

Smart. Flexible. Perfect.

Hand crafted quality gets automated



Fast, precise and uniform

Hand crafted quality
gets automated

We offer a new technology for high-speed plating. This technology electroplates each component individually regardless of ever changing requirements. The special surface finishing process enables a single part to be treated in an individual plating reactor especially customized for a particular part/component. With this new technology, we design, develop and build electroplating systems specially tailored to meet your component specifications.

Our motto is "One part like the other." Tailoring each component allows for complex surfaces to be plated within tight tolerances, and highly repeatable. Within seconds, your parts are plated with absolute dimensional stability, and accurate outline.





Our customized electroplating systems precisely match the surface treatments with the requirements of your components. Thus, we realize:

- Sequential plating of single parts
- High process capability index
- Uniform disposition of layer thickness
- Narrow tolerances with high repeat accuracy
- Low scrap rates – the same part in consistently same quality
- Targeted distribution of layer thickness in designated areas possible
- Selective plating possible
- Cost optimization through high level of automation
- Deposition of nearly all galvanic surfaces possible
- High throughput
- Secure and environmentally friendly production
- Marginal emissions
- Low space requirements

Demanding parts – automated processes

Example: Plant for chrome plating of valves
The plant was constructed, designed, and produced for the high-speed chromium plating of combustion engine valves.



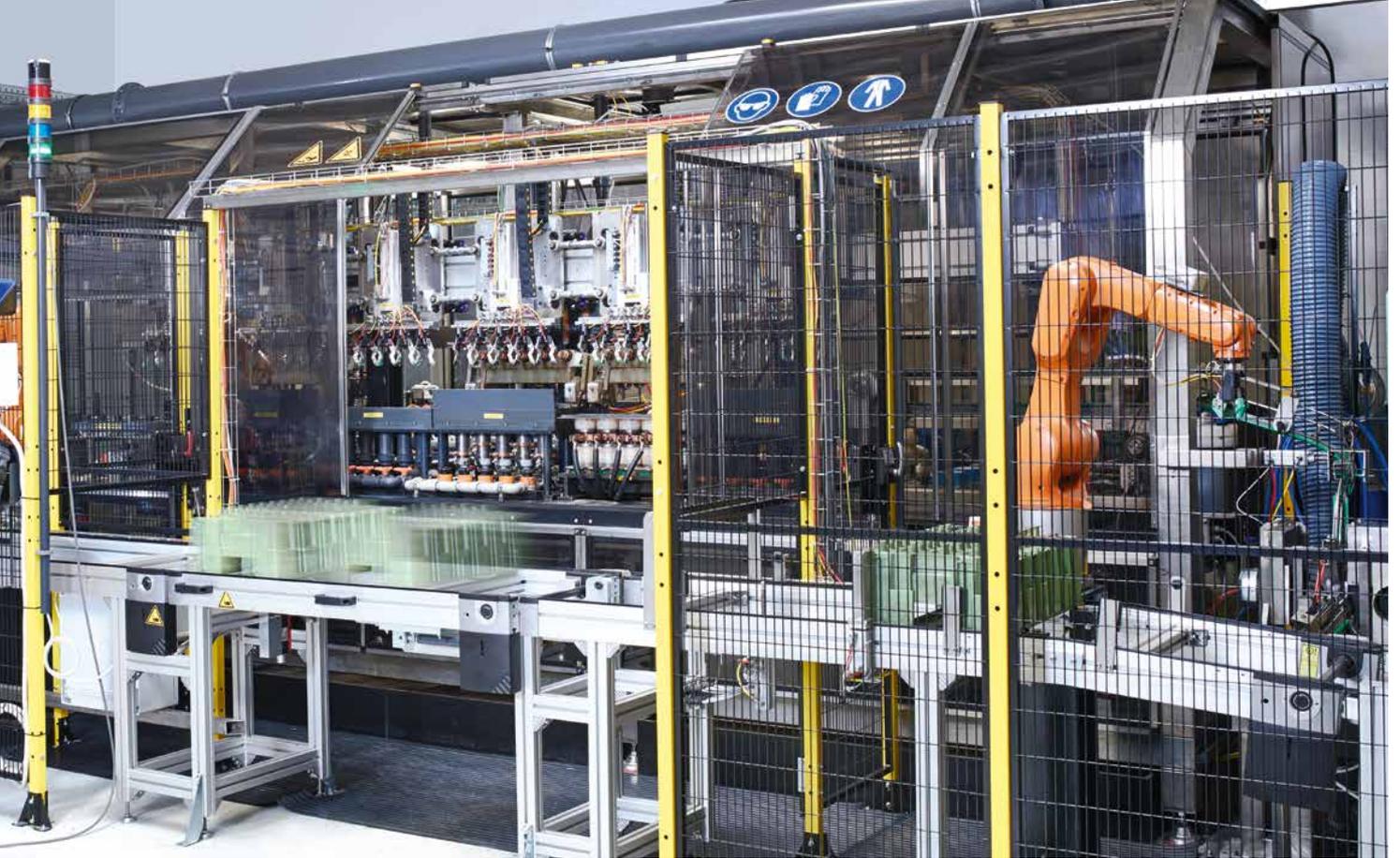
Demanding parts with high requirements concerning wear resistance

Due to their installation state, valves make high demands on plating:

- Parts move continuously and are subject to excessive wear
- Mechanical strain through permanent movement
- High temperature stress due to high temperatures of combustion gases
- Corrosive liability
- High wear- and corrosion-protection required

Plant chrome-plates valves within seconds – automated processes

- Plating of valves in 15-25 seconds (dependent on required layer thickness)
- Automated robotic system to assemble and move the valves
- Automated process within the closed plating system:
 - Electrolytic degreasing
 - Rinsing
 - Reverse etching
 - Chrome plating (hard chrome)
 - Polishing
 - If necessary, further process steps are applicable, i.e. further rinsing pre-treatments before degreasing or an automated drying system after the final rinsing.
- Continuous control of process parameters during series production
- Depending on layer thickness, four seconds processing time per part can be realised.
- One person supervises the plant.



Plant for plating single valves for the automobile industry in Holzapfel Group's Fast Plating Center

Comparison with conventional hard chrome plating

During a traditional chrome plating process, the parts are transported by special plating racks, always more pieces at a time. Thus, they are moved through various containers (tanks) with galvanic liquids. Traditional chrome plating requires special racks which carry multiple parts simultaneously through various galvanic baths. In order to deposit a chrome layer with a thickness of 4-50 μm (deposition time: 0,4 $\mu\text{m}/\text{min.}$), plating times in this traditional plating process can vary from some minutes to an hour.

This traditional process can cause:

- Inadequate layer thickness distribution, because in an electrolytic process this can vary, depending on the position of the parts on the plating rack.
- Only process documentation for the whole rack (i.e. exposure time, temperature, electrical distribution) and not down to individual parts.

With the high-speed hard chrome plating process, each part gets treated and plated separately.

Each part is placed in a single cell, called a reactor. There, the electrolytic liquid flows with a specific speed and pressure. These conditions enable the density to increase up to 1200 A/dm².

Our technology allows chrome layers of 3-10 μm to be deposited within 5-15 seconds (20+ $\mu\text{m}/\text{min.}$).

Application examples:

- Motor valves (intake and exhaust valves)
- Brake cylinders
- Piston rings
- Air piston rods
- Shock absorber rods
- Injectors/Injection nozzles
- Pistons/pressure pieces
- Plungers

Fast plating process

Plant composition

This style of plating has significantly improved hard chrome plating. The high plating speed takes the concept of traditional electroplating plants to a new dimension.

Advantages of the fast plating process

- Our process technology deposits chrome at a high speed (ca. 1 μm every 1,5 seconds).
- The complete volume of water endangering substances is substantially less than in a conventional electroplating plant.
- The system allows using less chromium (approx. 10 times less) than a conventional galvanic bath – with the same productivity.
- FPP-plants are highly automated and work with a single system for process control. Each part is handled separately: one rectifier per part.
- The system exceeds the traditional quality control.

Advantages of the fast chromium system

Rapid chrome plating system in fast plating process versus traditional chrome plating:

- 01 Production speed increase**
Deposition rates from 1 $\mu\text{m}/\text{minute}$ to 40+ $\mu\text{m}/\text{minute}$
- 02 Better quality control**
 - The 1:1-relation between part and reactor ensures a 100 % process control
 - Parts are treated separately which allows for single unit process parameter regulation
 - Scrap reduction
- 03 Energy Consumption Reduced**
 - Significant savings due to smaller tanks and closed reactor
 - 35% less power consumption of rectifier
 - 50% less power consumption of heating systems
 - 90% less emission
- 04 Better environmental protection**
 - 80% less water consumption (using recycling)
 - No open tank necessary
 - REACH compliance
- 05 Low space requirements**
Minimal space requirements compared to a traditional electrolytic plant (for a fast plating plant, 60% less space is required)

Research and development

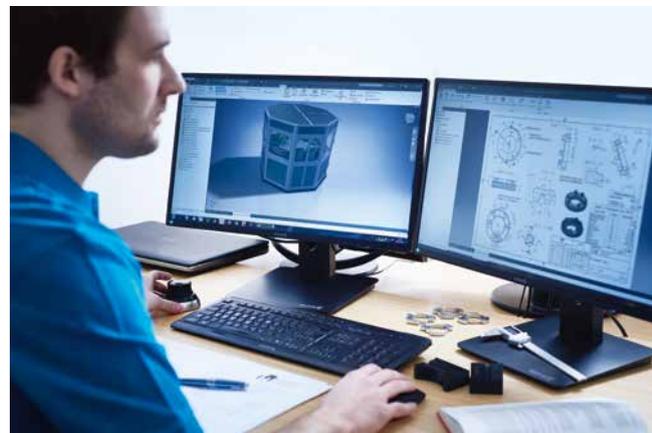
Competence in perfection

We have strong in-house supporting services of engineering, construction, production to complement our plating business. Usage of various simulation technologies simplifies and accelerates the development of plants and plating processes long before start of production. We can produce samples to develop and adapt processes through our two prototype lines. We also offer process engineering, and project development.

Our chemical and substance laboratory with state-of-the-art analytical apparatuses helps us monitor and enhance plants and processes.

Modern analytical methods such as a scanning electron microscope with an EDX-analysis system, or equipment for confocal microscopy allow for detailed layer analysis within the development process scope. For example, in-depth examinations of both layer composition and characteristics.

We deploy those microscopical tools for the qualitative and quantitative description of the material structure. The equipment is also used for the examination of the reciprocal effects between plating and raw material. With the findings gathered, we optimise plating/coating processes and realise the desired layer characteristics. When engaged early in the development process, the detailed analyses can help indicate design adaptations to suit the required plating process or even for alterations concerning the base materials.





Services:

- Plant development, engineering and production
- Process engineering: process and project development

Holzapfel Metallveredelung GmbH | Unterm Ruhestein 1 | D-35764 Sinn
FPP S.R.L. | Via Grange Palmero, 59 | I-10091 Alpignano (Torino)

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