Ciemat Mechanical Structure Proposal for a DHCAL m^3 Prototype.

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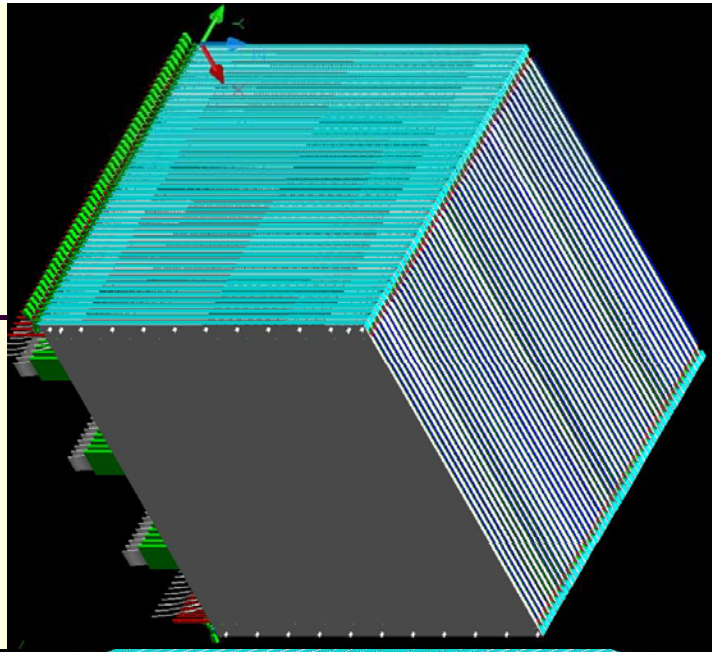
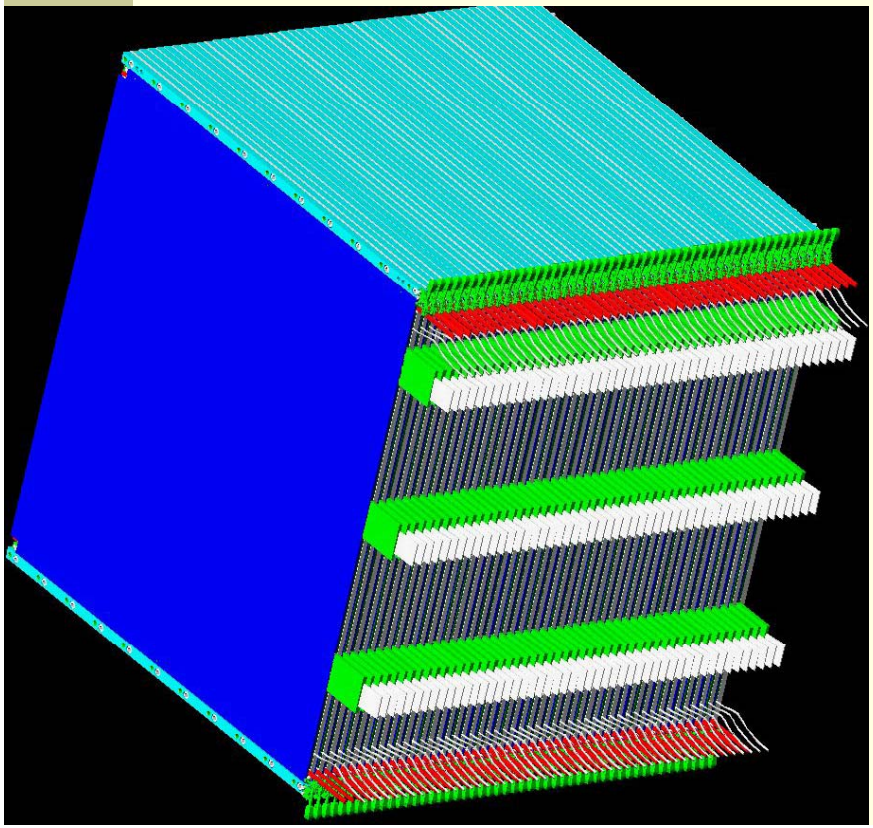
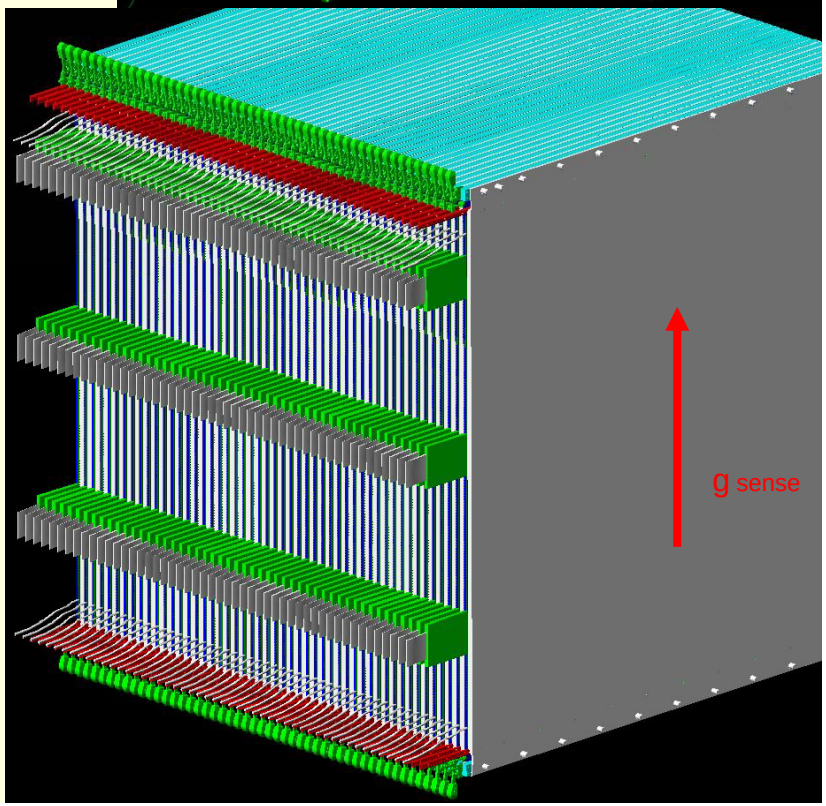
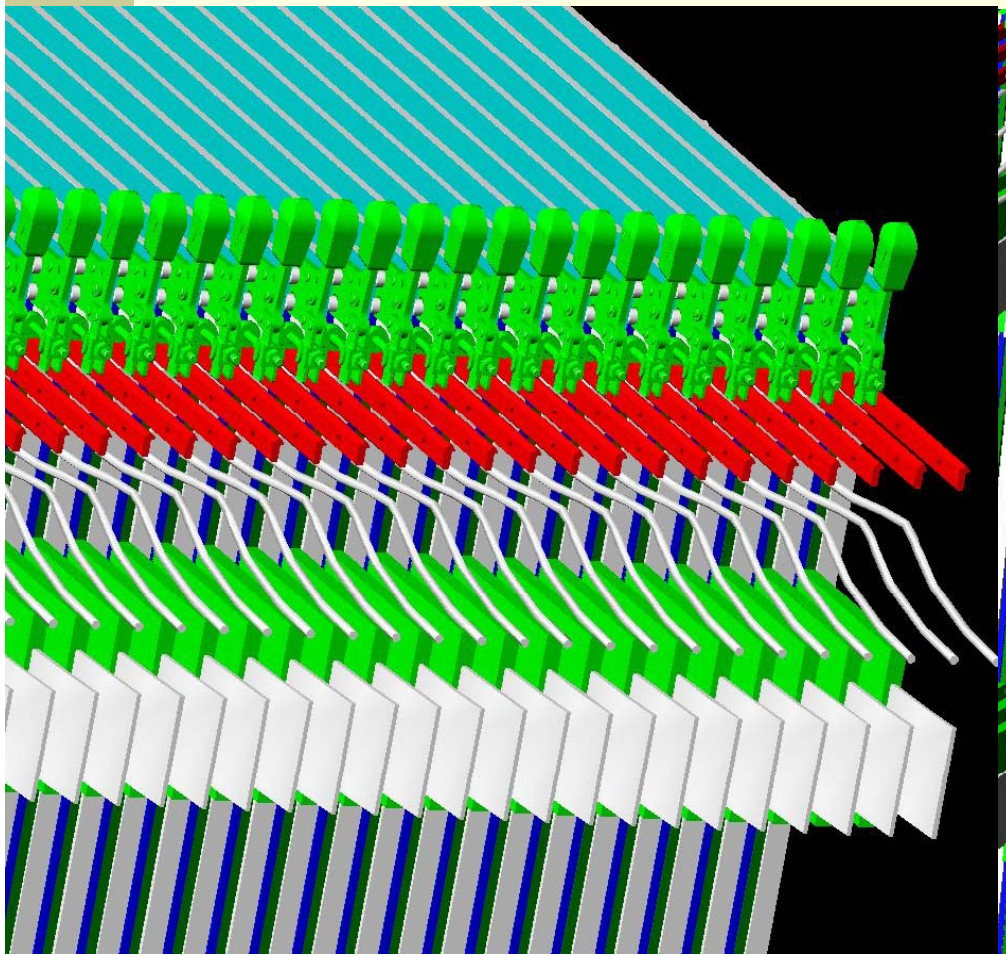
Here is shown the 3D of 1 m^3 module:
-Composed by 50 layer of 20 mm thinness.
-Each layer have 3/6 DIF Board and 2 gas pipes.
-The gravity sense is shown on the pictures.

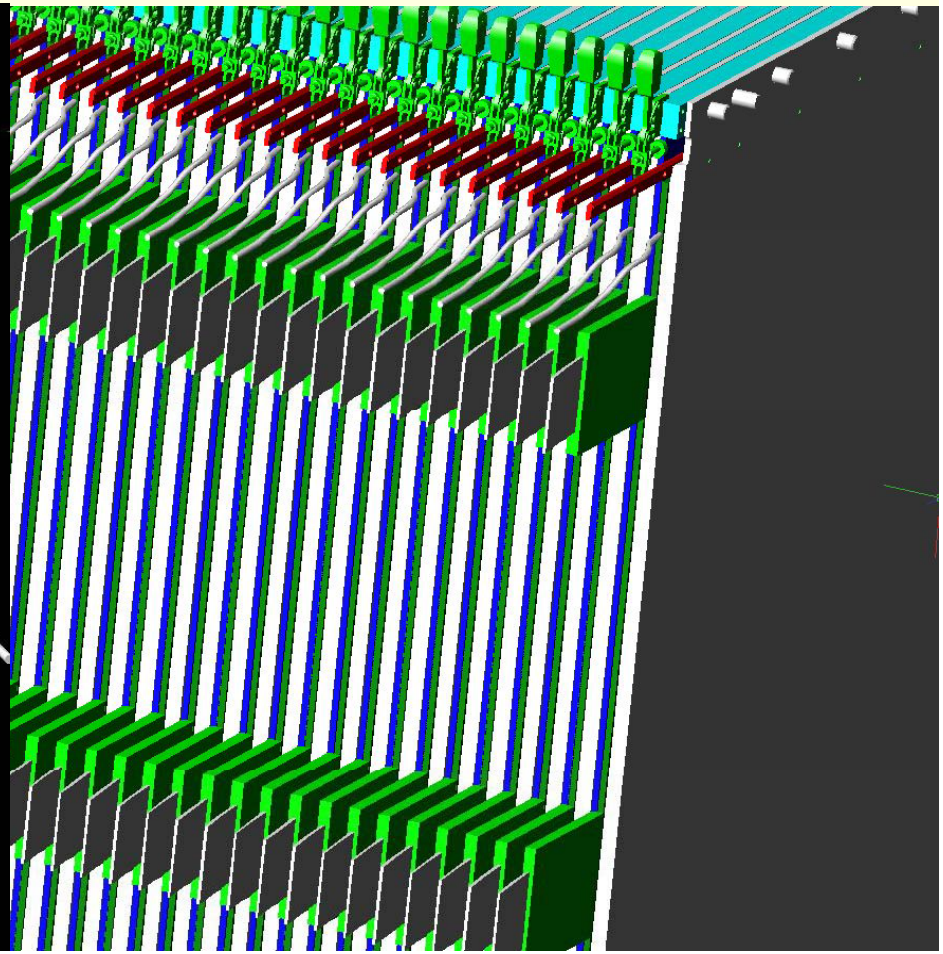


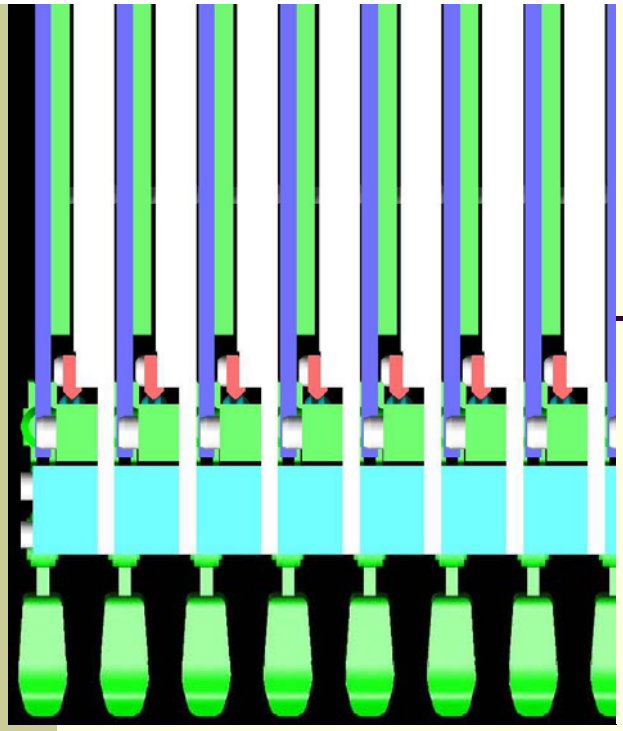




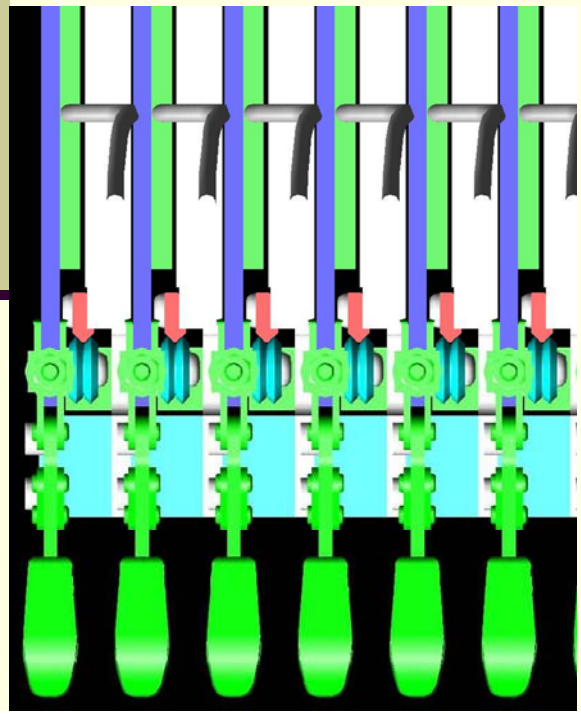
Details of the layout distribution.



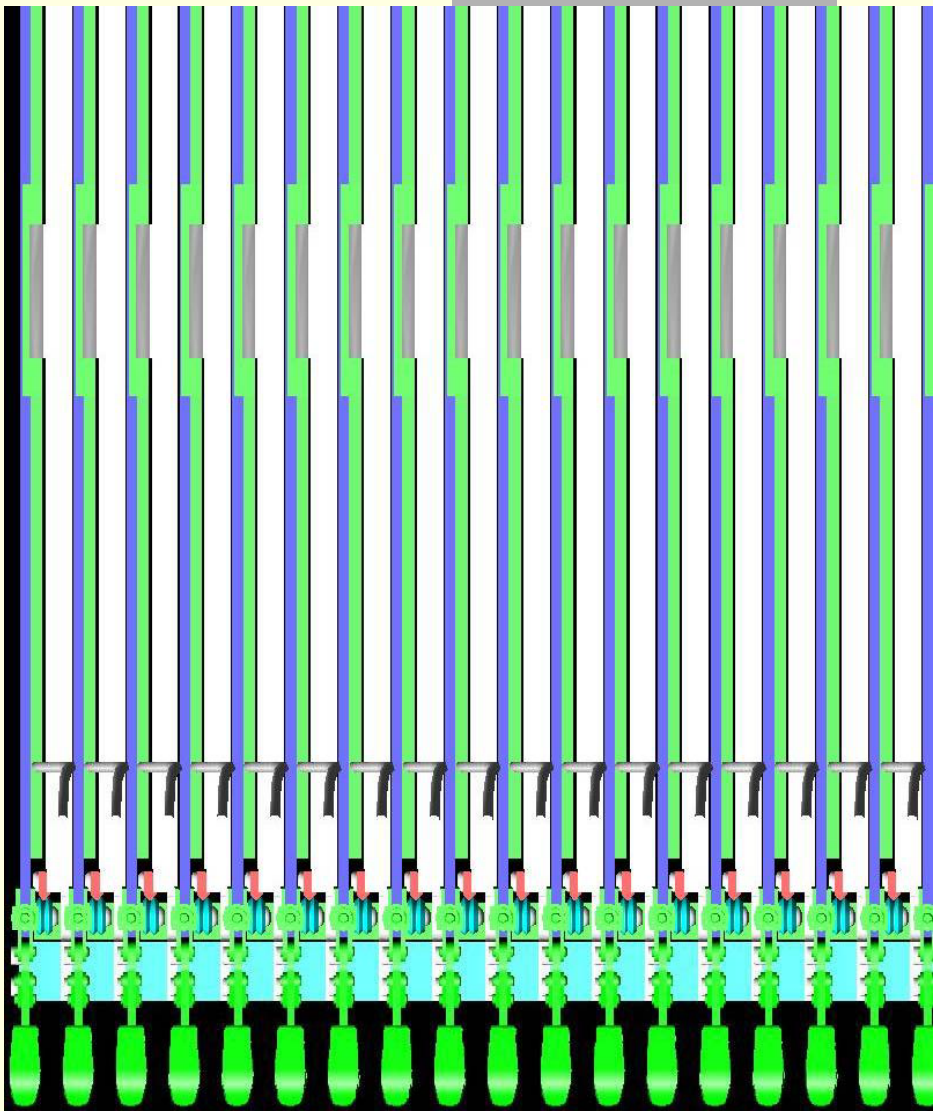


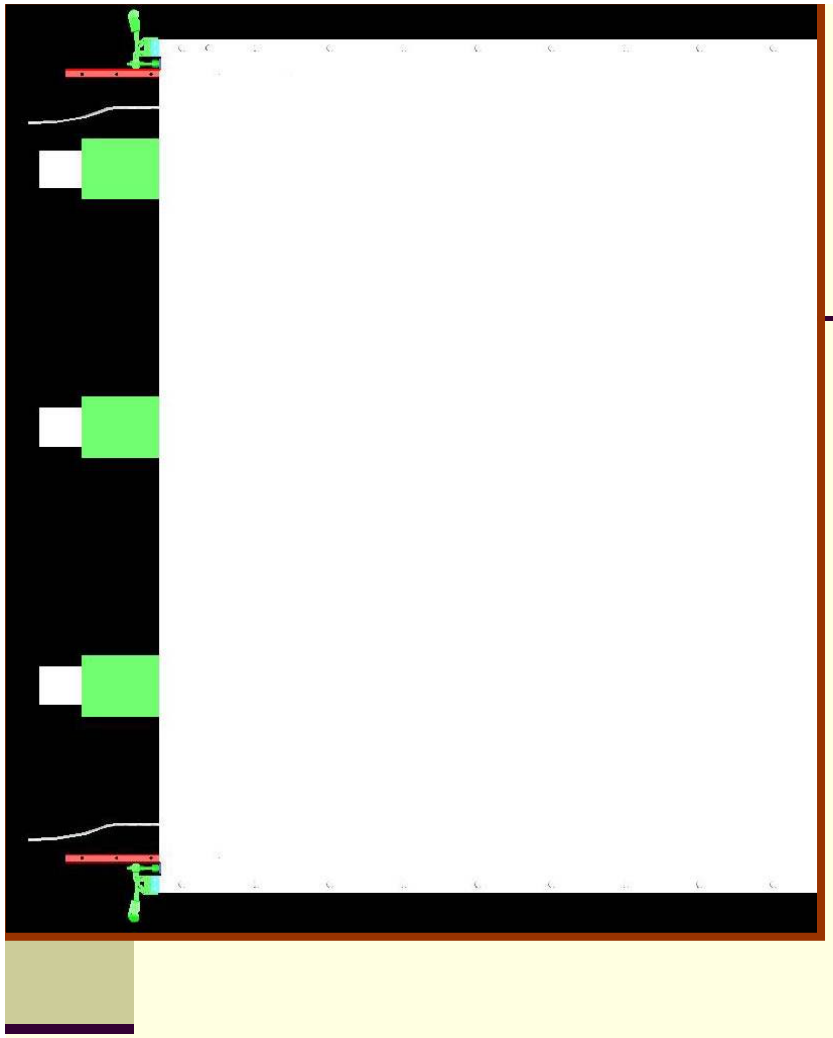


Rear view, that shows details of the layout distribution.



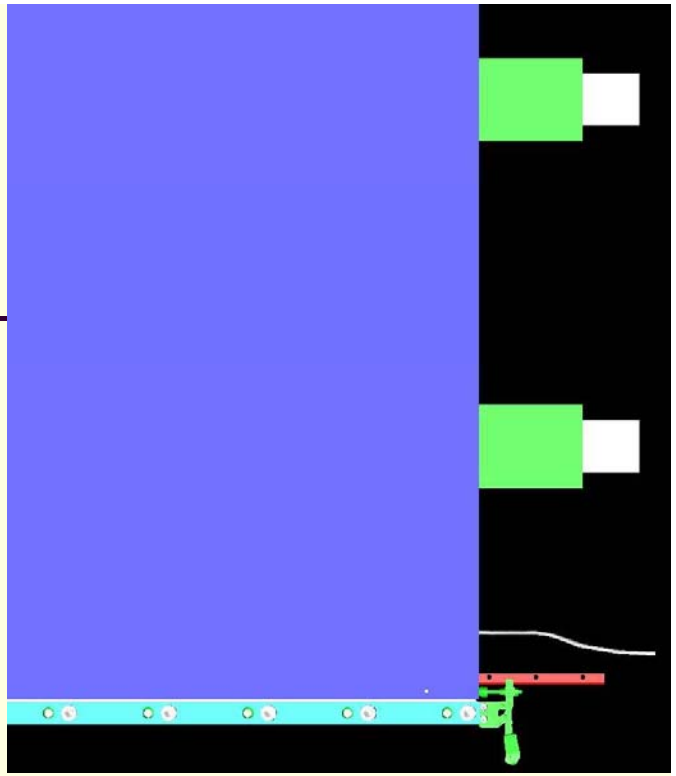
Front views



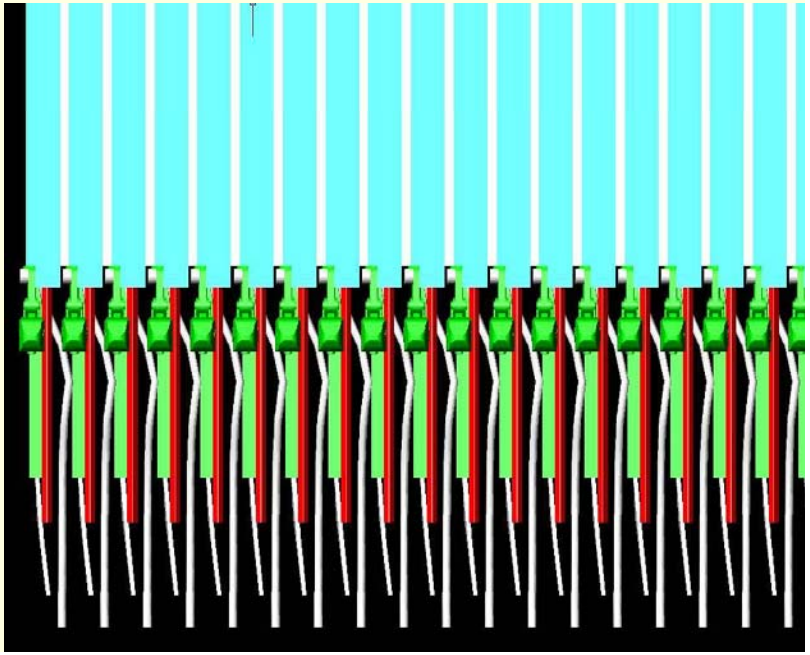


Lateral views that shows more details of the layout distribution.

Are showed:
2 Pipes, 3 DIF boards and 2 guide rails.



Top view.
Detail of the DIFs, Pipes and guide rails on each detector layer.



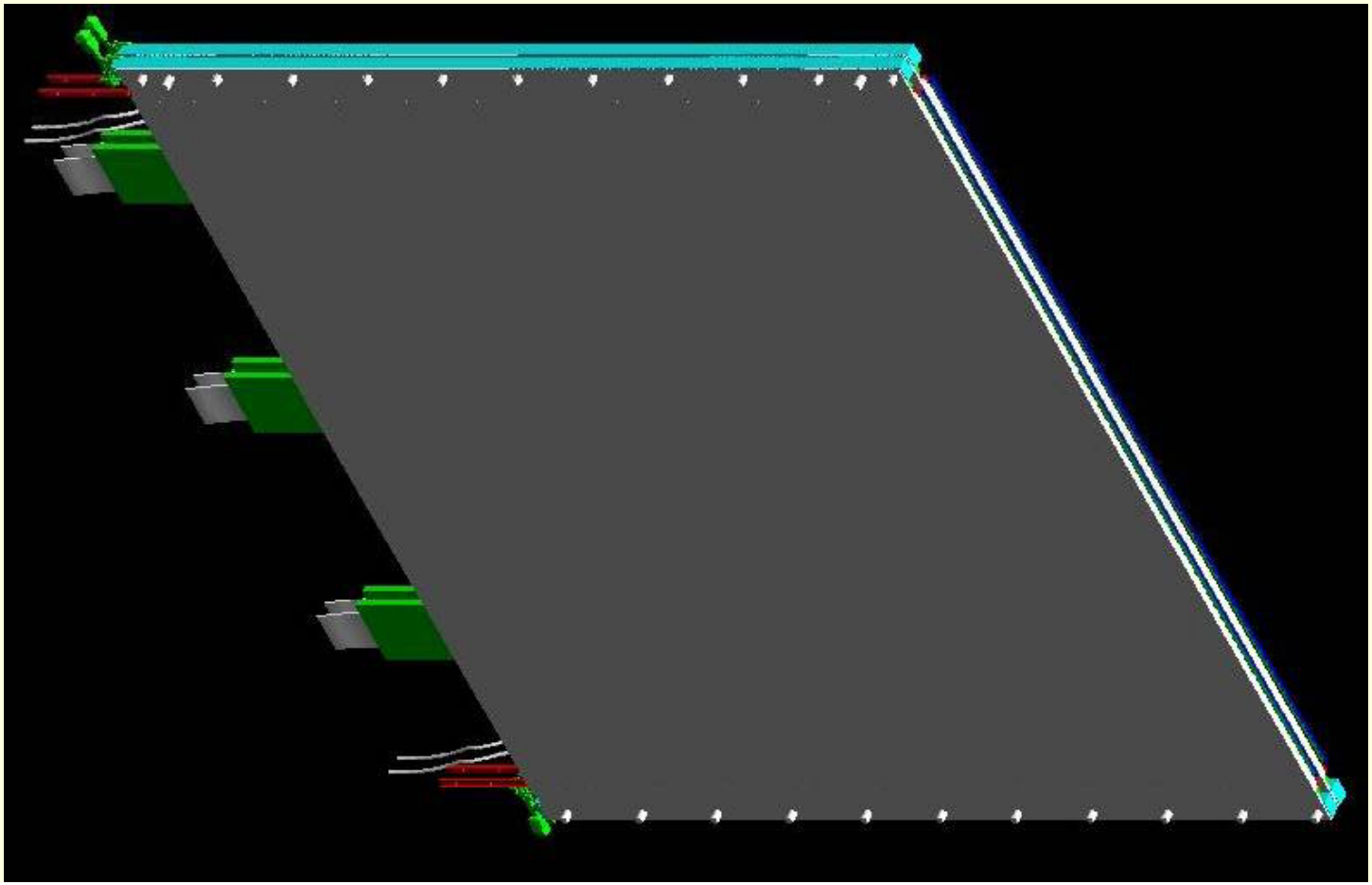
The layout distribution is modular. And can be piled as many layer as we need to assembly 1 m3 module. The basic repeat units it is composed by two layer of 20 mm each (Showed on the figure)

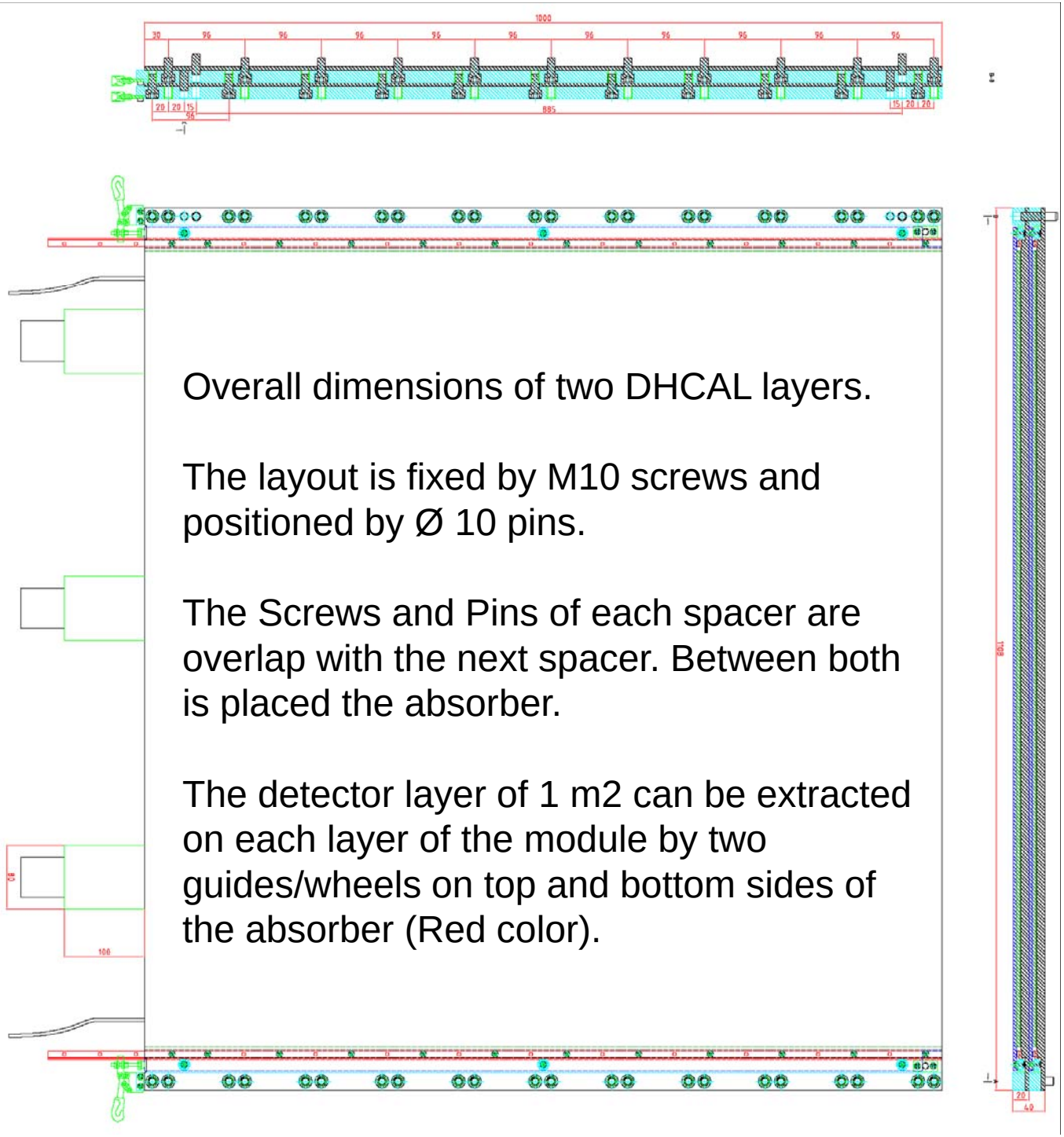
The absorber structure is composed by:

-Absorber layer (White color).

-Spacers (Top and Bottom) between absorber (Blue color).

-Top absolver have 2 Pins Holes, on the extremes, to permits the alignment between layers.





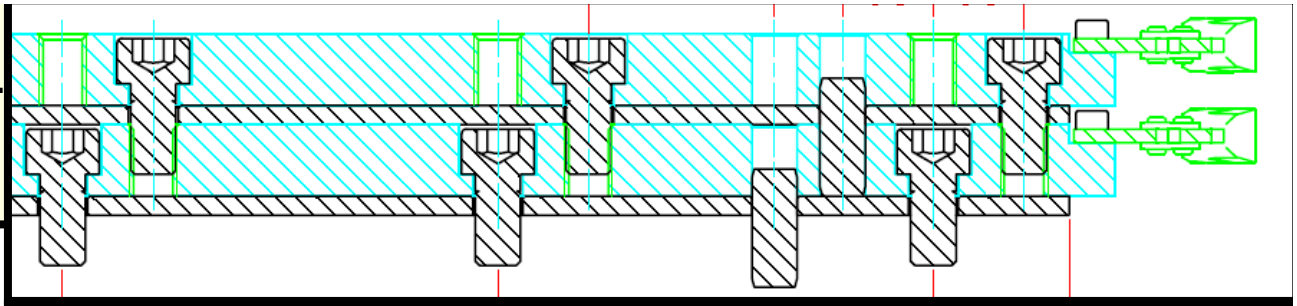
Overall dimensions of two DHCAL layers.

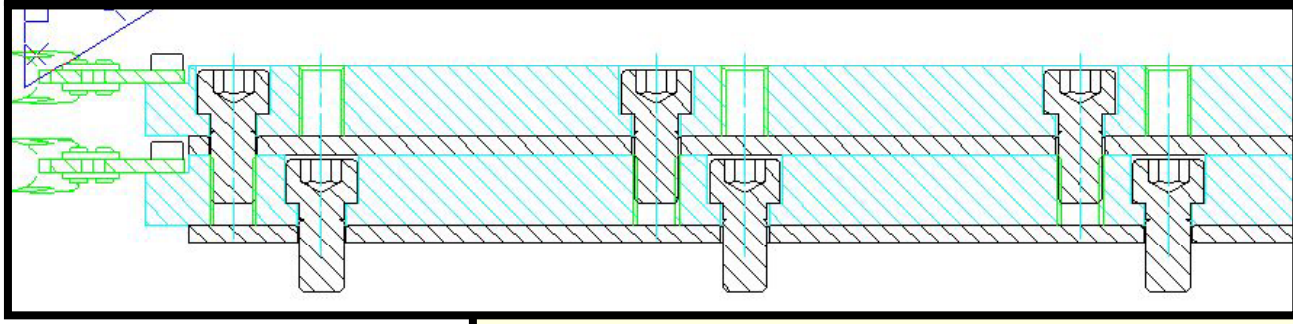
The layout is fixed by M10 screws and positioned by Ø 10 pins.

The Screws and Pins of each spacer are overlap with the next spacer. Between both is placed the absorber.

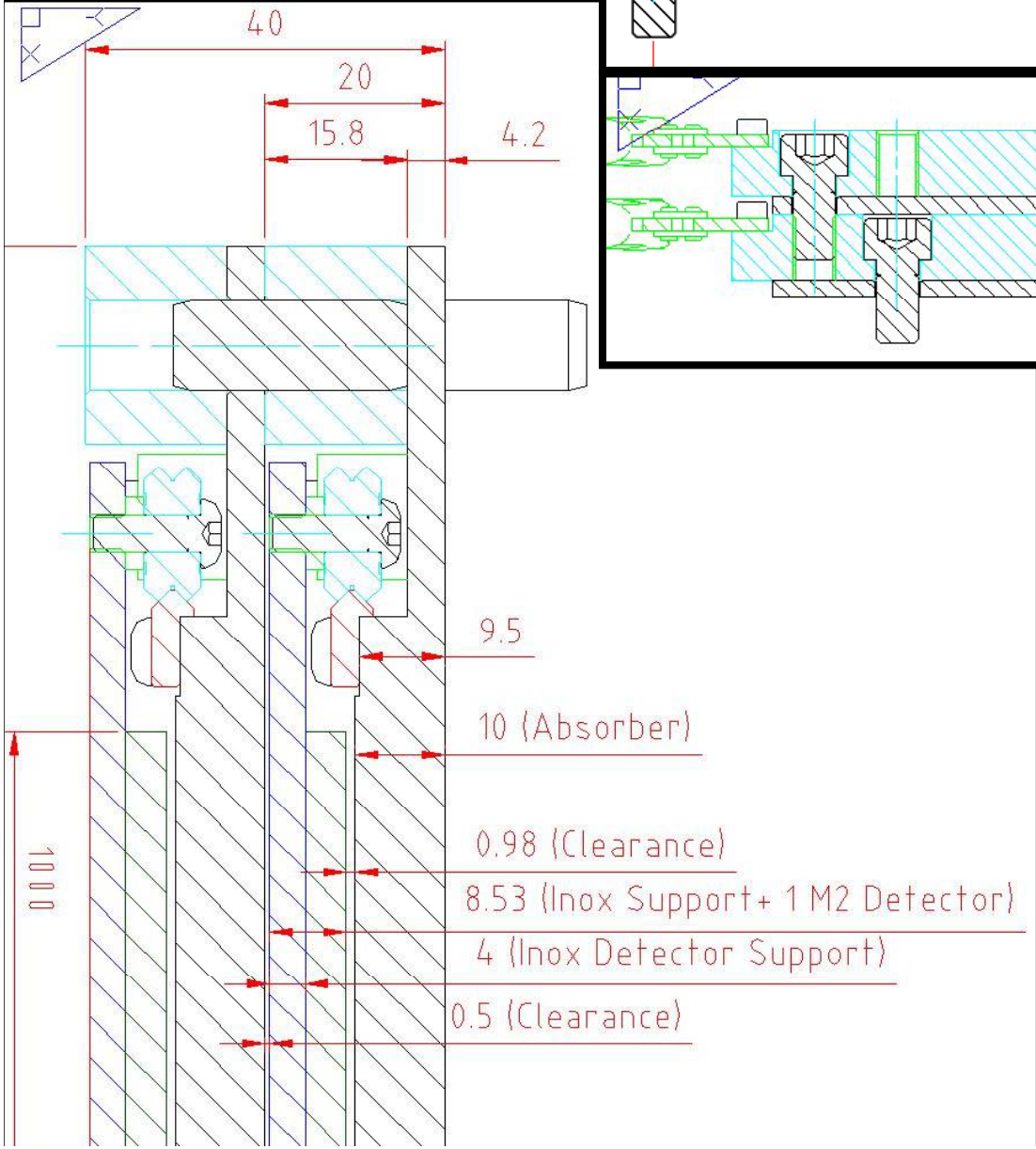
The detector layer of 1 m2 can be extracted on each layer of the module by two guides/wheels on top and bottom sides of the absorber (Red color).

Top Spacers.



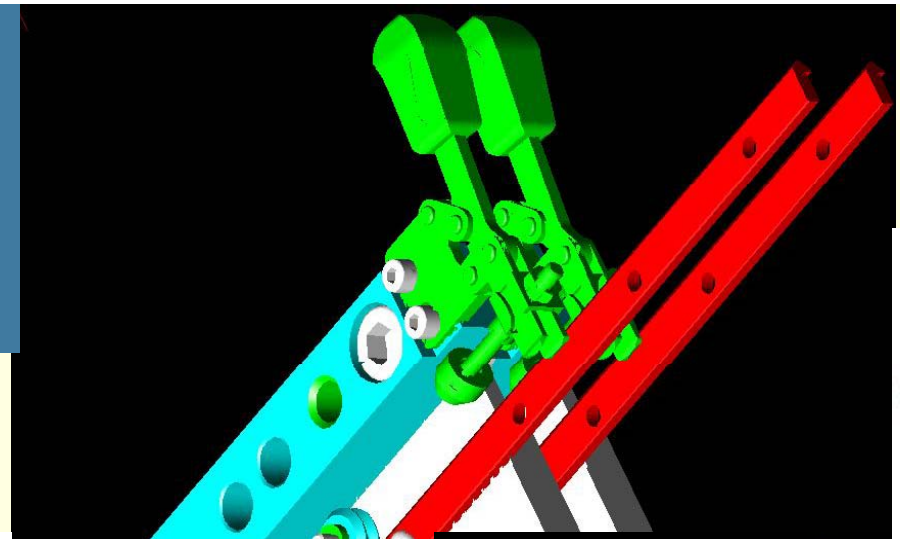


Bottom Spacers.

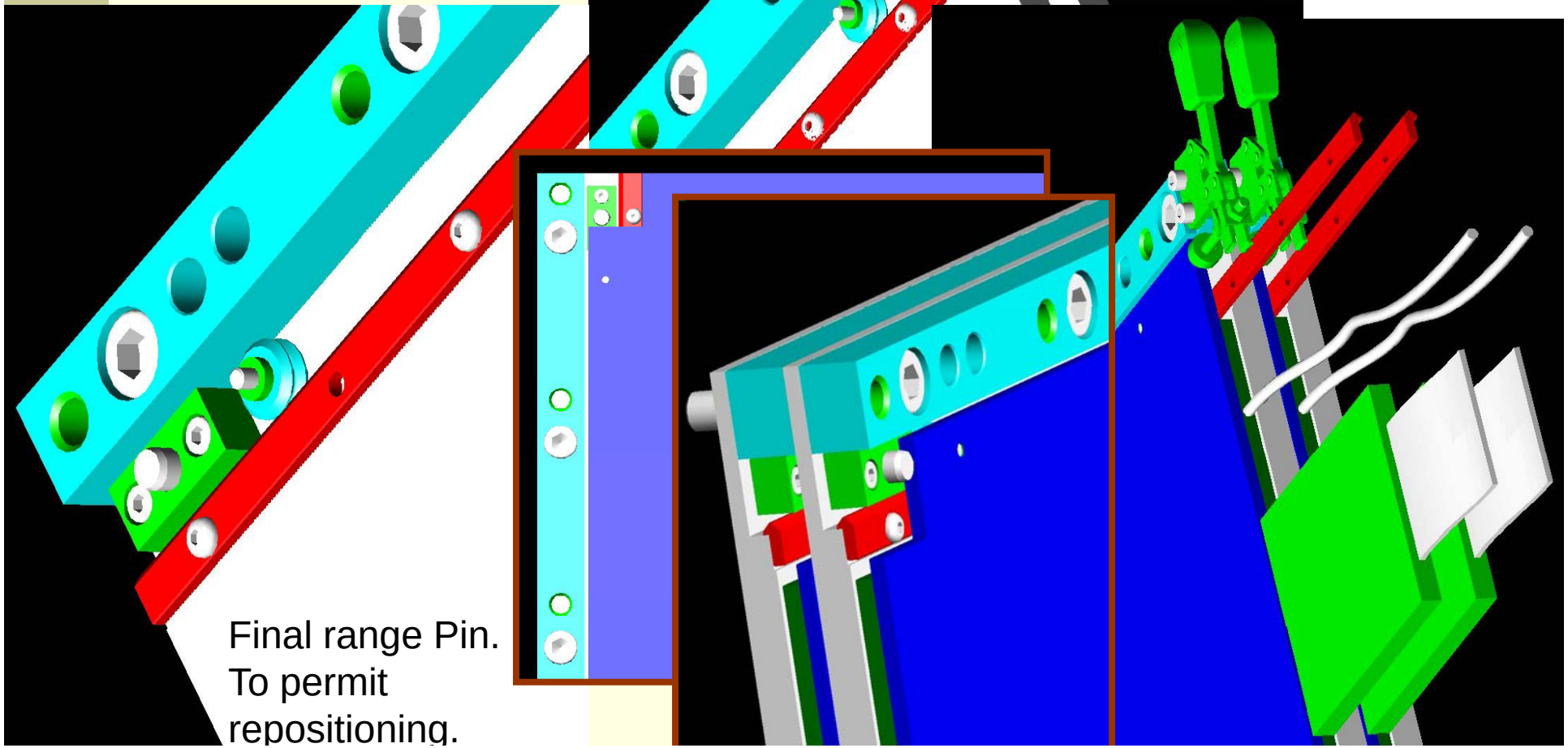


Layout details:
(Theoretical dimensions)
-Absorber 10 mm.
-Clearance 0.98 mm.
-1 M2 Detector 4.53 mm.
-Support of Detector 4 mm.
-Clearece 0.5 mm.

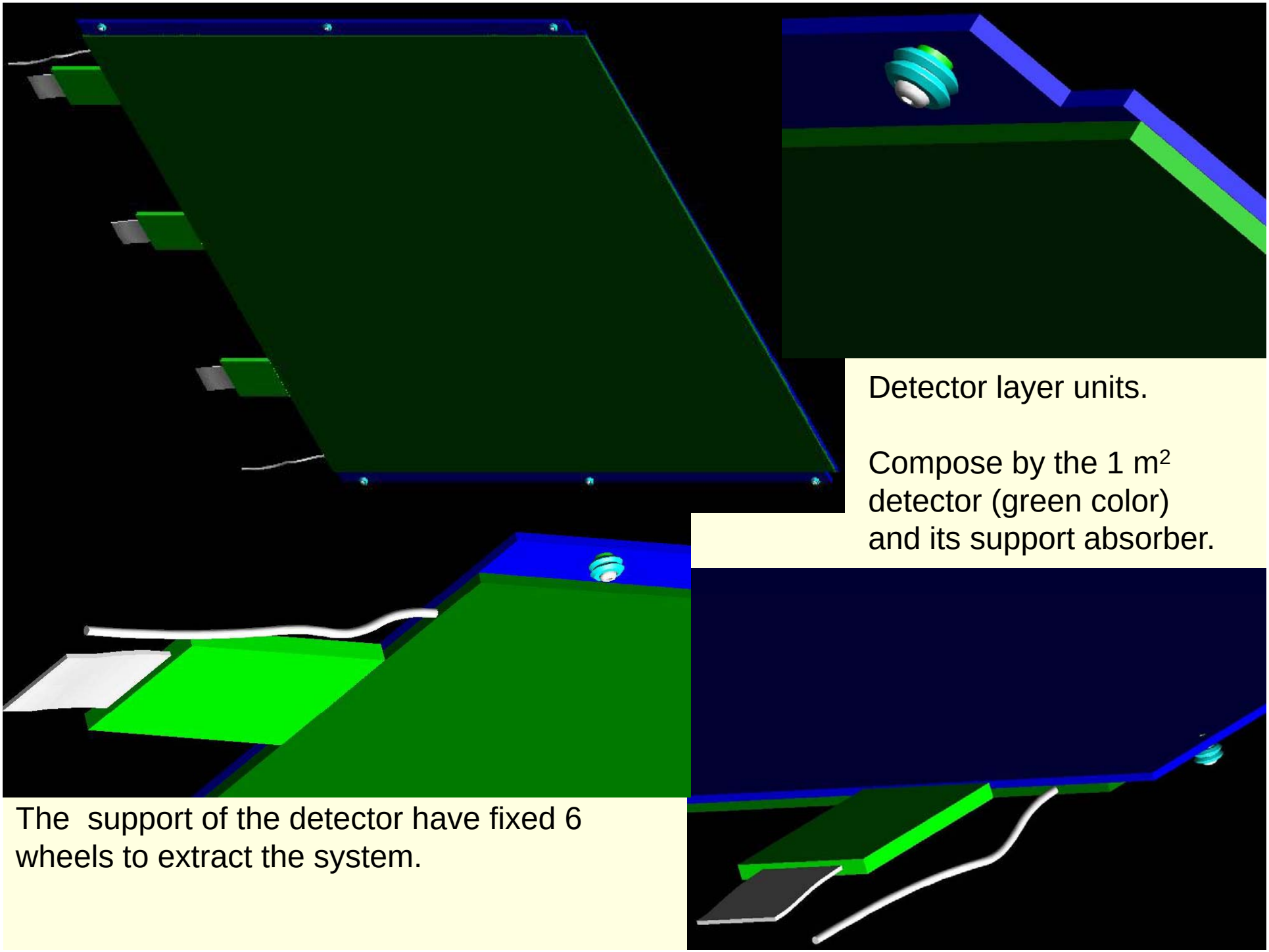
Details of the guiding and repositioning system.
The rails are fix on the absorber.



Attachment device.



Final range Pin.
To permit repositioning.



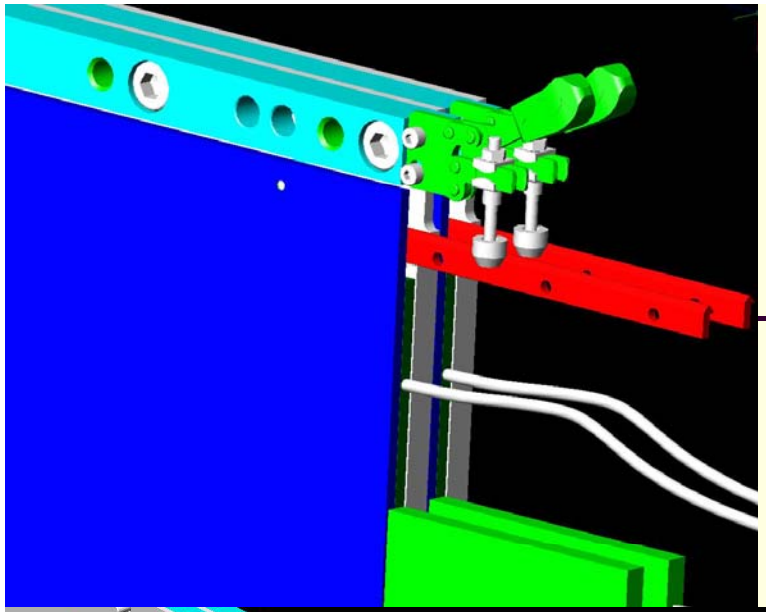
Detector layer units.

Compose by the 1 m^2 detector (green color) and its support absorber.

The support of the detector have fixed 6 wheels to extract the system.

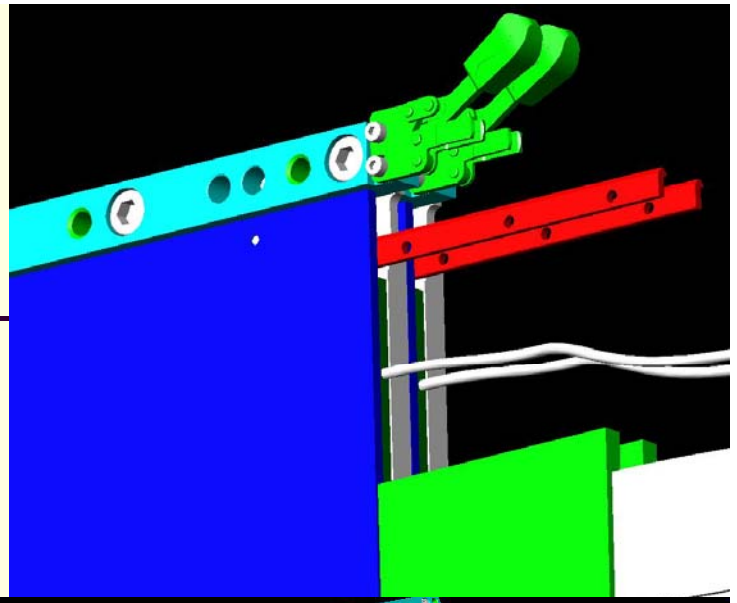
The support absorber is a Stainless steel.
Here is shows a prototype plate (1000x1000x4mm^3) made at Ciemat with holes to host the chips to support the 6 PCB for the electronics of the first large prototype.

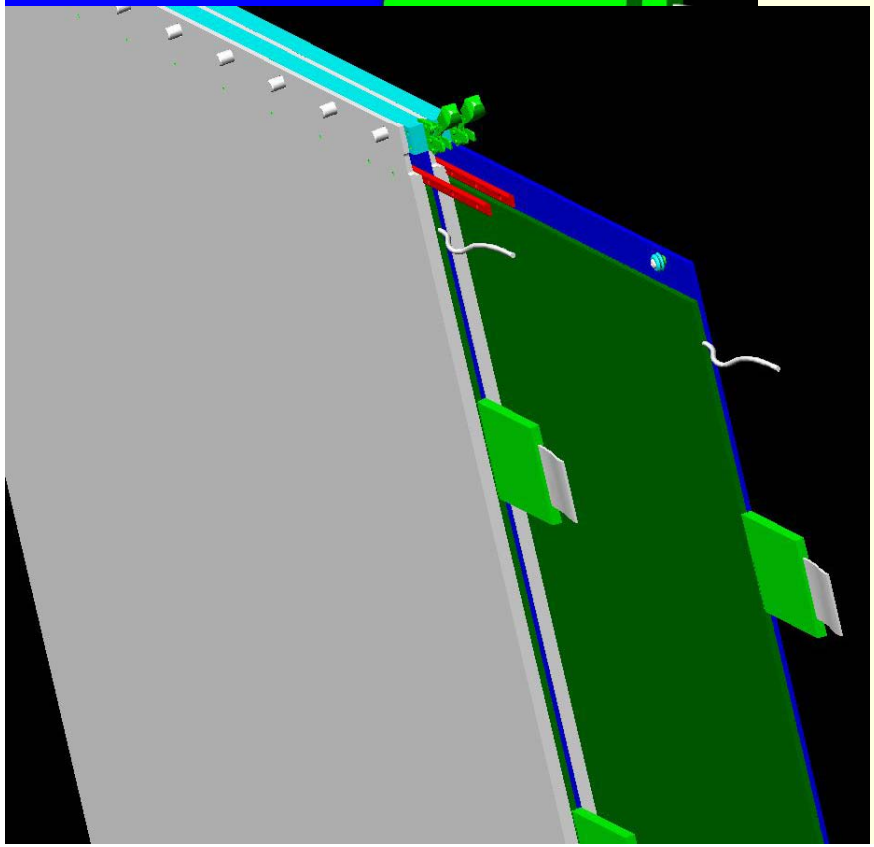
The construction problem, to do this job, was fillets the M1 holes.
We are doing test yet. But we think that we can not do the M1 at the Ciemat workshop for the 1 m^3 calorimeter.

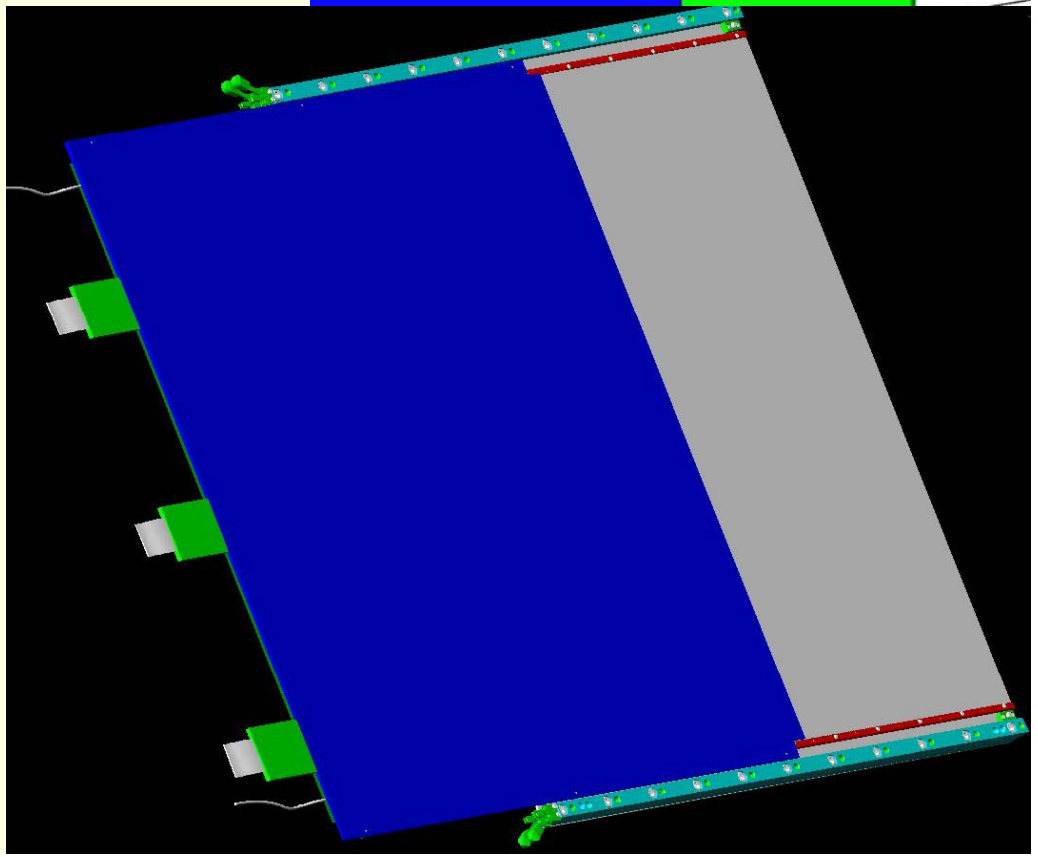


Detector layer under extraction.

To can do that need put the attachment device on the extraction position. And remove the extreme.







Fabrication constrains at Ciemat:

During this year, the workshop will be remodelated This can take 6-9 months. And this can start between final of May to August.
During this operation the big CNC machines will be not operative.

Next steps

- Fix the positioning tolerances of each detector layer in the calorimeter module prototype.
- Define the alignment procedure and references to include on the layers, to know the internal positioning between different detector layers.
- Define the interface support with the calibration setup.
- Fix the design of the calorimeter module prototype, with the different designers implied. To start the material survey and the fabrication as soon as possible.