

**Aerospace Industry:**  
Lift-off with key technologies  
for global OEM and MRO companies.

**Chemetall**  
expect more<sup>+</sup>

## Expect more from a leading global supplier of applied surface treatment technologies



As one of the leading global players, Chemetall is familiar with surface treatment in all its facets. Quality products and services are the prerequisite of our business success. However, at Chemetall, we know that it takes more than that to be a preferred global supplier.

The chemical treatment of metal surfaces is Chemetall's core competence. Like no other company, we base the focus of our worldwide activities on the development and implementation of customized technology and system solutions for surface treatment. The portfolio comprises technologies for cleaning, giving corrosion protection, sealing, improving paint adhesion, and facilitating the forming and treatment of metals. Globally established technologies, for example Ardrox®, Naftoseal® and Oxsilan®, are used in the most diverse market sectors from automotive to aerospace, from the appliance to architectural and construction industries. Over the past decades, Chemetall has been playing a leading role in shaping metal treatment.

### **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 cooperation with customers. It is therefore our aim to offer a value added product with top quality processes, on-time deliveries and excellent technical service.



### **Globally active, locally based**

The global business activities of Chemetall are based on tradition and experience dating back all the way to the 19th century. Nowadays, Chemetall is one of the leading global players in surface treatment with headquarters in Frankfurt am Main, Germany. With 2,500 employees, 40 subsidiaries and 22 production sites, Chemetall is a financially strong and fast-growing supplier with a long-term orientation, and we continue to aim high: we intend to strengthen our quality and innovation leadership even further. With sales and service teams, laboratories and warehouses at locations all around the world, we are operating in close proximity to our customers.

### **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.

### **Qualified supplier to the 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.

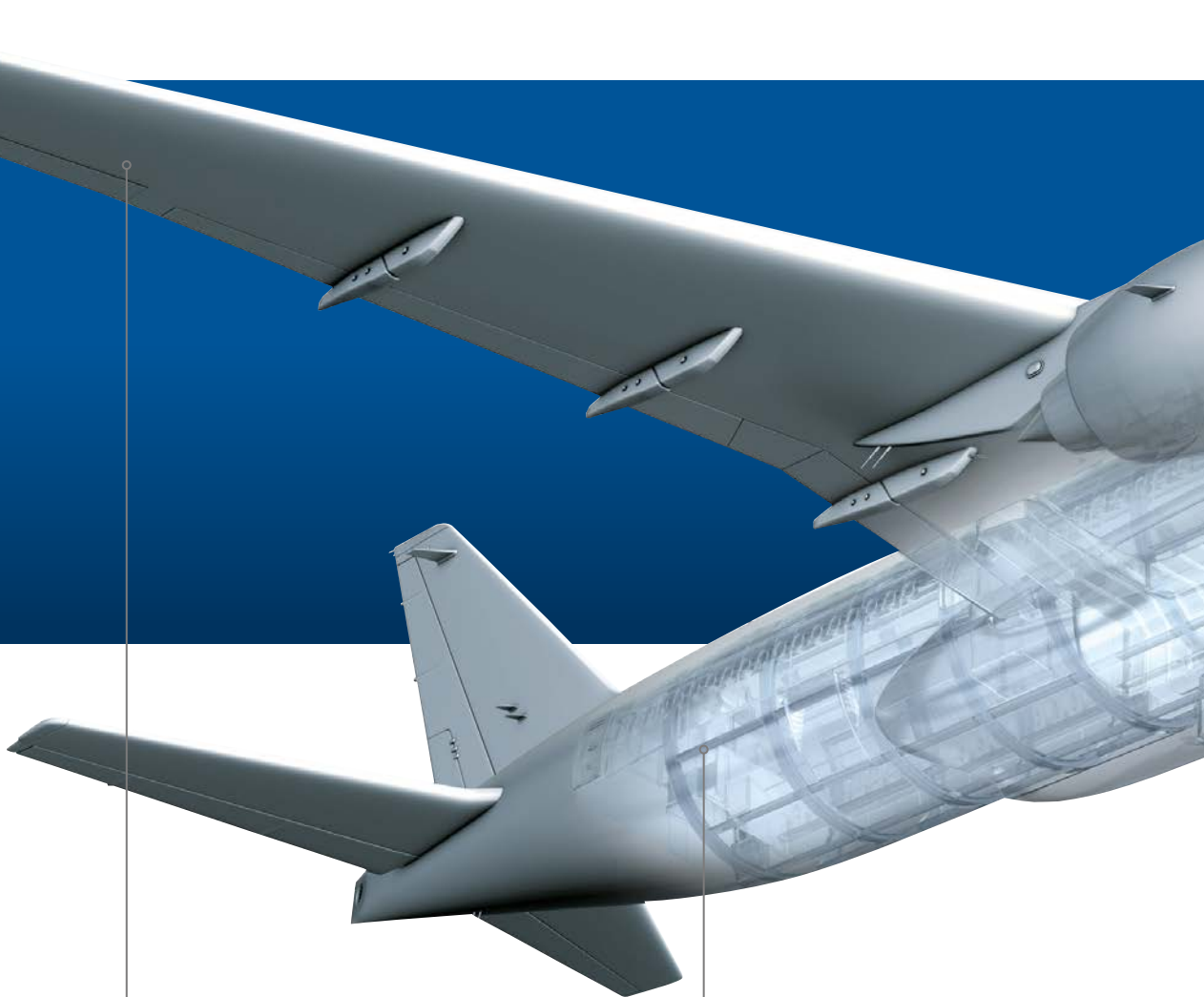
Our quality performance has not only been documented by numerous QM certifications such as DIN EN 9001, DIN EN 9100 and ISO/TS 16949, but also by leading customers, such as Airbus with their SQIP award.

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

➤ More to read on [www.chemetall.com](http://www.chemetall.com)

# Chemetall technologies "on board" the aircraft

## High-performing products for a wide range of applications

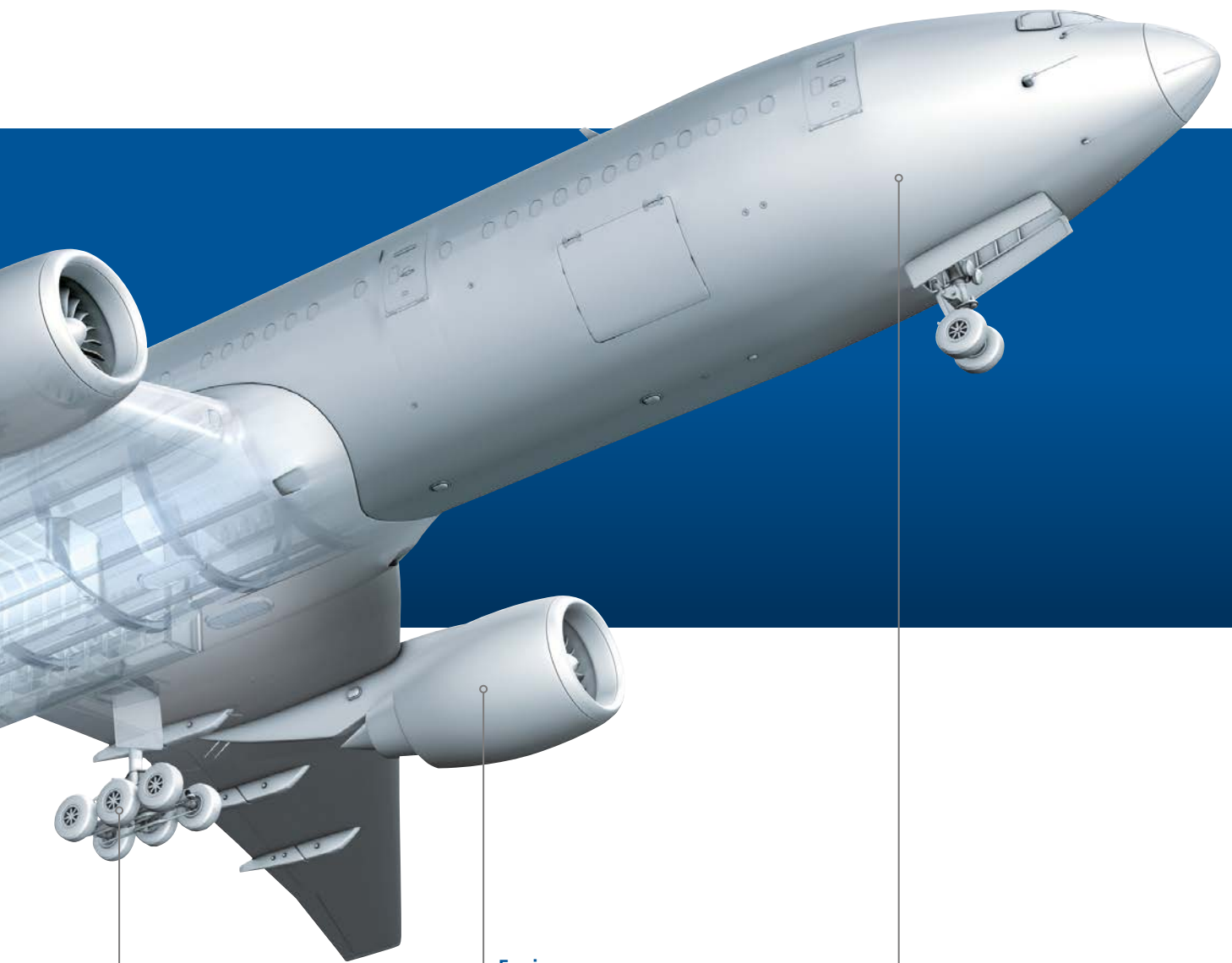


### Fuel Tank

- 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

#### **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 Ardrex®, Naftoseal®, Tech Cool® and Oakite® brands stand for high quality and innovation. They are globally available, offer product reliability and are used in all important sections of the market.

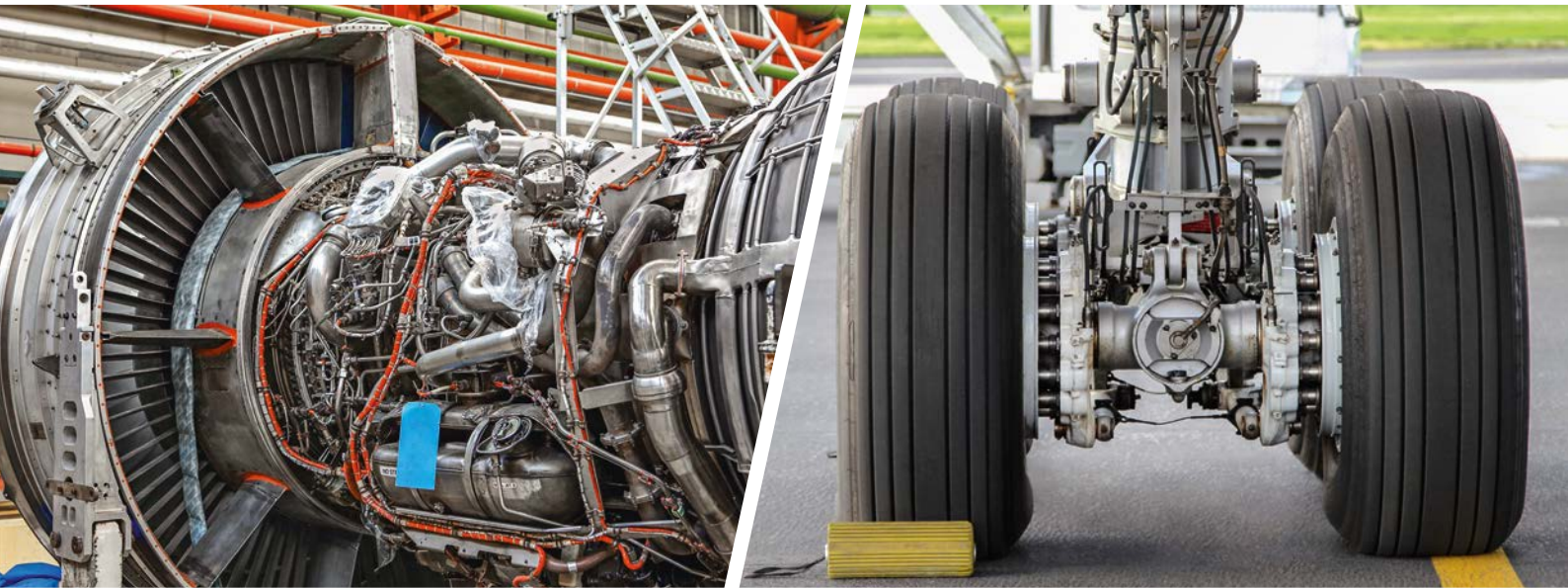
## Airframe OEM and maintenance

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

# Award winning expertise and innovative portfolio



Naftoseal® production plant in Langelsheim, Germany



Ardrex® production plant in Soissons, France

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), and DIN EN 9001 and ISO/TS 16949 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.





#### **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® 6489A**  
Alkaline liquid cleaner to remove temporary protection coatings from the aircraft surface prior to final pretreatment and coating operations.



Naftoseal® polysulphide sealants ensure excellent sealing quality in aircraft applications.

### **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 production rates
- + Good adhesion to various substrates
- + Excellent chemical resistance
- + High elasticity and resilience
- + Good thixotropic properties, no slump
- + Low- and medium-density products available



For a high-quality corrosion prevention and control program, Chemetall customers benefit from highly effective corrosion protection products combined with easy-to-use application systems.

### **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:**

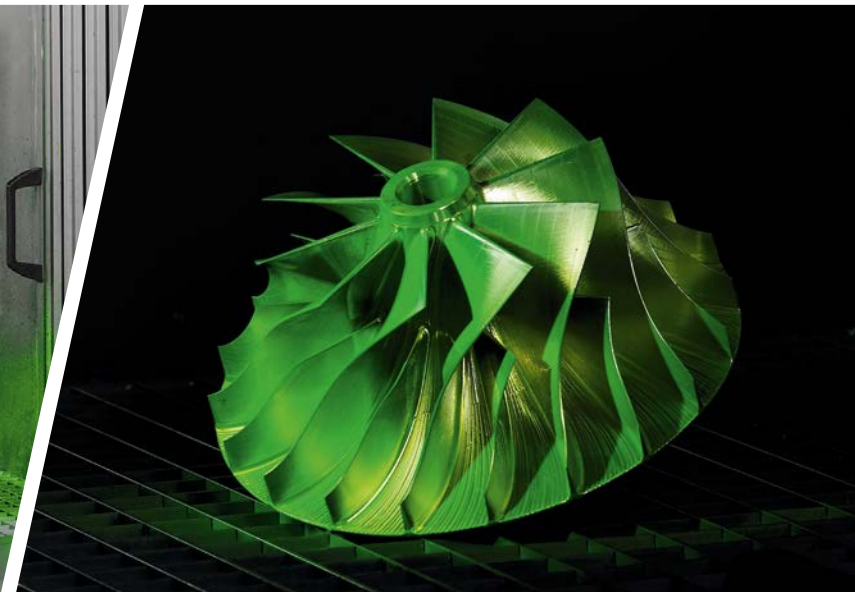
- ⊕ Corrosion inhibiting compounds (CIC)
- ⊕ Corrosion protection oils
- ⊕ Spray equipment
- ⊕ Technical training

### **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



Penetrant Testing



Fluorescent Testing

### **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)**

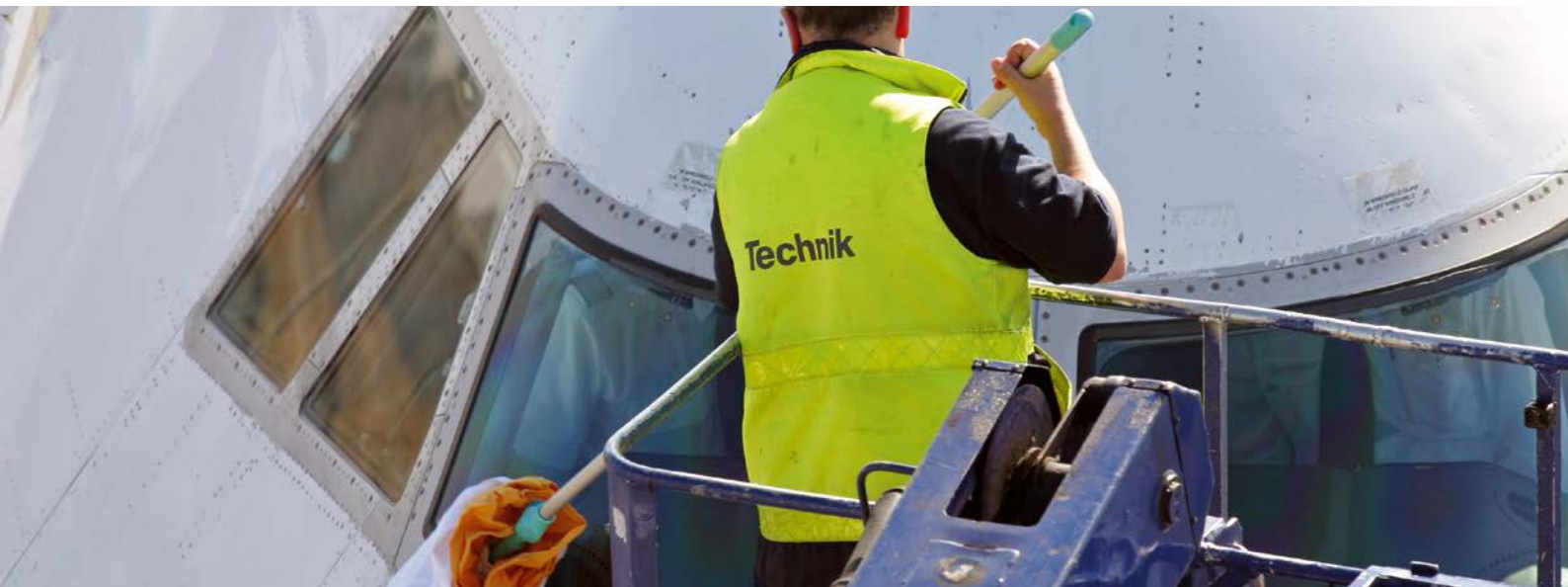
- ⊕ Fluorescent, water-washable penetrants (oil-based, surfactant-based, water-based)
- ⊕ Fluorescent, post-emulsifiable penetrants
- ⊕ Color-contrast penetrants
- ⊕ Penetrant removers
- ⊕ Developers

#### **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



Precasted Naftoseal® seal caps for an easy application.

### 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



A consistent sealant mix is ensured by the Naftoseal® MCI Mixer.

### 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





UVe-LUX Single Sensor UV/White Light Meter to measure the intensity of light.



AAS and ACS/LCS system for easy application of Ardrex® AV CIC.

### Ardrex® 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

### Ardrex® 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





## New European regulations on chemicals

### The impact of REACH and CLP

REACH is the European Community Regulation on chemicals and their safe use, which came into force on June 1, 2007. It applies directly and uniformly throughout the European Union and makes great demands on manufacturers, importers and users of chemicals. In order to meet the regulations of REACH and CLP, Chemetall has established a dedicated team.

To comply with the REACH initiative (**R**egistration, **E**valuation, **A**uthorization and **R**estriction of **C**hemical Substances), we have established a central REACH group in Frankfurt/Germany. For Chemetall companies located outside the EU and exporting directly to the EU, Chemetall GmbH was appointed as the „Only Representative“ to fulfill the REACH requirements. Therefore, customers of Chemetall are not importers under the regulation, but instead are regarded as downstream users.

To ensure continuity of delivery to our customers, we pre-registered all relevant substances that require registration at the European Chemical Agency (ECHA). Building on these pre-registrations, we intend to register all relevant substances by 2018. As part of the registration process, the uses for chemical substances must be identified and detailed according to ECHA Guidance. We are working closely with our customers and associations to ensure all uses for our chemistries are registered and detailed.

The goal of REACH is to ensure a higher level of protection of human health and the environment, and to establish an extensive risk assessment for the complete life-cycle of chemicals, involving the complete value chain. With REACH a uniform system is established providing information on registration of new notified substances and risk assessment for existing substances.

#### GHS – Globally Harmonized System

GHS provides a unified system to identify and to communicate hazards related to transporting and supplying chemicals across the world. The regulation describes criteria for the classification and labeling of substances and mixtures, its goals being the following:

- ⊕ to ensure a higher level of protection of human health and the environment,
- ⊕ to enhance free trade, competitiveness and innovation.

The more countries all over the world implement the GHS criteria in their legal system, the more valuable it becomes for all companies.

#### CLP – Implementation throughout the EU

The CLP Regulation will ultimately replace the current rules on **C**lassification, **L**abeling and **P**ackaging of Substances (Directive 67/548/EEC) and Preparations (Directive 1999/45/EC) after the transitional periods given in the regulation, and Chemetall will meet the deadlines for classification and labeling described in it. Several substances have already been classified and labeled according to the CLP regulation by December 1, 2010. The transitional period for mixtures ends on June 1, 2015.

Chemetall's Product Safety group, which is supported by EHS responsible persons in every legal entity, is intensively working on implementing the requirements resulting from the REACH and CLP regulations.

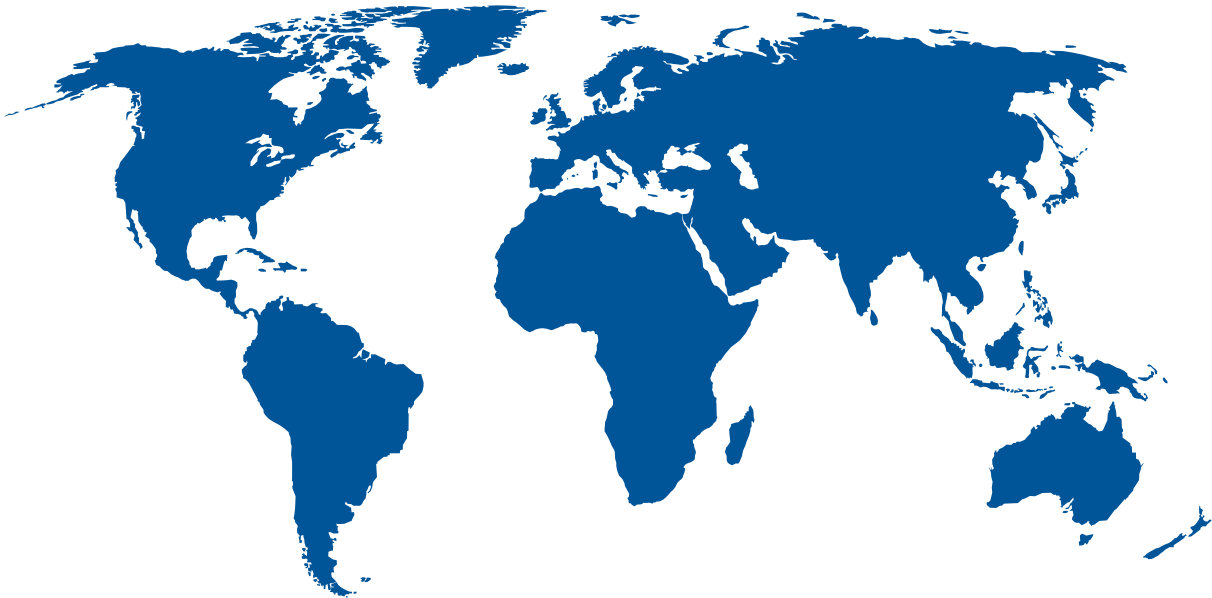
Expect more working with a leading supplier of surface treatment technologies. Chemetall is familiar with the legal, quality and environmental requirements and globally coordinates all its activities. Working with Chemetall, you can rely on a reliable, strong and innovative partner for sustainable success.

- ⊕ More to read in our GHS brochure or on [www.chemetall.com](http://www.chemetall.com)

# Chemetall at a glance

Chemetall is a leading global surface treatment supplier, headquartered in Frankfurt, Germany. With our 2,500 employees, 40 subsidiaries and 22 production sites, we are a financially strong and fast-growing company with a long-term orientation. Our aim is to further strengthen our quality and innovation leadership. With our own sales offices, production facilities, service teams, laboratories and warehouses at locations all around the world, we are operating in close proximity to our customers.

The chemical treatment of metal surfaces is our core competence. Our products are developed for cleaning, giving corrosion protection, sealing, improving paint adhesion, and facilitating the forming and treatment of metals. Our globally established technologies are used in the most diverse industry sectors and have played a leading role in shaping metal treatment.



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