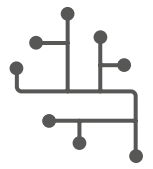


Functional electronic coatings

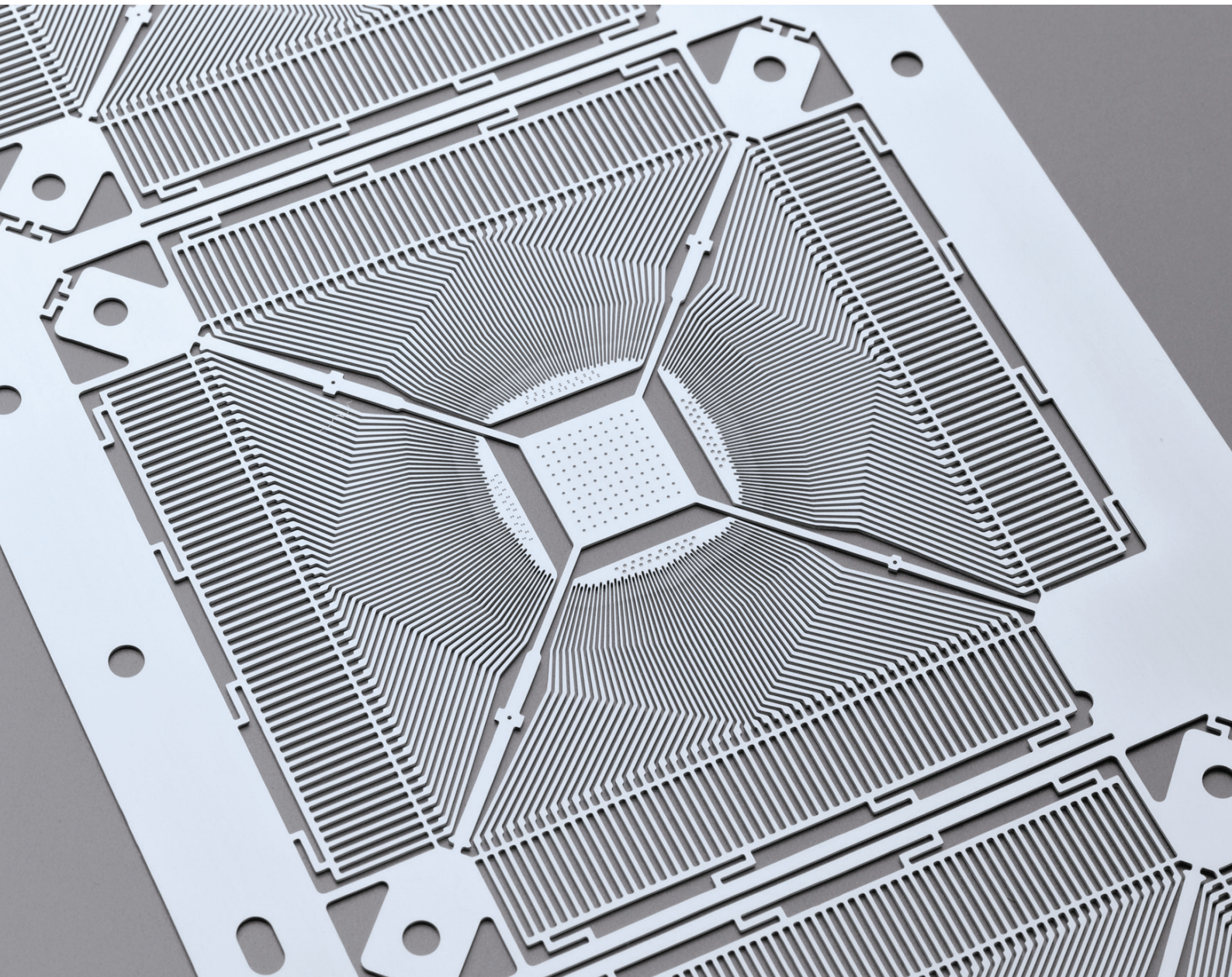


Surface technologies for the electrical
and electronic industries

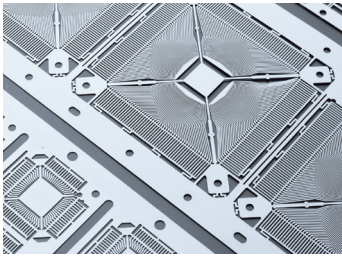
Electronics

Functional electronic coatings

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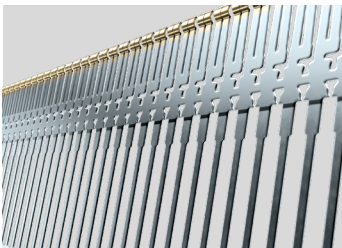
Our broad solutions portfolio



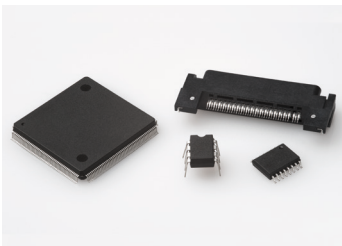
Lead frames



LEDs



Connectors



IC



3D MID

Cables, micro wave guides, sliding contacts, bus bars and more

Technology application	Process	Atotech solution
Lead Frames	Cleaners	Puronon and Electroglow
	Adhesion promotion	MoldPrep, AgPrep
	Epoxy bleed out	Anti-EBO T family
	Tin plating	Stannopure® and Niveostan® (matt and semi bright)
	Nickel and NIP plating	+Ni Sulphamate HS and Novoplate HS
	PdNi plating	Pallacor HSN Plus
	Silver plating	Silvertech HS
	Post-treatment	SuperDip®, Protectostan®
LEDs	High GAM Ag plating	Silvertech LED family
	Copper plating	Cupracid LED
	Protection	Argalin® family
Connectors	Cleaners	Puronon and Electroglow
	Nickel and NIP plating	Ni Sulphamate HS and Novoplate HS
	Hard Gold (Co, Ni or Fe alloyed)	Aurocor® HSC, HSN and HSF
	Ag plating	Argalux® NC (non cyanide) Silvertech® HS (low cyanide)
	Tin plating	Stannopure® and Niveostan® (matt and semi-bright) Stannolume (bright)
	Rh/Ru plating	Rhodilloy, Ruthentech and Rhodetech
	Protection	Argalin® family, Betatec®, Protectostan®
IC	Tin plating	Stannopure®
	Deflashing	Deflash
	Protection	Protectostan®
3D MID	Cleaners	MID Cleaners
	Activation	Cupralux INI, Cupralux 38
	Ni Activation	MID Activator
	E'less Nickel	MID Nickel MP
	Immersion Gold	MID Gold
	Protection	Betatec®

End markets and industries we serve



Smartphone



Automotive electronics



Computing



Big data infrastructure



Consumer electronics



Communication infrastructure



NEAP X.1 / X.2

Non-etching adhesion promoter for leadframes
(based on silver adhesion promoter – AgPrep 26L)



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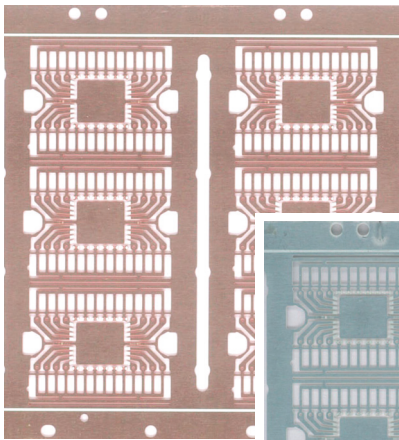
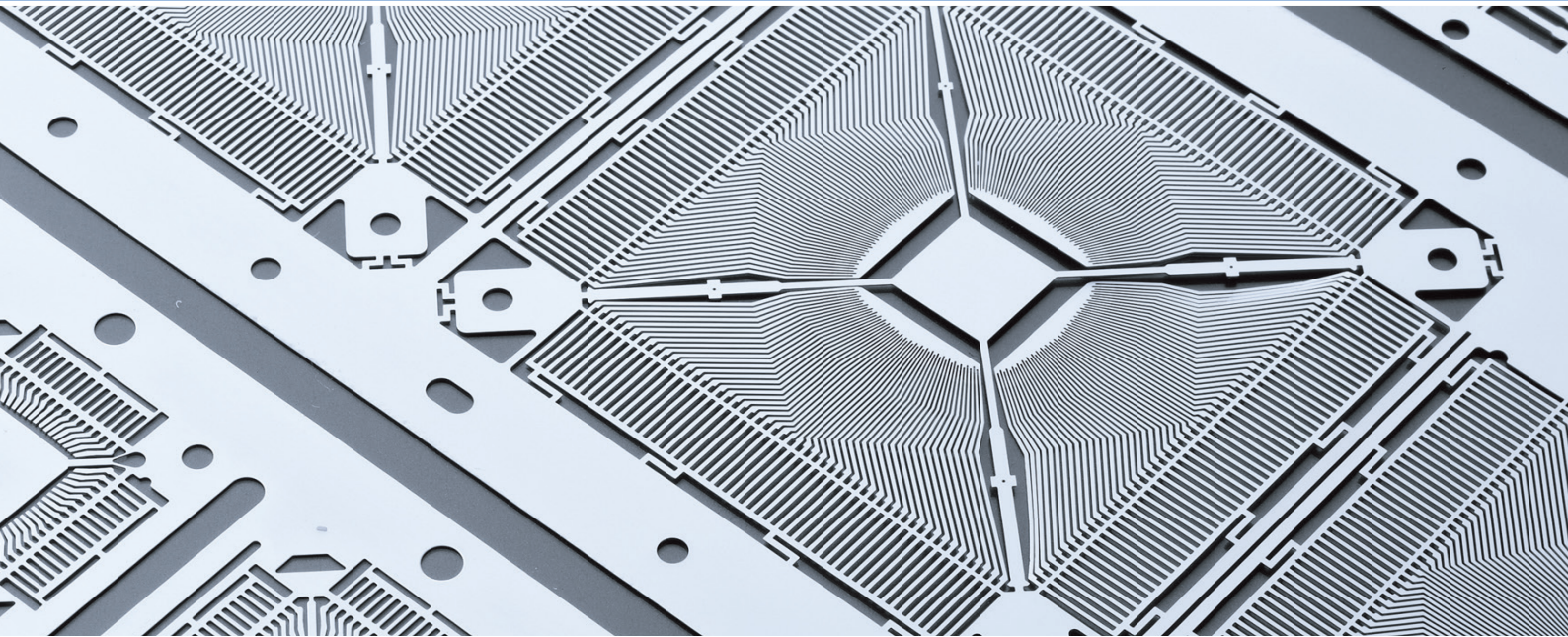


Figure 1: NEAP X.1 before treatment

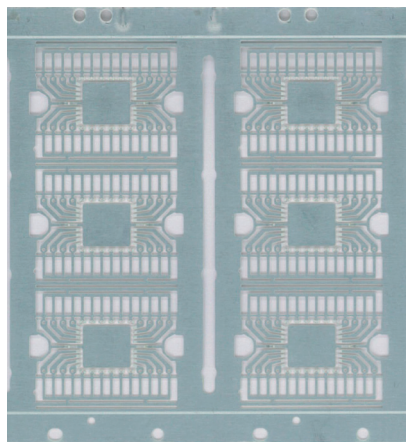


Figure 1: NEAP X.1 after treatment

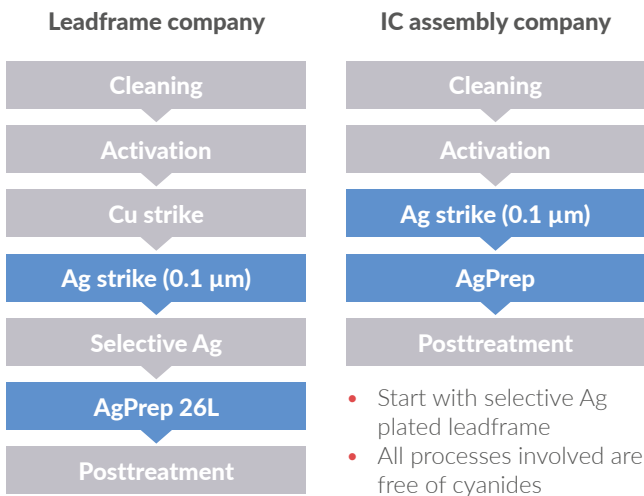
Next generation adhesion promoter

Adhesion promoters for leadframes have been gaining popularity in recent years due to the necessity to overcome package delamination issues. Most of these adhesion promoters are based on improving mechanical bonding to epoxy molding compound (EMC) and die attach glue, through a metal surface roughening process or a rough metal plating process. However, due to the nature of the yielded rough surface on leadframes, various assembly problems had been encountered, such as epoxy bleed out during die-attach and difficulty in deflashing after molding. Hence, the drive for a new novel process has led to the development of NEAP X.1 / X.2.

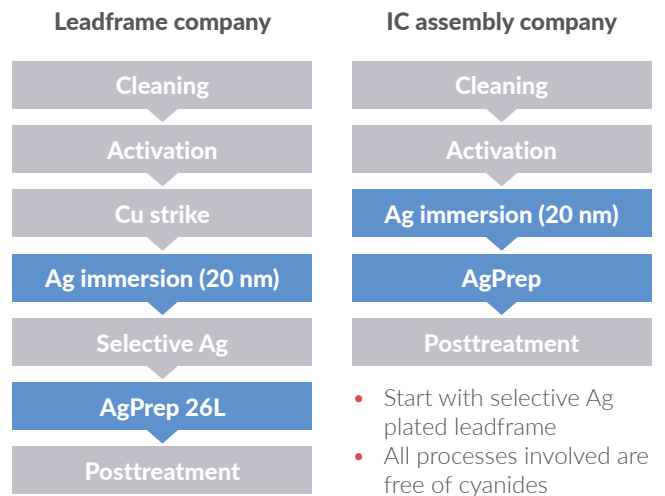
NEAP X.1 / X.2 is a simple process which can be easily “dropped-in” to the existing plating process of selective silver plated leadframes at the leadframe supplier sites. It can also be implemented in IC assembly companies as all chemical processes involved are “green” (free of cyanides), and thus no new / special waste treatment facilities are needed.

NEAP X.1 / X.2 – A new novel adhesion promoter

NEAP X.1



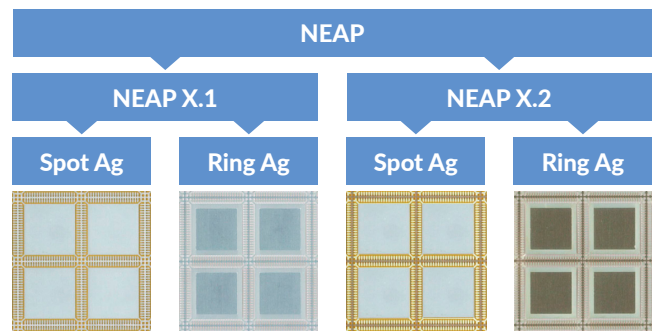
NEAP X.2



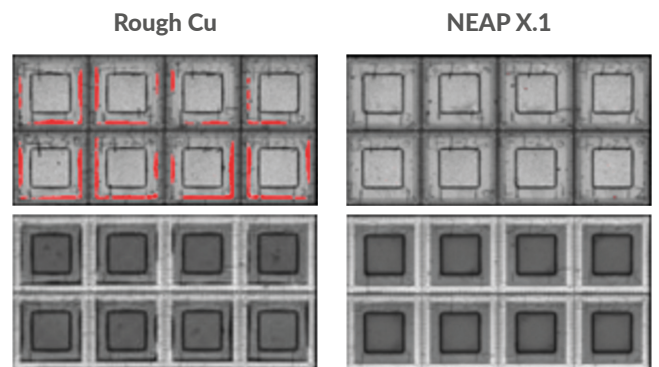
Benefits

- Non etched process
 - No rough / powdery coating on Cu surface
 - Much better controlled EBO (Epoxy Bleed Out) during die-attach
 - No difficulty in deflashing after molding
- Unique adhesion promoter for Ag surfaces
 - Rough Cu leadframes still pose a high risk of delamination on the Ag area
- Excellent reliability performance
 - Better reliability than rough Cu under high thermal conditions
 - Meets automotive requirements, i.e MSL 1 + HTS, MSL 1 + TC
- Simple process flow
 - Drop-in for leadframe plating line → replacing the Ag back-stripping with AgPrep 26L
 - Available non cyanide Ag processes enable the incorporation in IC assembly companies
- Versatile and lower overall costs
 - Works well on spot Ag and ring Ag leadframes
 - Unlike rough Cu technology, the Ag plating area does not need to be minimized through expensive photoresist plating

Appearance of various NEAP leadframes



Excellent reliability MSL 1 + HTS 1000 hrs @200 °C



Pallacor HSN Plus

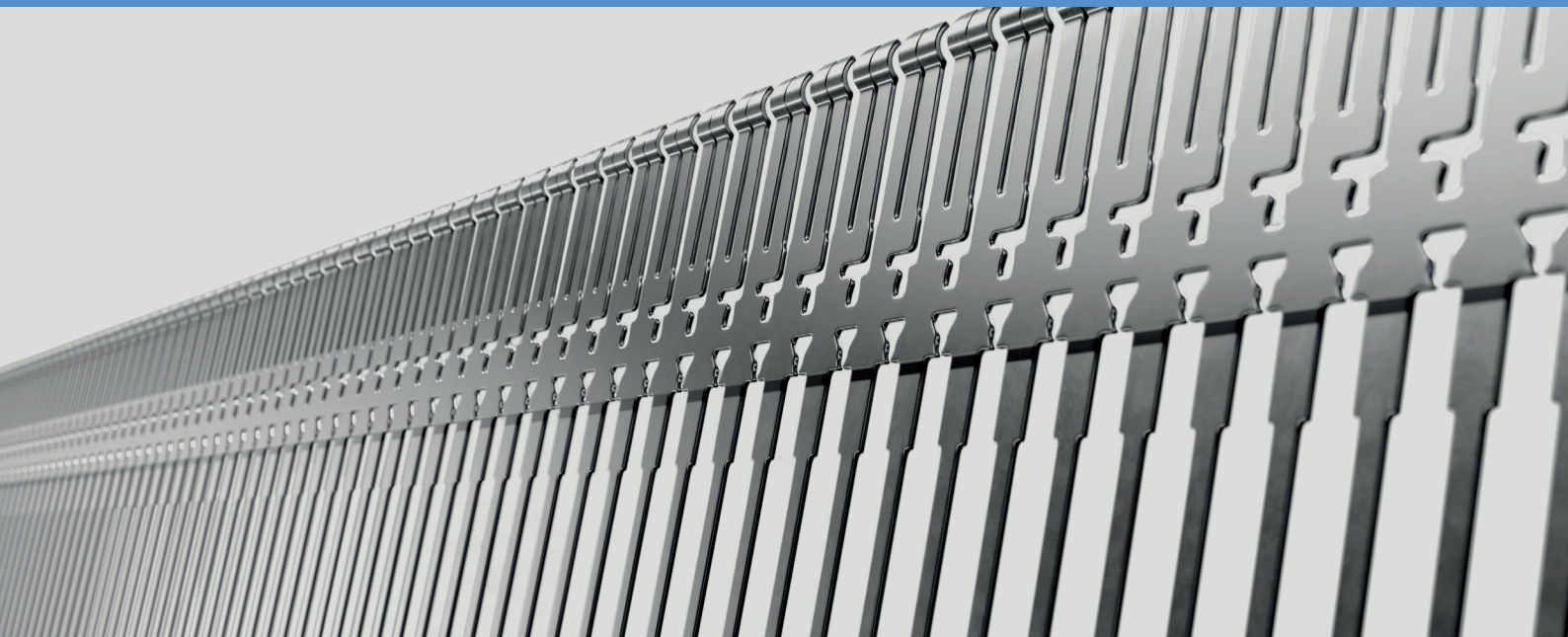
Pd/Ni plating solution



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Superior Pd/Ni layers with exceptional alloy uniformity and corrosion resistance

80/20

stable Pd/Ni ratio from
20 to 80 ASD

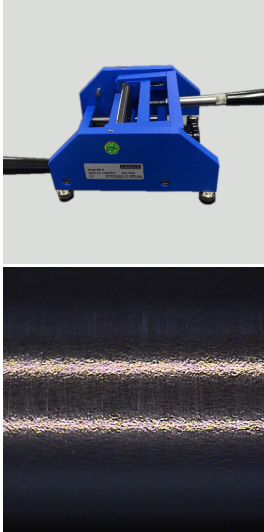
Suitable for various applications

With its vast operating window Pallacor HSN Plus is suitable for spot and brush plating as well as wheel plating applications. Uniform brightness can be achieved from high to low current density. Additionally, a single additive system is used for easier process control.

The ductile and pore-free, yet wear-resistant coatings ensure excellent corrosion resistance and solderability which makes them a real alternative to gold layers.

The bath life of more than 20 MTO reduces waste-water treatment, increases efficiency and makes Pallacor HSN Plus the more environmentally friendly option. Its chloride-free formulation minimizes the corrosive attack on equipment and base material. Pallacor HSN Plus can be easily integrated into existing plating lines by replacing the existing Pd/Ni solution with Pallacor HSN Plus.

Pallacor HSN Plus – combining ductility and wear-resistance



Bend Test for ductility as per ASTM B 489-85

Ductility

Good ductility is essential for connector plating applications as any crack in the surface exposes the non corrosion resistant base material. Pallacor HSN Plus layers show no cracks in bending tests using a 3mm mandrel. Other products in the market already show cracks using a 4mm mandrel.

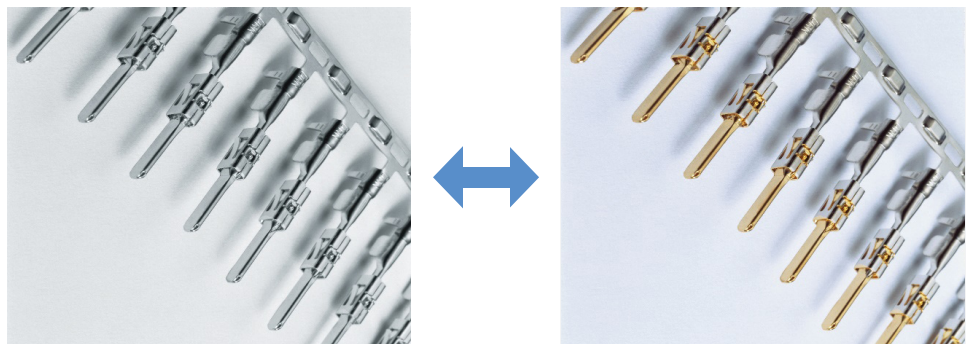
Operating parameters

- Current density: 20 – 80 ASD
- Temperature: 50 – 70 °C
- pH value: 6.5 – 8.0
- Deposition speed: 7.0 – 9.5 $\mu\text{m}/\text{min}$ (@ 40 ASD)
- Deposition rate: 24 – 28 mg/Amin
- Metal content: 15 g/l Pd | 7.4 g/l Ni
- Density: 1.1 – 1.2 g/cm^3
- Single additive system

Excellent alternative or supplement to gold

The outstanding hardness and wear resistance of Pallacor HSN Plus deposits is unmatched by gold layers which increases the product life cycle significantly.

However, flexibility is key nowadays where gold and palladium prices are subject to big price changes within only a few weeks. Combining Pallacor HSN Plus with our Aurocor series gives customers the opportunity to offer their customers a tailor-made and cost-effective solution at any given time.



Silvertech® RBH

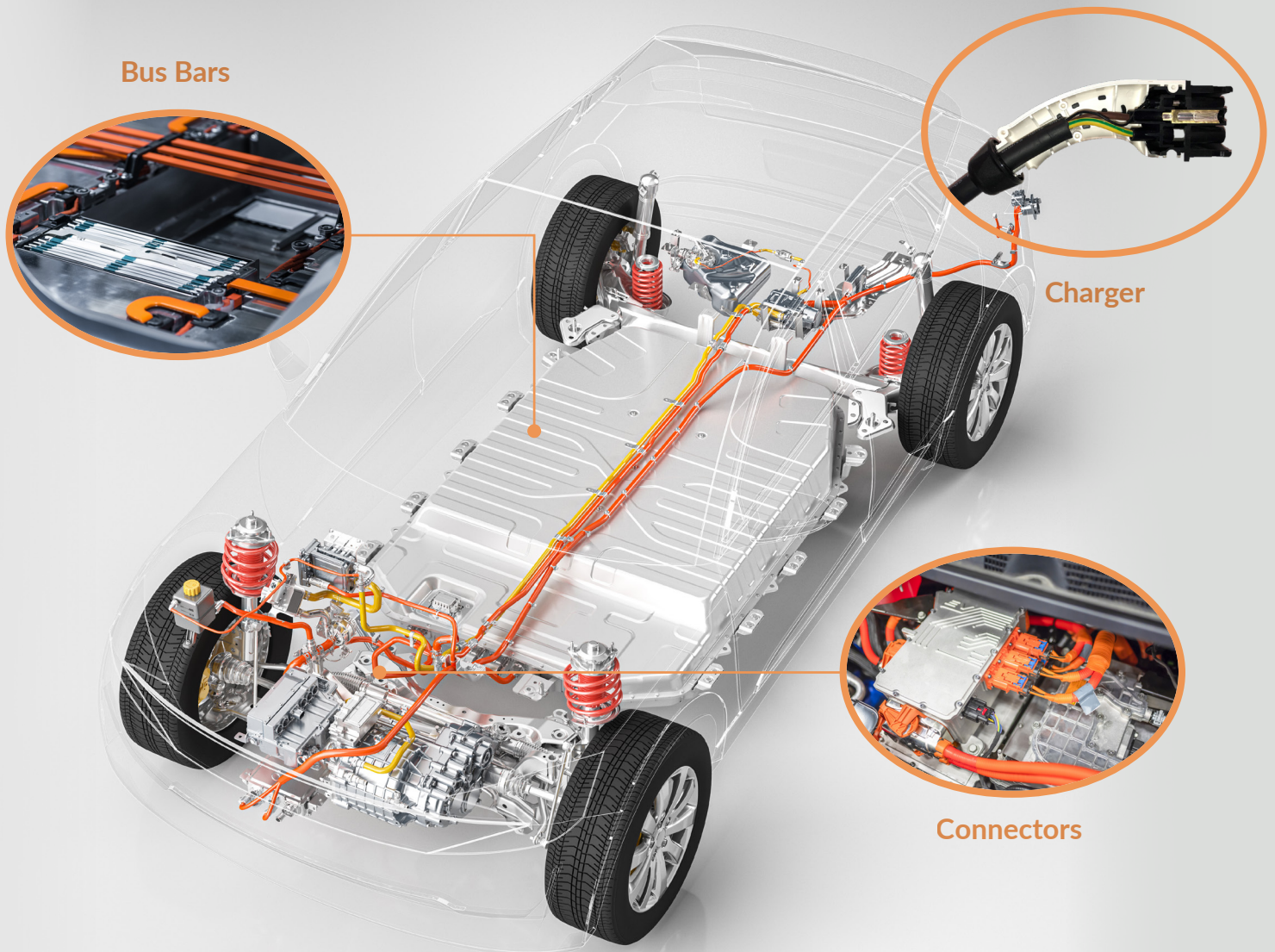
Hard silver plating



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Silvertech® RBH

Silvertech® RBH is a new plating process that deposits a hard silver layer on bus bars, connectors, and chargers. Its hardness of about 180 Hv and low contact resistance make it an ideal match for the needs of electrical vehicles. The process is designed to run in Rack and Barrel tools and exhibits an exceptional process stability. It can be combined with our Cr (VI) free anti-tarnishes to preserve its layer properties.

Silvertech[®] RBH – Hard silver plating process

Deposit characteristics of Silvertech[®] RBH



Figure 1: Deposit characteristics of a 35 µm Ag layer for fresh and aged electrolytes

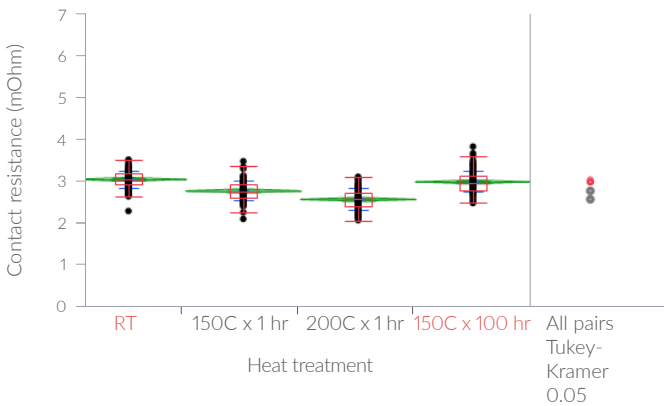


Figure 2: Contact resistance after heat treatment

Exceptional process stability

Consistent deposit properties over the life time of a process is a must. Silvertech[®] RBH is fulfilling this demand in a perfect way. Be it hardness, contact resistance, or coefficient of friction, all these crucial parameters stay within a narrow range over a long period.

The fine grained microstructure results in a hardness of >180 HV₂₀ and ensures an improved wear off behaviour whereas the low contact resistance is the perfect match for the high voltage/power connections within the power train of e-vehicles. Moreover, the low coefficient of friction allows for low mating forces which is essential for multi pin connectors.

To maintain properties over a long period of application we propose to protect the silver surface with our Cr(VI) free anti-tarnish Argalin[®] XL.

Temperature stability

Silver deposits have to withstand high temperatures during operation. Silvertech[®] RBH deposits withstand long periods at elevated temperatures without delamination from the underlying nickel or copper base material. It keeps its good contact resistance and low coefficient of friction and maintains a hardness value well above 120 HV₂₀ even after 1,000 h at 150 °C, a significant difference to pure silver deposits (60 HV₂₀).

Operating parameters and performance

- Current density: Up to 5 ASD
- Single additive system for simplified process control
- Hardness: 180 HV₂₀
- Contact resistance : 3-4 mOhm, heat stable
- Purity: ASTM B700-20 type 3, grade B, D
- Appearance: Technical brightness
- Good solderability



Silvertech[®] C

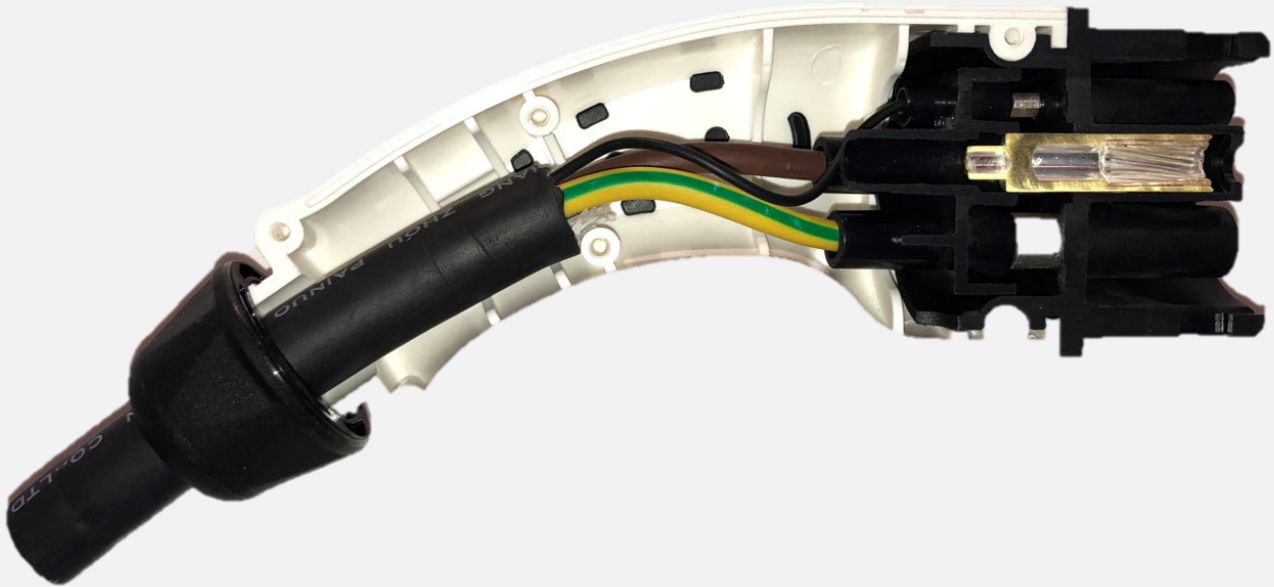
Silver Carbon process



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Silvertech[®] C – Silver Carbon for reduced wear off

Silvertech[®] C

Moving silver contacts are suffering from constant wear off. Over time, this can lead to a loss of conductivity. Silvertech[®] C is developed to reduce wear off by co-depositing carbon. The deposits exhibit a significantly higher wear resistance than pure silver.

We offer silver carbon with different carbon sizes that are for use in high-voltage switches and battery chargers.

Properties

- Matt appearance
- Applicable CD: 0.5 – 1.5 ASD
- Low temperature process: 15 – 25 °C
- Vicker's hardness: 60 – 90 HV25
- Wear resistance: > 20.000 mating cycles
- Low co-efficient of friction: 0.2 – 0.5
- Cyanide-based electrolyte for rack and barrel applications

Silvertech[®] C – a Silver Carbon process

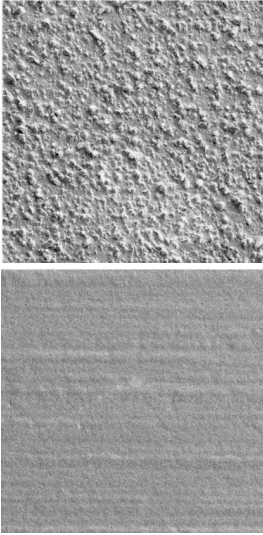


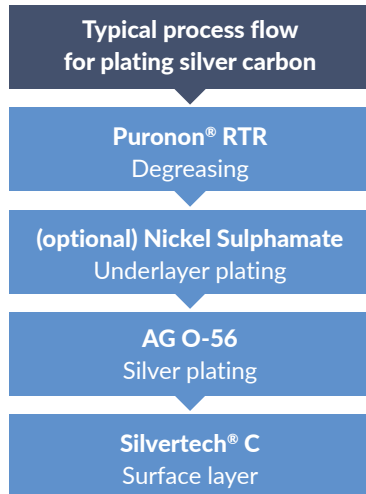
Figure 1+2:
SEM pictures for Ag-C
(1) without brightener
(2) with brightener

Deposit and process properties

The composition reduces the coefficient of friction and exhibits higher stability for arching. Therefore, the deposits show excellent wear resistance with more than double the mating cycles than pure plated silver.

Silvertech[®] C is available in two different types of carbon grain sizes. The process is designed for rack and barrel tools. At 1 ASD a deposition rate of 0.62 $\mu\text{m}/\text{min}$ is achieved. Current densities of 0.5 – 1.5 are also applicable making the process flexible and easy to handle.

With the use of a brightener, the surface can be smoothed and controlled. It also can reduce the amount of incorporated carbon (Figure 1+2).



Process flow

Silvertech[®] C is a cyanide-based electrolyte plating process. The deposits show co-deposition of 1 – 2 % carbon and produce a highly electrically conductive matt surface. A typical process flow for silver carbon plating on connectors contains electrolytic degreasing using Puronon[®] RTR to ensure optimal preparation for the following plating processes. In standard connector plating, a usual 2 μm nickel layer is plated using nickel sulphamate processes. To allow greater adhesion of the silver carbon surface layer, a pure silver layer of 1 – 2 μm is plated on top. Silvertech[®] C is plated as a final finish.

