DEON

Inline type

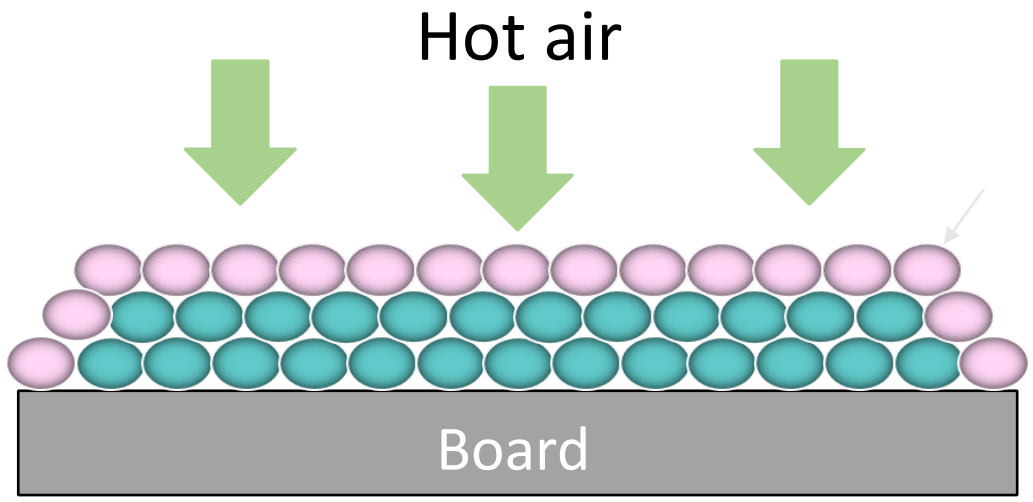
Batch type

Efficient and quick curing system for Solder Mask & Legend Marking

1/ 10 curing time of Solder Mask by Super Heated Vapor

- ✓High potential for energy saving by lower consumption
  => 70% and space saving design
- ✓Improve quality by minimized oxidation for Pad
- ✓Legend Marking curing in 3 min
- ✓Solder Mask curing in 5 min

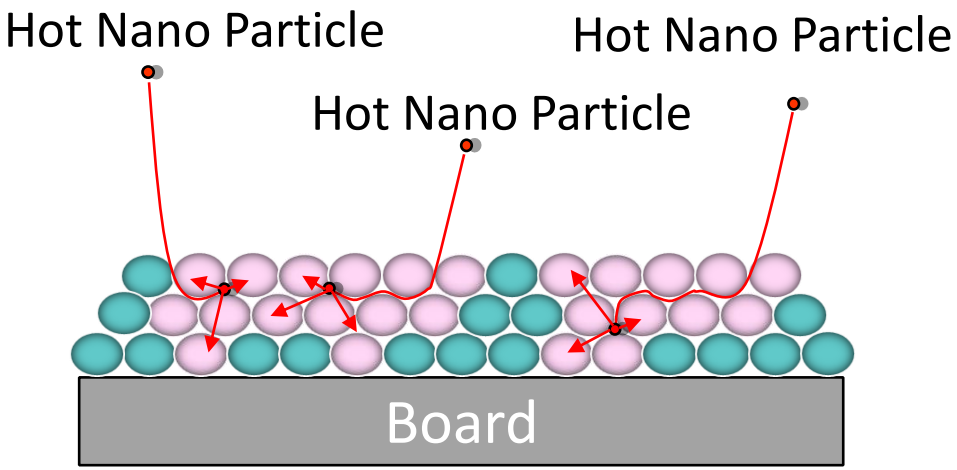
Conventional curing method



Hot energy heat solder mask gradually from outer layer.
It takes time to heat up inside, since energy slowly conduct inside.

Temperature as ca 150℃
Process time ca. 60-100 min

DEON Principle



Simultaneous curing to surface and inside by the Hot Nano Particle.

Quick curing with same performance and function.

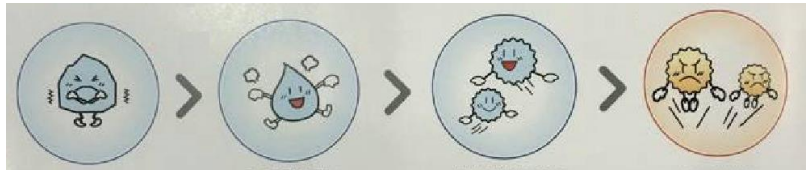
Four times of heating capacity by water vapor.

Curing time 180℃ - 5min

DEON Idea

1/10 curing time of solder mask by super heated vapor

Super heated vapor is high temperature vapor which is heated after the water reached to boiling point.



0℃	<100℃ Water	>100℃ steam	Super heated vapor

It has following features which are beneficial for drying technology.

- Large heating capacity
- Quite high heating conductivity
- Lower oxidization due to no liquid circumstance

Stand Alone type

PCB size: W200 x H200mm to W610 x H510mm

Thickness: 0,2 to 2,4mm

Possible to cure solder mask in 5 minutes

Legend marking curing also available

Inline System

PCB size: W200 x H200mm to W610 x H510mm

Thickness: 0,2 to 2,4mm

Possible to cure solder mask in 5 min

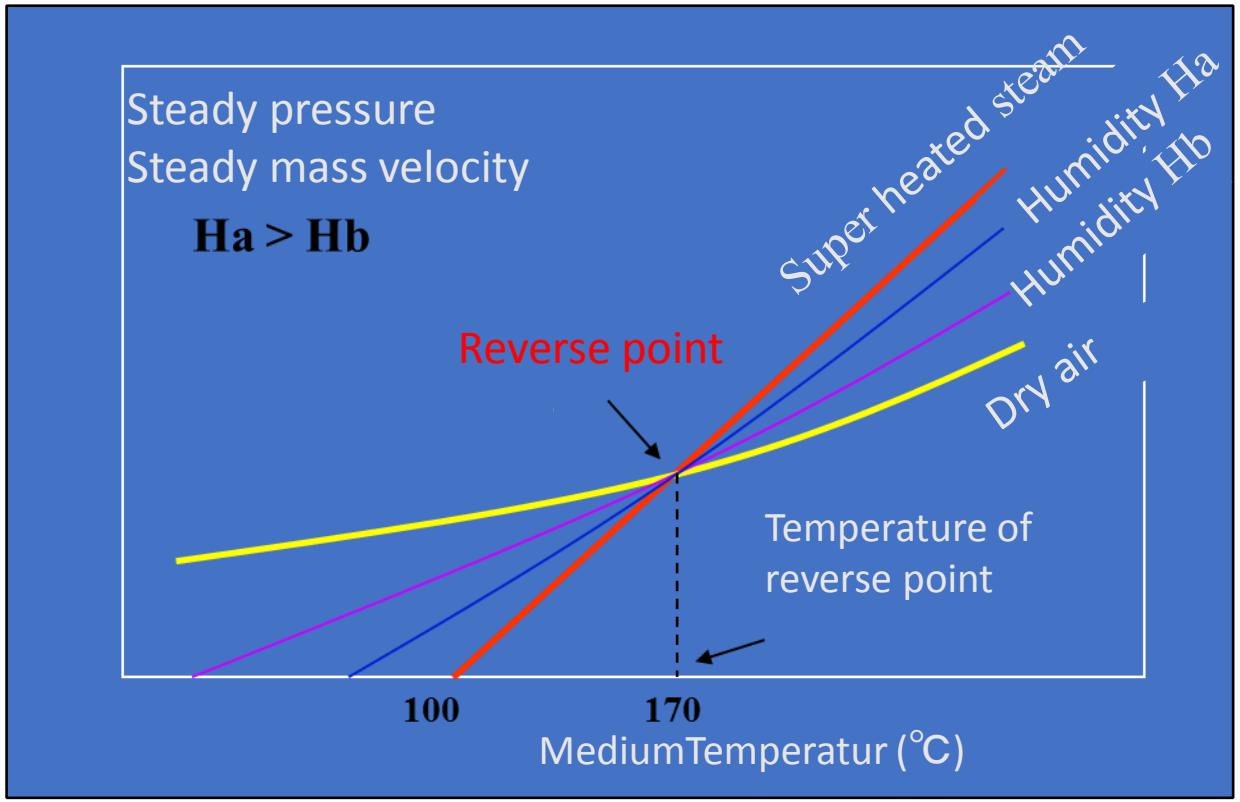
Legend marking curing also available

Cycle time: 7 seconds/panel as fastest, available with rack production

Possible to connect Developing process line

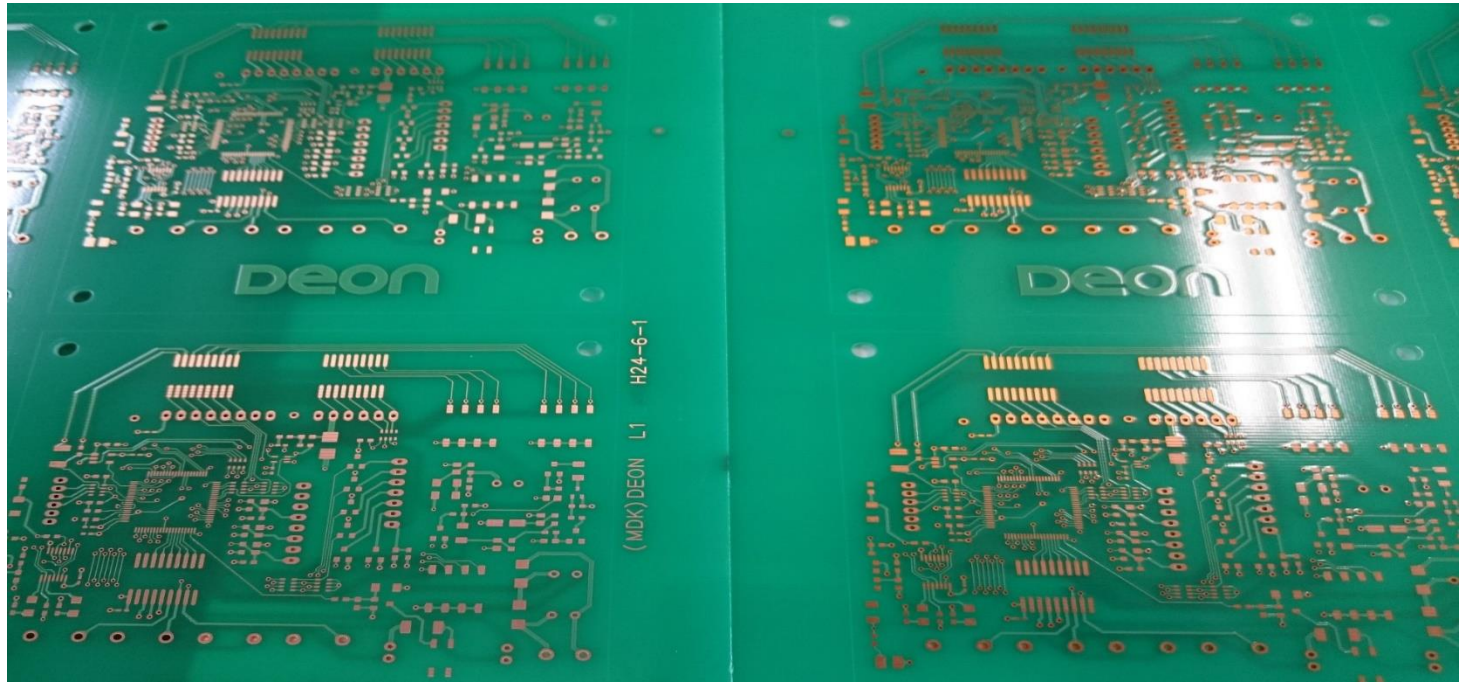
Automatic adjustment for different panel

Curing at deferent temperature and procedure



Super Heated Vapor is based on Water ‘H2O’ not Oxygen ‘O2’.

By curing in nearly Oxygen free condition, risk of oxidation for the pads are significantly minimized.
=> Improve quality



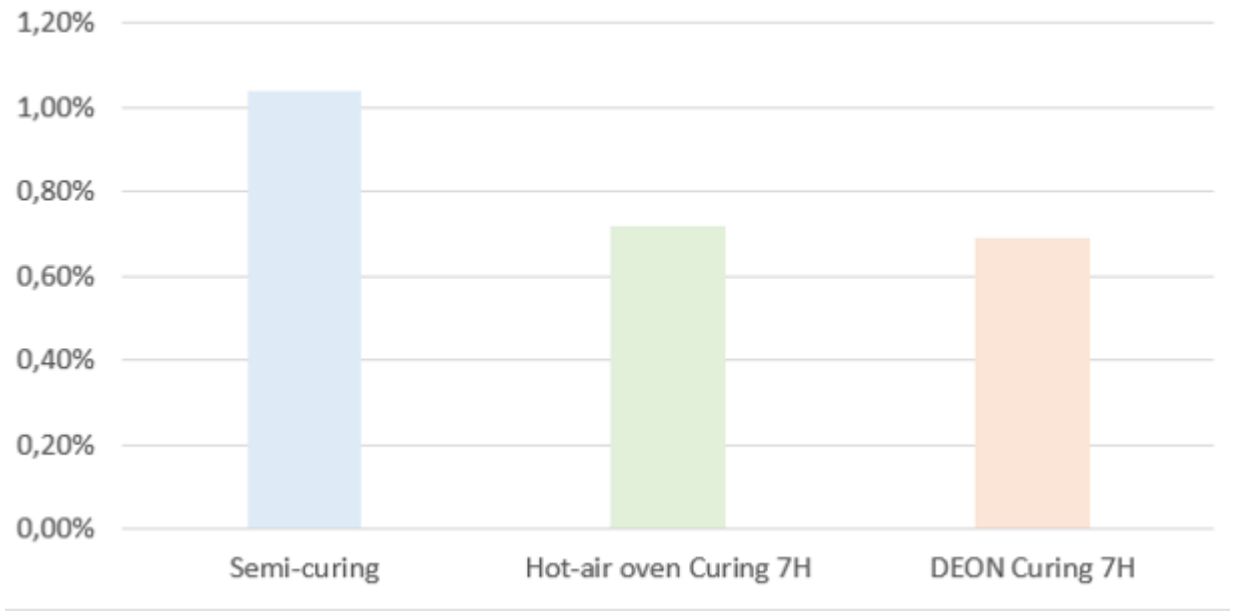
DEON 180℃ 5min

Conventional oven 150℃ 60min

Quantity of moisture in Solder Mask

Condition	Semi-Curing	Hot-air oven Curing	DEON curing
% of moisture in Solder Mask	1,04 %	0,72 %	0,69 %

150°C - 60 min Hot-air oven
180°C - 5 min DEON curing



Research of the residual moisture

Test Condition

Semi cure
Hot oven 150℃ - 60 min curing
DEON 180℃ - 5 min curing

These three test method are based on Nissan Arc Co. Ltd.

Karl Fisher method

One of the classic method of chemical analytic.
Accurate measurement of residual moisture in selected substrates.

DEON

* Reliability test of substrates cured with high temperature superheated vapor

1. Regarding the amount of water contained in the solder mask
   =>Nissan Ark Inc. Verification result report
2. Regarding the durability of solder mask
   =>Report on boiling test result
3. Regarding coating film properties
   =>Taiyo Ink Mfg. Co., Ltd. Verification result report
4. Regarding the reliability of the substrate
   =>Murakami Electronics Engineering Co., Ltd.

✓ Based on actual operation examples

✓ Quartech Co., Ltd. Verification result report

Solder mask resist reliability test

- Under Constant temperature 85℃, constant humidity 85%, 500 hours

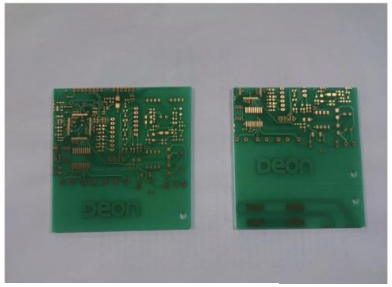
Test method	
1. Acid resistivity	10% H2SO4, 20℃, 20 minutes
2. Alkali resistance	10% NaOH, 20℃, 20 minutes
3. Solvent resistance	Propylene Glycol -1, Monomethyl ether-2, Acetate, 1 Minute
4. Solder dip resistance	Re-flow soldering according to the attached temperature profile
Tape healing test	

- Result
  No solder mask pealing in all samples

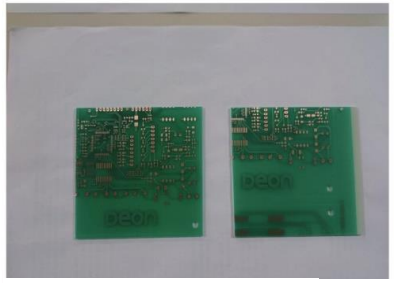
Test	Result		
	Sample 1	Sample 2	Sample 3
1. Acid resistivity	OK	OK	OK
2. Alkali resistance	OK	OK	OK
3. Solvent resistance	OK	OK	OK
4. Solder dip resistance	OK	OK	OK

Resistance test of solder mask cured by DEON（Boiling test)

1. Cut out the board



Hot air oven 150℃ 60min



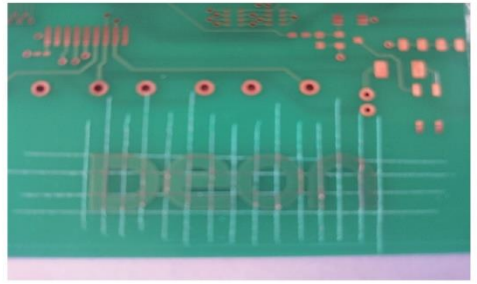
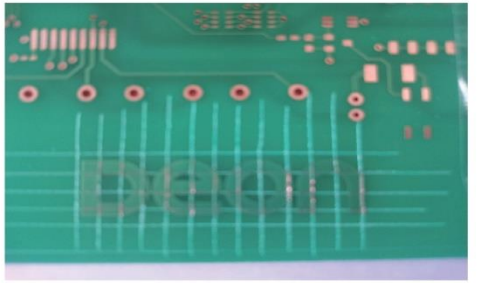
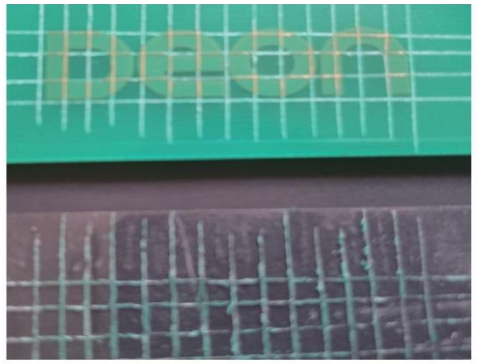
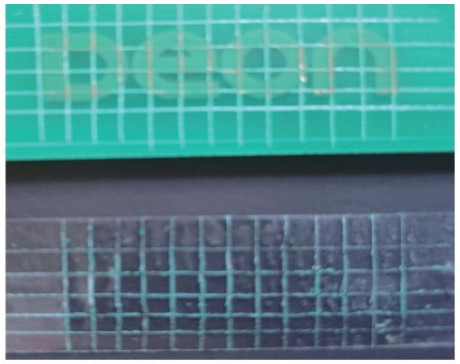
DEON 180℃ 5min

2. Put boiling water into the glass and keep boiling.

DEON

3. After 2 hours boiling, no color faded, also no other issues.


4. Board condition after 2 hours boil. No peeling of solder mask.

Test with Taiyo Manufacturing

- 26th Sep. 2015 at Ito Denki

- Product: PSR-4000 G24, SP19
  - Condition of curing: Taiyo made development in their own facility with their parameter setting. After that made post curing with below condition by Kessel machine.

    - Type 1 (160℃): 150℃x5min, (preheating: ca120℃ on surface of PCB) + 160℃x5 min
    - Type 2 (180℃): 150℃x5min, (preheating: ca120℃ on surface of PCB) + 180℃x5 min
    - Type 3 (200℃): 150℃x5min, (preheating: ca120℃ on surface of PCB) + 200℃x5 min

- Test items
  - Physical test: TMA, Tension test
  - Gold plating resistance test
  - Solder heat-proof test
  - Pencil hardness
  - Adhesion test

Test PSR-4000 G24

- TMA
  Equipment: SII nano-technology TMA/SSR6100

	TG (℃)	CTE (a1) 50℃～70℃	CTE (a2) 140℃～160℃	
Type 1 (160°C)	107	40ppm	148ppm	
Type 2 (180°C)	111	45ppm	136ppm	Taiyo recommendation
Type 3 (200°C)	111	43ppm	137ppm	

- Tension test
  Equipment: Shimadzu, AUTOGRPH AG-X1kN

	Degree of elasticity (GPa)	Rupture point tension (MPa)	Rupture point stretch (%)	
Type 1 (160°C)	4,9	42	1,0	
Type 2 (180°C)	4,9	48	1,2	Taiyo recommendation
Type 3 (200°C)	4,8	52	1,3	

Test Taiyo PSR-4000 SP19

- TMA
  Equipment: SII nano-technology TMA/SSR6100

	TG (℃)	CTE (a1) 50℃～70℃	CTE (a2) 140℃～160℃	
Type 1 (160°C)	100	51ppm	146ppm	
Type 2 (180°C)	100	42ppm	138ppm	Taiyo recommendation
Type 3 (200°C)	107	39ppm	122ppm	

- Tension test
  Equipment: Shimadzu, AUTOGRPH AG-X1kN

	Degree of elasticity (GPa)	Rupture point tension (MPa)	Rupture point stretch (%)	
Type 1 (160°C)	4,3	48	1,3	
Type 2 (180°C)	4,3	50	1,4	Taiyo recommendation
Type 3 (200°C)	4,2	56	1,6	

Other test result

- Immersion gold resistance test
  After processing of Ni: 3um, AU: 0,03um, tape peeling test

Ink	Type 1 (160°C)	Type 2 (180°C)	Type 3 (200°C)
G24	No peeling	No peeling	No peeling
SP19	No peeling	No peeling	No peeling

- Solder heat resistance test
  Rosin Flax, 260℃, 30secx1time, After solder floating, tape peeling test

Ink	Type 1 (160°C)	Type 2 (180°C)	Type 3 (200°C)
G24	No peeling	No peeling	No peeling
SP19	No peeling	No peeling	No peeling

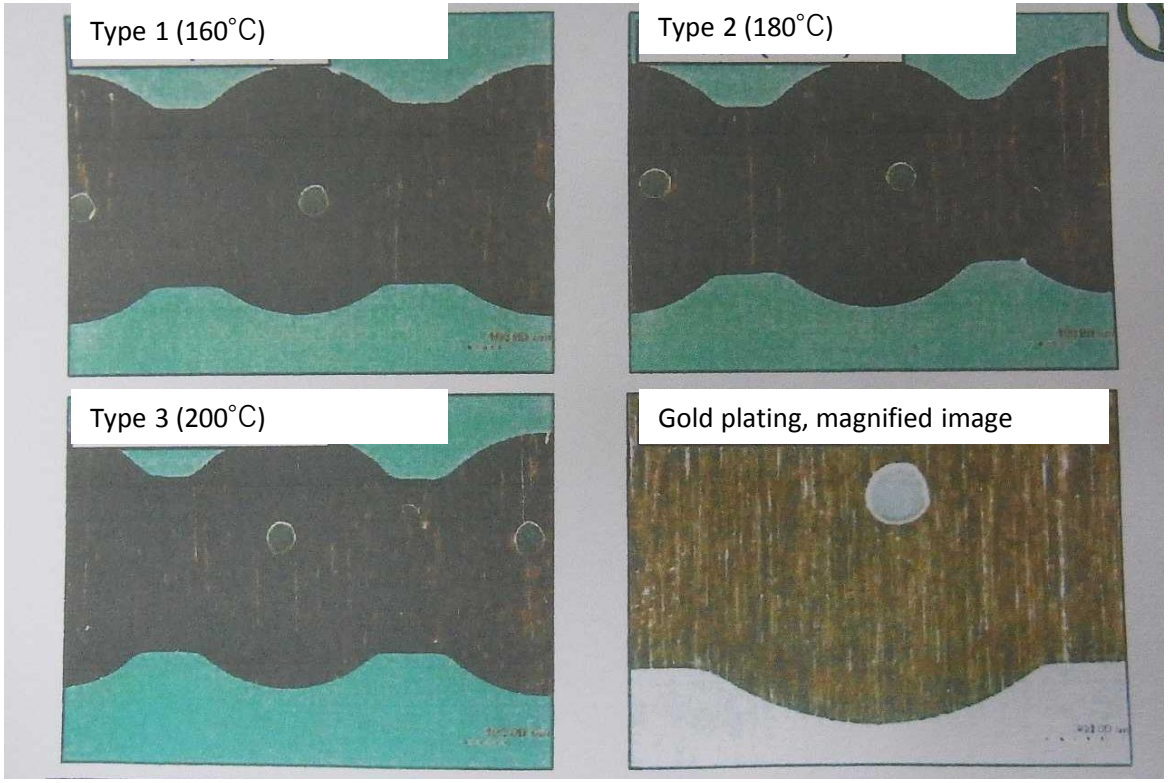
- Pencil hardness: Degree of hardness that doesn’t reach to the copper surface (1kg press)

Ink	Type 1 (160°C)	Type 2 (180°C)	Type 3 (200°C)
G24	8H	8H	8H
SP19	8H	8H	8H

- Adhesion test (Cross cut test)

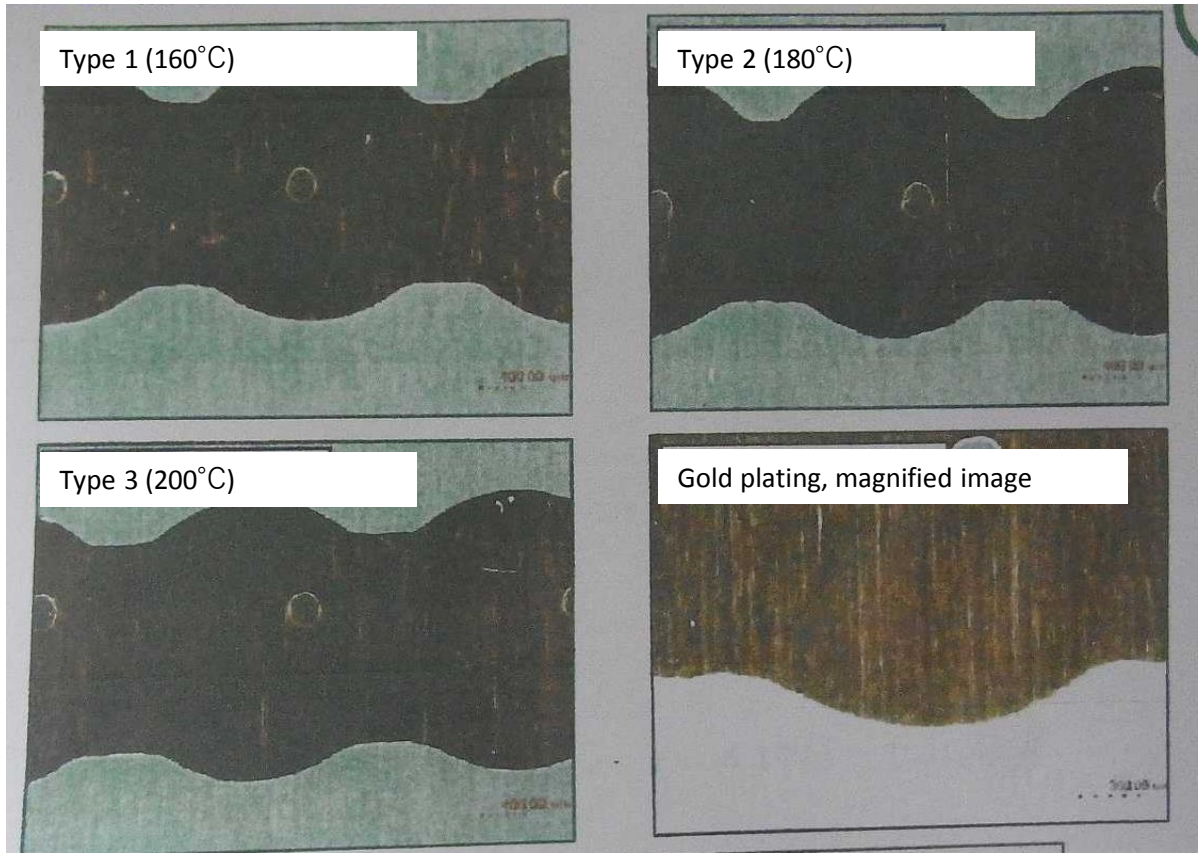
Ink	Type 1 (160°C)	Type 2 (180°C)	Type 3 (200°C)
G24	No peeling	No peeling	No peeling
SP19	No peeling	No peeling	No peeling

G24 Immersion Gold images



- No miss gold plating, but there are slight discoloration on the gold surface for all samples. (It confirmed only with light reflection)

SP19 Immersion Gold Images



- No discoloration on the gold plating by SP19.

Advantages

- Significantly faster production, 5 min instead of 60 - 100min
- Large amount of space saving, 5,4m to be 12m
- Big every saving approx. 70% for inline, 20% for Batch type
- Only 1/10 of cycle time
- Minimized oxidation on the pads
- Lesser maintenance

This technology is well proved in the worldwide and has been used successfully many years in the food industry.

Item	Specification
Product Type	Solder Mask BGA / Flip Chip / PCB / FPC ; Legend Mark
Power requirement	70 kW / Inline ; 40kW / Batch Type
Water consumption	40 l/h for Inline ; 30 l/h for Batch Type
Air consumption	0.0 Mpa for Inline ; 0.4 Mpa for Batch Type
Exhaust air	Via extraction with gas scrubber
Working temperature	180°C for Inline und Batch Type
Network	Not required
Transport	Horizontal belt drive for Inline, sub frame for Batch Type
Size	1.920 x 5.450 mm.
Maintenance	Clean inside once in a week, filter cleaning
Consumables	Belt for Inline, filter for batch type

Thank you for your attention!

Systems for Success

Contact:
SweeTec Ltd.
Nächstentalstrasse 21
D-79346 Endingen a. K.
Tel: +49 7642 9254264
Mobil: +49 171 1485958
mailto: strohm.peter@sweetec.eu