

Aerospace Industry

Lift-off with key technologies
for global OEM and MRO companies



 **BASF**

We create chemistry

Chemetall
expect more⁺

Expect more from a leading supplier of applied surface treatments



The Surface Treatment global business Unit of the Coatings division of BASF operating under the Chemetall brand, is a leading supplier of applied surface treatments and services for metal, plastic and glass substrates for a wide range of industries and end markets. The global business unit is headquartered in Frankfurt am Main, Germany, and comprises of companies and production sites spread across the globe together with a strategic network of technology centers.

Chemetall develops and manufactures customized technologies and system solutions for surface treatment.

The products protect surfaces from corrosion, facilitate forming and machining, allow surfaces to be optimally prepared for subsequent processes including painting, and ensure proper coating adhesion.

Globally established technologies, for example **Ardrox®**, **Gardobond®**, **Naftoseal®** and **Oxsilan®**, are used in a wide range of industries and end markets, such as automotive, aerospace, aluminum finishing, and metal forming. As one of the leading global players, Chemetall offers proven expertise in surface treatment and has been playing a leading role in shaping metal treatment over many decades.

Qualified expert for the global aerospace industry



Chemetall's proven, high-performance products for aerospace applications such as sealing, cleaning, pretreatment, corrosion protection and non-destructive testing have been specifically developed to meet the demanding requirements of national and international quality standards. With over 60 years of experience in supplying the aerospace industry, we can offer our customers a complete product portfolio with all essential approvals.

Our quality performance has not only been documented by numerous QM certifications such as DIN EN 9001, DIN EN 9100 and ISO/TS 16949, but also by leading customers, such as Airbus with their SQIP award.

Benefit from Chemetall's long-standing global experience in your line of business and our performance-driven and sustainable technologies.

In focus: value added for customers

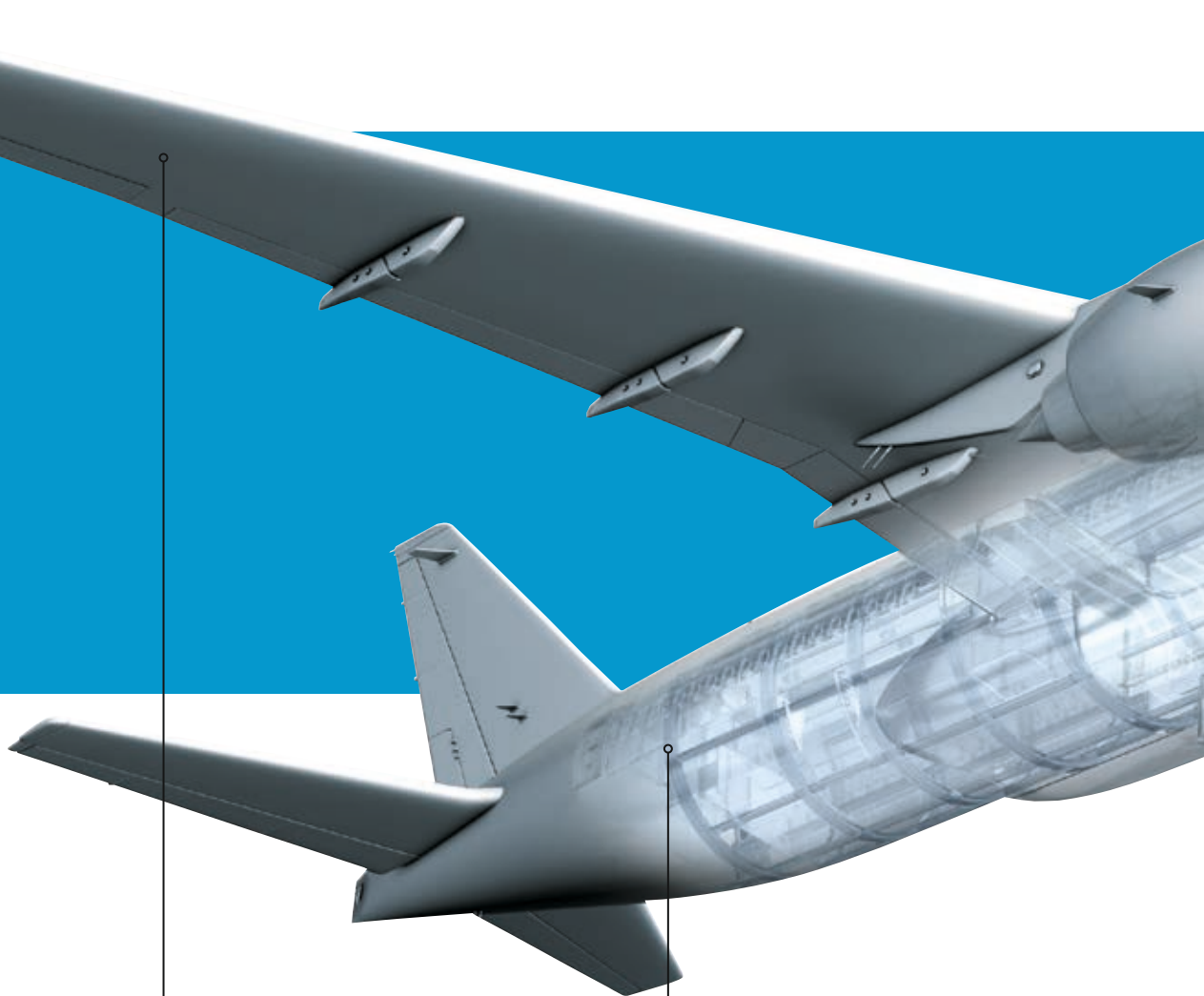
Good products and quality services are the prerequisites for a successful business. However, at Chemetall we believe that true success lies in a close and partnership-based global cooperation with our customers. It is therefore our aim to offer value-added products with top-quality processes, on-time deliveries and excellent technical service.

Sustainably successful

Responsible practices and sustainable development are key principles of Chemetall. Our first priority is to consistently implement environmental protection and work safety guidelines and to continuously improve the safety of our worldwide production sites. Chemetall acts responsibly with a view to society and the environment and puts them on an equal footing with its financial targets.

➤ More information available on www.chemetall.com

High-performing products: Chemetall technologies “on board” the aircraft



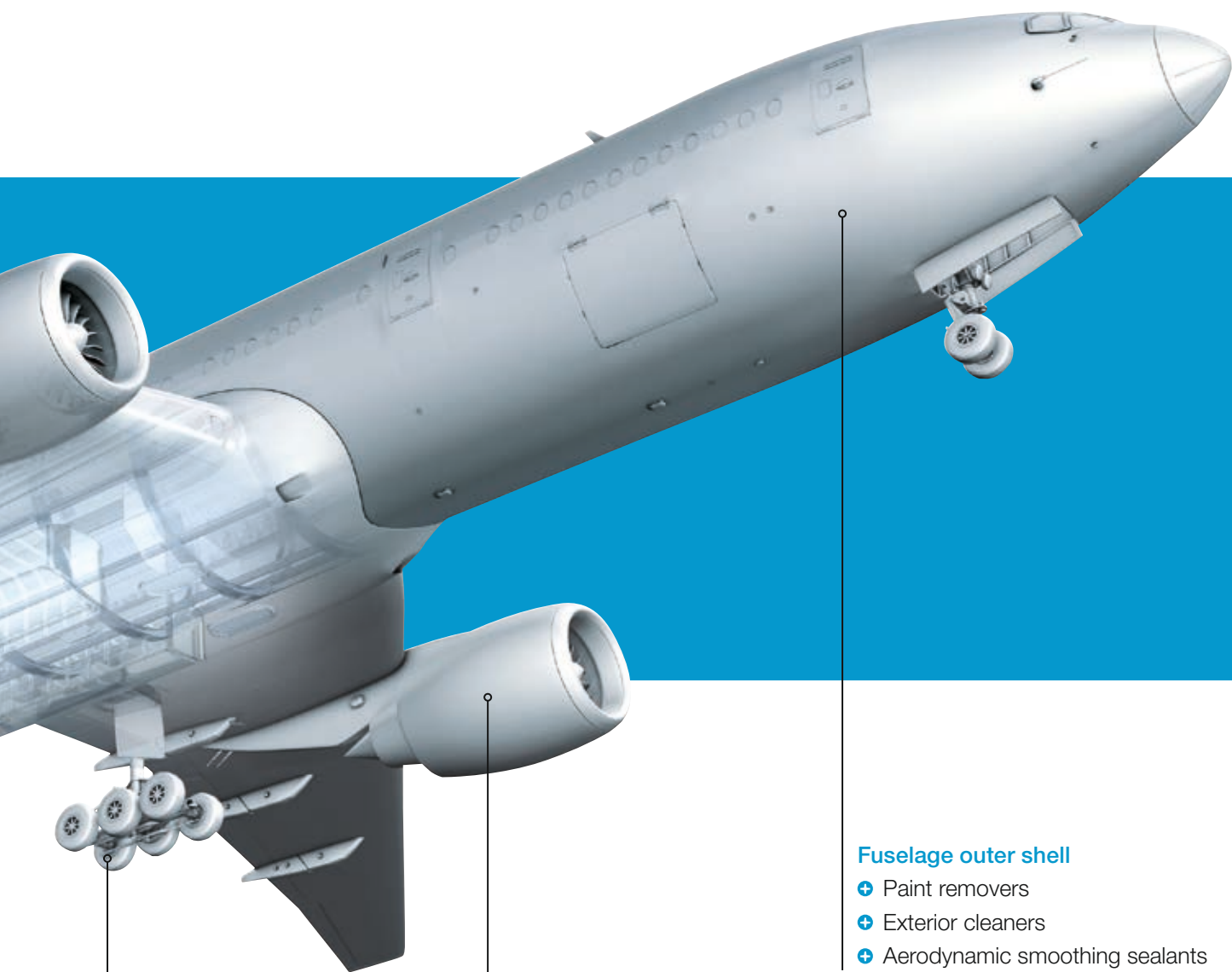
Fuel tank

- + Multi-purpose sealants
- + Cleaners
- + Pretreatment technologies

Aircraft structure

- + Multi-purpose sealants
- + Corrosion Inhibiting Compounds (CIC)
- + Cleaners
- + Pretreatment technologies
- + Non-Destructive Testing (NDT) products
- + Metalworking fluids





Landing gears

- + Cleaners
- + Non-Destructive Testing (NDT) products
- + Sealants
- + Corrosion Inhibiting Compounds (CIC)
- + Metalworking fluids

Engine

- + Cleaners
- + Pretreatment technologies
- + Non-Destructive Testing (NDT) products
- + Metalworking fluids

Fuselage outer shell

- + Paint removers
- + Exterior cleaners
- + Aerodynamic smoothing sealants

Global supplier of choice to the aerospace industry



As a leading global supplier of choice for aerospace specialty chemicals, Chemetall offers approved and eco-friendly technologies and processes for all airframe, aircraft operation and aero-engine OEM and maintenance applications.

Our well-known Ardrox®, Naftoseal® and Tech Cool® brands stand for high quality and innovation. They are globally available, offer product reliability and are used in all important sections of the market.

Airframe OEM and maintenance

We offer products for sealing and non-destructive testing as well as primary, inter-stage and solvent cleaning and removal of paint, coatings, carbon, scale and corrosion during

- + Component manufacturing and maintenance: wings, fuselage, sections, landing gears, undercarriage
- + Components assembly

Engine OEM and maintenance

Our range includes products for primary, inter-stage and solvent cleaning as well as removal of scale, oxidation and corrosion, non-destructive testing, gas path, thrust reverser and exterior cleaners, special silicone-rubber removers for:

- + Engines
- + Engine parts: fans, fan blades, compressors, combustors, turbines

Line maintenance for civil airlines

We provide reliable, approved, eco-friendly products for:

- + Exterior cleaning: general purpose, dry wash, spot cleaning
- + On-wing engine cleaning: gas path, thrust reverser, cabin care, toilet cleaning

Military

Corrosion protection, cleaners and weapon lubricants for:

- + Fixed-wing aircraft
- + Helicopters
- + Navy helicopters



Approvals and specifications are essential for the international aerospace industry. With nearly 70 years of experience in supplying the aerospace industry, we can offer the full scope of specifically designed and approved products for your aerospace applications.

Chemetall is proud to offer products which meet and frequently even exceed the requirements of most of the world's major aerospace standards. We hold a range of certifications, amongst others the EN 9100 (equivalent to AS 9100 Rev C, JIS Q 9100), DIN EN 9001, ISO/TS 16949, and NADCAP, and our products are approved by all major aero-engine and aircraft manufacturers.

Local manufacturing sites ensure short lead times

To ensure close proximity to the customer and short lead times Chemetall's approved and high quality products are manufactured in several plants all over the world.

Customer award verifies Chemetall's best-in-class performance

Our continuous commitment to provide top quality products and excellent delivery performance including on-time deliveries, quality manufacturing capabilities, and efficient processes have been honored by the Airbus „Materials & Parts SQIP“ (Supply Chain & Quality Improvement Program). The award 'accredited supplier' verifies Chemetall's best-in-class performance. Only a few of the strategic suppliers to Airbus have been awarded this honor.

Award winning expertise and innovative portfolio



Our portfolio:

- + Naftoseal® Aircraft Sealants, Sealant Remover for Tools
- + Ardrox® and Ardrox® AV Corrosion Protection Products
- + Ardrox® Non-Destructive Testing (NDT) Products
- + Ardrox® Cleaners
- + Ardrox® Paint Removers
- + Ardrox® Pretreatment Technologies
- + Tech Cool® Metalworking Fluids (MWF)

Your plus:

- + Comprehensive range of approvals for a wide range of applications
- + All major quality certifications available
- + Short lead times due to several production plants around the world
- + Local expert knowledge and support
- + Sustainable success due to excellent partnerships with OEMs, overhaul and maintenance companies, approving authorities and government bodies worldwide

Innovative products have shaped the market

Chemetall's commitment to safeguarding the environment has led us to be one of the first suppliers to provide approved technology solutions such as chrome-free sealants, borate-free cleaners and low/no VOC products. Other innovative technologies have provided major benefits to our customers:

- + **Naftoseal® MC-780:** Low-density sealants allow a total sealant weight reduction of up to 35%, enabling cost reductions to be achieved in fuel consumption and service
- + **Naftoseal® MC-460:** Fast curing, low-density and flame-retardant floor panel sealant for sealing operations where good adhesion as well as removability are important
- + **Naftoseal® Seal Caps:** Ready-made and precasted caps based on Naftoseal® MC-780 B-1/2 aircraft sealant for improved quality, efficiency and ergonomics
- + **Ardrox® AV 35D:** Super-penetrating, water-displacing corrosion protection product; UV-detectable and suitable for composites and metals
- + **Ardrox® 6490:** New immersion cleaner for aluminum, unique micro-emulsion technology, free of silicate and borate
- + **Ardrox® 2325:** Removal of polysulfide-based aircraft sealants, effective on cured and semi-cured sealant



Naftoseal® sealants for multi-purpose aerospace applications

Chemetall offers a full range of products, adhesion promoters and equipment to achieve a safe and efficient sealant application.

The Naftoseal® polysulphide sealants are approved for aircraft applications requiring sealants, such as fuel tank, fuselage, floor panels and aerodynamic smoothing. Our multi-purpose sealants are easy-to-use and enable higher production rates. With our one-component Naftoseal® adhesion promoters a secure, good adhesion can be achieved.

To completely remove polysulphide sealant contamination from mixing devices, application equipment, tools and assembly components we recommend our Ardrex® sealant remover, which is ideally suited to completely dissolve uncured, semi-cured and fully cured polysulphide sealants.

Our portfolio:

- + Sealants
- + Adhesion promoters
- + Tool and equipment cleaning technologies
- + Mixing devices
- + Seal caps

Your plus:

- + Ecologically-sound technologies – free of chromates and solvents/low in solvent content
- + Low temperature flexibility
- + Fast tack-free cure times for high productions rates
- + Good adhesion to various substrates
- + Excellent chemical resistance
- + High elasticity and resilience
- + Good thixotropic properties, no slump
- + Low- and medium-density products available



Ardrox® AV corrosion protection products for long-lasting airframe structures and components

Chemetall's corrosion protection products make an important contribution to the effective corrosion prevention and control programs in the aerospace industry. Our broad portfolio of Ardrox® products include corrosion inhibiting compounds to prevent and control airframe corrosion, products for the temporary and long-term protection of components and corrosion protection oils.

Our Ardrox® AV Corrosion Inhibiting Compounds (CIC) are initially applied during the manufacturing of the airframe and reapplied during the service life of the aircraft at periodic maintenance intervals. The compounds penetrate through interfaces to form a protective secondary barrier, and prevent the moisture from contacting the metal. This protective barrier is particularly important in the areas of the highest susceptibility to corrosion, preventing moisture and condensation from accumulating in crevices, cracks, and all metal-to-metal interfaces.

For the proper application of our high-quality corrosion protection products we offer a selected portfolio of application systems.

Our portfolio:

- + Corrosion inhibiting compounds (CIC)
- + Corrosion protection oils
- + Spray equipment
- + Technical training

Your plus:

- + High-quality corrosion prevention program
- + Suitable for heavy-duty applications
- + Excellent corrosion protection properties
- + Reduced weight on aircraft due to very low film thickness
- + Outstanding water-displacing properties
- + Complete product portfolio with all major approvals
- + High-temperature-resistant CIC for specific applications
- + Easy application and comprehensive equipment range



Ardrox® NDT easy application, bright and crisp indications

Our comprehensive NDT portfolio has been specifically developed to meet the demanding requirements of national and international quality standards such as AMS2644. Our Ardrox® NDT products hold all major approvals for the aerospace market and are widely used in the industry for fast and safe detection of indications. Our latest innovations are low-odor and NPE-free products as well as developments towards the easy biological degradability of water-based and surfactant-based products.

With our complete portfolio we can accompany the entire NDT process: from the cleaning stage to ensure an effective surface preparation, to the PT or MT application to a subsequent treatment providing a temporary corrosion protection if required.

Our experience over many years in working with numerous partners for example, with the manufacturers of PT-lines and MPI bench units, has created the best prerequisites for the development of holistic solutions to your needs comprising high-quality products, selected equipment and technical support from our globally available NDT experts.

Our portfolio:

Penetrant Testing (PT)

- + Fluorescent, water-washable penetrants (oil-based, surfactant-based, water-based)
- + Fluorescent, post-emulsifiable penetrants
- + Color-contrast penetrants
- + Penetrant removers
- + Developers

Magnetic Particle Testing (MT)

- + Fluorescent magnetic inks
- + Black magnetic inks and white contrast paints
- + Carrier oils
- + Removers

Your plus:

- + Integrated solutions: complete portfolio, selected equipment and expert service from one source
- + Comprehensive range of approvals for a wide range of applications
- + Fast and safe detection of indications
- + Cost-effective rinse water treatment
- + Easy and quick removal of products simplify the NDT process

Ardrox® cleaning technologies **approved products for versatile cleaning operations**

In the aerospace industry the Ardrox® brand is worldwide acknowledged as the leading brand for cleaning technologies. Our products hold approvals from major aircraft and engine manufacturers as well as operators for the safe and effective cleaning and maintenance of aircraft.

The cleaning requirements encountered in the aerospace industry are complex. Therefore Chemetall has developed a full line of cleaners to address the needs of the market. From cleaning requirements and environmental considerations to the necessary approvals, Chemetall products are designed to meet all the cleaning needs of the aerospace industry.

Our portfolio:

- + Interior and exterior aircraft cleaners
- + Cabin care products
- + Gas path cleaners
- + Scale removers
- + Inter-stage (inter-operational) cleaners
- + Toilet cleaners

Your plus:

- + Comprehensive material compatibility proven by third-party tests
- + Major conformances and approvals
- + Eco- & user-friendly
(no borate, no NPEO, REACH compliant)
- + Excellent product performance – from light- to heavy-duty cleaning

Ardrox® paint stripper **new generation immersion paint remover**

During the lifetime of an aircraft the paint is removed on average five times. Over the past decades conventional solvents for hot-dip paint removal, containing the reprotoxic pyrrolidones (NMP or NEP), were used. Today, Chemetall has introduced Ardrox® 2330 – an eco-friendly blend of solvents which offers the same stripping capability as conventional removers.

Ardrox® 2330 offers the safety of full compatibility with the materials to be stripped. This was achieved by completely re-designing the set of inhibitors without affecting the stripping power.

Ardrox® 2330 holds all major international registrations (REACH, TSCA, DSL, etc.).

Our portfolio:

Paint strippers for:

- + Manual application
- + Spray
- + Dip

Your plus:

- + Excellent paint removal
- + Eco- and user-friendly
(e.g. no borate, REACH compliant)
- + Effective on many paint systems over a wide range of temperatures
- + Multi-metal compatibility in accordance with major international specifications
- + Aerospace approvals from OEMs available



Ardrox® pretreatment enhanced corrosion protection and paint adhesion

The pretreatment of metals is always performed in a number of steps, depending on the application technology, substrate throughput as well as the intended use of the pretreated material. We help our customers to select the optimum solution for each of their process steps – from cleaning, activation, conversion coating to passivation. Our Ardrox® product range offers advanced technologies for a highly efficient, robust, easy-to-dose and ecologically sound surface treatment.

Your plus:

- ⊕ Complete range of pretreatment technologies
- ⊕ Excellent corrosion protection
- ⊕ Increased paint adhesion
- ⊕ Eco-friendly and conventional processes available

Tech Cool® Metalworking Fluids (MWF) products for advanced machining operations

Coolants play a crucial role in the metalworking industry. Our Tech Cool® technology provides a good cooling and rinsing effect and ensures an extended service lifetime for machine tools. Our portfolio is designed for light- to heavy-duty cutting and machining applications and is suitable for a broad range of substrates. Our customers can choose between a variety of high-performance soluble oil, semi-synthetic and synthetic coolant products as well as ecologically sound processes.

Your plus:

- ⊕ An integrated portfolio of innovative products
- ⊕ Lower coolant and disposal costs through extended sump life
- ⊕ Reduced tooling costs
- ⊕ Effective rejection of tramp oils
- ⊕ Superior corrosion protection
- ⊕ Low foaming and non-foaming products
- ⊕ Eco-friendly technologies available (DCHA-free, bactericide free, formaldehyde-free, non-chlorinated)
- ⊕ Multi-metal compatibility for application versatility

Selected equipment and products for enhanced and simplified applications



Naftoseal® seal caps

Our seal caps are ready-made and precasted caps based on the advanced Naftoseal® MC-780 B-1/2 aircraft sealant. Users benefit from a considerable improvement in quality, efficiency and ergonomics in comparison to usual wet sealant application technologies. Chemetall can offer a range of standard sizes which are designed to meet the required size of rivet or fastener.

Your plus:

- + Easy-to-use
- + Short application time
- + No special tools necessary
- + Fits on fasteners and rivets
- + No special tool cleaning required after application



Naftoseal® MC-injection mixer

The MCI sealant cartridge mixer is a fully automatic device for mixing two-component sealants. During the mixing operation, the hardener is automatically injected into the base material and the two components are thoroughly mixed. As the MC-Injection mixer is air-driven and does not contain any electrical parts, it can be operated close to the point of use of the sealant and, if necessary, in flame-proof areas.

Your plus:

- + Consistent sealant mix quality without air intrusion
- + Easy-to-use
- + Air-driven mixing device



Ardrox® NDT equipment

Chemetall's Penetrant Testing (PT) and Magnetic Particle Testing (MT) products and processes are completed by a selected range of specialized NDT equipment. Our portable handheld and stationary devices contribute to a high-quality NDT performance and ensure a fast and safe defect detection.

Our portfolio:

- + Ultraviolet inspection lamps
- + Stationary UV lamps
- + UV and white light measuring equipment
- + Permanent magnets and electromagnets
- + Magnetic field indicators
- + Field strength indicators
- + UV light protective glasses
- + Refractometers
- + Certified test panels for plant and process testing

Ardrox® AV equipment

For the proper application of aircraft corrosion protection products, customer's benefit from our selected portfolio of application systems. The ACS/LCS low-pressure airmix system is ideally suited if a high flexibility is required. With its five-liter pressure pot it can be carried by hand to the place where it is needed. Select the AAS for high throughput capacity. It is designed to take twenty-liter pails, so there is no filling operation required. Productivity can be enhanced with two spray guns supplied by one AAS.

Our portfolio:

- + Pressure pot for low-pressure airmix application
- + Airless application system
- + Spray guns
- + Different types of wands for spray application

Add Chemetall to your flight plan

OEM's and MRO's – increase your productivity with our integrated portfolio of innovative technologies.



Chemetall offers a fully integrated, innovative and optimized portfolio of products and technologies for OEM's and MRO's. These solutions arise from our comprehensive understanding of the materials and requirements for specific Aerospace applications.

In addition to our globally active and locally based technical support, you can rely on our vast experience with commercial and military aviation. Collaborate with us to increase your process efficiency.

Our products and solutions provide:

- ⊕ Comprehensive material compatibility confirmed by third party validation
- ⊕ Major approvals and conformances
- ⊕ Environmentally responsible solutions

Chemetall is proud to serve you from the following locations

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