



MAINTAINING ASSET INTEGRITY IN THE WATER AND WASTEWATER INDUSTRY

Belzona Protective Coatings and Engineering Composites

OUR HISTORY

Established in 1952, Belzona pioneered innovative polymer technology that revolutionised industrial repair and maintenance procedures. Today, Belzona is the world leader in the supply of polymer repair composites and industrial protective coatings and is continuously developing solutions to meet the ever-increasing market demand.



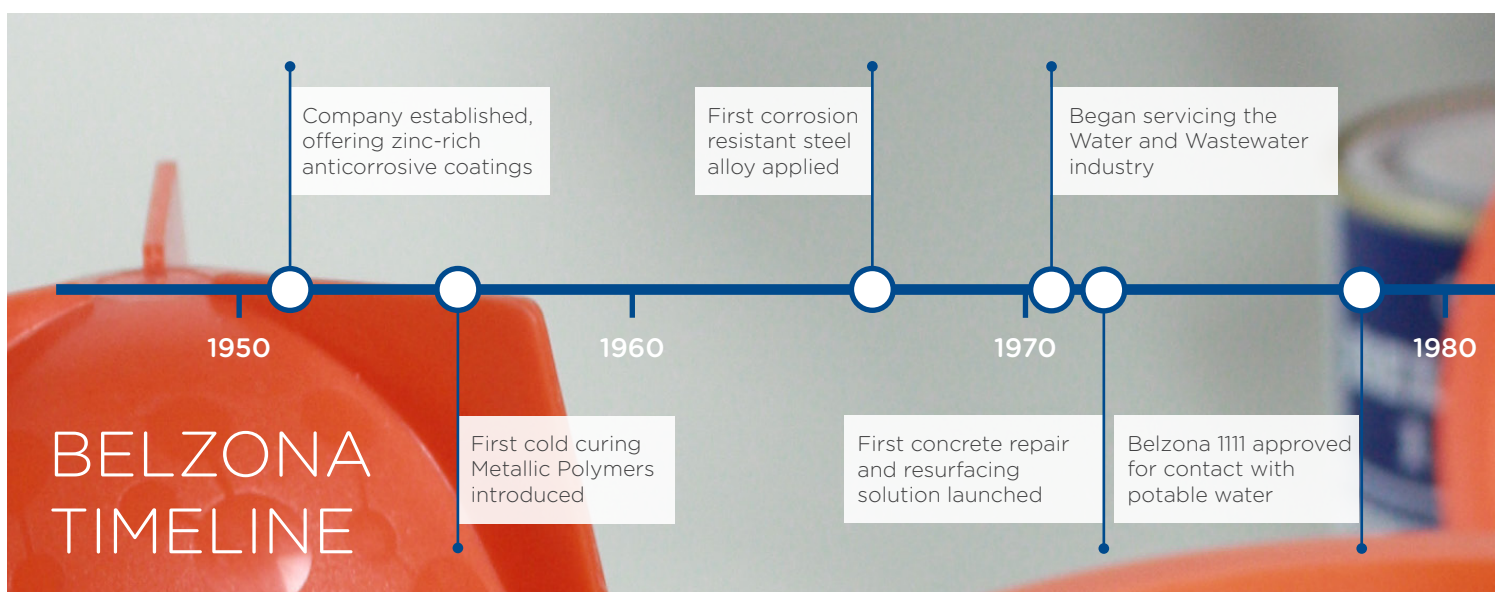
VERSATILE SOLUTIONS TO FIT SPECIFIC NEEDS

Water treatment plants present unique maintenance challenges. Corrosion, abrasion and chemical attack, together with the bacterial contamination and demanding application conditions found in water collection and treatment systems, require repair and protection solutions designed to withstand these harsh environments.

Belzona repair composites and protective coatings have been developed specifically for this market with full understanding of the causes of deterioration, as well as the application and cure challenges involved. Our unique solutions are designed to fit each client's specific needs, helping them to:

- Reduce capital expenditure
- Lower maintenance costs
- Improve efficiency and safety
- Simplify maintenance procedures
- Extend equipment and asset life

With a proven track record that spans over six decades, our carefully formulated materials successfully address the causes of deterioration to equipment and structures in the water and wastewater industry. We take pride in the quality of our materials as well as the comprehensive training and field support we provide to ensure the highest possible application standards.



GLOBAL PRESENCE - LOCAL SUPPORT

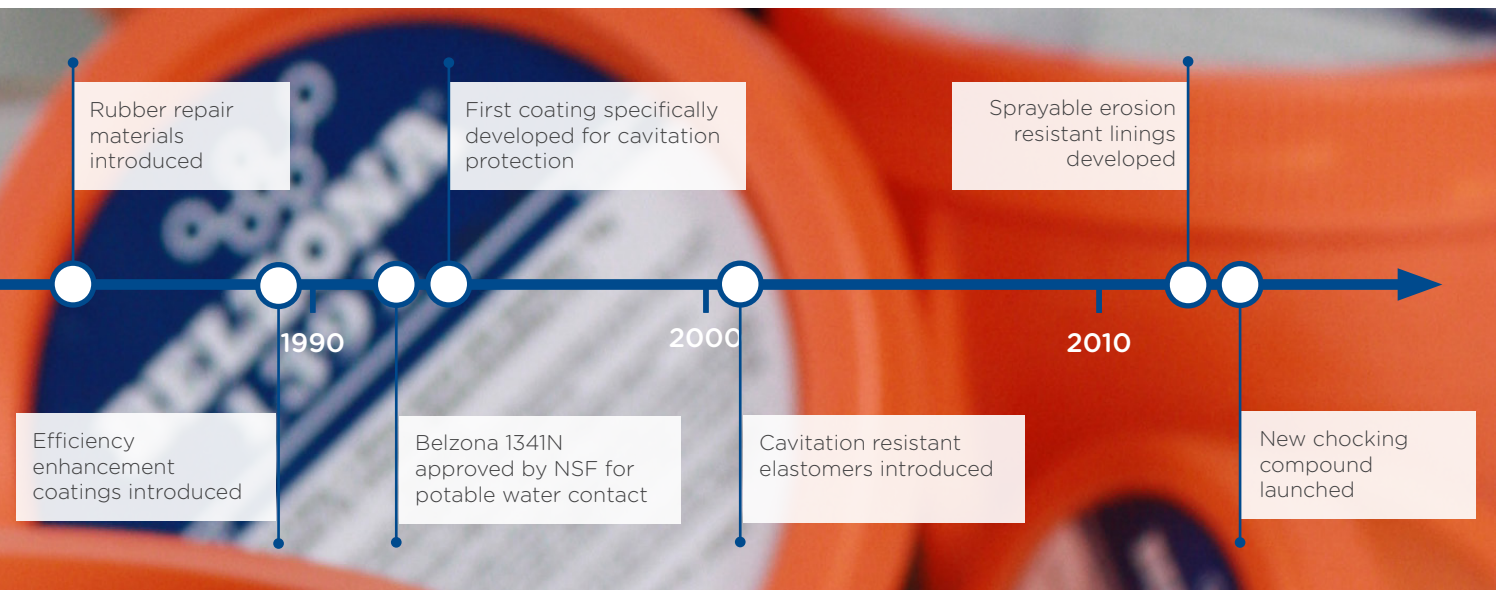
Belzona has over 140 Distributors in more than 120 countries, ensuring not only the availability of Belzona materials, but also specification support, project management, application and supervision services. Distributorships and their teams are supported by Belzona Corporate offices in Europe, North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

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

CORPORATE OFFICES

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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, discuss material selection options, recommend a solution and provide on-site application support.



EROSION AND ABRASION PROTECTION

Cold-applied repair composites and protective linings for abrasive environments

Equipment such as screw conveyors, slurry pumps and pipework used to handle solid waste materials in wastewater can quickly show signs of abrasive wear, resulting in the loss of wall thickness and consequent shortening of the equipment's operating life. Even thick steel designs intended to withstand these operating conditions will eventually suffer the effects of abrasion.

Abrasion Resistant Systems

The installation of abrasion resistant linings is common practice to slow down the abrasive process and extend the equipment life in service. For severe dry abrasive conditions, Belzona's 1800 Series of ceramic filled linings are proven to prolong the operating life of the component by providing a tough sacrificial lining. These solvent free materials, which incorporate hard ceramic aggregates, can be applied in situ at ambient temperatures, without the need for specialist tools to rebuild the damaged metallic substrate combining high adhesion values with high abrasion and wear resistance. New equipment can also be lined to extend its expected service life.



Belzona abrasion resistant coating extends the life of screw conveyor

For larger areas, Belzona alumina tiles can be bonded to the substrate and grouted with a Belzona material to form a high-performance abrasion resistant system. The alumina oxide used to manufacture the tiles has a hardness of 9 on the Mohs scale, making them extremely effective at resisting wear and abrasion.



Thin-wall defects on mixer



Rebuilt and protected against abrasion

Erosion-Corrosion Solutions

Fluid and slurry handling equipment can be repaired and protected against erosion-corrosion with our Belzona 1300 Series of repair composites and protective coatings. The paste grade repair material can rebuild the substrate to its original profile while our coatings will protect it, significantly slowing down the erosion-corrosion damage. Our latest Belzona 1300 Series materials incorporate new polymer alloy fillers providing even higher erosion resistance and facilitating spray application.

For brittle erosion conditions caused by a higher impact angle, Belzona's 2000 Series of resilient polyurethane coatings are frequently specified. These hard elastomeric materials will absorb the impact forces and deflect impacting materials. They can be used to repair damaged linings or be applied to new equipment.



Aerator taken out of service



Aerator protected with Belzona coating



SCREW CONVEYORS

The efficiency of a screw conveyor, determined mainly by the clearance between the tray and the screw, can be negatively affected by wear and abrasion caused by the solids being handled. Belzona's abrasion resistant materials are commonly used to rebuild the damaged areas and protect against future wear, increasing the performance of the conveying system. Belzona systems are specified based on the nature of the solids handled, as well as the operating temperature.



Screw conveyors prior to coating



Erosion resistant coating applied

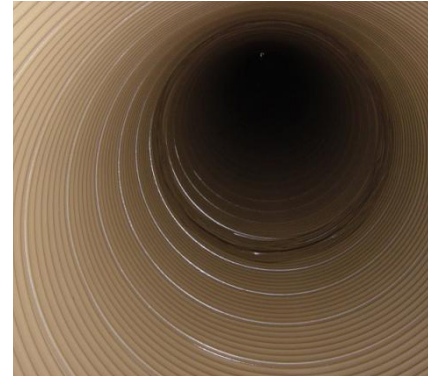
PIPEWORK

Pipe elbows are subject to severe abrasion and wear, especially on the inner surface of the outer circumference of the bend. This is due to the change in direction of the abrasive material which can cause excessive downtime across the whole system.

Belzona 1800 Series materials can be used in combination with Belzona alumina tiles to line the bend. If the metallic surface needs reinforcing due to holes or excessive loss of wall thickness, Belzona cold bonding technology can be performed in situ with a paste grade material, eliminating the need for hot work.



Pipe used to carry irrigation water



Spray applied internal coating applied

SLURRY PUMPS

Abrasion damage to the internal surfaces of slurry pumps can significantly shorten their service life. Coating the pump with a Belzona sacrificial lining ensures that the pump will stay in service for longer. Rubber linings can also be applied or localised repairs performed with Belzona 2000 Series polyurethanes.



Entrainment damage on slurry pump



Abrasion resistant coating applied

CONCRETE REPAIR AND PROTECTION

Repair and protection of concrete structures from degradation

The wastewater treatment process and related activities expose concrete to a variety of damage mechanisms including:

- Erosion-corrosion
- Physical damage
- Chemical and microbiological attack
- Carbonation
- Freeze-thaw cycles

High relative humidity levels, the need for cold temperature curing and the requirement to keep operations running smoothly make repairs increasingly difficult.

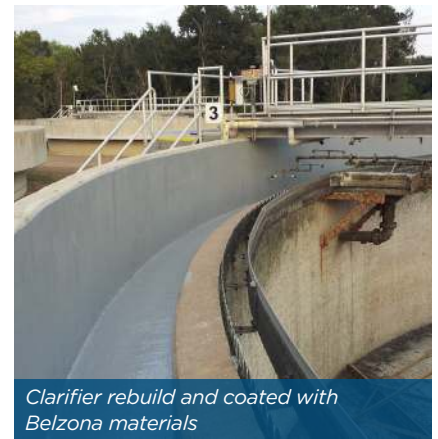
Belzona concrete repair composites are designed to rebuild and repair damaged concrete surfaces, restoring the original profile with a simple procedure that minimises downtime and can be completed without hot work. Belzona concrete repair systems will cure in a matter of hours, achieving full mechanical hardness soon after. Specialist coating solutions can then be applied to improve resistance to the common forms of wear and corrosion, extending service life with a minimum of financial outlay.

CLARIFIERS AND CHANNELS

PST tanks, clarifier walls and channels are vulnerable to attack by a number of factors. The most common problem is erosion and wear caused by water and abrasion due to entrained solids. Degradation can lead to leaks, mould and algae build-up and many other threats to efficiency and plant economy.

Belzona composites are designed to repair and protect sewage systems from common problems such as concrete spalling, wear, heavy loads, erosion and chemical attack. Belzona 4000 Series concrete repair materials can rebuild spalling concrete on equipment including clarifier troughs and channels, ensuring a fast and permanent solution. Facilities damaged under heavy load, like primary settlement tanks, can also be repaired using high strength materials which will strongly bond to existing concrete.

Our range of brush and spray-applied coatings provide long-term protection to a variety of equipment against corrosion and chemical attack as well as ensuring easy and safe application thanks to its solvent-free formulation.





EXPANSION JOINTS

Expansion joints can be damaged by a variety of factors, including corrosion and wear. Often, the original materials used to create expansion joints shrink during cure, allowing water and other liquids to ingress into the joint leading to degradation.

Through the use of Belzona elastomers it is possible to rapidly repair and seal expansion joints. High elasticity solutions can be cold applied and do not shrink during cure. Their excellent bond strength provides the ultimate long-term seal that can be applied to a range of surface materials such as concrete, natural rubber, nitrile, neoprene, SBR, polyurethane, PVC and steel.



Damaged PST tank drive track



Expansion joint sealed with Belzona material

BUNDS AND FLOORS

Chemical spillages will corrode and deteriorate the sumps and bunds designed to contain them, potentially leading to catastrophic consequences.

Cracks, deformation and poorly constructed manholes and bar screen chambers can be susceptible to infiltration and inflow into the network. Belzona can repair these areas and provide corrosion protection in order to extend their operational capabilities.

Belzona materials can be used to repair damaged concrete in situ with minimum downtime, whilst Belzona 4300 Series coatings can provide long-term chemical protection against acids and alkalis, even at elevated temperatures. Cold curing solutions can be simply applied by brush or spray with a minimum of downtime.



Leaking joints in sewage aeration channel



Repaired movement joint



Completed application



Chlorine contact tank with chemical attack



Surface prepared for repair application



Concrete protected with Belzona coating

INTERNAL SURFACE PROTECTION

Linings and repair composites for protection against corrosion and chemical attack

The chemicals used in the water and wastewater industries can be incredibly aggressive and cause severe damage to the internals of equipment including tanks, vessels, pumps and heat exchangers.

Microbial corrosion can cause sulphide stress cracking caused by the build up of sulphide-reducing bacteria. Acidic and alkaline liquids can attack substrates, leading to thin- or through-wall defects.

Belzona has a range of solutions to repair and protect against corrosion. These solutions have proven resistance to the aggressive chemicals used by modern water treatment facilities and can be effectively applied to a range of equipment and facilities to extend working life.

PUMP REPAIR AND EFFICIENCY ENHANCEMENT

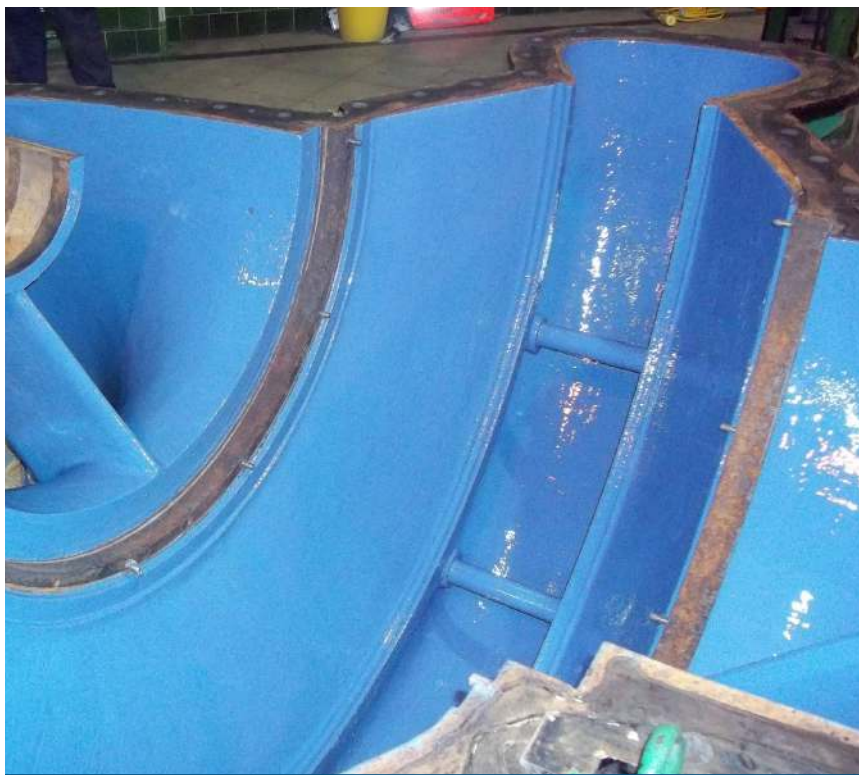
Pumps are under the constant threat of erosion and wear as they handle large quantities of liquid throughout their working day. Entrained solids can damage pump elements such as rotary pump lobes which wear down quickly. Casings can be eroded by constant water flow and substrates can be corroded by chemicals, sewage and other materials involved in the treatment process. Long lead times from manufacturers often means that an out of service pump can cause lengthy delays and shutdowns and outright replacement is often prohibitively expensive.

Belzona materials repair and protect damaged pump components, minimising downtime by using simple and effective cold-applied solutions to restore the parts to full functionality.

Coatings such as Belzona 1341 (Supermetalgilde) can be applied to increase efficiency and prevent wear. Efficiency increases of up to 7% have been recorded on new equipment and up to 20% on refurbished equipment. They are drinking water approved, meaning that they are certified as safe for contact with potable water supplies.

VALVES

Erosion-corrosion is a problem which affects most valves due to the environments in which they operate coupled with the operating regime which can induce impingement and cavitation damage. Belzona materials can be used to rebuild and re-profile the valve bodies and coat and protect from further erosion-corrosion damage.



Pump internals coated with Belzona materials for long-term corrosion protection



Corrosion and erosion on internal surfaces caused by sewage water



Internal surfaces rebuilt and protected with Belzona coating



Damaged plug and seat valve caused by crevice and galvanic corrosion



Valves rebuilt with Belzona ready to be re-installed

TANK/VESSEL INTERIORS

Steel vessels, ranging from drum thickeners to digester tanks, are subjected to a range of harsh conditions by the water and wastewater industry. The release of methane in the digestion process can attack steel substrates and cause serious corrosion, whilst the chlorides and sulphates present in wastewater sludge can similarly corrode steel vessel interiors, and these are just examples of the many forms of attack.

Concrete tank interiors can be eroded by submersion in water or corroded by chlorine chemical attack, leading to cracks and leaks, resulting in compromised water quality and plant efficiency.

Belzona coating solutions are designed to protect tank and vessel interiors by providing a chemical resistant internal lining.

Belzona 4311 (Magma CR1) is designed to protect secondary containment areas against chemical attack, whilst Belzona 5811 (Immersion Grade) can protect surfaces subjected to constant or regular immersion in aggressive liquid environments.

For the water and wastewater industry, Belzona 5811DW2 and Belzona 5812DW are approved for contact with potable water. Belzona solutions and coatings are easy to apply and cure at ambient temperatures, allowing for rapid application and a minimum of downtime. Providing a long-lasting, effective solution, they are an excellent alternative to lengthy replacement or repair works.



Tank showing severe corrosion



Tank lined with Belzona 5811



Unprotected mixing tank



Tank coated with Belzona 5811



New water filter tanks



Filters fully protected against erosion-corrosion



EXTERNAL CORROSION REPAIR AND PROTECTION

Plate bonding technology, flexible coatings and composite wraps

For over 60 years, Belzona has pioneered the design and manufacture of materials to restore, protect and reinforce pipework, tanks and other critical equipment from the effects of external corrosion and environmental damage. Utilising a high quality Belzona material will ensure the long-term integrity of the asset.

TANK EXTERIORS

Sealant failure, adverse weather conditions or condensation can lead to corrosion of the tank base, leakage and ultimately tank failure. To combat these problems, Belzona formulated a tank base sealing system in the mid 1960s, which is liquid applied in conjunction with a reinforcement sheet. As a flexible membrane, the system possesses a unique breathable feature; liquid cannot permeate the membrane. However, the vapour escapes freely, allowing for the base seal to stay dry.

Tank roofs are susceptible to rapid deterioration caused by the corrosive vapour of the storage media and is exacerbated by external forces. Roof damage can be safely repaired in situ and on-line, eliminating the need to drain the tank.

Tank walls can also suffer from corrosion and leaking welds. Belzona repairs can be carried out on-line with the use of cold bonded doubler plates or a reinforced composite system.

Spray-applied, corrosion resistant epoxy coatings provide easy to clean surfaces and long-term corrosion protection for tank external surfaces.



Belzona lining applied to a newly fabricated process vessel



Holed tank



Tank repaired by cold bonding



Tank roof restored with a Belzona protective coating



PIPEWORK

Pipework is vulnerable to corrosion, which can lead to a loss of efficiency, damage other elements and pose a health and safety hazard. Design and maintenance scenarios that would historically involve hot work can be completed with the use of polymeric cold bonding composites that add structural strength to the pipe.

There is a variety of solutions that can help to repair, restore and protect pipework and flanged components from these threats. Thin- and through-wall defects caused by external corrosion can be repaired using a Belzona wrap system or a simple cold plate bonding technique.

Belzona 1100 Series repair composites are applied and cure at ambient temperatures, improving safety and reducing downtime.

Belzona SuperWrap II is a composite wrap solution that can be cold applied and boasts a high mechanical strength. Compliant to ASME PCC-2 and ISO 24817, it is designed to handle pressurised leaks in safety-critical systems and can be used to either prevent or repair damage with a minimum of cost and downtime.

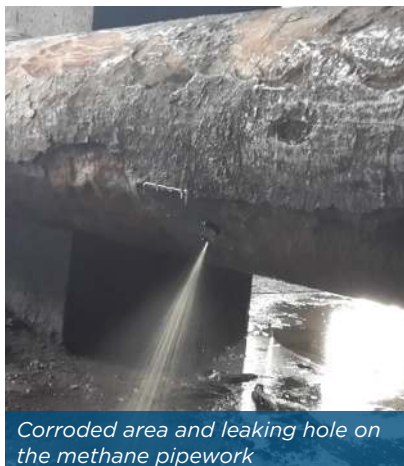
In addition, Belzona flange face forming technology eliminates the need for conventional repair methods involving hot work and allows for a simple application in emergency situations, especially in areas with limited access.



Newly fitted pipework showing signs of failure



Chemical resistant coating applied



Corroded area and leaking hole on the methane pipework



Belzona cold bonding technology applied to damaged areas

REPAIR OF MECHANICALLY DAMAGED EQUIPMENT

Composite materials for rebuilding metal parts to their original profiles and exact dimensions

The repetitive or constant motion involved in the mechanical elements of the water and wastewater industry can cause serious damage to equipment. Erosion, abrasion and wear can degrade and damage mechanical equipment, compromising a range of components such as keyways, shafts, bearings, agitator blades and more.

This equipment can be difficult to replace, and it is often financially prudent to repair them in situ instead. Belzona solutions are specifically designed for maintenance and repair work. They can be applied cold, in-situ and without the need for lengthy downtime or expensive specialist tools.

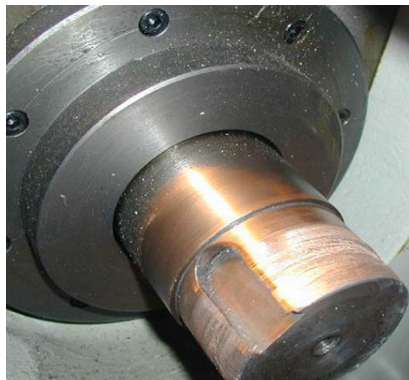
SHAFTS AND KEYWAYS

Shafts become worn and damaged due to vibration, friction, 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.

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.

BEARING HOUSINGS

As well as erosion and galvanic corrosion, bearing equipment can be damaged by abrasive wear. Constant contact and repeated pressures can damage and deform bearings and their housings, which in turn can lead to total mechanical failure if not addressed. Paste grade metallic polymers can be used to rebuild bearing housings with a minimum of downtime. These solutions offer high mechanical strength, extending the lifetime of mechanical components and helping to reduce the risk of repeat problems.



Damaged keyway housing and scored shaft



Keyway housing and shaft repaired with Belzona material



Former in place during in-situ shaft repair



Shaft rebuilt with Belzona material



SHIMMING, CHOCKING AND LEVELING

Excessive vibration and friction causes damage to machinery chocks and shims, affecting the equipment performance and operating reliability. Belzona's industrial chocking compound has been designed for the precise installation of engines, mills and other equipment.

Belzona chocking compound provides exact alignment per its non-shrinking properties, whilst its high impact and compressive strength provides high load bearing capabilities.

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



Newly installed equipment requiring chocking



Belzona 100% solids chocking compound applied



Pouring Belzona 7111 for precise alignment



New equipment set into place



Video: Belzona Chocking and Shimming

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.

Belzona materials are approved by classification societies from all around the world including NSF International (National Sanitary Foundation- US) and Water Regulations Advisory Scheme (WRAS) meaning they are suitable for contact with potable water.



SPECIFICATION

Optimum materials and application procedures are selected to meet specific design and operating conditions of the asset. Dedicated Belzona trained specialists 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 recognises the need to set and monitor global application standards.

Applications are carried out by experienced and trained personnel. Belzona runs training programmes with theoretical and practical courses, including on-site training programs. Combined with water and wastewater specific application specifications, method statements, quality control procedures and daily inspection reports, we strive to ensure application standards are maintained.



INSPECTION

Inspection is carried out by certified inspectors (e.g. NACE) 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 WATER AND WASTEWATER INDUSTRY

ABRASION RESISTANT MATERIALS
for long-term repair and protection



MAGMA POLYMERS
for the maintenance of floors and concrete structures



COATINGS AND LININGS
for erosion and corrosion resistance



PASTE GRADE COMPOSITES
for metal rebuilding



COLD BONDING AND SHIMMING
to replace hot work



MEMBRANE SYSTEMS
for flexible and microporous sealing



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