Hard Chrome

1. General Information

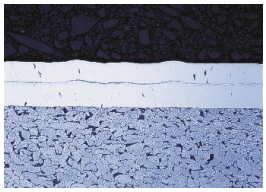
Each workpiece can be hard chrome plated either partially or completely.

This requires a dedicated fixture or setup for each workpiece (electrical contacts, masks, anodes, etc.). Either a specified coating thickness is applied, or the part is chrome plated to a defined dimension. Dimensional chrome plating can be reliably performed with coating thicknesses of up to 0.05 mm and to tolerance grade 7 (no post-processing required). Using special processes, a specific gloss level or defined wettability can be controlled and reproduced. Surface finishes with customer-specified roughness values can also be achieved.

The various coating processes are briefly listed below:

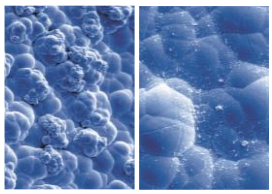
Hard chromium-plating Durit® Special Process

Functional platings, surface qualities ranging from mirror-high-gloss Rz 0.05 µm to structured platings that are Rz 50 µm



Multilayer hard chromium-plating M-Durit®

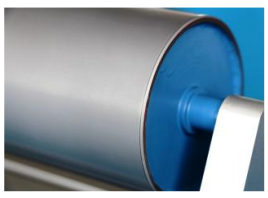
From 2 to 10 platings for increased corrosion protection and high abrasion resistance



Matt hard chromium-plating Satin® Special Process

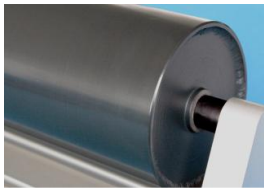
Electrolytically mattified and mechanically textured surfaces

Adapted surface topography for processing textiles, nonwovens, paper, films, prepregs (CFRP), and plastics as well as other materials



Durit® Teflon Chrome

Non-stick properties; through additional chemical treatment of the chrome layer, PTFE lubricants can be incorporated into the surface



Durit® Black Sky 50

High wear resistance and non-stick effect through special surface treatment and application of PTFE

Durit® Nano Aqua

Using a sol-gel process, nanoparticles are applied to the existing chrome layer. High wear resistance, non-stick effect, and easy cleaning “easy to clean”

2. Properties

Thanks to the exceptionally versatile properties of hard chrome, there are virtually no limits to its fields of application. The most important characteristics of hard chrome coatings are:

- Hardness 62 – 65 HRC (750 – 1050 HV)
- Melting point 1850 – 1900 °C
- Large coating thicknesses possible (> 1 mm)
- High wear resistance
- Good coefficient of friction
- Good corrosion resistance; for multi-layer systems at least 0.08 mm coating thickness
- Poor wettability
- Definable surface finishes (from very smooth to rough, from matt to glossy)
- Can be mechanically reworked (grinding, polishing, etc.)
- Workpieces can be refurbished multiple times
- Low processing temperature (no distortion of dimensionally accurate parts)
- Suitable for coating very small to very large workpieces

3. Process

Hard chrome plating is an electroplating process, i.e. an electrochemical process.

The electrolyte (consisting of water, chromic anhydride, and sulfuric acid) is maintained at a constant temperature in an acid-resistant lined tank. Depending on the application, suitable catalyst salts may be added to the electrolyte. This allows properties such as gloss, hardness, deposition rate, etc. to be influenced.

The deposition of chromium from the electrolyte takes place by means of direct current. Vapors generated on the surface of the bath are extracted and cleaned in chromium separators. The purified air is released into the environment, while the recycled wash solution is returned to the baths. Under high bath load conditions, the electrolyte temperature increases and is cooled via a water circulation system. The energy recovered is utilized through heat exchangers and mixed into the fresh air supply.

4. Chemical Resistance

With very few exceptions, hard chrome is resistant to virtually all chemicals. Resistance to other materials and chemicals is documented separately in the document “Chemical Resistance of Chromium”.

This document can be found in the download section of the Hartchromwerk Brunner AG website.

5. T Technical Hard Chrome Plating Using the Durit® Special Process

5.1. Types

Dimensional Hard Chrome Plating:

- Heavy Hard Chrome Plating
- Multi-Layer Hard Chrome Plating (M-Durit® Special Process)
- Matt Hard Chrome Plating
- Electrolytic Matt Hard Chrome Plating
- Structured surfaces with defined roughness
- Satin® Special Process
- Hydrophilic hard chrome coatings
- Functional coatings (Hard Chrome – PTFE)

5.2. Maximum Dimensions

Diameter: up to 3,200 mm

Length: up to 12,000 mm

Weight: up to 25 t

5.3. Base Materials

- All types of steel (including hardened, nitrided, stainless steel, etc.)
- Cast iron
- Copper, brass, bronze, nickel silver, soldered joints
- Aluminum
- Zinc
- Nickel-plated workpieces
- CFRP

In principle, all metallic materials can be chrome plated. However, an excessively high chromium alloy content may have adverse effects (greater than 25%).

Since pre-treatment must be adapted to the respective base material, the exact material specification must be known. Highly martensitic steels are prone to hydrogen embrittlement.

6. Design Requirements

- Defects in the base material such as pores, gas inclusions, laminations, etc. are usually visible after chrome plating and require additional repair work at our facility
- The steel should be as fine-grained as possible
- Castings with an excessively high recycled content may cause problems (porosity)
- Avoid sharp edges (use radii)
- Recesses: maximum depth = diameter
- Partial chrome plating may, under certain circumstances, be more expensive than complete chrome plating (masking effort)
- For complete chrome plating, clarify whether all areas (e.g. small holes) actually need to be plated
- Select coating thickness according to the application requirements
- Avoid unnecessary tolerance specifications

Please Note:

- Chrome plating (without mechanical post-processing) never improves the surface roughness
- Deliver workpieces protected against damage (plastic, wooden crate, acid-free cardboard, etc.)
- Workpieces should be lightly oiled (e.g. oil paper)
- Never use silicone-containing products
- Clean thoroughly after pre-machining, i.e. no metallic or loose residues on or inside the workpiece
- Whenever possible, always include a drawing
- Provide precise material specifications and any prior treatments performed (e.g. gas nitriding, ion nitriding, etc.)