



BELZONA POLYMERIC SOLUTIONS FOR MACHINERY AND EQUIPMENT

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 manufacture of polymer repair composites and industrial protective coatings and is continuously developing solutions to meet the ever increasing market demand.



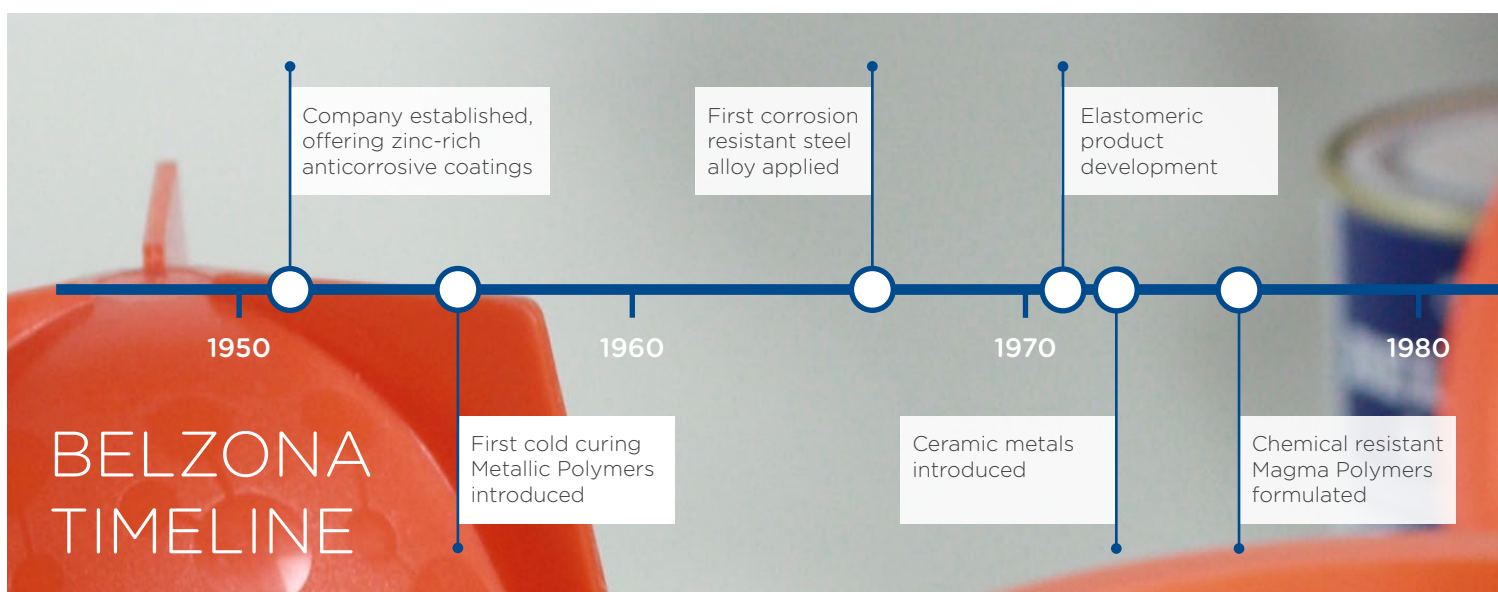
NOVEL SOLUTIONS TO AGE-OLD PROBLEMS

In service machinery and equipment is exposed to a variety of damage mechanisms that can severely deteriorate the integrity of a system. Whilst erosion, corrosion and physical damage pose a threat to many sectors, we understand that the real issues are downtime, efficiency decline, profit losses and safety hazards created by the root problem.

As a result of over 60 years of continuous development, Belzona provides a complete range of innovative repair and protection systems for all types of machinery and equipment. Our products have stood the test of time by providing high performance solutions which are proven to last, helping clients to:

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

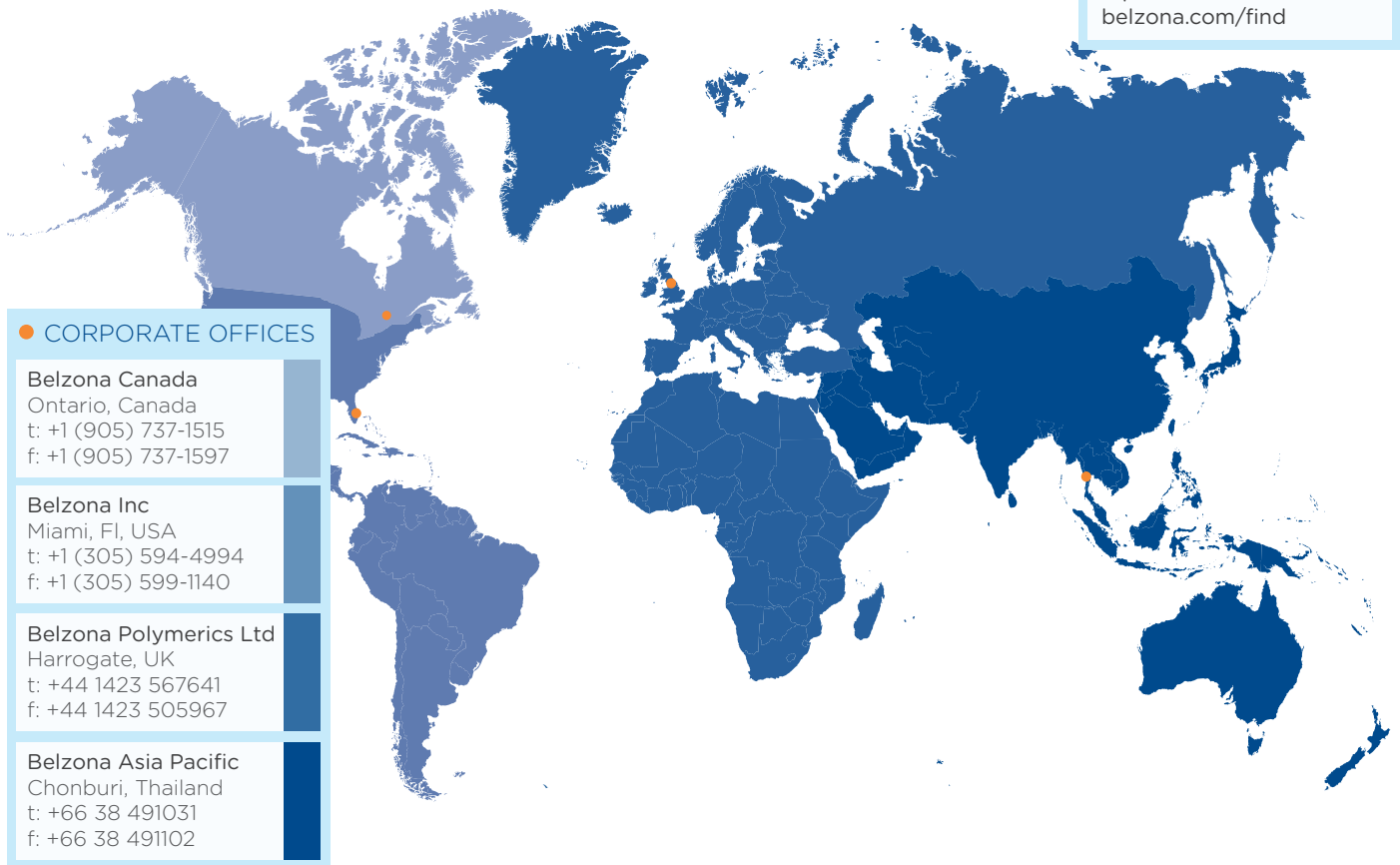
Our unique solutions are engineered to withstand the most aggressive environments and operating conditions such as erosion, corrosion, abrasion, chemical attack and mechanical damage, as well as high pressures and temperatures.



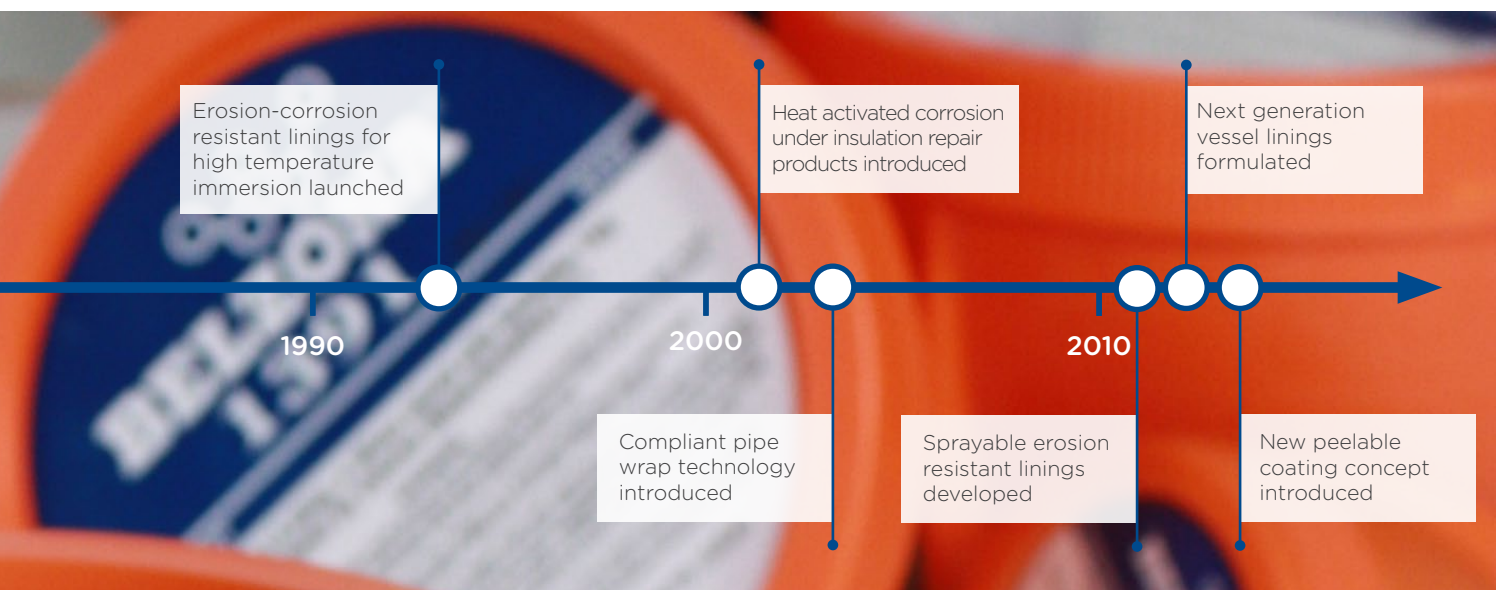
GLOBAL PRESENCE - LOCAL SUPPORT

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



ENGINEERING COMPOSITES

For the repair, rebuilding, sealing and bonding of rigid components

Erosion, corrosion and physical damage of components can frequently lead to downtime, efficiency decline, profit loss and safety hazards. Replacement of the component or the use of repair techniques such as welding can easily become costly and will not solve the root of the problem.

As a result of over 60 years of research and development, Belzona has developed a range of two-component repair and rebuilding materials based on the latest polymer technology. These cold curing systems can safely repair damaged machinery and equipment and offer long-term protection against corrosion, erosion and other forms of mechanical damage. By minimizing equipment failure and ongoing maintenance, these easy to apply materials reduce the need for spare parts, cut downtime and extend equipment service life.

Belzona's composites combine easy and safe application with outstanding mechanical properties. The versatile product range provides a variety of working times, cure time, temperature and degree of required surface preparation.



- DURABLE**
Toughness and excellent adhesion
- EASY TO USE**
No specialist tools required
- SOLVENT FREE**
No shrinkage during cure
- COLD APPLIED**
Safe to use

Product Selection Guide	Belzona 1111	Belzona 1121	Belzona 1131	Belzona 1151	Belzona 1161	Belzona 1212	Belzona 1221	Belzona 1251	Belzona 1311	Belzona 1511	Belzona SuperWrap II
Adhesion (grit blasted steel) – above 13 MPa (ASTM D4541)	●	●		●	●	●		●	●	●	●
Compressive strength – above 82 MPa (ASTM D695)	●	●		●	●	●		●	●	●	
Dry heat resistance – above 140°C [○]; above 190°C [●]	●	●	●	●	○	●	○	●	●	●	
Approved for contact with potable water – WRAS [○]; NSF [●]	●					○	●				
Rapid cure						●	●				
Extended working life [○]; heat activated [●]		○						●		○	
Surface tolerance to oil/water contamination					●	●					
ASME PCC2 / ISO 24817 compliant wrap											●

*For further information and advice please contact your local Belzona representative.

BONDING

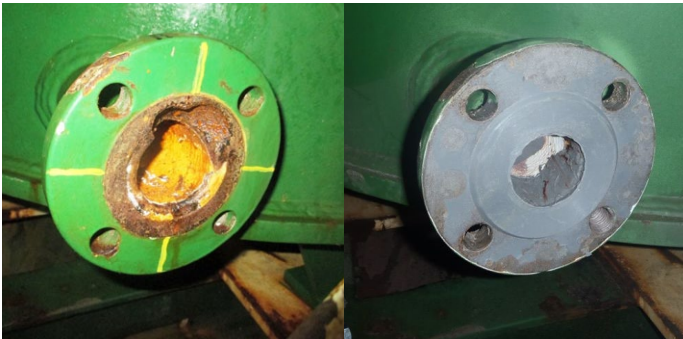


Cold plate bonding on tank

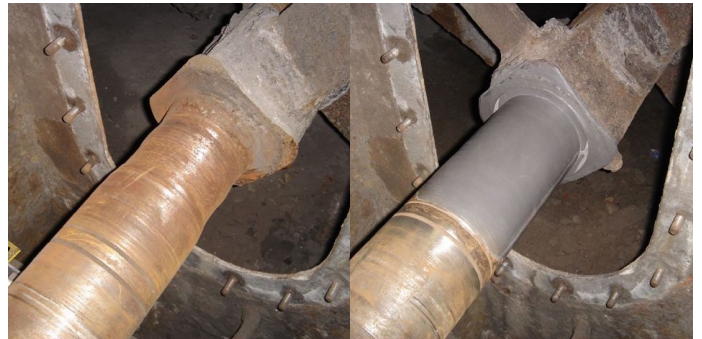


Pipe support bonded

FORMING AND REBUILDING



Damaged flange face reformed



Shaft rebuilt to its original profile in situ

WRAPPING AND PATCHING



Wrap repair on pipework



Defect on tank sealed by patching

SEALING AND FILLING



Sealing of leaking pipework



Wet cylinder liner refurbished

PROTECTIVE LININGS

For the coating, protection and upgrading of rigid surfaces

Equipment can suffer from various physical and mechanical problems, including general and localised corrosion, erosion, chemical attack, wear and cavitation. All these deterioration mechanisms may affect the equipment's performance, considerably increasing its lifetime running cost. Coating these assets with corrosion and erosion resistant materials can not only offer enhanced protection, but also increase their efficiency levels, lower maintenance costs and extend their life in service.

Belzona provides a variety of solvent free coatings designed for the protection of equipment against erosion, corrosion and abrasion damage. Cold curing epoxies allow for rapid application minimising downtime whilst providing long-term protection. Specialist coatings incorporating dry abrasion, chemical and high temperature resistance, or a combination of these properties, ensure Belzona has a solution for almost all service conditions.

Belzona's range of coatings is easy to mix and apply by brush or spray, and cure at ambient temperature or in service. Many of these coatings meet national and international standards for drinking water and food contact.



- DURABLE**
Excellent erosion-corrosion resistance
- SOLVENT FREE**
No shrinkage during cure
- CHEMICAL RESISTANT**
Withstands a wide range of chemicals
- HIGH ADHESION**
Long service life

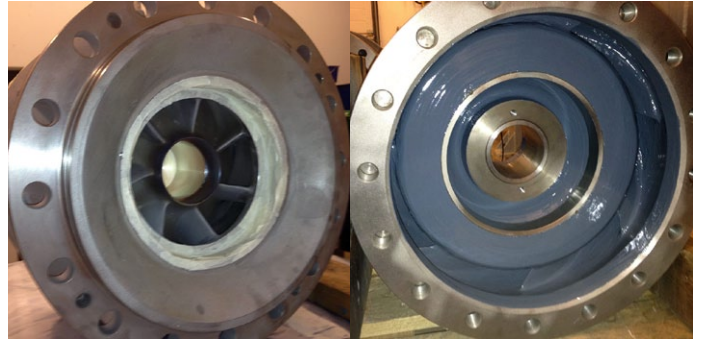
Product Selection Guide	Belzona 1321	Belzona 1331	Belzona 1341	Belzona 1381	Belzona 1391	Belzona 1391S	Belzona 1391T	Belzona 1392	Belzona 1523	Belzona 1593	Belzona 1811	Belzona 1812	Belzona 1813
Tensile shear adhesion (grit blasted mild steel) – above 15 MPa (ASTM D1002)	●	●	●	●	●	●	●	●	●	●	●		●
Dry heat resistance above 200°C	●				●	●	●	●	●	●			●
Operation under continuous immersion – below 95°C [○]; above 95°C [●]	○	○	○	○	●	●	●	●	●	●			
Erosion-corrosion protection from flowing media – good [○]; excellent [●]	●	●	○	●	●	○	●	●	●	●	●	●	●
Heavy wear resistance											●	●	●
24-hour overcoat window		●	●	●		●	●		●	●			
Approved for contact with potable water			●										
Suitable for spray application		●	●	●		●			●				

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EROSION-CORROSION PROTECTION

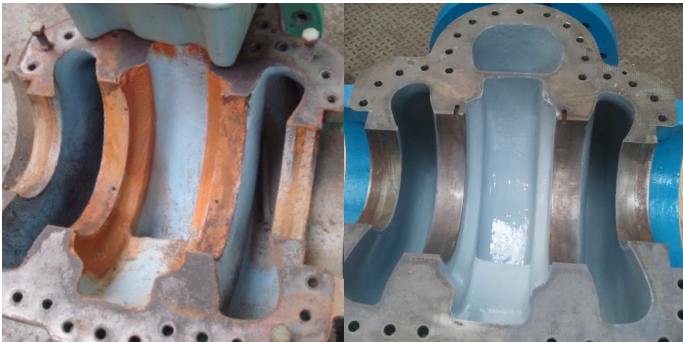


Heat exchanger coated for erosion-corrosion protection

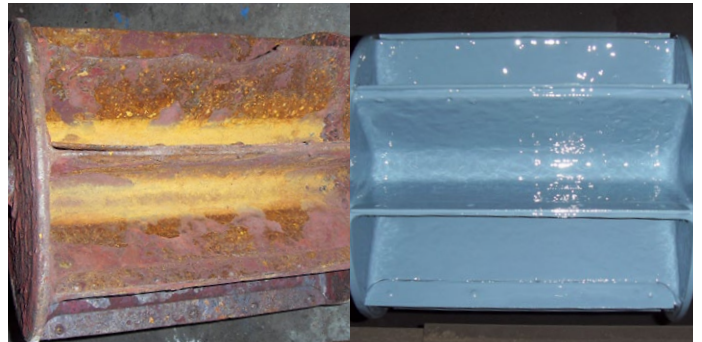


Internal coating of seawater lift pump chambers

EFFICIENCY ENHANCEMENT



Pump casing coated for protection and efficiency improvement



Vacuum pump rotor protected from erosion-corrosion damage

ABRASION PROTECTION



Mixer rebuilt and protected against abrasion

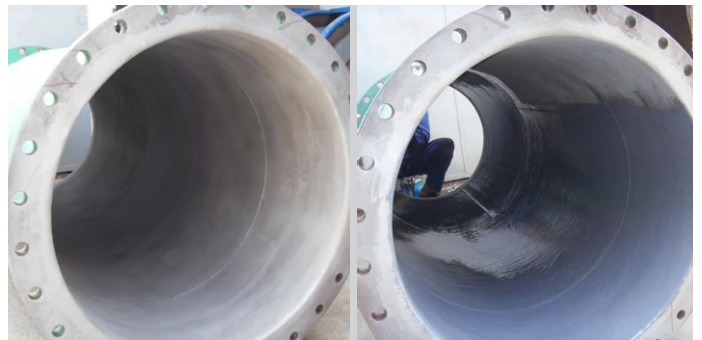


Archimedes screw protected against abrasion

HIGH TEMPERATURE/PRESSURE AND CHEMICAL PROTECTION



Vessel lined for corrosion protection at elevated temperatures



Discharge pipes protected from acidic slurry attack

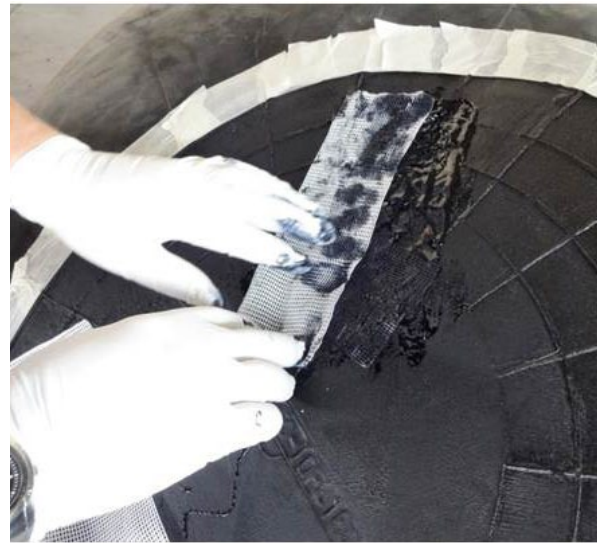
FLEXIBLE POLYMERS

For flexible repair and coating applications

Flexible components and linings on metallic equipment can suffer from extreme erosion, abrasion and impact damage. Traditional repair methods such as hot vulcanising can be time consuming as well as requiring special equipment and hot work. Alternatively, the equipment could be replaced but this process can be highly expensive.

Belzona's Flexible Polymers are high performance cold curing polyurethane systems designed for the repair and casting of rubber components, as well as lining of metallic substrates. These cold applied materials can be used in-situ where durability, elasticity, high abrasion and tear resistance are required to repair and protect machinery and equipment subject to abrasion, cavitation, erosion, corrosion and impact damage. The resulting repairs are extremely durable, yet retain the elastic properties of the original material.

Belzona's Flexible Polymers do not require any hot work and allow for simple and safe application, minimising cost, downtime and health and safety risks. These versatile materials can be used to repair damaged parts and linings or cast new parts.



- DURABLE**
Toughness and excellent adhesion
- IMPACT RESISTANT**
Withstands high impact forces
- FLEXIBLE**
Moves in sympathy with the substrate
- COLD APPLIED**
Safe to use

Product Selection Guide	Belzona 2111	Belzona 2121	Belzona 2131	Belzona 2141	Belzona 2211	Belzona 2221	Belzona 2311
Hardness (Shore A) – above 70 [○]; above 85 [●] (ASTM D2240)	●	●	●	●	○	○	○
Tensile strength – above 9 MPa [○]; above 15 MPa [●] (ASTM D412)	●	●	●	●	○	○	○
Elongation – up to 500% [○]; up to 1,000% [●] (ASTM D412)	○	○	○	○	●	●	○
Tear strength – above 4,000 kg/m [○]; above 6,500 kg/m [●] (ASTM D624)	●	●	●	●	○	○	○
Abrasion resistance	●	●	●	●			
Fluid grade [○]; paste grade [●]	●	○	○	○	●	○	●
Rapid cure							●
Cavitation resistance (ASTM G32)				●			

*For further information and advice please contact your local Belzona representative.

IMPACT DAMAGE REPAIR



Oil suction and discharge hose repaired



Damaged floating hose restored

ABRASION AND CAVITATION PROTECTION

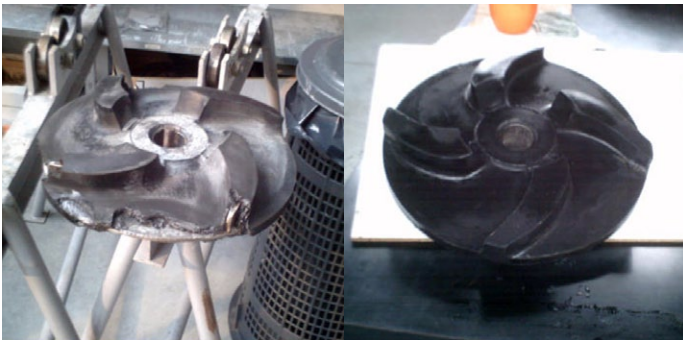


Ships rudder protected against cavitation



Hoppers lined for abrasion protection

CASTING AND RECONSTRUCTION

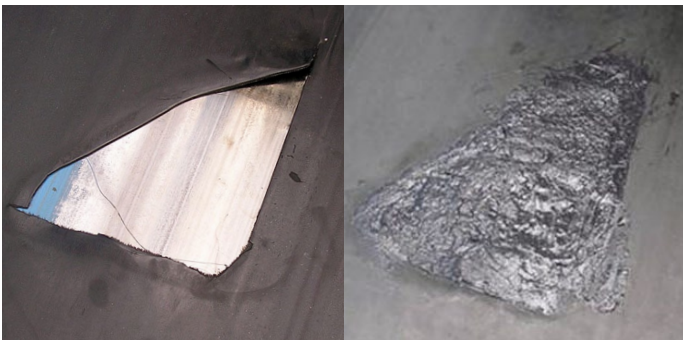


Severely damaged impeller restored



Expansion joint repaired

EMERGENCY REPAIR



Damaged conveyor belt repaired



Tyre repaired in-situ

CONSTRUCTION POLYMERS

For the rebuilding, securing and protection of machinery and structures

Equipment bases and foundations can suffer from impact, vibration and chemical damage as well as environmental degradation, affecting the overall performance and operating reliability of the asset. Traditional repairs such as the use of new concrete to rebuild the damaged areas can require lengthy downtime and usually need reapplication within the equipment lifetime.

Belzona's Construction Polymers allow for a rapid and durable repair and protection of damaged bases and foundations. These epoxy based repair materials adhere strongly to the existing concrete and cure in a matter of hours, achieving full mechanical hardness soon after. Their high compressive strength, chemical and abrasion resistance, together with a simple application method, make them ideal for the repair of damaged bases and fixing of anchor bolts.

In addition, Belzona's Construction Polymers can be used for shimming applications, providing 100% contact and allowing for a simple installation of equipment that will prevent vibration issues usually experienced by mechanical fixings.



- COMPRESSIVE STRENGTH**
Withstands high loads
- CHEMICAL RESISTANT**
Withstands a wide range of chemicals
- SOLVENT FREE**
No shrinkage during cure
- IMPACT RESISTANT**
Withstands high impact forces

Product Selection Guide	Belzona 4111	Belzona 4131	Belzona 4141	Belzona 4181	Belzona 4301	Belzona 7111
High impact strength	●	●		●	●	●
Dry heat resistance – above 140°C [○]; above 190°C [●]	●	○	○	○	●	
Shimming and chocking	●	●		●		●
Compressive strength – above 80 MPa [○]; above 100 MPa [●] (ASTM D695 ambient cure)	○	○			○	●
Chemical resistance – moderate [○]; excellent [●]	○	○	○	●	●	
Non-shrinking – 100% solids	●	●	●	●	●	●
Lightweight material for application onto vertical/overhead surfaces			●			
ABS and Lloyds Register approved						●

*For further information and advice please contact your local Belzona representative.

CASTING AND REPAIR OF CONCRETE BASES



Vessel supports repaired by shimming



Electrolyte pump base restored

SECURING OF ANCHORING BOLTS



Screen base repaired



Anchors set on gearbox

SHIMMING AND CHOCKING



Tank support on chemical containment area secured



Installation of pump base

TANK BASE REPAIR AND SEALING



Tank base fillet installed



Sealing of tank base

ENVIRONMENTAL BARRIER POLYMERS

To protect against and reduce environmental impact

Equipment aging and deterioration can occur as a result of exposure to adverse weather conditions, salt spray and chemical attack. In response to an increasing demand from industry and government requirements, Belzona has developed a wide range of high performance coatings to protect equipment and structures and reduce environmental impact.

Belzona's Environmental Barrier Polymers are high performance systems for the long-term protection of machinery and equipment subject to corrosive, chemical and environmental attack. With the ability to be applied by brush or airless spray, areas suffering from environmental attack can be effectively protected.

Belzona's wide range of environmental coatings are designed to cover a variety of application and operation requirements, including on-line application on hot surfaces, application on wet and underwater situations, severe chemical attack and operation under immersion.



- WEATHERPROOF**
Prevents environmental damage
- CHEMICAL RESISTANT**
Withstands a wide range of chemicals
- HIGH ADHESION**
Long service life
- EASY TO USE**
No specialist tools required

Product Selection Guide	Belzona 3411	Belzona 4311	Belzona 4331	Belzona 4341	Belzona 4361	Belzona 5811	Belzona 5811 DW2	Belzona 5831	Belzona 5841	Belzona 5851	Belzona 5892	Belzona 5111	Belzona 6111
Adhesion (grit blasted steel) – above 13 MPa (ASTM D4541 ambient cure)		●	●	●	●	●	●				●		
Dry heat resistance – 150°C or above [○]; 200°C or above [●]		●	●	●		○	○		●	○	●		●
Corrosion protection [○]; including operation under immersion [●]	○	●	●	●	○	●	●	●	○	○	●	○	○
Chemical resistance – moderate [○]; excellent [●]		●	●	●	●	○		○	○	○	○	○	
Suitable for spray application		●		●		●	●				●	●	●
Surface tolerant – surface preparation [○]; including water tolerance [●]	○							●	○	○			
Flexibility (crack and movement resistant)	●				●								
Approved for contact with potable water – WRAS and NSF							●				●		

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CORROSION UNDER INSULATION BARRIER PROTECTION



Protection against corrosion under insulation on vessel



Coating against corrosion under insulation on hot pipework

SURFACE TOLERANT COATINGS



Corroded pipework coated



Offshore production platform leg protected

EXTERNAL CORROSION AND WEATHERING PROTECTION

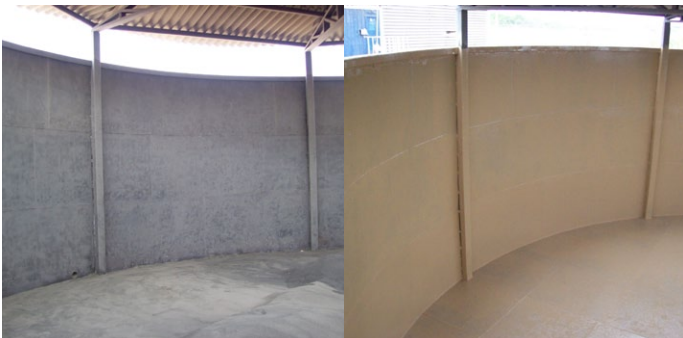


Tank external protected



Flange encapsulated for corrosion protection

PROTECTION AGAINST CHEMICAL ATTACK



Long-term protection provided to tank walls



Secondary containment area coated for chemical protection

GLOBAL APPLICATION STANDARDS



PREQUALIFICATION

Belzona materials are subject to stringent independent and inhouse testing, documented in the product specification sheets and chemical resistance charts. Testing is performed in our ISO 9001 audited laboratory to recognised standards, including ASTM, ISO and NACE.

Belzona products are approved by classification societies and companies from all around the world, including Lloyds Register, DNV GL, ABS, CCS, RS, KR, WRAS, Bureau Veritas, NSF, Nato, GE Hitachi Nuclear Energy, Ford and General Motors, among others. In addition, our products have received acknowledgements from the U.S. Navy and the U.K. Ministry of Defence.



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, particularly with respect to 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 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 the 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 the Belzona systems tend to outlast projected service life.

BELZONA SOLUTIONS FOR MACHINERY AND EQUIPMENT

ENGINEERING COMPOSITES

for repair and rebuilding applications



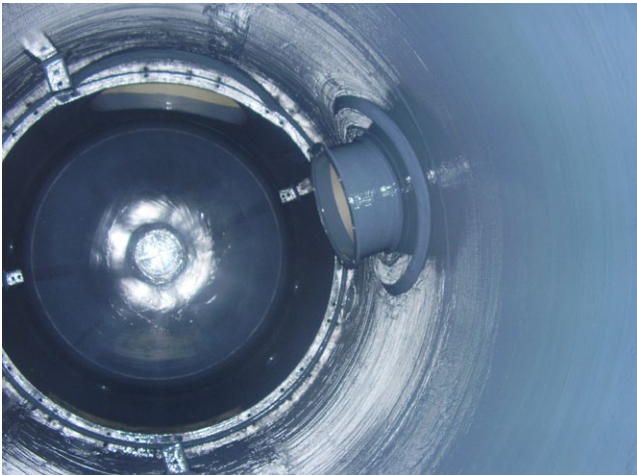
PROTECTIVE LININGS

for protection and upgrading



HIGH PERFORMANCE LININGS

for resistance to high pressures and temperatures



FLEXIBLE POLYMERS

for flexible repair and coating applications



REPAIR AND SHIMMING MORTARS

for installation and securing of machinery



ENVIRONMENTAL BARRIERS

for protection against environmental impact





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

