eifeler

OUR RANGE OF SERVICES

From building systems to ensuring reliability

voestalpine eifeler group
www.eifeler.com

voestalpine
ONE STEP AHEAD.

WE AT VOESTALPINE EIFELER GROUP

40 Years

Coating-Performance

10 years voestalpine

True to our motto ‘one step ahead’, we offer you advanced services in the field of surface treatment. With our technologies, products and pplication consulting, we can offer you targeted adaptations of your surface properties to help you optimise your manufacturing processes and tool properties.

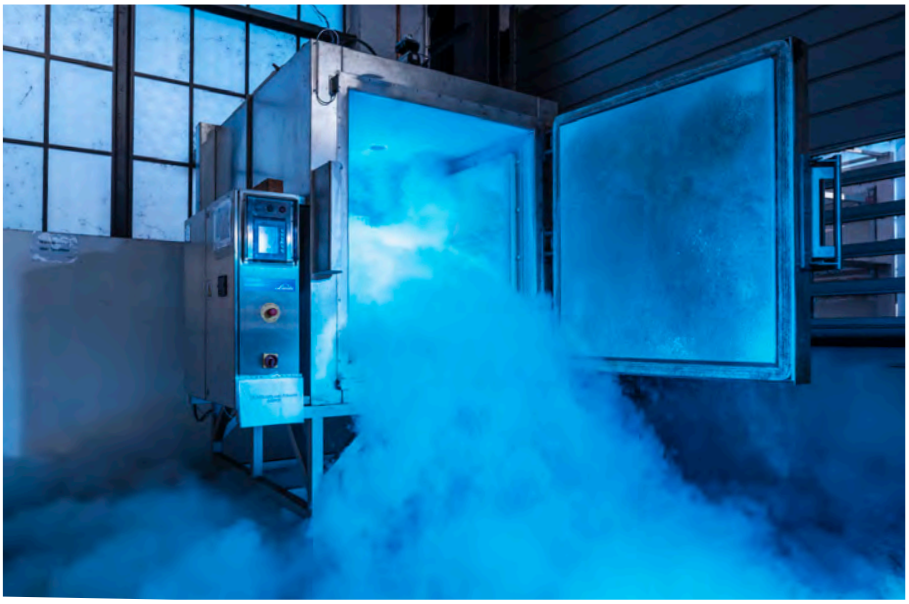
Our extensive product range has been used successfully for 40 years in the following areas:

- Tools:
  - Machining
  - Metal forming
  - Punching / Fine blanking
  - Plastics processing
  - Die casting
- Components:
  - Automotive industry
  - Aviation
  - Medical technology
  - Food and packaging industry

With the right product solution for the respective customer application, we make it possible to reduce wear and increase the service life of tools and components.

OUR TECHNOLOGIES

VACUUM HARDENING HEAT TREATMENT



Vacuum hardening is the heat treatment of metal, especially steel, workpieces with controlled times. The material properties are improved through the use of coordinated temperatures considering heating and cooling rates.

The heat treatment lends tools and components the adequate properties for later use, e.g. strength, toughness and surface hardness.

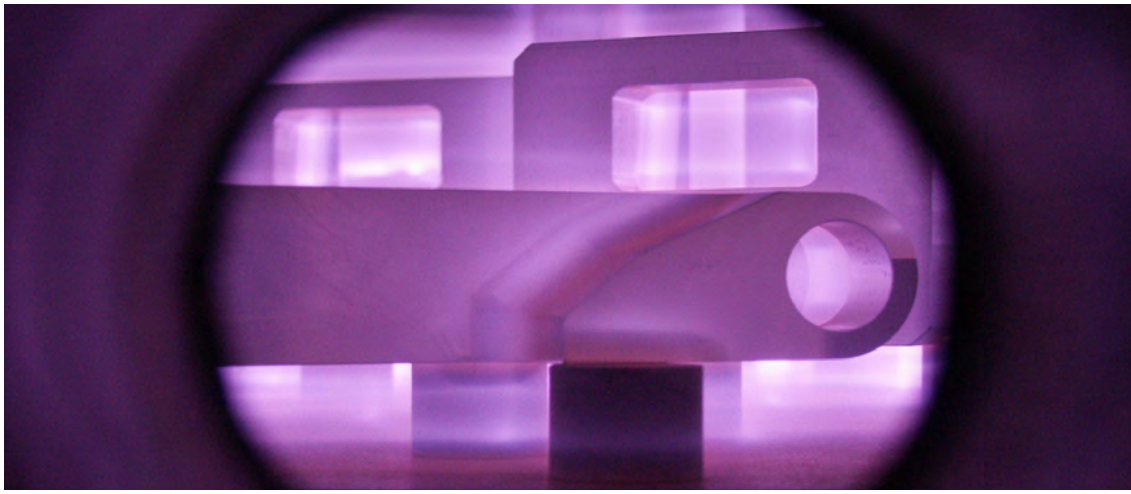
Across all locations and all parts from tiny stents to tools weighing up to 500 kg, all vacuum heat treatments are carried out reproducibly.

» Treatment depth: Complete, bulk to surface

» Purpose: Strength adjustment, toughness and surface hardness

» Use: In almost all industries

PLASMA NITRIDING



Plasma nitriding is an environmentally friendly thermochemical diffusion process in which the surface layer of a workpiece is enriched with nitrogen in a targeted manner. This results in an increase in the hardness of the surface layer and thus improvements in the wear resistance, service life and lifetime of the workpieces. The material core remains unchanged by the treatment; it retains its original properties, e.g. regarding toughness. If carbon is introduced in addition to nitrogen, the process is called ‘plasma nitrocarburising’.

The targeted and reproducible plasma nitriding process is adapted to the respective application area, material grade, workpiece geometry and workpiece surface. In the temperature range of approx. 400 to 600 °C, nitrogen and possibly carbon from an ionised gas atmosphere diffuse into the surface zones of unalloyed and alloyed steel, cast iron and special materials in a targeted manner. The arising nitrided layer generally consists of a diffusion layer and a compound layer above it, the formation of which depends on the steel grade and the treatment parameters temperature, time and gas composition. At the customer’s request, compound layer-free plasma nitriding or partial treatment of specific workpiece regions can be carried out.

» Treatment depth: Surface treatment to approx. 0.6 mm depth (material-dependent)

» Purpose: Surface hardening increase through introduction of nitrogen and/or carbon into the surface layer microstructure

» Use: In industries such as mechanical and plant engineering, toolmaking, automotive and energy technology

CVD COATING

Chemical vapour deposition, or CVD, is a coating process in which thermally induced chemical reactions occurring at temperatures of approx. 1000 °C cause layer synthesis from a specific gas mixture-precursor combination.

CVD coatings can be deposited on hard metal or steel materials.

CVD-coated steel substrates must be post-hardened in a subsequent heat treatment for restoring the defined microstructure and the necessary supporting action of the base material.

CVD as a coating process for increasing wear resistance is especially relevant in the forming industry, but is also used in various applications in machining-based manufacturing processes.

» Treatment zone: Surface application to max 10 µm (coating-dependent)

» Purpose: Tool surface modification through application of layers with specifically adjusted mechanical, chemical and thermal properties (e.g. hardness)

» Use: In areas of industry in which (due to the possible dimensional changes) no near-net-shape requirement exists, sheet metal forming technology, deep drawing, (cold) bulk forming, hot forming, punching and bending technology, and in certain areas of machining technology

PVD COATING

Physical vapour deposition, or PVD, is a process for synthesis of hard material layers based on ionised metal vapour at process temperatures of approx. 450 °C. The most common methods, and those used at the voestalpine eifeler group, are cathode sputtering (magnetron sputtering) and cathodic arc deposition.

In the sputtering process, growth of a coating is made possible through bombardment of a metal target by energised noble gas ions. The arc process, in contrast, uses arc discharge in a vacuum to vaporise the respective source metal. The ceramic (nitride) hard material layers are generated through the addition of specific reactive gases (e.g. nitrogen). This results in deposition of a micrometre-thin hard material layer with the respective chemical composition on the substrate/tool. All PVD processes take place in vacuum conditions for reasons of purity.

A suitable PVD layer for a specific application is selected based on the workpiece material, friction partner/counterbody material and environmental conditions (e.g. temperatures of use and use of lubricants or flow agents). In this way optimal performance is ensured.

- Treatment zone: Surface application to max 8 µm (coating-dependent)
- Purpose: Tool surface modification through application of layers with specifically adjusted mechanical, chemical and thermal properties (e.g. hardness)
- Use: In nearly all industrial areas with special focus on the following properties of the PVD coating:
  - Wear-resistant and lowered-friction layers
  - Reduced adhesion
  - Reduced reactivity of tool surface through chemically inert PVD coatings (e.g. corrosion protection or oxidation protection)
  - Functional properties (e.g. improved lubrication behaviour)
  - Decorative characteristics (e.g. colour)

PVD DUPLEX COATING

The PVD duplex treatment involves nitriding the tool surface using a specifically adapted plasma process immediately followed, without interruption of the vacuum process, by depositing a PVD coating. This combined process (two steps in one process) leads to a defined increase in the surface layer strength and load capacity of the tool or component with a subsequent targeted coating application.

» Treatment zone: Surface application to max 8 µm (coating-dependent) in combination with a plasma-based substrate surface treatment/hardening to a depth of approx. 50 µm (material-dependent) for steel materials

» Purpose: Targeted microstructural transformation in the substrate upper surface layer to increase load capacity and wear resistance in combination with modification of the tool surface for achieving specific mechanical, chemical and thermal properties (e.g. hardness)

» Use: In nearly all industrial areas with special focus on reduced tool wear and simultaneously increased load capacity of the part in near-surface regions

POLISHING

Polishing refers to the removal/smoothing of small amounts of material on part or tool surfaces. The goal is to smooth the surface to optimise friction characteristics or achieve the surface roughness level required for the subsequent surface application.

» Treatment depth: Removal and smoothing in the range of a few µm

» Purpose: Targeted modification or adaptation of surface roughness

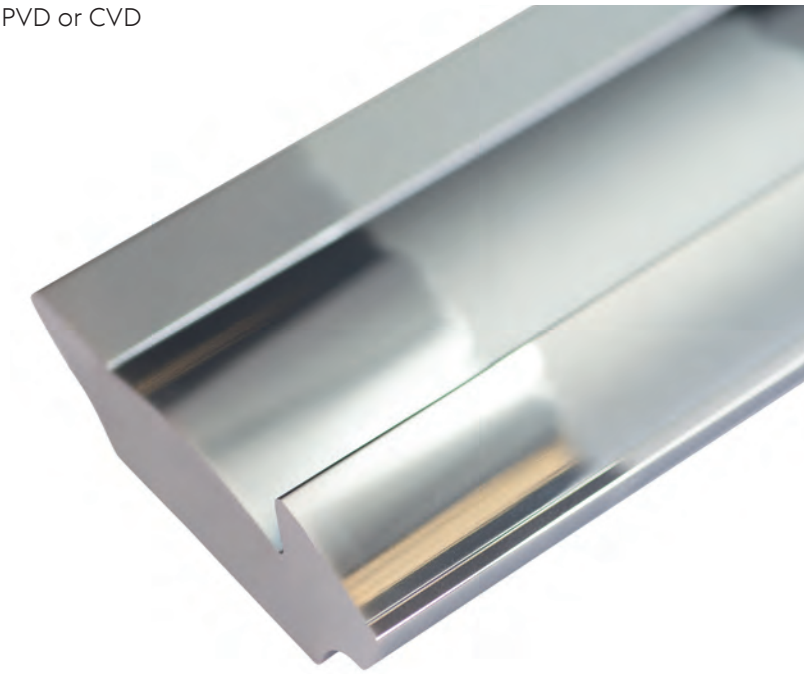
» Use: For example, in the manufacture of moulds for plastic injection moulding and tools for sheet metal and steel machining

DE-COATING

De-coating involves removal of residues from pre-existing PVD or CVD coatings using chemical and/or electrolytic processes.

» Treatment zone: Removal of pre-applied coatings

» Purpose: Complete removal of already applied coatings and residues



CLEANING

Cleaning using liquid media forms the last, essential step prior to the PVD- / CVD-based surface treatment. By corresponding cleaning media, the tools and components are cleaned and freed of transport protection materials residues, or corrosion protection agents in the form of liquids or dust so that optimal adhesion of the PVD / CVD coatings subsequently applied can be guaranteed.

PVD COATING SYSTEMS

At the Düsseldorf location, voestalpine eifeler Vacotec GmbH develops and builds sophisticated and innovative PVD systems for international customers in the tooling and general industries.

Over our many years of experience in the field of vacuum technology, we at voestalpine eifeler Vacotec have gained a considerable amount of know-how which we apply to the design and construction of new system generations.

The arc-based coating systems alpha400P and alpha900P utilise voestalpine eifeler's specific SPCS technology for synthesis of smooth and wear-resistant PVD coatings for diverse tooling and component applications. In addition, voestalpine eifeler's own DUPLEX technology can be used for controlled in situ nitriding without interruption of the PVD coating process.

Forming tools with high demands on load capacity in the surface areas and on avoidance of porous compound layers can profit from this technology.

voestalpine eifeler Vacotec not only offers the PVD coating systems, but also can supply the corresponding turnkey production lines including everything from cleaning to the appropriate measurement technology for quality inspection of the PVD coatings. Our worldwide service staff support customers from the acceptance of the overall infrastructure deployment plan for our technology on site to start-up and training on our systems.

RESEARCH AND DEVELOPMENT

Future-oriented research and development has long been part of the strategic focus of the voestalpine eifeler group. As one of the leading providers of products and services for surface treatment, we ensure through our research and development department in Düsseldorf that we always have innovative solutions available for our customers and for changing market challenges. Our continuous product and technology developments are made possible by our highly qualified engineers as well as a strong worldwide know-how network extending along the entire value chain.

DO YOU HAVE ANY QUESTIONS ABOUT OUR PRODUCT RANGE OR WOULD YOU LIKE TO REQUEST A QUOTE?

You can contact us by phone on +49 211-970 76 0.

Per e-mail at gruppe@eifeler.com.

Or use our contact form at www.eifeler.com.

voestalpine eifeler Coating GmbH

Dusseldorf centre
Duderstädter Straße 14
40595 Düsseldorf
T. +49/211/970 76-0
duesseldorf@eifeler.com

Ettlingen centre
Englerstraße 18a
76275 Ettlingen
T. +49/7243/57 78-0
ettlingen@eifeler.com

Schnaittach centre
Kirschenleite 10–12
91220 Schnaittach
T. +49/9153/92 27-0
schnaittach@eifeler.com

Salzgitter centre
Gottfried-Linke-Straße 205
38239 Salzgitter
T. +49/5341/22 32-0
salzgitter@eifeler.com

voestalpine eifeler Vacotec GmbH

Dusseldorf
Hansaallee 321
40549 Düsseldorf
T. +49/211/522-2400
gruppe@eifeler.com

voestalpine eifeler group
Duderstädter Straße 14
40595 Düsseldorf
T. +49/211/970 76-0
F. +49/211/970 76-955
www.eifeler.com

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