rhv-Technik has focused intensively on surface technology for more than thirty years and leads the field in the south of Germany.

Reputable enterprises at home and abroad are among its numerous customers. The company has extended its competence beyond general engineering and has the capacity to provide you a complete manufacturing program. The range of products offered by rhv is constantly being expanded by new and further developments which derive from its own research projects or arise directly from close cooperation with customers.

rhv-Technik is a manufacturer of:

• semi-finished goods through to completely new products

rhv-Technik is a specialist for:

• thermal spray technology, in the areas of wear friction oxidation, corrosion, cavitation, erosion, scaling and thermo-cycling or temperature shocks in service
• scaling properties and mechanical galling, surface hardness/durability, coefficient of friction, surface structure, durability, reflection/absorption
• for better and longer performance maintenance

rhv-Technik guarantees you certified quality:

• premium-spray materials from notable manufacturers for high added value
• careful and thorough work on your premises and building sites, carried out with the latest application engineering
• precise, reliable information and advice in collaboration with your specialists
• individual training programs

THERMAL SPRAYING

A versatile trend-setting process technology

rhv-Technik

Has focused intensively on surface technology for more than thirty years and leads the field in the south of Germany.

Proven expertise

For more than 40 years, thermal spraying has been successfully applied to protect surfaces against wear, friction, oxidation, erosion, corrosion, cavitation and scaling, and in connection with thermal barriers - both for repairs and new production. At maximum substrate temperatures of 100 °C to 150 °C, excellent surface regeneration can now be achieved which also provides ideal conditions for an unrestricted coating structure. The vast selection of suitable spray materials and their multiple combinations generate a diversity of coating compositions which makes their areas of application virtually unlimited.

The process is suited to treating almost all types of substrates, from metals, plastics, ceramics through to wood and cardboard.

CUSTOMER SERVICES MADE TO ORDER

• Complete range of machining processes
• Turning between centres
• Milling, cylindrical grinding (external)
• Cylindrical grinding (internal)
• Surface grinding

DIN EN ISO 9001
DVS ZERT®

Thermal coatings
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rhv-Technik is a specialist for:
• thermal spray surface protection in the areas of wear friction oxidation – erosion – cavitation – corrosion – scaling and thermal shock in operation
• sliding properties and reduction to galling – surface hardness/ductility – coefficient of friction – surface structure – workability, reflection/absorption for better appeal and preventive maintenance

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A VERSATILE TREND-SETTING PROCESS TECHNOLOGY

THERMAL SPRAYING

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Rhv-Technik GmbH + Co. KG
Rybak + Hofmann
A versatile trend-setting process technology

Innovative. accurate. rapid.

thermal coatings
Metal spraying processes are a process technology belonging to the new family of coating systems to manufacture high-quality coatings. They have their origin in the area of welding and coating. In contrast to common welding processes, in coating processes the material is brought to the molten state by means of high energy and applied onto the workpiece by means of a directed high-speed gas or particle jet. Metal spraying processes are based on the use of molten metal as a feedstock. The sprayed metal is fed to the process in the molten state as metal powder, wire or rod. This metal feedstock is then converted into a sprayable fine metal powder by means of various atomization methods. A process technology belonging to the new family of coating systems to manufacture high-quality coatings. They have their origin in the area of welding and coating. In contrast to common welding processes, in coating processes the material is brought to the molten state by means of high energy and applied onto the workpiece by means of a directed high-speed gas or particle jet. Metal spraying processes are based on the use of molten metal as a feedstock. The sprayed metal is fed to the process in the molten state as metal powder, wire or rod. This metal feedstock is then converted into a sprayable fine metal powder by means of various atomization methods.

HARD METAL HVAF SPRAYING

Special features of the HVAF spraying process:

- Extremely high gas velocity and relatively low spraying pressure lead to the following typical coating characteristics:
  - High build rate
  - High degree of fusion
- White-light interferometry (WLI) systems generally generate coating roughness values of 2–3 µm, i.e. in the case of coatings, this leads to some powder particle velocities of 200 m/s, which in turn results in very high peak values. This leads to a high degree of flattening and high surface textures.
- The spray process employs the nozzle’s maximum in terms of high build rate and high fusion rate without losing the positive powder handling characteristics typical of low-pressure processes. Very low process power enables sufficient atomization pressure to high stresses, high yield strengths, bending strengths, surface textural hardnesses, etc.

Sample selection of spray materials for HVAF coating:

- The coating material is specified on the basis of high thermal conductivity, high build rate, high degree of fusion, cost-effective coating and high-quality surface finish.

CERAMIC COATINGS

Objectives

The purpose of these coatings is to achieve the desired protection against wear and corrosion at low cost. Coatings must therefore:

- Improve substrate hardness and wear resistance by means of a variety of coating techniques, like plasma spraying, powder spraying, or metal spraying.

Typical applications include:

- Abrasion-resistant coatings for abrasive environments, e.g. in milling, grinding, and cutting tools.
- Corrosion-resistant coatings for chemical environments, e.g. in chemical processing industries.

Combined wear-corrosion protection:

- The coating material must be able to withstand both wear and corrosion simultaneously. This is achieved through the use of a combination of ceramic and metallic coating materials, e.g. ceramic coatings on metallic substrates.

COMBINED METAL AND COATING MATERIALS

Systems and materials

- Ceramics: Stainless steel, carbon steel, high chromium cast iron.
- Metal-matrix composites: High silicate glass, cast iron, metal-matrix composites.
- Cast irons: Ductile cast iron, nodular cast iron, semi-steel cast iron.
- Chrome-ceramic coatings: Tungsten carbide and chrome-ceramic coatings.
- Ceramic coatings: Ceramic coatings, ceramic-matrix composites.
- Environmental coatings: High temperature coatings, self-fluxing alloy coatings.

Sample selection of spray materials for HVAF coating:

- The coating material is specified on the basis of high thermal conductivity, high build rate, high degree of fusion, cost-effective coating and high-quality surface finish.

FEASIBILITY OF METAL SPRAYING

- The feasibility of metal spraying can be determined by assessing the suitability of the material for the coating process. This includes the physical properties of the material, such as melting point, hardness, and thermal conductivity, as well as the chemical properties, such as corrosivity and reactivity.

References

**EXTRACT FROM OUR RANGE OF SERVICES**

In addition to being used for pure corrosion protection, the material is not damaged by caustic solutions and does not show any risk of distortion. In contrast to hot-dip galvanizing, the application of the process is not dependent on the technical conditions of the linear source of the nickel deposit. Being a vacuum process, the preparation of the substrate is necessary. Therefore, the expensive mechanical preparation of the surface need not be dispensed with. Also used for the open bearing areas of the feed chuck, milling rolls, etc. Suitable for pseudo-alloys and/or corrosion protection in non-sulphurous atmospheres. Resistant to oxidation and corrosion. Resistant in connection with S and Cr alloys. Excellent for use at high temperatures: shafts, housings, impellers, thermoelements.

**CERAMIC COATINGS**

- **Metal-spray coatings:** Amongst others, chrome-aluminium oxide/crushed oxide and/or corrosion-resistant coatings can be used in various applications, e.g. for use in paper industry rollers which are exposed to wet corrosion zones. Oxidation resistant at temperatures up to 1,200 °C. Also suitable for water-cooled electric motors, shields and catalytic converters.
- **Bond coat, buffer layer, corrosion protection:** Provide good rust protection for machine parts which require resistance to oxygen. Typical hardness 60 – 62 HRc.
- **Nickel-chrome-oxide coating against cold shutting behavior:** Special features of the HVOF spray process. Typical hardness (60 – 62 HRc).
- **Nickel-aluminium (Ni-Al 95/5)**
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**COMBINED CORROSION PROTECTION**

- **Plasma spraying (PS):** Plasmaspraying is a process in which solid particles are accelerated by an electric arc and then ionized by flowing gas to a temperature of about 10,000 °K. The high temperature of the plasma and the velocity of the particles lead to hard and wear-resistant coatings.
- **Wire flame spraying (WFS):** In the process range, wire-fed or arc-welded wire flame spraying is used. This process is used for surface treatment in various industries. Typical hardness (45 – 60 HRc) is achieved. Knowledgeable for use in nuclear reactors.
- **Plasma flame spraying (PFS):** Powder flame spraying is a process in which the particles are accelerated by plasma radiation. This method can offer a wide range of coating systems to manufacture high-quality components. Typical hardness (45 – 60 HRc) is achieved. Knowledgeable for use in nuclear reactors.
- **Hard flame spraying:** Using a wide range of processes coupled with a variety of thermal spray equipment.

**MELT-SHIELDING TECHNOLOGY**

- **Melted droplets from sintered oxide rods are fused and surface-melted, reaches 10,000 °C**
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**CONCLUSION**

- **RHV-Technik offers a wide range of processes coupled with a variety of thermal spray equipment.**
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**Objectives**

- To improve the coefficient of friction for dry bearing elements and anti-seizure coatings.
- To enhance surface hardness – ductility.
- To increase resistance and thermal resistance – cavitation.
- To increase temperature resistance – scaling.
- To substitute repair parts and return parts without production pauses.

**Advantages**

- Weld hardening of all cast and wrought iron steels, free of chill marks and gas pores, for bearing parts with high static and dynamic loads.
- Excellent hardenability and toughness properties by forming a fine surface layer, high elasticity.
- Metal-matrix composites are significantly improved in wear resistance, where stress concentrations occur. The thick cast carburizing layers are replaced by metal-matrix composites, which can be enhanced even more in combination with fiber or particle reinforcement.

**Bearing metal (Sno-Go-Cr)**

- Nitrogen aluminium (Al-Ni 6.5-7.5)
- Nitrogen bearing steel with molybdenum, free of chill marks and gas pores, for bearing parts with high static and dynamic loads.
- Excellent hardenability and toughness properties by forming a fine surface layer, high elasticity.
- Metal-matrix composites are significantly improved in wear resistance, where stress concentrations occur. The thick cast carburizing layers are replaced by metal-matrix composites, which can be enhanced even more in combination with fiber or particle reinforcement.

**Applications**

- The fine-grained, micro-porous finishing process provides ideal conditions for laminate technology.
- The extremely high gas velocity and related high operating temperatures lead to the following typical coating characteristics:
- Long-term high performance.
- High wear resistance and very good corrosion protection.
- High thermal conductivity.
- High adhesion and elasticity.

**Special features of the HVIPS process**

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**Selecting the sample of spray materials**

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**Ceramic Coatings**

- Typical specializations of the coating are multiphase structures, abrasion resistance, corrosion resistance, high resistance to wear, and high resistance to corrosion.
- The high resistance to wear results from the formation of hard ceramic phases in the coating.
- The high corrosion resistance is achieved by the formation of compact oxide films on the substrate.
- The high resistance to wear is due to the formation of hard ceramic phases in the coating.
- The high resistance to corrosion is achieved by the formation of compact oxide films on the substrate.

**Composition**

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