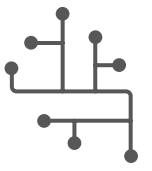


# Final finishing

Leading production solutions  
for PCB and package substrates



---

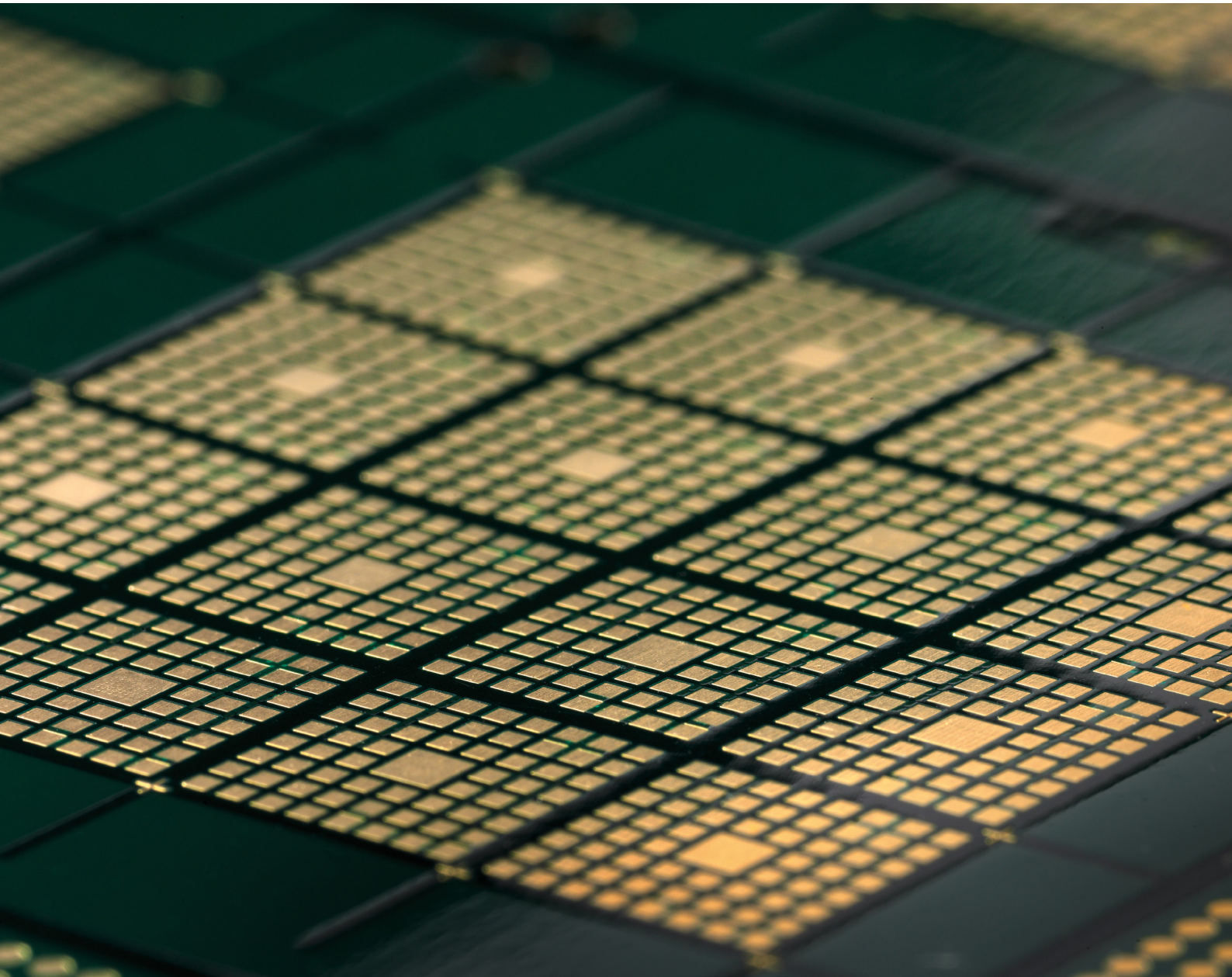
Electronics

---

Final finishing technology

---

[atotech.com](http://atotech.com)



# Final finishing at a glance

## Application oriented expertise

- Press fit
- Soldering
- Wire bonding
- TCB and TSB bonding



### Auxillary equipment

Crystallizer® and ConStannic® designed to minimize chemistry costs and maximize process control



**163 registered patents**  
in our portfolio



### High competence

Processes tailored to OEM requirements



### R&D

ISO certified development processes



### Niche solutions

Biocompatible deposits for medical applications



### Horizon® Stannatech

Leading surface finish for the automotive industry



### Technology solutions

- Thermal compression bonding solutions available
- Next generation pure wire and alloy compatible





# Surface protection layers for PCBs and package substrates



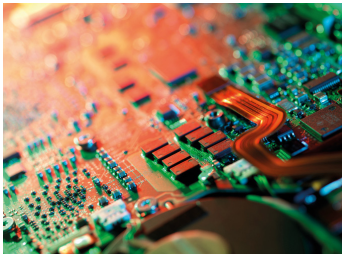
Highest global market share  
for final finishing

MKS' Atotech final finishing technology team offers chemical processes, which provide surface protection layers for PCBs and package substrates. Driven by the needs and demands of the PCB industry and OEMs, MKS' Atotech has developed several processes, which are established in the market. The team is continually working on the enhancement of existing and development of new products in order to meet the requirements of latest packaging and assembly techniques. MKS' Atotech broad range of final finishes complies with ever more stringent environmental law.

## Key highlights

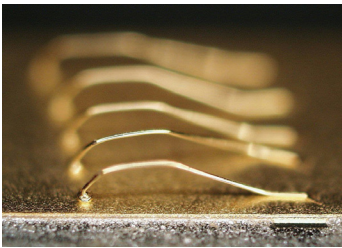
- Highest global market share for final finishing
- Complete portfolio of final finishes
- Production proven lead free processing
- OEM relevant development

# Our broad solutions portfolio



## Soldering

(eutectic and lead-free)

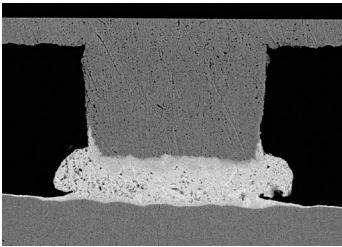


## Wire bonding

(Au wire / CuPd wire and Al wire)



## Press fit and QFN



## TCB and TSB bonding

In cooperation with Georgia Institute of Technology



## Systems

### Horizon® Stannatech

Elimination of particles associated with the mechanical assembly as there is no hardness disparity between the tin pin and the finish



Technology application	Process	Atotech solution
MLB, HDI	ENIG	Aurotech® CNN, Aurotech® Plus, AuNic®, Aurotech® HP
	ENEPIG	Universal Finish SolderBond, Aurotech® PEP
	ImSn	Stannatech® 2000 (H or V)
	OSP	OS-Tech®, OS-Tech® SIT
Package substrate	ENEPIG	Universal ASF, Universal ASF II
	EPAG	PallaBond®
Flex / rigid-flex	ENIG	Aurotech® Flex
	ImSn	Stanna-CoF
LTCC	ENIG	Cerabond® M
MLB, HDI	ENEPIG	Universal Finish SolderBond, Aurotech® PEP
Package substrate	ENEPIG	Universal ASF, Universal ASF II
	EPAG	PallaBond®
LTCC	ENIG	CeraBond® M
MLB, HDI, package substrate	ImSn	Stannatech® 2000 (H or V), Stannatech® IC
MLB, HDI	ImSn	Stanna-Q®
MLB, HDI, package substrate	EPAG	PallaBond®



## Auxiliary equipment

### Crystallizer® and ConStannic®

Designed to minimize chemistry costs whilst maximizing process control



## Forging the future by understanding needs and appropriate solutions

< 20µm

line and space capability

### PallaBond®

This process is the only final finish product confronting ultra-fine features and high frequency requirements of future requirements. It allows for direct deposition of palladium on copper due to its relatively shorter deposition time, EPAG offers significantly more production capacity compared to ENEPIG. The process enables wire bonding with Cu, Cu Pd, Au and Ag, and is compatible with many new base materials and soldermask types. PallaBond® is also biocompatible and is therefore suited to bespoke medical applications.

### Stanna-Q®

The novel immersion tin finish is designed for quad flat, no lead components. It is guaranteed to produce 3 dimensional solder joints resulting in maximum reliability. The process offers good solderability even after steam age test and the deposition of high tin thickness >1.4µm is possible. This new process demonstrates a stable and high quality solution that can be applied in horizontal, vertical and barrel plating mode.



# Horizontal Stannatech<sup>®</sup> 2000 – the market leading immersion tin process

> 100

installations worldwide

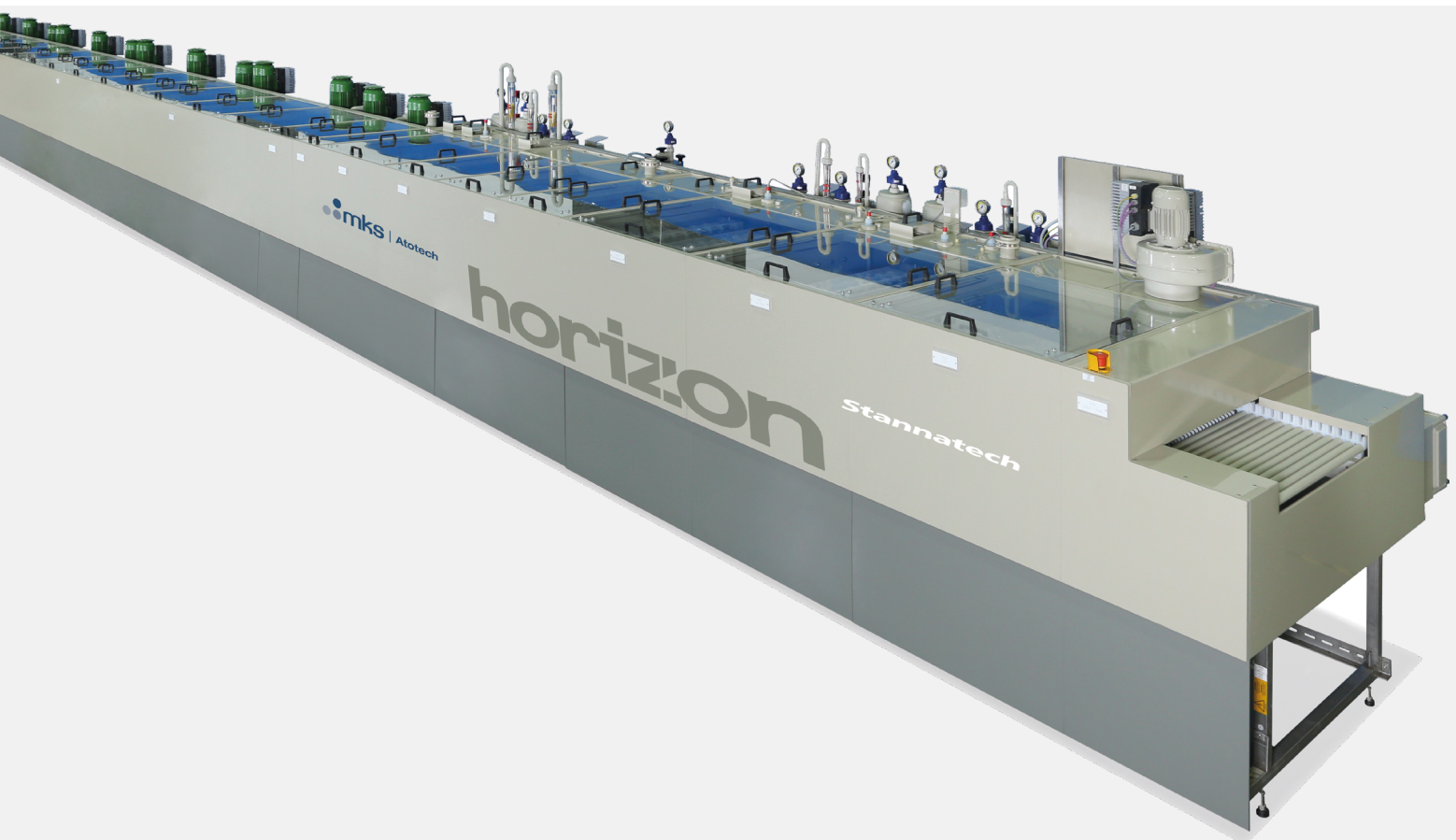


Market leading immersion tin finish

Stannatech<sup>®</sup> 2000 is a highly corrosion resistant final finish capable of multiple eutectic or lead free reflow cycling. The similar hardness properties of this finish and lead frame metals make Stannatech<sup>®</sup> 2000 the premier press fit deposit. It offers an exceptionally long shelf life under controlled storage conditions enhancing its overall performance. Therefore Stannatech<sup>®</sup> 2000 is ideal for the automotive industry, with over 10M m<sup>2</sup> being processed each year. Stannatech<sup>®</sup> 2000 offers the unique combination of chemical process and state of the art equipment from a single pool of expertise.

## Equipment highlights

- Combines excellent reliability with lead-free and halogen-free soldering techniques
- Anti whisker additive ensures highest reliability for fine features
- A realistic lead free, planar finish
- Excellent bath stability, chemistry lifetime of up to twelve months leads to substantially lower process costs
- Auxiliary equipment: Crystallizer<sup>®</sup> and ConStannic<sup>®</sup> for tangible savings in water and chemistry





# End markets and industries we serve



Smartphone



Automotive electronics



Computing



Big data infrastructure



Consumer electronics



Communication infrastructure



# Aurotech® G-Bond 3

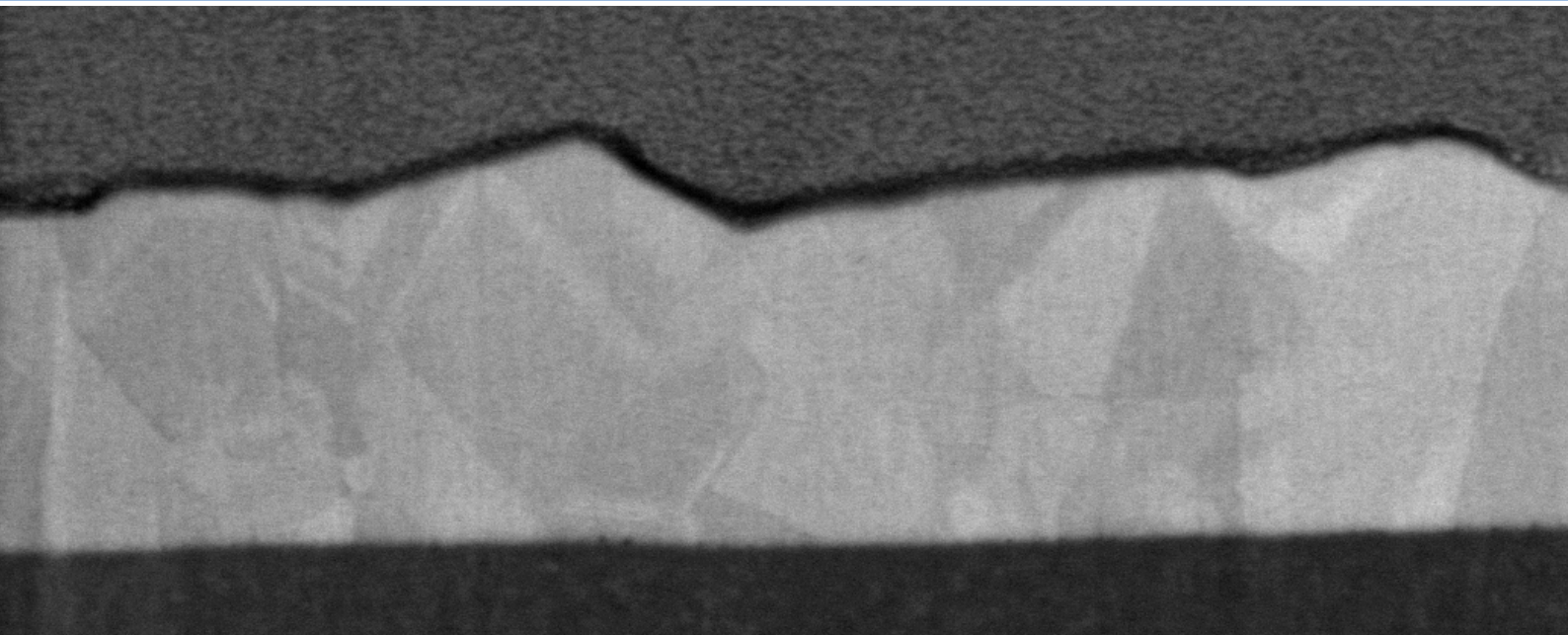
New mixed reaction gold for ENIG,  
ENEPIG, and EPAG



Electronics

Final finishing technology

atotech.com



## A mixed reaction gold with non-toxic stabilization

# 0.6

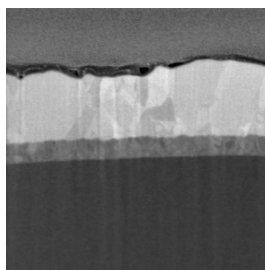
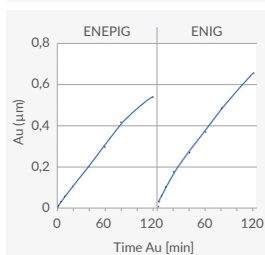
g/l gold content in  
plating solution

### Latest generation corrosion-free gold for ENIG, ENEPIG, and EPAG

Aurotech® G-Bond 3 is the latest generation gold electrolyte that fulfills all industry standards for ENIG, ENEPIG, and EPAG plating. It exhibits autocatalytic plating properties to mitigate the attack to the underlying layer and enables the plating of high gold thickness where required. Besides offering the highest bath stability and excellent layer performance, the process exhibits the benefit of non-toxic stabilization so that no handling of KCN replenishment is required. The new process combines the known benefits of Aurotech® G-Bond 2 with outstanding stability, long bath life, and a new and toxic-free stabilizer.

The low gold content of 0.6 g/l and the excellent thickness distribution of below 5% CoV ensures cost-competitive manufacturing for all types of gold containing final finishes.

# The state-of-the-art gold plating solution



**Figure 1-3:**  
Non-toxic stabilizer  
replenishment  
Linear thickness increase  
over time  
Defect-free interface at  
Ni/Pd/Au

## Safe handling

Mixed reaction gold electrolytes with high autocatalytic properties imply the challenge to combine a highly active plating solution with user-friendly bath stability that ensures long bath life with low maintenance efforts. In the past, the continuous replenishment of the KCN solution assured the complexed gold and prevented spontaneous plate out and decomposition. With Aurotech® G-Bond 3 a new, more user-friendly process becomes available that works with a fully KCN-free stabilizer to allow easier and safer process handling.

## Fulfilling latest industry demands

Due to its unique composition, Aurotech® G-Bond 3 enables versatile use for plating Ni/Au, Ni/Pd/Au, and Pd/Au deposits without needing any adjustments on the plating solution. The bath provides excellent stability and a long lifetime and allows the deposition of a high gold layer thickness on nickel and palladium. In addition, the autocatalytic properties mitigate the risk of a corrosive attack on nickel so that the latest industry standards on the corrosive attack in ENIG can be easily fulfilled. The low gold content and the excellent thickness distribution allow for keeping the gold plating cost low by reducing the drag-out losses and allowing low target layer thickness.

## Features and benefits

- Non-toxic stabilizer, no KCN handling required for replenishment
- Low Au-content (0.6 g/l)
- High bath stability, no plate out
- ENIG corrosion level 0 and 1
- Excellent thickness distribution of < 5% COV





# PD-Core®

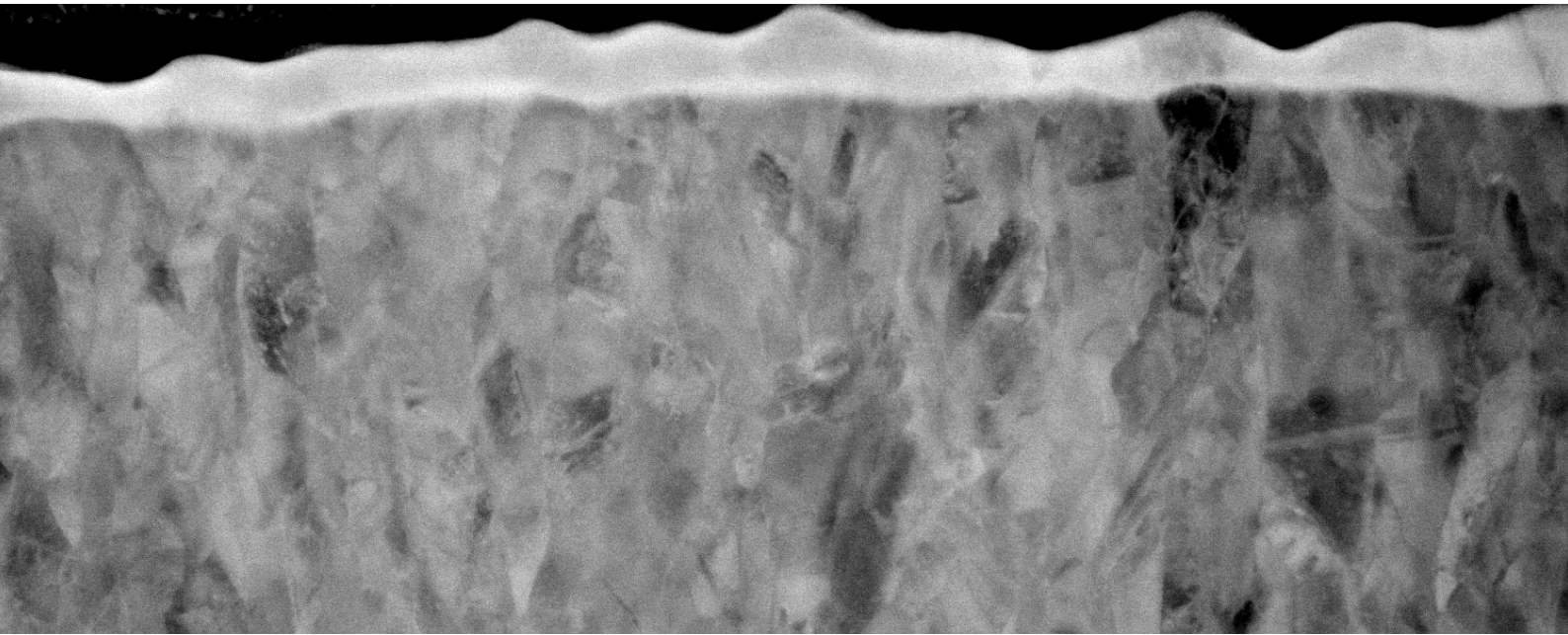
## The next generation Pd-electrolyte



General metal finishing

Final finishing technology

atotech.com



## The Pd-electrolyte with low Pd-content and highest stability

# 0.5

g/l Pd content in the electrolyte leads to lower drag out losses

### Best performance for lower cost

The PD-Core® palladium bath deposits pure palladium layers for the highest quality ENEPIG finishes. With the low Pd-content of 0.5 g/l palladium the process is highly cost-efficient as it significantly reduces the precious metal loss due to drag out. The bath offers excellent stability and provides the best performance for more than 10 MTO. Pd layers of up to 400 nm and more are possible if a high Pd-thickness is required.

The Pd-process can be combined with the existing MKS' Atotech mid-P Nickel electrolytes Aurotech® NIC, Aurotech® SIT Plus and Aurotech® CNN as well as the latest gold electrolytes such as Aurotech® DC CH, Aurotech® AU Plus CH, Aurotech® G-Bond and Aurotech® G-Bond 2. Eventhough it was initially developed for plating on nickel, PD-Core® can also be plated on copper directly.

# Highest robustness and stability with low Pd-content

## Low Pd-content

---

- Pd-content in the bath of 0.5 g/l
- Reduced drag out losses
- Excellent thickness distribution
- Reduced precious metal consumption
- Cost savings due to reduced precious metal loss

## High process robustness

---

- High process robustness
- Low sensitivity to contamination
- High tolerance to Ni and Cu ions in the solution
- Reduced maintenance due to high bath stability

## Stable performance

---

- Stable bath life up to 10 MTO and more
- Constant performance in solder joint reliability and wire bonding over full bath life
- No plate out or precipitation
- High thickness of 400 nm and more is possible

## Process compatibility

---

- Can be combined with MKS' Atotech's mid-P Nickel bathes Aurotech<sup>®</sup> NIC, Aurotech<sup>®</sup> SIT Plus and Aurotech<sup>®</sup> CNN
- Compatible with all actual MKS' Atotech's mixed reaction gold bathes such as Aurotech<sup>®</sup> DC (CH), Aurotech<sup>®</sup> AU Plus (CH), Aurotech<sup>®</sup> G-Bond and Aurotech<sup>®</sup> G-Bond 2



# OS-Tech® SIT 2

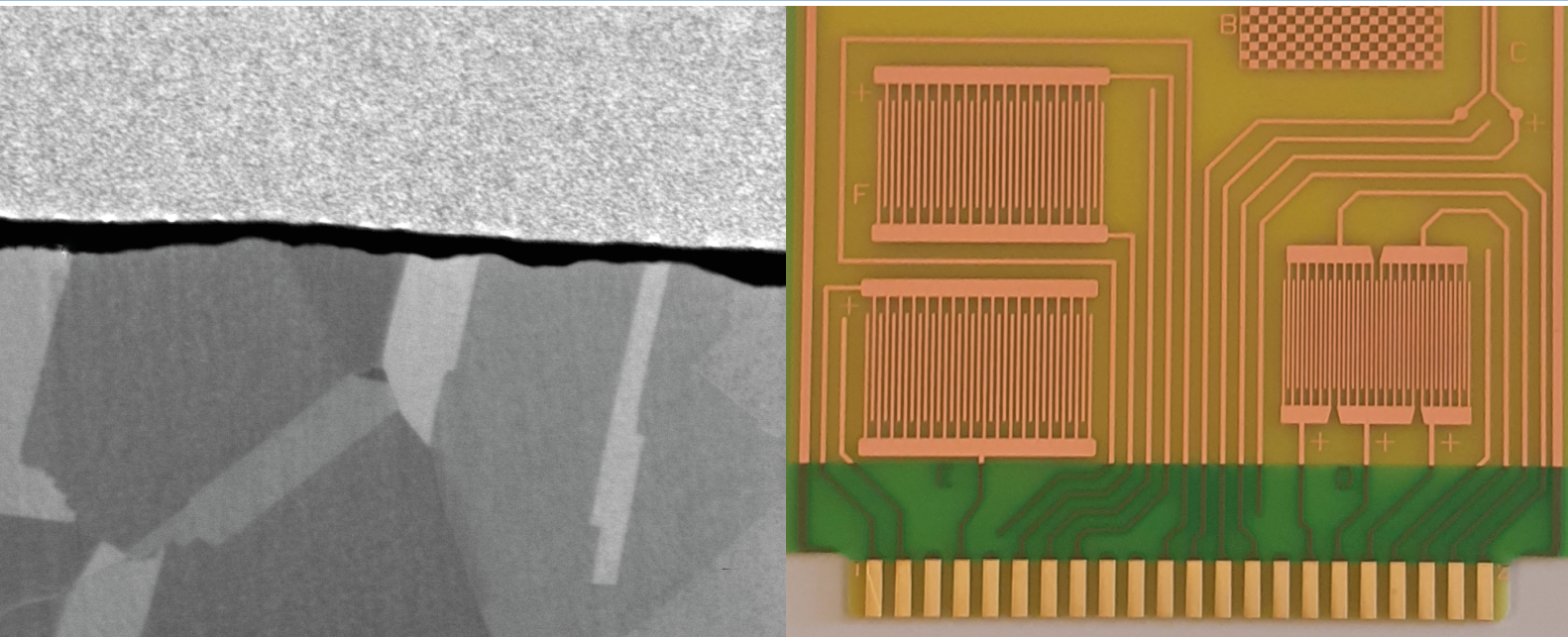
## OSP finish for SIT applications



Electronics

Final finishing technology

atotech.com



## The OSP solution combinable with ENIG

### Development by design

Organic surface finishes provide a solderable environmentally friendly finish for fabricators in the electronics industry. The key to the potency of the process is the number of reflow cycles the finish can endure. Additionally, the thickness of the coating is a key quality indicator or process control tool as it is a measure of the potential for solder joint quality implications.

Like its sister process OS-Tech® the new OS-Tech® SIT 2 can guarantee multiple solder reflow cycles and is applicable to work in combination with MKS' Atotech production-proven ENIG processes.

### Features and benefits

- Drop in for existing lines
- Application of MKS' Atotech equipment possible
- Short processing times
- Heat resistant coating applicable for soldering and press fit applications



# OS-Tech® SIT 2 – the next generation organic preservative coating

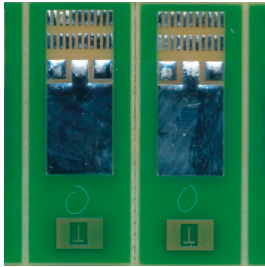


Figure 1:  
Excellent solder wetting on edge dip coupons after 1 x reflow aging

## Vertical and horizontal processing

	vertical	horizontal
<b>Cleaner</b>	ProSelect SF (SF/CT/UC*) or ProSelect EC 1 – 2 min. @ 45 °C	ProSelect H (H/CT/UC) or ProSelect EC 45 – 80 s @ 45 °C
<b>Rinse</b>	2 min. @ RT	60s @ RT
<b>MicroEtch C</b>	1 min @ 30 °C Etch depth 0.6 µm	1 min @ 30 °C Etch depth 0.6 µm
<b>Rinse</b>	1 min. @ RT	1 min @ RT
<b>OS-Tech Pre-Dip</b>	0.5 – 1 min @ 30 °C	0.5 – 1 min @ 30 °C
<b>Rinse</b>	1 min. @ RT	1 min @ RT
<b>Dry</b>	air knife	air knife
<b>OS-Tech® SIT 2</b>	60 s @ 40 °C 0.2 – 0.45 µm (FIB)	60 s @ 40 °C 0.2 – 0.45 µm (FIB)
<b>Rinse</b>	2 min. @ RT	60 s @ RT
<b>Dry</b>	15 min. @ 60 °C	60 s @ 65 °C

\* depends on machine design

## A heat resistant organic surface finish

Based on the chemical formulation of OS-Tech® SIT 2, the deposited organic layer exhibits exceptional heat resistance and was proven to survive five lead-free reflow cycles without any reduction of the coating thickness.

