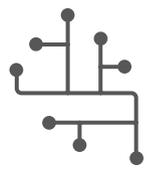


Plating Connectors

from A to Z / alpha to omega

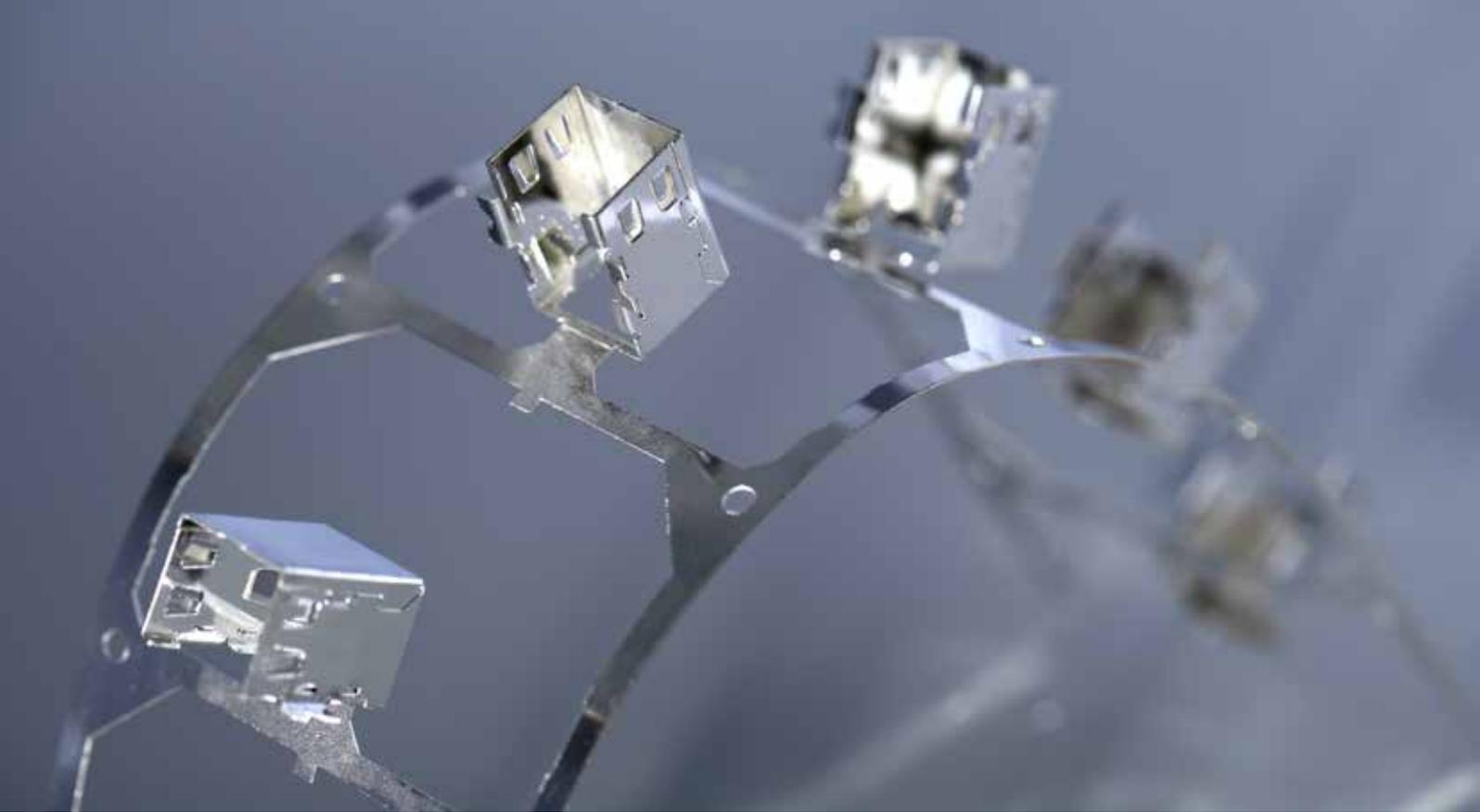


Electronics

Semiconductor &
functional electronic coatings

atotech.com





From pretreatment to posttreatment – Atotech offers a rich plating portfolio of products for virtually every connector type. What we offer ranges from the most effective cleaning and pretreatment steps to the latest metal layers and their perfectly matching anti-tarnishes to fulfill even the toughest reliability requirements.

The right solution for every tool

Our processes are optimized for every production tool, be it modern high speed roll to roll platers, rack or barrel platers. For each of these plating technologies we offer the best solution. The process chemistry can be applied either for full or spot plating applications. As an example we offer specific high speed electrolytes with a deposition rate of up to 150 ASD for R2R platers, such as our Silverttech HS electrolytes.

Reducing chemistry footprint while improving performance

We are continuously striving to improve the performance while minimizing the use of harmful chemistry. Examples are

- Our high speed Silverttech HS process electrolytes with a significantly reduced cyanide concentration
- Our cyanide free silver process Argalux NC for batch and barrel applications
- Our RoHS conformal Cr(VI) free anti-tarnish for silver, Argalin® XL, with a performance matching every Cr(VI) containing anti-tarnish and outperforming organic anti-tarnishes

Chemistry for every need

The requirement may change from customer to customer – the chemistry will follow. Our Sn and Ag plating portfolio offer the proper solution for nearly every application. Have a look at our tin electrolytes ranging from matt over semi bright to bright deposit either from MSA, fluoroborate or sulfuric acid.

Process flow for improved corrosion resistance

Maximum corrosion resistance results from the perfect combination of single processes. Atotech's preferred process flow combines the most effective process steps to match with the toughest requirements. The example is given for high speed roll to roll manufacturing lines – for barrel and rack plating lines we recommend slightly different process sequences.

Pretreatment

Puronon LF, designed for R2R lines, is applied as dip and electrocleaner, effectively removing oxide layers and oil residues. Electroglow smoothens and levels the base material surface and prepares it for plating.

Metal plating

Ni Sulfamate HS is a high speed pure Ni plating electrolyte for a perfect barrier with excellent mechanical strength.

Novoplate[®] HS, a NiP electrolyte, significantly improves corrosion resistance. For most of the requirements this is the layer of choice. For even tougher requirements one may apply the alternative Pd-Ni electrolyte, Pallacor HSN-LS.

Aurocor HSC is a hard gold electrolyte for selective plating giving the best electrical and corrosion resistant contact material.

Stannopure[®] PF can be applied selectively to deposit a solderable surface.

Posttreatment

Betatec[®] is the perfect anti-tarnish for both Au and Sn -one treatment for two surfaces to improve corrosion resistance.

Process Step	Preferred Product	Function
Cleaning	Puronon LF	Degreasing
Electro-polishing	Electroglow	Levels surface defects
Ni plating	Ni Sulfamate HS	Effective diffusion barrier
NiP plating	Novoplate [™] HS	Perfect corrosion resistance
Au plating	Aurocor HSC	Optimum contact layer
Sn plating	Stannopure [®] PF	Solderable surface layer
Posttreatment	Betatec [®]	Improved corrosion resistance

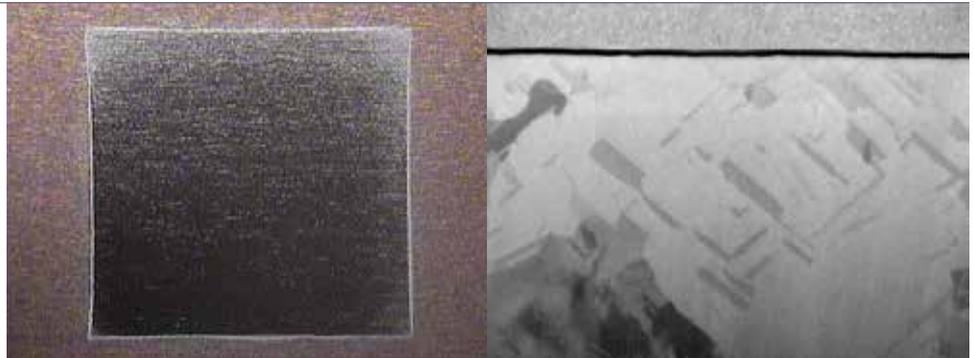
Silver plating on connectors

Hard silver deposits are becoming more and more popular as the alternative to NiAu. Hard silver deposits have a Vickers hardness of more than 120 Hv. Thick Ag layers of a few ten μm can be plated for high power applications as used in hybrid or electrical vehicles (EHV). Atotechs Ag plating processes cover a hardness range from 70 -210 HV with semibright processes at the low and the mirrorbright Argalux 64 at the high end of the hardness scale.

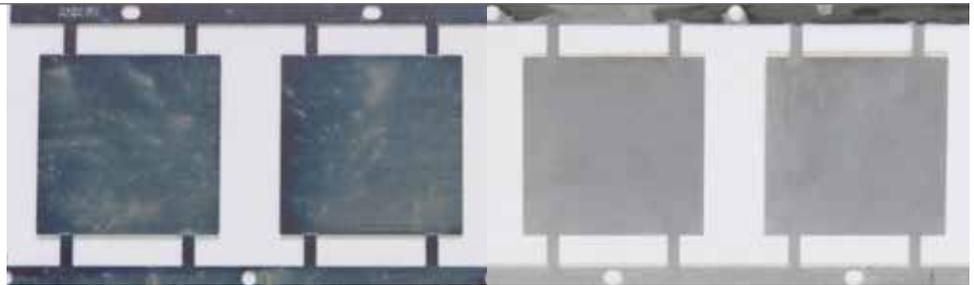
We also offer low cyanide electrolytes for high speed R2R applications up to 160 ASD and cyanide free electrolytes for rack and barrel plating.

The right choice of the posttreatment ensures that the silver layer maintains the original electrical and mechanical properties of the Ag layer depending on the required aging tests. Argalin XL, Atotechs latest product, delivers an anti-tarnish performance as you know it only from Cr(VI) – only that it is completely RoHS conform and is applied from Cr(III) solution.

Deposit of Silvertch HS:
Top and side view showing polygonal crystals structure



K₂S test: Left non-treated, right Argalin® XL



Our Silvertch HS series is a high speed Ag plating process with low cyanide content and

Argalux NC is a non cyanide electrolyte for barrel and rack applications with a Vickers hardness of more than 130 Hv.

Argalux 64 is a low speed Ag plating process with mirrorbright deposit and the highest hardness of 160-210 HV

Argalin® T is an organic anti-tarnish deposited from an emulsion for those applications where wirebonding is required. The layer also reduces the sliding friction of the Ag surface.

Argalin® XL is an anti-tarnish with the best performance realised by a nm thick metallic top layer. This layer is deposited from a Cr (III) process.

Tin plating on connectors

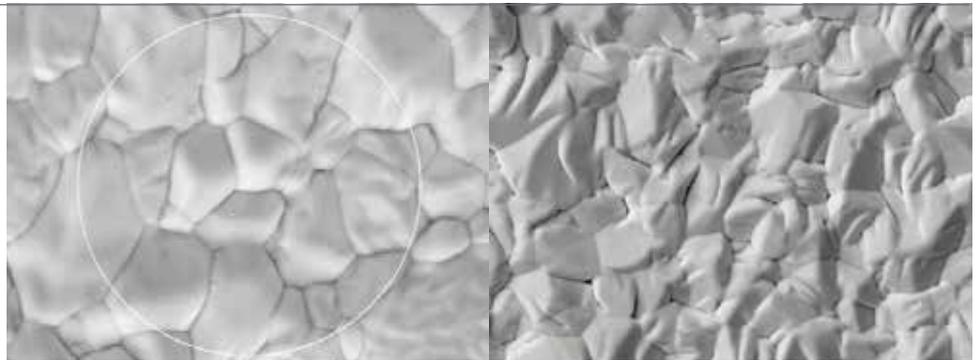
Layers of tin are plated on parts that need to be soldered. Atotech's tin plating portfolio offers a wide range of products, from bright to matt deposits with a perfect solderability.

Our Stannopure® product line delivers either matt or bright tin deposits from MSA based electrolytes.

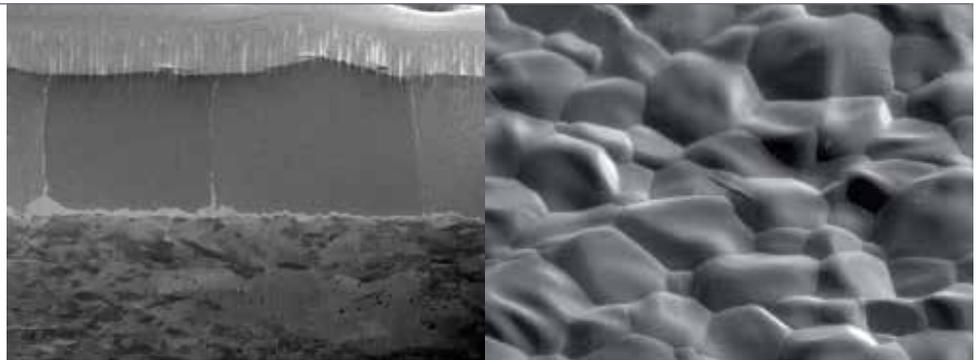
The Niveostan product line results in a semi bright tin deposit from MSA based electrolytes.

Both product lines are optimized for R2R, barrel and rack plates. Stannopure® and Niveostan electrolytes are extremely stable process solutions which do not tend to form oil on the electrolyte surface and have a significantly longer bath life as sulfuric acid based electrolytes.

Comparison between a semibright Niveostan SL layer (left) and the matt deposit from Stannopure® 100



Sn deposit plated from Stannopure® HS family after 5 months storage. Left X section and right top view.



Stannopure® PF is specifically designed to plate a matt tin deposit on even the most demanding connector designs with a perfect coverage also at low current densities. It has the lowest tendency of forming pressure whiskers.

Stannopure® HSB is a high speed bright Sn process with excellent solderability and wettability. Stannopure HSB meets iNEMI /JEDEC requirements with and without a Ni interlayer! Stannopure HSB has a low tendency for whisker formation even at the harshest conditions as 1000 TCT cycles from -55 °C to 85 °C.

Niveostan SL is a semi bright high speed Sn process with a flat surface morphology and big grains. The Sn layer is easily solderable. The process can be run with a comparably low content in MSA and Sn to reduce running cost. It is an easy to operate one additive system.

Precious metals

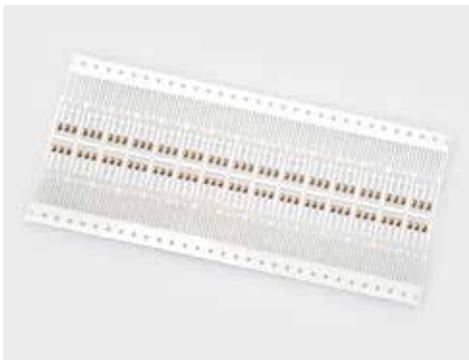
Gold, palladium, rhodium and ruthenium

Thin layers of precious metals serve as final finishes to improve conductivity, solderability and aging test performance. Gold is probably the most commonly used precious metal finish combined with a Nickel underlayer and well established in the connector industry.

Our Aurocor HS hard gold processes are designed to meet industries standard in every type of tool – be it R2R, barrel or rack. Atotech offers a variety of different hard gold electrolytes based on cobalt, nickel or iron.

An alternative to a pure Au deposit is a 80:20 % Pd-Ni alloy followed by a thin Au finish to reduce costs. Our Pallacor products harmonize perfectly with our hard gold process.

Ruthenium and rhodium deposits offer the best wear resistance. Their extreme hardness combined with low electrical resistivity make them first choice when long term reliability is paramount. Both metals are used in Reed contacts, relay contacts and plug and socket connectors.



Connectors spot plated with Aurocor HSC on Nickel sulfamate HS



Ruthenium deposits: left without additive, right with additive

Aurocor HSC is a hard gold process based on cobalt, corresponding to ASTM B 488-95 Type 2 and 3 Code C and D. The process is very tolerant to Ni impurities and is known to have a very long bath life while operating at higher current efficiencies as usual.

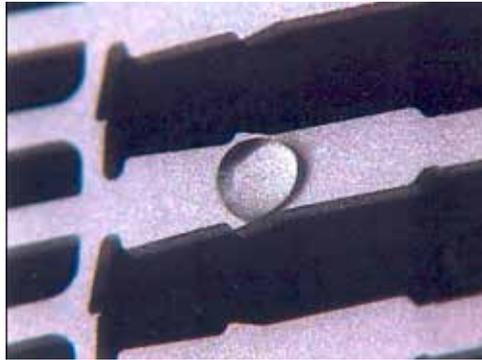
Pallacor HSN is a 80:20 Pd -Ni plating process resulting in wear resistant deposits with low internal stress and low porosity. Deposits show a very low contact resistance and perfect solderability.

Rhodotech 198 layers are extremely corrosion resistant and withstand even hot and concentrated HCl and concentrated HNO₃. With 800-1000 HV hardness values are above other connector materials. Up to 2µm thick brilliant white layers of pure rhodium can be deposited from barrel and rack tools.

Ruthentech 298 layers show a similar hardness of 800-850 HV25. Their pure ruthenium deposits can be varied from grey to anthracite – with an appropriate additive system. Deposit thicknesses of up to 0.4 µm can be achieved. Ruthentech 298 is an extremely forgiving process with a high tolerance for metallic and organic contaminations. Ruthentech 298 is applied in rack plating tools.

Anti-tarnishes

Anti-tarnishes are the most under estimated process solutions. They protect the final surfaces effectively from corrosion, discoloration and other aging phenomena. But only the right combination of the final metal layer and the anti-tarnish delivers the reliability you expect from a finished product. Atotech has more than just one solution for every surface finish.



Protectostan® Plus LF covered Sn layer



Hard gold surface after
Nitric Acid Vapor test (NAV)
Top: Without Betatec
Bottom: With Betatec EI treatment

The Argalin® product family delivers a variety of different Ag anti-tarnishes. The choice between various organic and inorganic products depends on your reliability requests.

Our Protectostan® product family helps to protect the Sn layers and significantly reduces whisker formation and discoloration during accelerated aging tests such as steam ageing, PCT, etc.

Betatec® is the ideal product line for Au surfaces but can also be applied on Sn. One product for two surfaces.

The SuperDip family protects Cu and Ag surfaces and improves adhesion to epoxy resins. Super-Dip 21N is also an effective anti-bleed-out process for epoxy material.

End markets and industries we serve



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Automotive electronics



Computing



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Communication infrastructure

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