BCM1 Mechanical Structures, Integration and Installation

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Summary – BCM1

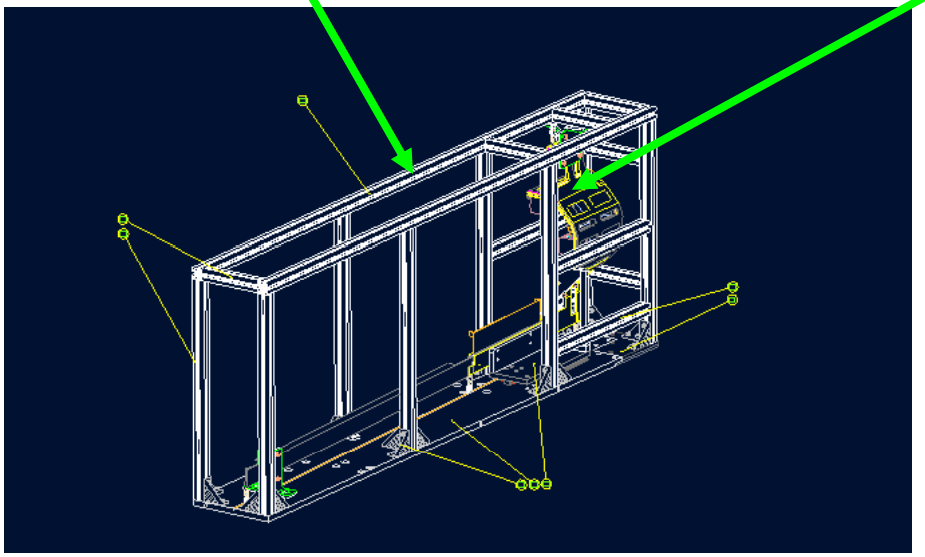
- BCM1 Installation cassette
  - Combined function as installation and transport
- BCM1 Installation sequence
- BCM1 cabling PP0/PP1
- BCM1 maintenance scenario

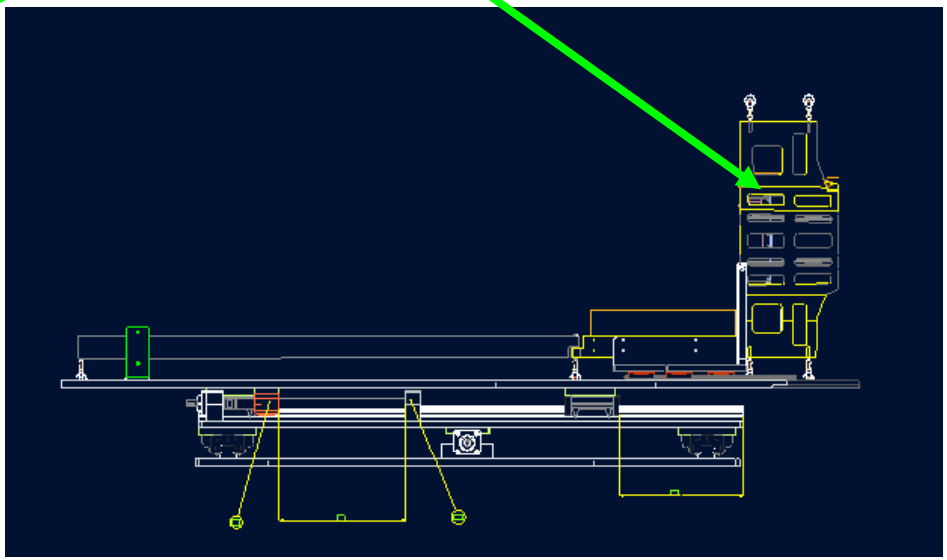
BCM1 Combined function

The design is fixed and under construction

Bosch-rexroth 20x20 mm framing
Aluminum profiles

BCM1/PLT carriage





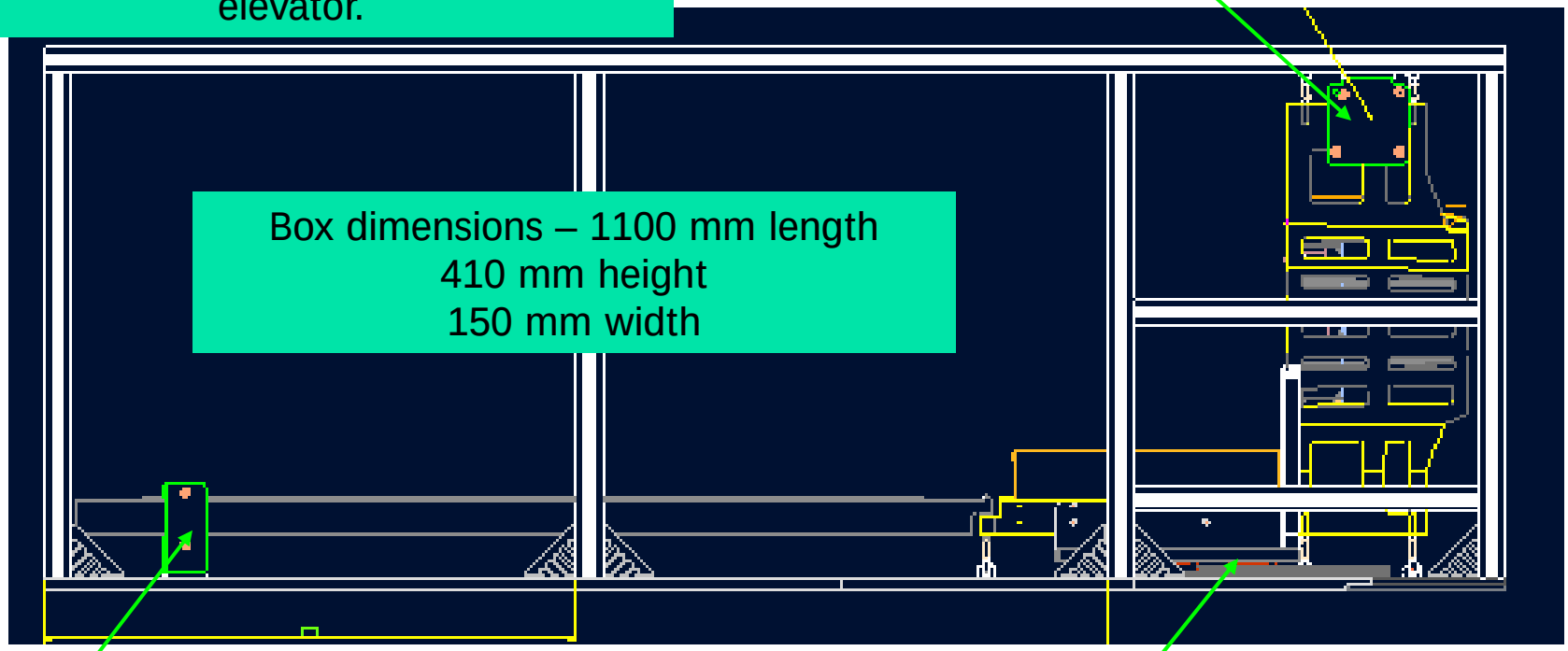
Transport frame

Installation system

BCM1 transport

Transport from TIF, Meyrin to Pt 5, UXC, pixel installation table.

Transport cassette will be lowered in the elevator.



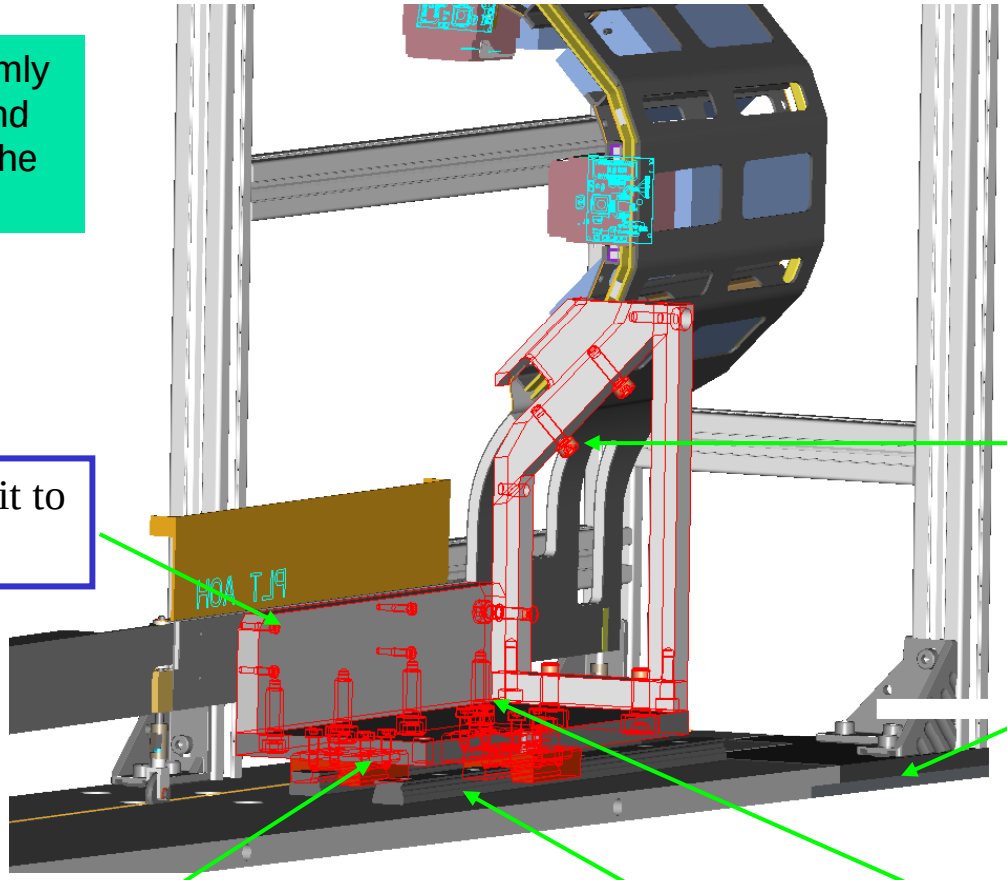
Clamping support for transportation

Clamping support back

Sliding/support mechanism (see next slide)

BCM1 transport

Carriage is firmly supported and fixed within the cassette.



Blocked for transportation/ / sliding for installation

2 bolts block the main carriage body

4 M2 screws fix it to the arm

Add-on plate will be dismount for installation

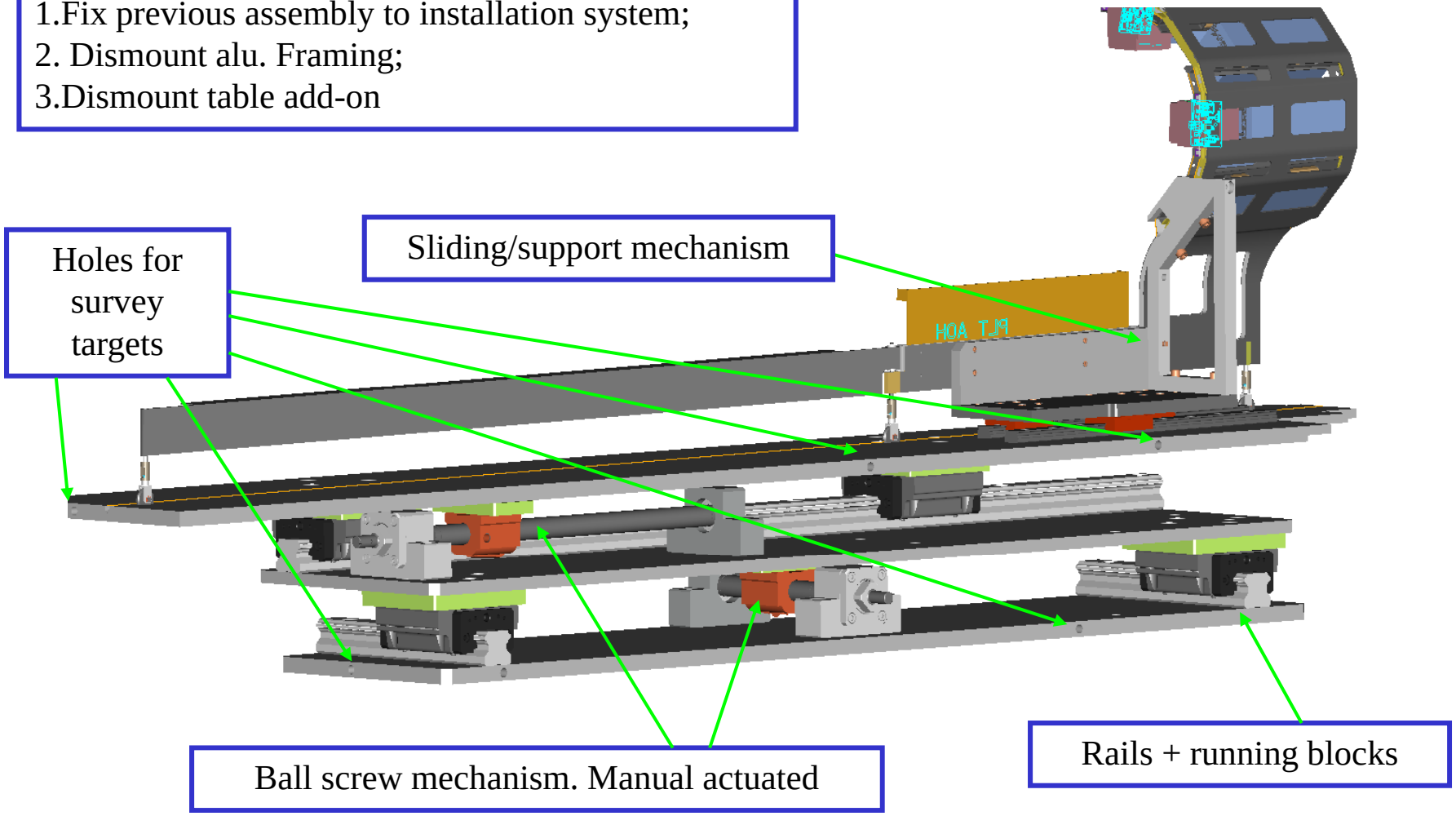
A M8 screw block it against the rail plate when in transport mode

2 parallel rails and 3 running blocks

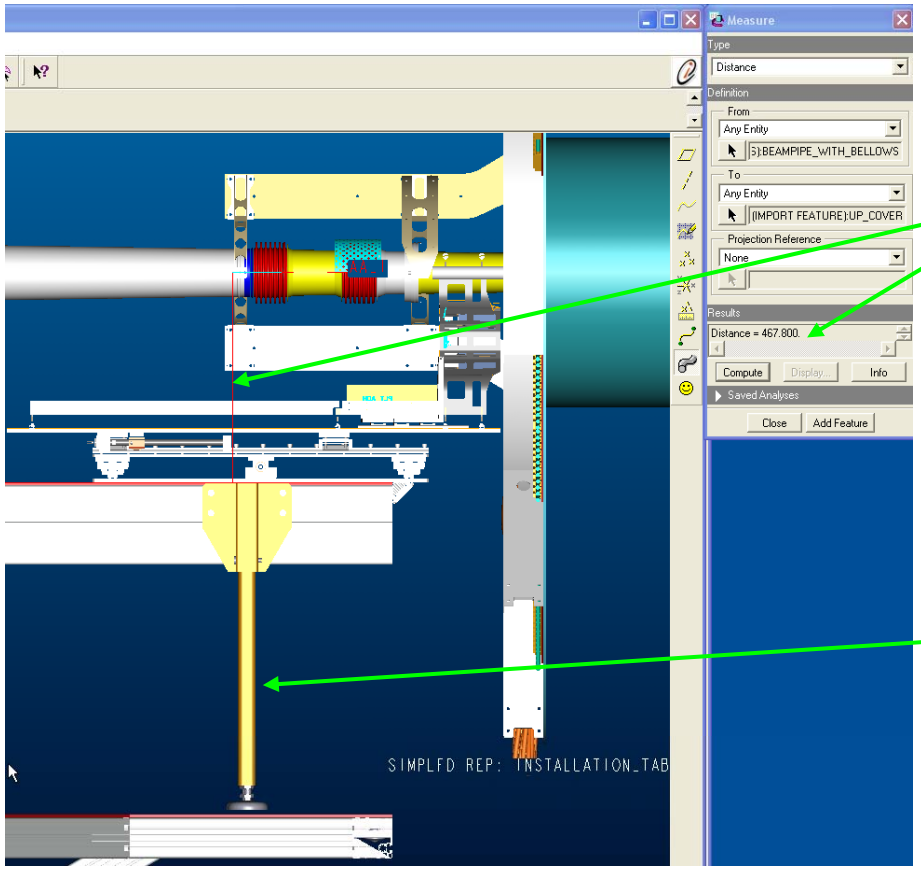
Sliding/clamping mechanism highlighted

BCM1 installation

1.Fix previous assembly to installation system;
2. Dismount alu. Framing;
3.Dismount table add-on



BCM1 installation



Minimum Y table position it is not as shown at PRR (see next slide)

As latest model downloaded from http://www.pi.infn.it/~bosi

This element is completely retracted thus I am assuming that the table is in it is minimum position.

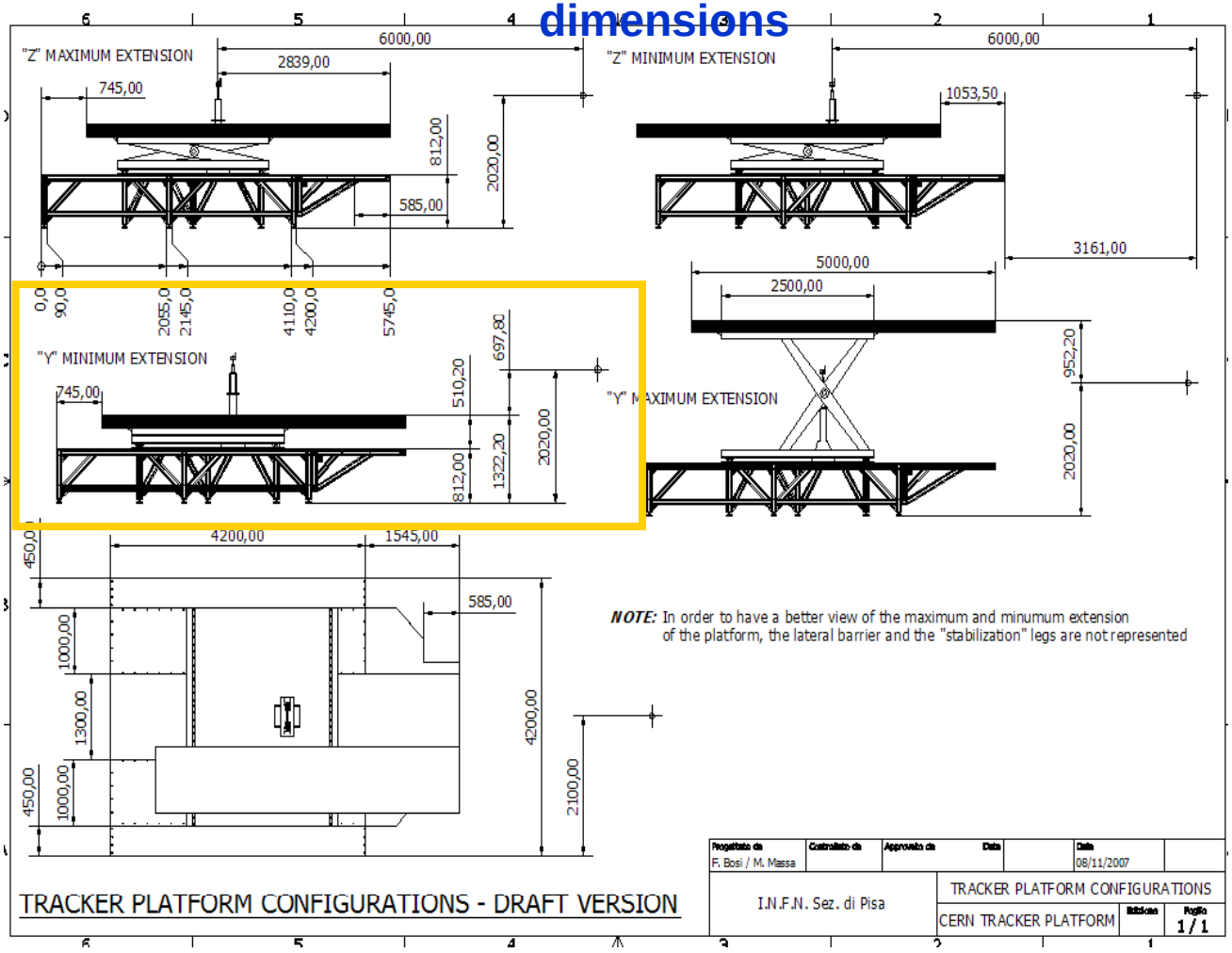
Is it correct ?

Insufficient height for BCM installation

Overall dimensions

Material from PRR of 15th November

Overall structure dimensions



Lower Platform :

L= 5745 mm

w = 4200 mm

h= 812 mm (Surkov ground)

Used essentially beam 90x90 mm²

Upper Platform :

L= 5000 mm

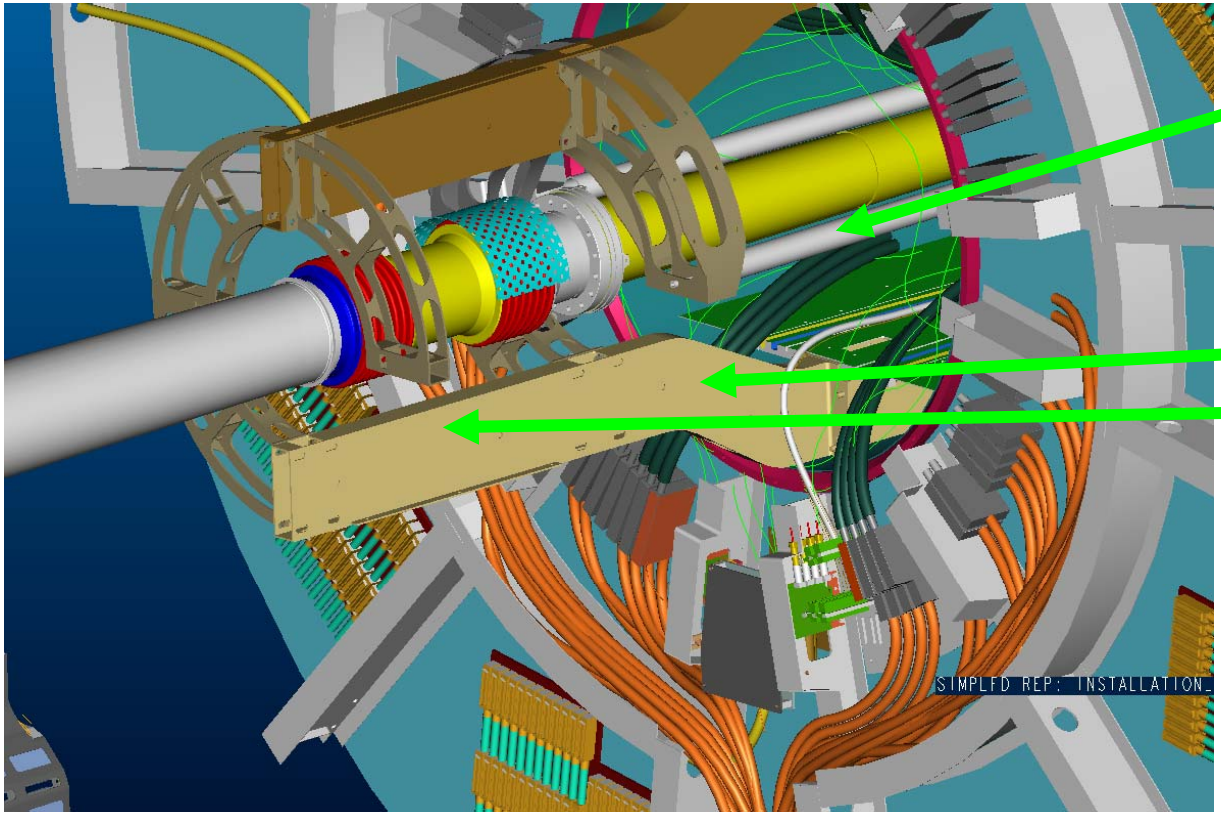
w= 1000 mm

h= 510-2160 mm (Lower Platform)

Used beam 180x90 mm²

BCM1 installation-preparation

If general installation table is as at PRR



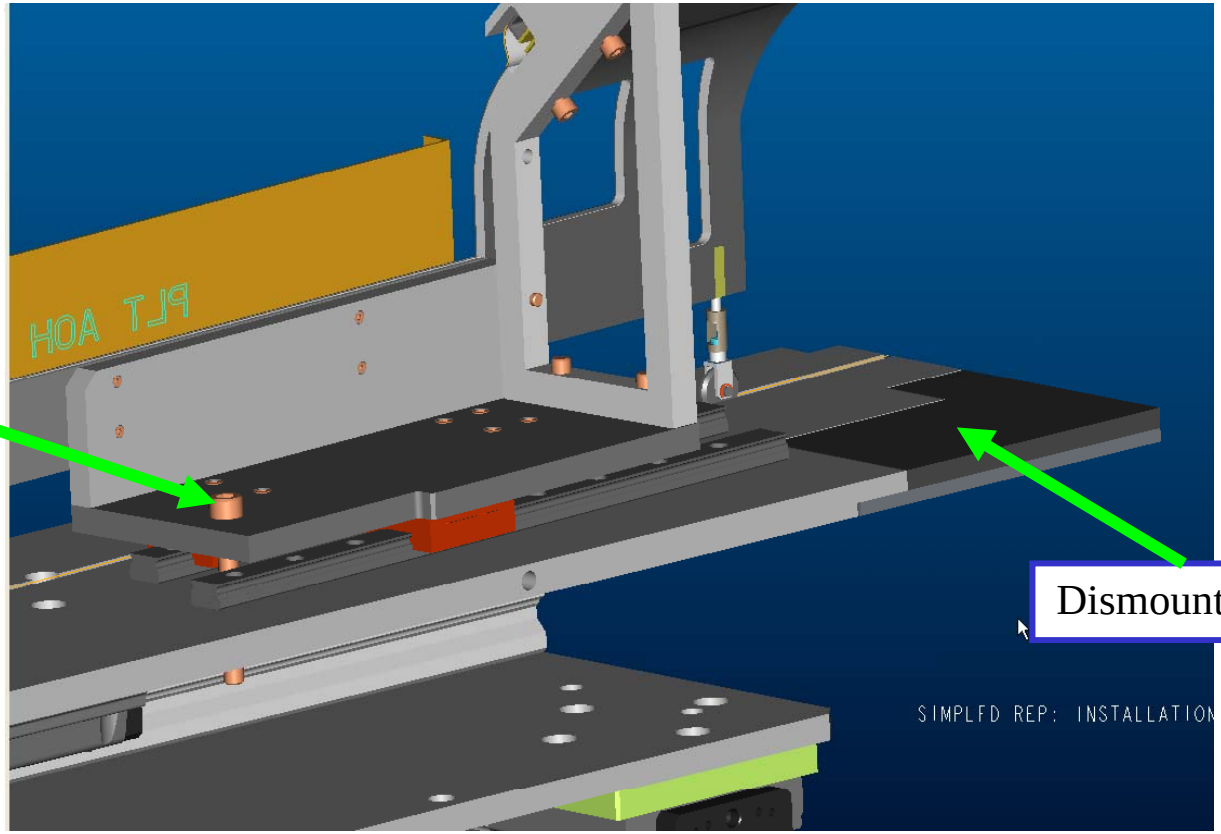
Beampipe support wires kept in place

1. Dismount bottom quarter rings (not shown)

BCM1 installation-preparation

Position carriage to start installation

Remove blocking bolt and slide everything 25 mm to the front. Block it again (threaded hole exists displaced 25 mm)



Dismount this plate addon

BCM1 installation z movement

General installation table fully retracted. Reference point at BCM installation system known

Table at minimum Z position

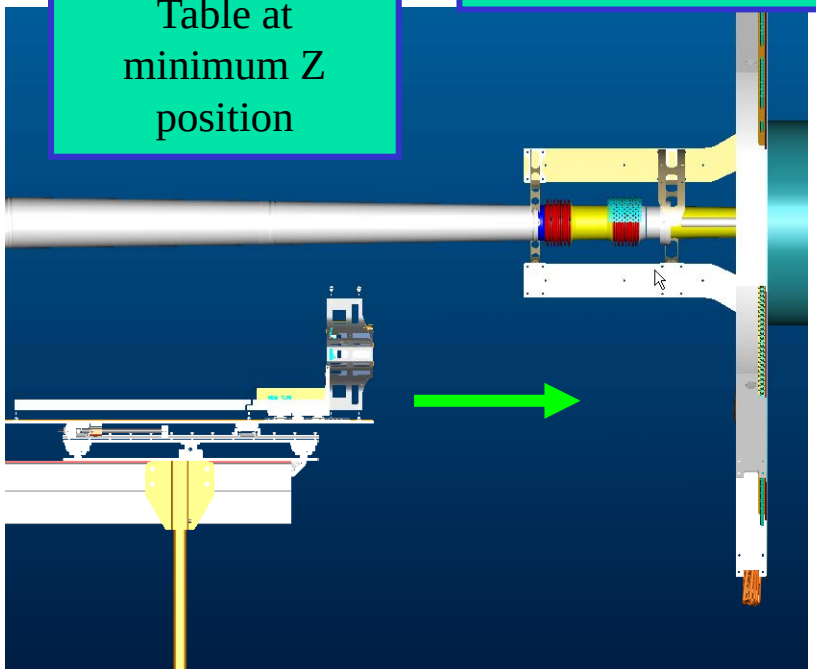
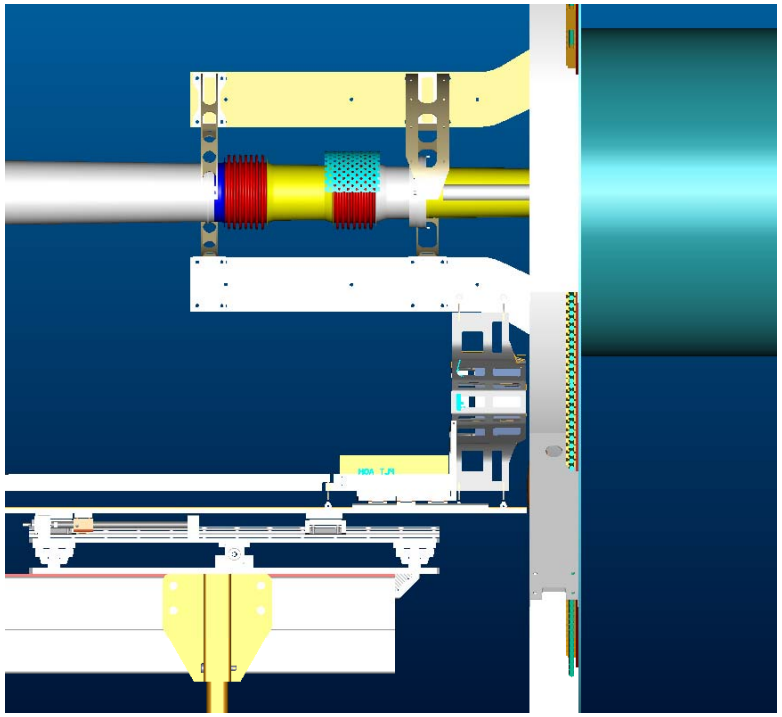


Table move in the arrow direction until reference point is at
x= 63 mm y=-494 mm z= 2919 mm

BCM can fine tune this Z movement with its rails.



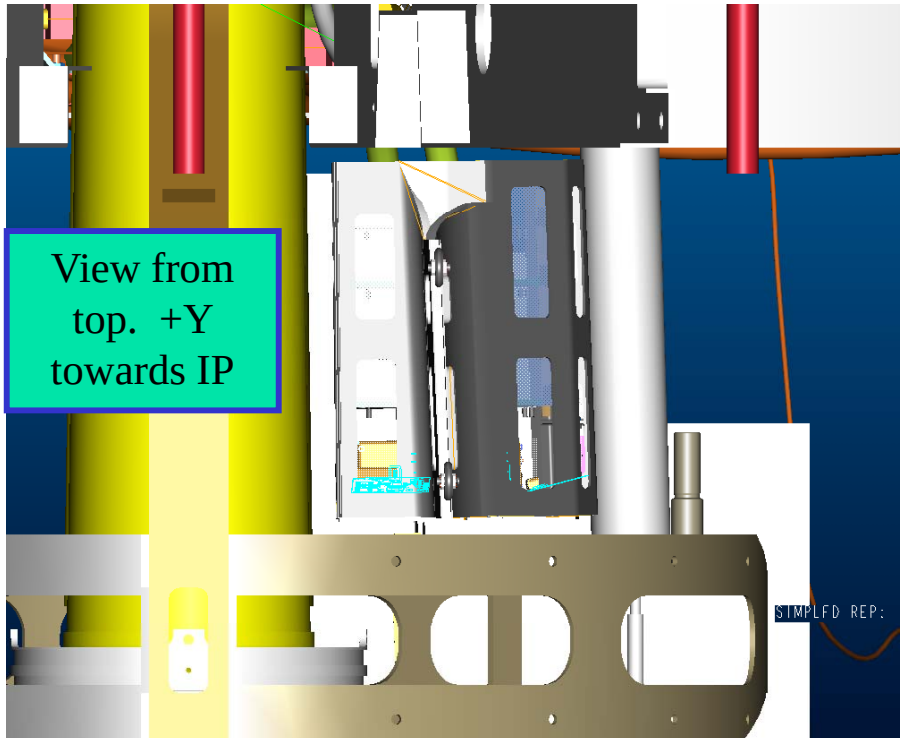
BCM1 installation Y movement

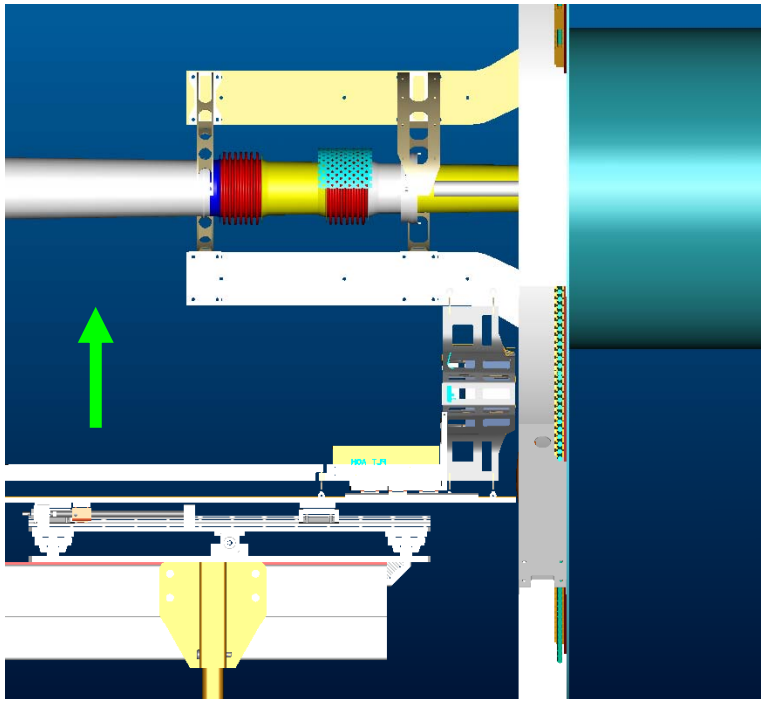
Before and during vertical raise, clearances should be checked. Clearance to BP (yellow) and BP wire 15 mm* radius envelope can be tune with BCM rails.

Ref Pt: x= 63 mm y=-494 mm z= 2919 mm ->
x= 63 mm y=-194 mm z= 2919 mm

Table move in the arrow direction

Table at minimum Y position





BCM1 installation x movement

Ref Pt: x= 63 mm y=-194 mm z= 2919 mm ->
x= 38 mm y=-194 mm z= 2919 mm

Table should rise until rail plates are aligned

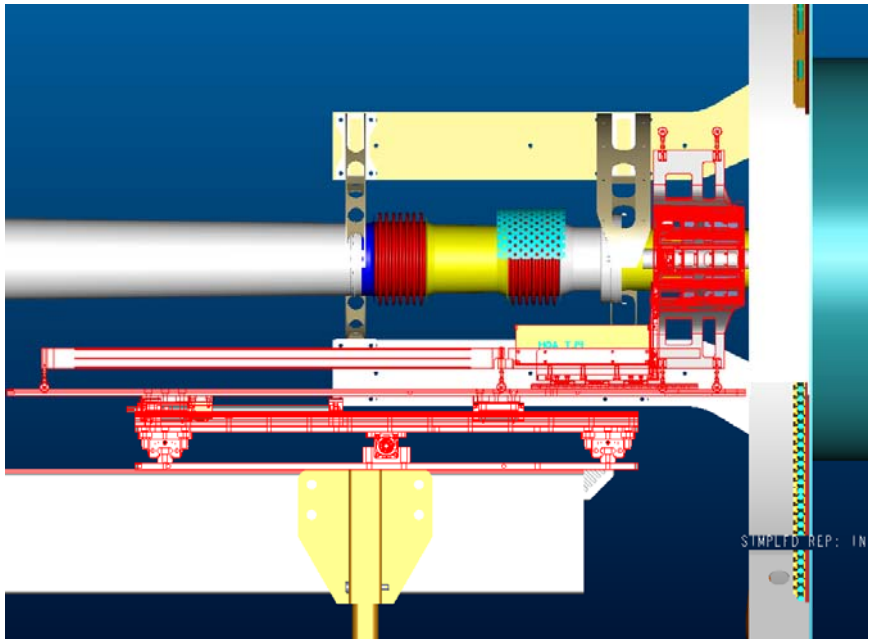
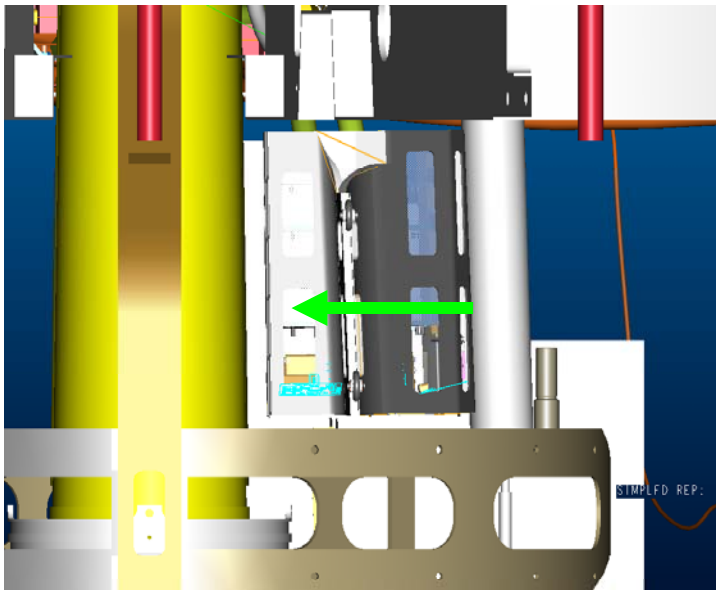
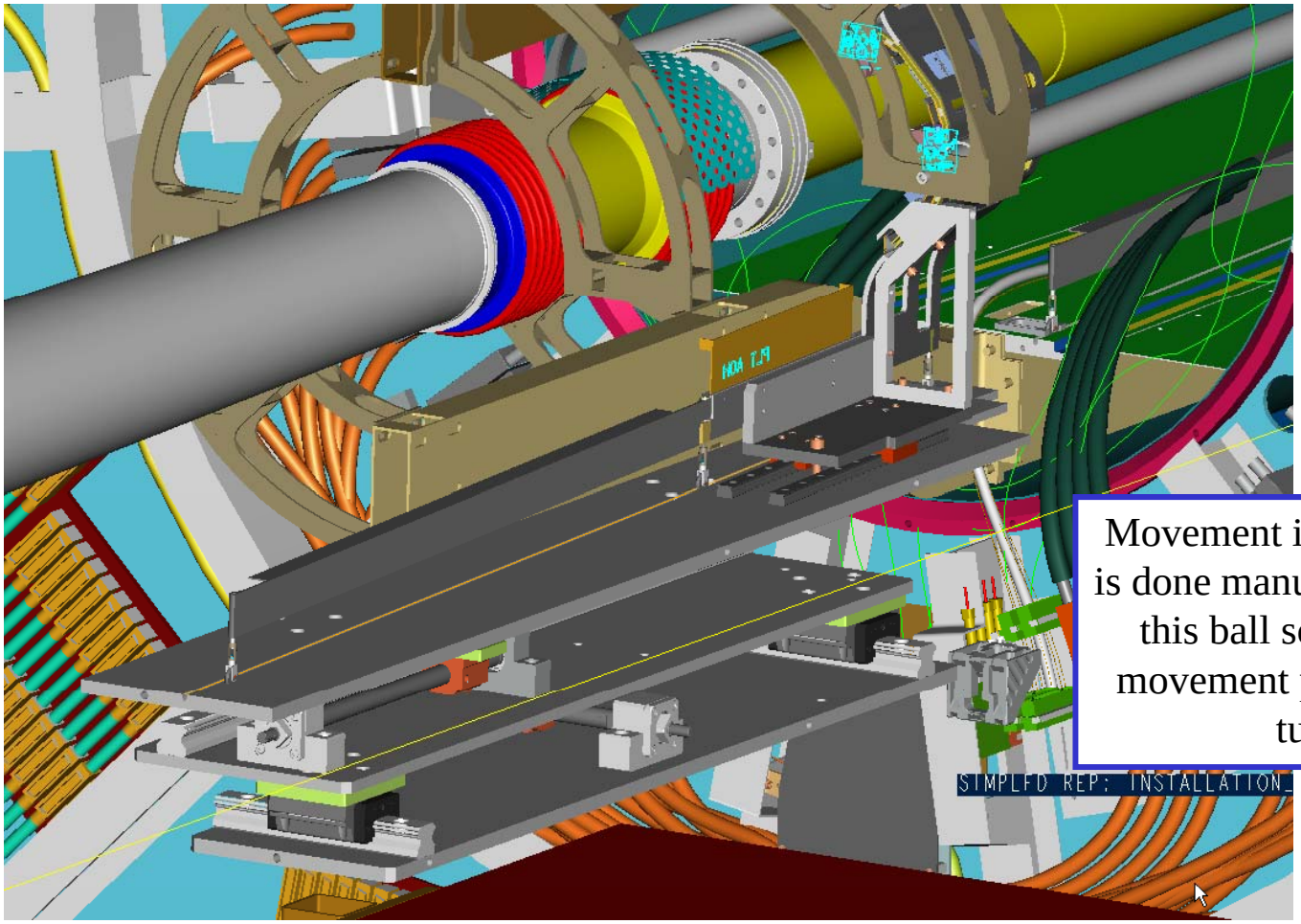


Table move in the arrow direction – 25 mm



BCM1 installation - sliding

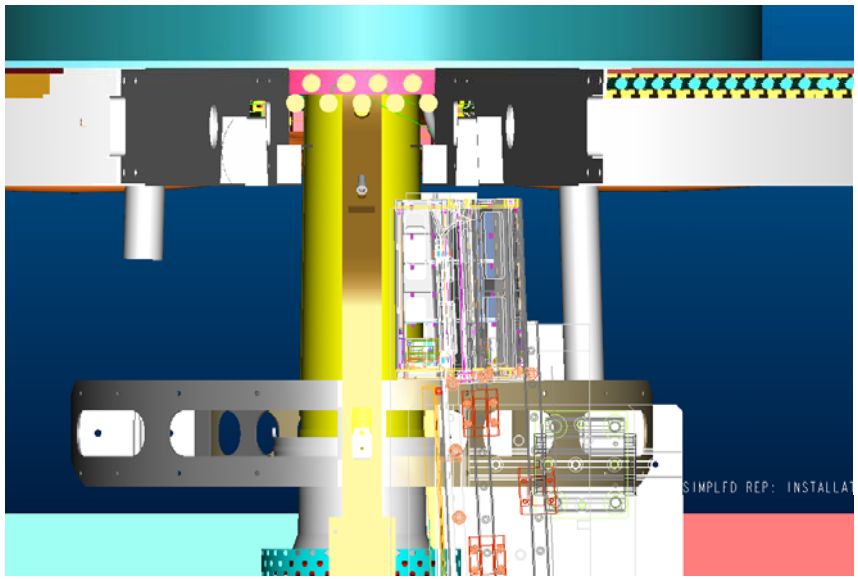


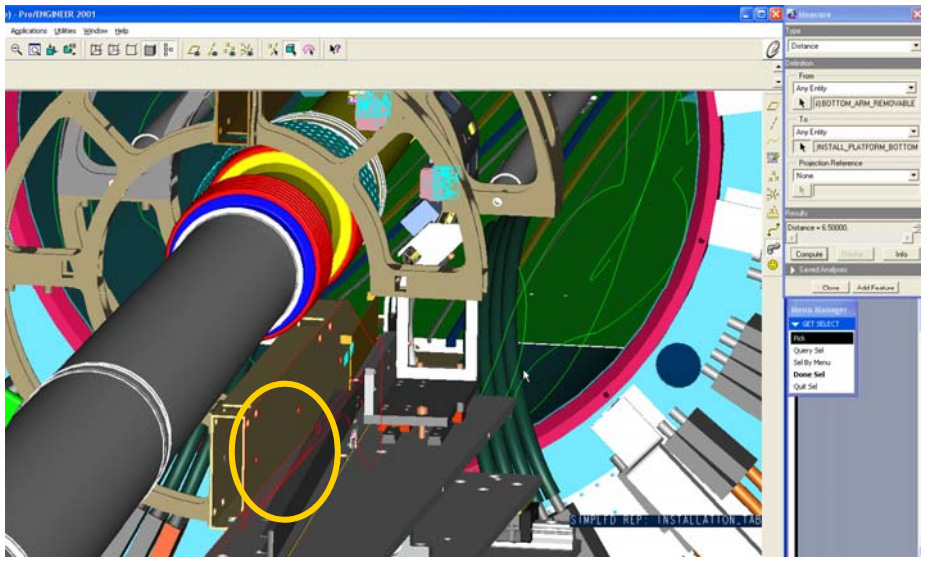
Movement in x of 25 mm is done manually actuating this ball screw. 4 mm movement per complete turn.

BCM1 installation - sliding

After 25 mm movement in x

Clearance between fishing arm and rail plate is 6.5 mm

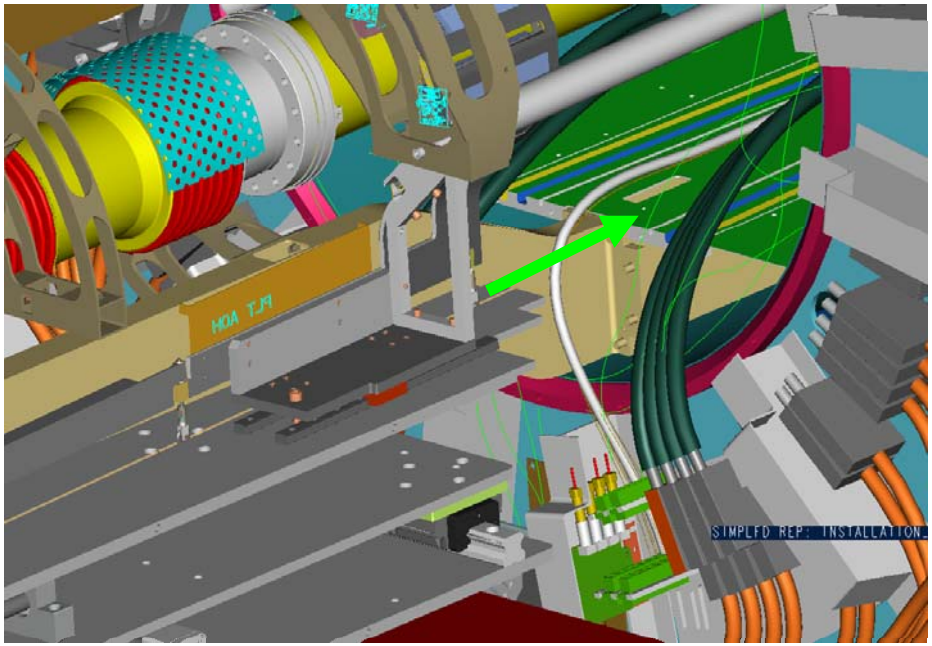


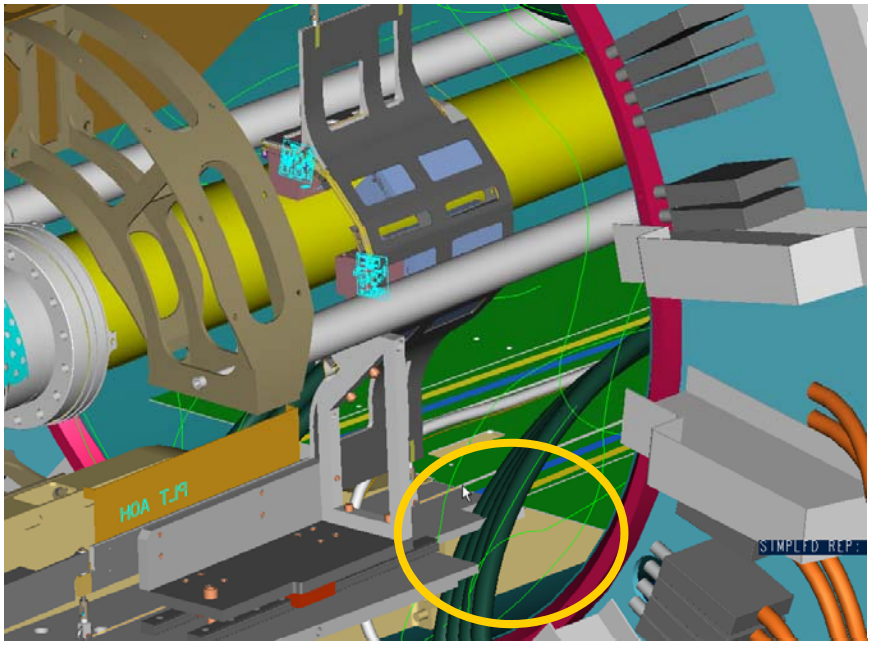


BCM1 docking

Z movement of 144 mm until docking

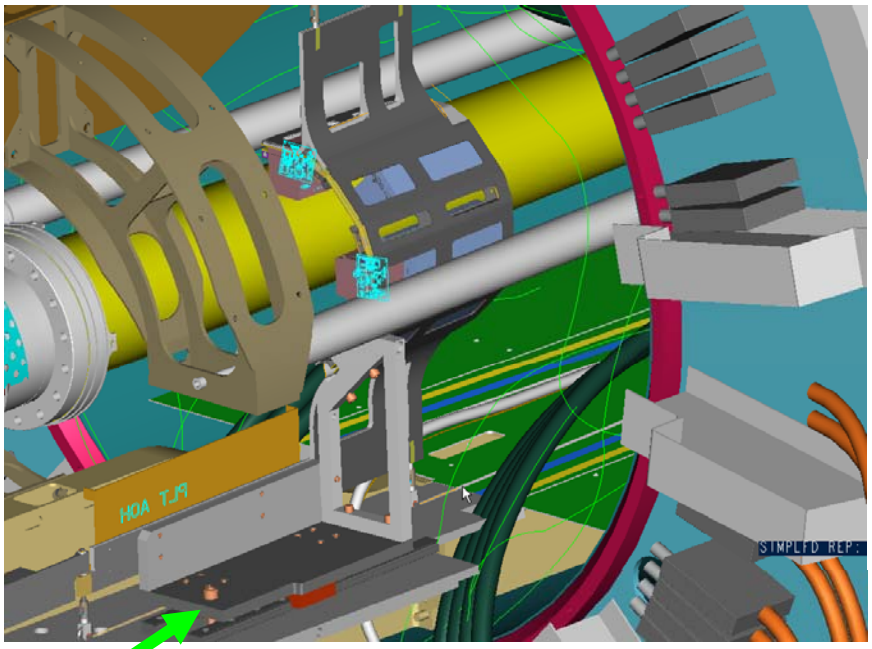
Ref. Pt x= 38 mm y=-194 mm z= 2919 mm -> x= 38 mm y=-194 mm z= 2775 mm



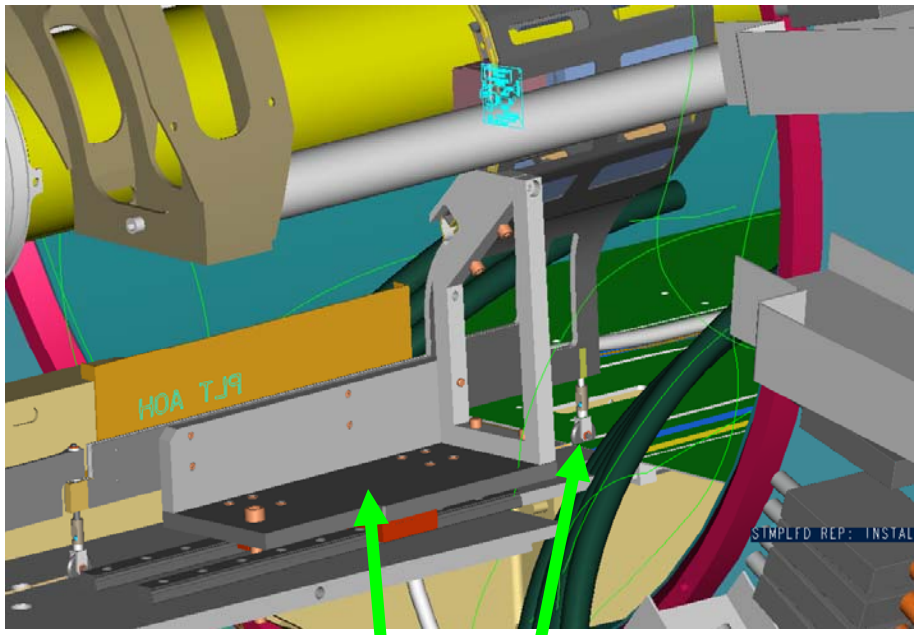


Important that pixel cables are inside their envelope

BCM1 installation sliding



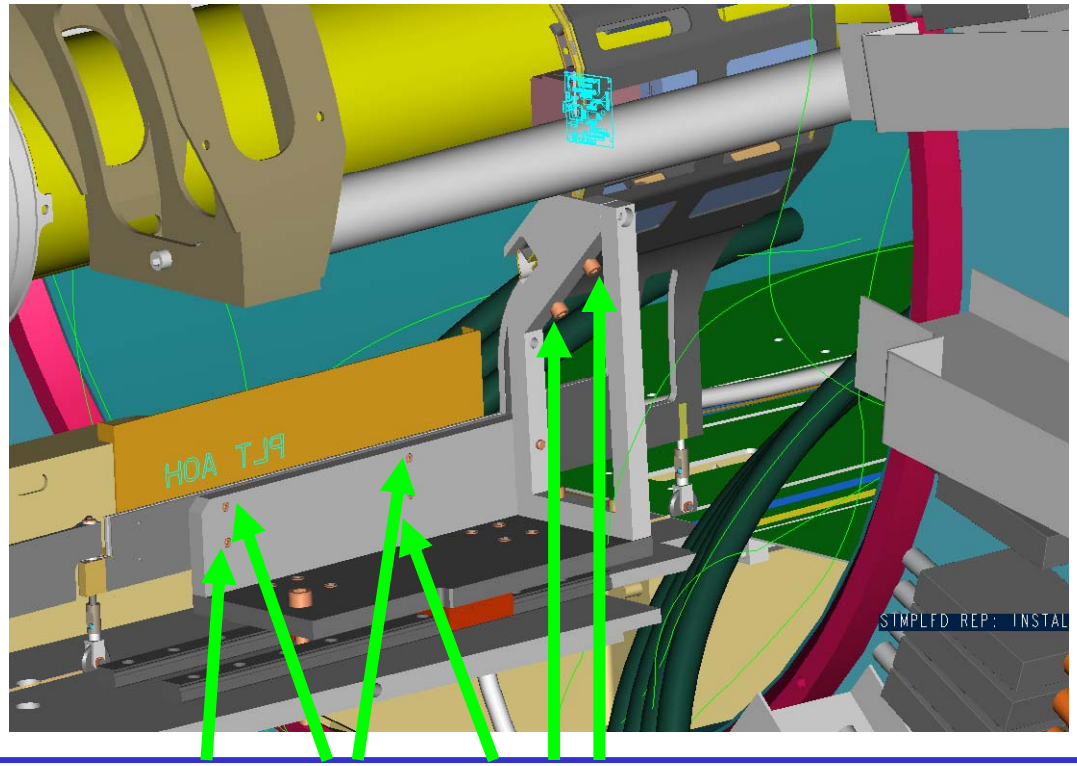
Remove this bolt



Sliding the support and the carriage 50 mm until front top and bottom feet engage in the top and bottom rail plate

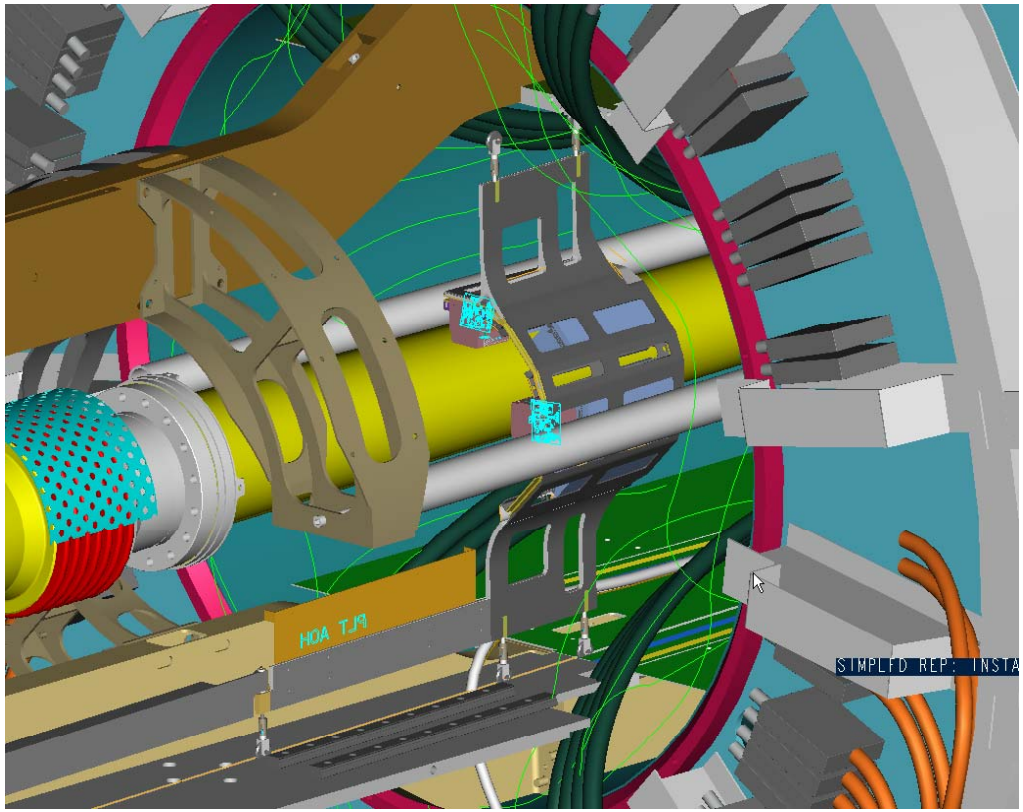
BCM1 installation

Carriage engaged in TOP and BOTTOM rail plates. Stability of carriage assured by the rail plates.
--> No chance of tipping



Remove these bolts. Sliding support is then decoupled from carriage and can then be pulled.

BCM1 installation – final move

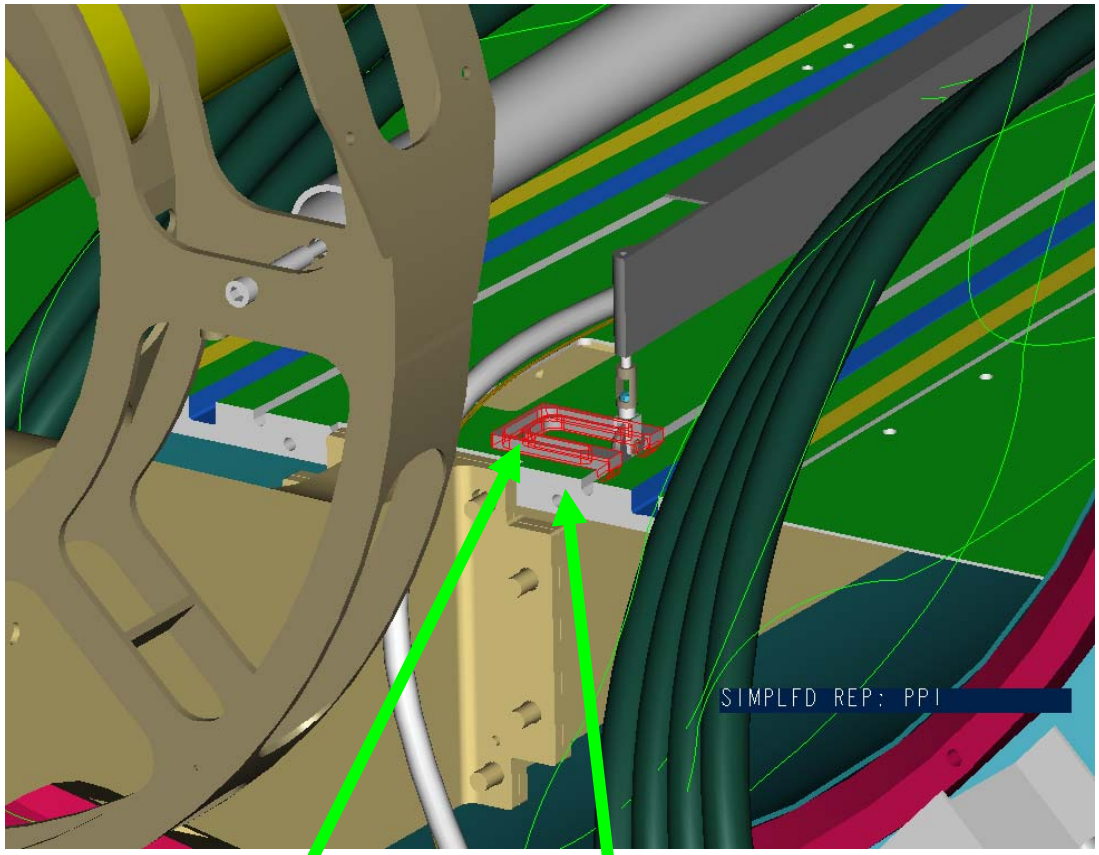


Slide carriage in until its final position – mechanical stop at the back

BCM1 installation – steps

1. Dismount bottom quarter rings in one side;
2. Fix the transportation frame to the installation system;
3. Fix the all assembly to the general installation table;
4. On the transport frame – take all the aluminium framing – slide carriage 25 mm in the rail to the front;
5. Remove extension on top rail plate;
6. Move general installation table in Z; Fine tuning position with BCM rails if needed;
7. Move general installation table in Y;
8. BCM installation system movement of 25 mm in X;
9. BCM installation system movement of 144 mm in Z until both plates dock;
10. Slide carriage supported by support mechanism until front wheels are well inside the rail plate;
11. Remove bolts that fix support mechanism to the carriage;
12. Slide completely carriage in until final position controlled by block fixing the rear wheel at the back;
13. Retract rails and platforms;
14. Cable at PP0;

BCM1 installation - locking



Blocking the back foot. There is 5 mm from the front carriage foot until the end of rail.

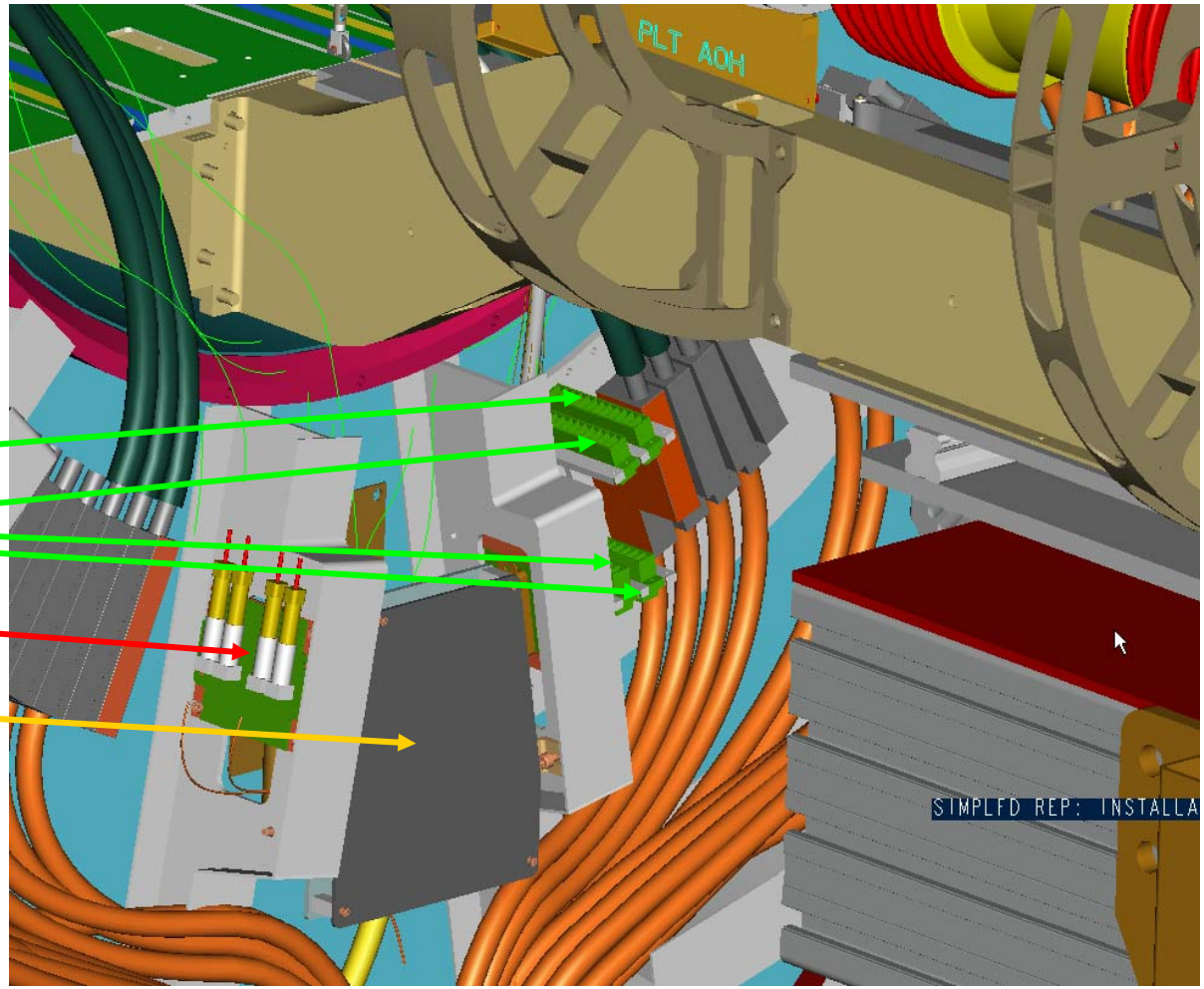
Known position for the locking at 8 mm from this rail plate surface.

BCM1 cabling

- Carriage is assembled outside (including cabling attached to extensions);
- Complete BCM cabling is understood – we have the real objects;
- Route to patch panel 0 and then cables go with pixel ones.

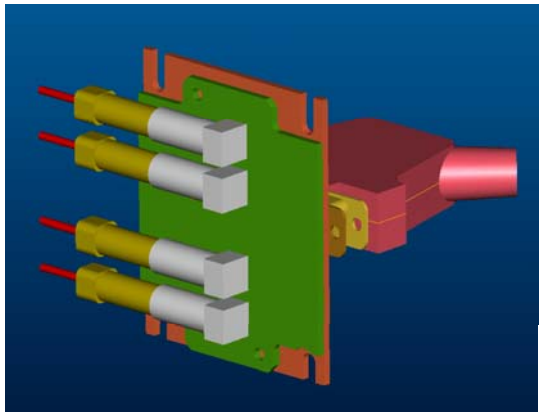
BCM1 cabling – PP0

- BCM1 required connections per side (+Z/-Z) (in agreement with Pixels: Kurt Gabathuler and Willy Bertl)
  - 4 optical 12 way ribbons (top & bottom);
  - 2 electrical connections.
  - Plate for coiling fibers
  - Maintain left right separation in design and cabling

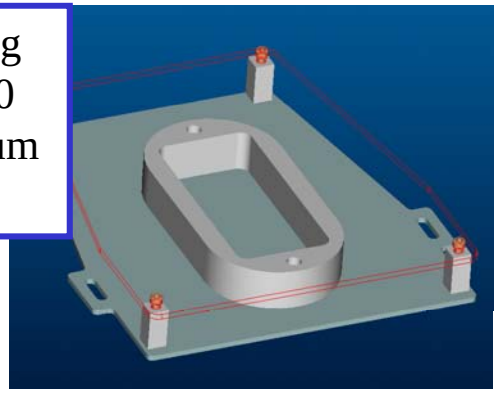


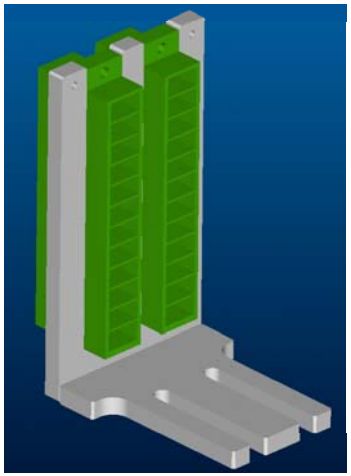
BCM1 cabling – PP0

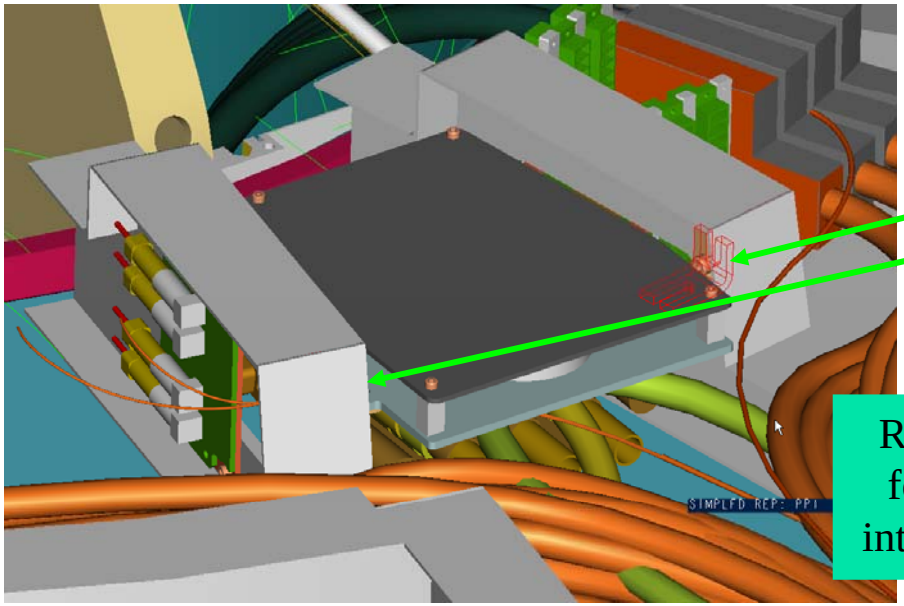
Copper cables PP0 fixed to the rib. G10



Fibers coiling support. G10 with aluminium spacers





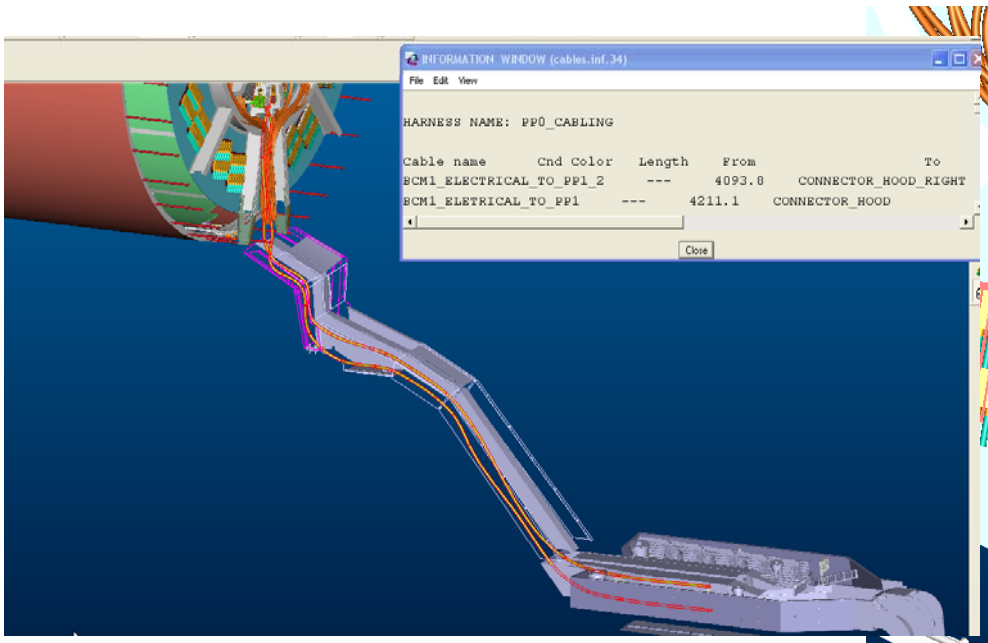


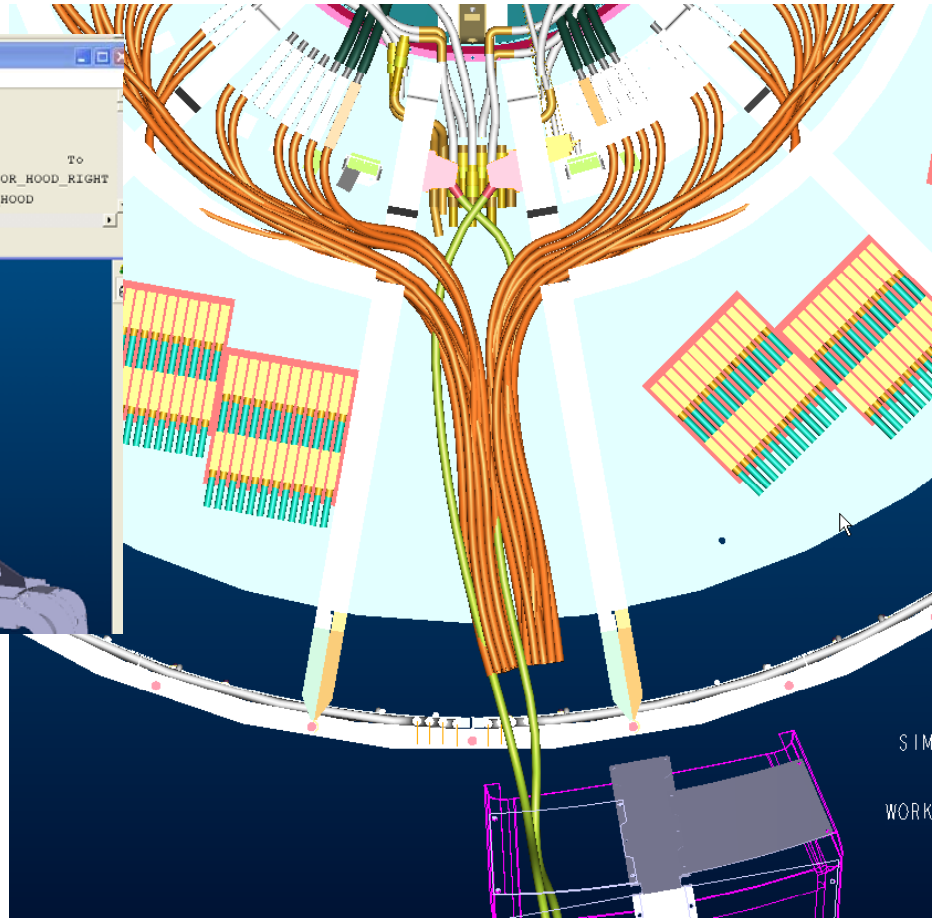
Fibers coiling support. Use this support, one per side attached to the rib

Fibers PP0 fixed to pixel PP0 plate. Aluminium

Received sign off from Paolo for envelopes and items - no interference with pixel services

BCM1 cabling–from PP0 to PP1



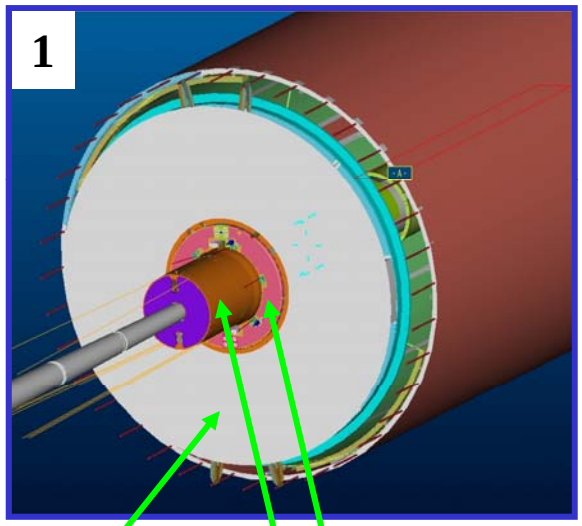


Ian Manning: Slack management at pp1 +-100 mm

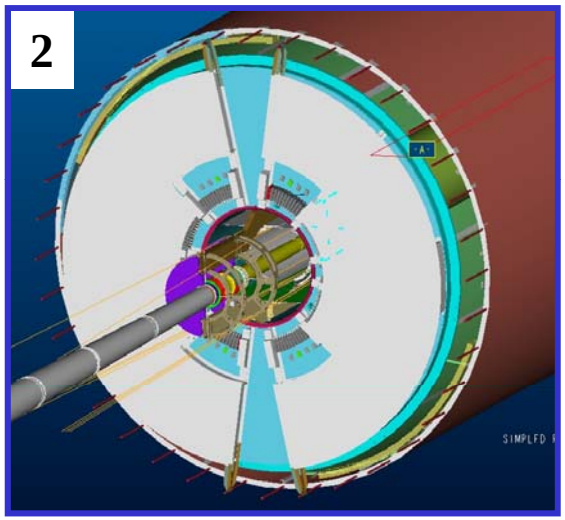
BCM copper cables join pixel cables

BCM1 - Extraction scenario

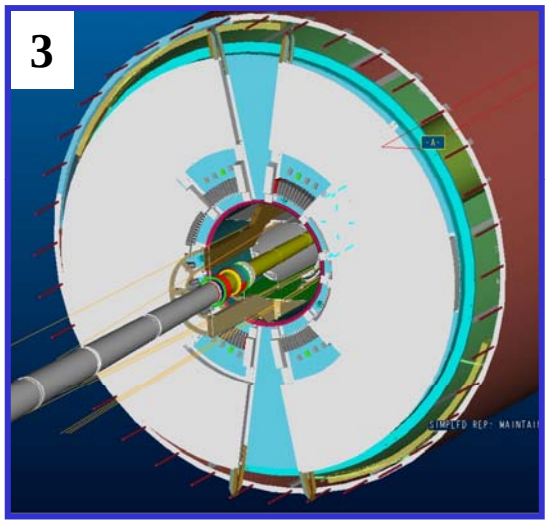
- Assembly sequence with Pixel and FWD Pixel in position



Bulkhead closed
Take off – Alignment ring
Cover shells
Cover Panels



Take off
- Bottom rings (one side)



Arrive with a platform that dock in the rails in one side. Indvidual fibers/cables disconnected

Next steps as in the installation described before.

BCM1 maintenance-Questions

- What if, it's necessary to take out the BCM1 ?

  - It’s possible to extract the carriage without interfering with all the rest;

    YES –requires access to TK bulkhead

  - Or extract slightly the carriage to reach the module and then extract it, only. YES

- What if, it's necessary to take out the barrel or FWD pixel, or to access the BP support/collar region ?
  - It’s necessary to extract the BCM1 carriage in order to extract the Pixel barrel or FWD Pixel.

BCM1 Assumptions/Conclusions

- Foreseen 4 days for installation of all the 4 carriages. The estimated installation times assume that a mock-up is available. Unavailability of a mock-up will imply that more time is required for the installation
  - 1 day per end for installation of 2 carriages at each end (+/-)
  - 1 day per end (+/-) reserved as contingency, in case intervention is needed following checkout of services.