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Technical Details

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CSV – process and technology

In contrast to the conventional spray painting methods, the CSV-technique (German: Chemisches Spritzmetallisieren) is based on reductive precipitation of metal. The method is also known as "mirroring".

First a special treatment of the raw area to be metallised is to be applied. A base coat is then a prerequisite for a very thin layer of silver can be produced on the prepared area. The delicate silver layer is protected by final protective and clear coatings.

Range of application

Professional use

- (fast) prototyping in any industrial research & development dept.
- model making, experimental pieces
- trade fair/booth construction
- exhibition samples
- objects of plastic arts
- interior design/chattels

Process features

- workpieces can be metallised in total or just in partitions
- stageless gloss level and colouring of the metal-effect possible
- diverse, subtle structures of the surface can be displayed perfectly

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Processible surfaces

The right choice of pre-treatment and the decent execution on the surface area is crucial regarding the quality of the final result. The same significance lies within the quality of the raw material and the personal applying/spraying skills.

Basically it is possible to metallise every surface which can be filled and glued beforehand.

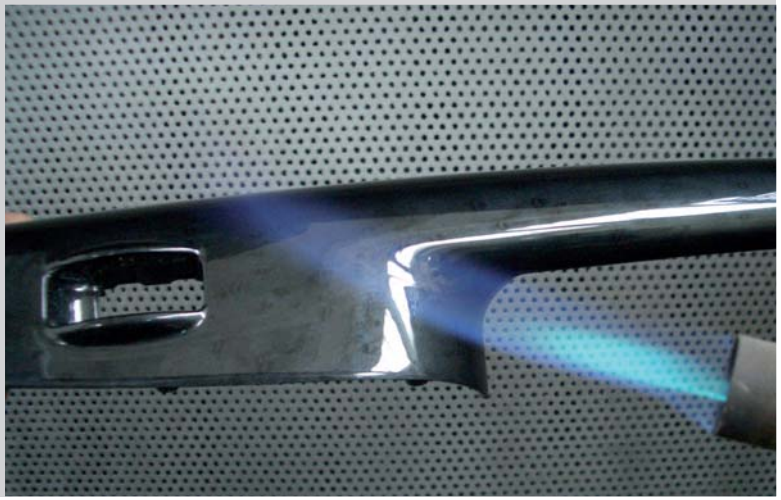
Examples:
wood, glassware, metal, ...

Prerequisites:
Consistency of paint/lacquer, dissolver, thinner and temperature of up to 60°C

Abstract of synthetic materials:

ABS	butadiene-acrylonitrile-styrol
GFK	fibreglass-reinforced synthetics
PA	polyamide plastic
PBT	polybutylenterephtalate
PE	polyethylene
PP	polypropylene
PUR	polyurethane
PF	phenolformaldehyde

Pre-treatment of sensitive synthetic surfaces:
- fluoridate with fluoric gas
- plasma treatment
- application of primer
- scorching, flame treatment



CSV - Process

A. Preparation of the surface area:

Depending on the state of surface, the area is to be slightly grinded, to be smoothed and to be covered with primer and filler. Then the work piece is covered with a two-component-acrylic lacquer. The given surface will be honed with a 1200-graining.

Base coat: approx. 20-30µm

In between the original surface of the workpiece and the supposed metallic layer, the base coat acts as an intermediate layer which guarantees maximum adhesion and least disturbing factors like out-gassing or activities of softening agents.

The base coats levels tiny unevenness of the workpiece and is thus crucial for a brilliant final outcome. In some cases, e. g. if a particular structure of the surface is intended, special structure or effect lacquer can be deployed as base coat.

Depending on the layer thickness the base coat needs a drying period from 2 to 5 hours at a min. temperature of 60°C. Afterwards the base coat is susceptive to the chemical metallisation. It now features the required wettability.

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B. Metallisation process

The metallisation process splits up into several stages:

1. Activation
The workpiece/the object area is rinsed with demineralised water (max.: 1,0 Mega Ohm) for it prevents from a contamination of the silver layer. After spraying the activator, the surface tension eases. Finally it is again rinsed with demineralised water.

2. Metallisation (approx. 1 µm)
Through a particular spraying method, a two-component-spraying pistol assembles two different chemicals, silver nitrate and a reaction partner. The chemical reaction of the watery solution precipitates a very thin silver layer on the workpiece/the area. The spraying pistol consists of two different valves, which at the same time produce silver salt and reductive solution. On the encounter of the two substances the chemical reaction and thus the precipitation of metal begins. After the metallization process the workpiece is again thoroughly rinsed with demineralised water and dried upon.

3. Protective coating (approx. 20–50 µm)
The protective coating guards the metal layer against chemical and physical effects. The coating is applied and dried at 60°C. Using colourless or modified lacquer, the chrome-effect is finally generated.

Applying special essences of colouring, the chrome-effect can produced with shades of every colour of the rainbow and also with black, gold, aluminium, etc.

By using nano-clear coats, a better scratching resistance can be procreated. UV-absorbing clear coats enhance the light resistance of the surface.

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C. Capacity

As the thin silver layer is embedded amid base and protective coatings, the quality of a chrome-surface created by the CSV procedure can be treated in terms of a conventional lacquer coating. By employing special clear coats, the final surface of the workpiece is e. g. comparable to a car coating.

In general the light resistance of the CSV-metallised area does not bear any problems. Though the numerous colouring essences are each to be treated differently. Depending on the nature of the essence, extensive UV-exposure may induce fadings. The use of special UV-absorbing coatings can enhance the durability in this regard.

Due to the danger of tiny scratches and undermining corrosion, it is not advisable to use the CSV-procedure on parts exposed to heavy atmospheric conditions, e. g. on the outer chassis of cars etc.

Overall CSV-metallised workpieces or object areas meet high quality demands by providing a profoundly resistant surface. Improper use of the objects may cause damage of the protective layer and thus the silver layer. As a result the entire coating may oxidise and flake.

We suggest pre-tests on original samples of material to find out beforehand if special requirements in the process are needed.

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Benefits of different methods

CSV-process vs. Galvanisation vs. high-vacuum-sputtering

Through the **galvanisation or plating process**, a chrome-layer can be produced on the workpiece using electricity in huge chemical baths. The plating process is the appropriate method to procreate entirely metallised workpieces in large quantities with maximum durability. By assembling several layers ideal physical and chemical properties can be achieved. In mass production of chrome-parts, which need to resist outer atmospheric conditions, today the galvanisation process is commonly applied.

In contrast to the plating process the **CSV-metallisation** mostly serves decorative purposes or if only small batches of products are needed. The method metallises shapes, surfaces and base materials where plating processes have their limits. Materials like plastics, wood and special metals can be covered with

very thin layers, also only in selected areas, if necessary. The surface quality achieved appears as perfect chromium - the final outcome looks real. The process is especially suitable and beneficial for individual pieces/prototypes or small quantities.

Big advantages of the **CSV-method** derive from the ubiquitous scope of application.

Due to the particular need of equipment in **high-vacuum-sputtering** usually small parts of mass production are being metallised. The CSV-process allows to work on large-volume or large-measure objects as well.

Dimensions of layers:

The thickness of layers depend on the raw surface quality of the objects and the desired final purpose. Due to particular preparations and finishing the dimensions vary from 130 µm to 370 µm.

Layer	approx. thickness
primer	20 µm
filler	max. 150 µm
two-component-acrylic lacquer	70 µm
base coat	30 µm
silver	0,5-1 µm
protective coat	50 µm
UV-clear coat	50 µm

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