QUAD development/ Testbox

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NIKHEF

Nikhef/Bonn LepCol meeting
January 28, 2019

Simplified overview production

| QUAD	started	Mech. assy	Wire bonded	DAQ/HV test	Ready	Remarks
10	X	X	X	-		DEMO, not electrically working
11	X	X	X	X	X	~30 um alignment error
12	X	X	X	X	X	~30 um alignment error
13	X	X	X	X	X	
14	X	X	X	X/-	X	2 chips not operational (flex damage)
15	X	X	X	X	X	
16	X	X	X	X	X	
17	X	X	X	X	X	
18	X	X	X	-		Presently not working, Bas is looking at it
19	X	X	X	X	X	
20	X	X	X	X	X	
21	X	X	X	X	X	
22	X	X	X			
23	X	X	X			
24	X	X	X			

Production status

- 9 QUADs were tested at 300 V in air
  - No sparking observed
  - 2 showed bit elevated current ~25 nA
  - Rest at 1 nA or below

- 9 guards produced => 10 QUADs completed
  - QUAD14 has only 2 working chips
  - (flex damage)

- QUAD18 cannot be read out
  - Flex damage: one of the clock lines does not arrive at the wirebond board

- 3 QUADs waiting for DAQ test
- Still 3 guards needed
- Concentrator programming not yet done

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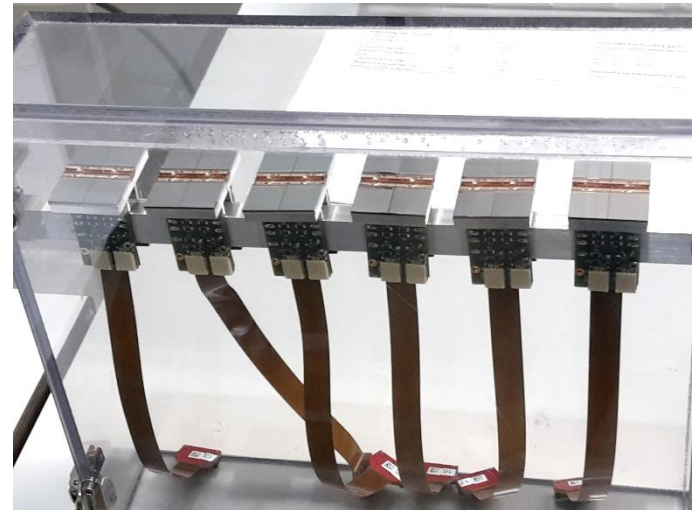
8 QUADs in testbox now

- **To be done**
  - Check QUADs HV connection
  - Guard strips need adjustment
    - Presently too low
  - Measuring all chip positions (X,Y,Z)
    - Jig for microscope completed
   - LabVIEW program to be written

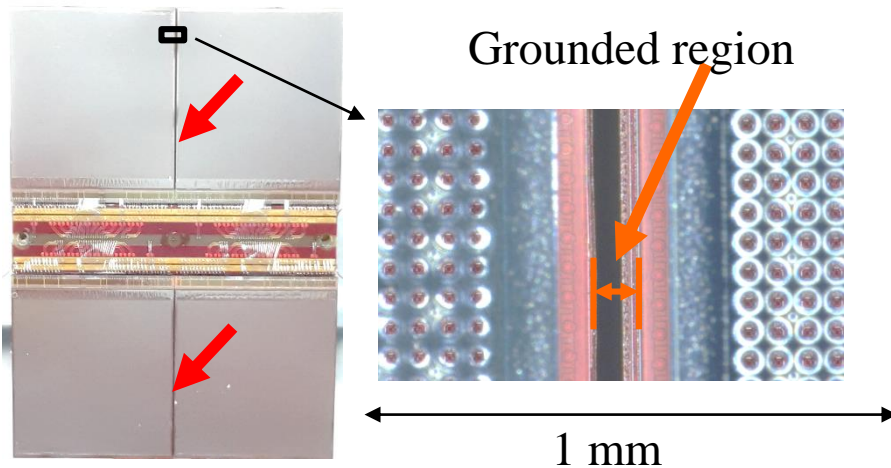Fred Hartjes

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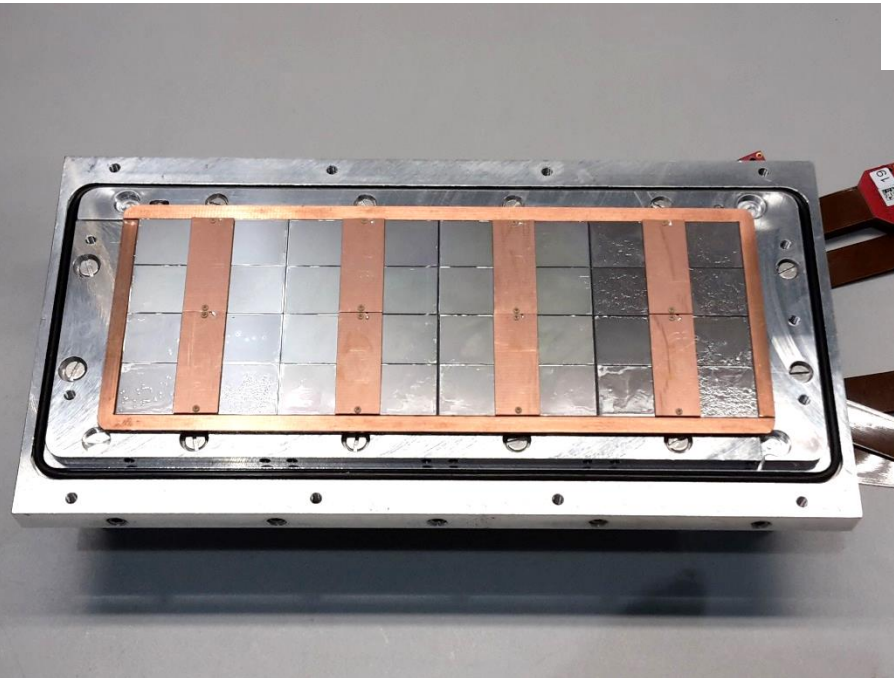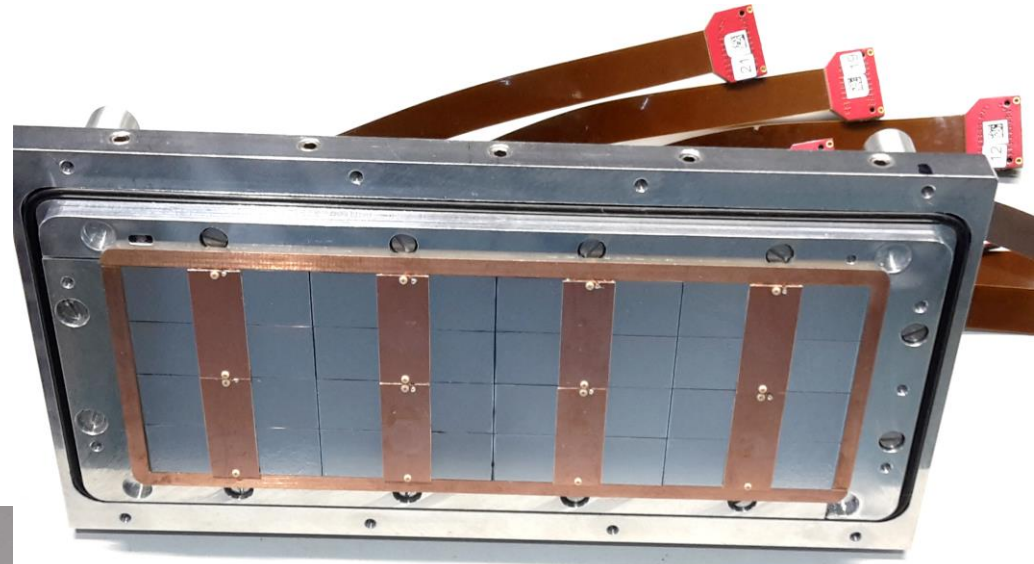
Other testbox items

- **Preliminary height measurement**
  - Two chips 240 μm too high
  - Other chips look OK, possibly within +/- 20 μm range
- **Testbox will be mounted upside down**
  - Space needed for easy access and concentrator boards
  - Concentrator boards to be mounted vertically

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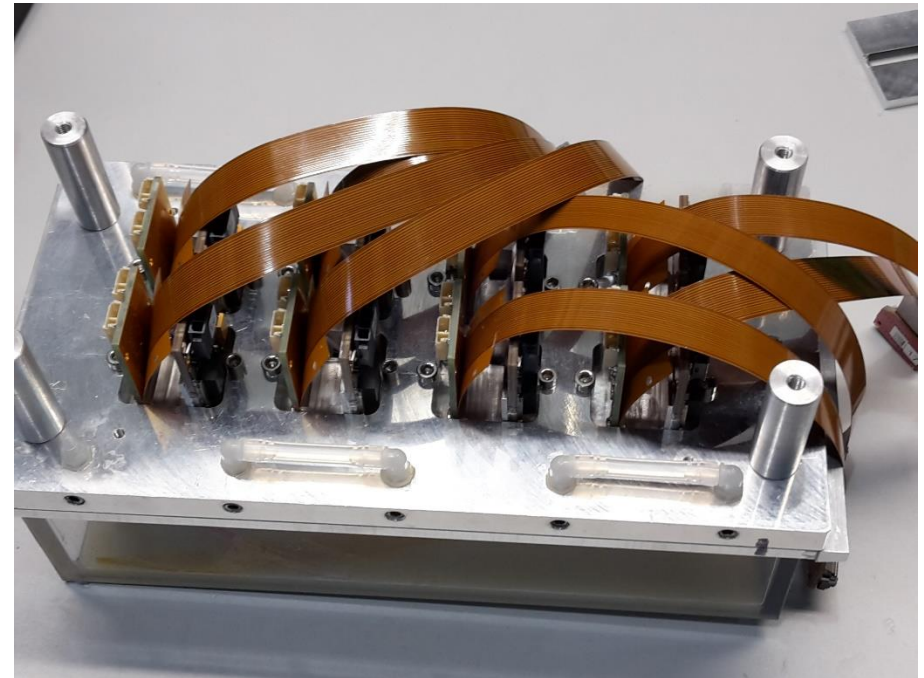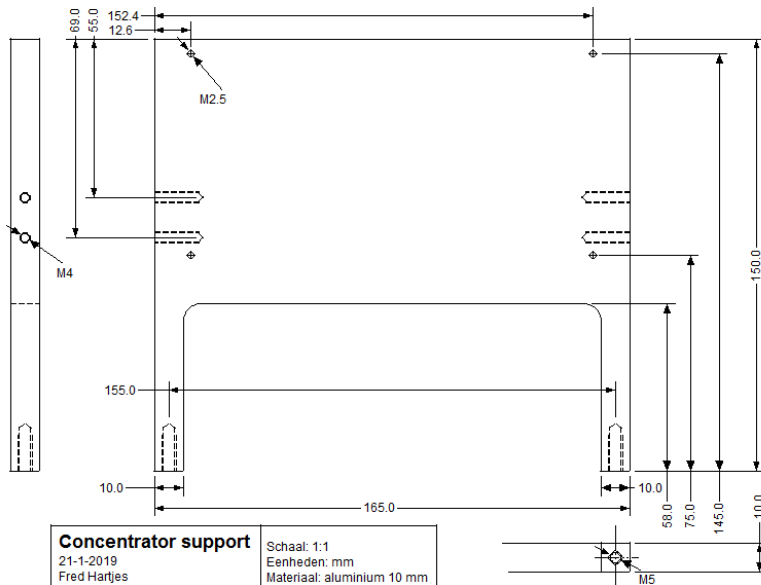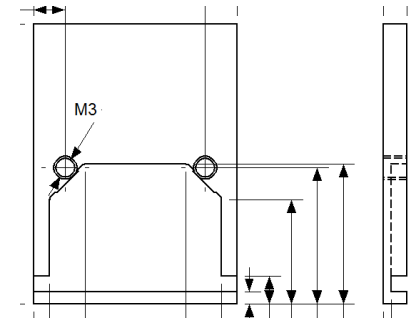
QUAD edge deformations

- Small deformations due to
    - Dead zone between chips
    - Grounded region between chips
- May be corrected by fitted correction function or adding proper guard electrode

Grounded region

1 mm

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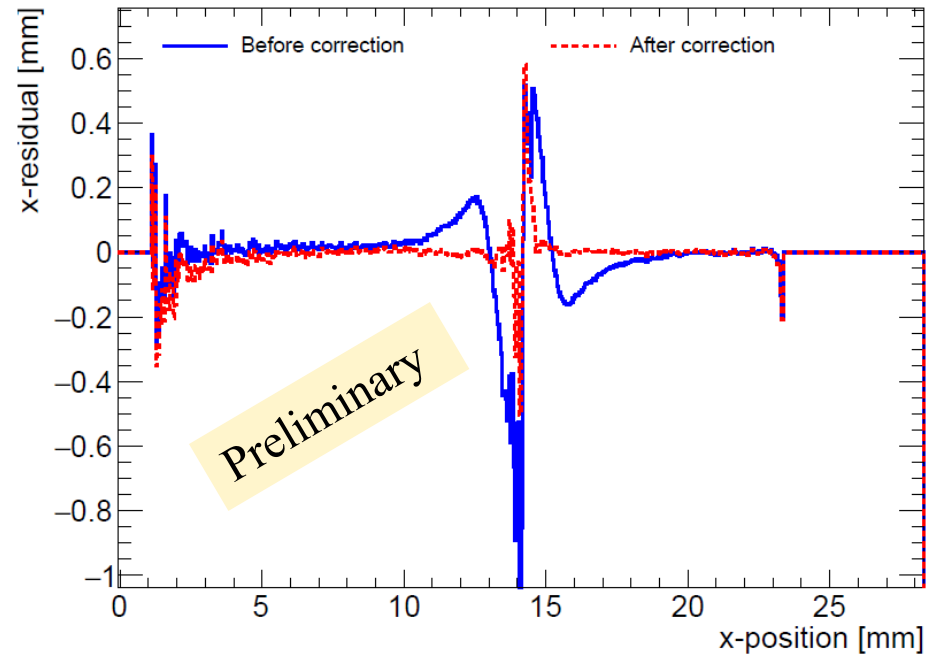
Guard idea

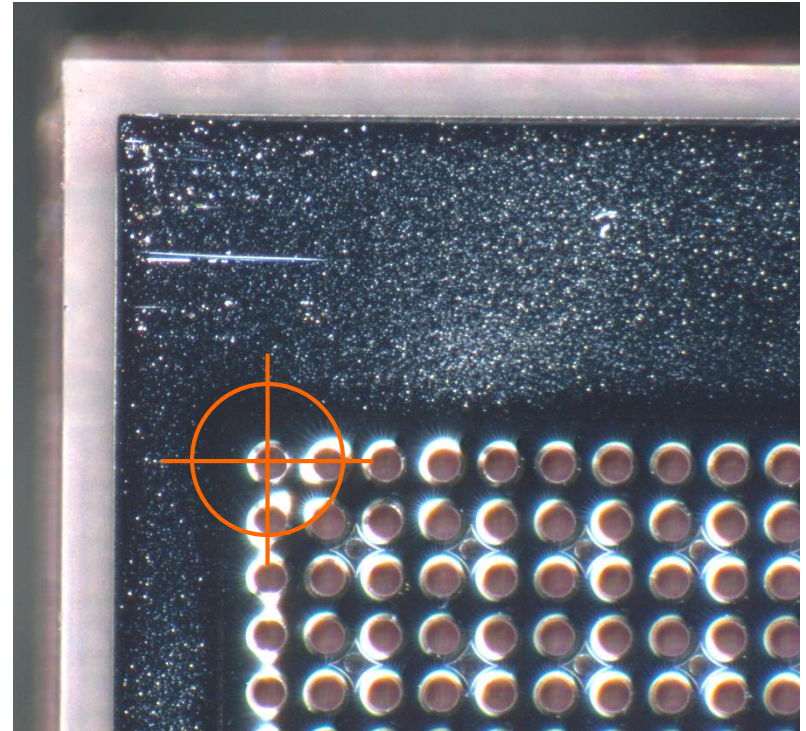- Wires being glued on field cage frame
  - 1.1 mm above grids

Field cage frame

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Chip position dataset

- For the completely assembled testbox we need a map with the X/Y/Z/φ coordinates of all 32 chips
 - Characterize each chip by measuring 3 holes on the grid

No absolute measurements, everything in relative units

Measuring chip position

- Use the alignment microscope with LabVIEW controlled XY stage
    - Stage range 100 x 100 mm => we have to do it in two steps with a number of points in overlap
- Use LabVIEW program to move to all measuring points
    - XY by manual fine adjustment, automatic coordinate recording
    - Z by autofocusing of microscope => **coordinate recording by hand!**
- Also measurement of guard height
- In total 96 + 16 (overlap) + 12 (guard) = 124 points to measure
- One point may take ~ 1 min

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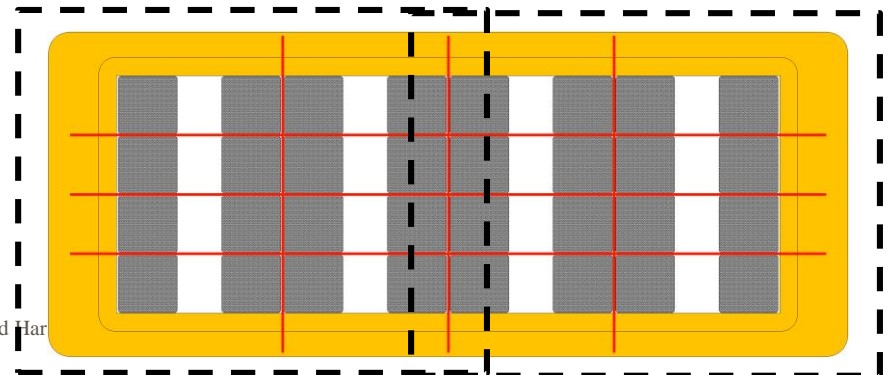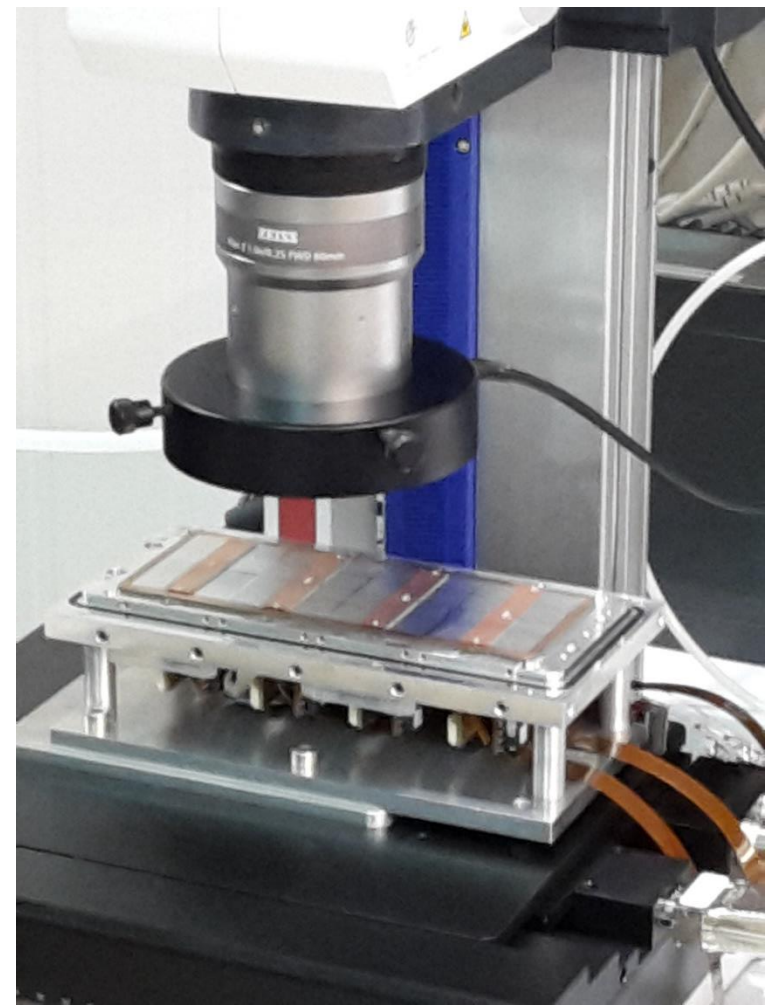
Preliminary height check

- Two chips were tilted (~ 250 μm)

- Caused by slanting cutting edge of certain chips

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