repaired with Belzona



REBUILDING DAMAGED SHAFTS

Shafts become worn and damaged due to vibration, rubbing, abrasive contaminants and corrosion. Where it is impractical to strip a shaft, Belzona metallic polymers can repair in-situ without the risks that result from welding procedures.



Worn out shaft



Shaft rebuilding in progress

REPAIRING OVERSIZED KEYWAYS

Keyways become worn and oversized due to constant pressure from starting and stopping, causing vibration, misalignment, and stress on couplings. Belzona epoxy composite materials are designed to repair and prevent these common failures to mechanical power transmission equipment. Using a new key as a former, a perfect zero-tolerance fit is created. This simple repair saves time and money, while quickly returning the equipment to operation.



Enlarged keyway



Keyway repaired

PREVENTING BEARING HOUSING DISTORTIONS

Abrasive wear to bearing housings is a result of seizures and/or heavy loading. To provide in-situ and cost-effective repair solutions, Belzona paste grade metallic polymers are recommended to rebuild the oversized housings, allowing the machinery to rapidly return to service with minimum downtime.



Oversized housing



Housing repaired

REPAIRING CRUSHER BOWL LINERS

Movement and vibration causes wear and tear to crusher components, such as fasteners of the bowl liner. Belzona solves the problem in-situ, avoiding the need to stock spare parts. Our solutions deliver a significantly longer life to equipment and reduce expenses by eliminating the need for new parts.



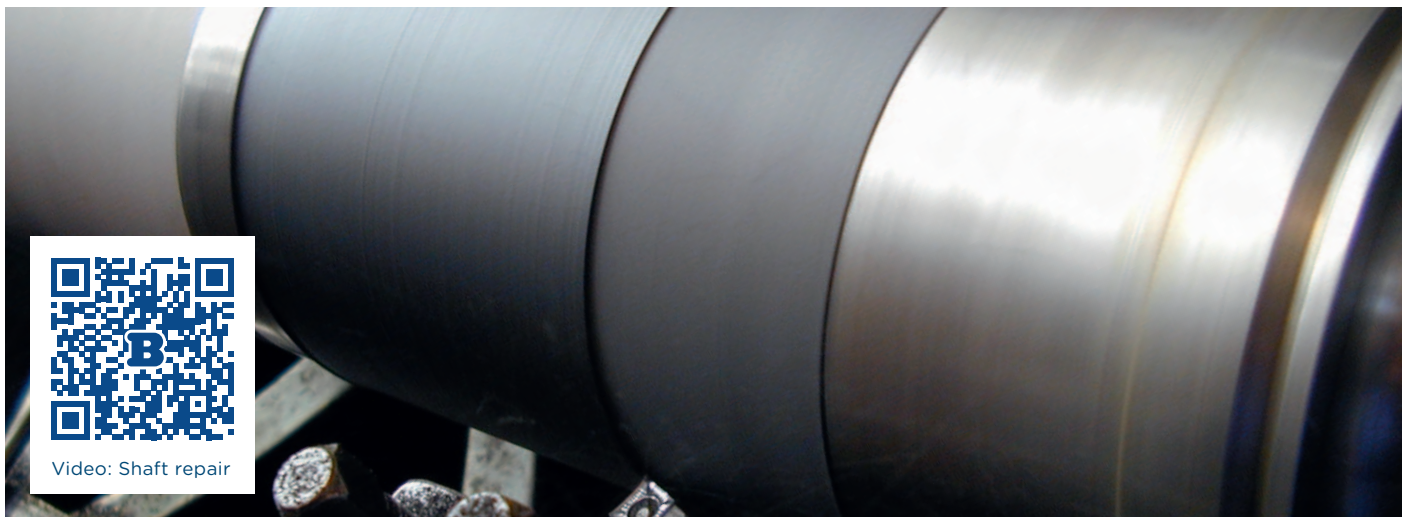
Surface preparation in progress



Rebuilding in progress



Video: Shaft repair



OPTIMISING THE STRUCTURAL INTEGRITY OF FACILITIES

Belzona polymeric materials provide durable internal and external protection from environmental attack

Machinery and equipment are integral to the smooth operation of a plant, however, structure deterioration has the potential to cause lengthy and costly downtime. Belzona has been providing reliable and cost-effective solutions for facilities maintenance since the 1960s.

ROOFING MEMBRANES

Belzona liquid applied polymeric membrane systems have been offering unrivaled water and weatherproofing for all types of roofing substrates as well as insulation since 1966. Additionally, its flexibility allows for complex architectural designs, seamless protection and movements in sympathy with the substrate, allowing for expansion and contraction. Emergency solutions are also available, allowing for the application to be carried out directly onto wet surfaces.

For more information visit
belzona.com/roof

WALL MAINTENANCE

Belzona provides a wide range of epoxy repair composites and coatings for walls susceptible to damage and leaking joints. Furthermore, Belzona provides protection from water ingress as well as physical and bacterial attack.

Our solvent free coatings can be easily applied without the need to interrupt the surrounding processes.

FLOOR REPAIR AND PROTECTION

Damaged and worn concrete and stone floors can be quickly repaired and protected using Belzona epoxy composites and coatings. Our solutions provide outstanding impact and abrasion resistance and also offer excellent chemical resistance against a wide range of chemicals.

For more information visit
belzona.com/floor



belzona.com/facilities



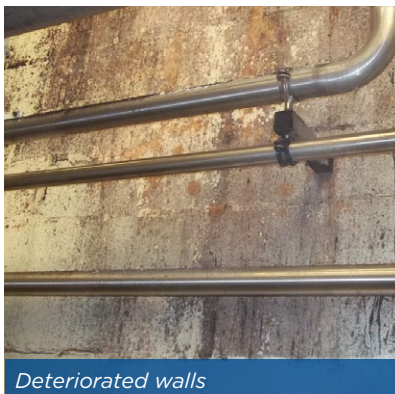
Buildings and Structures in the Mining industry



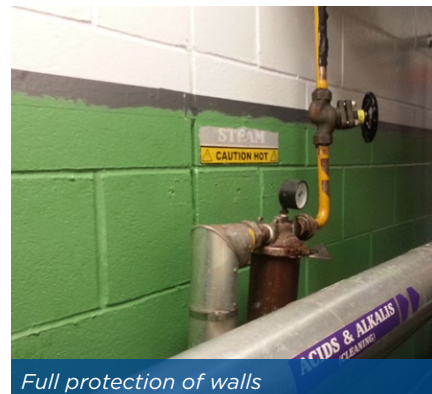
Unprotected roof



Roof protection in progress



Deteriorated walls



Full protection of walls



Worn spillage zone of floor



Protected spillage zone

STRUCTURAL INTEGRITY OF EQUIPMENT BASES

Belzona provides a cost-effective solution to rebuild bases and, in addition, to level and grout machinery and equipment

CONCRETE BASE REPAIR

Bases, plinths and supports suffer from damage caused by impact, vibration or chemical attack. The machinery and equipment of the above mentioned and their contents are extremely valuable assets, thus its protection is essential.

Belzona magma polymers are used for repairing, resurfacing and protecting concrete and stone. These epoxy based materials have overcome the limitations imposed from the use of cement, in which the most common constraint is the poor adhesion to the underlying substrate.

The extraordinary blend of an epoxy resin system with a selected quartz particle provides phenomenal bond strength to the surface when repaired. On the contrary, conventional mineral materials, such as concrete, slate and stone, would cohesively fail to bond.

Concrete repairs can take twenty eight days to cure, leading to a lengthy downtime. Whereas, magma polymers can solidify within a few hours and achieve their full chemical resistance properties in up to three days.

Belzona Magma-Quartz, introduced in 1972, has been successfully utilized in any desired consistency, whether it be a pourable consistency for grouting or a trowelable consistency for rebuilding.

SHIMMING, BACKING AND LEVELING

Excessive vibration and friction causes damage to machinery chocks and shims, affecting the equipment performance and operating reliability.

Belzona industrial chocking compound has been designed for the precise installation of engines, mills and other equipment. Belzona provides precise alignment per its non-shrinking properties whilst its high impact and compressive strength provides high load bearing capabilities.

Our self-leveling material is easy to use, thus reducing the installation time. In addition, the chocking compound offers a durable and non-corroding solution where alignment and stabilization of heavy equipment are essential.



Damaged bases of railroad tracks



Restoration in progress



Damaged concrete base



Completed application



Shimming excavator bearing seats



Completed injection



Chocking in progress



Precise alignment of the equipment

GLOBAL APPLICATION STANDARDS



PREQUALIFICATION

Belzona materials are subject to stringent independent and in-house testing, documented in the product specification sheets and chemical resistance charts. Testing is performed in our ISO 9001 audited laboratory to recognised standards as well as by external partners. Numerous high profile Mining and Quarrying companies prequalify the use of Belzona materials for asset maintenance.



SPECIFICATION

Optimum materials and application procedures are selected to meet specific design and operating conditions of the asset. Dedicated project engineers coupled with round the clock head office technical support allow for the correct material and application procedure to be specified.

We also maintain a comprehensive database accessible by the Global Belzona Distributor network, which facilitates sharing of information and experience, improving specification and application standards.



APPLICATION

Application standards, including surface preparation, are integral to the success of solution implementation. Belzona recognizes the need to set and monitor global application standards.

Applications are carried out by experienced and trained personnel. Belzona runs training programs with theoretical and practical courses, including on-site training programs. To ensure application standards are maintained, method statements, quality control procedures and daily inspection reports are performed.



INSPECTION

Inspection is carried out prior to, during and upon completion of the application to ensure Belzona systems are applied in accordance with our standards and client's requirements.

Upon nearing the end of the system's expected service life, the asset is inspected again and appropriate action recommended, which may involve minor repair work or no action, as Belzona systems tend to outlast projected service life.

BELZONA SOLUTIONS FOR THE MINING AND QUARRYING INDUSTRY

EROSION RESISTANT SYSTEMS for protection against harsh environments



COMPOSITE MATERIALS for high mechanical strength



CONCRETE REPAIR COMPOSITES for structural integrity



CHOCKING COMPOUND for shimming and leveling equipment



ABRASION RESISTANT ELASTOMERS for flexible repairs



MAGMA POLYMERS for the protection against chemical attack





ISO 9001:2008
Q 09335
ISO 14001:2004
EMS 509612

Belzona products are manufactured
under an ISO 9000 Registered Quality
Management System

UK • USA • Canada • Thailand

