

Electroless Nickel Plating



COTEC has various surface treatment technologies and the company concentrates on products development and quality control to develop various surface treatment items



Production items and applications

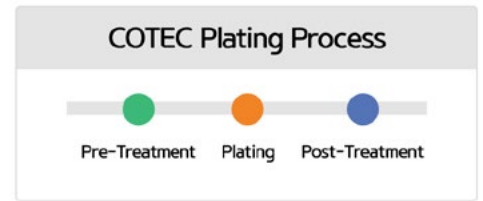
Department / Material		Aircraft, Defence, Semiconductor parts, Machinery for general industries / Fe, STS, Cu, Al	
Usage		Memory disc, Plating on non-conductive metals, Replacement of hard chromium plating for computer parts and through hole plating on PCB	
Thickness (General criteria)		1~70µm hours	
Applied specifications	National defense 0115-0018 (1.4) MIL-C-26074 AMS-C-26074 ASTM-B-733, 656 FEIS 114 AMS 2404 KSD 8344 AIPS 02.04.008	Thickness	38µm for type 1 (No heat treatment) 13µm for type 2 (Heat treatment)
		Adhesiveness	No separation of coating from the base metals
		Hardness	Limited to type 2 (Rockwell tester) and type 3 (Vickers tester)
		Stress relief	At 191±14°C, for more than 3 hours
		Relief of hydrogen embrittlement	The brittle time depending on material organization state and hardness At 191±14°C, for more than 3 hours (HRC 32~39) At 191±14°C, for more than 8 hours (HRC 40~47) At 191±14°C, for more than 23 hours (HRC 48)
Acceptance		External	NADCAP, BOEING, AIRBUS, PARKER, MHI
		Internal	HYUNDAE WIA, DOOWON, KAI, ADD

Equipment condition

COTEC	2,000 × 900 × 1,500 mm (4 Units)
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Electroless Nickel Plating



Capable of coating complex parts

Our technologies and their applications

Strength

- Forms a uniform coating layer even on a complex surface.
- Less porous than electric coating.
- No need for complicate racking.
- Forming a coating layer on non-conductors with a proper pre-treatment.
- Has physical properties that are different from the electric plating.

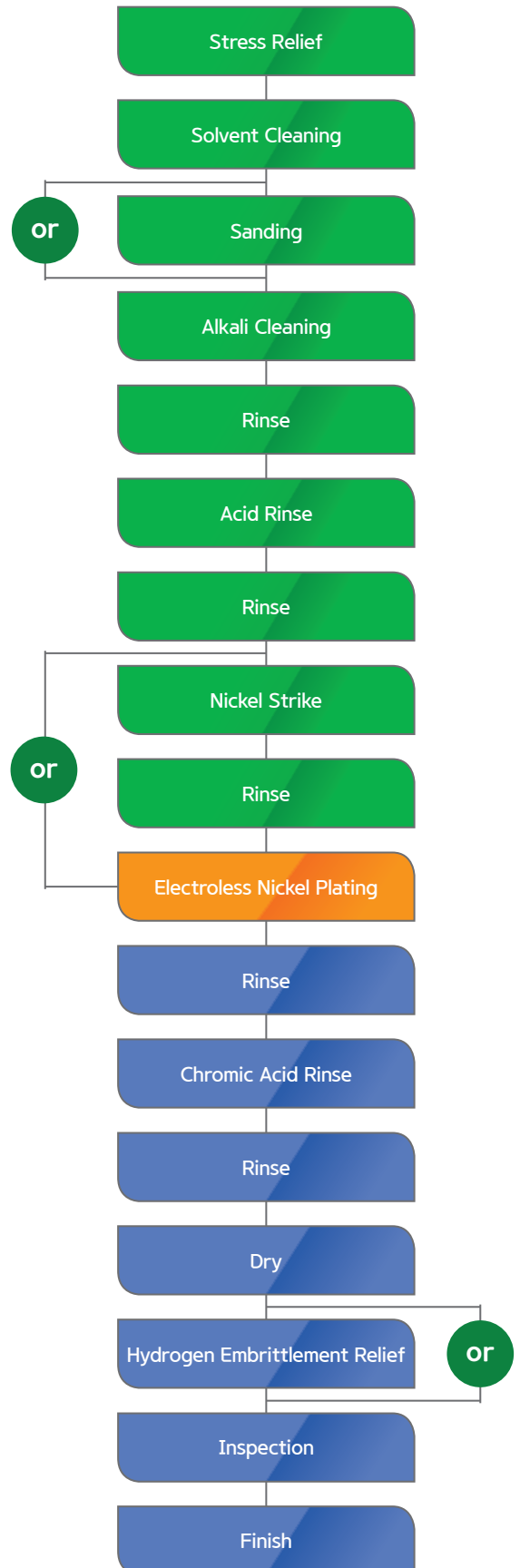
Weakness

- Its production cost is higher than the electric coating.
- Short life due to unstable coating solution.
- Difficult control of coating solution.
- Slow coating speed.

Applicable parts

Memory disk, Coating on non conductive material, Replacement of hard chromium coating, Plating on Computer parts, Through Hole on PCB

Process



The above plating process is the property of COTEC Corporation.

Silver Plating



COTEC has various surface treatment technologies and the company concentrates on products development and quality control to develop various surface treatment items



Production items and applications

Department / Material		Aircraft, Defence, Atomic power, Electric products, Electronic products / Fe, STS, Al, Cu	
Usage		Parts for soldering, Product with its electric conductivity to be enhanced and products, Electrical contact parts	
Thickness (General criteria)		1~30μm hours	
Applied specifications	National defense 0115-0015 (Yeon) AMS QQ-S-365 ASTM B 700 KSD 8339	Thickness	12.5μm minimum ↑
		Adhesiveness	No trace of separation of coating from substrate.
		Relief of hydrogen embrittlement	The brittle time depending on material organization state and hardness At 191 ± 14°C, for more than 3 hours (HRC 32~39) At 191 ± 14°C, for more than 8 hours (HRC 40~47) At 191 ± 14°C, for more than 23 hours (HRC 48)
		Soldering test	No mass should be generated on the coated surface and the uniform soldering. The coating should not fall or break from the surface.
Acceptance		External	HAMILTON
		Internal	DOOWON, HANHWA, KAI, LIG NEX 1, ADD

Equipment condition

COTEC	800 × 600 × 1,200 mm
	1,600 × 600 × 1,000 mm
	9,000 × 200 × 350 mm

Silver Plating

Capable of coating complex parts

Our technologies and their applications

Hardness

The hardness of silver, which is acquired from the basic component bath, is only Hv 70-90. But one of the silver, which is changed into crystal form by adding the brightener, increases up to Hv 110-130. If a small volume of hardener is added, the hardness can increase up to Hv 140-160.

Lubricity

Even though the lubricity of silver plating is relatively good, it can be bad when the hardness is increased. This is thought to be the cause of breakage of the crystalline form and wearing caused by the loss of ductility.

Conductivity

The coated silver is a little higher in electric resistance than pure silver. That is similar to the resistance level of copper or aluminium.

Solderability

It is widely used in the semiconductor field, excellent solderability.

Resistance to tarnish

Even though tarnish is unavoidable, the metal is to be slightly protected from tarnish by chromating it thinly or by implementing other coating

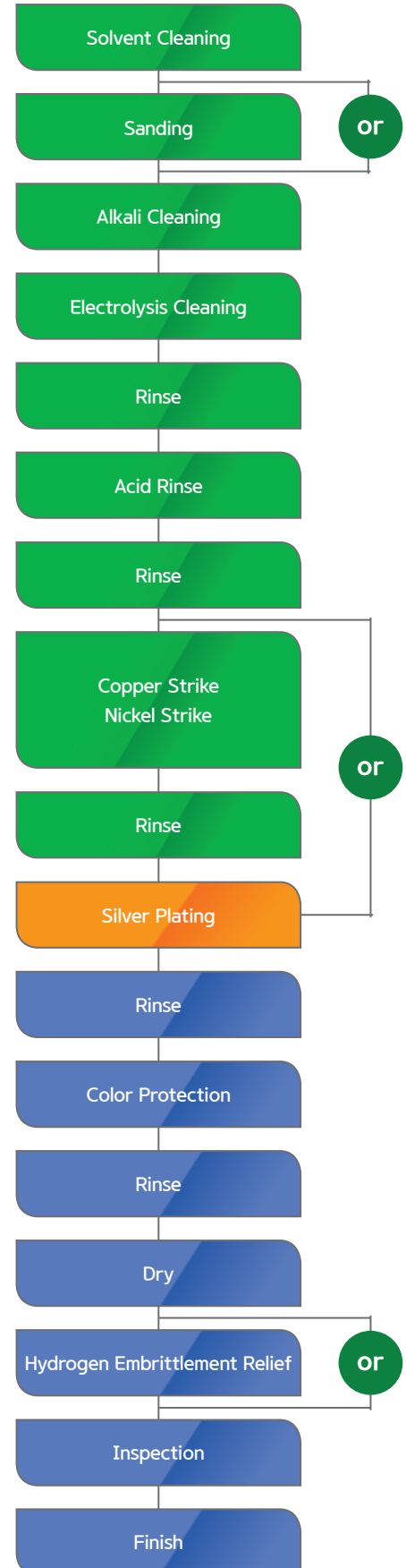


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COTEC Plating Process



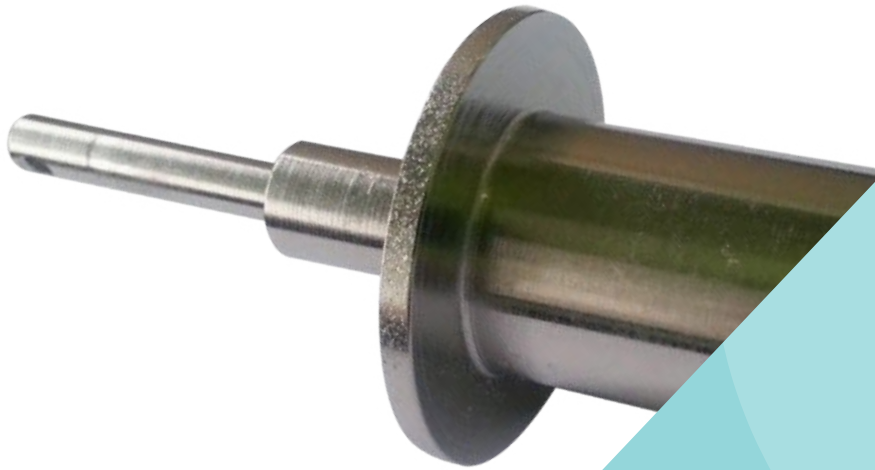
Process



Nickel Plating



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Production items and applications

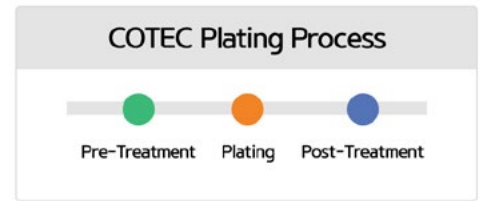
Department / Material		Aircraft, Defence, Atomic power, Electronic products, Machinery for general industries / Fe, STS, Al, Cu	
Usage		Corrosion prevention and decoration purposes	
Thickness (General criteria)		1~70µm hours	
Applied specifications	National defense 0115-0012 AMS2403 QQ-N-290	Thickness	It varies depending on the specification requirements According to the class applying 5~40µm
		Adhesiveness	No trace of separation after bending
		Stress relief	At 191±14°C, for more than 3 hours
		Relief of hydrogen embrittlement	The brittle time depending on material organization state and hardness At 191±14°C, for more than 3 hours (HRC 32~39) At 191±14°C, for more than 8 hours (HRC 40~47) At 191±14°C, for more than 23 hours (HRC 48)
Acceptance		External	
		Internal	DOOWON, HANHWA, KAI, LIG NEX 1, ADD

Equipment condition

COTEC	2,400 × 900 × 1,200 mm
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Nickel Plating

Capable of coating complex parts



Our technologies and their applications

Nickel strike plating

Characteristic

- As a plating for good adhesion on stainless (Pre-treatment), it is good for triple nickel plating.
- Ventilation is to be installed as it discharges chlorine gas.

Applicable parts

- for various primer coating

Black nickel plating

Characteristic

- Black nickel is good for decoration, optical instruments or military equipment as it prevents the reflection of light and gives a good feeling.
- Generally, it is for decoration as it has low corrosion resistance.
- The thin coating's adhesiveness is good but the wear resistance and flexibility are not good.
- Transparent lacquer coating is done to prevent tarnish.
- The bath has two different solutions such as nickel sulfide baths and nickel chloride bath. The nickel chloride bath is excellent.

Nickel plating

- Nickel sulfate, nickel chloride, boric acid, are used as base solution with acetylene, alcohols as smoothing agent.
- Surface is semi-gloss finish, which could acquire polished and buffed finish at the same time.

Single and multiple nickel plating

Characteristic

- Single nickel plating is usually used for decorative purposes. As the coating layer is 5 to 12µm, it can be used in a corrosive environment.
- Double nickel plating is to conduct the coating on a substrate with high level nickel and also to conduct the sufficient bright nickel layer on the coated surface which does not require expensive mechanical buffing.
- Triple nickel plating is done to add nickel plating between the semi-bright nickel layer and bright nickel layer with the highly active electrochemical nickel.

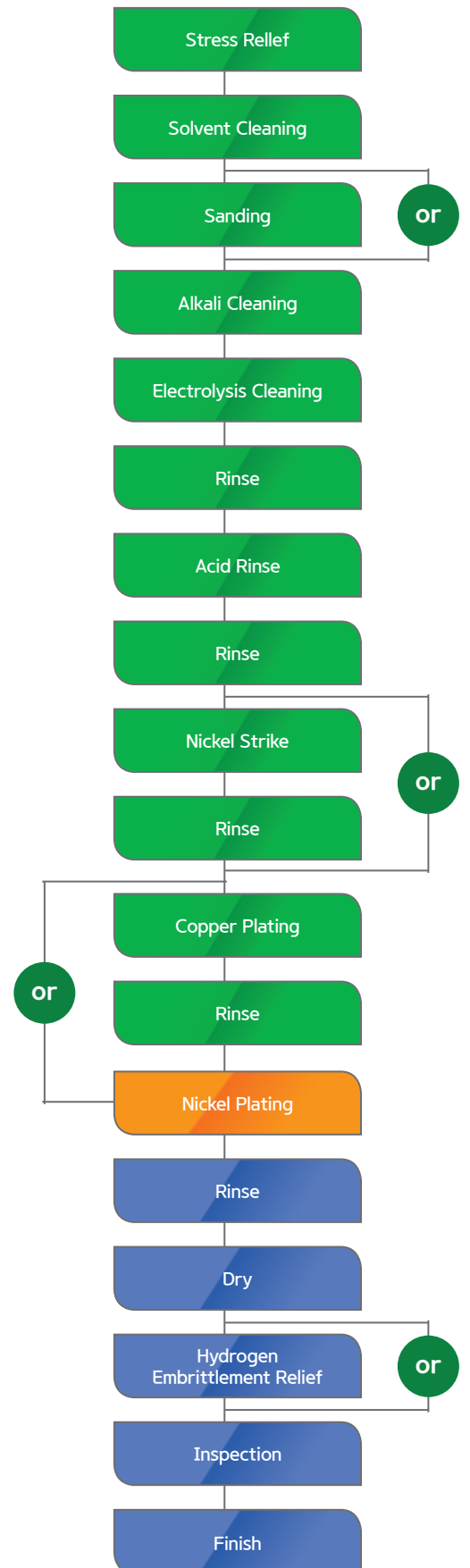
Applicable parts

- Various under coating parts



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Process



Tin Plating

COTEC has various surface treatment technologies and the company concentrates on products development and quality control to develop various surface treatment items



Production items and applications

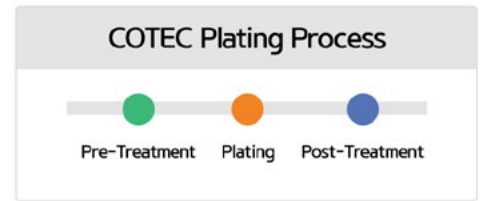
Department / Material		Defence, Atomic power, Electric products, Semiconductor parts / Fe, STS, Al, Cu	
Usage		Soldering, Corrosion, Prevention of corrosive hardened layer during nitrification, Prevention of adhesion	
Thickness (General criteria)		1~20 μ m	
Applied specifications	National defense 0115-0019 (Yeon) MIL-T-10727 ASTM B 545 FEIS 104 KSD 8330	Thickness	2.5 μ m~6.4 μ m for soldering 5.0 μ m~10 μ m for prevention of adhesion 7.5 μ m for corrosion prevention 5 μ m~15 μ m for prevention of hardening during nitrification
		Adhesiveness	No trace of separation of coating from substrate when bending 180 degree.
		Corrosion resistance test	Salt spray test with 20% NaCl for 24 hours (less than 6 pits within 2.5cm ²)
Acceptance		External	
		Internal	DOOWON, HANHWA, KAI, LIG NEX 1, ADD

Equipment condition

COTEC	1,500 × 600 × 1,200 mm
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Tin Plating

Capable of coating complex parts



Our technologies and their applications

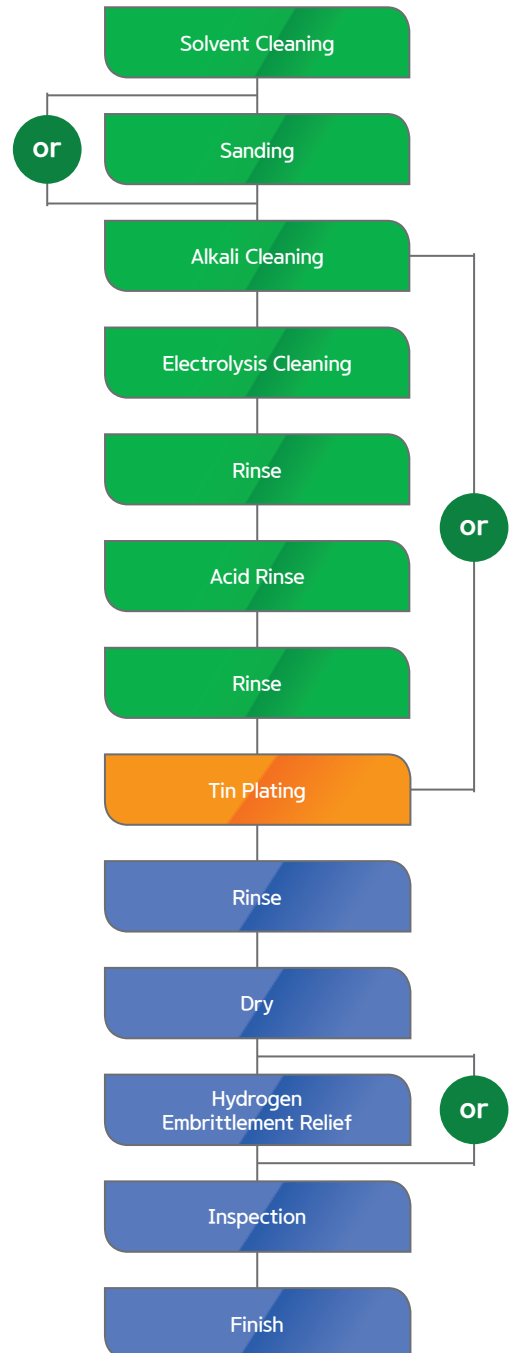
Characteristic

- Tin is soft and malleable and it has a low melting point of 231.9°C.
- As a silvery metal, its heat conductivity is one third of that of silver while its electricity conductivity is one seventh of that of silver.
- Tin provides little hazard to human health; it is used as a coating for bowls. It is also resistant to acid, so it is used as a coating for food cans.
- Excellent soldering and widely used as a coating for electric and electronic parts.
- Different from zinc plating on ferrous metals, the corrosion rapidly progresses when there is a pin hole on the surface of the metal substrate because the ferrous metal becomes anodic.
- Lubrication and moving capability can be enhanced with tin replacing plating and electric tin plating on the moving parts and pistons.

Applicable parts

- Defense equipment, Aircraft parts, Automotive parts, Architectural sash

Process



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Copper Plating



COTEC has various surface treatment technologies and the company concentrates on products development and quality control to develop various surface treatment items



Production items and applications

Department / Material		Aircraft, Defence, Atomic power, Machinery for general industries / Fe, STS, Al			
Usage		Undercoat for Ni, Ni-Cr plating, Carburization prevention			
Applied specifications	MIL-C-14550 National defense 0115-0025 AMS2418	Thickness	CLASS	Thickness(μm)	Application
			0	25 - 127	Shield for heat treatment
			1	25 or thicker	Prevention of carburization and decarburization, Coating for hole in PCB
			2	13 or thicker	Undercoating for nickel and other plating
			3	5 or thicker	To prevent th substrate from moving to tin layer and so damaging the solderability
		4	3 or thicker	Same as class 3	
		Soldering	Solder shall be easy and fully cover the substrate. No foam, Blowhole, Pore or other defects allowed. Solder shall be securely adhesive to the substrate. (No trace of separation allowed. It shall not be peeled with sharp tool in testing)		
		Stress removal	At 191 ± 14°C, for more than 3~4 hours		
		Relief of hydrogen embrittlement	The brittle time depending on material organization state and hardness At 191 ± 14°C, for more than 3 hours (HRC 32~39) At 191 ± 14°C, for more than 8 hours (HRC 40~47) At 191 ± 14°C, for more than 23 hours (HRC 48)		
Acceptance		External			
		Internal	HANHWA, KAI, KAL, LIG NEX 1, ADD		

Equipment condition

COTEC	1,500 × 700 × 1,200 mm
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Copper Plating

Capable of coating complex parts

Our technologies and their applications

Cyanated copper plating

Characteristic

- It can directly coat the steel.
- Its plated surface is better than copper sulfate plating.
- Copper crystals generated from it is very small.
- Plating speed is very fast.
- It can be applied to almost all materials.
- It is toxic as it has cyanide in it.
- Waste disposal and ventilation are required.

Applicable parts

- Defense equipment parts, Aircraft parts

Copper sulfate plating

Characteristic

- Less contaminating, less costly and good smoothness.
- Used for undercoating for top coat, color coat, electroforming and plating on PCB.
- Bad adhesion on steel or zinc diecasting materials, thus difficult to direct coat them.
- Good smoothing, and easy to get brightness by removing the buffing trace.
- Its adhesiveness is inferior to alkaline bath.
- It is indispensable to electroplating on plastics after chemical plating.
- High current density can be applied.
- Electric conductivity is good.

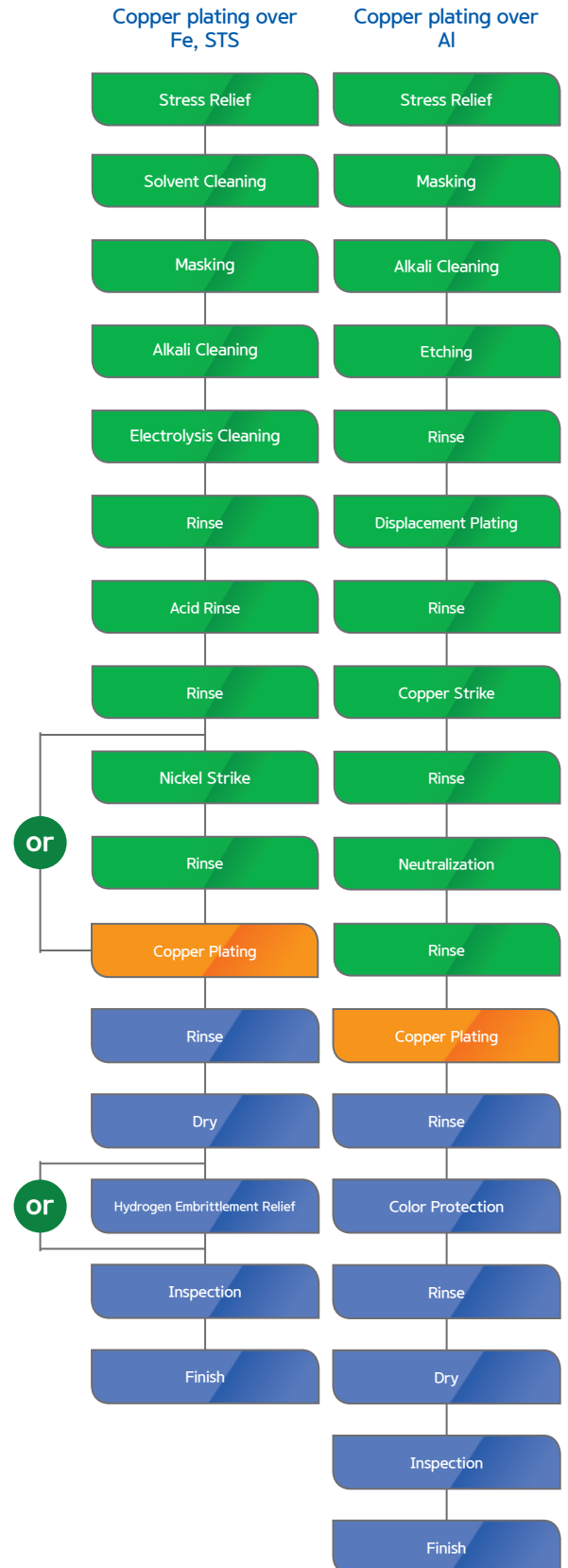
Applicable parts

- Electronic parts, Defense equipment parts, Decorative parts

COTEC Plating Process



Process

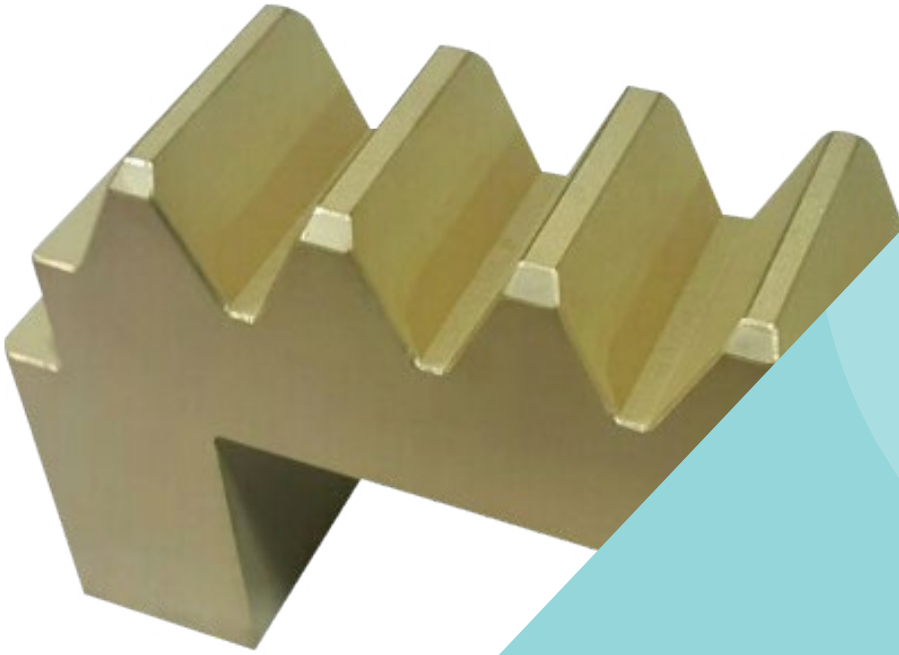


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Copper Cleaning



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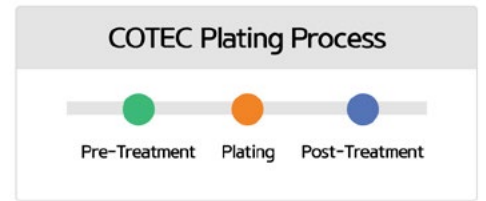
Equipment condition

COTEC

700 × 600 × 1,200 mm

Copper Cleaning

Capable of coating complex parts



Our technologies and their applications

Copper cleaning

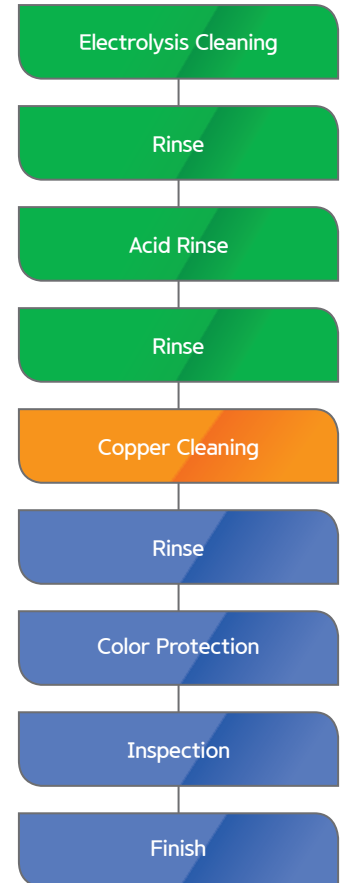
Characteristic

- If copper part's friction resistance are increased due to contamination or oxidation, simple washing process can be used to revive the lost characteristics. it could also improve electrical conductivity.
- Also for decoration, it provides additional discoloration resistance and contamination resistance.

Applicable parts

- Bus bar, Socket, Machined products

Process



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