

The Road To ZERO Defects ~ Printing

Surface Mount Technology

In Process Contamination



In Process Contamination

Does Contamination exist ? **YES**

Why does it exist ? *Open floor environment*

Can it be controlled ? **YES**



In Process Contamination

Where does it exist ?

- **Boards**
- **Stencil**
- **Environment**

Why do contaminants exist?

- ❖ *SMT lines are not in “Clean Room” dust free areas*
- ❖ *PCB’s often supplied stacked, sealed in plastic film*
- ❖ *PCB’s may be individually wrapped in tissue paper*
- ❖ *Stacked PCB’s on separation generate static*
- ❖ *PCB’s have raw sawn edges – Epoxy Dust*
- ❖ *PCB’s constructed from Glass fibre – loose fibres*
- ❖ *Stencils from storage*
- ❖ *General risk from operators – hairs & clothing fibres*
- ❖ *Working environment*

The Surface Contaminants

❖ Process

- ❖ Glass fibre strands ~ Snap outs
- ❖ Epoxy dust
- ❖ Packing fibres
- ❖ Loose resist

❖ Production Area

- ❖ Human hair and skin flakes
- ❖ Clothing fibres
- ❖ Airborne dust and pollutants

Would you add Contaminants ?



Take a new pot of solder paste

Mix in

- Some hair
- Some glass fibre dust
- Some clothing fibres
- Some airborne dust

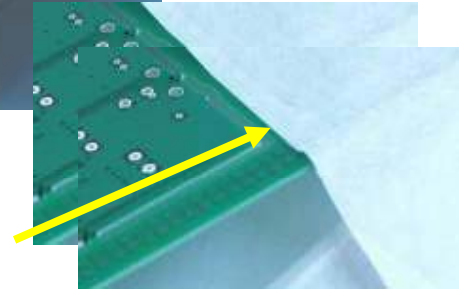
Or is this a recipe for printing disasters ?

“printing onto contaminated boards has the same effect”

Contamination from ~ board packaging



*Plastic outer +
Individual paper*



Boards are insulators ~ typically shrink wrapped in plastic film or individually wrapped in tissue paper > on unpacking, static is generated becoming a magnet for attracting contaminants

Contamination from ~ board packaging

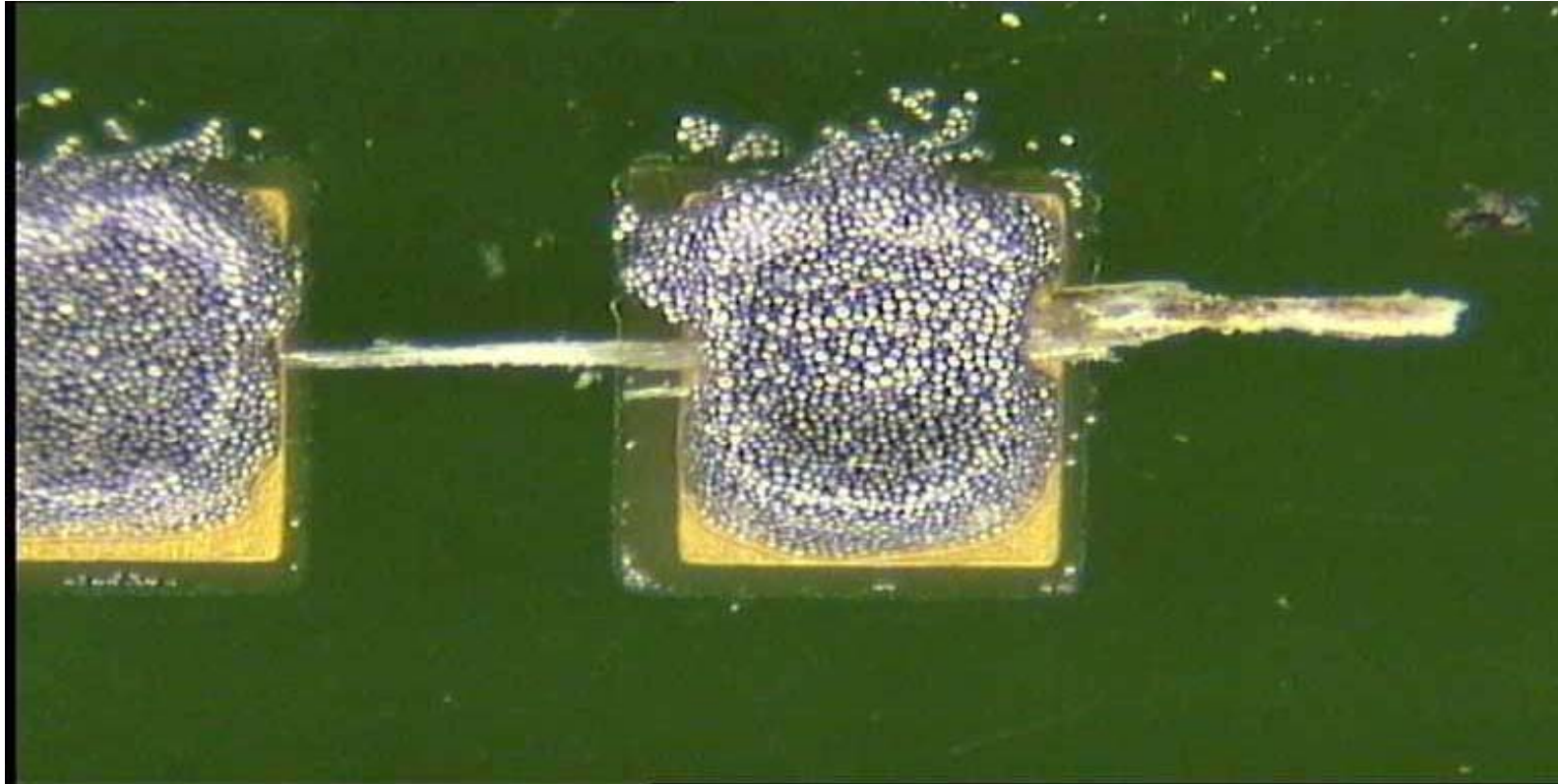
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Contaminants Introduced

- ❖ *Glass fibre strands ~ Snap outs*
- ❖ *Epoxy dust*
- ❖ *Packing fibres*
- ❖ *Loose resist*

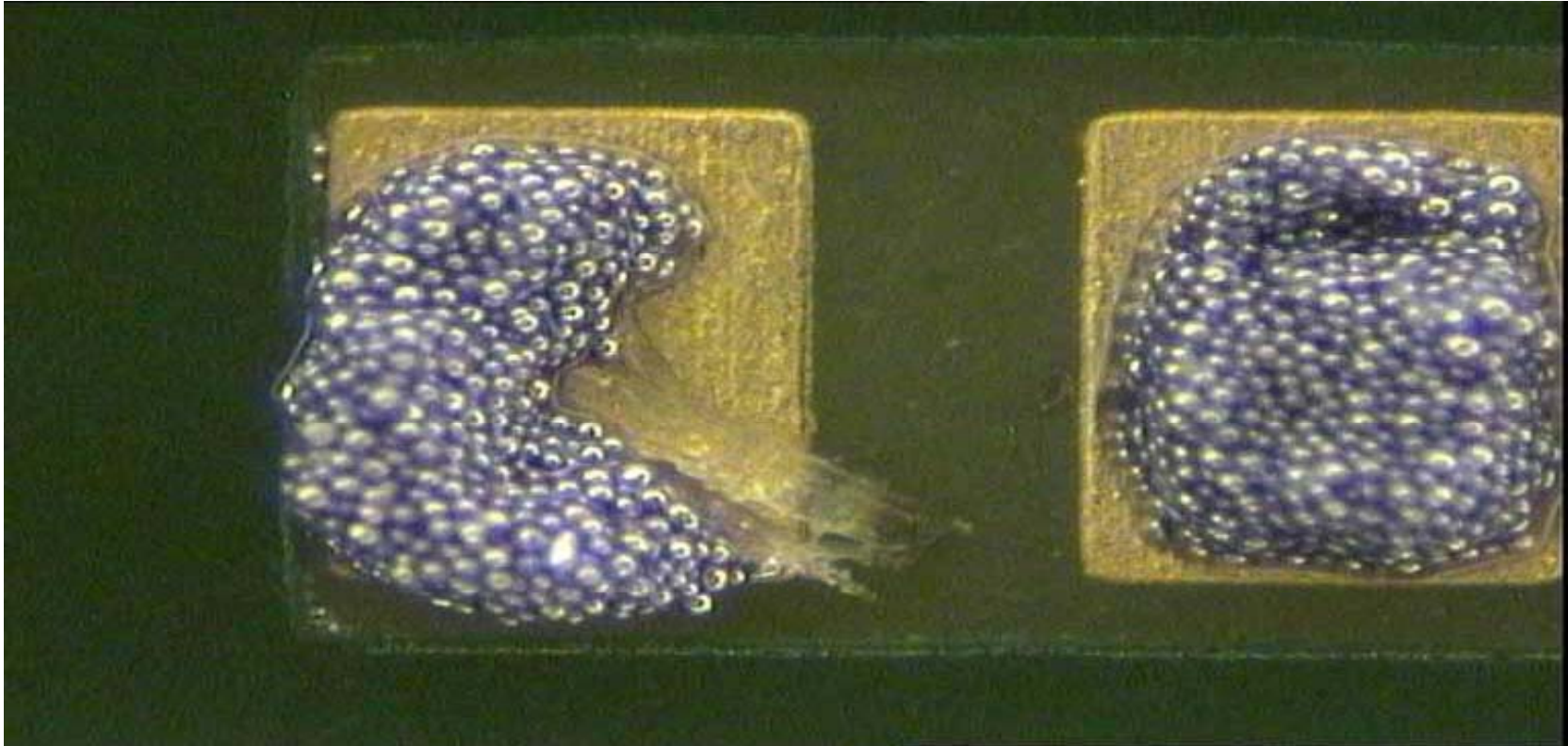


Contamination from ~ glass fibre splinter



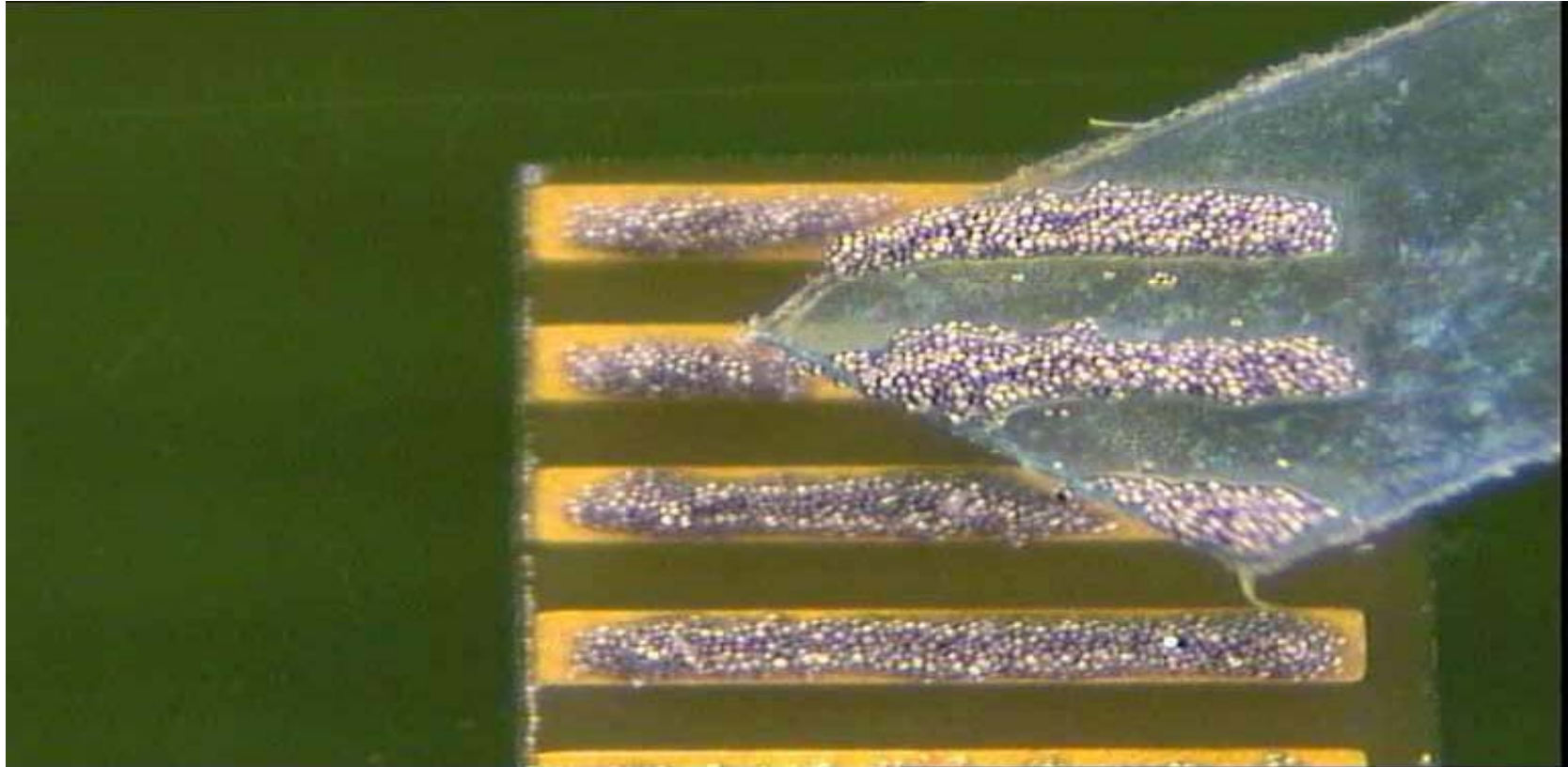
Glass fibre splinter on an 0603 pad, results in a poor board > stencil gasket ~ misprint risks are solder balls and a tomb stoned joint

Contamination from ~ glass fibre swarf



Glass fibre swarf deflects the printed deposit on an 0402 pad resulting in poor joint integrity plus tomb stoning risk

Contamination from ~ loose solder resist



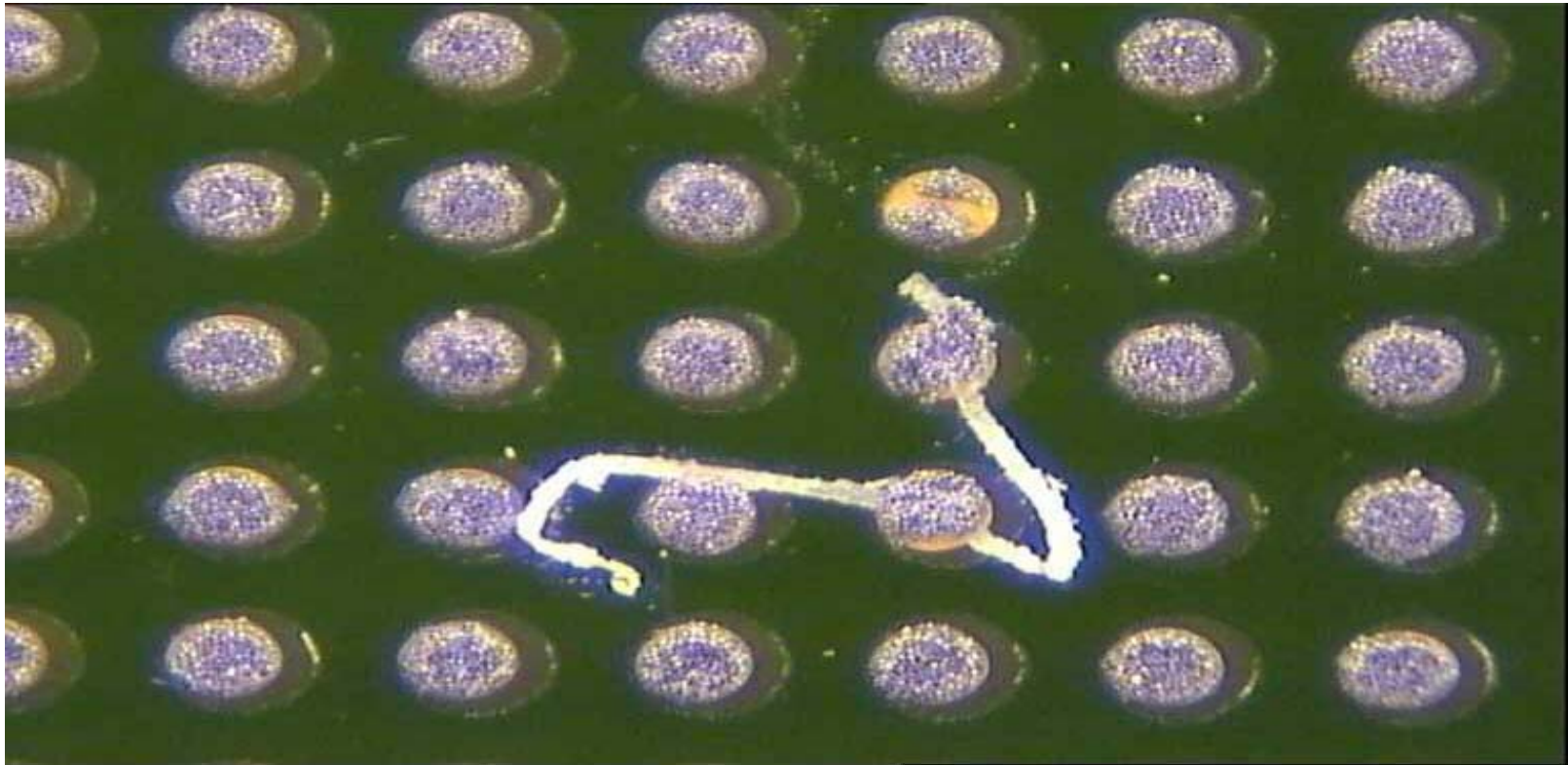
Solder paste is printed onto a piece of loose resist film masking the QFP pads ~ what happens when the paste reflows?

Contamination from ~ epoxy dust



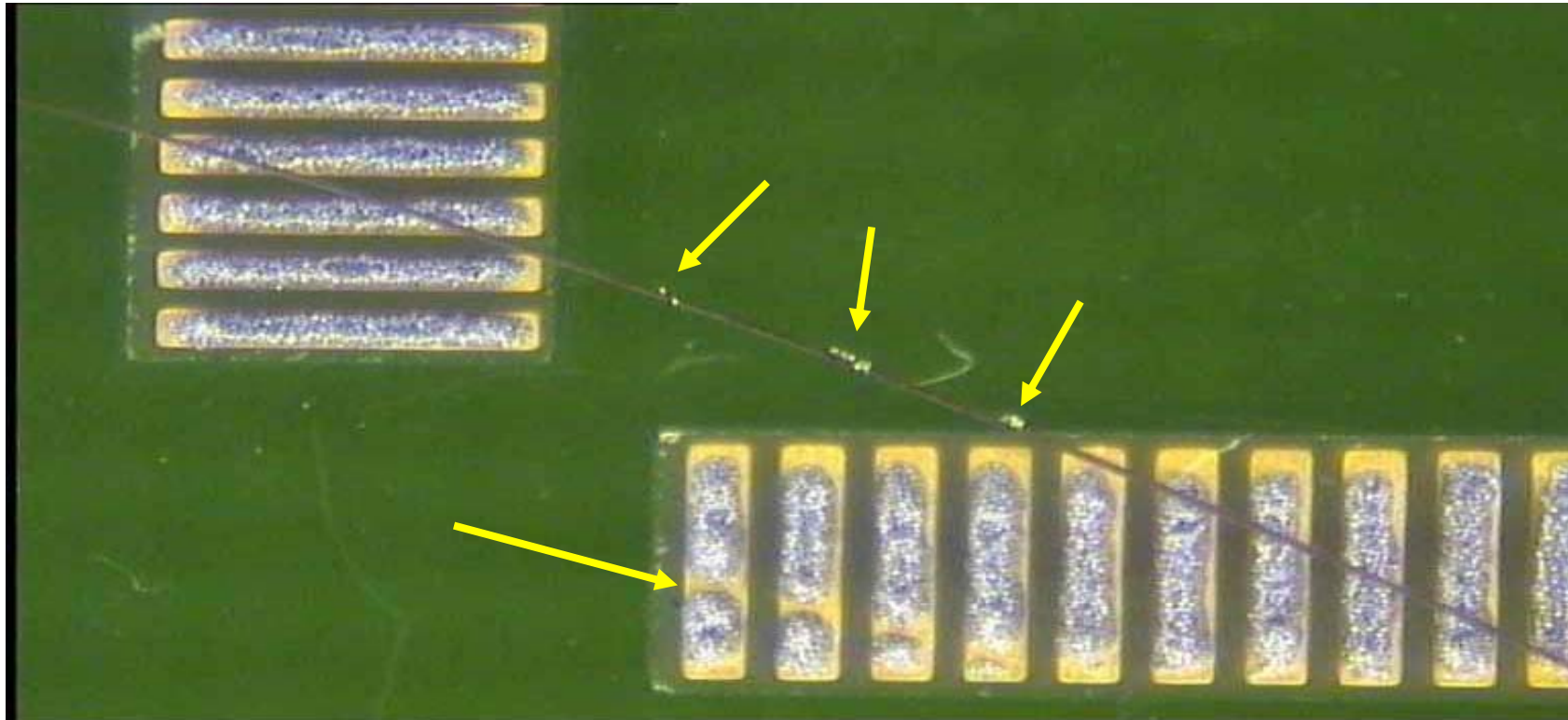
**Epoxy dust and clothing fibre contaminate the pad areas of a BGA
risk to joint integrity**

Contamination from ~ clothing fibre



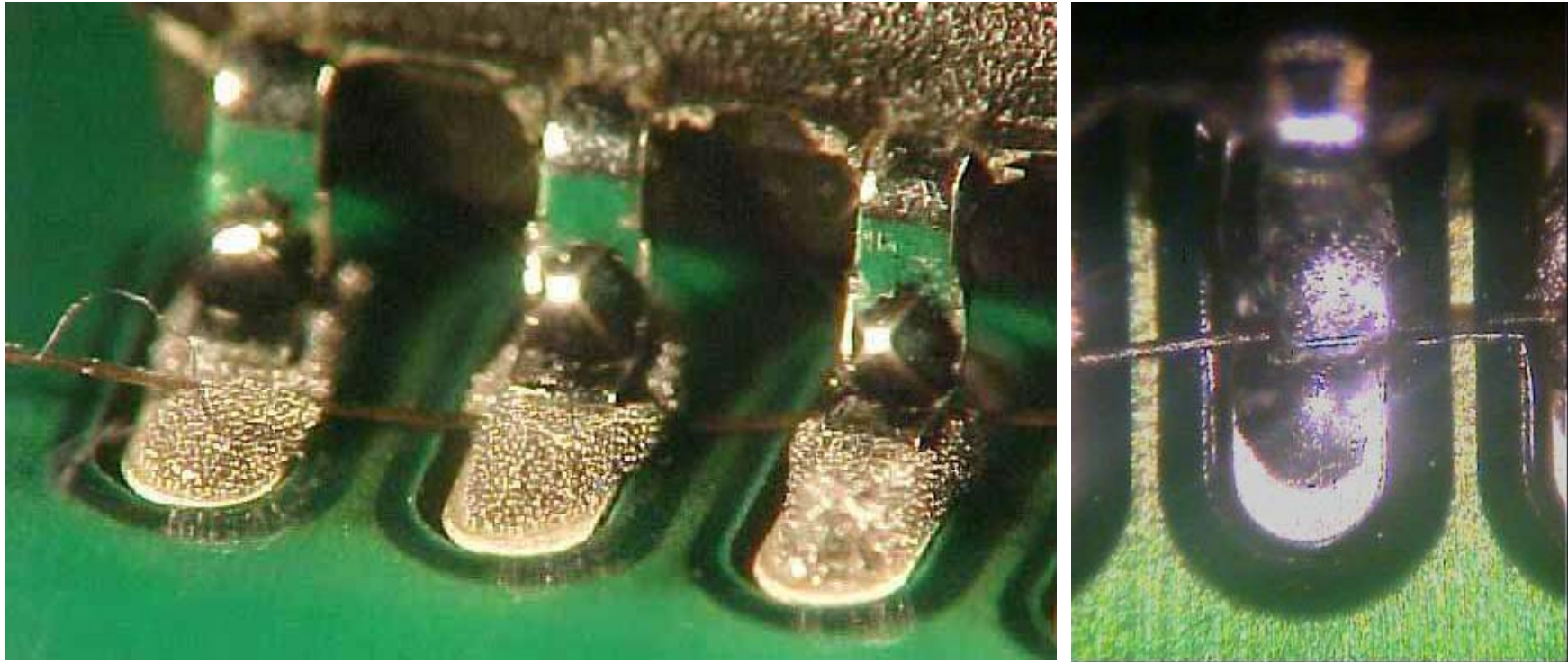
During “print” the clothing fibre was trapped on the upper pad, on separation the fibre springs back pulling paste from the pad

Contamination from ~ human hair



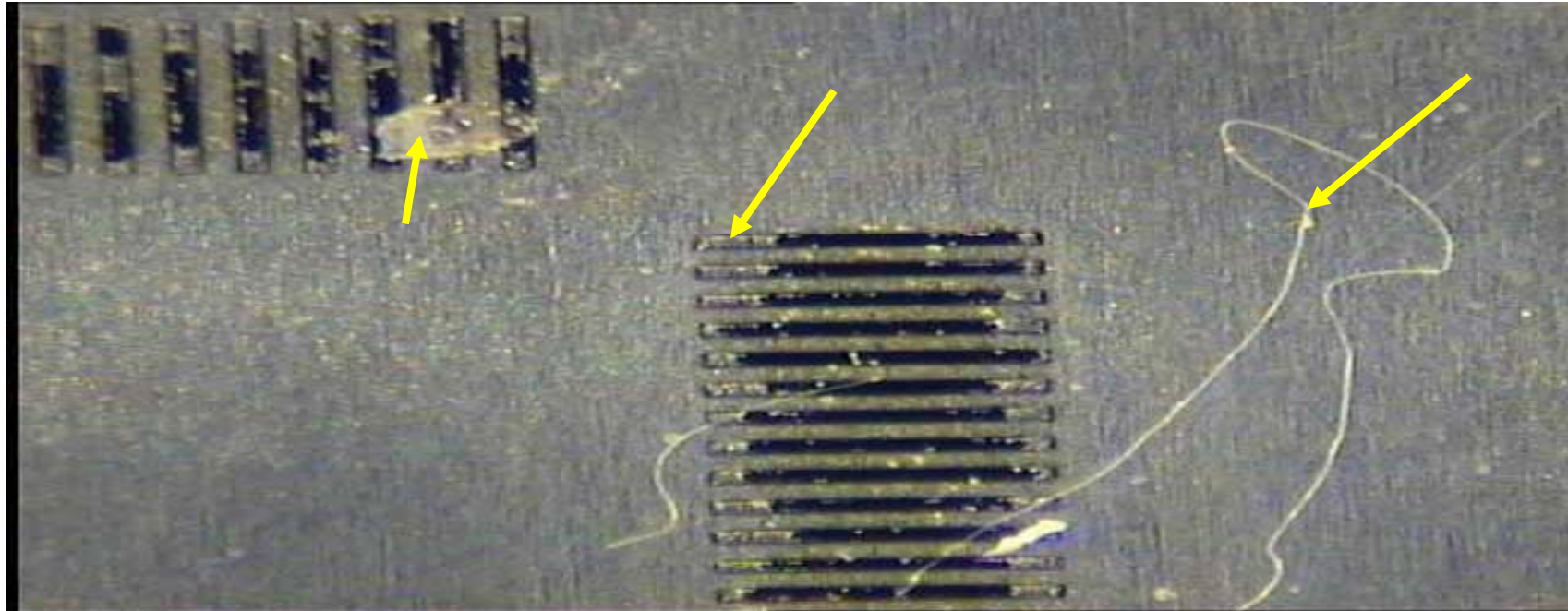
At “print” the hair was sitting on the QFP pad, on separation it is moved by the stencil . Risk of floating solder balls under the QFP and contamination caused to underside of stencil.

Contamination from ~ human hair



**A human hair links the pads of a an SO device deforming the “print”
Hairs remain within the soldered joint after reflow ~ joint integrity**

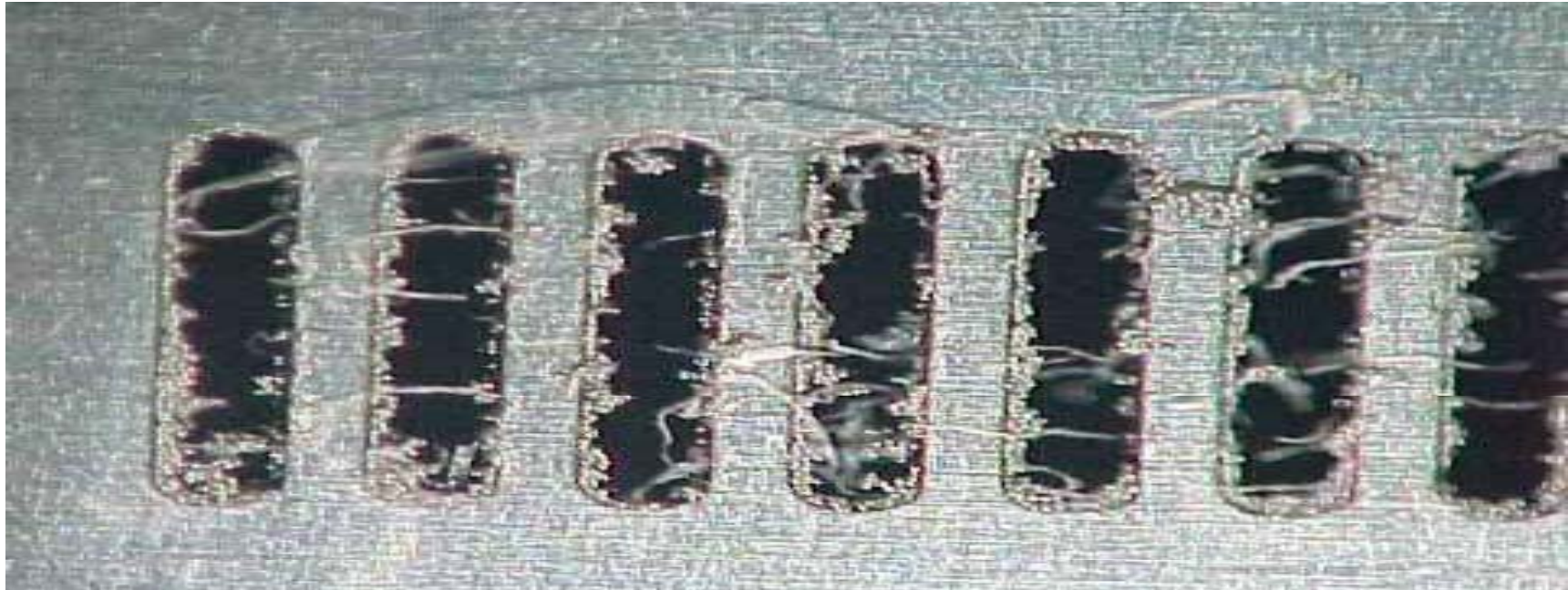
Stencil contamination ~ fibres & hair



A piece of glass fibre swarf blocks apertures causing stand off and poor paste release from adjoining apertures.

A human hair is attached from flux bleed.

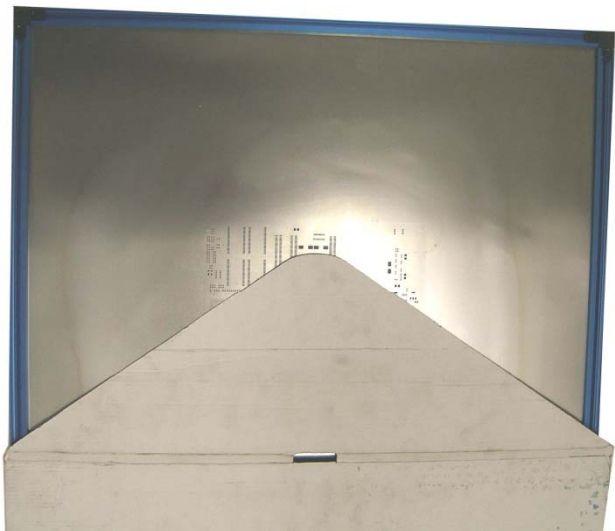
Stencil contamination ~ lint fibres



Fabric lint & fibres attach to the underside of a stencil causing poor gasketing and incomplete paste release

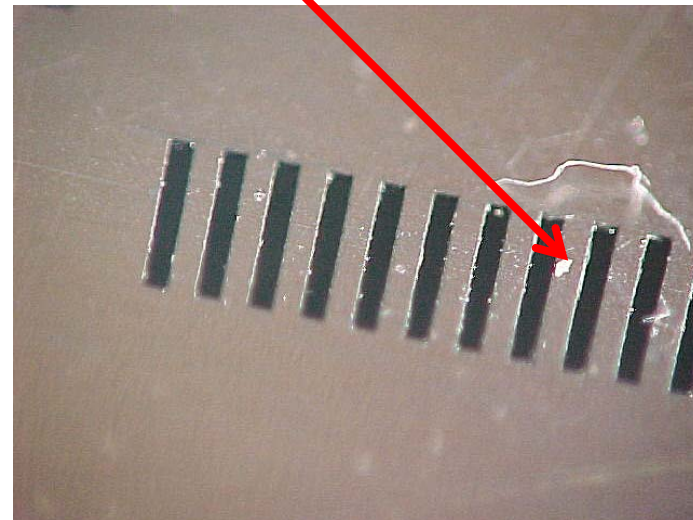
Contamination from ~ stencil storage

Stencil Storage is often in cardboard boxes / sleeves



Risk of shaving

Risk of loose particles



Contamination removal solution

1



High surface energy Polymer Roller lifts and holds "loose" surface contaminants



2

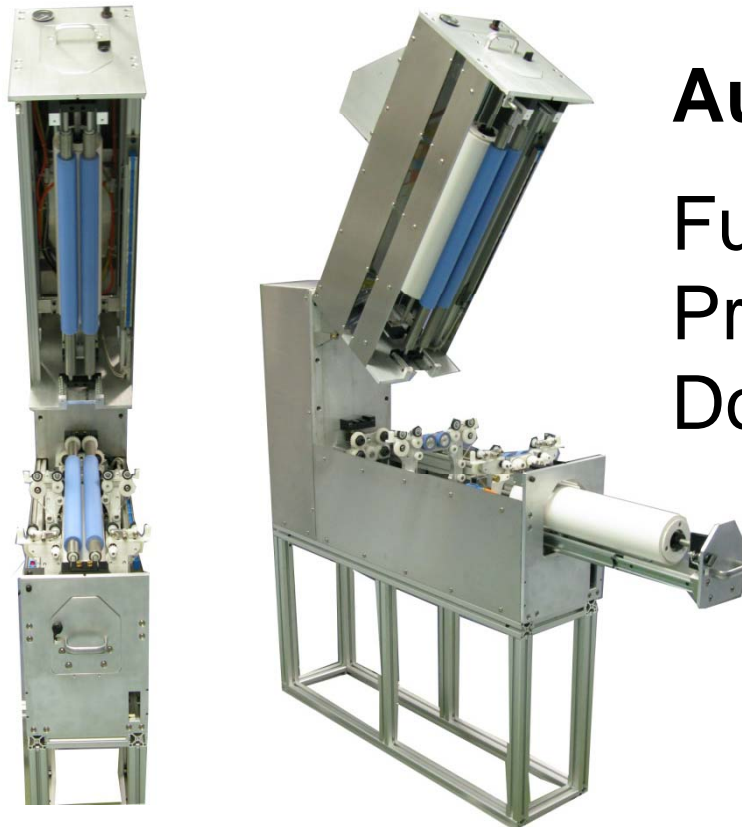
Transfer contaminants onto adhesive backed paper that traps the contamination and cleans the Elastomer.



Contamination removal solution



Manual : Table Top Cleaning Centres
with hand rollers & pads

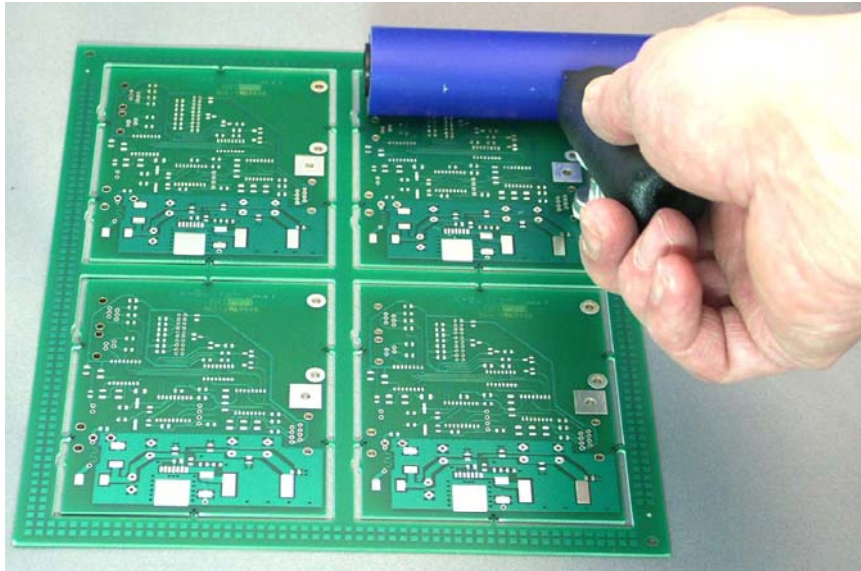


Automatic: In Line pass thru
Fully integrated to printer
Programmable functionality
Double sided / Top side only clean



Contamination removal solution

Manual : Table Top Cleaning Centre



Transfer trapped
contaminants onto
adhesive pad

Pull roller over board
prior to printing or placing
boards into cassette



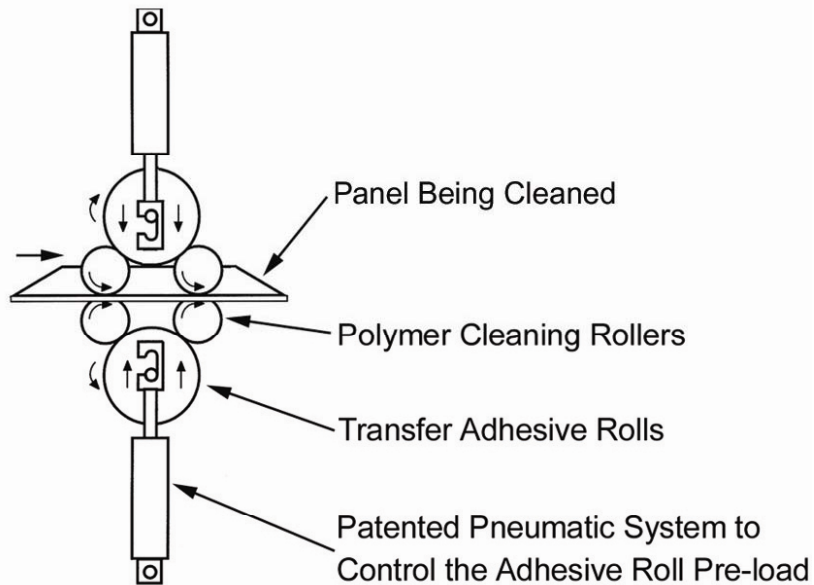
DUST REMOVAL SYSTEM

caution: do not leave ro



Contamination removal solution

Automatic



➤ **PCB** enters on infeed conveyor

➤ **Polymer Roller** lifts off the loose surface contaminants

➤ **Contaminants transferred to the Adhesive roll**

➤ **Static Elimination device** removes any static on PCB

Double sided or Top side only cleaning

Contamination removal solution

Automatic



- ✓ Easy Access
- ✓ Fully Programmable
- ✓ PCB tracking
- ✓ Warning Alarm
- ✓ SMEMA interface



Contamination Removal & Trapment

Automatic

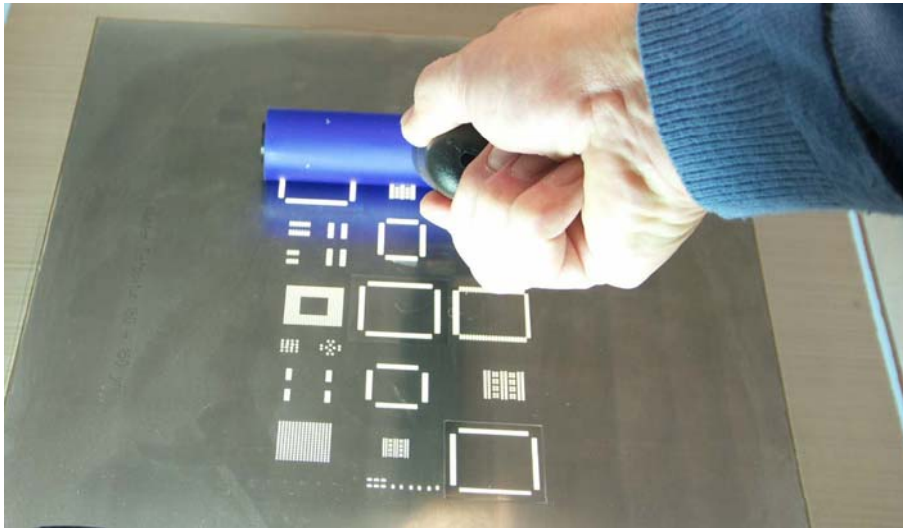


Examine the Evidence

- *Contaminants are trapped on adhesive*
- *Contaminants can be identified*
- *Edge bands indicate dirty conveyor belts*
- *Quick & Easy replenishment of adhesive*

Contamination removal solution

STENCIL ~ Manual Table Top Cleaning Centre



Transfer trapped
contaminants onto
adhesive pad

Pull roller over stencil
(both sides) prior to
inserting into printer



benefits of pre-cleaning...

- ✓ **Ensures a clean surface for printing**
- ✓ **Improves solder joint integrity**
- ✓ **Reduces frequency of Under Screen Cleaning**
- ✓ **Ensures better stencil to board gasketing**
- ✓ **Reduces rework**
- ✓ **Improves End of Line Yields**
- ✓ **Ensures starting with clean stencil**



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Can it be controlled ? **YES**

