PMTs motherboard

02.06.12 LaBiodola

Massimo B. , Gabriele Simi

SuperB FDIRC
PMTs MotherBoard baseline

Backplane = 8 Mboards of 6 PMTs each

MBoard: simple structural profile + PCB in order to:

-Support PMTs in precise position ($\perp$ and // to quartz window)

-Allow FE boards insertion without forces on connectors and PMTs

-Transmit signals to FEbs, 64 contacts/PMTs or <200 contacts/FEb required

Baseline:

- Samtec SQT on PMT side for both signals and HV+GND
- Connectors on PMTs do not allow elastic mounting then
- Clearance PMTs to Quarz avoids compression on PMTs and interferences with quartz due to: piling up tolerances, FEb insertion, Fbox thermal deformation
- Erni connectors Mboard to Feb
- PMTs type C
- HV daisy chain
- PMTs $\perp$ position driven by set-screws acting on PMTs corners, secured by the M3 screw

SuperB FDIRC
MBoard to FEb connectors

Baseline: Non-ZIF Erni connectors

ERNI SMC-Q 64004 press fit connector

50 contacts/pc, 100 contacts/PMT

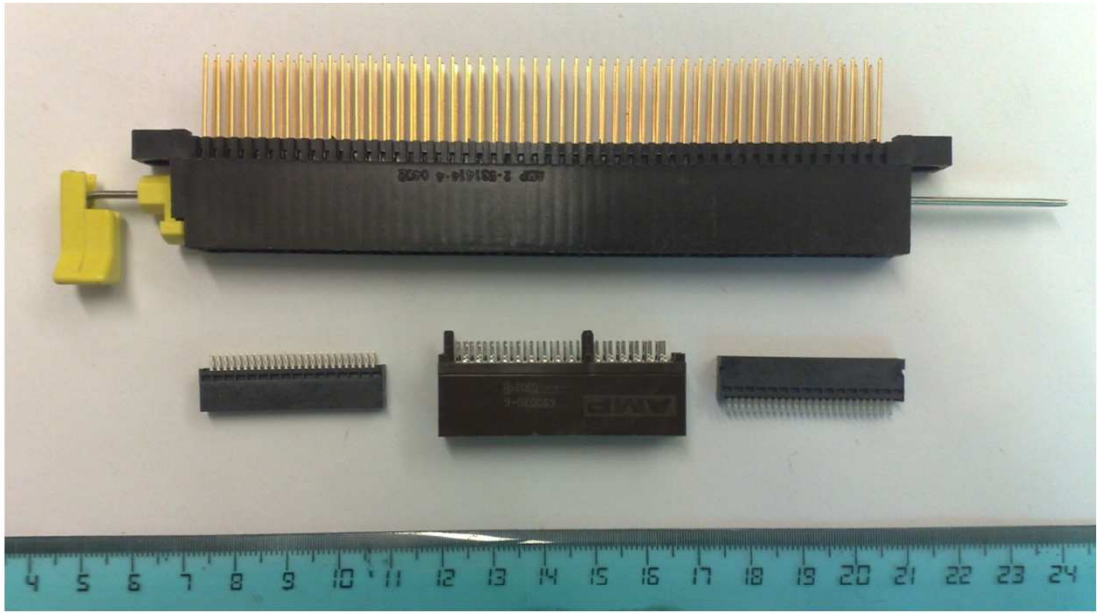
Quoted BW 3 GHz

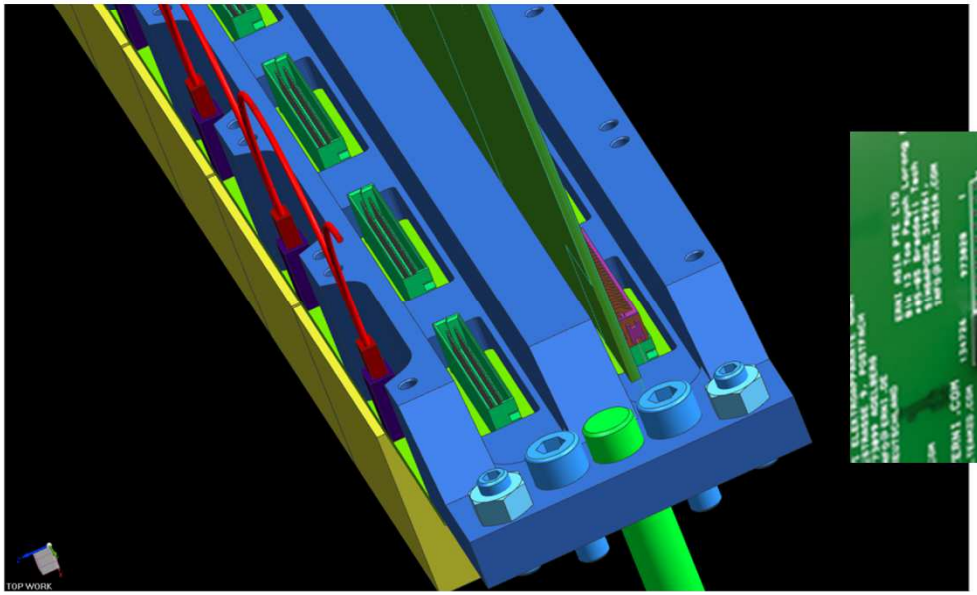
Press fit: only male connector

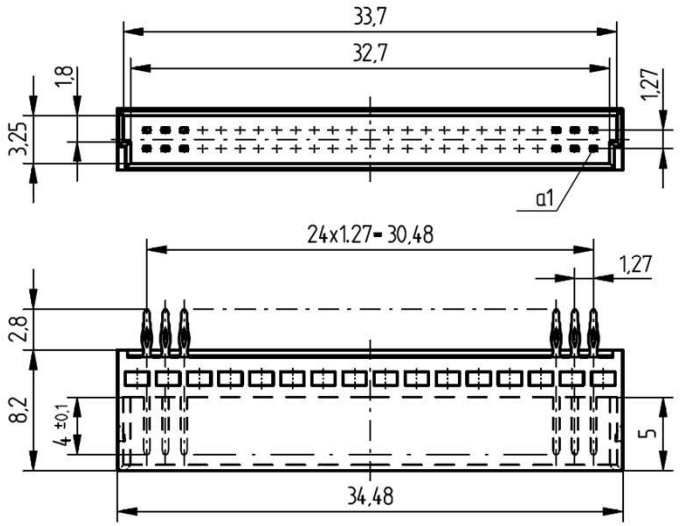
Insertion force 26N each (datasheet)

160N/Feb (row of 6 connectors)

Best if centering feature e.g. pre-alignment module, to be fit the Mboard... in progess







SuperB FDIRC
PMTs Backplane

Beam structure sag

Deformation of aluminum bar, section 50x20, 3 wings 5-10-5 mm thick, under 160N of distributed load

Sag ≃ 50 um of alu bar

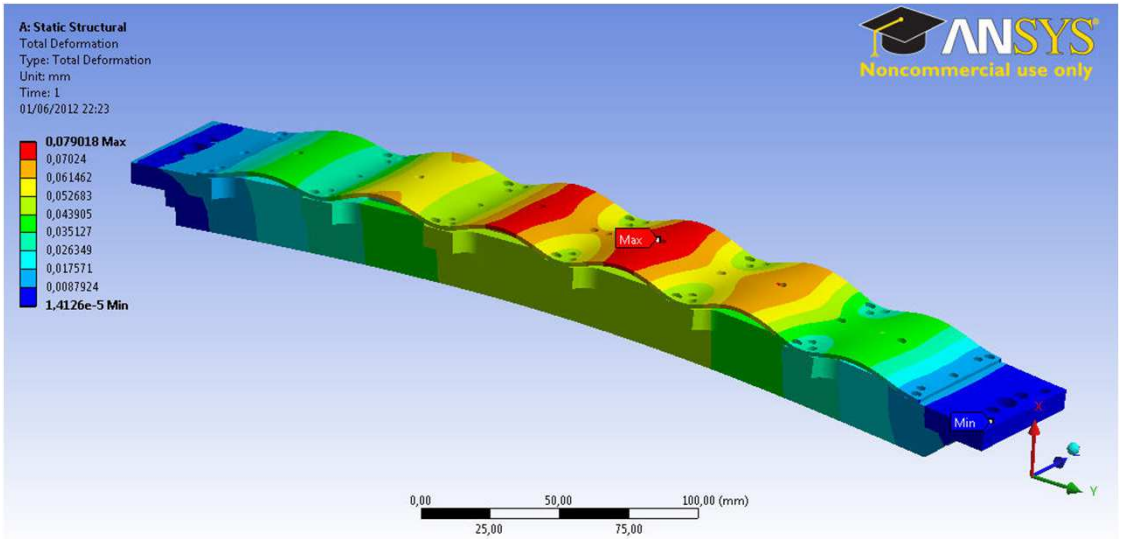
PCBs deformation depending on thickness and coupling to beam structure

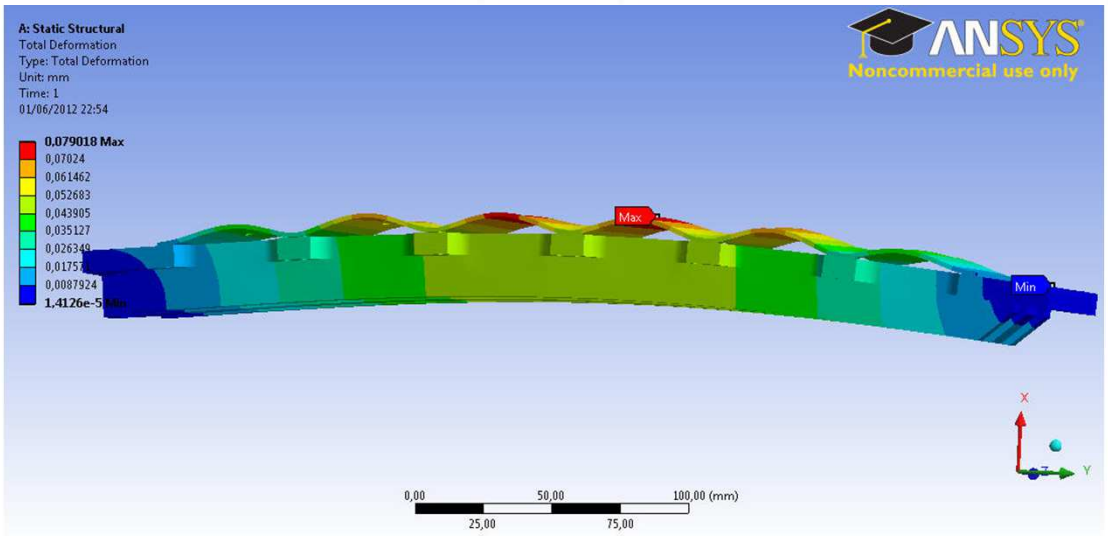
Requires many coupling screws or PCB gluing to structure

Add tolerance, thermal effect …

suggested clearance of 200 - 300 um

(PMTs built-in average clearance … 60 um?)



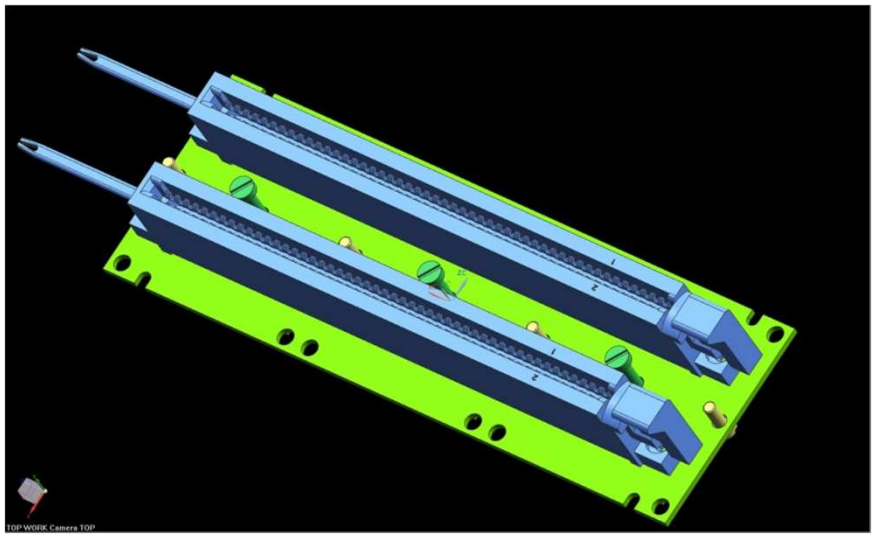


SuperB FDIRC
Why not AMP ZIF connectors

Rotary ZIF connectors AMP 531414

Large dimensions due to pitch of 2.54 mm, lenght of connector body ≃ 150 mm

50 dual contacts, 200 contacts each 3 PMTs

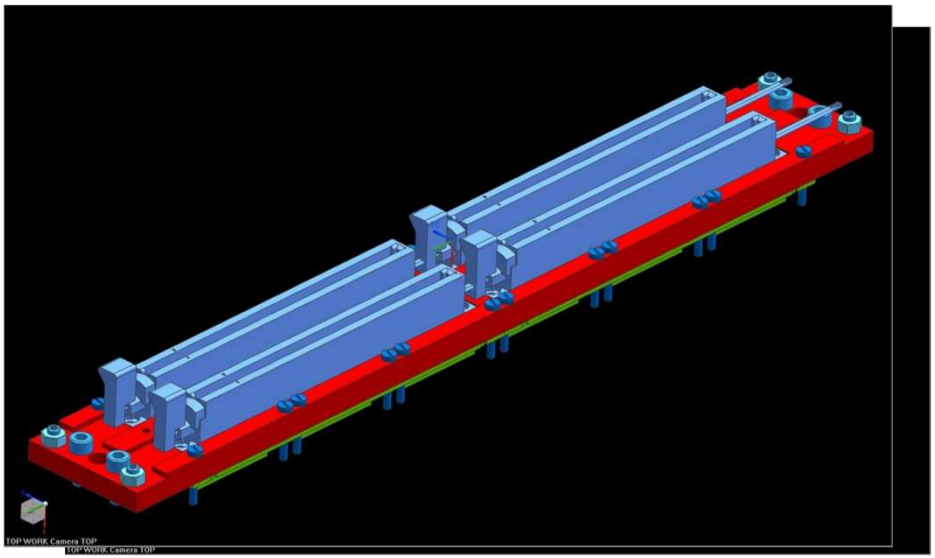


Pro

Zero force, zero deformation of Mboard, torque not negligible but low bar deformation

Possibile Cons

- Bandwidth not quoted
- Require access to cam levers
- Prone to bad contacts?



Running out of production !!

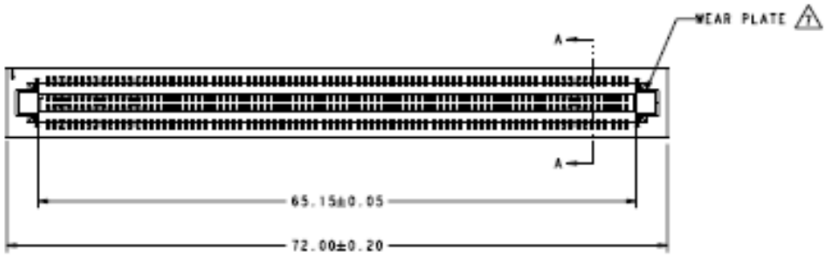
Tyco does not suggest this family of connectors

SuperB FDIRC
Other suggested by TE

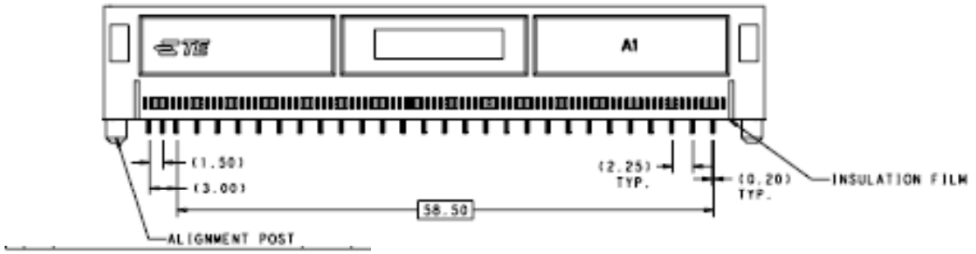
"If you want a product with bandwidth, please use:

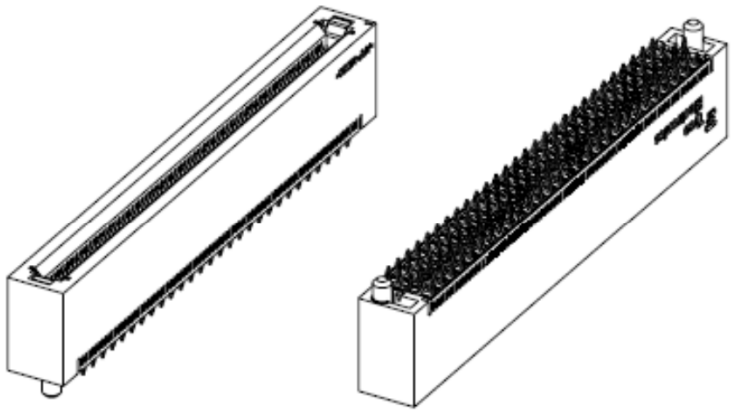
1932632-1 the more available

1934768 less contacts " (50 … 110 …170)

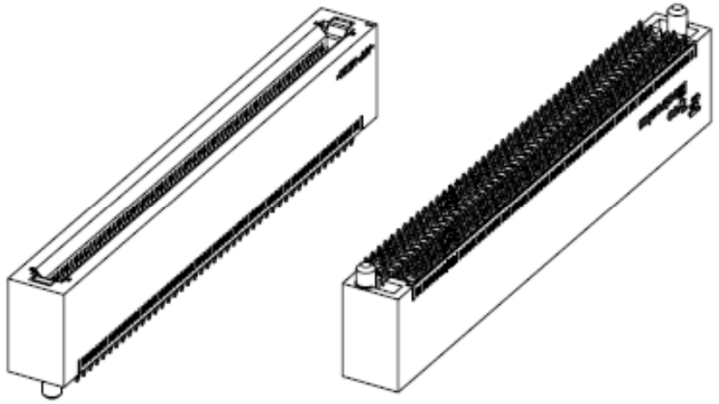


Still missing both bandwidth and insertion force





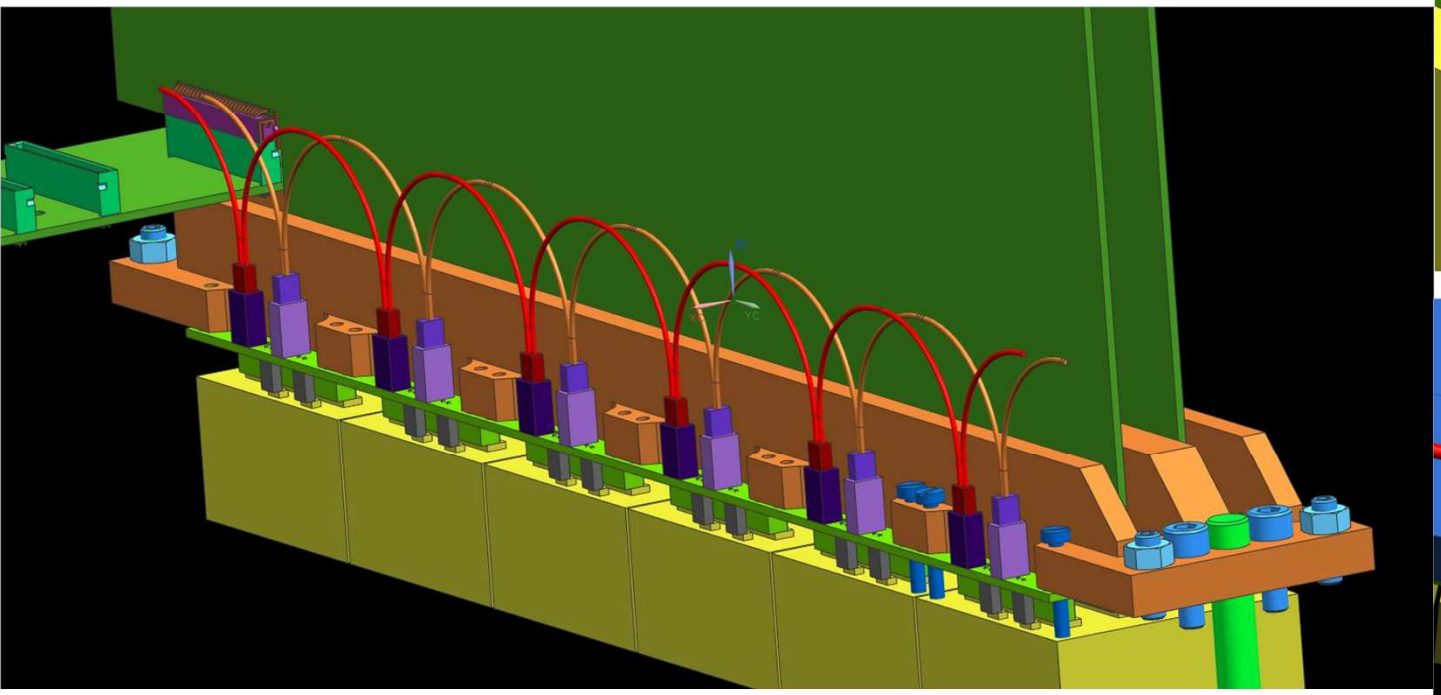
PART NUMBERS
2-1934768-1 THRU 3-1934768-6
DIFFERENTIAL PAIR CONFIGURATION

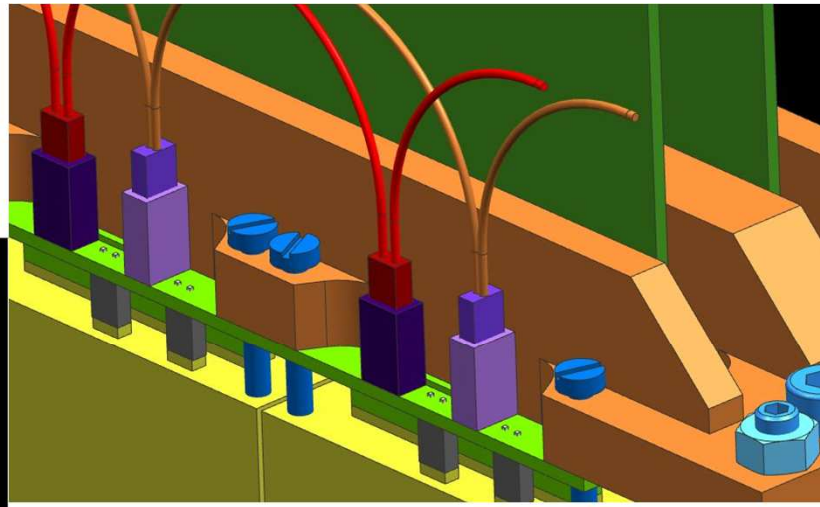


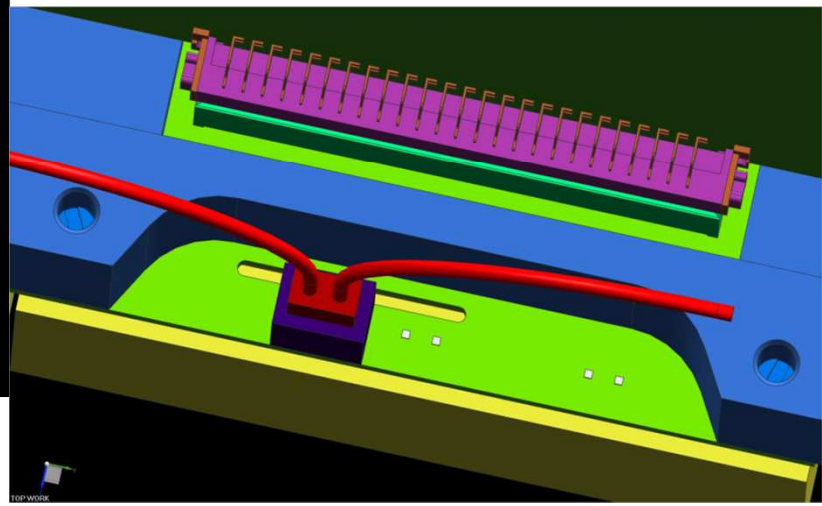
PART NUMBERS
1934768-1 THRU 1-1934768-6
INDIVIDUAL SIGNAL CONFIGURATION

SuperB FDIRC
HV distribution baseline: PMTs of type D

Baseline: HV and ground distribution by daisy chain
HV connectors on PCB just aside to PMTs HV connectors, short HV path
Cut on PCB to minimize risk of surface currents (as Hamamatsu)
Same for GND
HV+GND connectors not defined yet (any suggestion welcome).
Ground for signals can run separately

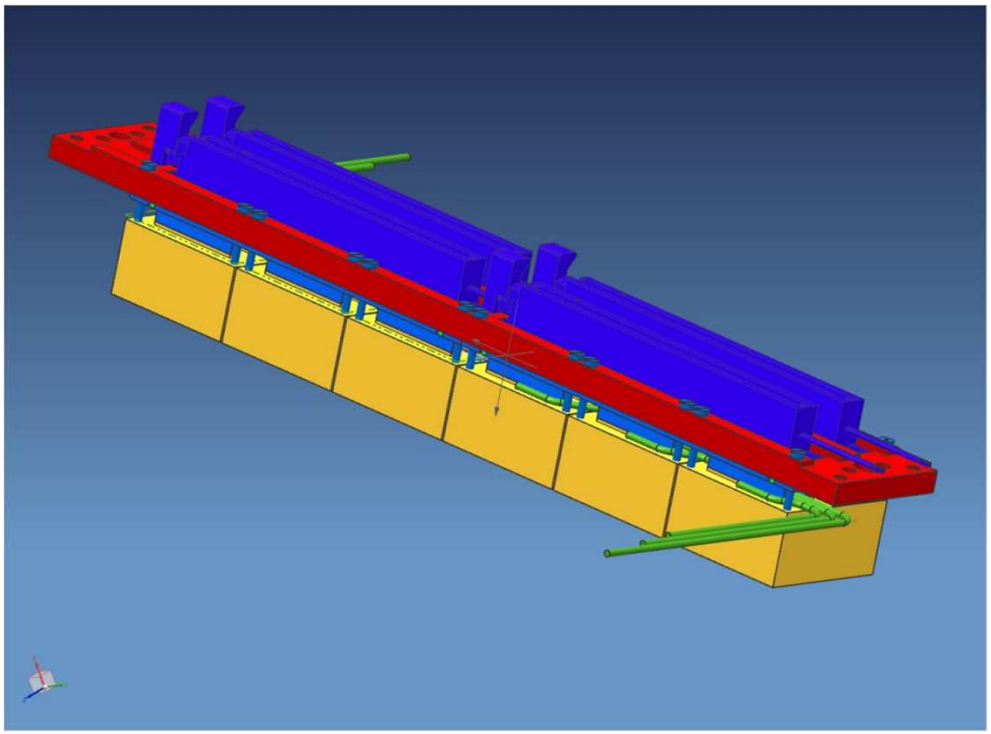


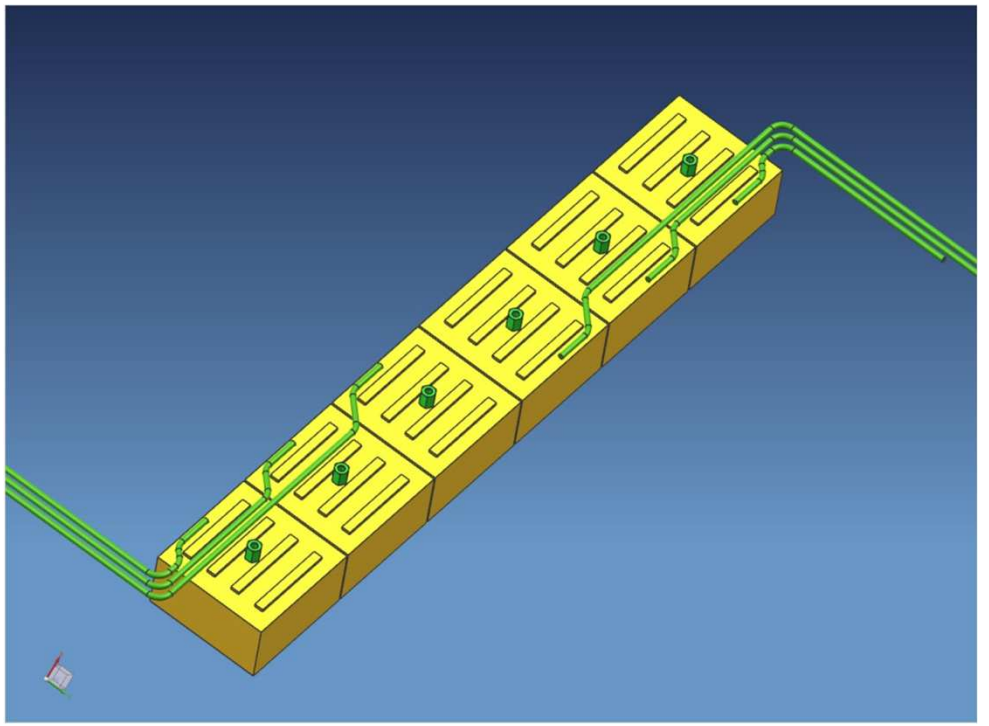




SuperB FDIRC
Safe backup: PMTs of type C

HV cables of each PMTs running between top of PMTs and bottom of PCB (7.5 mm gap)
E.g. 12 cables per «crate» corner: not really a mess
Requires dismounting additional 1or2 PMTs to remove PMTs of 2°, 3°, 4° 5° row.
Gas tightness or air circulation of the 7.5 mm gap more difficult
Handling , installation, dismounting of the 6 PMTs bar more difficult (bar with piggy tails)





SuperB FDIRC
Mboard assembly procedure

Preliminary acceptance checks of geometry / dimensions of PMTs, PCBs, alum. bars

Mount and screw PCB to bars (reference pins), check PCB position and flatness etc…

Insert PMTs on PCB connectors

Mount on jig (reference to bars end reference faces)

Level PMTs faces (e.g. set PMTs against reference face)

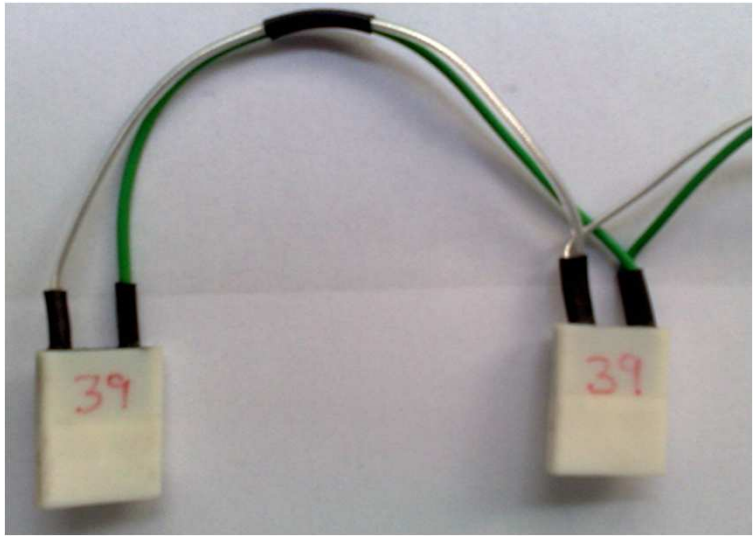
Tight set screw (acting on PMTs top face corners)
Tight M3 screw (center retaining screw)

CMM Measure, any other test (connections, HV, gnd …)

SuperB FDIRC
Going to prototype

HV and GND Daisy chain

- missing HV connectors definition
- Start test/assembly/produce daisy chain …missing dedicated technicians



Do we design Mboard for current Fbox?

Or for the «final design» updated with crate interface?

For more realistic model

- Missing FE boards and connection board dimension
- Missing connector FE boards to Connection board definition