



QUAD development

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Nikhef/Bonn LepCol meeting
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Schedule QUAD assembly

- Mechanical QUAD

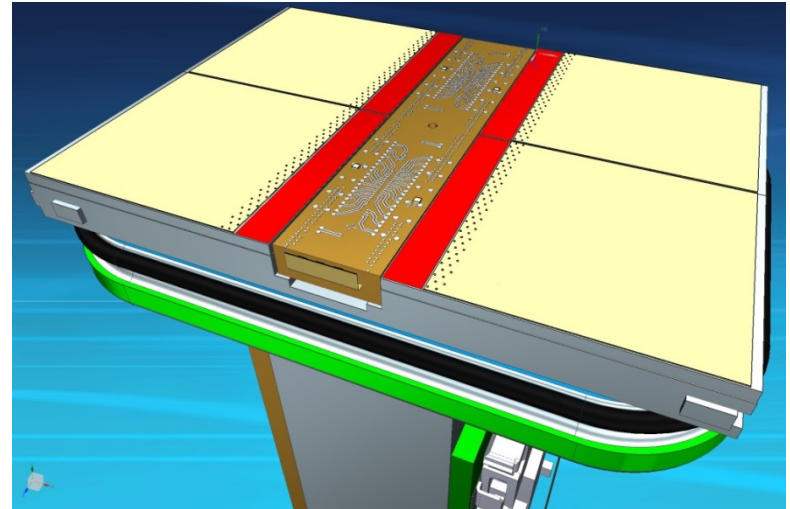
- Class F chips with damaged grid

- Mechanical QUAD
- Class F chips with good grid

- Electrical QUAD

- Class D chips
- Grid partly delaminated => possible pickup problems
- May have HV grid problems

- Electrical QUAD
- > class D chips
- Performance tests (laser, testbeam)



Overview QUAD assembly so far

- Pickup tool looks OK now
- Most tooling calibrations done
- Z alignment done using the microscope
 - Autofocussing
 - No easy adjustment screws, Z-tuning done l adding shims and by slightly repositioning
- X-Y calibration much easier
 - Accurate measurement using remotely controlled X-Y stage
- Progress hindered by absence of a coca built according to the final design
 - Using instead less accurate and worse fitting thermal coca
- Investigation chip glues
 - Most glues are too strong
 - Araldite, Gloptop, RTV615
 - Looking for poor adhesion low viscosity glue



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Defining chip's Z position

- Final Z value of the mounted chip NOT adjustable
- Z of the grid **exclusively** depends on
 - Thickness of chip (752 μm)
 - Thickness of the coca
 - Thickness of glue layer
- It will not be possible with the present tooling to correct for deviations in chip and coca thickness/flatness
 - Capillary forces of the glue between chip and coca will prevent adjustments on the μm scale
 - Glue layer will be thin (10 μm range)

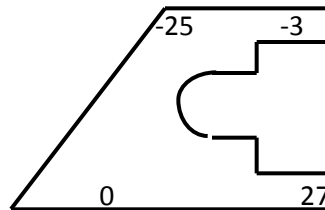


- **Question: where is the Z referred to?**
 - **At present: the lower surface of the coca**

Relative Z values after alignment

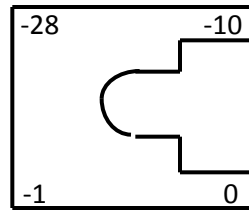
- Alignment block

- Deviations $\leq 10 \mu\text{m}$



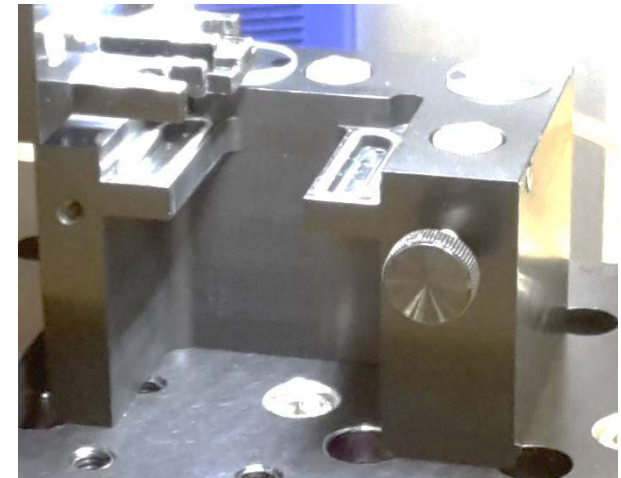
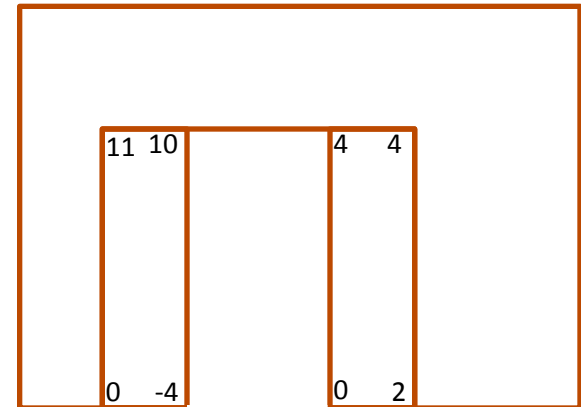
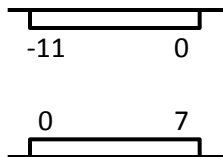
- Forks

- Somewhat bigger deviations
 - Probably deformed



- Pickup tool surface

- Quite small errors f



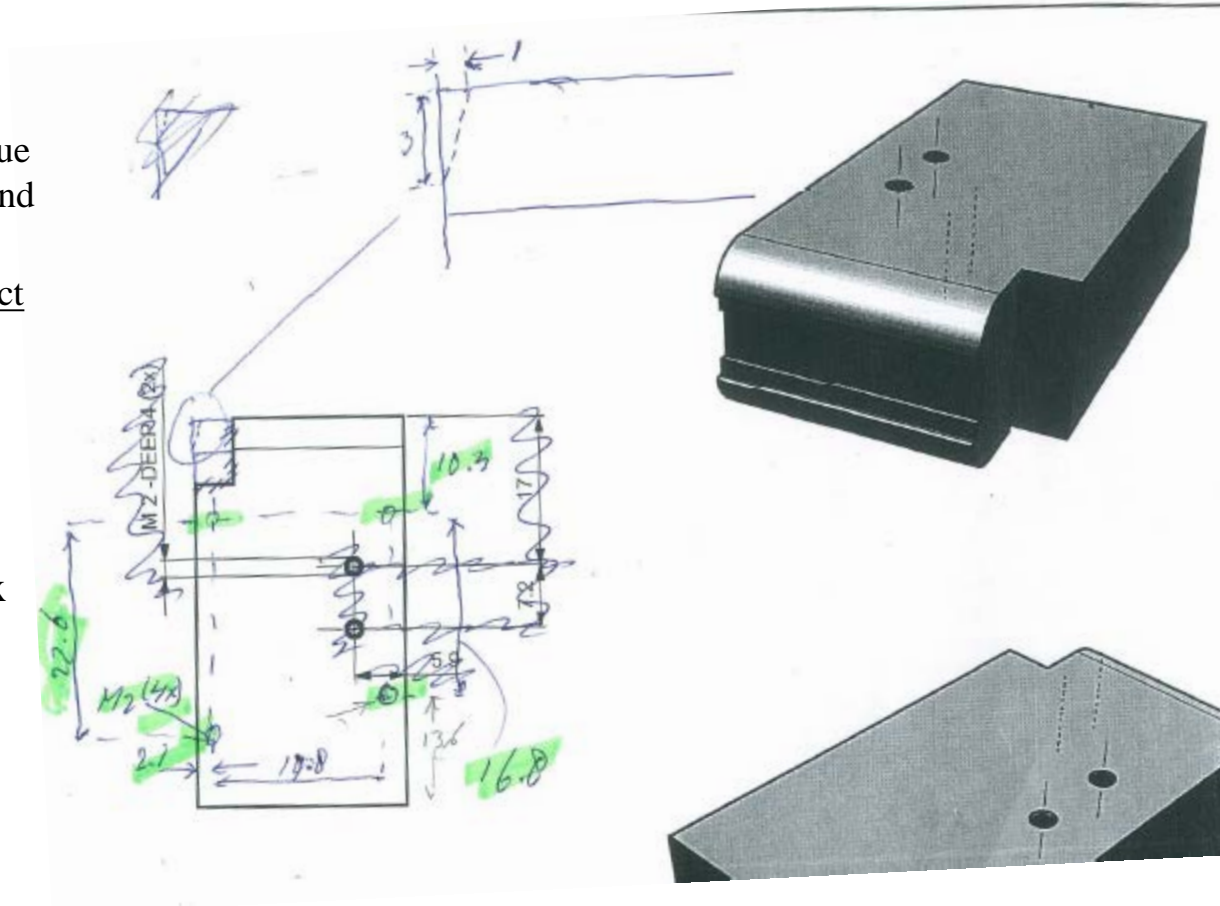
Mechanical modifications

■ Stump

- Omit the cut-out
 - (not needed since we glue stump, coca and wirebond PCB in one go)
 - Improves thermal contact
- ☑ Shorten by 4 mm
- ☑ Add/omit various holes
- ☑ Widen inner groove for wirebond PCB
 - Add groove for guard flex

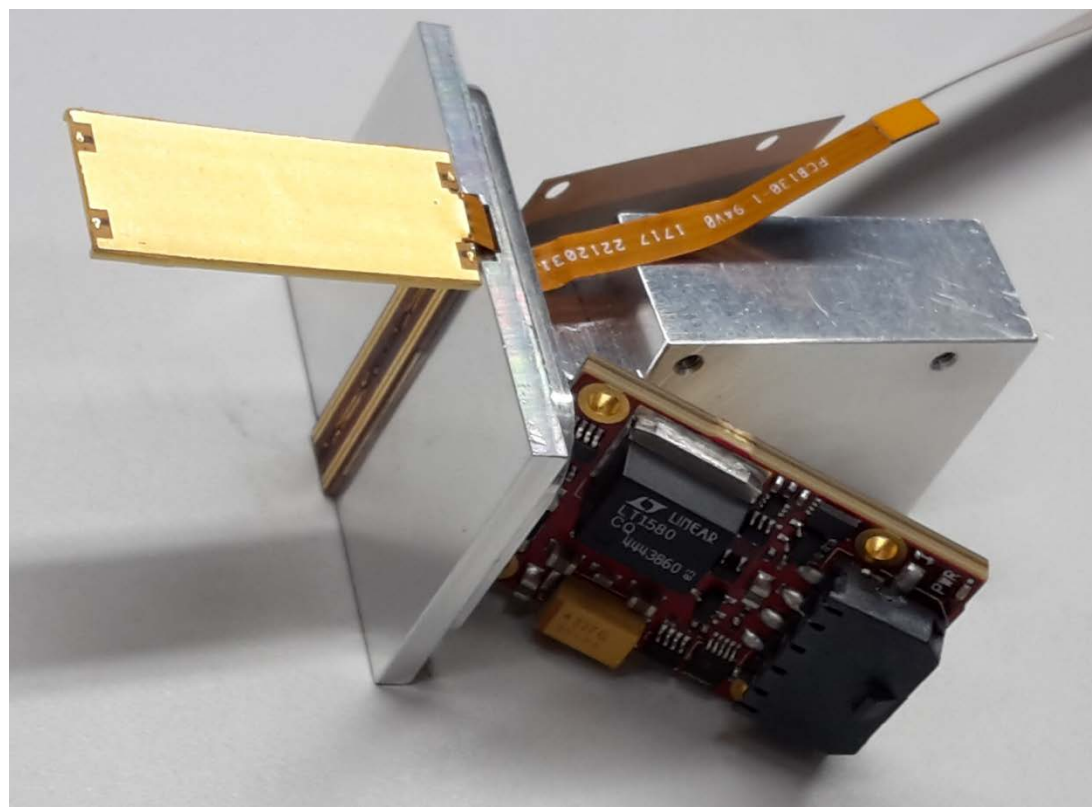
■ Coca

- Few minor modifications

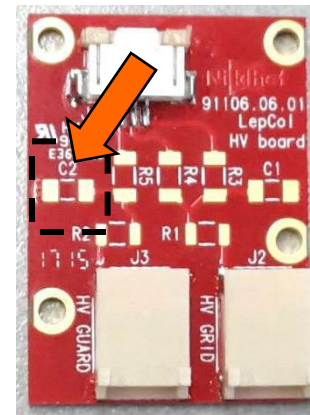


QUAD assembly

- Bad fit of wirebond PCB in coca
 - Epoxy residues on edges to be removed
 - Minor adaptations of coca to be made

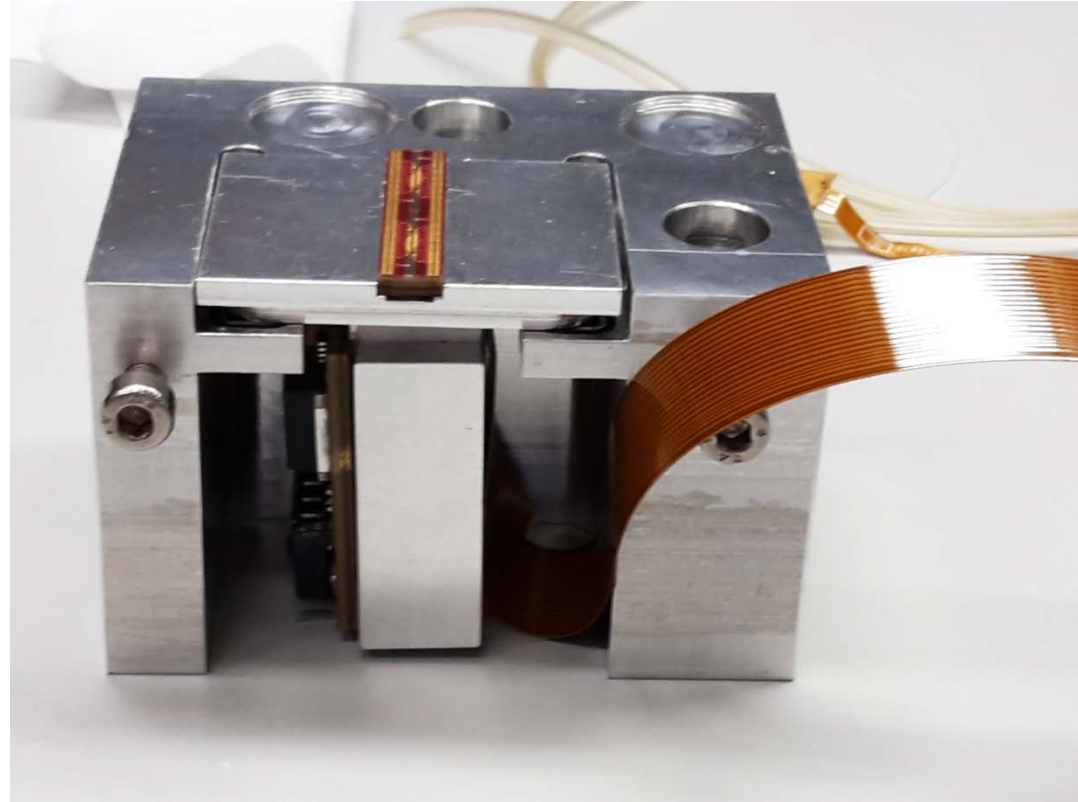


- Guard flex
 - Change routing
 - Modify HV PCB
 - Flex connector to the left side
 - Ready beginning August
 - Not needed for mechanical QUAD



Tooling required

- For the glue jig of coca to stump we can make use of the discarded alignment block
 - Note that the flex of the exiting signals has to be folded in the alignment block
- Alignment tool for the guard still to be designed

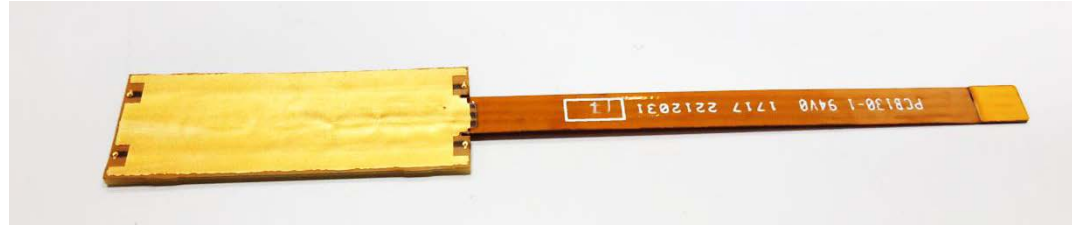


Assembly sequence QUAD

- 1) Insert wirebond PCB in coca
- 2) Mount LV PCB on stump
- 3) Glue stump to coca using an appropriate jig
- 4) Insert QUAD into alignment block
- 5) Align and glue two chips
- 6) Rotate QUAD by 180° in alignment block
- 7) Align and glue the two other chips
- 8) Add wirebonds to the chips
- 9) Test the electronics
- 10) Mount the HV PCB
- 11) Insert the guard flex and glue the guard to the surface of the chips
- 12) Make the wire connections of the 4 grids to the guard
- 13) Apply HV tests

Comments

- The present design of the guard gives many problems



- It has to be glued on the chip surface
- Some stress is needed to force it to a flat surface
 - At present it is hollow with a Sagitta of 100 μm
 - The stress may increase while running (temperature effect)
- Once mounted it may not be possible to remove it without damaging/destroying the 4 chips
- Every time the guard is taken off, the glued wire connections to the 4 grids have to be removed and renewed afterwards
 - Very critical operation, cannot be done many times without damaging the grids

- => We might have to redesign the guard
 - Grid connections not on the guard
 - Attach guard only at the ends

