



METALWORKING & CLEANING

Economical product solutions
for the metal processing



**Harmony in
Chemistry**



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KLUTHE AT A GLANCE

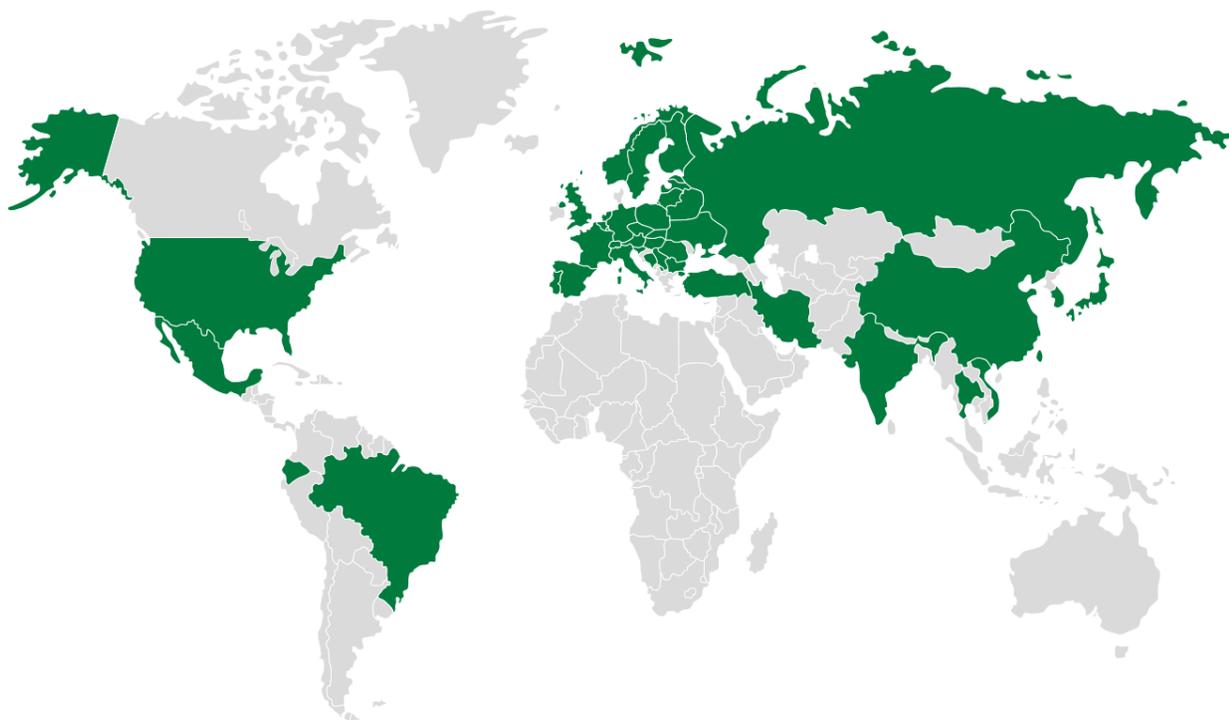
Chemicals are all around us. The question is, how much is necessary and useful. The surface pretreatment with chemical technical products cannot be carried out with just a few standard products, nor should treatments, often consisting of several processes, be disregarded. This is where our process responsibility for integrated

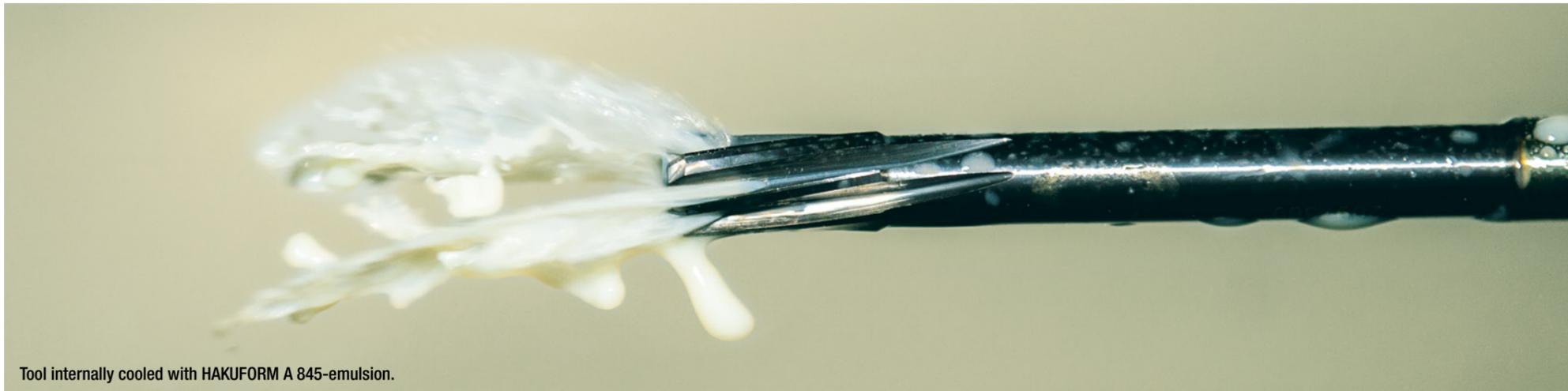
treatment processes comes into play—we determine the optimal product and process sequence and the best application type for you to achieve optimal efficiency and economic viability. Only the best performing product has the greatest potential to save costs.

KLUTHE COMPACT

Established:	1950	Locations:	44
Company Headquarters:	Heidelberg, Germany	Turnover:	EUR 220 million
Executive Management:	Martin Kluthe	Employees:	700

KLUTHE WORLDWIDE



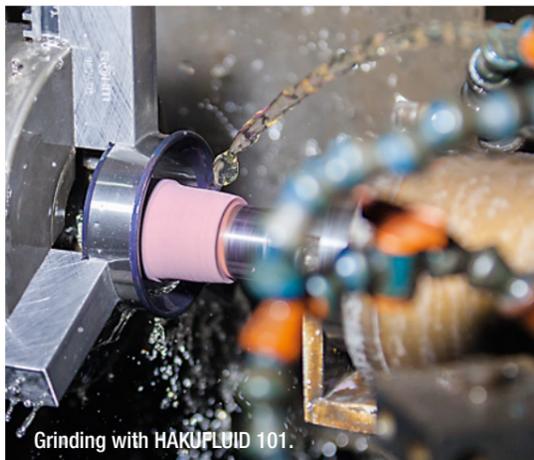


Tool internally cooled with HAKUFORM A 845-emulsion.



COOLING LUBRICANTS

Cooling lubricants are used in most application cases in metalworking. This type of lubricant must perform a lubricating and cooling function at the same time. Moreover, the fluid is supposed to remove the metal shavings created during processing. These lubricants must possess particularly strong corrosion protection characteristics to prevent corrosion at the processed parts, tools and processing machine surfaces. Furthermore, the cooling lubricants must contain special additives that prevent excess wear and tear on the tool or premature tool damage.



Grinding with HAKUPLUID 101.

The cooling lubricants are divided into two major groups:

Water-miscible



HAKUFORM A

- Water-miscible, mineral oil-containing cooling lubricants
- Emulsions for machining and forming

HAKUFLUID

- Water-soluble, mineral oil-free, fully synthetic cooling lubricants
- Clear solutions for metal cutting

Non-water miscible



HAKUFORM L

- Non-water miscible cooling lubricants (cutting oil, drawing oil, grinding oil)
- For machining and forming

OUR SERVICE

The water-mixed cooling lubricants must be regularly tested. The concentration must at no time fall below a minimum value in order to ensure process reliability. Furthermore, the pH values and nitrite concentrations must be measured weekly (stipulated by the German Technical Regulations for Hazardous Substances [TRGS] 611).

In our lab, we carry out these types of inspections and thus reduce our customers' workload. The cooling lubricants are washed off after the metalworking is complete. Various industrial cleaning agents are used for this process. The processed parts subsequently often require preservation to protect them from corrosion. We take into account subsequent processes when choosing the cooling lubricants and recommend respectively appropriate cleaning agents and corrosion protection products from our product line. The individual products are optimally matched.

ADVANTAGES

- All from one provider: Water-miscible and non-water miscible characteristics for machining and forming processes
- Use in large central systems as well as individually filled machines
- Nothing is "ready made": When choosing our products, we take the customer's requirements into account and consider the respective framework conditions
- Always up-to-date: Our cooling lubricants are regularly adjusted to current requirements and comply with all rules and regulations

WATER-SOLUBLE COOLING LUBRICANTS

HAKUFLUID

HAKUFLUID cooling lubricants are sustainable, highly effective and innovative. HAKUFLUID is a water-based, boron, formaldehyde and oil-free metalworking fluid. The products combine the advantages of non-water miscible processing materials with those of water-miscible processing materials: They provide an optimal cooling with an optimal lubrication. Thanks to the characteristics of our HAKUFLUID cooling lubricants, the personnel and environment around the processing machines are not negatively impacted by oil vapour and oil mist. The products have an excellent skin compatibility and a very high yield.

When switching from emulsion to HAKUFLUID, the consumed quantity can be reduced by up to 30%. When switching from processing oil to HAKUFLUID, the consumed quantity can be reduced by up to 90%.

HAKUFLUID is suitable for various processing operations and is successfully used in many different industrial sectors.



Processing within a machining center with HAKUFLUID 181.



ADVANTAGES

- Significantly increased tool life due to reduced wear and tear
- Extraordinary machining results
- Non-flammable—fire protection is not required
- Excellent demulsifying power with regard to foreign oils
- No oil mist—clean working environment
- Excellent skin compatibility



POSSIBLE PROCESSING OPERATIONS

Machining with a defined cutting edge

- ▶ Turning, milling, drilling
- ▶ Thread cutting and tapping
- ▶ Broaching
- ▶ Deep drilling
- ▶ Reaming
- ▶ Cutting
- ▶ Roll milling

Machining with an undefined cutting edge

- ▶ Flat grinding, cylindrical grinding, internal grinding, belt grinding
- ▶ Power honing
- ▶ Profile grinding and groove grinding
- ▶ Gear grinding

Areas of application:

- ▶ Automotive manufacturers or automotive industry
- ▶ Tool manufacturers
- ▶ Steel industry
- ▶ Engine manufacturing, gear manufacturing



Milling with HAKUFLUID 181.



POSSIBLE PROCESSING OPERATIONS

Machining with a defined cutting edge

- ▶ Turning, milling, drilling, cutting
- ▶ Thread cutting and tapping
- ▶ Broaching
- ▶ Deep drilling

Machining with an undefined cutting edge

- ▶ Flat grinding
- ▶ Cylindrical grinding
- ▶ Internal grinding
- ▶ Belt grinding

Areas of application:

- ▶ Automotive manufacturers or automotive industry
- ▶ Tool manufacturers
- ▶ Steel industry
- ▶ Engine manufacturing, gear manufacturing

Machining of aluminum with HAKUFORM A 835.

EMULSIFIABLE COOLING LUBRICANTS

HAKUFORM A

The water-miscible HAKUFORM A series cooling lubricants are free of plant-based oils that tend to become resinous and do not contain any volatile or odor-intensive amines. The cooling lubricants are mainly boron-free and meet all TRGS 611 requirements. HAKUFORM A cooling lubricants are characterized by their superior pH and bio stability, as well as through proper corrosion protection properties. The cooling lubricants are also free of formaldehyde depot material, which is still often used as bactericide in water-miscible cooling lubricants. The emulsions of these cooling lubricants are able to achieve a very long tool life. The separate addition of corrective chemicals such as biocides is usually not necessary.

The goal of any production is to achieve low fault rates, and the prevention of unplanned downtimes. At the

same time, there is a focus on the increase of quantities and the surface quality improvement. Additionally, the geometries of the components are becoming increasingly complex.

✓

ADVANTAGES

- Extended tool lives thanks to the excellent performance
- Very good skin compatibility
- Universal use for most metalworking processes



NON-WATER MISCIBLE COOLING LUBRICANTS

HAKUFORM L

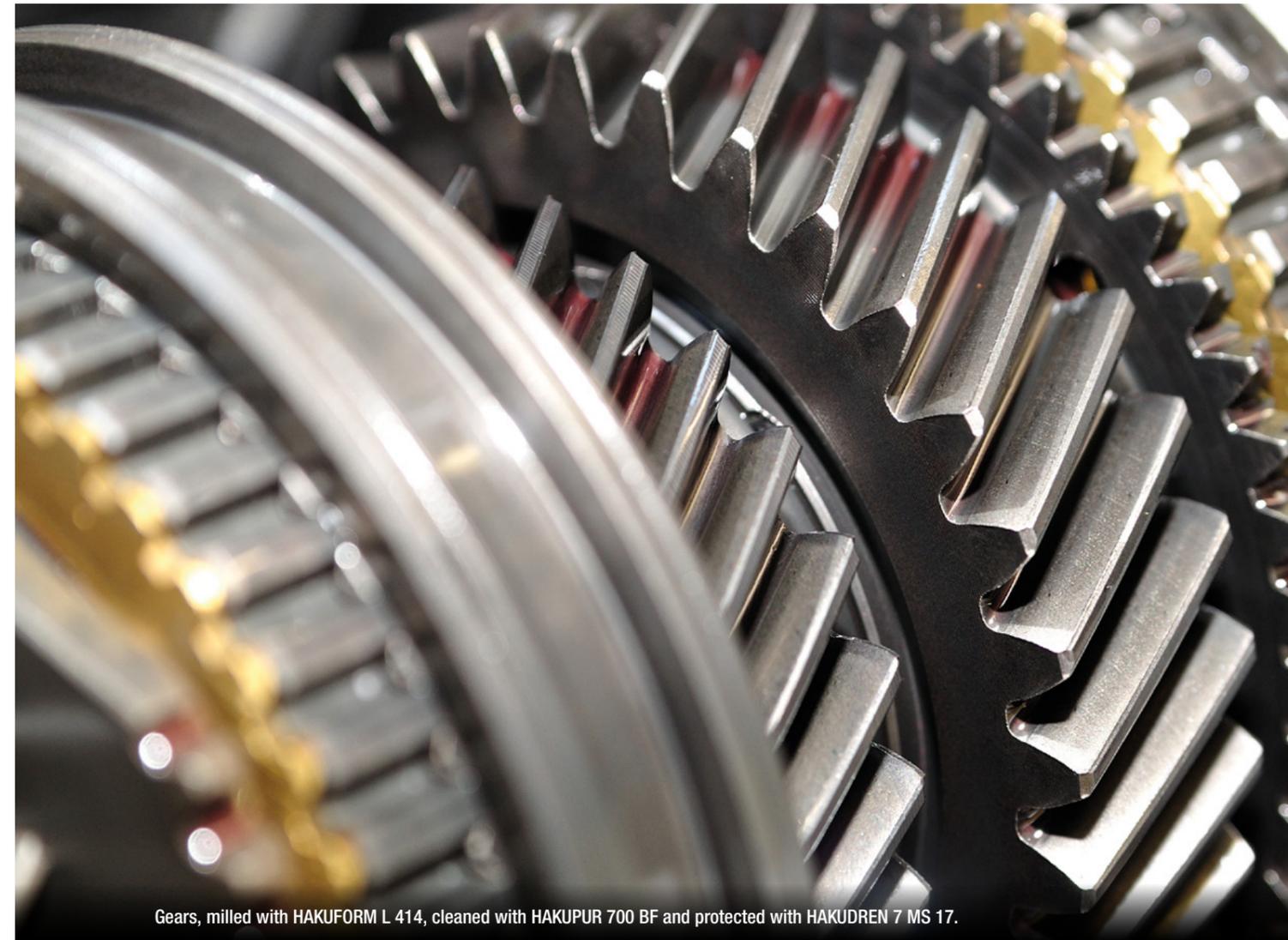
HAKUFORM L are non-water miscible cooling lubricants, which contain natural gas-derived base fluids ("GTL oils"). Due to the main component, GTL oil, the HAKUFORM L processing lubricants are exceptionally low regarding vaporization and fogging, and also have very high flash points. In addition, the HAKUFORM L oils contain special additive combinations which will yield long tool lifetimes.

HAKUFORM L is suitable for various processing operations and is successfully used in many different industrial sectors.



ADVANTAGES

- Significant reduction of oil mist and oil vapor exposure
- Reduction in quantities consumed thanks to lower losses due to oil mist and oil vapor
- "Safe product" due to high flash point
- Extended tool lives thanks to the excellent performance
- Excellent skin compatibility through to the aromatic compound-free GTL oils



Gears, milled with HAKUFORM L 414, cleaned with HAKUPUR 700 BF and protected with HAKUDREN 7 MS 17.

POSSIBLE PROCESSING OPERATIONS

Machining with a defined cutting edge

- ▶ Turning, milling, drilling, cutting
- ▶ Thread cutting and tapping
- ▶ Broaching
- ▶ Deep drilling

Machining with an undefined cutting edge

- ▶ Flat grinding, cylindrical grinding, internal grinding, belt grinding
- ▶ Power honing
- ▶ Profile grinding and groove grinding
- ▶ Gear grinding

Areas of application:

- ▶ Automotive manufacturers or automotive industry
- ▶ Tool manufacturers
- ▶ Steel industry
- ▶ Engine manufacturing, gear manufacturing

FURTHERMORE

In addition to the above-mentioned products, the Kluthe product range also includes other water-miscible and non-water miscible cooling lubricants for forming processes, including the production of pipes and profiles, and the production of beverage cans. Furthermore, volatile stamping oils, minimum quantity cooling lubricants, cold extrusion and drawing oils are components of the extensive product range.



WATER-BASED CLEANERS

In the area of water-based cleaning products, we offer acidic, neutral or alkaline solutions. The respective product is used depending on the surface that needs to be cleaned as well as the system type and the kind of soiling.

Usually, the HAKUPUR cleaning agents are processed as a 0.2–15% solution in water. The processing temperature is between 20 and 70 °C.



HAKUPUR

- Water-based intermediate and final cleaning
- Acidic, neutral or alkaline
- For the residue-free removal of processing media, conservations and soiling in general
- For cleaning metal and plastic surfaces
- Cleaning and preservation in one work step
- As maintenance cleaner for cleaning floors

OUR SERVICE

The types of contamination to be removed can be fundamentally different. The bandwidth is quite extensive and ranges from easily removed residues of a water-mixed cooling lubricant to problematic polishing compounds and release agent residues. We carry out various cleaning tests in our technical center. This ensures that the optimal cleaning agent is determined for a process at hand. Furthermore, we can analyse our customers' immersion bath samples in our laboratory, and thereby contribute to process reliability.



CEKASIN

- Acidic, neutral or alkaline
- For the cleaning of micro- and ultra-filtration membranes

HAKUPUR application in an immersion process.



ADVANTAGES

- A perfectly suitable cleaning agent is available for almost every type of cleaning task
- Always up-to-date: Our cleaning agents are regularly adjusted to current requirements and comply with all rules and regulations.
- Nothing is "ready made": When choosing our products, we take the customer's requirements into account and consider the respective framework conditions.



Industrial cleaning with HAKUPUR in a MAFAC KEA cleaning system.

INDUSTRIAL CLEANING AGENTS

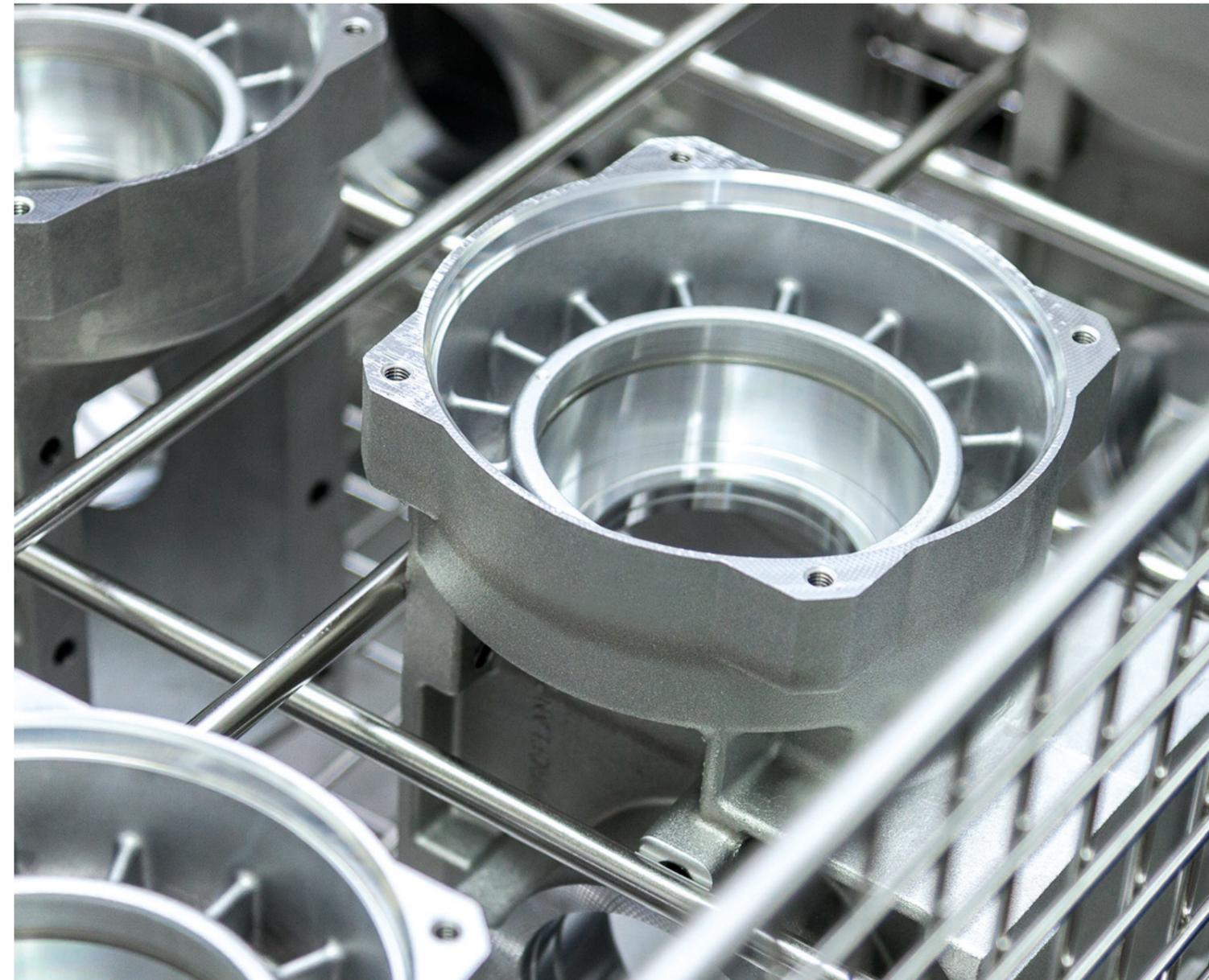
After the processing is completed, metal parts are soiled with a water-mixed cooling lubricant, a low-viscous or a high-viscous processing oil and metal shavings. In addition to ferrous metals such as grey cast iron, steel and stainless steel, HAKUPUR is also able to clean various light and non-ferrous metals. One of the frequently used cleaning processes is a spray process. HAKUPUR cleaners can also be used in immersion, ultrasonic, flooding and steam jet processes.

ADVANTAGES

- Outstanding cleaning power
- Multiple metal protection characteristics
- Very low foam generation

OTHER WATER-BASED CLEANING AGENTS

The HAKUPUR series contain a multitude of additional cleaning products aside from the industrial cleaning agents used after metalworking processes. This includes cleaning agents for plastic materials, products for floors and machine cleaners, but also products for the cleaning of tank trucks. The product range is completed by emulsion cleaners and replacement products for cold cleaners on a solvent basis.



POTENTIAL APPLICATION AREAS

Processing types

- ▶ Spraying
- ▶ Deburring
- ▶ Immersion
- ▶ Ultrasonic
- ▶ Flooding
- ▶ Steam jet cleaning

Materials

- ▶ Steel
- ▶ Cast
- ▶ Galvanized steel
- ▶ Stainless steel
- ▶ Aluminum
- ▶ Non-ferrous metal
- ▶ Plastic

A part after cleaning with HAKUPUR.



ADVANTAGES

- A perfectly suitable cleaning agent is available for almost every type of cleaning task
- Nothing is "ready made": When choosing our products, we take the customers' requirements into account and consider the respective framework conditions
- Always up-to-date: Our cleaning agents are regularly adjusted to current requirements and comply with all rules and regulations

A part is dipped into a solvent based cleaner. The cleaning process is immediately started.

SOLVENT-BASED CLEANERS

Certain cleaning tasks cannot be carried out by water-based cleaning agents. For these types of processes, we offer cleaning agents based on organic solvents. In contrast to the water-based cleaning agents, solvent-based cleaning agents are processed in their delivery state, i.e. not after they have been diluted with water.

NIKUTEX 2003, et al.

- Solvent-based cleaning agents based on modified alcohols for application in enclosed systems
- For the removal of polar (e.g., residues of water-mixed cooling lubricants) and non-polar contaminants (e.g., processing oils)
- Very high yield due to closed-loop circulation and repeated use

HAKU 1025 series

- Degreasers and cold cleaners based on hydrocarbon solvents
- Very high solubility when used with oils, grease, wax and similar substances
- Fully volatile and evaporate without leaving residues
- Application at room temperature
- Mildly smelling

HAKUTEX

- Special cleaning agents for special cleaning tasks (oil carbon remover, paint and glue solvents)
- Cleaning and maintenance of a large variety of surfaces

POTENTIAL APPLICATION AREAS

Processing types

- ▶ Spraying, immersion
- ▶ Manual application
- ▶ In enclosed plants

Materials

- ▶ All metals
- ▶ Plastic materials
- ▶ Varnished surfaces



The part is cleaned after a short time.

CORROSION PROTECTION

Easily corroding metals, such as cast iron, standard steel, but also galvanized steel surfaces must be protected before they are stored for a longer period of time or before they are transported. For this, we offer several different corrosion protection products. These leave a protective film or protective layers that protect against corrosion up to significantly more than a year and can be easily removed, if required.

ADVANTAGES

- High corrosion protection with even a thin film
- Easily removable protection films

PLASTELOX

- Thermoplastic hot-dip compounds
- Processed at 150–170 °C, exclusively in an immersion process
- Transparent, malleable plastic layer
- Protection against mechanical damage and corrosion

CUSTOS

CUSTOS 10 series

- VOC-free, water-immiscible corrosion protection oils

CUSTOS 20 series and 40 series

- Easily applicable products based on organic solvents with a protection period of significantly more than 12 months

CUSTOS 70 series and 600 series

- Water-soluble and water-miscible corrosion inhibitors, emulsion cleaners and emulsifiable corrosion protection oils

HAKUDREN

- Film-generating, solvent-based corrosion protection products with excellent corrosion protection characteristics while only applying a thin film

OR

- Dewatering products for simultaneous drying and preservation of water-wet processed parts in the immersion process



Easy immersion preservation with HAKUDREN 7 MS 17.

OUR SERVICE

We have modern test equipment available in our lab and test centre. This allows us to test corrosion protection characteristics under certain storage conditions such as changes in temperature or humidity. Our customers often provide us with the processed parts requiring preservation. We subsequently carry out comparative tests, and will ultimately recommend the most suitable corrosion protection product.



POTENTIAL APPLICATION AREAS FOR OUR CORROSION PROTECTION PRODUCTS

Processing types

- ▶ Immersion
- ▶ Flooding
- ▶ Spraying

Materials

- ▶ Steel
- ▶ Cast
- ▶ Galvanized steel

SOLVENT-CONTAINING CORROSION PROTECTION PRODUCTS

Solvent-containing CUSTOS and HAKUDREN corrosion protection products are still widely used. This product type may be easily applied through immersion, flux or spraying. Depending on the consistency and proportion of the film-generating agent in the product, an oily, vaseline-containing or waxy protection film remains after the corrosion protection product has dried.



ADVANTAGES

- Unproblematic processing
- Excellent corrosion protection
- Bath monitoring only necessary under certain conditions

SOLVENT-FREE CORROSION PROTECTION OILS

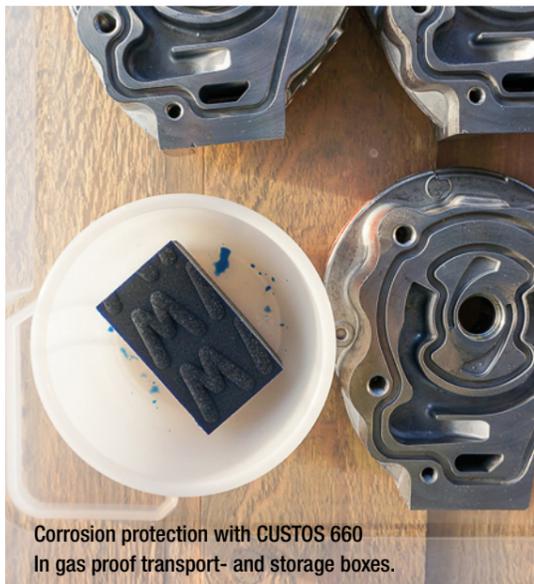
CUSTOS

Corrosion protection products that do not contain volatile hydrocarbon solvents and are consequently VOC-free are gaining popularity. The products in the CUSTOS series are highly fluid, have flash points above 100 °C and leave very thin protection films after drying that protect metal surfaces from corrosion for more than 12 months.

DEWATERING PRODUCTS

HAKUDREN

Water-wet processed parts may be dried and simultaneously preserved through immersion into a HAKUDREN product. The water film adhering to the metal parts is displaced from the metal surface and the water is separated out at the bottom of the immersion tank. After the dewatering agent has dried, a thin protection film remains that protects the processed parts against corrosion for a certain period of time.



Corrosion protection with CUSTOS 660
In gas proof transport- and storage boxes.



A corrosion protected part is stored.

WATER-SOLUBLE CORROSION INHIBITORS

Water or aqueous solutions are mixed with corrosion inhibitors so that metals that come into contact with water are protected against corrosion. A typical application for this product type are pressure baths that test the tightness of certain components. Moreover, we also add our CUSTOS corrosion inhibitors to water-mixed cooling lubricants or neutral cleaning solutions to improve the corrosion protection characteristics of these products. Certain water-soluble corrosion inhibitors are used instead of a neutral cleaner. The cleaned metal surfaces are subsequently protected against corrosion for several months.



HOT-DIP COMPOUNDS

PLASTELOX

Under the product name PLASTELOX, we offer thermo-soften plastics that are processed in immersion containers at 150–170 °C. In this temperature range, the melt is a highly viscous fluid. The PLASTELOX melt is present in this temperature range as a highly viscous liquid. Metallic workpieces are coated with PLASTELOX by dipping them into the melt. Subsequently, the parts are protected against mechanical damage and corrosion by a transparent, plastic layer. If necessary, the film can be removed by peeling it off.



EMULSIFIABLE CORROSION PROTECTION OILS AND CORROSION PROTECTION EMULSIONS

The CUSTOS series emulsifiable corrosion protection oils are usually processed in a 5–15% emulsion at 50–60 °C in a spraying process. Metal components can be cleaned and simultaneously protected against corrosion in one work step.

The immediately applicable corrosion protection emulsions are free of organic solvents and are applied in an immersion or spraying process. After the drying, a protective film will remain on the component after the emulsion has dried, which protects the treated metal surfaces against corrosion for up to 12 months.





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