

FROM RESEARCH TO INDUSTRY



Irfu

Institut de recherche
sur les lois fondamentales
de l'Univers

Operational Multilayer MLO

CEA-Saclay Team:

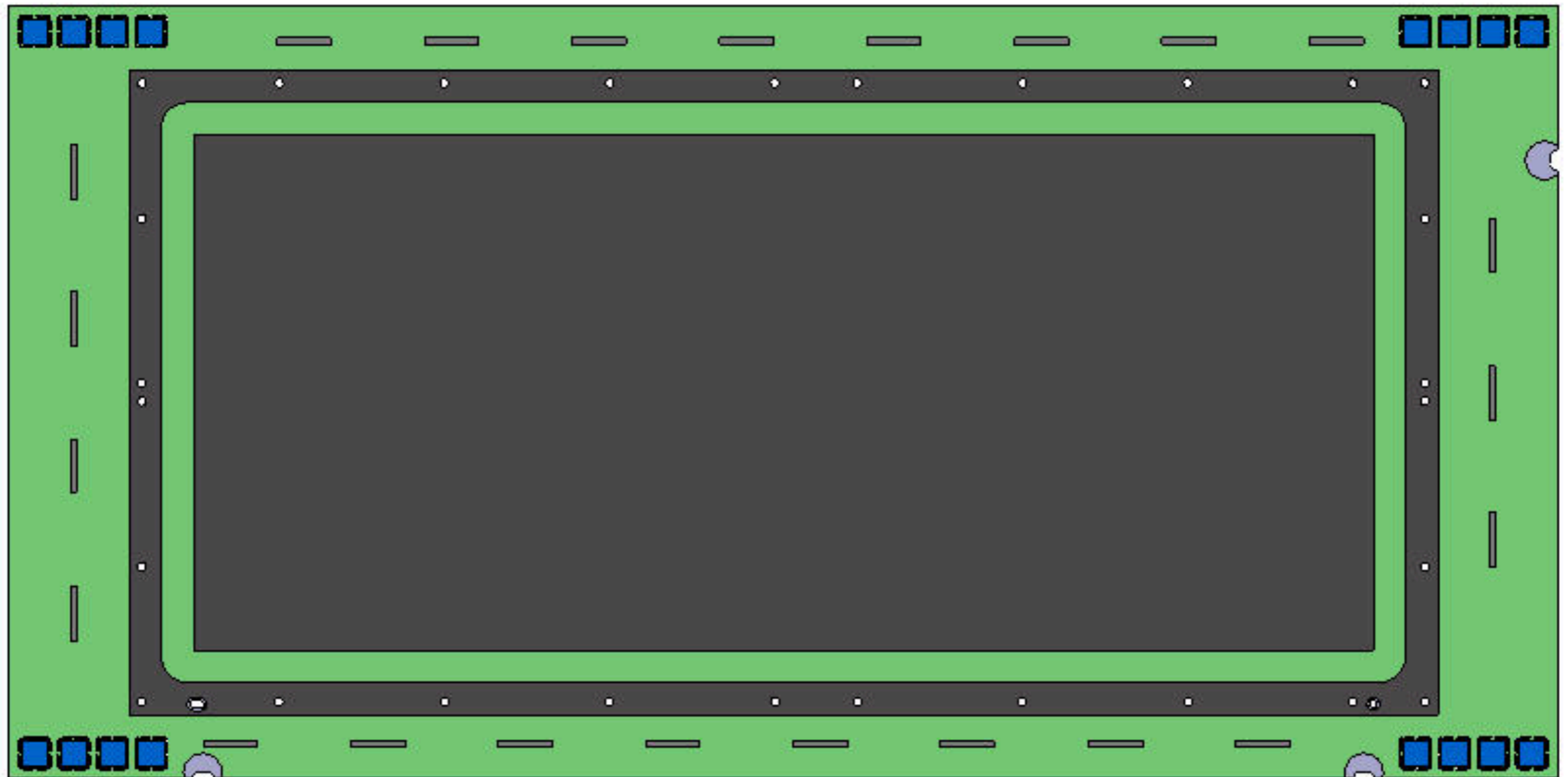
Florian BAUER, Esther FERRER RIBAS, William GAMACHE, Arnaud GIGANON,
Pierre-Francois GIRAUD, Patrick GRAFFIN, Sébastien HERLANT, Serge HERVE,
Fabien JEANNEAU, Hervé Le PROVOST, Olivier MEUNIER, **Alan PEYAUD**,
Patrick PONSOT, Philippe SCHUNE

Why such a MM multilayer?

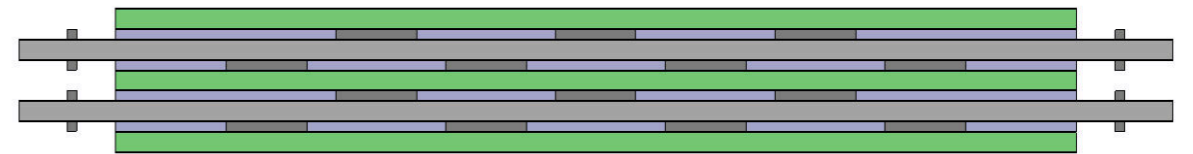
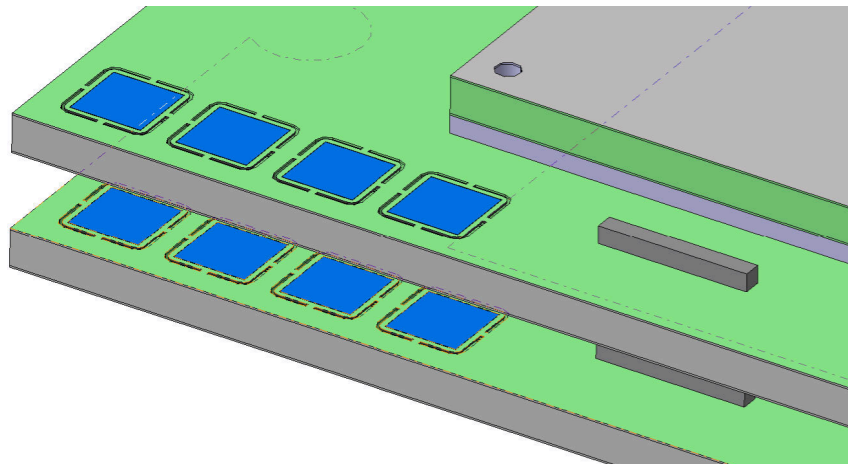
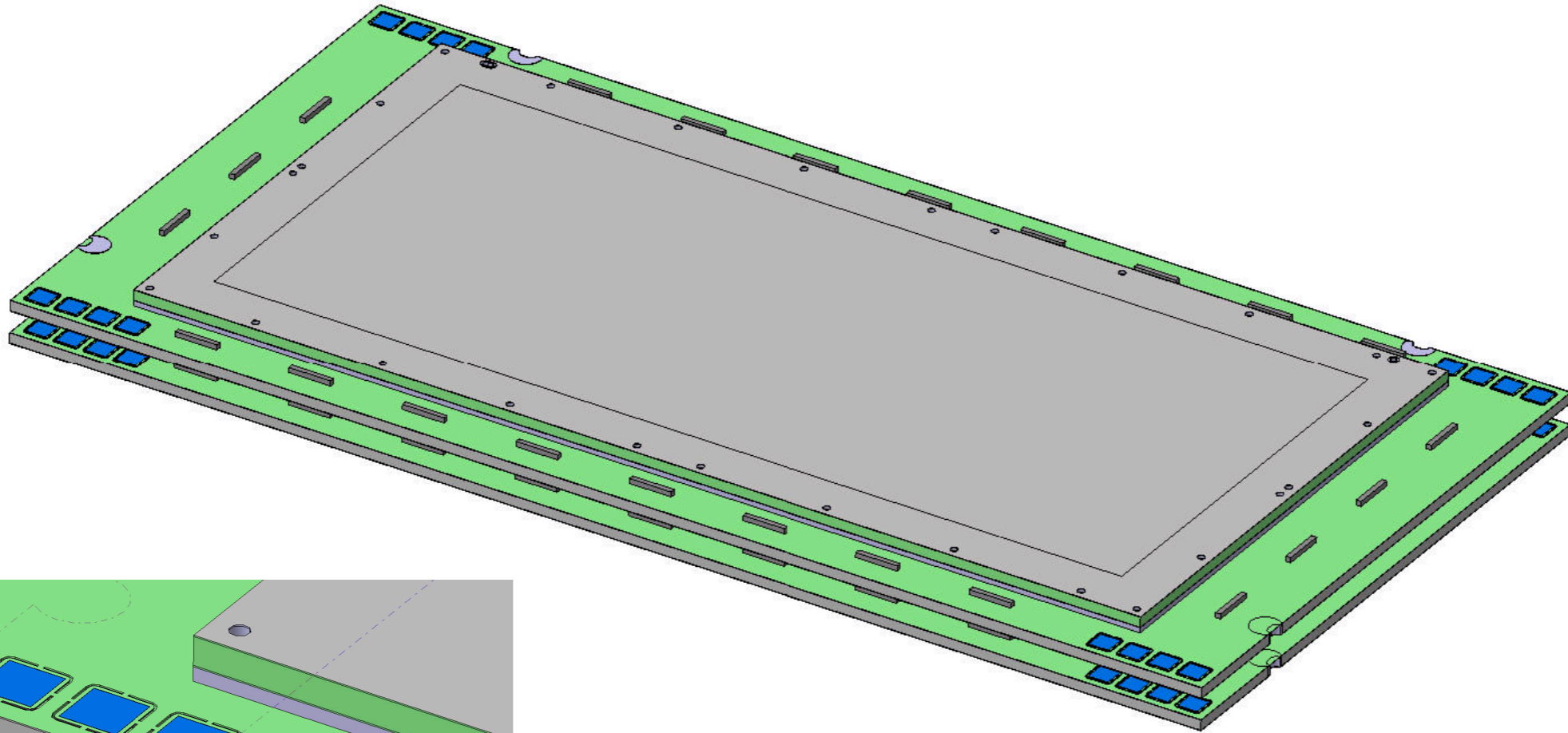
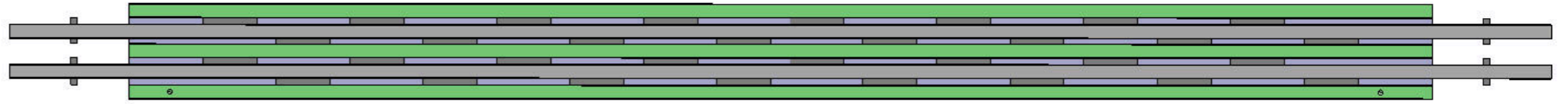
Purpose - infrastructure

- proof of concept
- gluing & metrology process to reach the desired specifications
- ...a good idea to show that we can do it in a small version...
- raise issues on the alignment procedure between 2 successive layers
- will help us to pinpoint problems that we will encounter for the large version

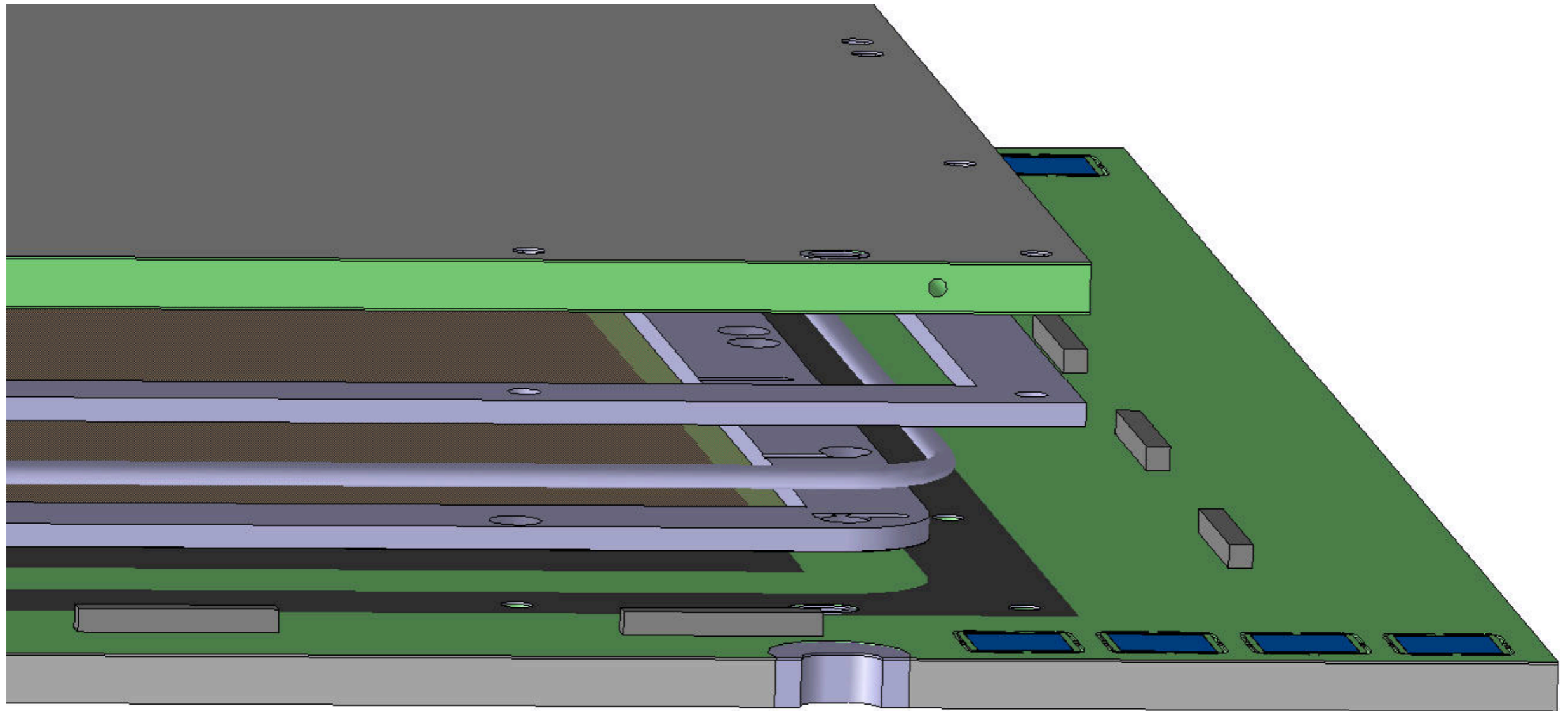
Layout - use a standard PCB plate - 1200 x 600mm
active surface (~900 x 450mm) - XY strips + resistive layer
materials: G10 frames / honeycomb / FR4...and some glue



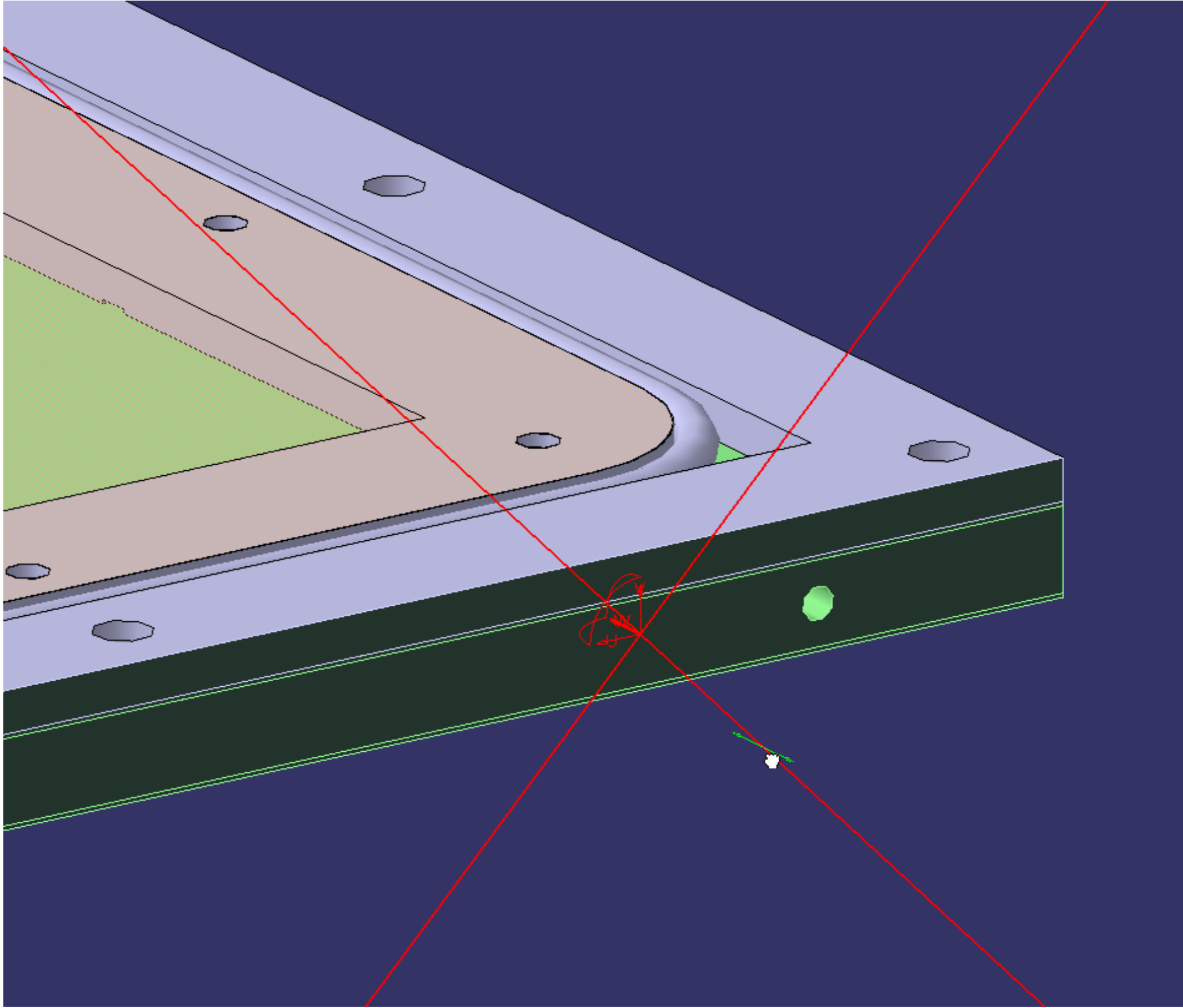
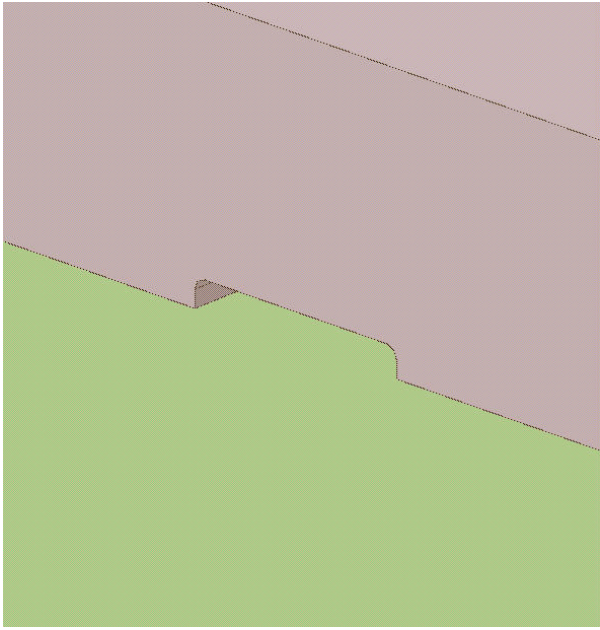
Layout contd. - key idea: every readout layer is interchangeable
rasmaks + copper strips deposited at the same time with other
positioners (crosshair like)



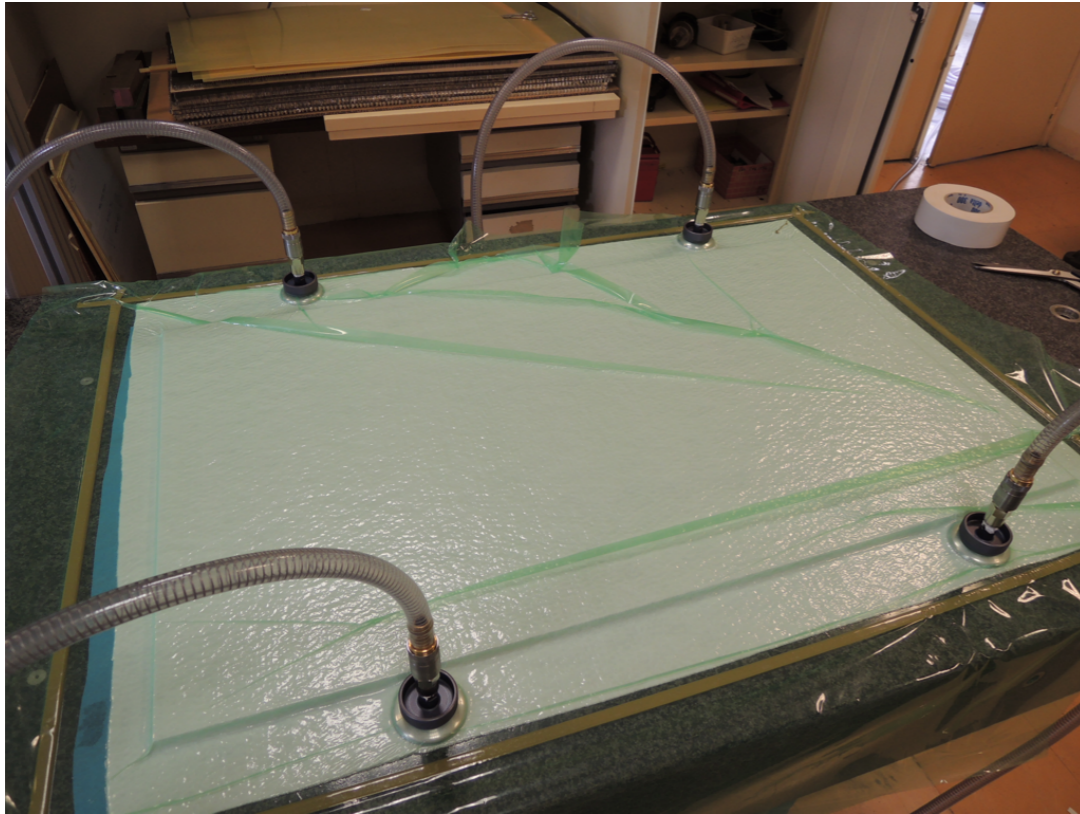
Layout contd. – piling sequence



Layout contd. - Gas services



Gluing procedure - Tests



Vaccum bagging: evenly distributed pressure over the entire surface regardless of the type or quantity of material being laminated.

At each step we will perform a careful metrology:

- pitch, resistive layer, thickness, planeity...

quadruplet assembly:

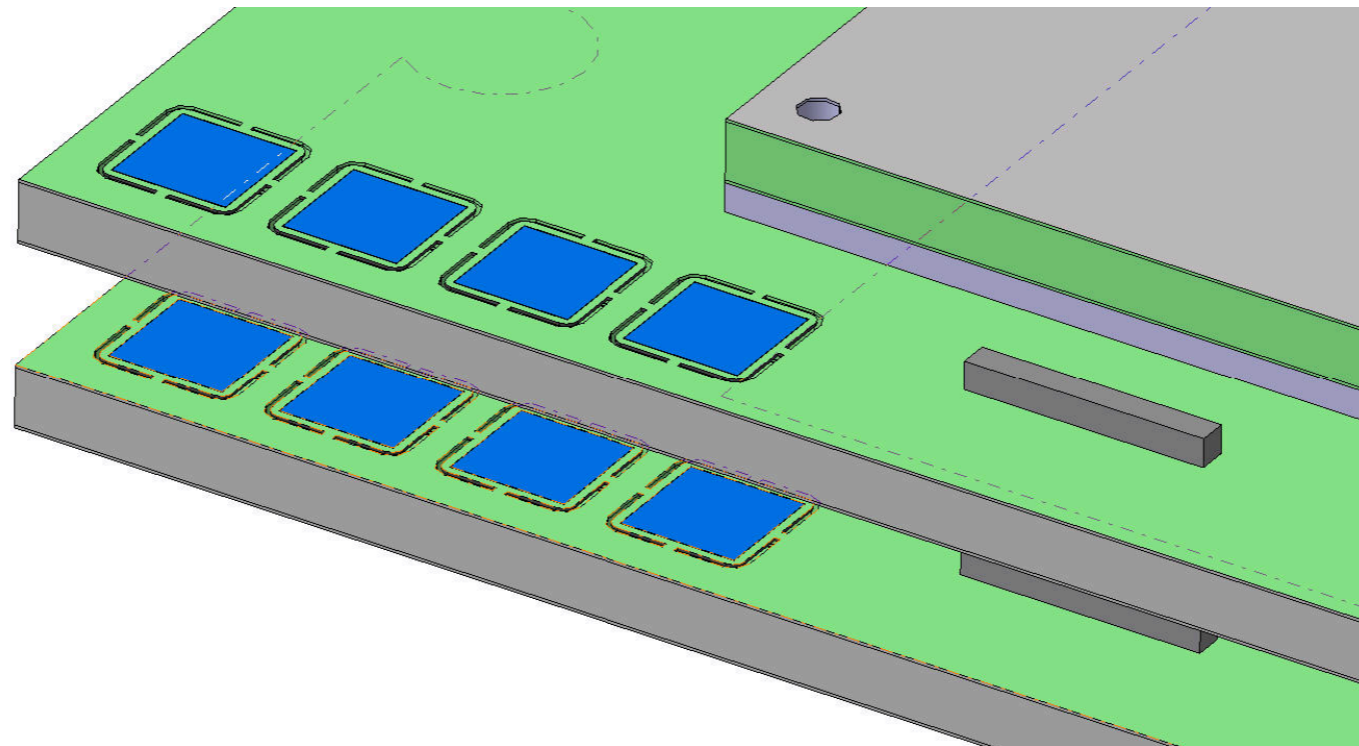
- doublet mounting
- alignment of 2 doublets to one another
- kinematical mounting between the 2 doublets



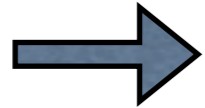


Alignment

- using rasmasks placed at each corner of the PCB
- use of an optical head on a CMM machine
- rasmasks can be seen on 2 successive layers back to back by **thinning** [Tested by Rui at the moment] the FR4 underneath the rasmasks
- if it is not accurate enough we replace the rasmaks by “glass rasmaks” → each layer has a calibration coeff. in order to readjust to every other one layer



Operational Tests

- cosmic bench
- DAQ  SRS system using the APV elx cards
- beam test

So the MLO...

- Effective layout (XY - resist)
- Services [Elx - Gas and all associated parts]
- mechanical assembly via screws for simplicity and be able to swap/change any part
- this is not a attempt to a solution but a working concept of a quadruplet to be able to do some physics with!!!
- Custom alignment hardware will be needed
-raising the issue of space...and many others...

Perspectives

Institutes who wants to join are more than welcome -

Goal is to have this MLO in the
ATLAS pit in December 2014