

Coating of metal sheets and strips

Vacuum coating at Fraunhofer FEP



*In-line vacuum coating equipment for sheets
and metal strips MAXI*

Vacuum-based technologies such as physical vapor deposition (PVD) allow large surfaces to be coated at high rates under industrial conditions. A wide selection of materials can be deposited: Metals, alloys of differing composition, adhesion layers, as well as gradient and metastable layers can be applied with low consumption of materials.

Also at high coating rates we, at Fraunhofer FEP, can guarantee good layer qualities. The technologies we have developed such as plasma-activated high-rate coating, high-rate plasma enhanced chemical vapor deposition (PECVD), and relevant pre-treatment methods allow dense and uniform layers having customized properties to be applied to metal sheets and strips.

The coatings can, for example, give metal sheets and strips improved corrosion protection, abrasion resistance, and scratch resistance. This is opening new applications in areas such as thin film photovoltaic technology, machine construction, environment, and energy. In addition, costs are being reduced due to the improved service lives of products and components.

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Advantages of PVD coating

- High productivity and low costs for coating large areas
- Low consumption of materials
- Excellent layer properties
- Large selection of coating materials
- Combination of PVD and PECVD processes is possible

Application fields

- Automotive
- Photovoltaic technology
- Solar thermal energy
- Architecture
- Packaging
- Interior decoration
- Lighting

Our offer

- Coating of steel, stainless steel, pre-coated steel, copper, aluminum, and their alloys
- Technology and process development to meet customer requirements
- Pilot production of metal strips (up to 300 mm wide) and large metal sheets (up to 500 × 500 mm²) in our pilot plant MAXI
- In-line process management, from the pre-treatment to the post coating
- Wet-chemical cleaning prior to the vacuum coating

Technologies

- High-rate evaporation (thermal or electron beam heated)
- Plasma-activated high-rate deposition
- Pulse magnetron sputtering
- Pulsed-plasma treatment
- Wet-chemical cleaning
- Other PVD and PECVD technologies on request

Applications

Function	Layer material	Example application
Corrosion protection	Ti, Al, Cr, Cu, Sn, ZnMg, Zn	Exhaust pipes ZnMg-coated sheet steel for car bodies
Decorative	TiN, Cr, Ti, TiO ₂	Interior of elevators
Transparent scratch protection	SiO _x , Al ₂ O ₃	Kitchen interior
Hard material layer	TiN, TiC, WC, Al ₂ O ₃ , a-C(:H)(:Ti/W)	Cutting blades
Insulation	SiO _x , Al ₂ O ₃	Thin film solar cells
Electrically conducting	Al, Cu, Sn, Mo	Plug contacts / back contacts for Cl(G)S thin film solar cells
Braze- and weldable	Cu, Sn, Si	Brake lines, heat exchangers
Photocatalytic	TiO ₂	Building facades
Solar absorber	Ti or Cr based Cermets	Thermal solar absorbers (flat collectors)
Photovoltaics	Si	Thin film photovoltaic cells
Highly reflective	SiO ₂ , TiO ₂	Lamp reflectors
Special functions	Al, Cu, Sn	Sliding bearings
Solid electrolyte	YSZ, LiPON	Fuel cells, thin film batteries



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