

The logo features the word "Ultraseal" in a bold, dark blue sans-serif font. It is centered within a stylized blue atomic symbol consisting of three elliptical orbits with arrows indicating a clockwise direction.

**Ultraseal**



**Impregnation Sealants**



## A PEDIGREE SECOND TO NONE



Ultraseal International has been at the forefront of impregnation technology for more than three decades, supplying high-quality sealants for the effective impregnation of all types of castings to solve the problem of porosity. If untreated, porosity can result in costly performance and reliability problems of components during their life cycle.

Today the company is a long-term partner to many of the leading global automotive manufacturers and tier one suppliers as well as manufacturing companies in a wide variety of other sectors.

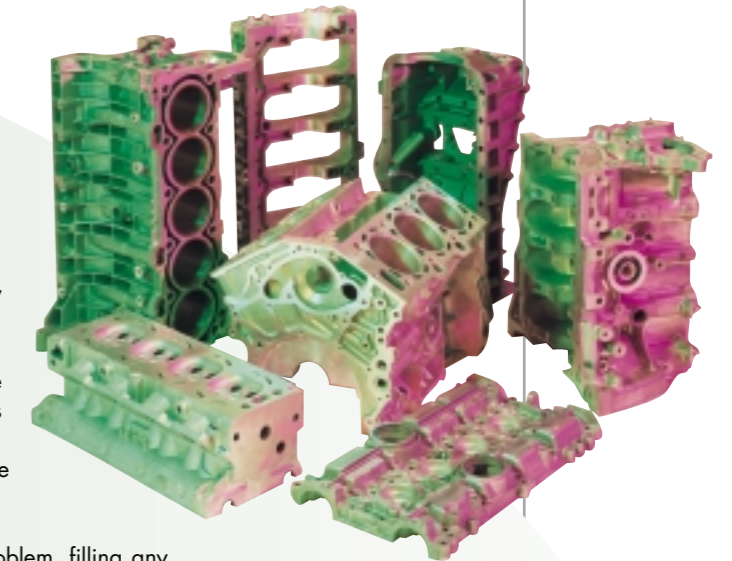
Founded in 1967, the company operates from its global headquarters in Coventry, in the UK. All of the company's manufacturing operations are based there, ensuring total control on quality and allowing clients to access turnkey solutions to this specialised process, whether their need is simply for ongoing sealant supplies or for the design and supply of bespoke automated systems.

Ongoing investment in research and development and a commitment to delivering the very highest levels of product quality and service have made Ultraseal International universally acknowledged as the leading global force in impregnation.

Indeed, the company's advanced products have enabled impregnation to become established as a vital integrated process in manufacturing today, giving added value and cost savings while focusing on environmentally friendly solutions.



## WHAT IS IMPREGNATION?



Porosity is a phenomenon that occurs in materials, especially castings, as they change state from liquid to solid during the manufacturing process. Impregnation is a cost effective, permanent solution to the problems that may be encountered as a result of such porosity.

Holes or defects may be created that are too small to be seen by the naked eye and if these are permeated by gas or fluid, significant and costly quality problems can arise, even leading to the failure of the component in service through leaks or surface defects.

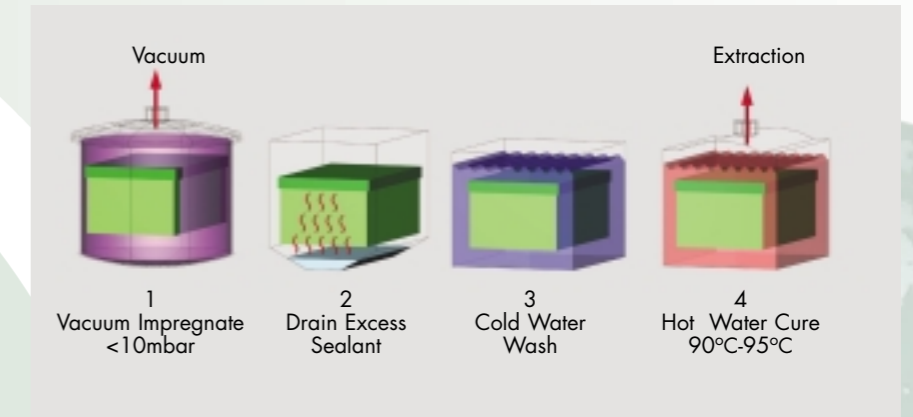
Vacuum impregnation is the permanent solution to this problem, filling any voids with a stable yet flexible material that is resistant to attack from heat, oils or chemicals. The process is sub-surface and can be performed on raw materials or the finished machined part, causing no dimensional change or contamination to the component.

Impregnation as a means of treating porosity has been employed since the 1950s, although traditional sealants such as sodium silicate or polyesters have since been replaced by more effective and environmentally friendly methacrylate based products.

It is Ultraseal International's commitment to continuous improvement over the years that has convinced companies of the benefits of impregnation as a genuine quality enhancement rather than a rectification process.

Porosity can be found in many materials but is particularly prevalent in aluminium die castings, where three main types may be identified:

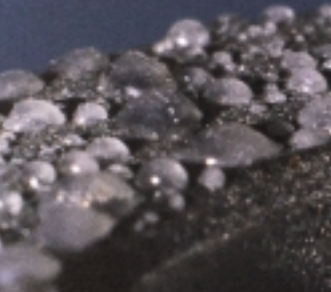
- **FLOW POROSITY**, resulting in surface or internal defects caused by poor pressure conditions in the process.
- **GAS POROSITY**, usually internal, caused by trapped gases of various kinds in the die.
- **SHRINK POROSITY**, the most common and most difficult to control, caused by the change in volume as the metal changes state from liquid to solid.





## METHACRYLATE SEALANT

## A MILESTONE IN SEALING QUALITY AND PERFORMANCE



**TOUGHNESS AND FLEXIBILITY ALONGSIDE OUTSTANDING ADHESIVE QUALITIES MAKE ULTRASEAL PC504/66 THE MOST ADVANCED SEALANT OF ITS KIND IN THE WORLD TODAY.**

Launched in the 1970's and progressively refined, Ultraseal PC504/66 methacrylate sealant is established as the benchmark for sealing performance and quality in a wide variety of industries and applications.

As well as greater productivity levels, this pioneering sealant was the first to offer consistently high quality, while also avoiding the safety and environmental issues associated with its predecessors.

These factors saw Ultraseal PC504/66 rapidly become the preferred choice worldwide in sectors ranging from military and aerospace components to high-volume automotive engines. With a proven track record spanning more than a quarter of a century in these demanding applications, it offers unrivalled quality in terms of sealing performance and temperature stability.

Exhaustive trials in Europe, USA and Japan - the world's most technically demanding markets - show it can operate effectively between -50°C and 200°C, in metal castings, plastic mouldings, sintered components and other porous materials.

Ultraseal PC504/66 also offers low shrinkage during polymerisation, making for outstanding void filling capacity, while the product's low viscosity enables faster, deeper penetration into even the finest micro-porosity.

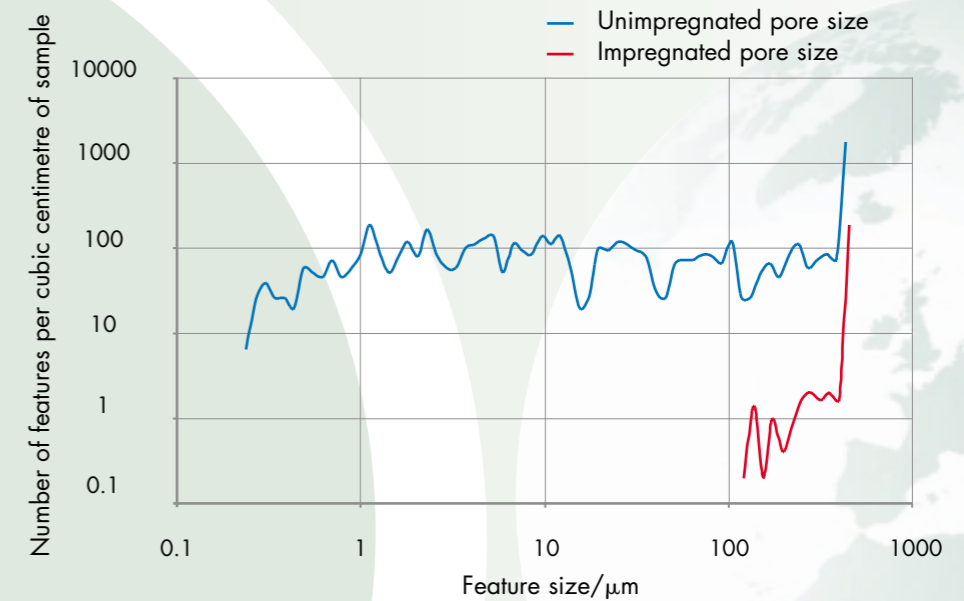
It is suitable for use in both large batch and lean manufacturing applications, producing consistent high quality performance, whatever the size or nature of the components being treated.



### US MILITARY SPECIFICATION MIL-I-17563C CLASS 1 & 3 APPROVAL

This approval process subjects test rings manufactured from Copper Alloy, Iron and Aluminium to a number of stringent sealing capability tests. These show the chemical resistance and thermal stability of the sealant over a wide range.

MATERIAL	TIME	TEMPERATURE
Water	14 days	100°C (Boiling)
Oil	14 days	99°C (+/- 2.8°C)
Hydrocarbon Fluid	14 days	23°C (+/- 2°C)
Carbon Removal	30 Minutes	23°C (+/- 2°C)
Lubricating Oil	48 Hours	121°C (+/- 2.8°C)
Turbine Fluid	48 Hours	23°C (+/- 2°C)
Ethylene Glycol	14 days	149°C (+/- 2.8°C)
Hydraulic Fluid	14 days	99°C (+/- 2.8°C)
Fuel	48 Hours	23°C (+/- 2°C)
Diester Grease	48 Hours	23°C (+/- 2°C)
Sulphuric Acid (18%)	2 Hours	23°C (+/- 2°C)
Stoddard Solvent	48 Hours	23°C (+/- 2°C)
Ethyl Alcohol	14 days	23°C (+/- 2°C)
Thermal Resistance	14 days	149°C (+/- 2°C)
Effect on Paint	Pass	





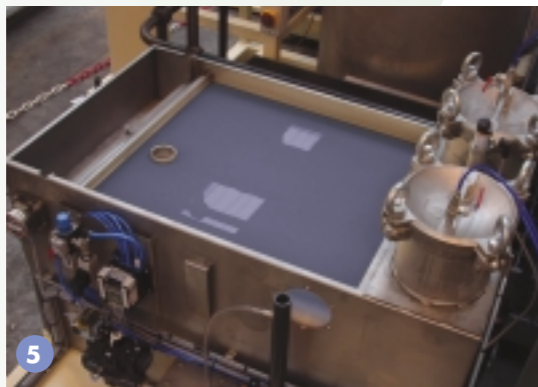
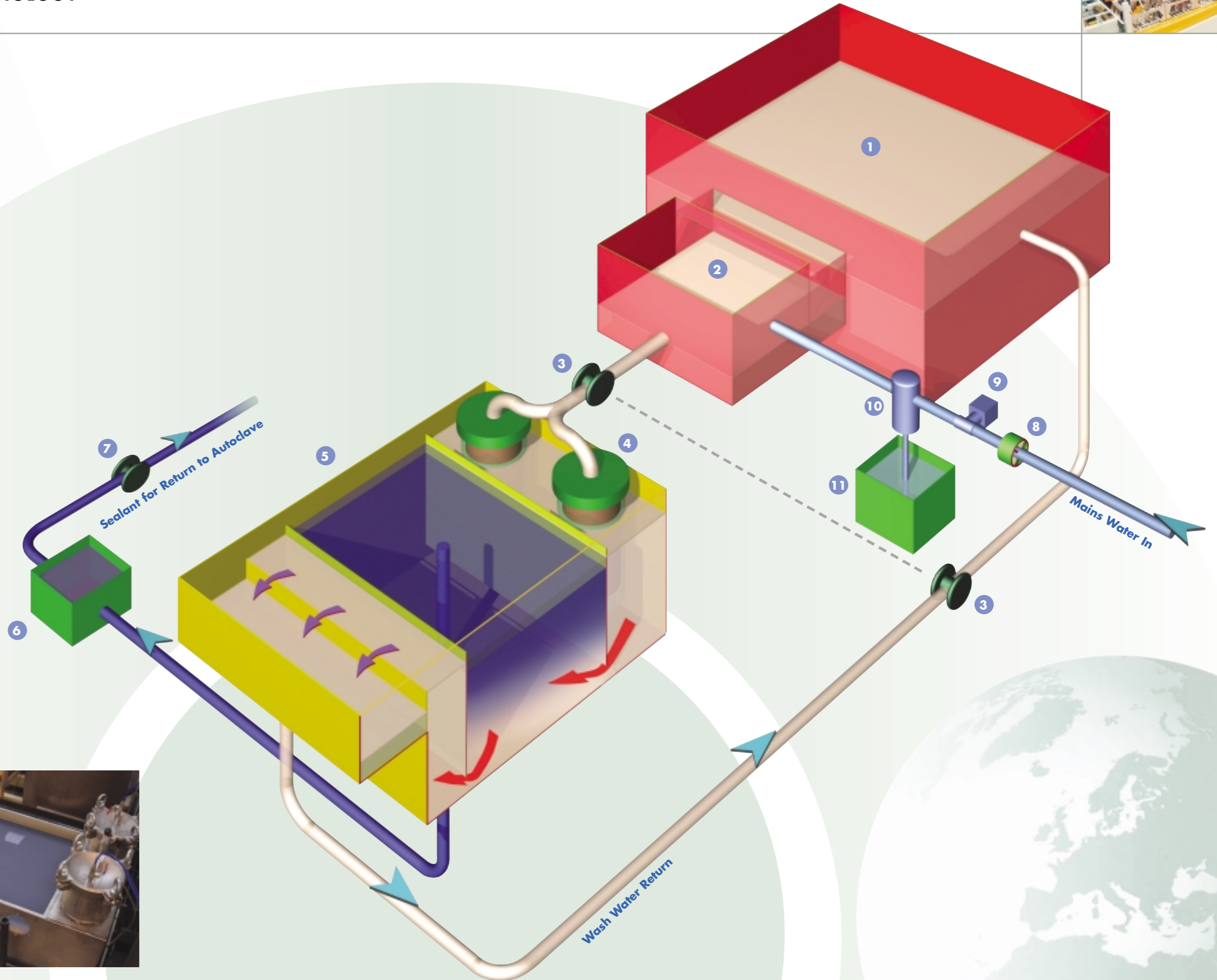
# RECYCLING TECHNOLOGY



Ultrasal recycling sealants have been specifically formulated to enable them to be recovered from the cold wash water and re-used in the autoclave rather than being disposed of as effluent waste. They are hydrophobic in nature, have a specific gravity less than 1.0 and thus will tend to separate from water and float on the surface. The separation process involves treatment of the wash water solution by the metered addition of Ultrasal Wash Water Conditioner (WWC).

The Sealant Recovery System (SRS) is a unique mechanical separator that takes sealant-laden water from the wash tank, passes it through filters before separating the sealant from the water. The sealant is then pumped back for re-use in the autoclave and the cleaned water pumped directly to the wash tank giving a totally closed loop system.

- 1 Cold Wash Tank
- 2 Weir Box
- 3 Diaphragm Pump
- 4 Twin Filters
- 5 SRS
- 6 Sealant Discharge Pot
- 7 Diaphragm Pump
- 8 Pressure Reducing Valve
- 9 Water Meter
- 10 Dosing Unit
- 11 WWC Container





**CHARACTERISTICS OF ULTRASEAL MX2**

- **LOW SHRINKAGE** on polymerisation giving excellent void filling capabilities
- **VISCOSITY AND CAPILLARY ACTION** optimised to enable fast deep penetration of micro porosity
- **TOUGH AND FLEXIBLE** in cured state to provide long-term resistance to chemical, temperature and vibration applications
- **EXCELLENT ADHESION** to cavity walls ensuring a permanent seal
- **NON-VOLATILE** enabling fast, low vacuums to be drawn during the process

While conventional sealing technologies have made major advances in terms of quality and consistency, increasing concerns over the efficiencies and effluent impact of the process led to greater research towards a more environmentally friendly and effective solution.

Traditional impregnation processes, in fact, allow up to 90% of the sealant consumed to go down the drain as effluent from the cold wash tank. This is not only wasteful and adds cost to the process, but also brings a greater financial burden to bear on companies who are facing ever increasing environmental legislation and concern. The growing need for manufacturers to reduce bottom-line costs and address environmental issues led Ultraseal International to develop the world's first recycling sealant in 1987. This revolutionary sealant, Ultraseal MX2, offered all the qualities and advantages of conventional sealant with the added commercial and environmental benefits of being recyclable.

Instead of simply being washed down the drain and wasted, the sealant is collected from the wash tank and passed through the Ultraseal unique Sealant Recovery System (SRS) for retrieval and reuse.

With sealant consumption reduced by up to 90% and water usage also significantly cut, users have been quick to see the benefits - particularly as zero effluent is produced creating an associated reduction in treatment costs.

Rigorous laboratory testing ensured that Ultraseal MX2 delivered the same results as Ultraseal PC504/66 and also conformed to the internationally accepted US Military Specification MIL - I - 17563C.

Ultraseal MX2 sealant has become the preferred choice for companies in a wide range of sectors seeking to maintain sealing quality and consistency while simultaneously reducing sealant and water usage. Expenditure on dealing with the environmental impact of disposing of used sealant is also eliminated.

This product today remains the only globally accepted recycling sealant, its versatility and reliability is illustrated by the number of international users and the variety of applications for which it is employed.



Ultraseal International's latest generation of recycling sealant, Rexeal 100, breaks new ground in this field, exceeding current customer expectations. It has been developed specifically to meet the ongoing needs of companies requiring the highest possible levels of sealing quality.

Extensive research by Ultraseal International's expert team of chemists has drawn upon a proven track record of more than a decade in the use of recycling sealants to develop this evolutionary product. By examination of the performance of Ultraseal MX2 in the field and taking into account extensive feedback from the market, Rexeal 100 has been specifically formulated to bring additional tangible benefits to the user.

Rexeal 100 is fully compatible with Ultraseal MX2 and can, if required, be introduced into existing recycling systems. Thus, there is no cost penalty for existing users when introducing this more technically advanced product.



**TEMPERATURE TESTING**

Rexeal 100 has been fully tested to stringent international standards including the Japanese standard Heat/Freeze cycle, a test that challenges the sealant over extremes of temperatures.

**THERMAL CYCLING**

Aluminium test rings were impregnated with Rexeal 100 and then subjected to temperature cycling at 1-hour intervals from -76°C to ambient to +160°C to ambient. After 30 days the rings were tested for leaks at 20 bar and remained sealed.

**HEAT RESISTANCE (LONG TERM)**

Aluminium test rings were impregnated with Rexeal 100 and then subjected to a temperature of 200°C for 30 days. After this period the rings were tested for leaks at 4 bar and remained sealed.

**BENEFITS OF REXEAL 100:**

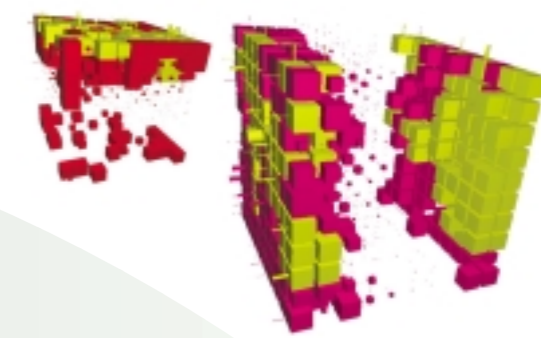
- **PROCESS STABILITY** improved - resulting in more easily maintained systems
- **GEL TIME** drift reduced or eliminated - therefore requiring less catalyst
- **WASHING CHARACTERISTICS** enhanced leading to cleaner components
- **THERMAL RESISTANCE** increased to 220°C
- **HYDROPHOBIC PROPERTIES** Increased ensuring the sealant will release moisture more quickly
- **ENVIRONMENT** - further protected by the use of more environmentally friendly chemicals in the formulation





## SOLUTIONS FOR SPECIALIST APPLICATIONS

## THE FUTURE



### COMPLETING THE PRODUCT PORTFOLIO

In tandem with its acclaimed range of standard and specialist sealants, Ultraseal International provides a full range of ancillary products such as detergents and corrosion inhibitors, which are required to clean and protect components as part of the impregnation process.

All of these are fully tested and proven to be entirely compatible with Ultraseal sealant, so removing the risk of contamination or concern to quality during the impregnation process.

■ **DB85** A nitrite based corrosion inhibitor with excellent properties for both ferrous and aluminium alloy components.

■ **DB100** A nitrite free, general purpose detergent and corrosion inhibitor giving excellent results on aluminium alloys whilst affording some protection on ferrous parts.

■ **DB105** A nitrite free, low dosing general purpose corrosion inhibitor for both ferrous and aluminium alloy components.

Ultraseal International's extensive sub-contract impregnation experience over three decades has equipped the company with unique and unrivalled expertise in meeting the requirements of customers in all sectors needing to treat porosity.

This has enabled the company to develop bespoke products for specific applications demanding additional performance or where the nature of the components themselves renders standard impregnation methods inappropriate.

### SINTERSEAL 100

Nowhere is this better illustrated than by Ultraseal's development of Sinterseal 100, a sealant specifically for the powdered metal industry. Traditionally, cast components are impregnated to seal them against leaks, which if left untreated would cause them to fail in service. Sintered parts, from the Powder Metal industry, have different properties that require impregnation for one or more different reasons.

#### ■ Increased Machinability

Powder Metal components are notorious for their aggressive affect on cutting tools. Impregnation prior to machining effectively creates a more homogeneous surface thereby reducing potential for tool "chatter". This can result in extension of tool life by up to 100 times.

#### ■ Surface coating pre-treatment

The significant porosity in powder metal parts can harbour contaminants such as oil, acids or cleaning agents, from production processes. If left untreated, this can lead to subsequent surface treatments being damaged when these contaminants leach out to the surface. Impregnation effectively cleans and fills this porosity allowing a better quality surface treatment thus ensuring increased life expectancy.

#### ■ Pressure Integrity

In applications where powder metal parts are used for pressure critical components, impregnation ensures that the inherent porosity within the part is fully sealed, therefore ensuring it is fit for purpose.



As the drive towards greater quality and efficiency increases, so suppliers must continue to enhance their product range and develop innovative solutions to client requirements.

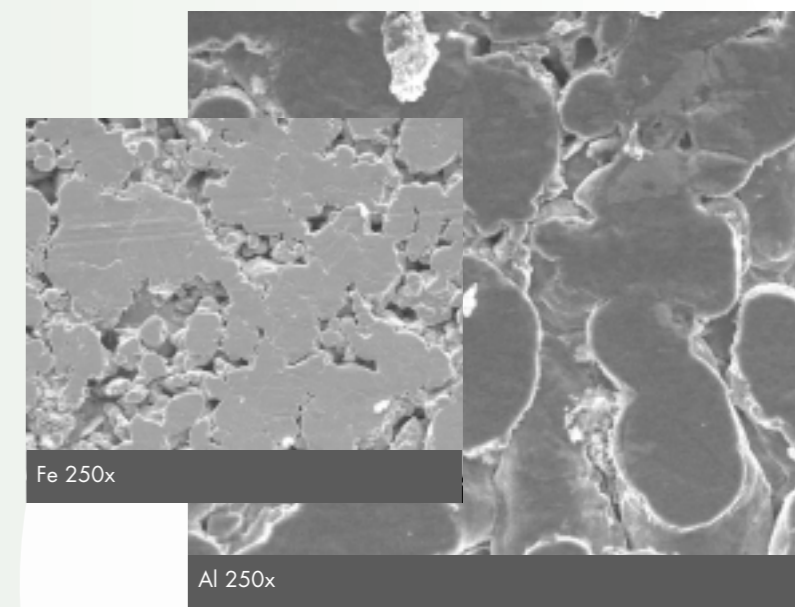
Ultraseal International has always been at the forefront of innovation in impregnation technology and its success in researching and developing high-quality sealants is evident by its strategic global partnerships with leading companies across a diverse range of industry sectors.

While some competitors have seen fit to divide their manufacturing function, Ultraseal International maintains total control of the production and quality assurance processes by having all resources from research and development through to manufacture and despatch on one centrally located site.

Indeed, the company's ongoing quest for outstanding quality is shown through its BS EN ISO 9002 accreditation, and it remains committed to achieving global quality standards and alert to ever-changing legislative and environmental considerations.

An extensive on site laboratory performs two key functions: one deals with quality checks on raw materials and monitors production, in addition to testing samples of customers' sealants when required. The other concentrates on the research and development work crucial to the implementation of new products to meet future requirements, and to maintaining Ultraseal's world-leading position in the impregnation industry.

An integral part of the research and development programme is undertaken in conjunction with leading universities in the UK who specialise in this field of science. This brings together the combined resources of each, involving the theory and practical experience necessary for effective development. Advanced analytical technology is used to study and evaluate the structure and physical properties of porous substrates. The results of these studies are invaluable tools, not only in the development of the next generation of sealants but also in fully exploring the future requirements of process equipment.





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