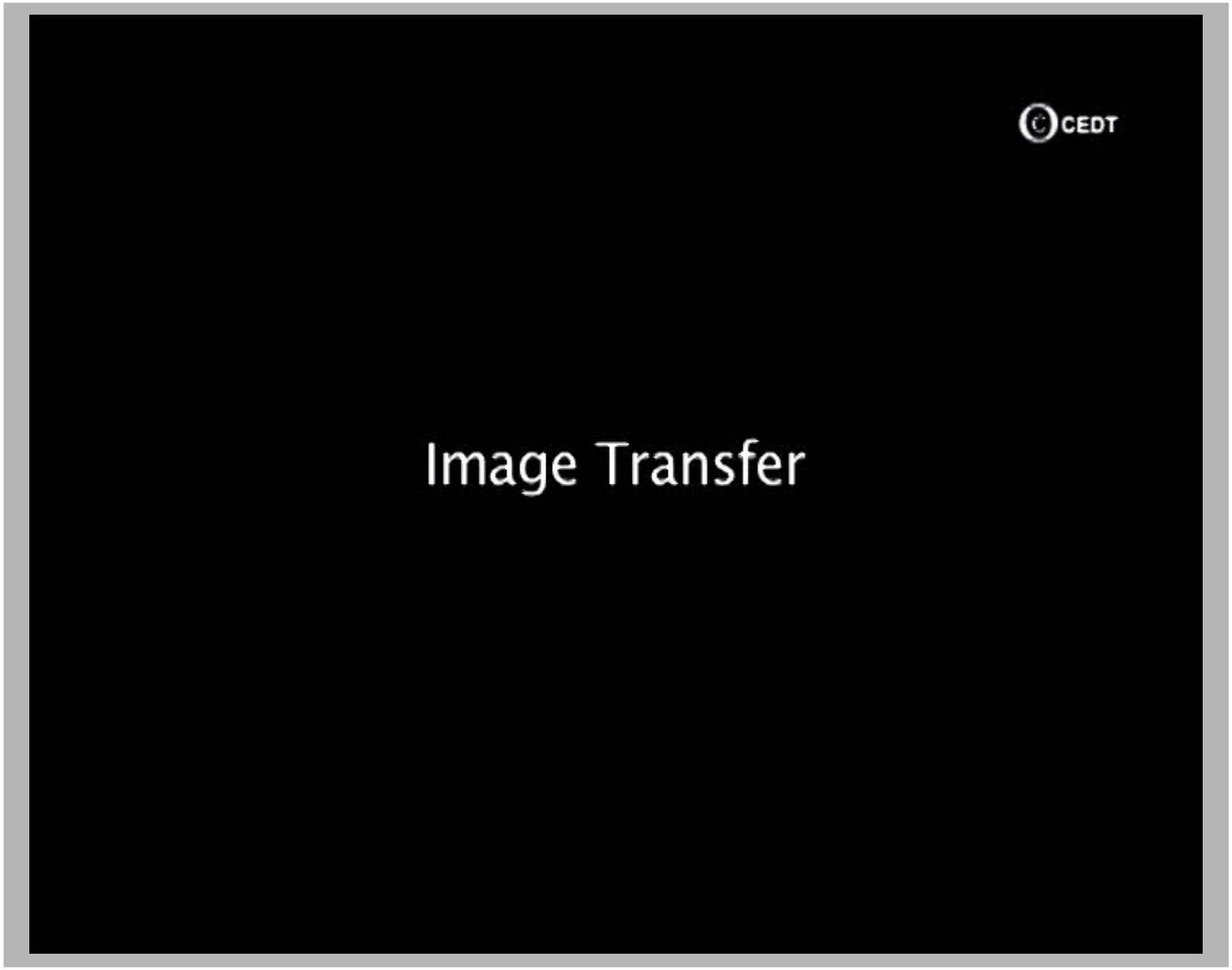
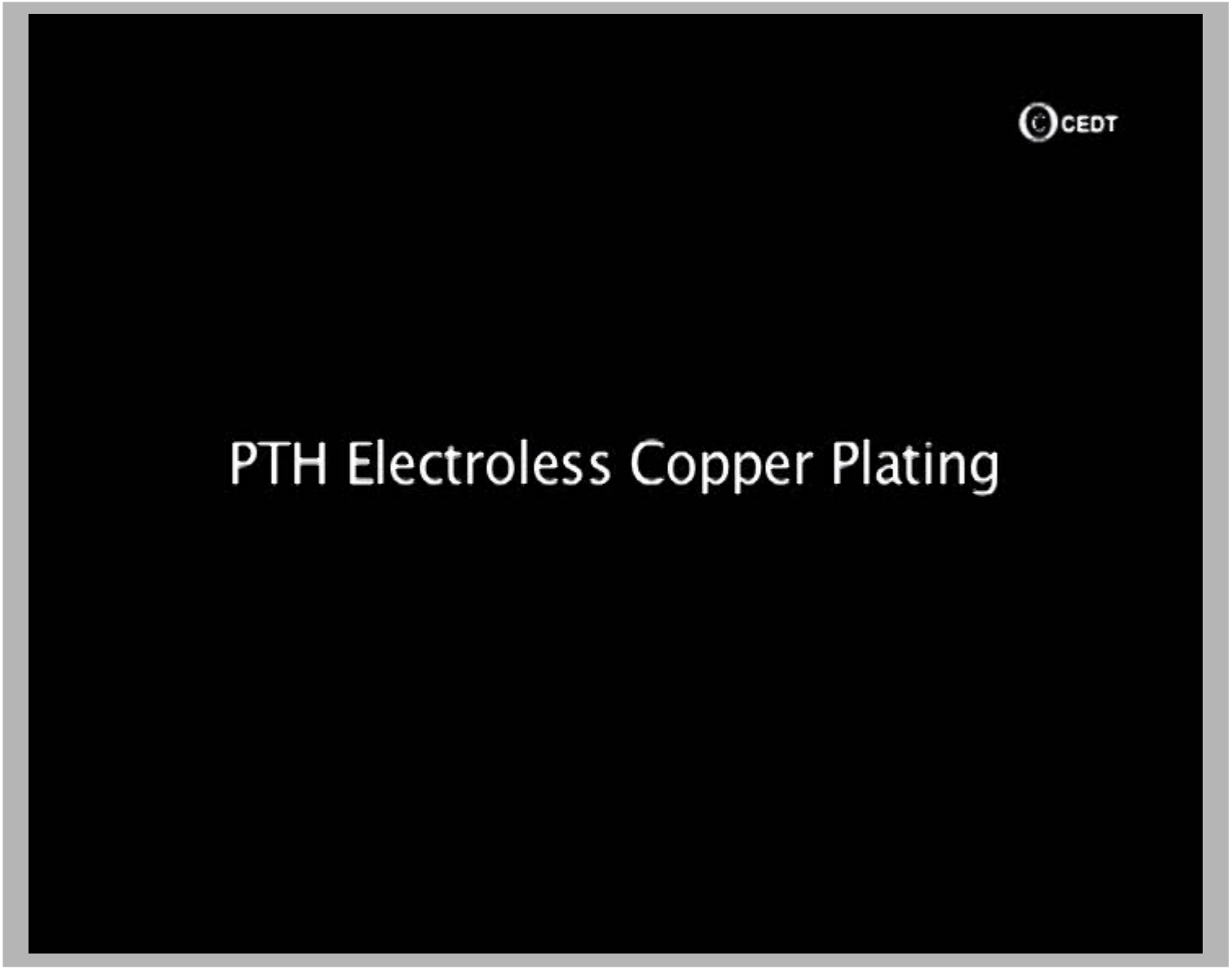
Continuing..

PRINTED WIRING BOARD TECHNOLOGIES



1

Video highlights-PTH process sequence- complete steps



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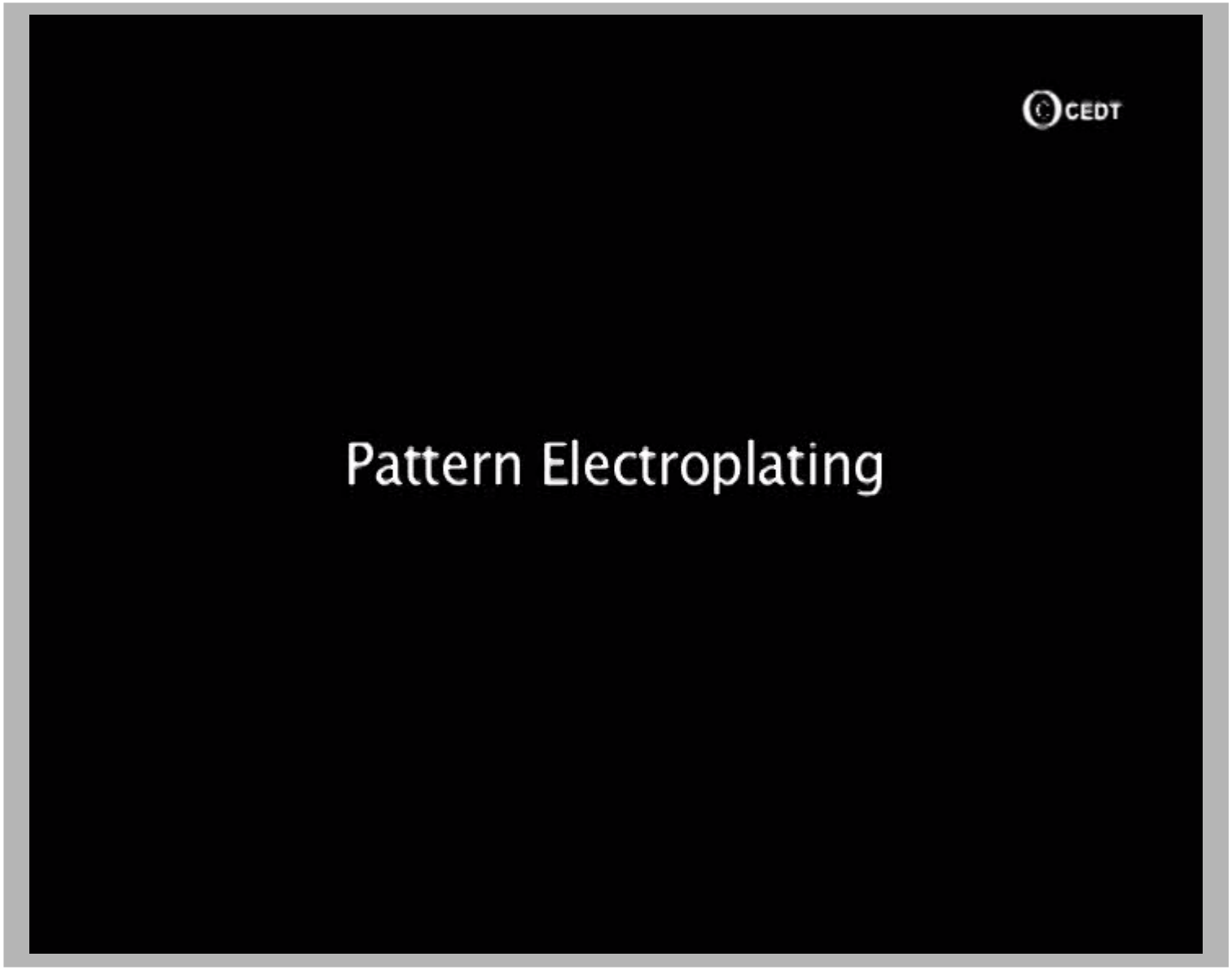
Video highlights-PTH process sequence- complete steps

3

Video highlights-PTH process sequence- complete steps



4

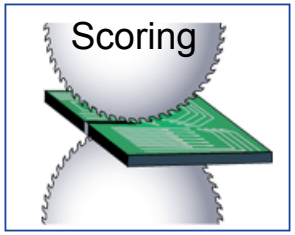
Video highlights-PTH process sequence- complete steps

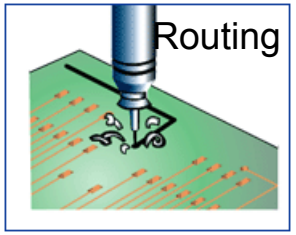
5

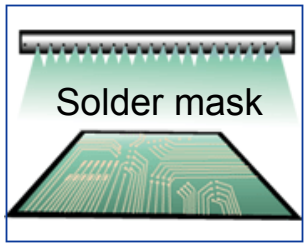
Video highlights-PTH process sequence- complete steps

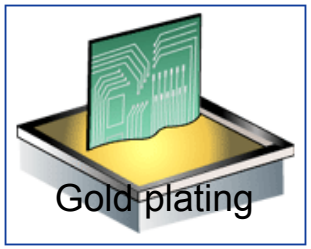
Post operations

1. Quality Inspection (at all stages)
2. Solder Masking
3. Legend printing
4. Scoring and Routing
5. Edge chamfering
6. Bare board Testing
7. Packaging/Shipping










CEDT
PWB Microsectioning


©CEDT
PWB Microsection Polishing

Solder Masking On Bare Copper - SMOBC

Tin is not a good base for applying Solder Mask

Steps for SMOBC

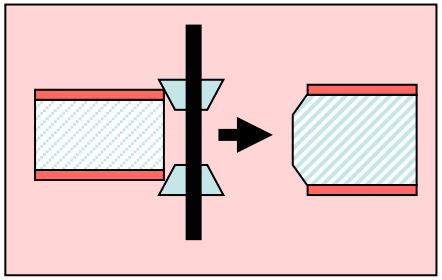
Plug all PTH holes…tenting or Screen ink
Chemically strip TIN metal till the underneath Cu is exposed
Treat the exposed copper to convert to Black/Brown oxide
Apply Solder Mask
UV/Thermal cure

The Color of the Solder mask is generally GREEN because White **Legend Ink** is more clearly visible on a green background
[other colors are also used]

Legend Printing

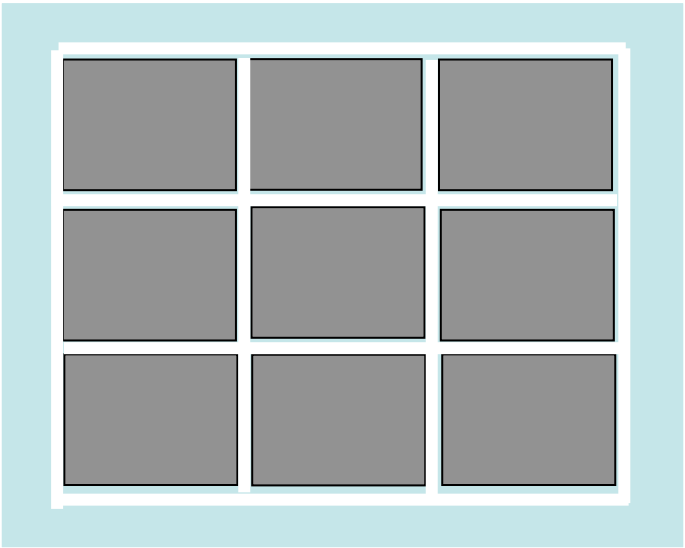
White Legend Inks on green background

Edge Chamfer



Routing

Routing is a cutting operation used to create channels as well as for creating **special cut-outs** in the board introduced by the design requirement



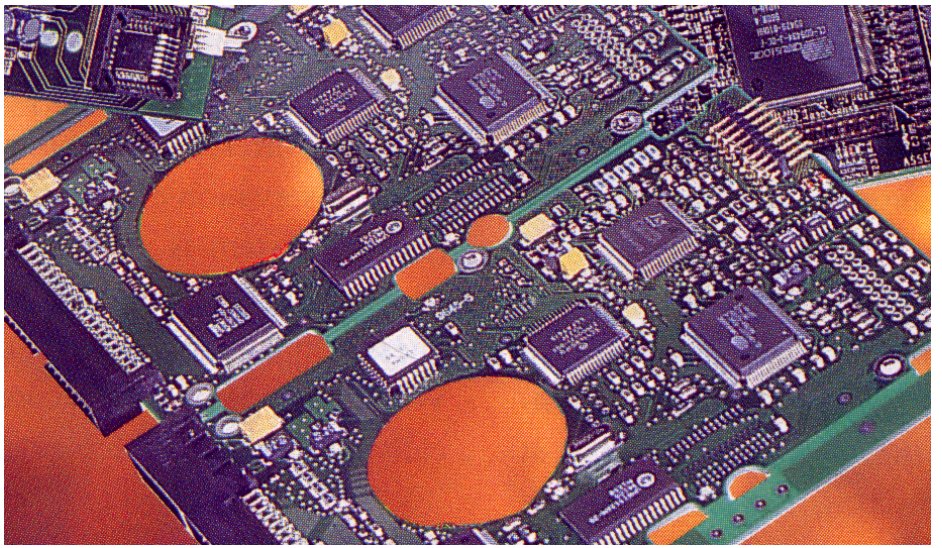
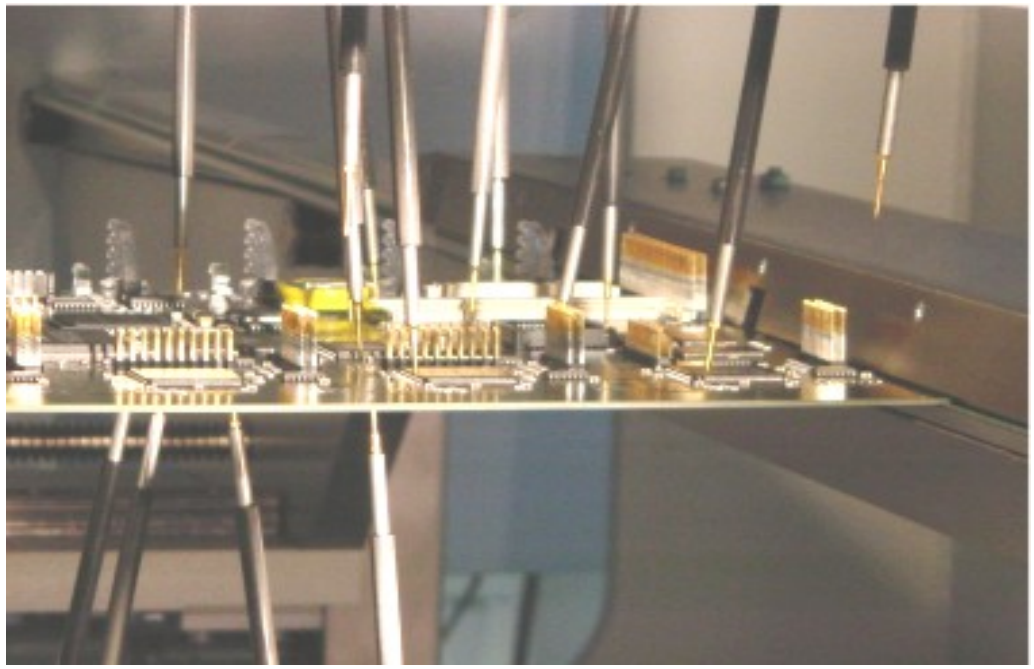


Illustration of Cut-outs in PWB

Bare Board Testing Fixture-Bed of Nails

Flying Probe Tester



Board Finishes

Solder Finish	- Electroplated Tin
Gold Finish	- Ni-Gold for planarity - ENIG

The Board is now ready for assembly

Multi Layer-Types

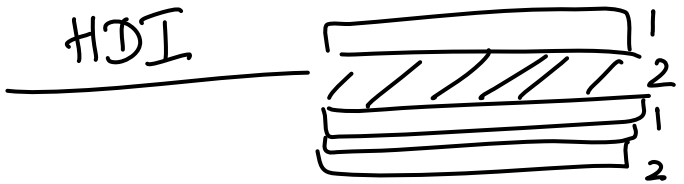
1. Laminated Multi layer Structures

Made by stacking separately made layers and Pressing them into to a mono block in a press

Called Conventional MLBs

2. High Density Multi layer Structures

Made by sequentially adding layer by layer onto a core substrate



Construction of
Laminated Multi layer Structures

Key Raw Materials:

1.	Thin Core laminates	0.5-1.50 mm
2.	Prepreg material	0.5- 1.40 mm
3.	Treated Copper foil	10-35 um

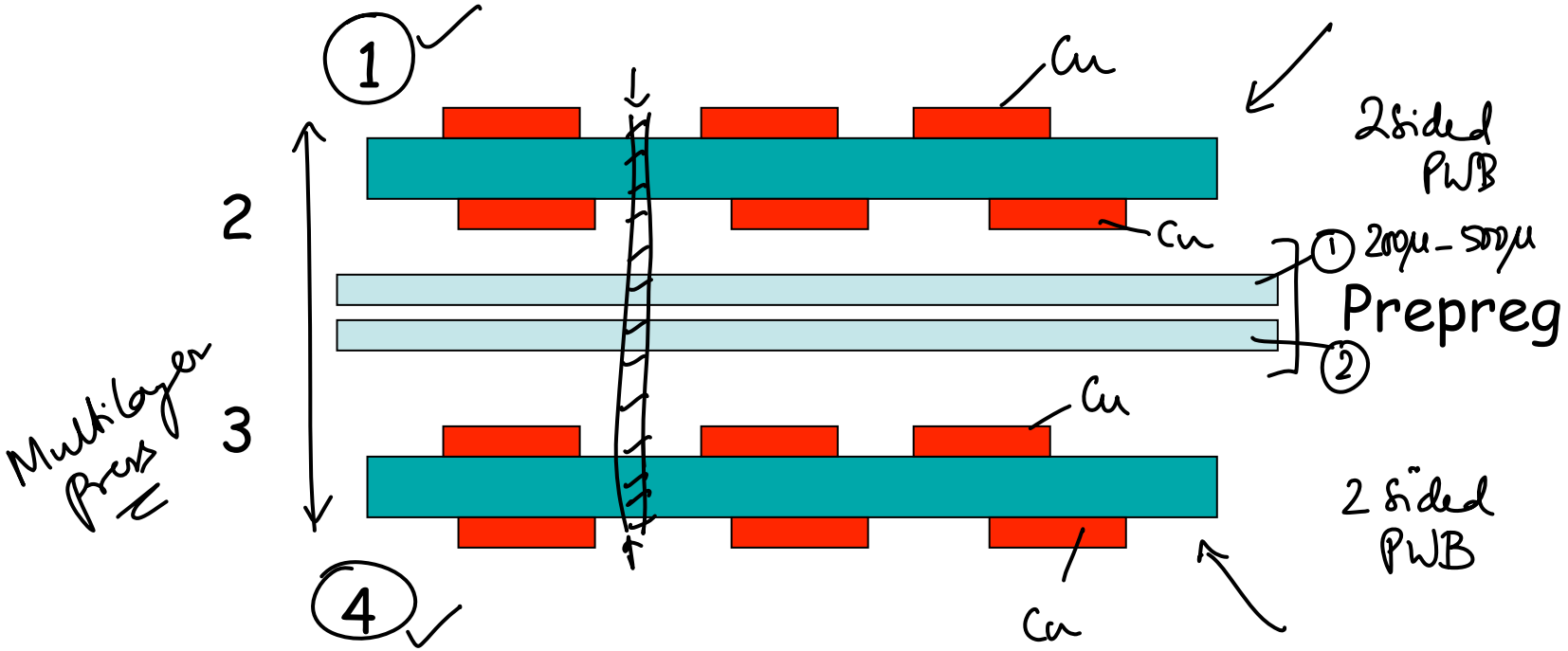
Manufacturing route options:

1. Copper foils bonded with prepreg
2. Rigid laminates bonded with prepreg

Routes for 4-layer MLB Construction

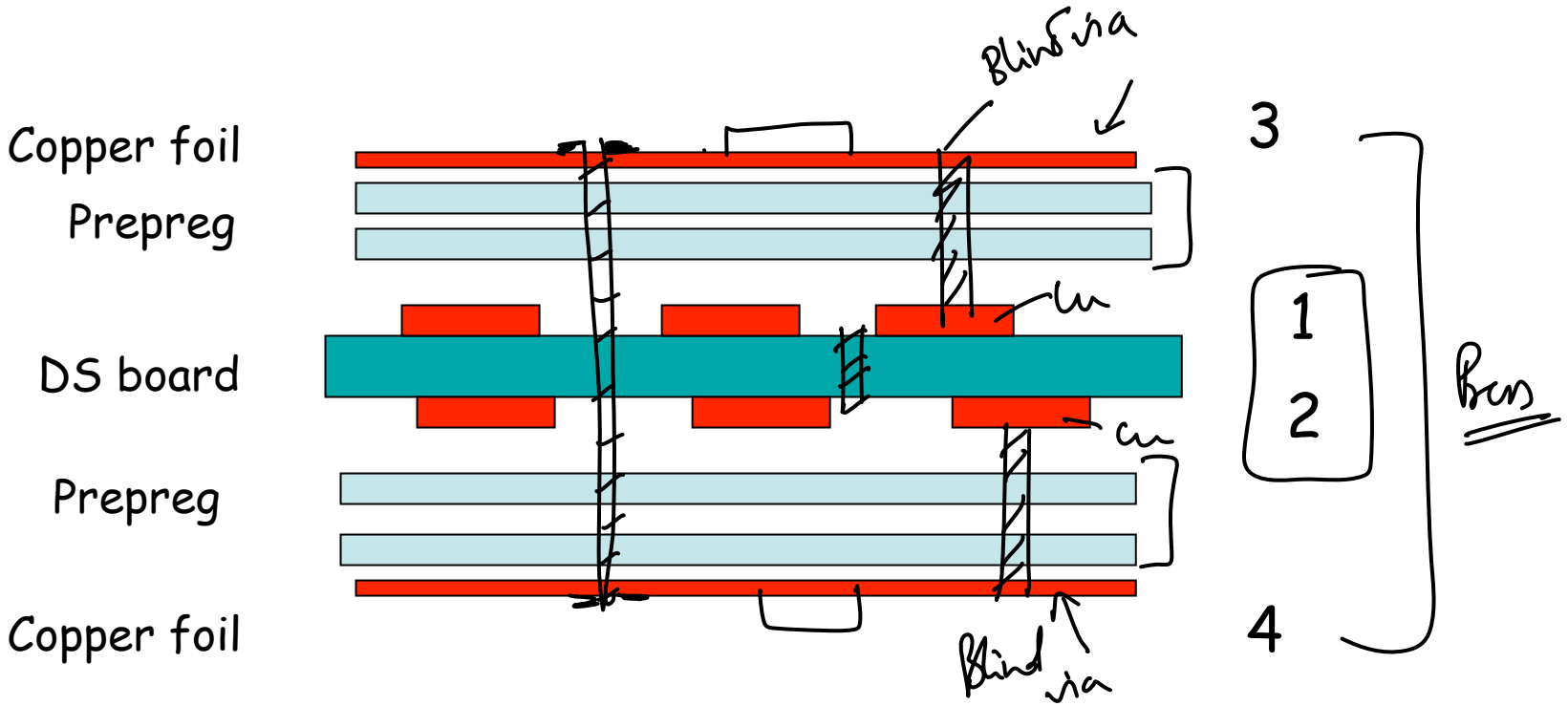
Option -1

Stack bonding two DS boards using Prepreg



Option - 2

Stack bonding a DS board and
adding copper foil for final two layers



Major Steps in 4-layer Construction

1. Process a Double sided board – on 0.80 mm core
2. Lay 0.40 mm thick prepreg on either side
3. Lay 35 microns copper on top of prepreg on either side
4. Press in a laminating press-@ spec pressure & temp. (slow process)
5. Cool to RT
6. Drill the required via holes
7. Plate through the holes
8. Pattern top and bottom
9. Post finish ✓ Sn / Ni-Au

Solder Mask
Legend Print

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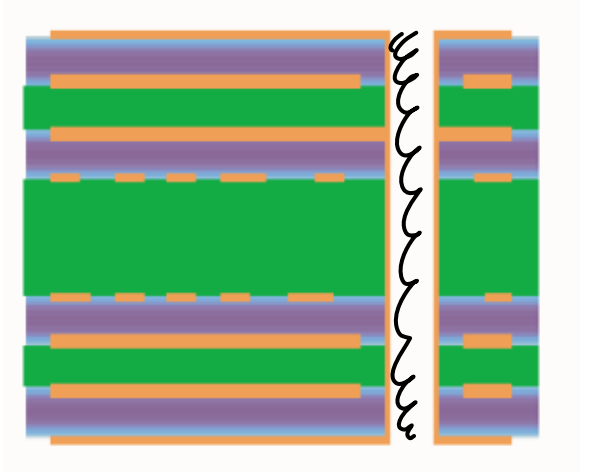
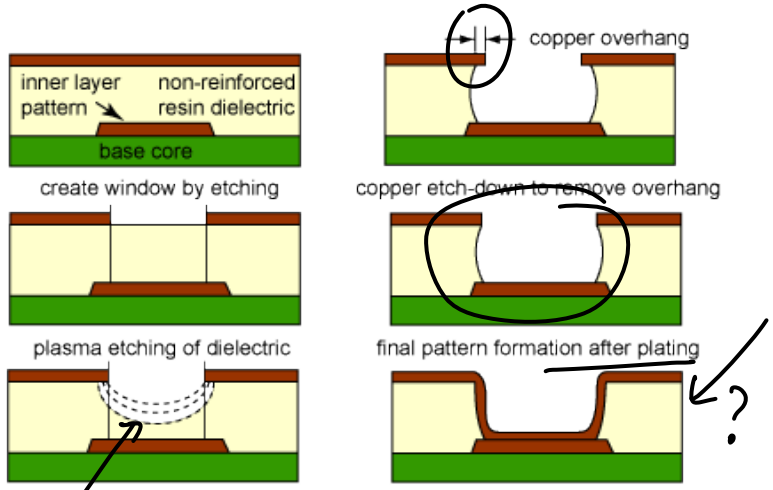
Interconnect Hole Formation



- Mechanical Drilling
  - limitations
  - 0.3mm
  - 0.2mm
  - 0.125mm
- Laser Drilling
  - YAG/CO_2 Laser
    - Excimer (UV) laser or laser ablation
- Photochemical via formation
  - liquid photo-definable dielectric layer
  - dry film photo-definable dielectric layer
- Etching: Wet etching and dry plasma

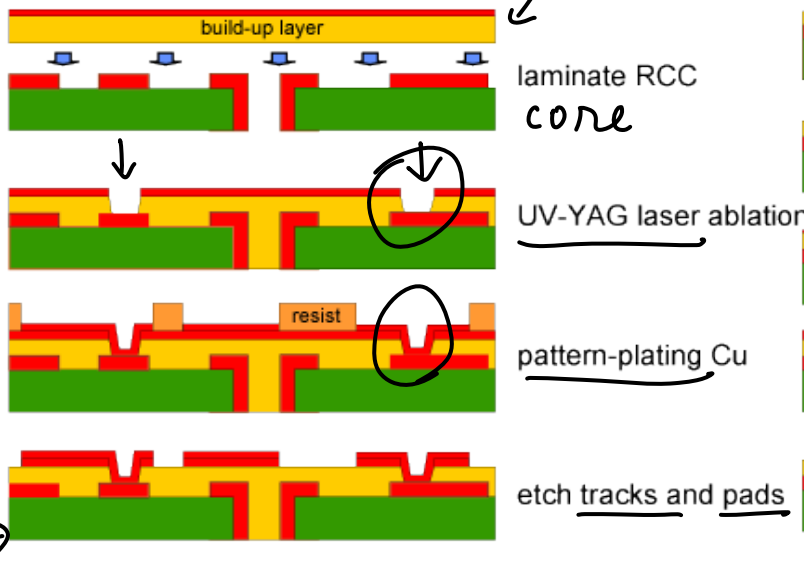
Microvias
< 150μm
< 125μm

Interconnect Hole Formation



Plasma etch and microvia

Laser drilling & SBU



Photovia formation

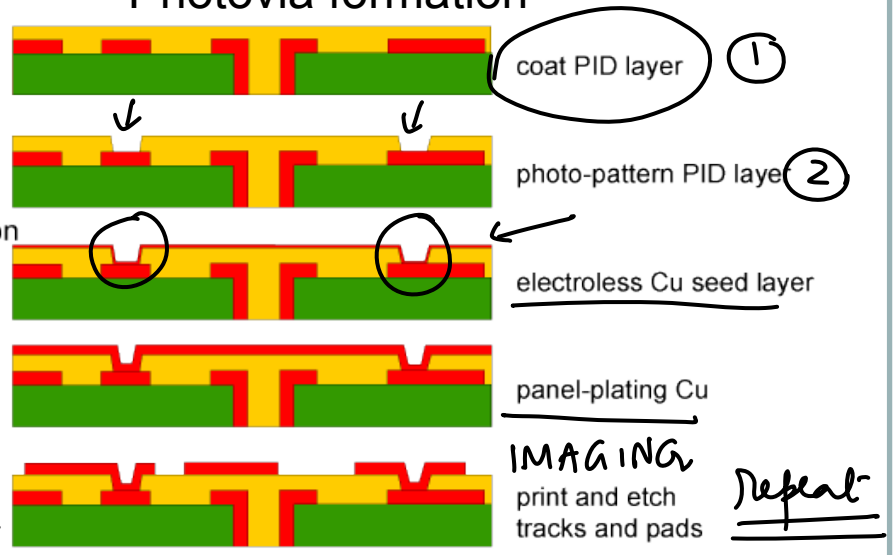


Figure Source: Dr Gerard Edwards, University of Bolton, UK

Mechanical Drilling Limitations

- Technical aspects
  - minimum hole dia ~0.15mm
  - Registration
  - Debris and smear generation
- Economical aspects ‘LOW YIELD’
  - Sequential process
  - High investment of multi-spindle machines
  - Drill bits, entry/exit foil material
  - De-burring and de-smearing
- The maximum rpm obtainable with conventional spindles has prevented the smallest diameter drill bits from operating at their most efficient cutting speeds.