

Stencil Cleaning-

A practical approach to improving yields and maximizing your through-put

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Overview


- **Introduction**
- **Technologies for the job**
- **More than a flat piece of Stainless**
 - **Compatibility**
- **Solubility in stencil cleaning**
- **Influencing factors**
- **Best Practices to reduce misprints and increase yields**

Introduction

- It's just a stencil...
- ...touches 100% of your products



"Thanks for coming in. You've given me a lot to forget about after you leave."

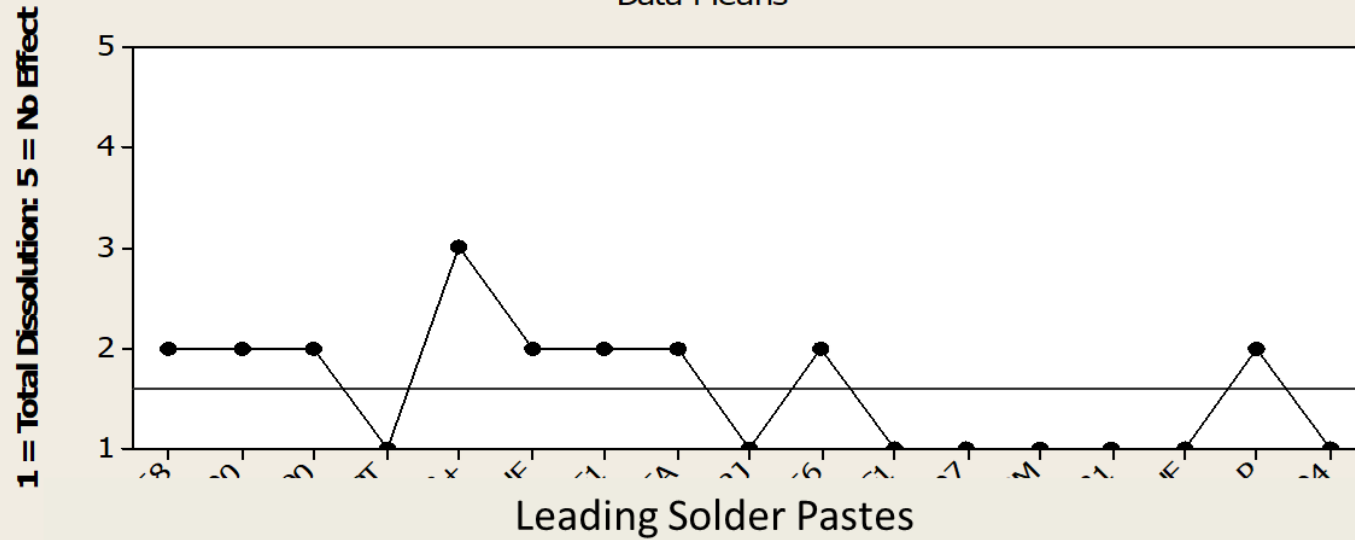


Off The Printer Stencil Cleaning:
Ultra Sonic or Spray-in-Air
Or Manual?



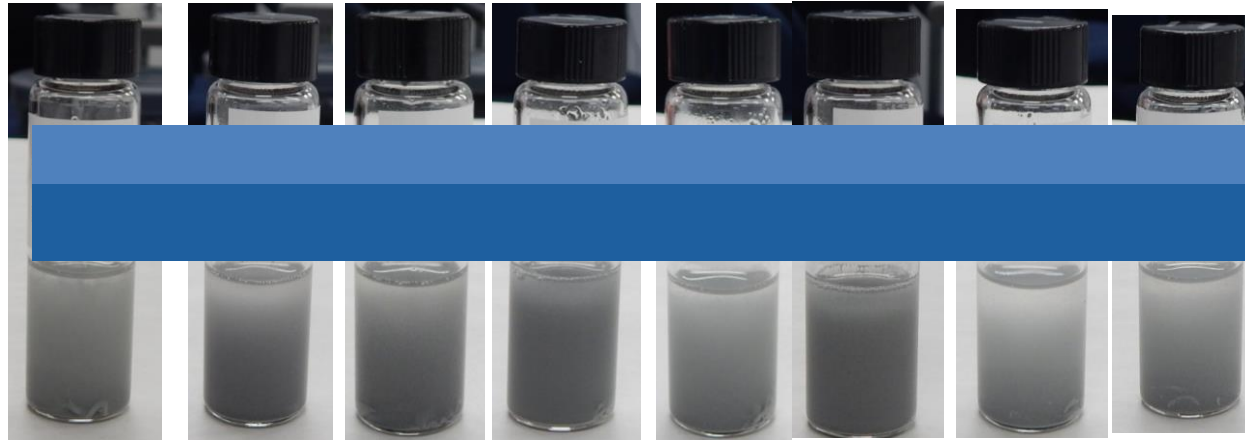
Solubility of Solder Paste in Cleaning Agent A

Data Means

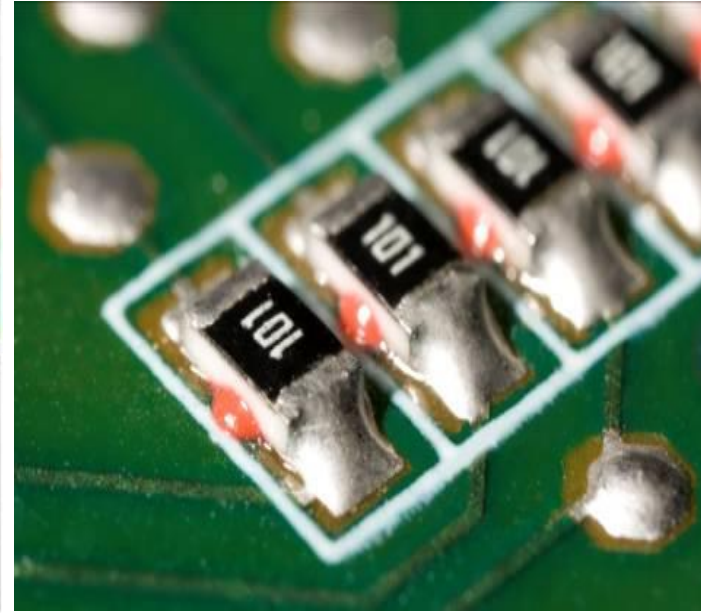
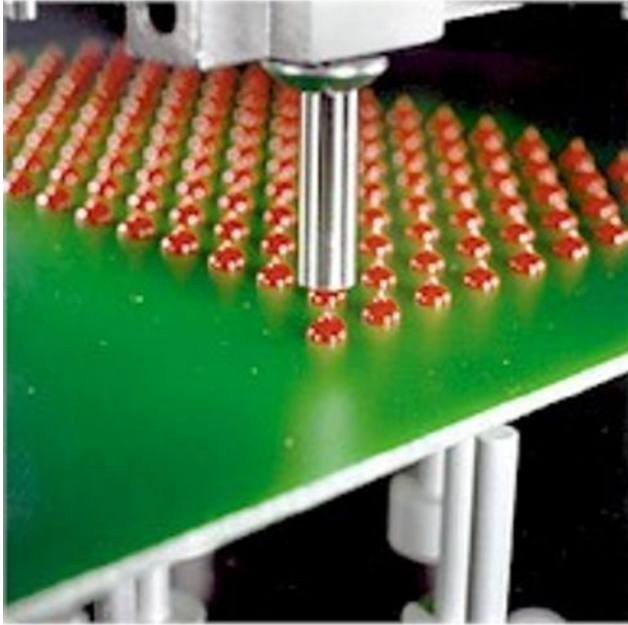


Solder Paste

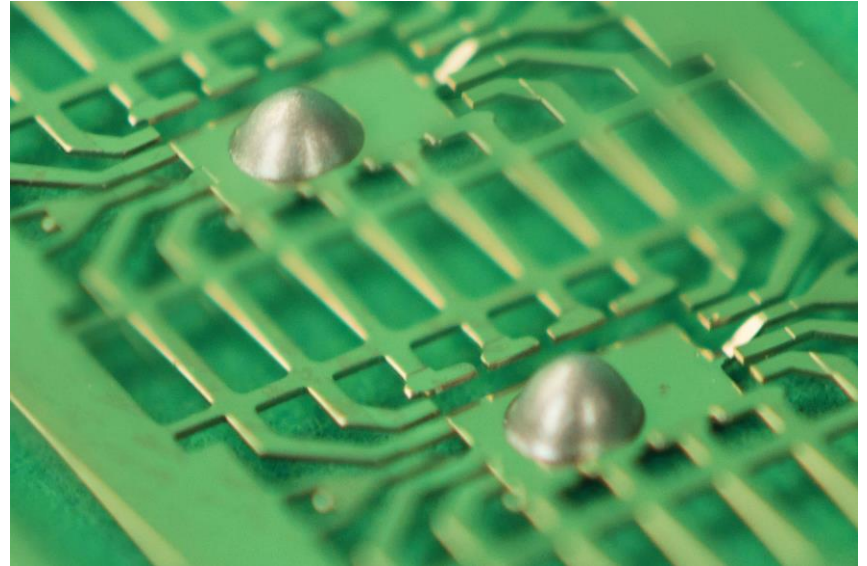
Properly Engineered Solvent for *Your* Goo!



Chip Bonder/Epoxies



Silver Conductive Epoxy



Stencil Cleaning Choices



Ultrasonic

With DI Rinsing
With Solvent Rinsing
Without Rinsing
Manual Hand-Held Devices



Spray in Air

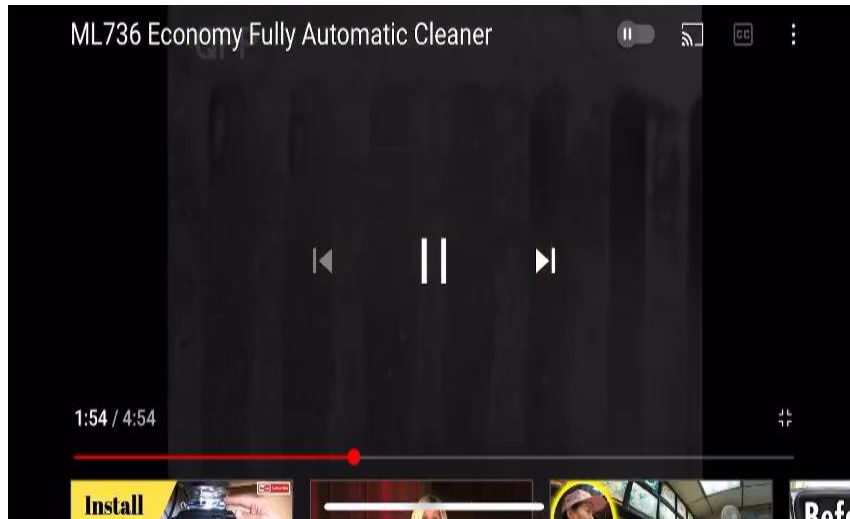
With DI Rinsing
With Solvent
Rinsing



Manual wipe

Inside

Ultrasonic Stencil Cleaning



Courtesy Sawa Corp

Spray-in-Air Stencil Cleaning



Courtesy Austin American

Each Technology Has Unique Approach

- Spray bar orientation
- Spray bar movement
- Drying technology

Semi automatic

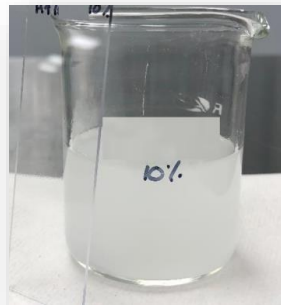
Automatic

Loading

- Front load
- Top load
- Side load

Cleaning Agents Choices

- Solvents
- Aqueous Cleaning agents
 - DI Rinse
 - Self Rinsing
 - Bi-Phase
 - Homogeneous
- Ultrasonic-
 - Designed to optimize the energy
- Spray in Air
 - Designed with Deformer



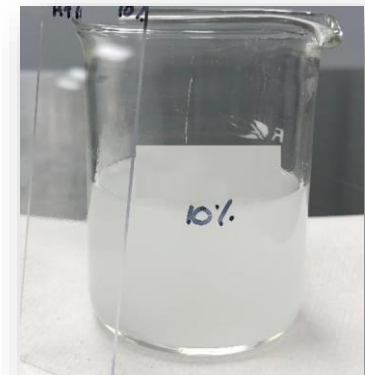
Use the Right Product

■ Bi-Phase

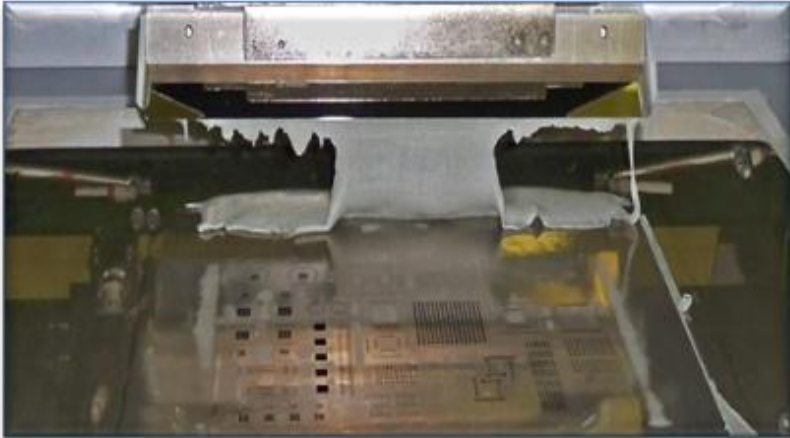
- Have a defoam layer on top
- Must be kept fully Mixed to ensure consistent performance
- More difficult to rinse in Ultrasonic/Spray under Immersion
- Often do not cavitate well

■ Homogenous

- May Not have defoamer necessary for spray in air
- May have higher alkalinity



Process Tips



1. Remove *all* excess solder paste from stencil before cleaning improves bath life
2. Wash Stencil as soon as it is removed from the printer
3. Recirculating filter on wash tank helps with bath life
4. Use temperatures at 120°F or below for Stencil
5. Higher temperatures can cure epoxies/adhesives
6. Avoid cleaning B-side Misprints in your stencil cleaner

Don't Forget



Additional Considerations



Not all cleaning agents can remove adhesives



Some cleaning agents, especially high alkalinity cleaners will remove a nano coating

Low or High pH DI water will remove the wipe on type coatings within a few wash cycles.

Flux, printing, etc also affect the life of the coating



Concentration has a major impact on bath life



Not all stencil cleaners will clean at the same parameters for every solder paste

Nano Coatings

Polymer Type Coatings

- Typically compatible with most chemistries
- Curing Process can have an impact on coating life

SAMP (wipe on)

- Have several benefits, however are more sensitive to pH of chemistry or rinse water
 - Don't forget the flux

Evaluating your Process?

Do you periodically inspect your stencils?

- inspect the apertures of a stencil on the shelf.

Do you have printing defects?

- Would YOU like to improve their printing

Do you use a nano coating? What type? Do you inspect to make sure it is still on?

- Use a Sharp to check the bottom of the stencil for coating?

Do you have white streaks on you stencils?

- indicates poor rinsing

How often do you change your bath?

Do you clean misprints? Do you have an OSP coating?

- Many material will remove OSP coating from PCB

Real World Case Study

- Global CM Overview:
 - Several NC/LF paste types
 - Spray-in-air batch machine.
 - History of Stencil damage due to chemical attack, poor performance, and/or high cost
- Results:
 - Easily removed all solder paste residue from the stencil surface while showing no negative effects to the stencil.
 - The fine pitch apertures were 100% clean and no solder spheres were noted.
 - There were no issues with long-term stencil compatibility

Cleaning Process Parameters	
Temperature:	Room temperature
Cleaning Agent:	Homogenous Cleaning Agent
Concentration:	15%
Technology:	Spray-in-Air
Time:	3 Minutes
Drip:	4 Minutes

The low operating concentration without decreasing effectiveness or bath life at ambient temperature provided the cost savings desired by the customer.

Real World Case Study

■ Global Leading Automotive PCB Manufacturer:

- 3 different No Clean, Lead Free solder pastes from SMT stencils.
- The stencils with both nano coated and non-coated framed stencils from 4 different suppliers.
- Ultrasonic stencil cleaning machines with No Rinse.

■ Results:

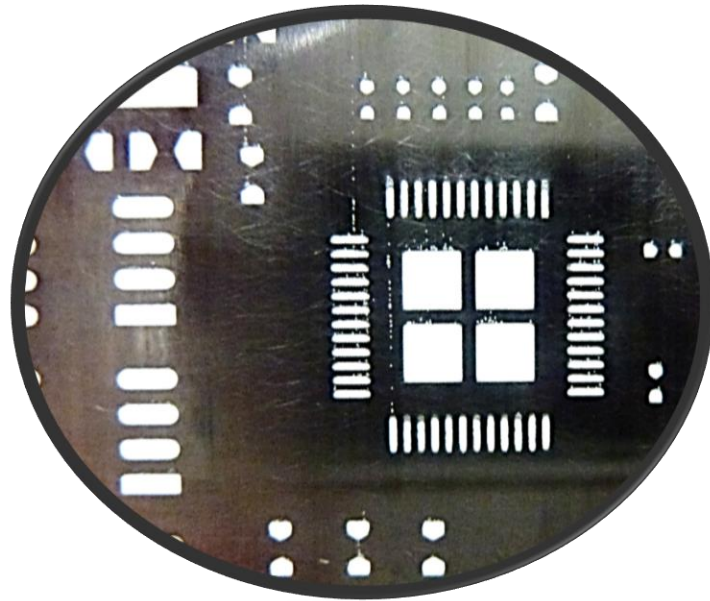
- Easily removed all solder paste residue from the stencil surface while showing no negative effects to the stencil.
- The fine pitch apertures were 100% clean as well as the stencil surface.

Cleaning Process Parameters	
Temperature:	Ambient
Cleaning Agent:	Homogenous Cleaning Agent
Concentration:	15%
Technology:	Ultrasonic
Time:	2 Minutes
Drying Process Parameters	
Temperature:	Ambient
Time:	5 Minutes
Technology:	Air

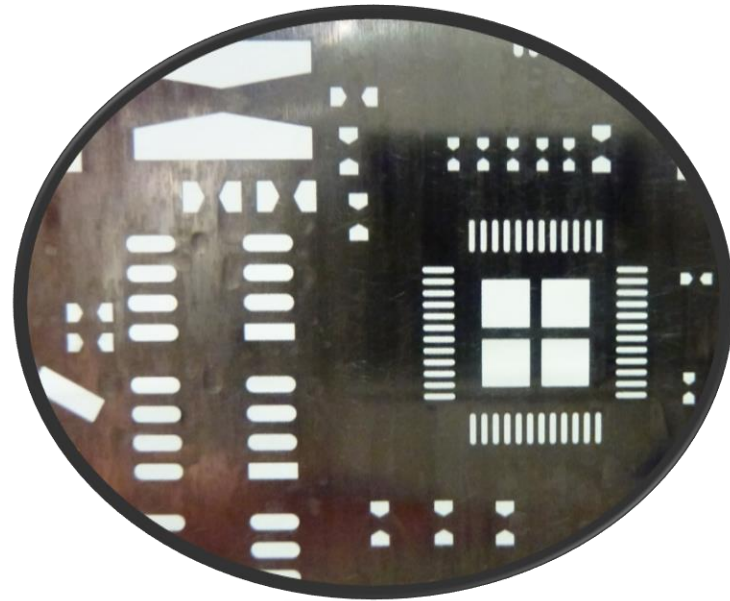
The low operating concentration without decreasing effectiveness or bath life at ambient temperature, provided the cost savings desired by the customer.

Inspection

Before Cleaning



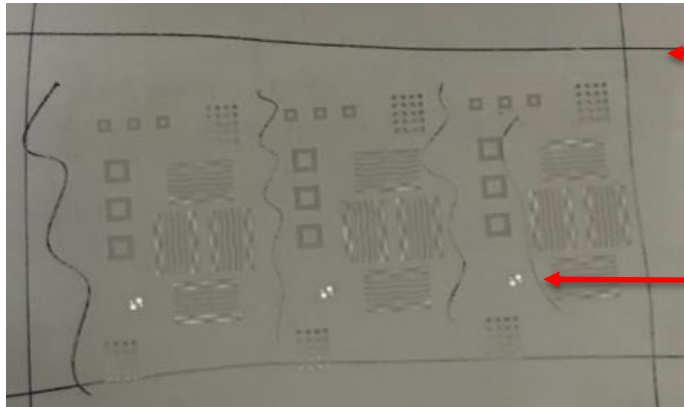
After Cleaning



Nano Coat Quick Test

Take a dyne pen or a sharpie.

- If it beads up on the bottom side of the stencil, the nano coating is still present.



No Nano Coat



Nano-coat

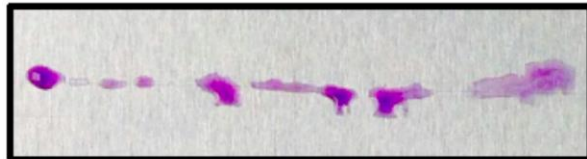
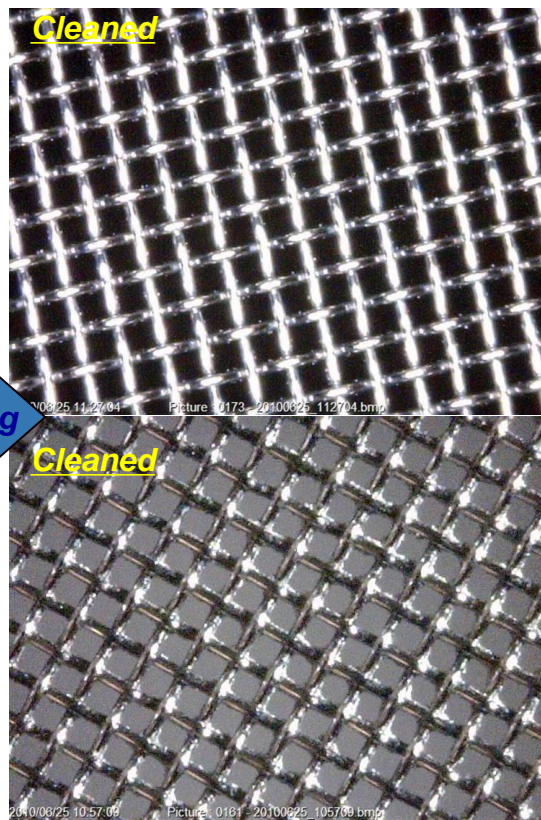
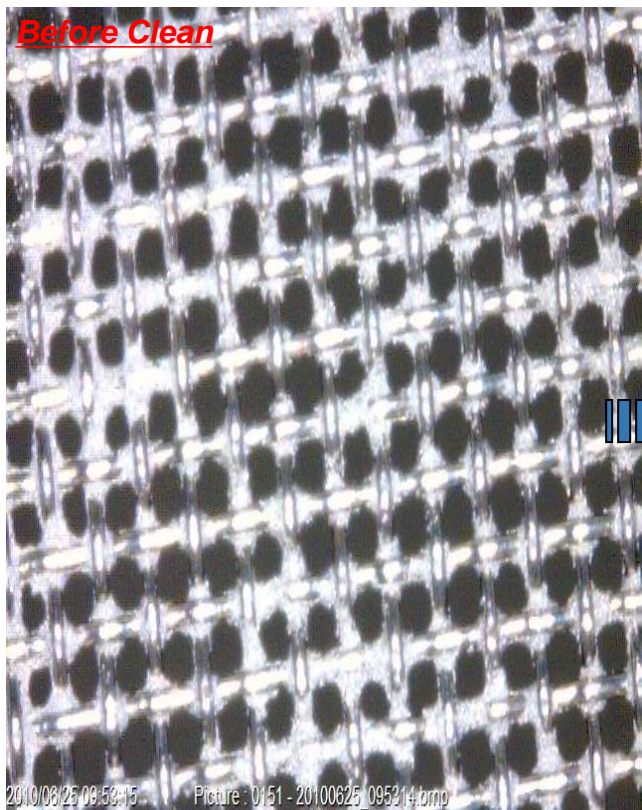


Figure 4: Image of how the dyne solution appears when beaded up on the surface of the stencil

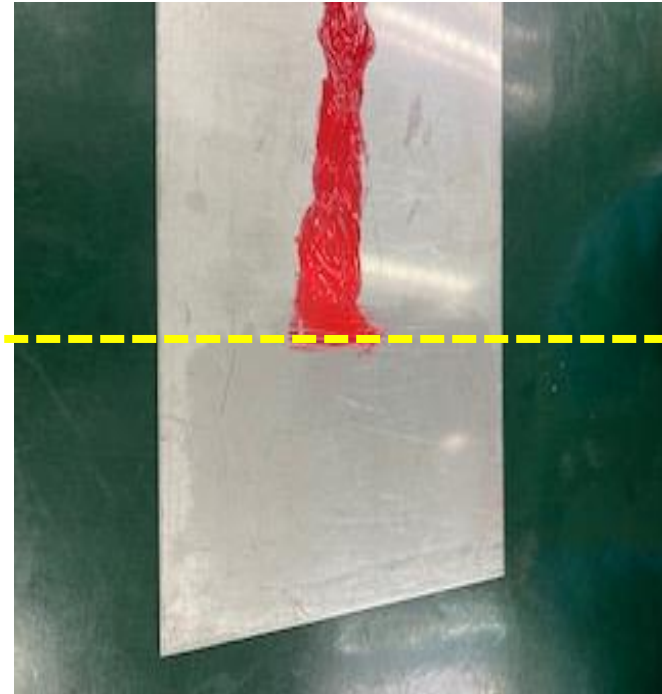
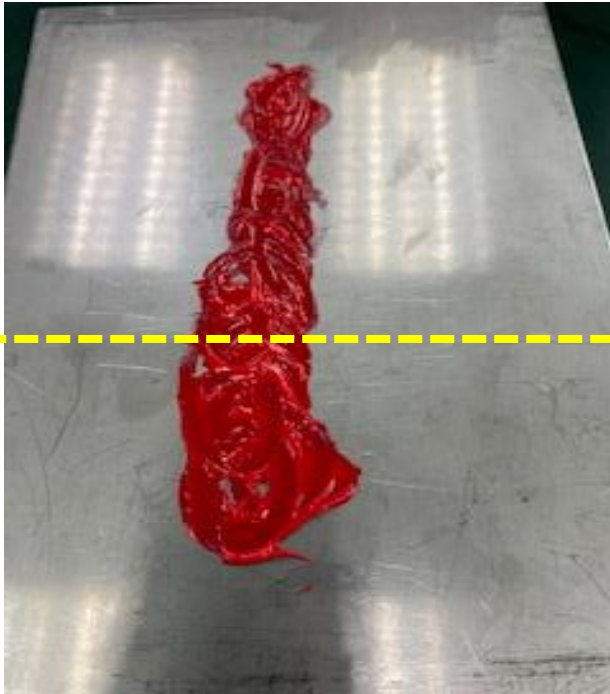


Silver Epoxy

Before & After Clean Picture on the stencil

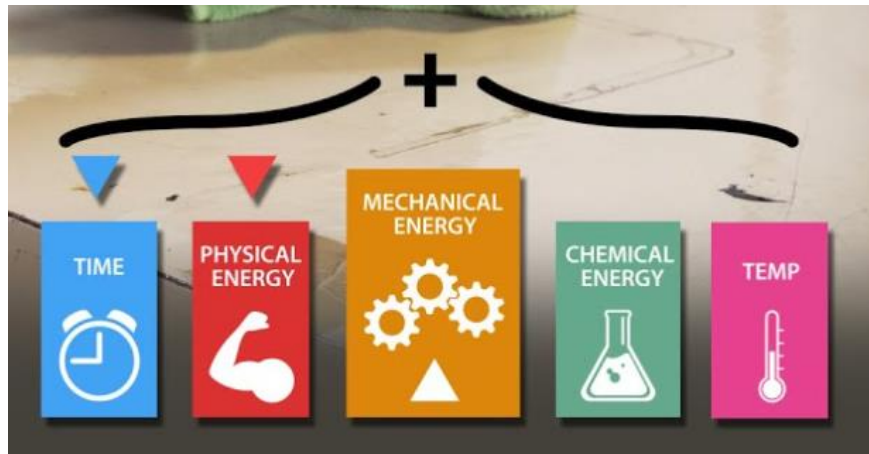


Before Curing



In Conclusion

- Same Principles apply to all types of stencil cleaning-paste, silver epoxy, adhesives



Simple but Ignored

We can ignore
reality, but we
cannot ignore the
consequences of
ignoring reality.

Ayn Rand



Stencil Cleaning-

A practical approach to improving yields and maximizing your through-put

Q&A Session

Please type questions into the chat

Thank You!

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