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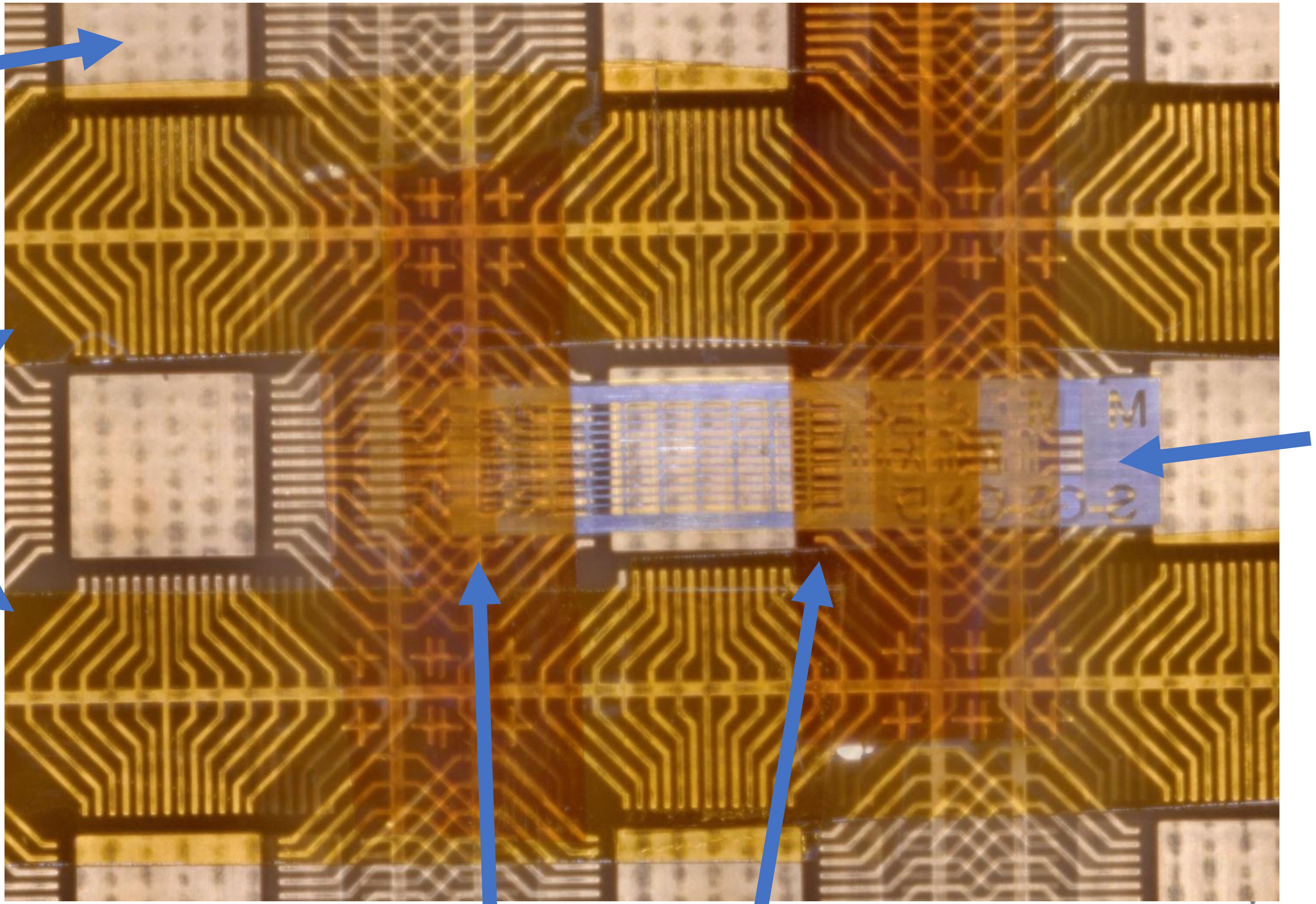
spTAB testing and preparation

James Glover

OB module: ad-hoc meeting

Mon, 6th January 2025

spTAB test set-up



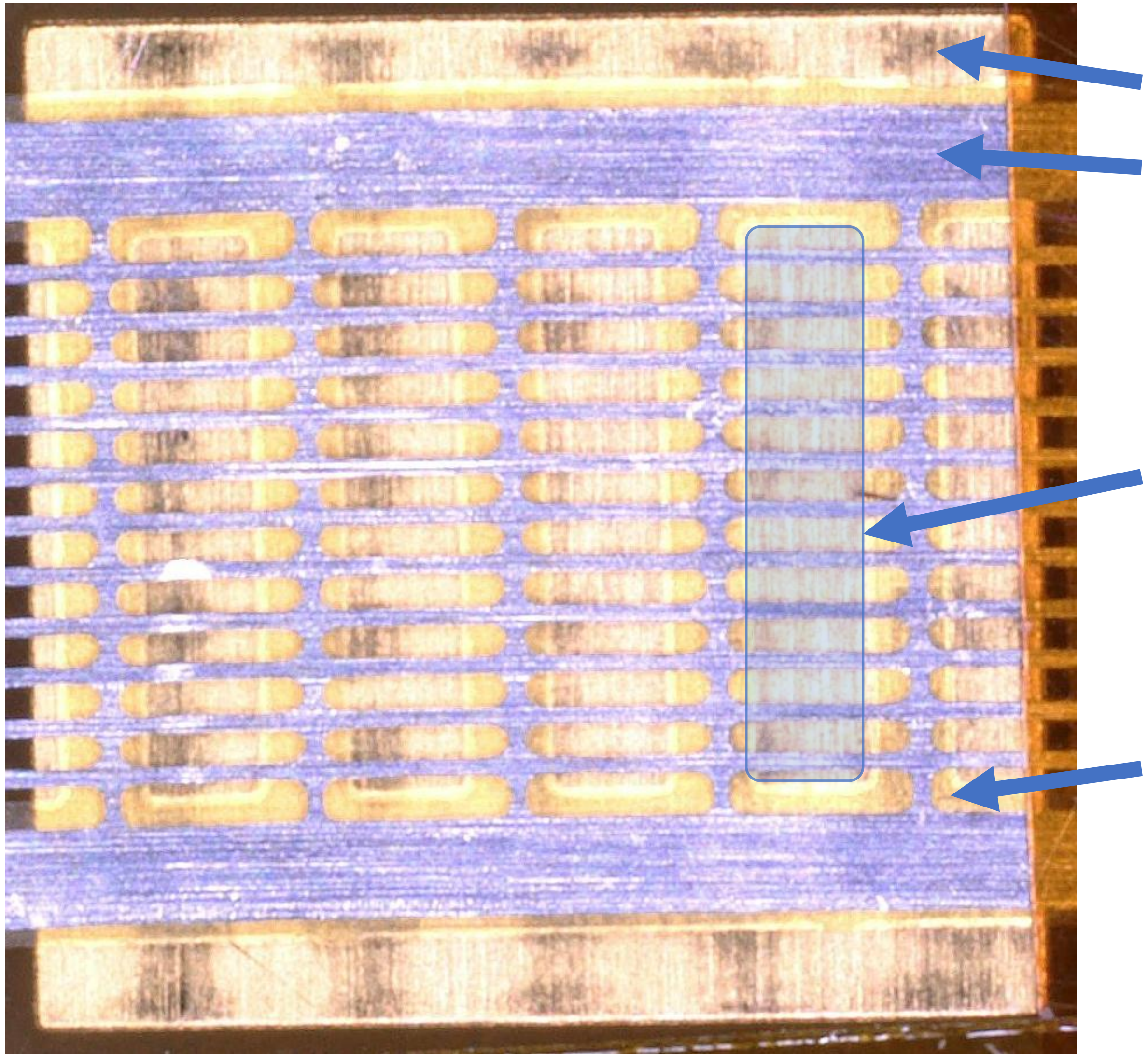
Wire bond test substrate

Kapton tape

spTAB test structure

Kapton film

spTAB test set-up (zoomed)



ENIG bond pad (on substrate)

FPC aluminium film (to bond)

Bond window

FPC Kapton support sheet

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Initial bonds

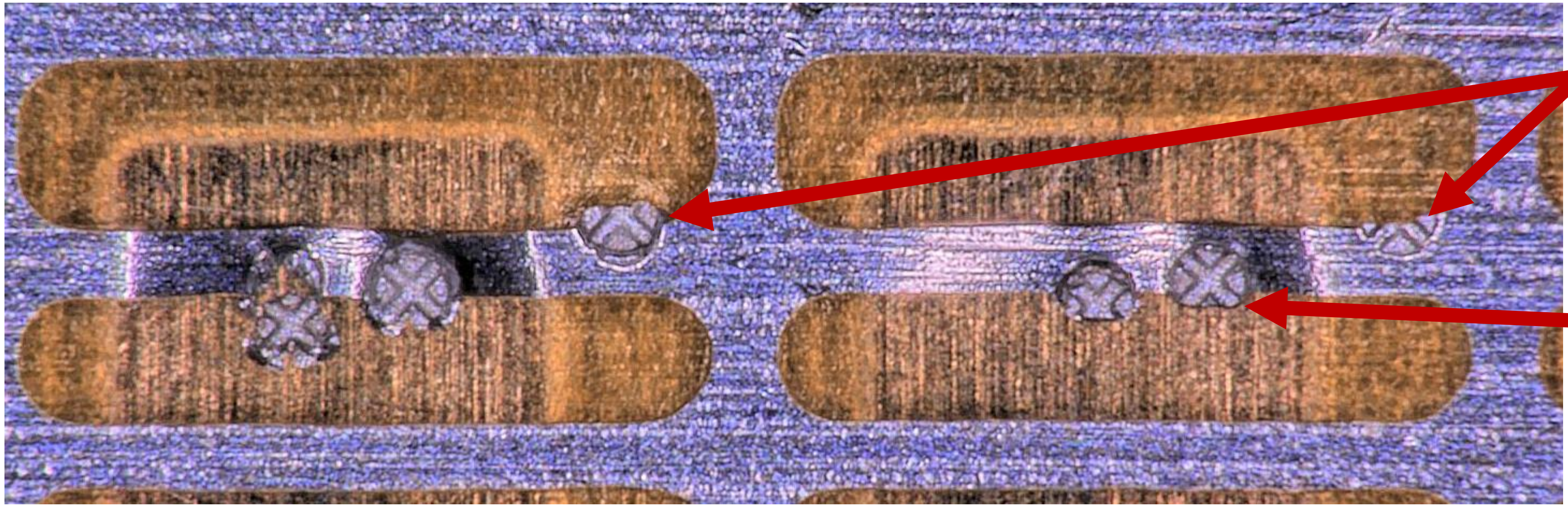
Bond machine was set up with the general 25 µm wire bonding settings:

Ultrasonic power (US): 20%

Bondforce (BF): 20 cN

Deformation: 35 µm

Duration: 70 ms



Initial bond position calibration needed work.

Uncentred due to Z-axis offset (movement of foil as it is pushed through the Kapton window).

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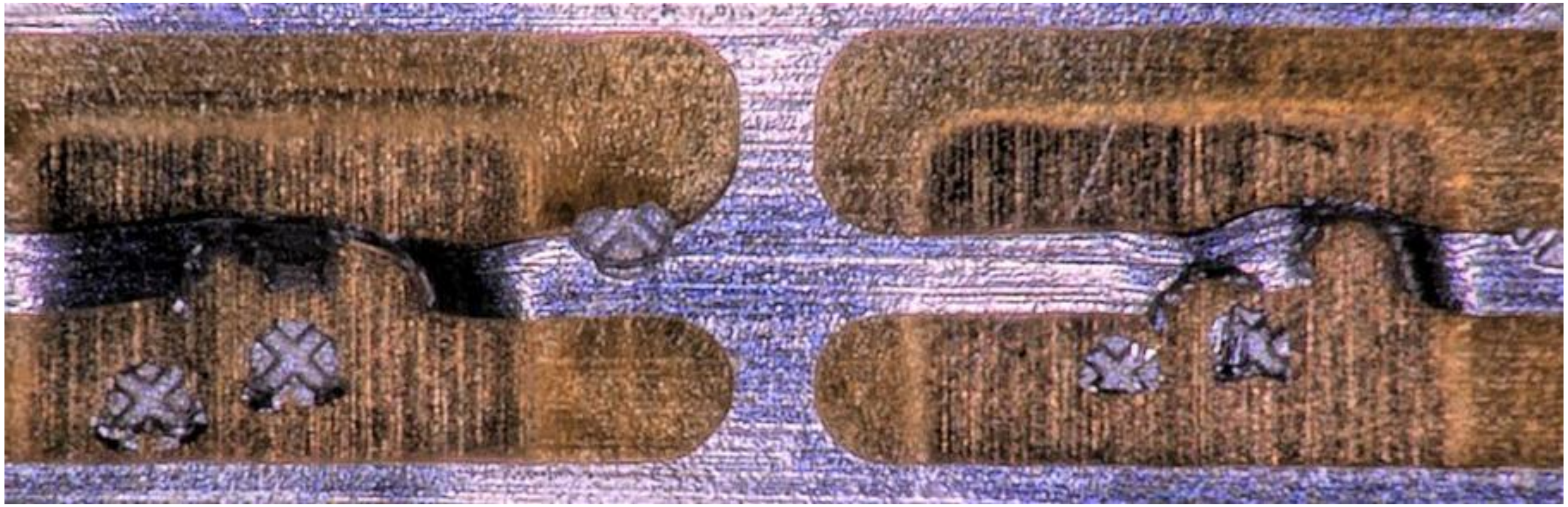
Initial bonds – failure modes

Bonds stayed on substrate and foil broke.

∴ bond strength ≈ foil strength

(crude approximation, actual testing needed)



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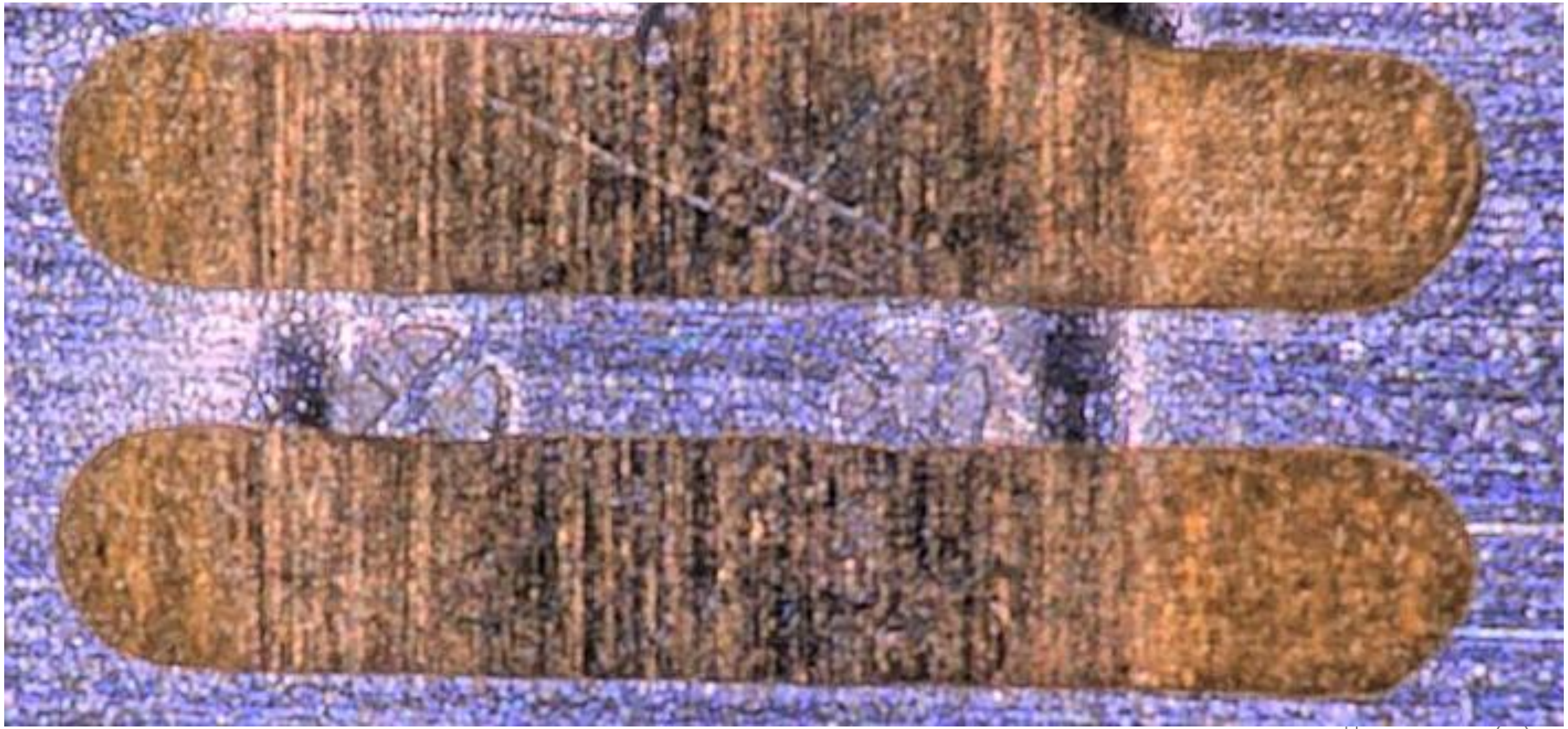
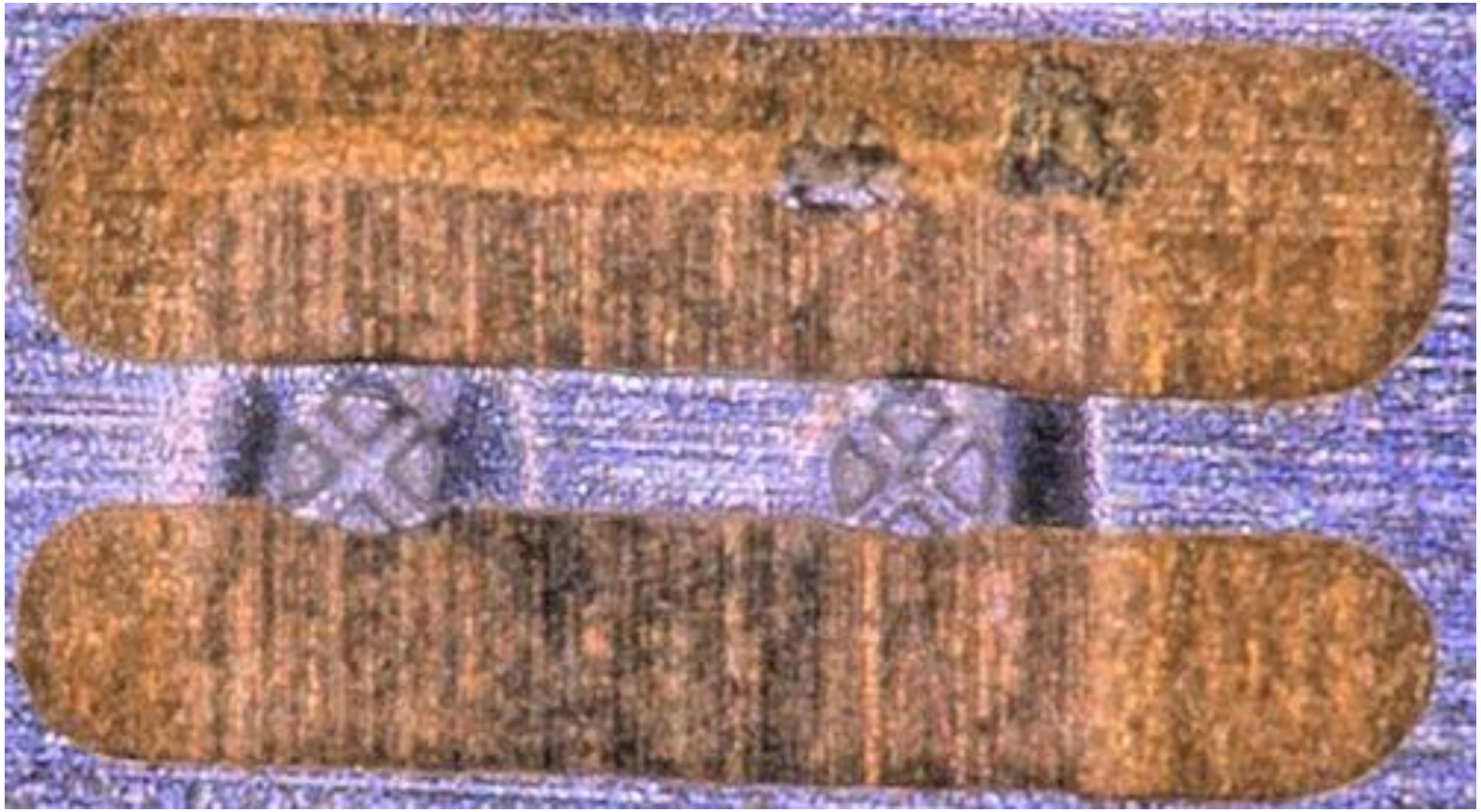
Adjusting settings (US15|BF15)

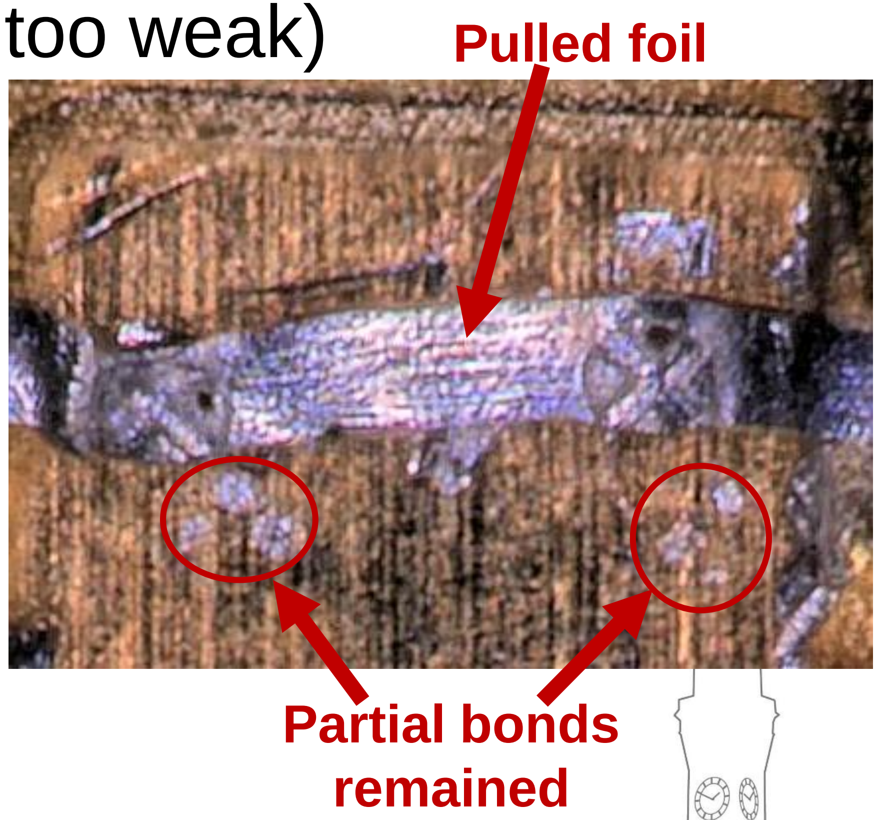
Faint bonds, foil peeled from substrate (definitely too weak).



Adjusting settings (US18|BF18)

Bonds look good, only slight foil breaks (likely too weak)





Summary

- Promising initial bond attempts.
- Representative of FPC to test-PCB bonds.
- Default machine settings (for 25 µm wire) seem reasonable.
- Height offset between substrate and aluminium foil leads to off-centre bonds.
  - Need to keep FPC as flat as possible.
  - 1st bond(s) help to hold the FPC down (and improve bond alignment).

Future work

- (Eve) designing a jig for the m-FPC to test-PCB bonding.
  - Careful preparation needed to get things secured and flat.
  - In discussions with ATLAS to make sure we can utilise 1 bond machine when ready.
- Requested some K9 carbon foam from Oxford.
  - Will start to look at bond settings for b-FPC to m-FPC on top of the foam (representative of the on-module spTAB requirements).
- Looking at the tooling/jigs for the b-FPC to m-FPC bonds.

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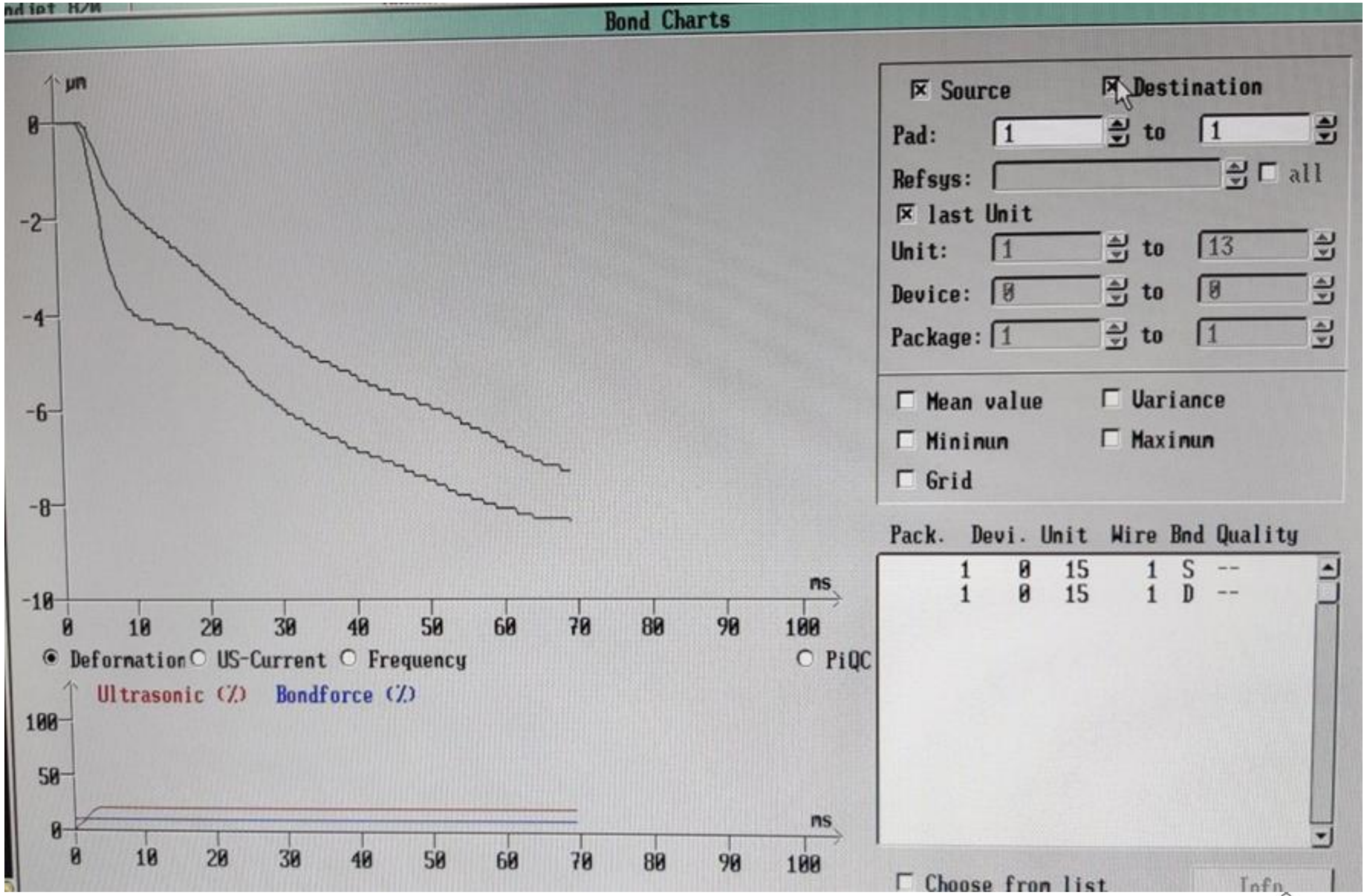
Thank you very much!

Any questions?

Additional (support) slides

Bond charts – initial 20|20 bonds



● Deformation ○ US-Current ○ Frequency ○ PiQC

☒ Source ☒ Destination

Pad: 1 to 1

Refsys: ☐ all

☒ last Unit

Unit: 1 to 13

Device: 0 to 0

Package: 1 to 1

☐ Mean value ☐ Variance

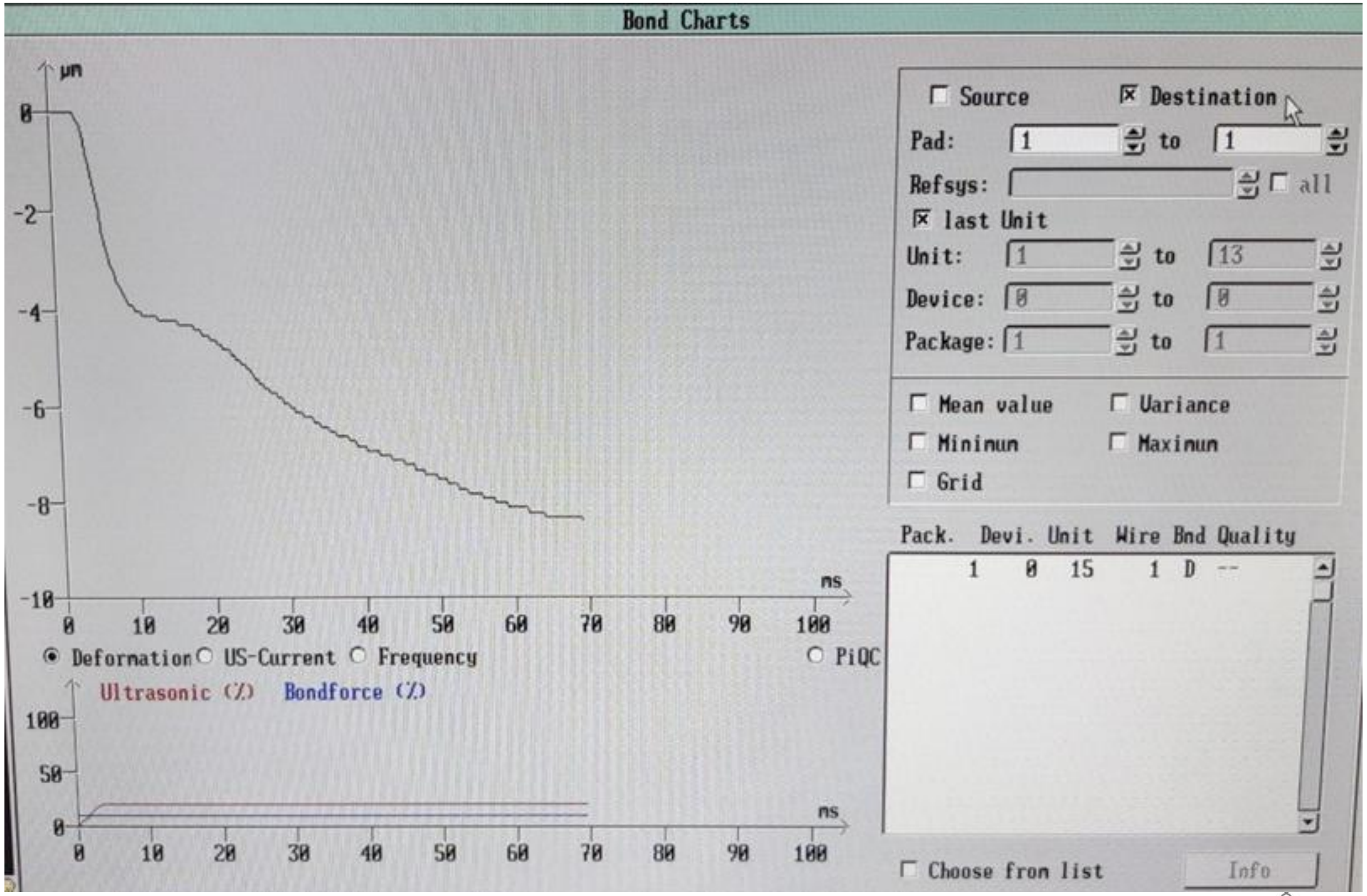
☐ Minimum ☐ Maximum

☐ Grid

Pack.	Devi.	Unit	Wire	Bnd	Quality
1	0	15	1	S	--
1	0	15	1	D	--

☐ Choose from list

Bond chart - destination



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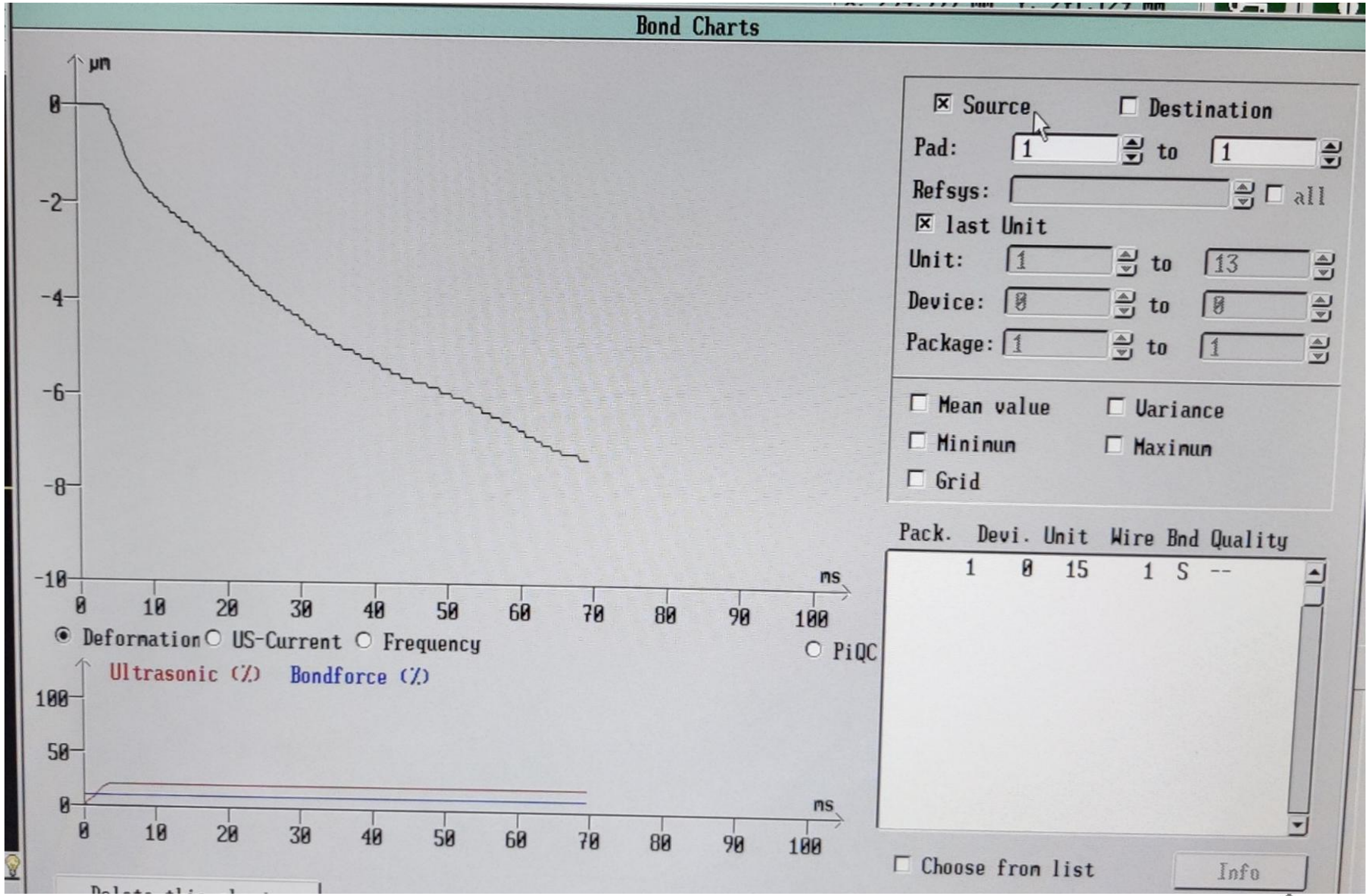
☐ Minimum ☐ Maximum

☐ Grid

Pack.	Devi.	Unit	Wire	Bnd	Quality
1	0	15	1	D	--

☐ Choose from list

Bond chart - source



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☐ Choose from list