Case study: 80% less precious metal through selective hard gold plating

When only the function needs to be coated

Customer

Manufacturer of electromechanical components for signal and power transmission. The components require highly conductive and wear-resistant contact surfaces for a permanently reliable electrical connection.

The challenge

Hard gold coatings are often used for electrical contacts. Gold offers very good electrical conductivity, high corrosion resistance and excellent wear properties. This is why it is used especially in high-quality contact and signal transmission systems.

In many applications, however, one central question arises:

Does the entire component have to be gold plated if only a small area is electrically active?

In this case, only defined contact surfaces were involved in the actual signal transmission. Large parts of the component surface had no electrical function at all. Full-surface precious-metal plating would therefore have led to unnecessary gold consumption and significantly higher production costs.

The problem

An obvious solution would be to coat only the functional areas.

In practice, however, this is considerably more demanding than it first appears.

From a development engineer's point of view, this involves several risks:

- Gold may only be deposited on the defined contact surfaces.
- Non-functional areas must be reliably protected.
- The masking must withstand the chemical stresses of the electroplating process.
- Temperature changes must not damage the protective layer.
- The separation edges must be reproducible and suitable for serial production.
- The electrical function must not be impaired by the process.

Many conventional masking processes reach economic and technical limits with small geometries, high quantities or complex contours.

The SURPRO solution

SURPRO combined two different manufacturing technologies into one continuous production process:

1. Precise partial masking by pad printing

The areas of the component that were not to receive a precious-metal coating were masked using a specially developed lacquer system in the pad printing process.

This process enables:

- high positioning accuracy
- reproducible masking
- economical serial production
- processing of complex geometries

2. Electroplated precious-metal coating

After pad printing, the exposed functional surfaces were electroplated with hard gold. The lacquer system used was specially adapted to the chemical and thermal stresses of the electroplating process.

This ensured that only the intended contact surfaces were coated.

Why this solution is special

The added value lies in using precious metals only where they are technically required.

The challenge was therefore:

- precise masking of non-functional surfaces,
- resistance during the electroplating process,
- exact separation between functional and non-functional areas,
- ensuring suitability for serial production.

This is exactly where the core competence of the SURPRO solution lies.

The result

By combining pad printing and electroplated precious-metal coating, selective gold plating of the relevant contact areas was achieved. The unneeded surfaces remained masked and were not coated with the expensive precious metal.

The solution enabled:

- ☑ precise coating of defined functional surfaces
- ☑ reproducible serial production
- ☑ reduced use of precious metals
- ☑ lower component costs
- ☑ preserved electrical functional reliability
- ☑ more economical use of gold coatings

Customer benefits

For the customer, this meant:

- lower material costs
- less precious-metal consumption
- more economical serial production
- unchanged electrical performance
- higher resource efficiency

Especially in times of high precious-metal prices, the economical use of gold is increasingly becoming a decisive competitive factor.

Conclusion

A customer needed highly conductive and wear-resistant contact surfaces but wanted to avoid the costs of full-surface hard gold plating. For this purpose, SURPRO developed a combined process of precise pad printing and electroplated precious-metal coating. By selectively coating only the functional areas actually required, the use of precious metal was significantly reduced without compromising quality, conductivity or service life.

Why gold-plate an entire component when only the function needs gold?

SURPRO positions precious metals exactly there where they can deliver their best benefits.