UNIVERSITÄT
HEIDELBERG

Bumping Experience in Mannheim

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Valencia

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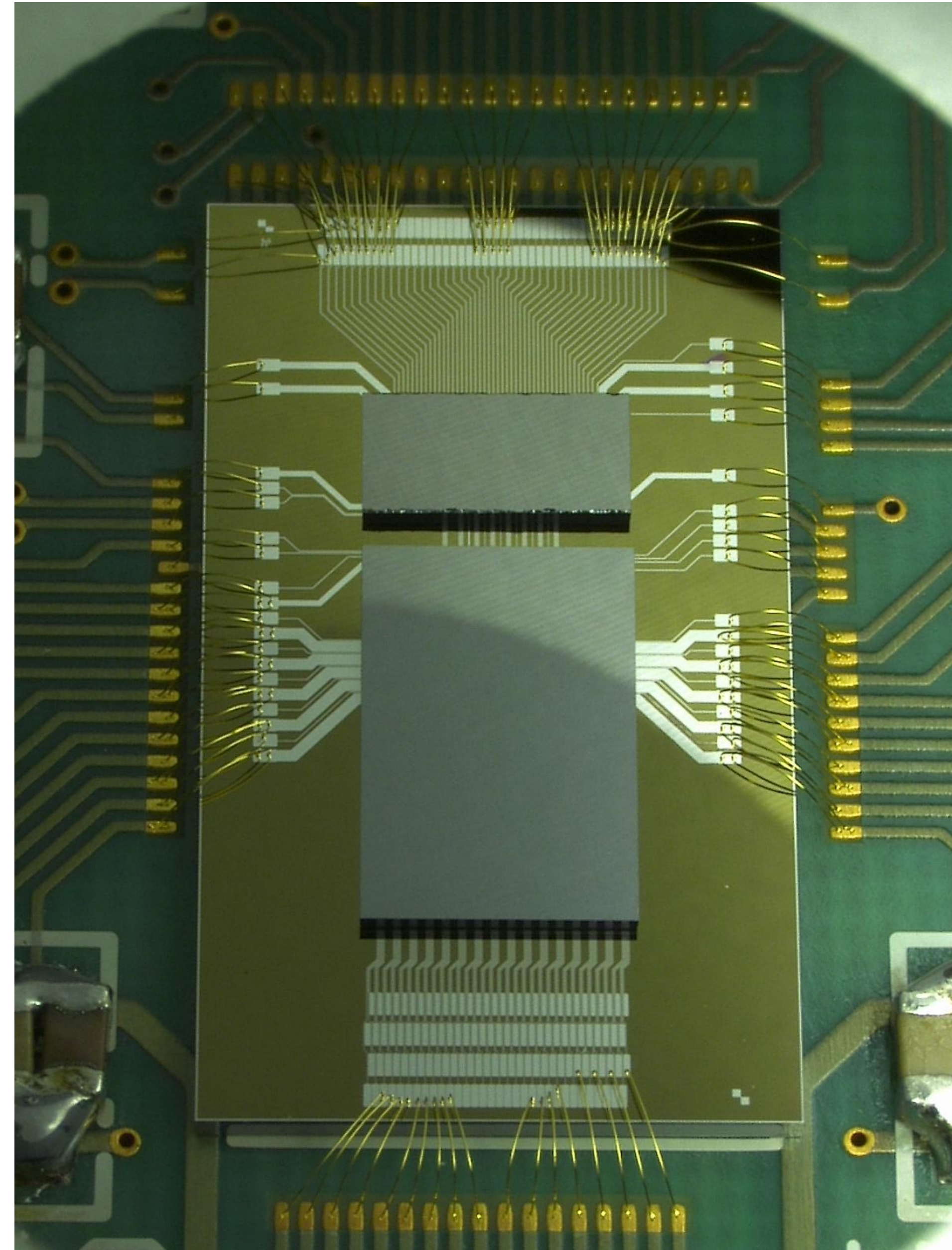
Adapter Assembly

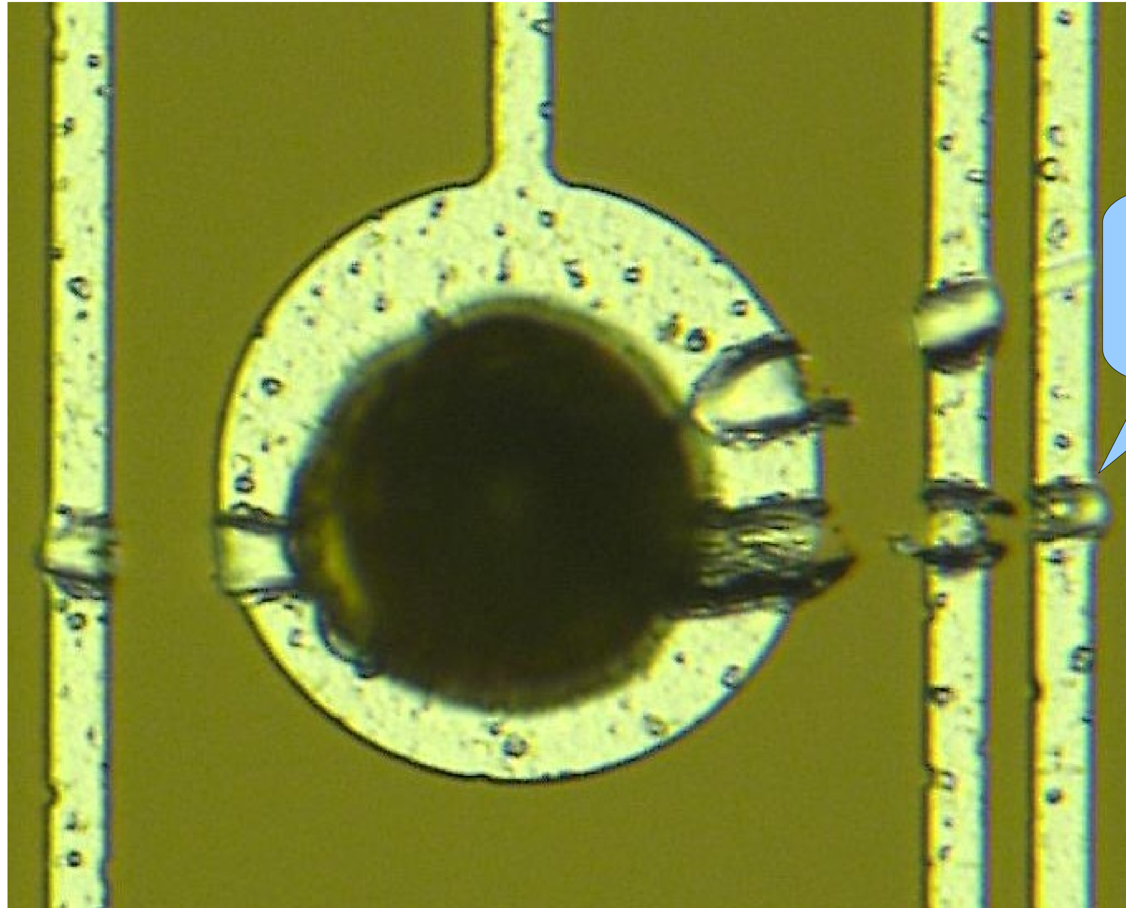
- 1st assembly of DCD-RO
  - only bumps on adapter: gap too small
  - flipchip-head not in parallel to substrate
    → chip touched substrate and shorted lines
- flipchip head has been repaired
- 2nd assembly
  - bumps on substrate and DCD-RO
  - flat head
    → good assembly
- gap between DCD-B and substrate: ~110µm
- gap between DCD-RO and substrate: ~50µm

Wirebond Adapter

- DCD_DCD-RO assemblies
  - 5 pcs assembled
  - 1 flipping failed
- teached technicians in Bonn
  - same wirebonder machine
  - same flipchip machine
  - they can assemble too



- 1st wirebond adapter had no passivation layer
  - bonder error can damage traces and create shorts



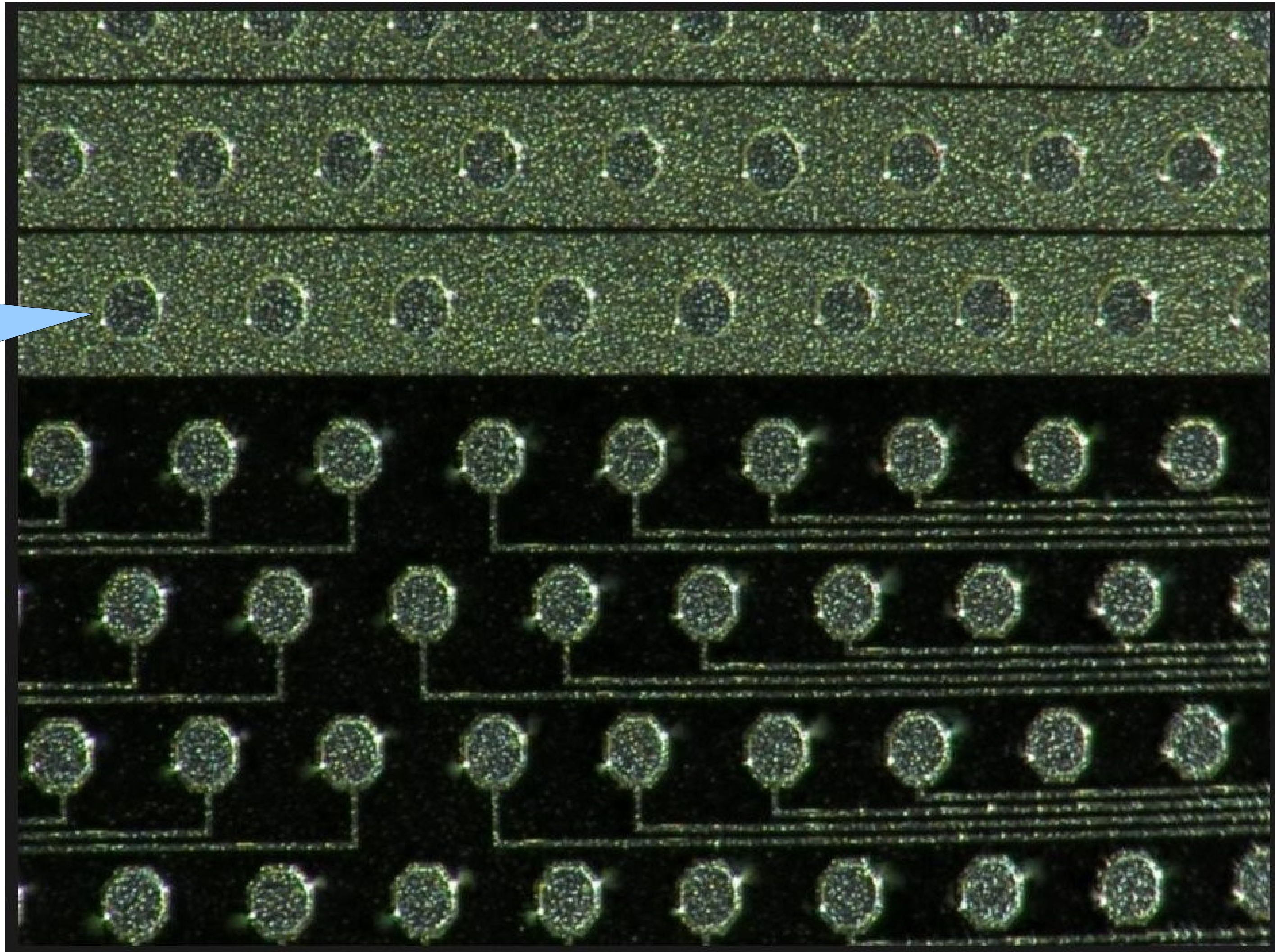
vacuum couldn't suck bump to capillery; wire touched traces;
ultrasonic vibrations on wire deformed traces

new WB-Adapter

- new WB-Adapter was designed with passivation layer
- HLL has produced WB-Adapters with BCB passivation
- adapter types contained on wafer
  - MatrixSwPCB 34pcs.
  - MatrixDrainPCB 43pcs.
  - WB_DCD_DCDRO PCB 18pcs.
  - WB_DCD_DCDRO Matrix 18pcs.
  - SwitcherB PCB 18pcs.
  - WB_DCD_DHP Matrix 7pcs.
  - WB_DCD_DHP PCB 7pcs.
  - WB_DCD_DHP Matrix Flex 6pcs.
  - WB_DCD_DHP PCB Flex 6pcs.

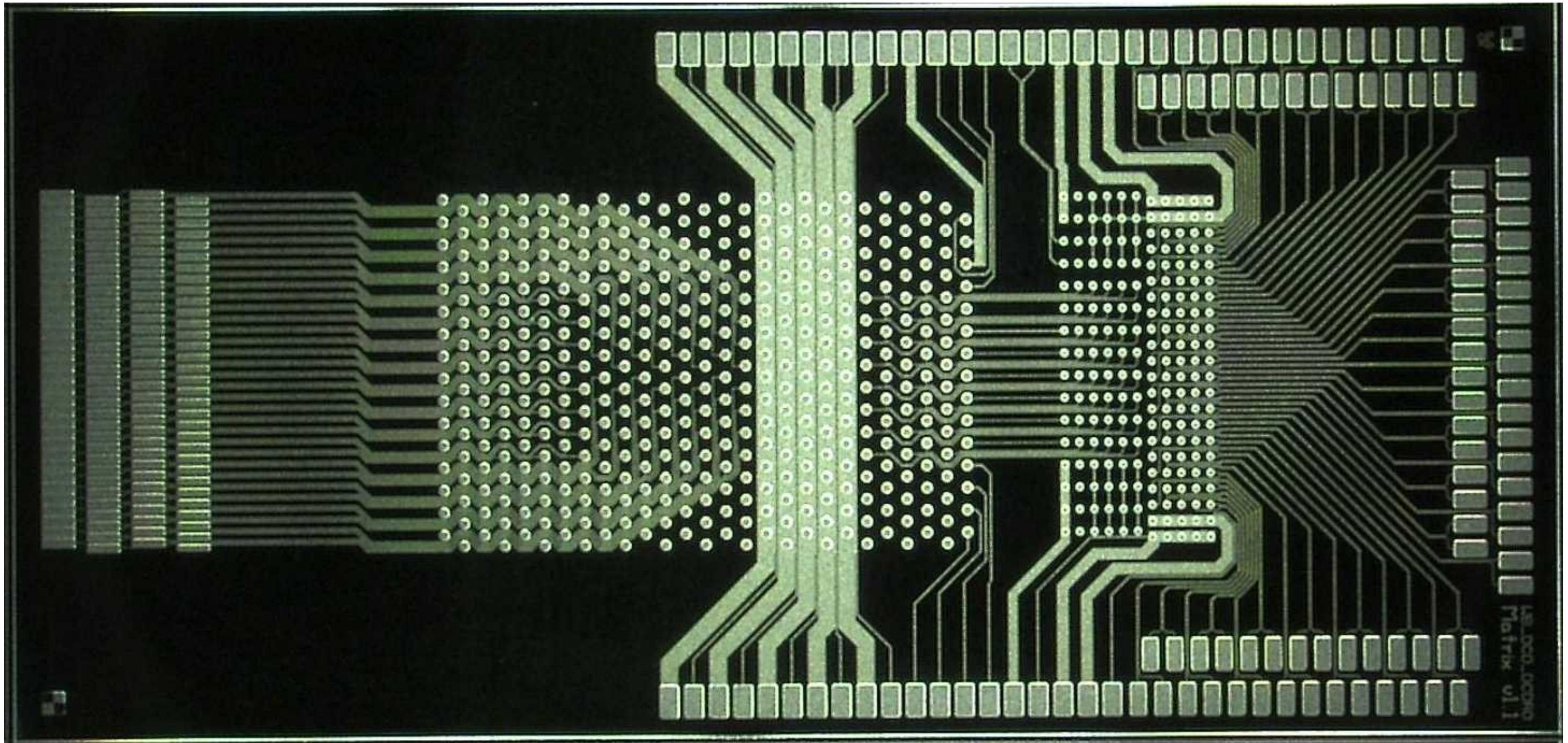
Passivation

passivation opening



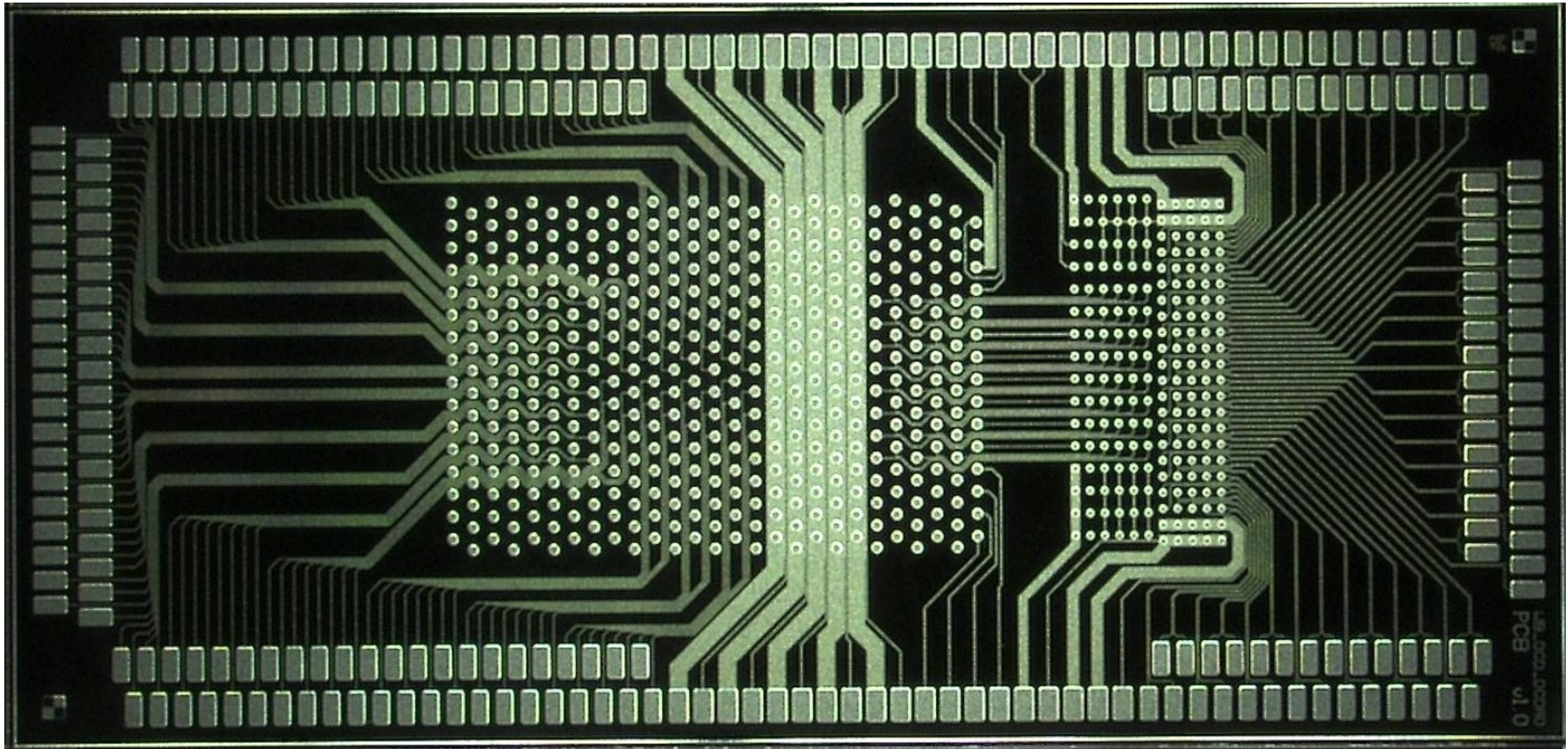
WB_DCD_DCDRO Matrix

- Adapter for DCD-B and DCD-RO
  - PCB kompatible pitch for digital I/O
  - fits matrix drain pitch



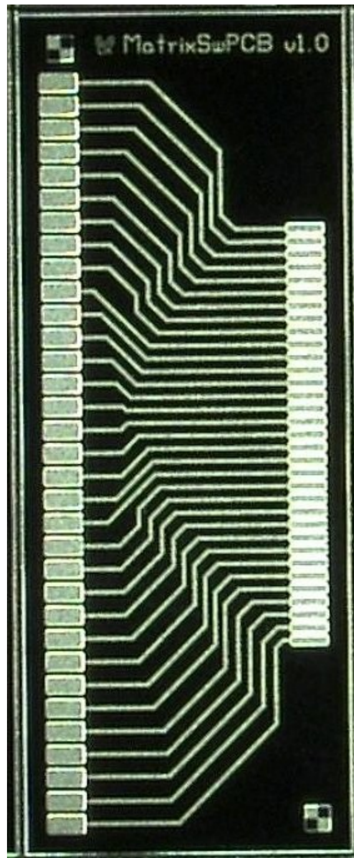
WB_DCD_DCDRO PCB

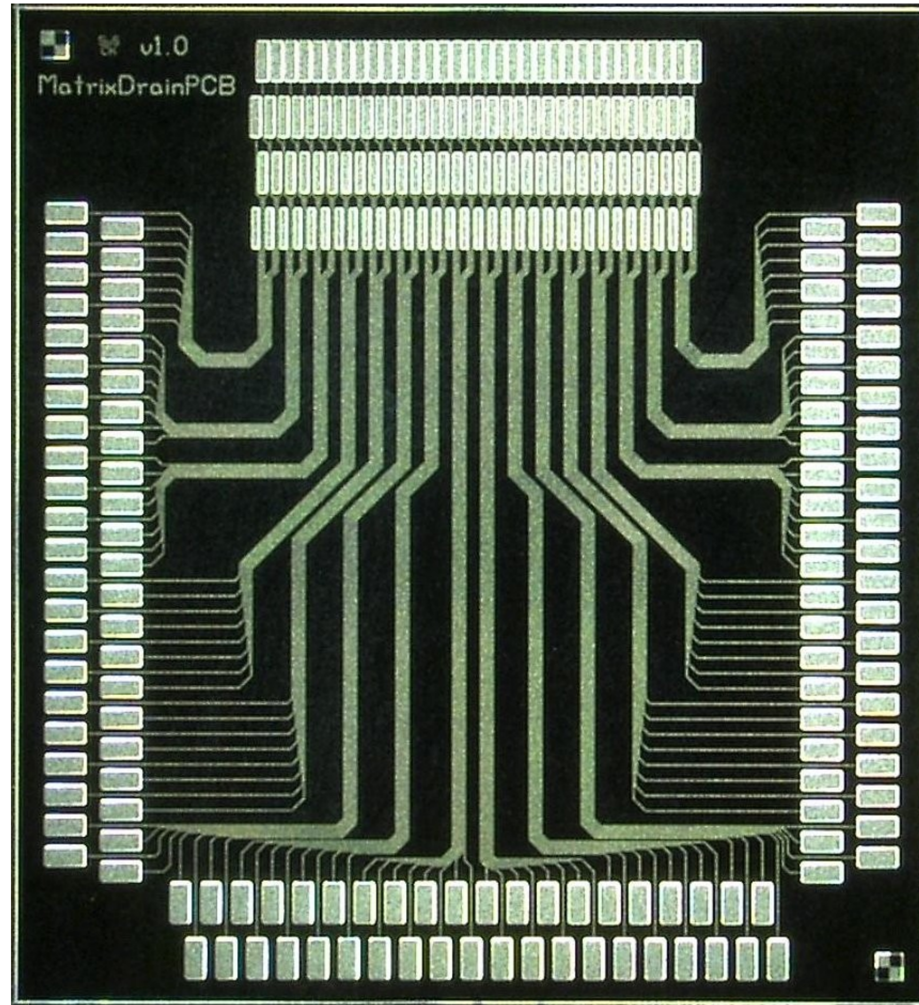
- Adapter for DCD-B and DCD-RO
  - PCB kompatible pitch for drain and digital I/O



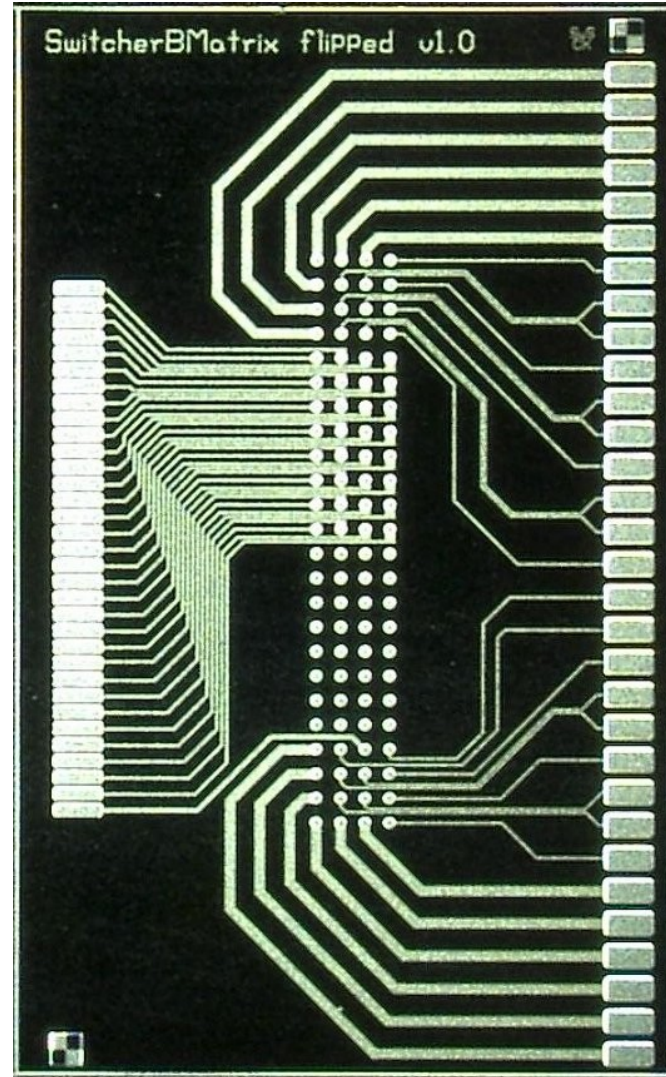
Matrix Pitch Adapters

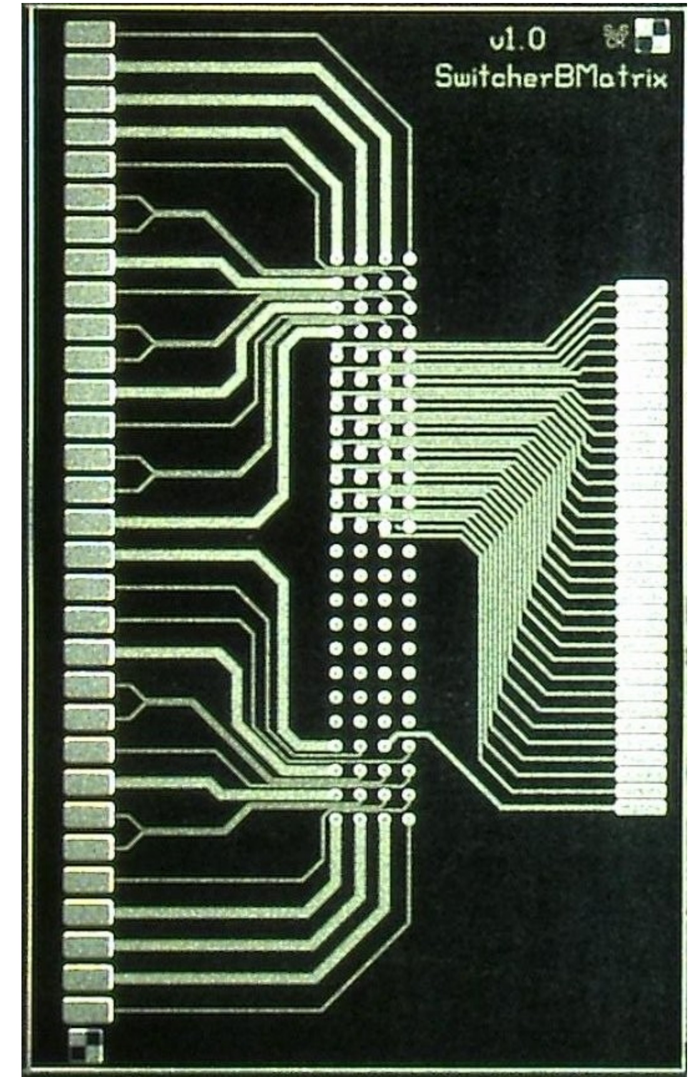
- Pitch adapter to bond a matrix to a PCB





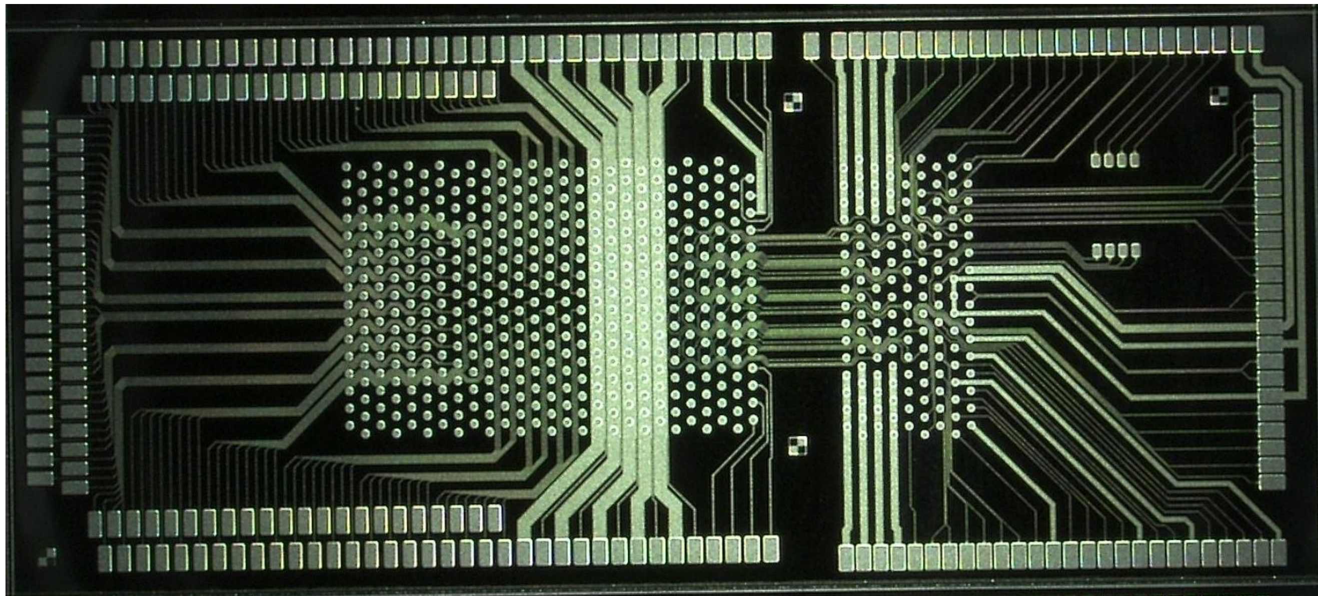
- SwitcherBMatrix
- SwitcherBMatrix flipped





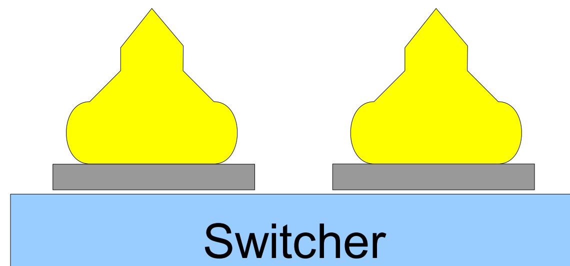
DCD_DHP

- DCD and DHP with PCB kompatible pitch

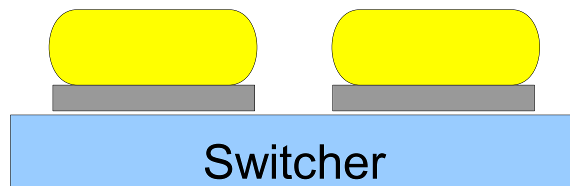


Single Chip Solder Bumping

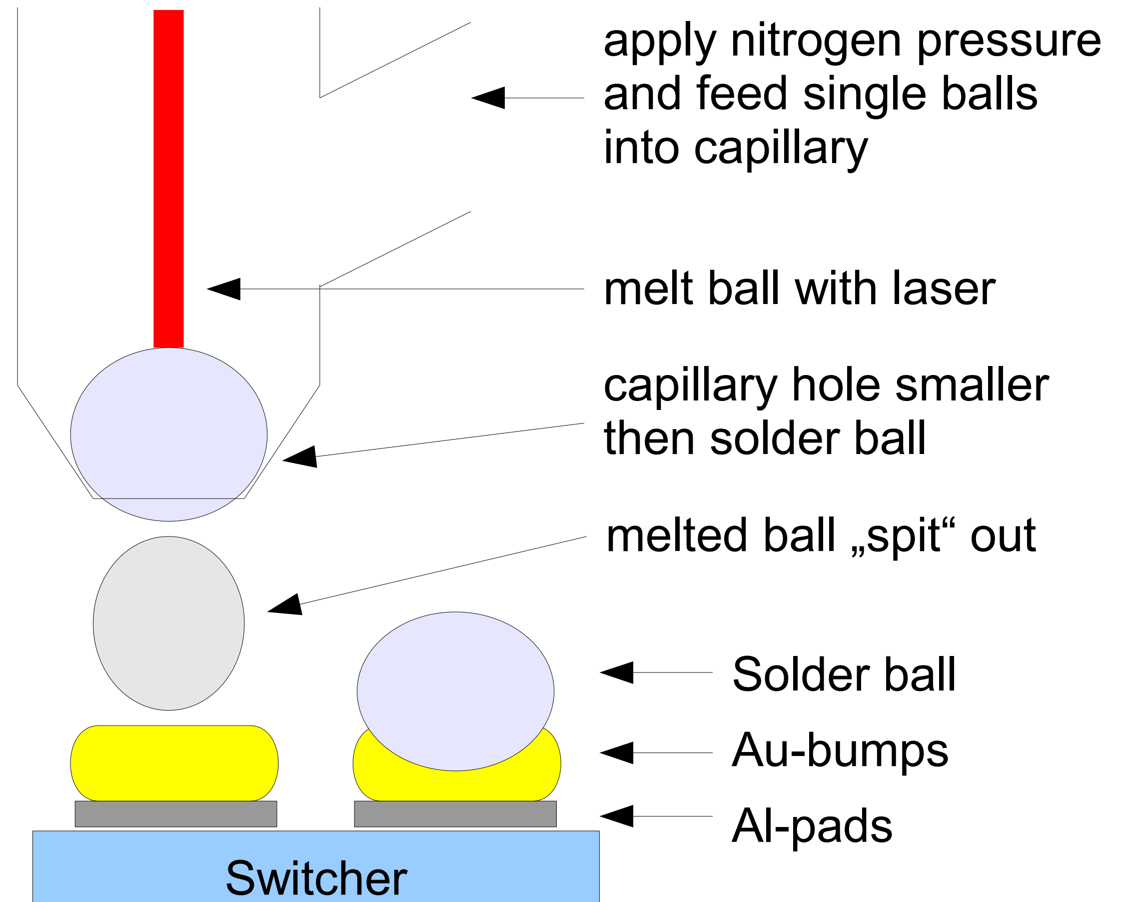
- use coined gold studs as an under bump metallization
- place solder bumps ontop using PacTec solder jetting technology
  - 60µm minimum ball size available
  - SnAgCu solder
  - Pb-free



1st : place goldstud



2rd : coin gold studs

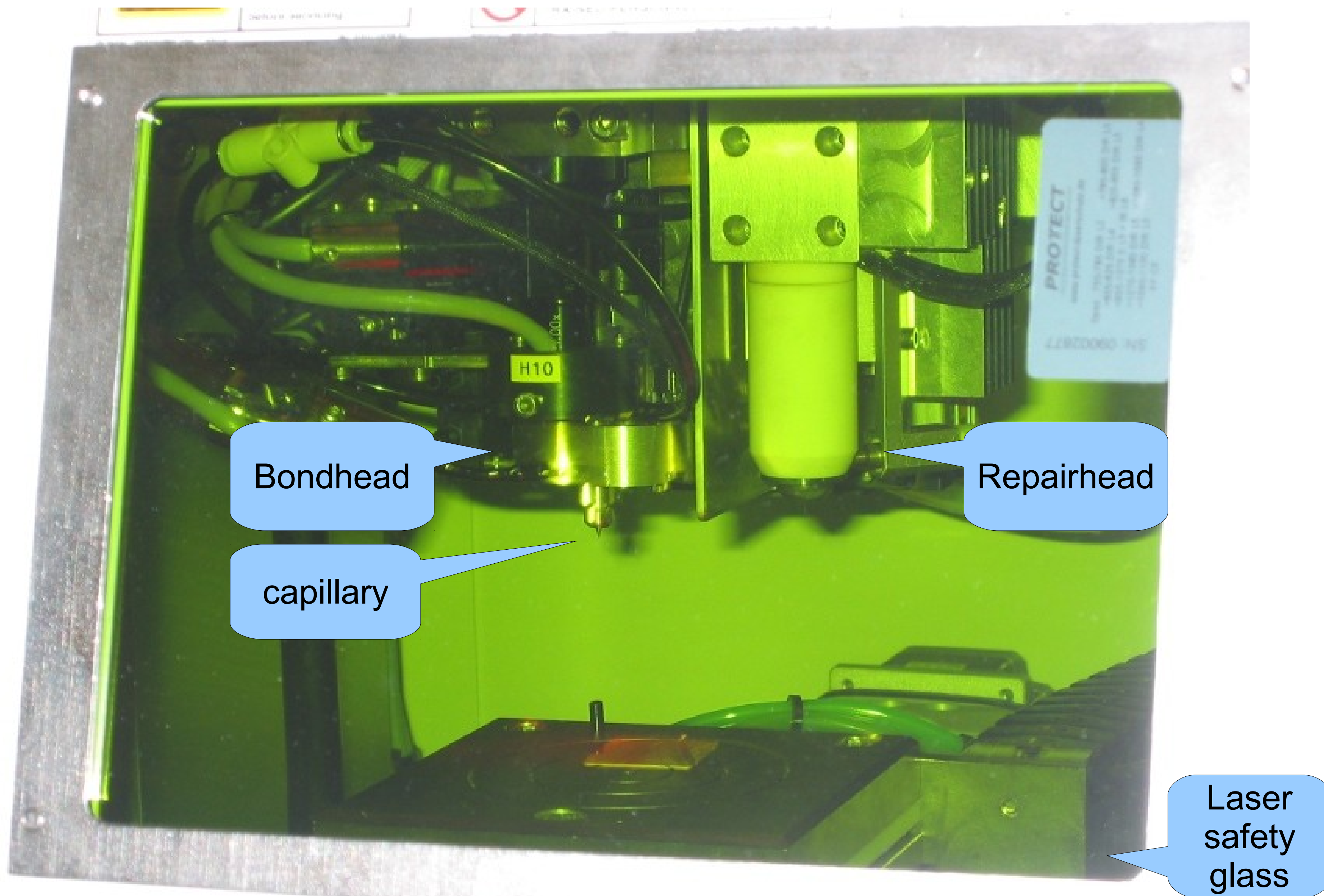


3rd : jet solder balls

PacTec SB2-M

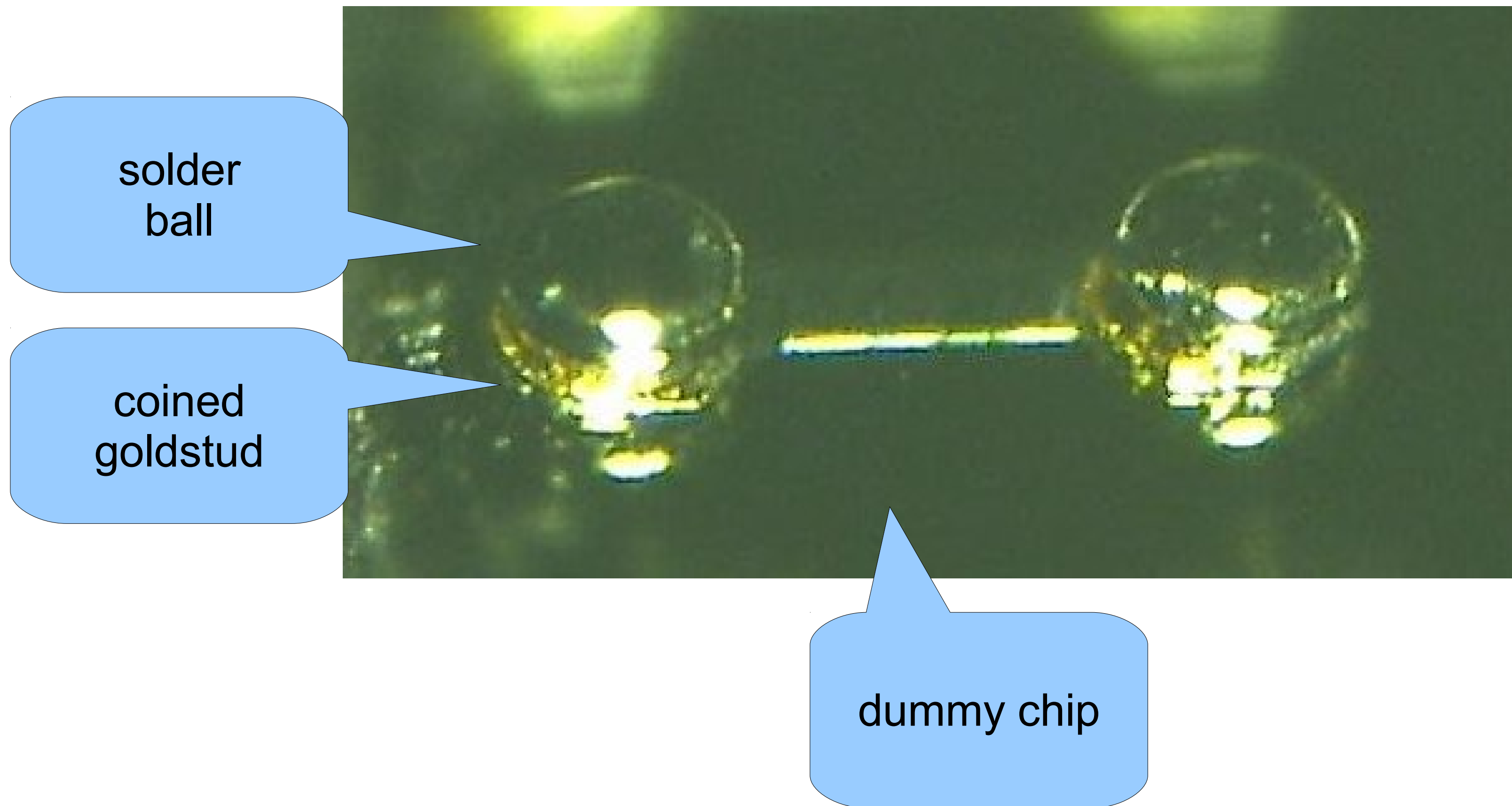
- can deposit single solder balls
- 60µm solderballs SnAgCu
- 5 balls/sec
- melts ball with 20W IR laser
- machine has been installed 2 weeks ago
- first solder bumps have been placed

Bond- and Repairhead



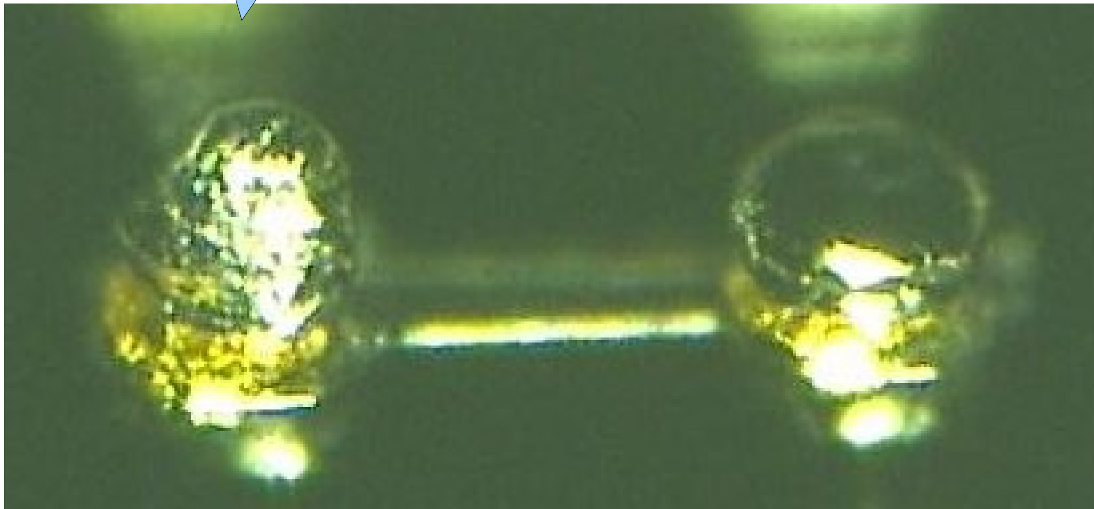
first solder bumps

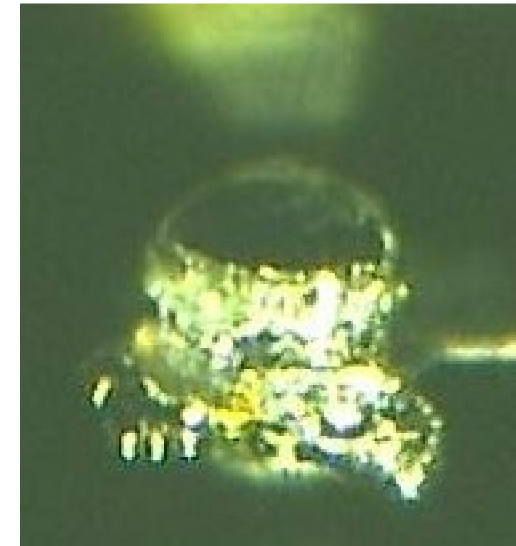
- first solder deposited on coined goldstuds in Mannheim
- machine parameter have to be adjusted
  - solder balls are flat → less pressure to keep spherical shape



- doesn't work yet
- company is working on a solution

solder melted
but not removed





Chip Inventory

	Mannheim	Bonn
• DCD-RO	24pcs.	21pcs.
• DCD-B	73pcs.	30pcs.
• Switcher-B	15pcs.	15pcs.

- Switcher-B and DCD-RO will be re-ordered

WB Adapter Inventory

- Wirebond Adapter Wafer with passivation content:
  - MatrixSwPCB 34pcs.
  - MatrixDrainPCB 43pcs.
  - WB_DCD_DCDRO PCB 18pcs.
  - WB_DCD_DCDRO Matrix 18pcs.
  - SwitcherB PCB 18pcs.
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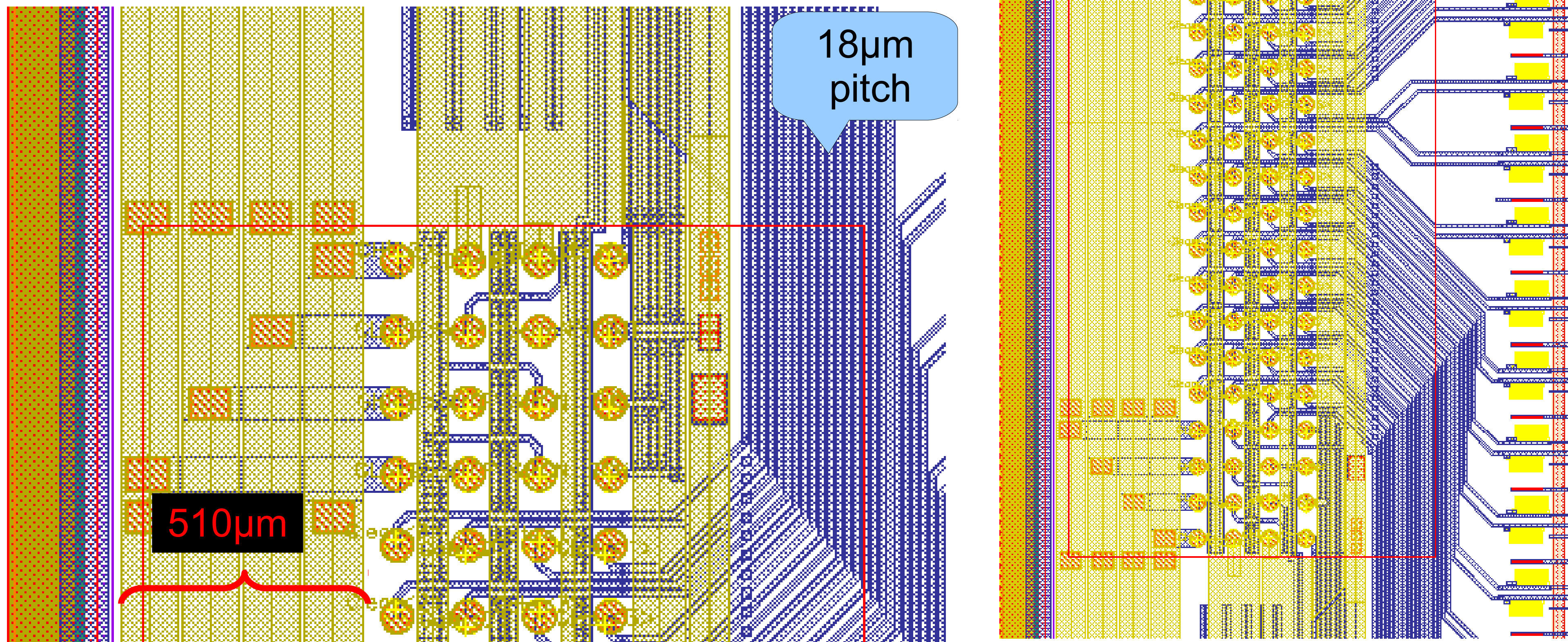
Switcher Balcony on final module

- 1 bump row = 4 traces = 36µm
- need to make power traces smaller
  - 4,5cm long power busses, 3.75mΩ/sq
  - 120µm width, 1.34Ω @26mA, 35mV drop



Thank you!