IR status

9h Belle II VXD workshop @IFIC

S. Tanaka (KEK)

IR status (machine)

*superKEKB Beam pipe connected in last month

*Beam operation will start from Feb.

1, Linac -> BT

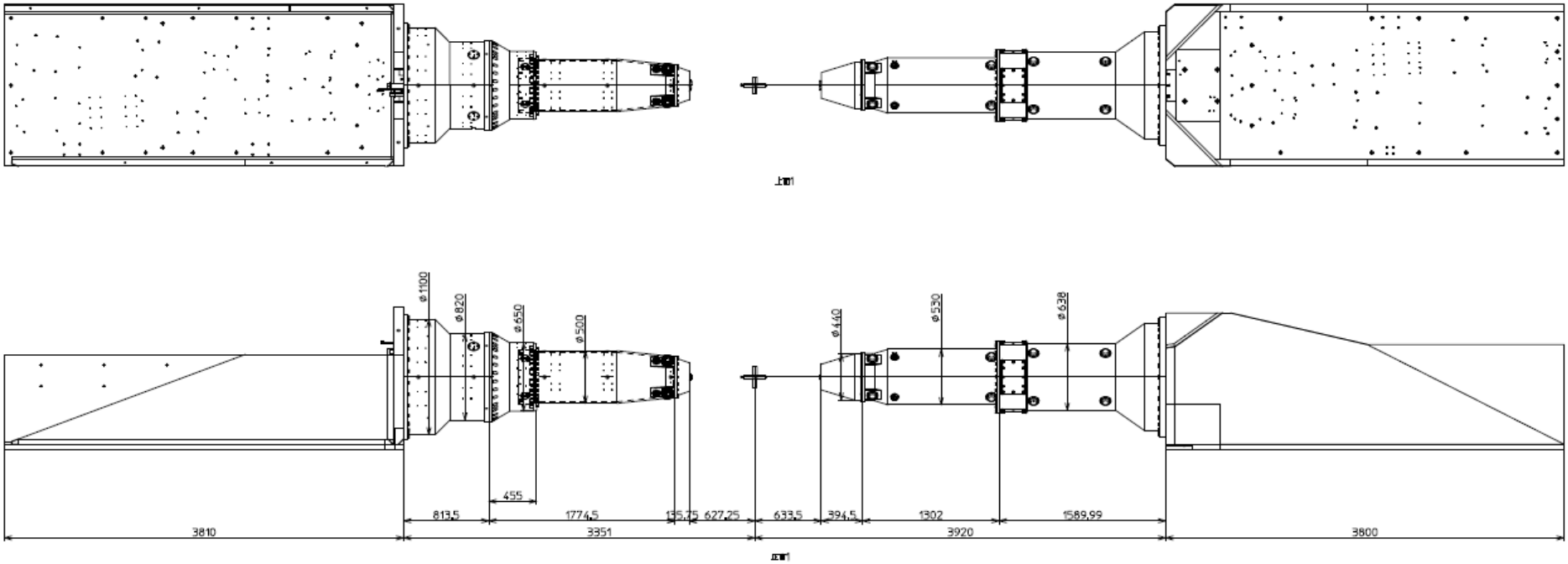
2, BT -> SuperKEKB ring

*Injection signal test take place in this week

QCSL delivered（12/25)

Pictures：https://ilc.kek.jp/photos/20151225Di/

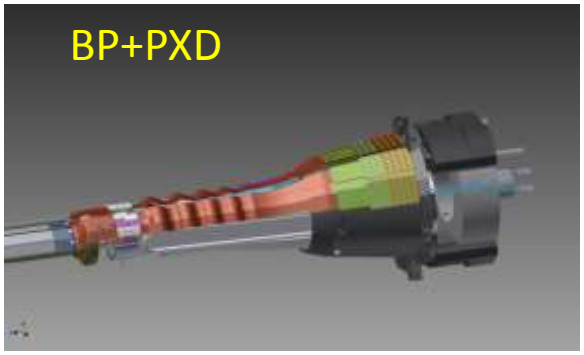
QCS design

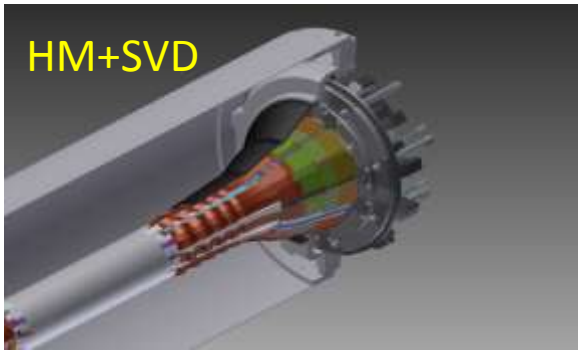


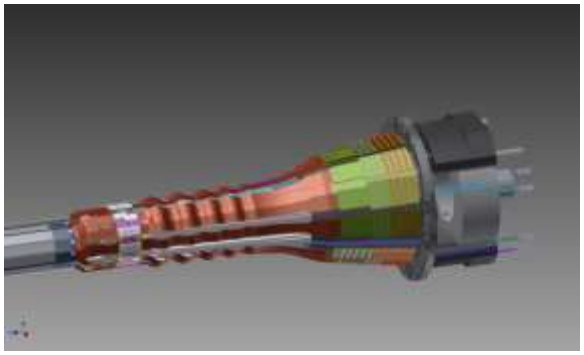
New QCSR design

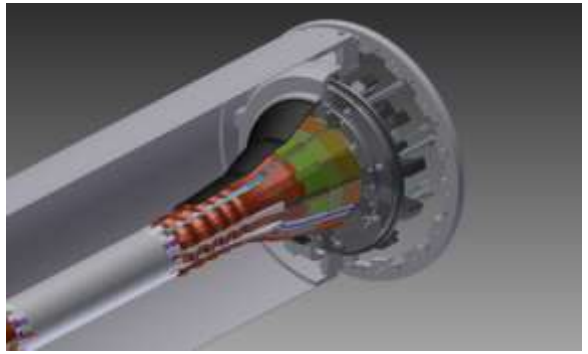
VXD assembly steps

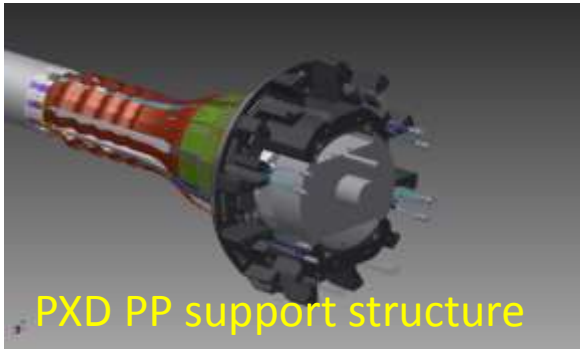
HM: Heavy Metal shields











VXD assembly

Tsukuba hall B1 room

SVD
(Ladder mount table)

First Practice done

- Outer cover gluing ✔
- Support cone gluing ✔
- Endring gluing ✔
- Mount SVD structure on ladder mount table ✔
- Ladder mount !!!!
- Attaching to Division tool ✔

BP+HM+PXD
(VXD assembly table)

- Alignment of Beam pipe position ✔
- Fixing Heavy metal on the table ✔
- Attaching BP onto heavy metal parts ✔
- Covering upper heavy metal parts ✔
- PXD assembly at MPI
- Attaching PXD system !!!!

Connection BP+PXD with SVD (@VXD assembly table) ✔

✔

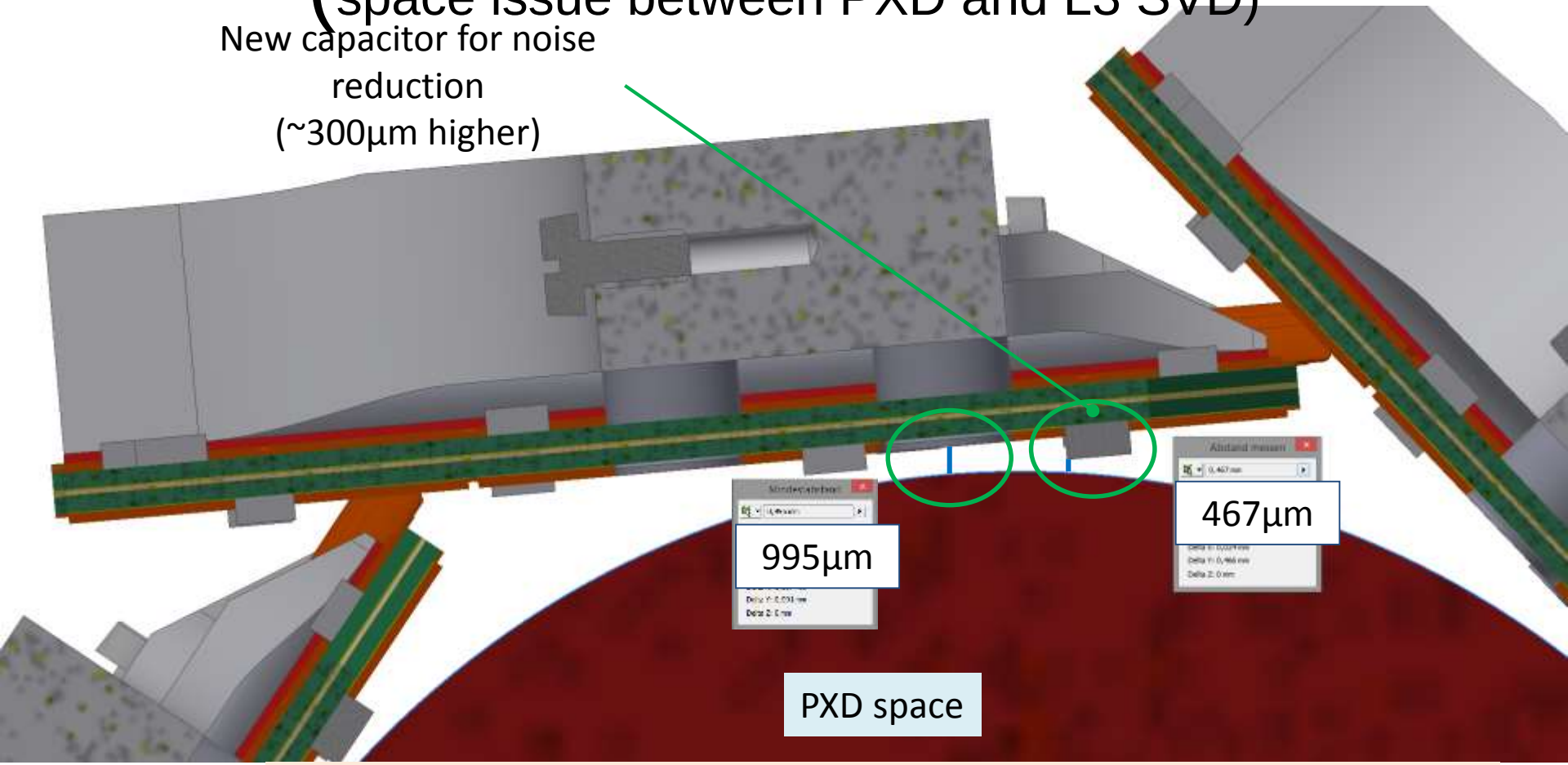
VXD installation

Tsukuba hall B4

See David's talk

Minimum Clearance BWD

(space issue between PXD and L3 SVD)



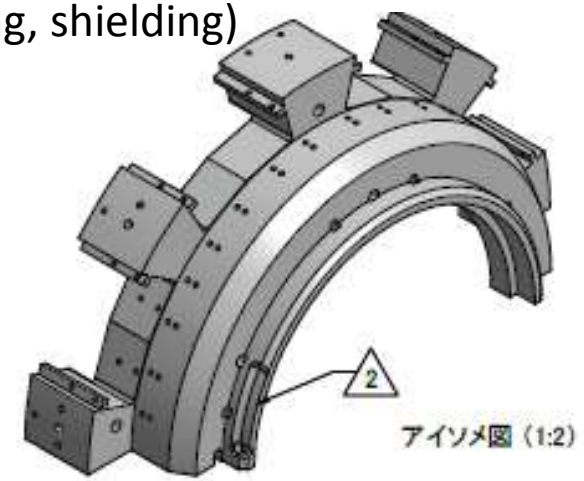
Solution:

SVD group decided to move L3 by 1mm outer side

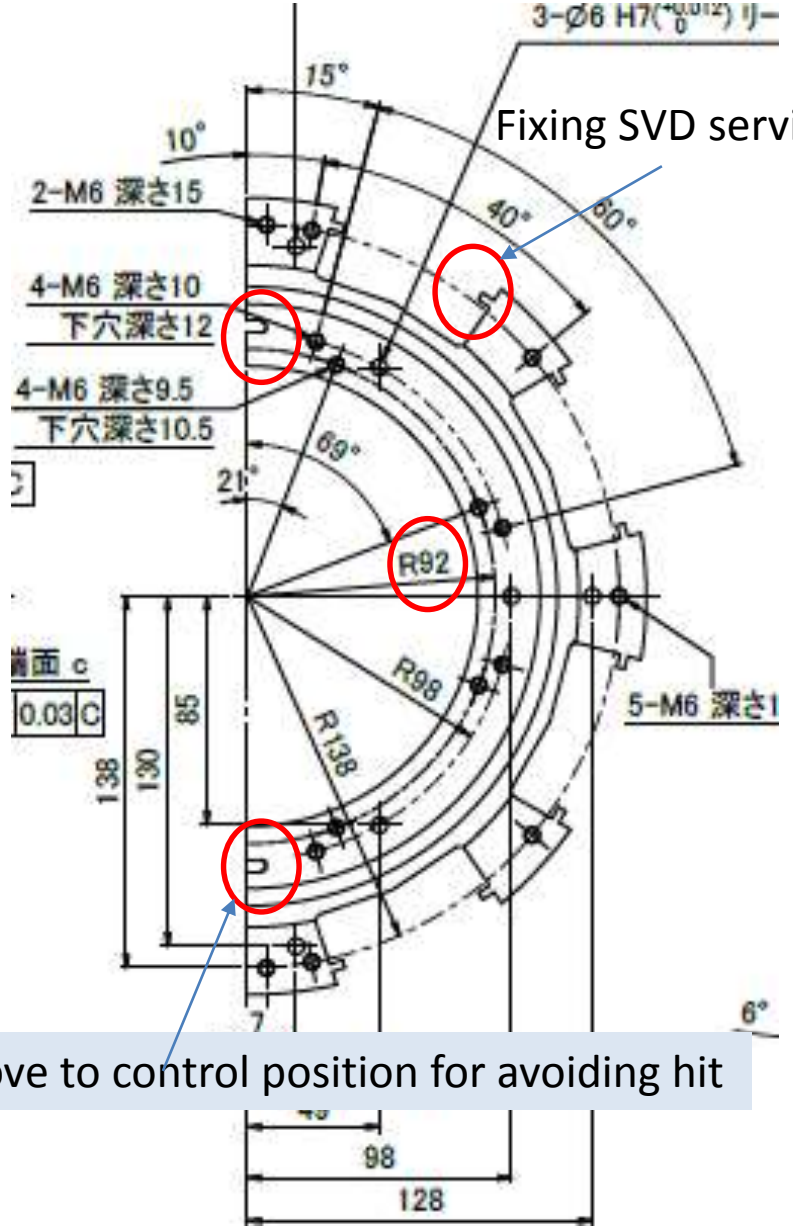
Making guide pin to control SVD position on connection

VXD mechanics

CFRP with 100umt AL sheet
(grounding, shielding)



FWD End-flange for phase 3

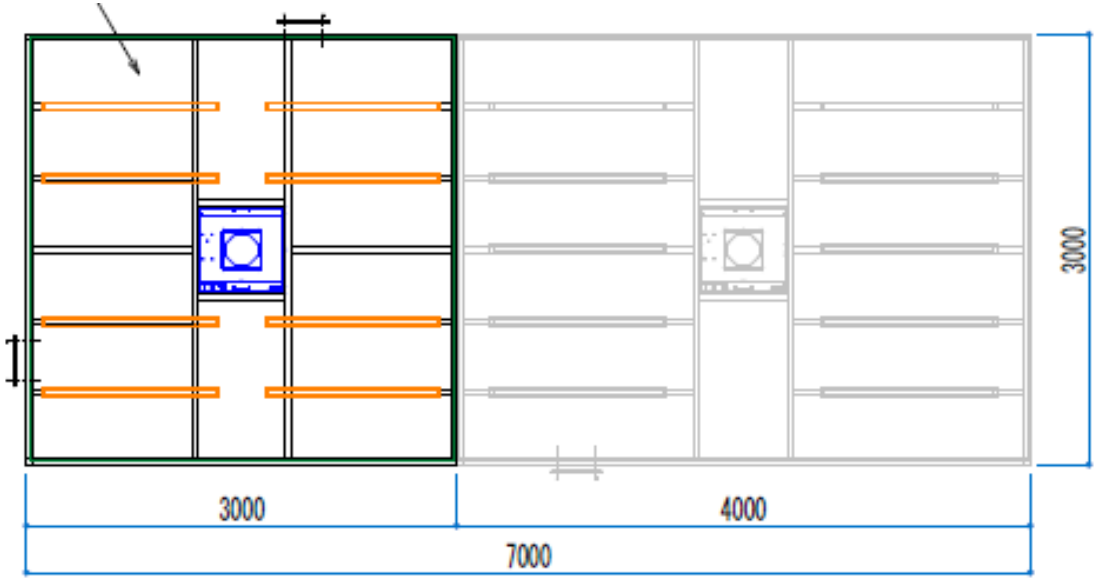


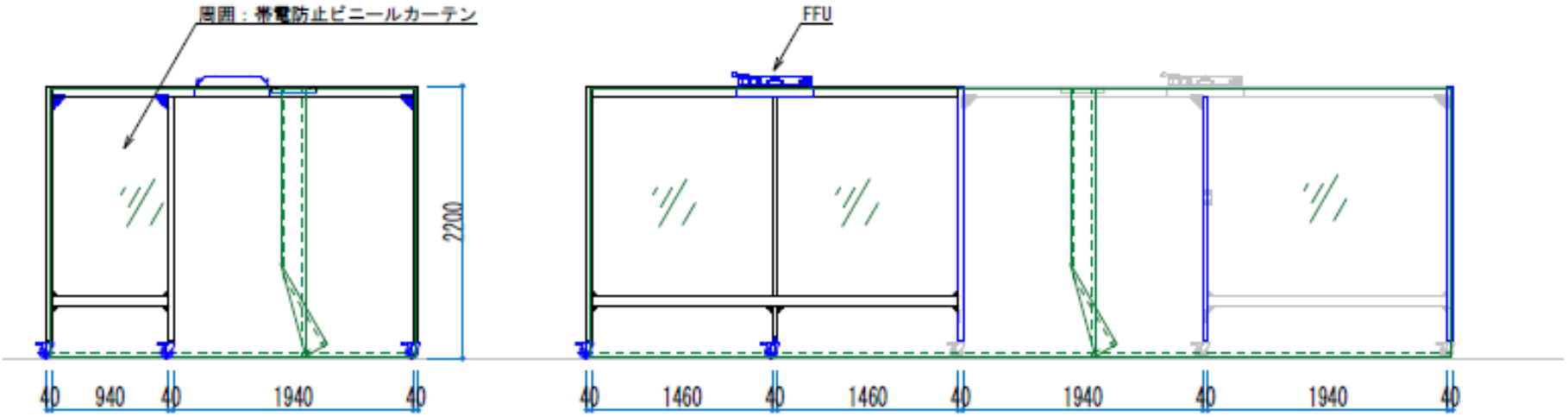
Fixing SVD services

Groove to control position for avoiding hit

B1 clean booth for VXD assembly

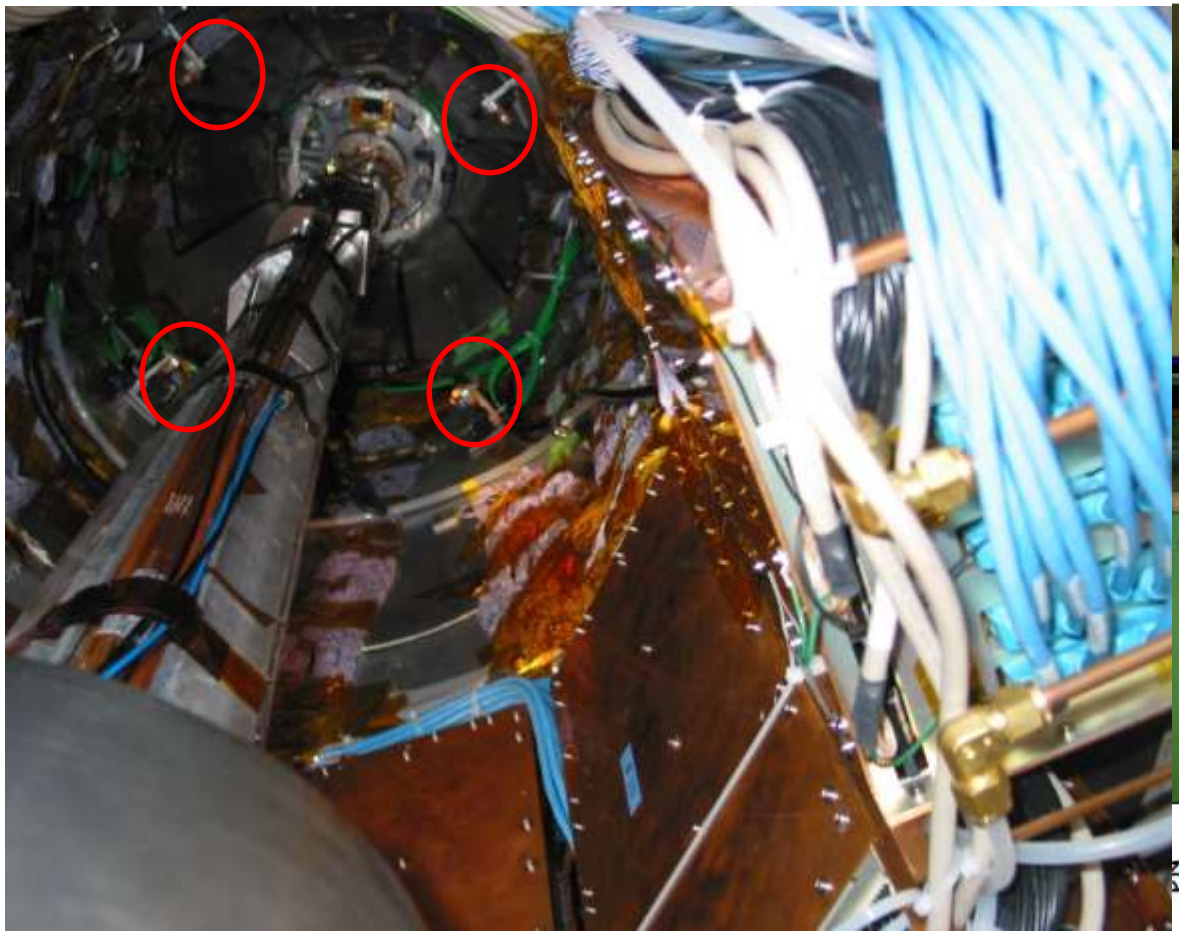
Another possibility to use CDC Clean booth in B4 side room

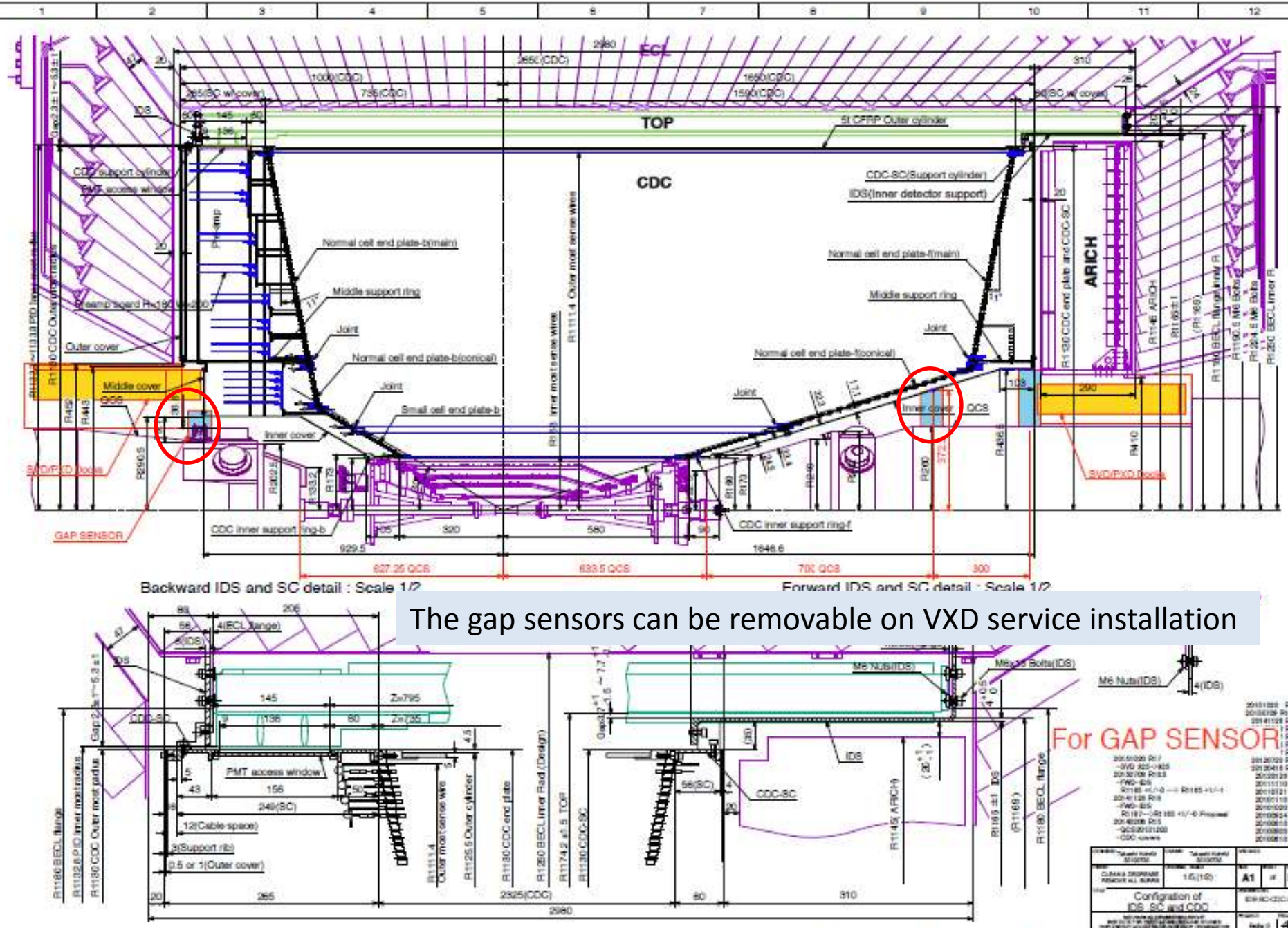




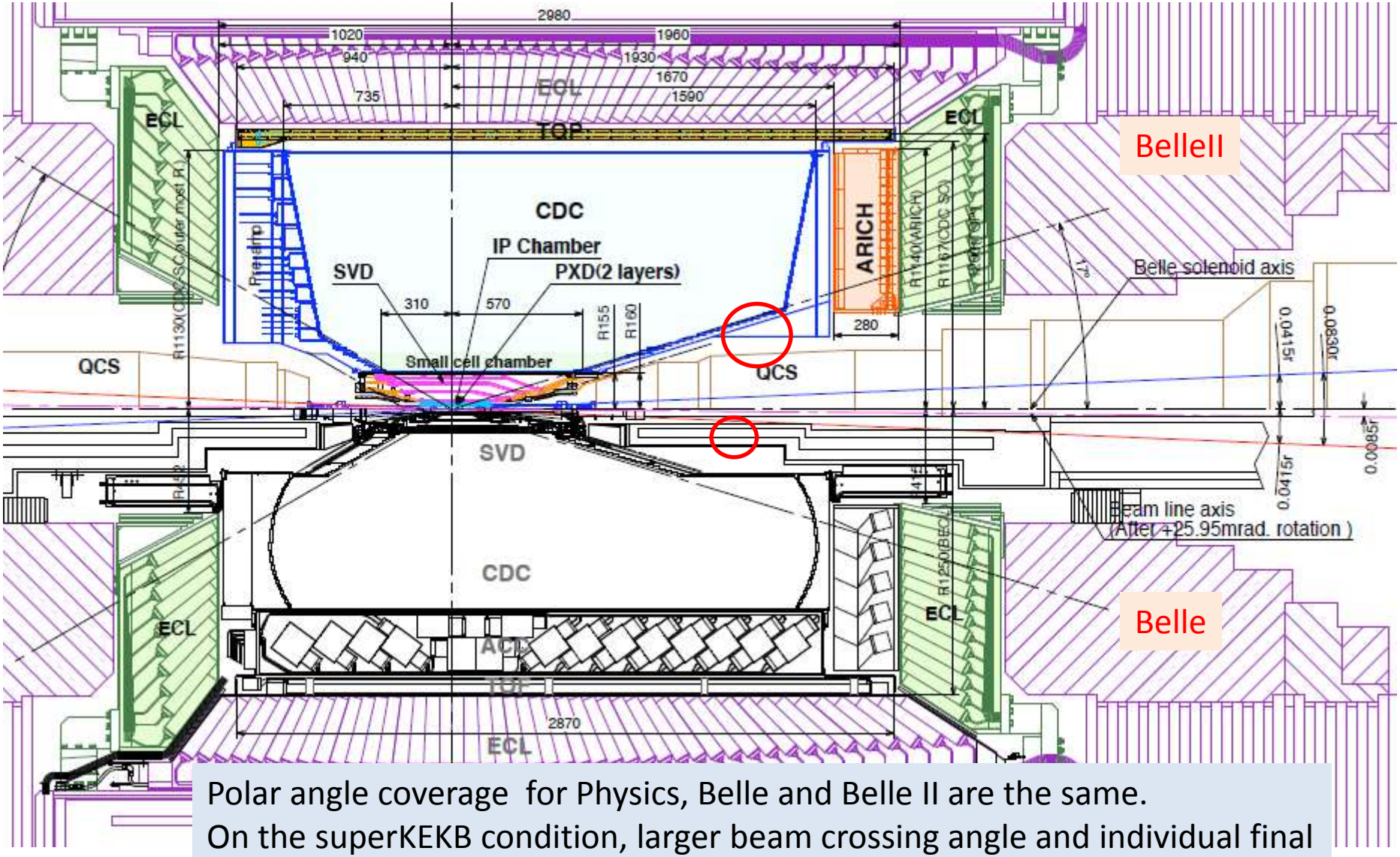
Gap sensor

- Monitoring relative position by capacitance between QCS and CDC
- On belle case, Gap sensor was attached before installing QCS
- On Belle II case, we did not verify space confliction with VXD dock



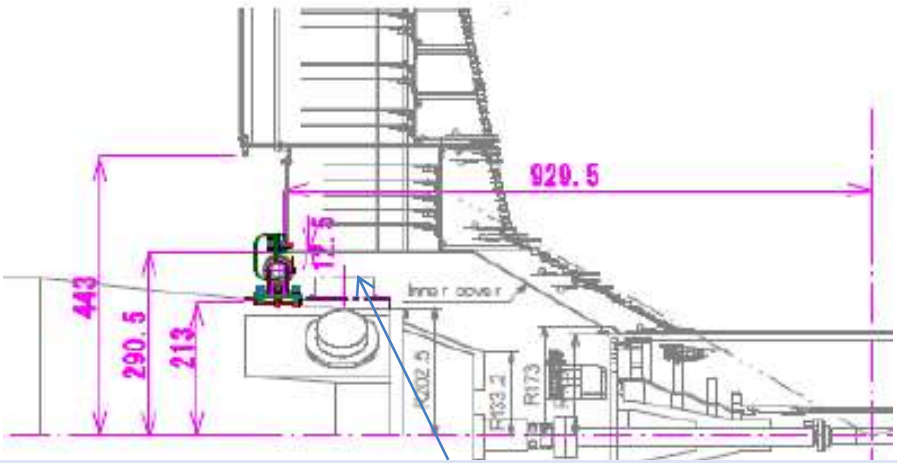

TOP
CDC
ECL
ARICH
Normal cell end plate-b(main)
Middle support ring
Joint
Normal cell end plate-b(conical)
Small cell end plate-b
Outer cover
Middle cover
Inner cover
GAP SENSOR
CDC inner support ring-b
CDC inner support ring-f
Normal cell end plate-f(main)
Normal cell end plate-f(conical)
Backward IDS and SC detail : Scale 1/2
Forward IDS and SC detail : Scale 1/2
The gap sensors can be removable on VXD service installation
For GAP SENSOR
Configration of IDS, SC and CDC

Difference between Belle and BelleII

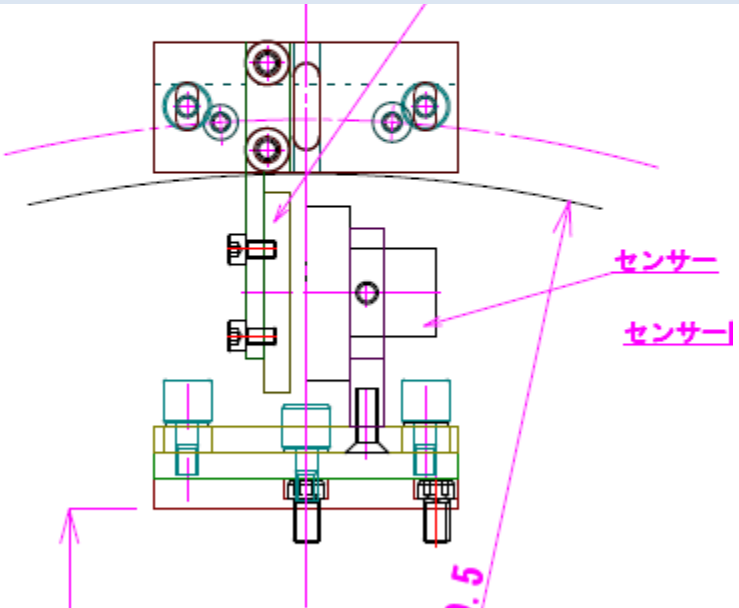


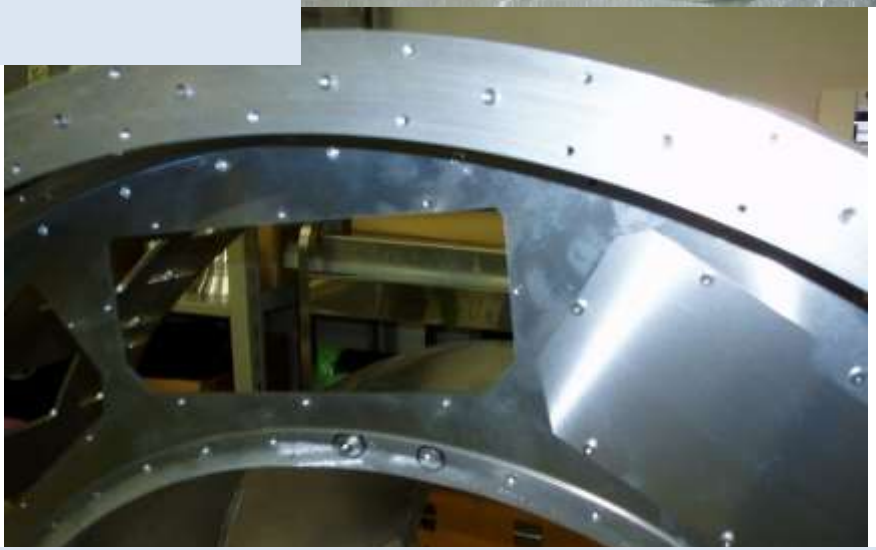
Polar angle coverage for Physics, Belle and Belle II are the same.
On the superKEKB condition, larger beam crossing angle and individual final focus magnets require bigger space than Belle.

Gap sensor connection (Backward)



Phi location is the same with support rod connection
4 sensors (45, 135, 225, 315 degrees)

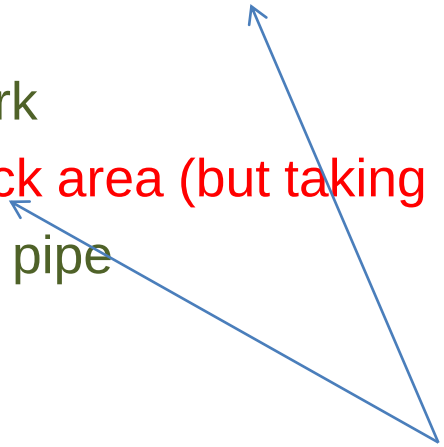




Space is very tight for VXD service work
Should be verified ASAP by design and mock test

What items are concern with this issue?

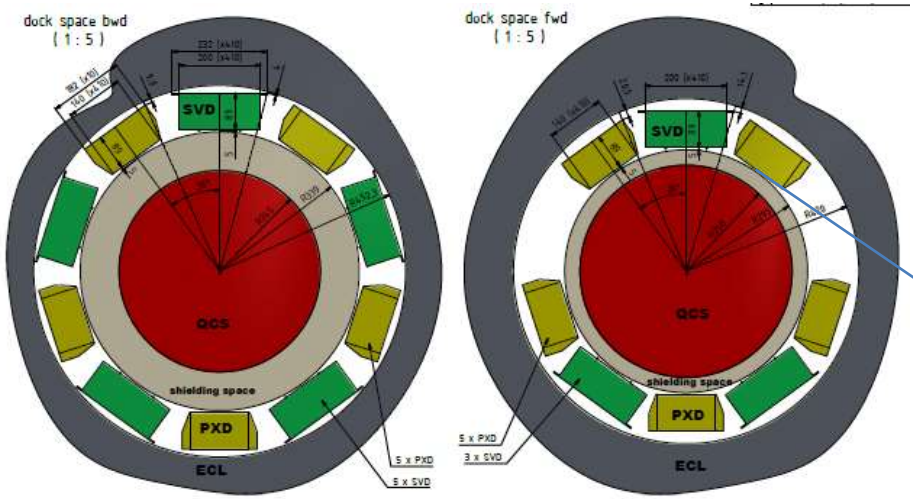
- Possible problem after starting physics run.
  - Broken Bellow pipe by HOM heating (also happen on Belle)
- On extracting QCS (worst case which require many extraction steps)
  - Opening End-yoke
  - Setting up of Endcap extracting stage
    - Disconnection of all services for ARICH and E-ECL
  - Extracting Endcap
  - Preparing scaffoldings for service work
  - Service disassembly around VXD dock area (but taking long time)
  - Disconnection of services for bellows pipe
  - Beam pipe disconnection by RVC
  - Extracting QCS
  - Replacing bellows pipe

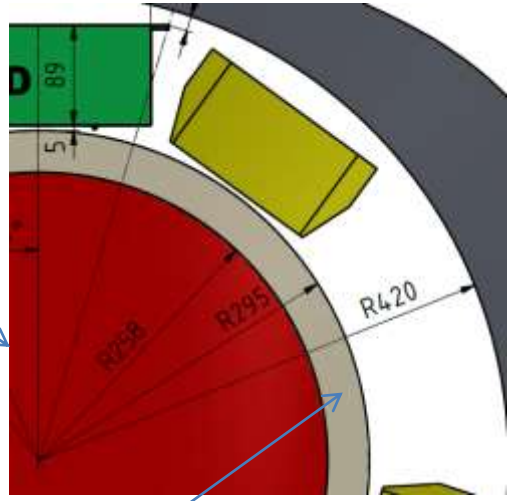


Some experts may be necessary

On QCS installation, just reverse of above work
(VXD service work around Dock area can start after QCS installation)

Discussion with machine group





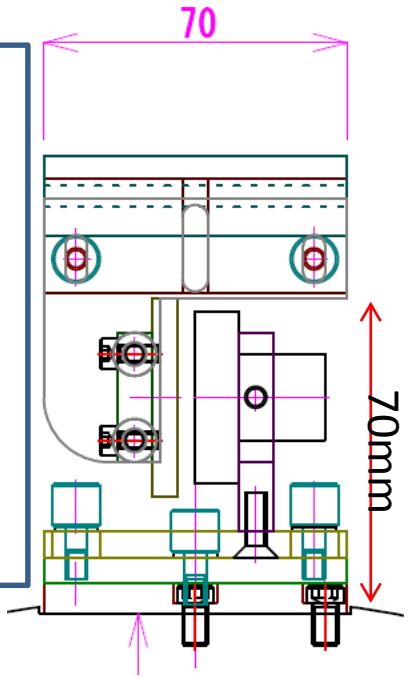
Current VXD dock design
(Cabling and piping are not shown)

Current agreement between machine group and Belle group

1,Machine group should try to reduce height of gap sensor from 70mm to 35mm.

2,VXD group have to keep 35mm (50mm width)of open space between QCS and VXD services

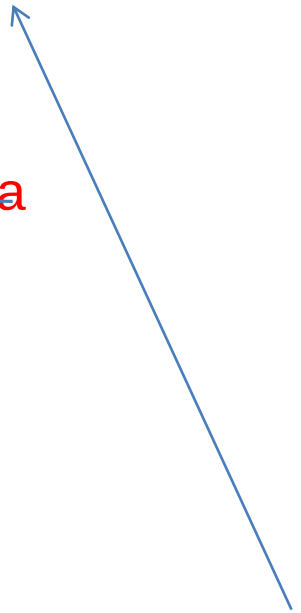
!! Issue: Radius of QCS has increased from 258 to 265mm



Problem: Tscharlie is very busy by PXD ladder assembly.
No one can control/understand this issue at present

Possible scenario by agreement

- On extracting QCS (35mmt Gap sensor and keeping open space)
  - Opening End-yoke
  - Setting up of Endcap extracting stage
    - Disconnection of all services for ARICH and E-ECL
  - Extracting Endcap
  - Preparing scaffoldings for service work
  - ~~Service Disassembly around VXD dock area~~
  - Disconnection of services for bellows pipe
  - Beam pipe disconnection by RVC
  - Extracting QCS
  - Replacing bellows pipe

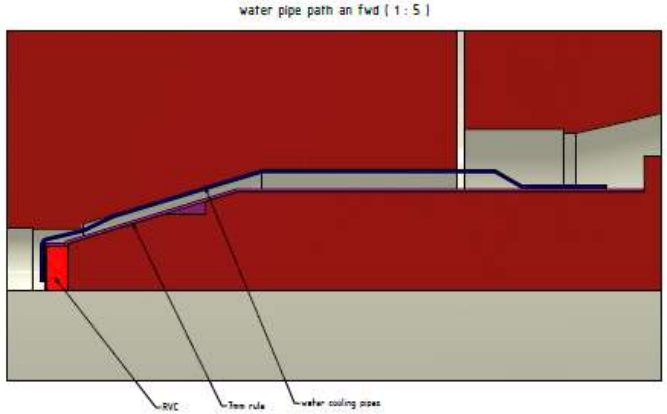


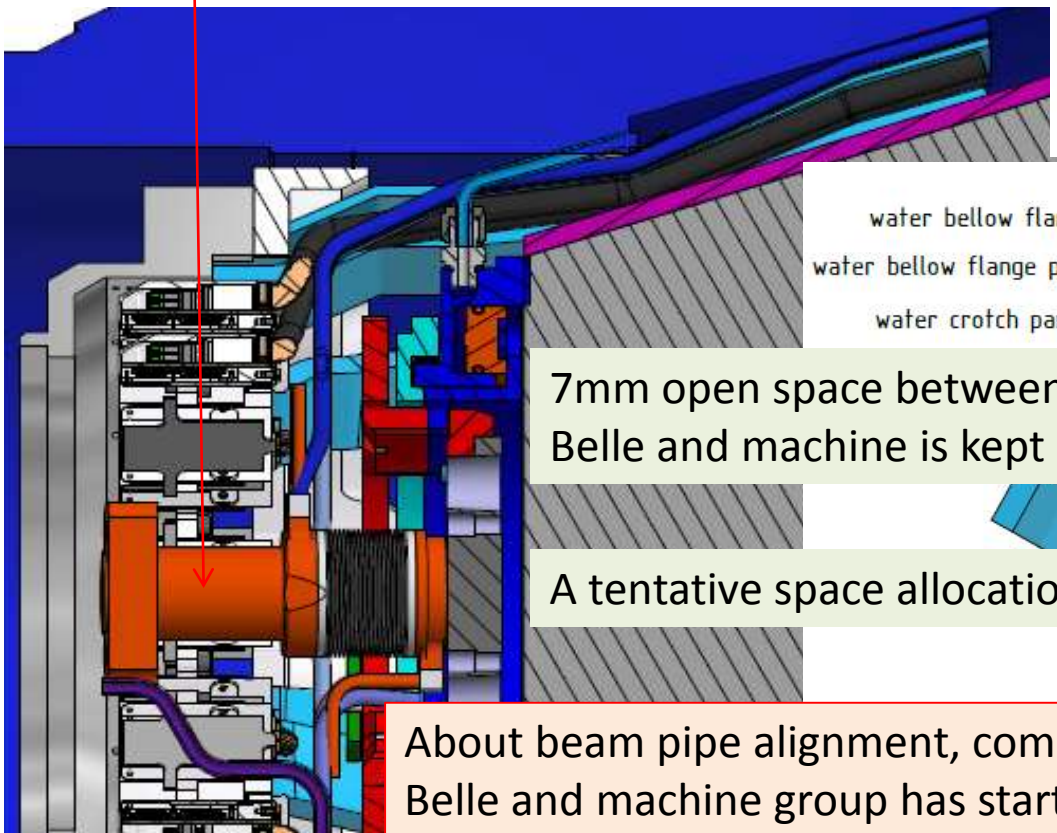
Some experts may be necessary

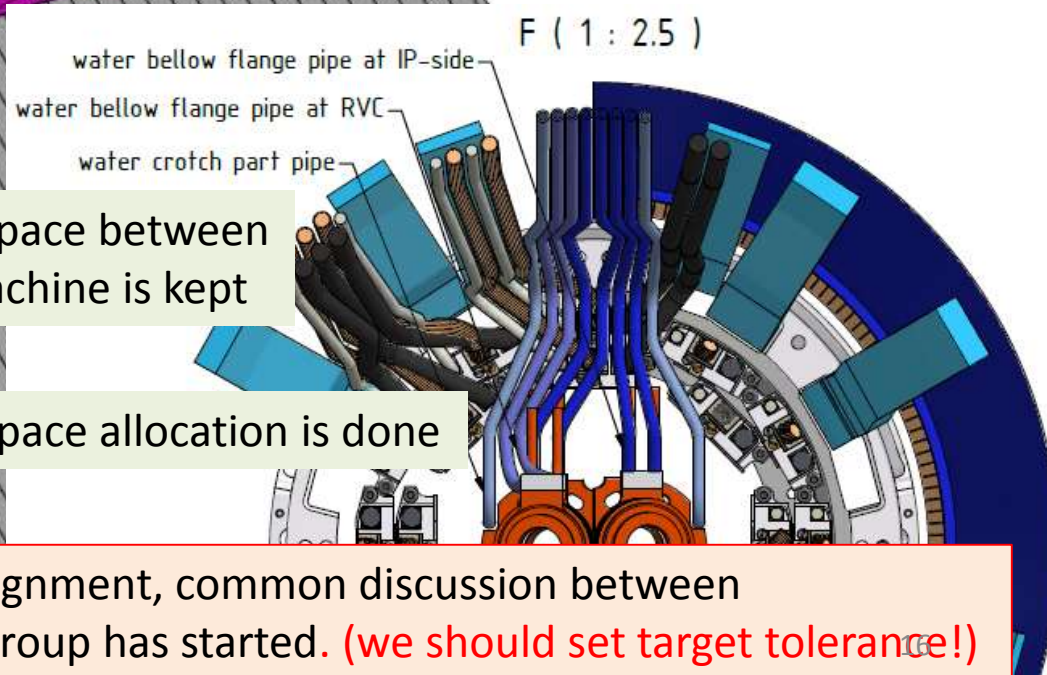
On QCS installation, just reverse of above work
(VXD service work around Dock area can start <u>after QCS installation</u>)

Space between QCS and CDC

- Bellows pipe connection
  - After installation, bellows pipes are installed (baseline)
  - If we can see IP chamber directly after installation, BP alignment can be done easily.
- Tentative service route
  - RVC service: on the QCS
  - Another: on the inner CDC wall







7mm open space between Belle and machine is kept

A tentative space allocation is done

About beam pipe alignment, common discussion between Belle and machine group has started. (we should set target tolerance!)

Status of VXD assembly → installation

VXD Parts status

Name	Phase 2	Phase 3
Beam pipe	Delivered	Production ongoing
BP brackets	Will be modified	Not yet
Bellows pipe	*Produce in 2016*	*Produce in 2016*
PXD/BEAST mount block	Not yet	Not yet (design done)
Heavy metal shields	(need to repair)	Delivering in Mar. 2016
Heavy metal bolts	??? (depends on budget)	Produce in 2016
End flange	Delivered	Delivering in Mar. 2016
SVD CFRP support cone	No	Delivered
CFRP Outer cover	Delivered	Delivered
Al sheet gluing to CFRP	Test production	Not yet
Outer cover brackets	Delivered	Delivered
VXD installation ring	Not yet (design decided)	Not Yet (design decided)
SVD division tool	No	Now updating

Under lined subject (by S.T)

VXD services

Name	Phase 2	Phase 3
Temp. sensor on BP	Not yet	Not yet
Paraffin cooling pipes	Piping until KLM in Jan. 2015	
Water cooling pipes	Piping route is not finalized	
VXD Dock ring	Design is not finished	
Brackets for services from Dock to KLM	Not yet	Not yet
CO2 piping from IBBelle to E-hut	Will finish in Mar. 2016	
SVD cooling chiller and piping	Should finish in 2016	

VXD assembly + installation

Name	Phase 2/Phase 3
VXD assembly table	Optimization in 2016
Support flame for services	Production in 2016
VXD transport tool	Testing in B2GM (Feb. 2015)
Support flame for VXD tray	Production in 2016
Scaffoldings	Prepared in 2016

VXD task list until Mar. 2016 (KEK VXD group)

Beam Pipe

- Inner + Outer tube EBW connection: Mar. 2016
- IP chamber + crotch part connection test: Mar. 2016
- Parylene C coating of IP chamber (Phase 2, phase 3): done
  - Avoiding water corrosion of Be
- Piping for Paraffin (IP chamber cooling by H.Nakayama): Jan. 2016

VXD

- CO2 piping from IBBelle to E-hut: Mar. 2016
- *AC400V transformer (pending: depending on budget)*
- Area clean-up for IBBelle space(by Adachi): Mar. 2016
- PXD E-rack platform (by Adachi): in Feb. 2016
- Heavy metal shields for phase 3: Mar. 2016
- End-flanges for phase 3: Mar. 2016
- Extension of VXD clean booth (quotation ongoing: Mar. 2016)
- B1 cable tray: after completion of B1 clean booth
- AL flames for VXD transportation: almost ordered
- SVD division tool update: rail will deliver soon
- Gluing test of CFRP outer cover with AL sheet: delivered
- Cutting fence of B1 terrace for VXD transportation: Jan. 2016

VXD group at KEK
S. Tanaka (H. Nakayama)
(supported by Kohriki, Suzuki)
Quite low manpower!!!

What are my issues/problem now!

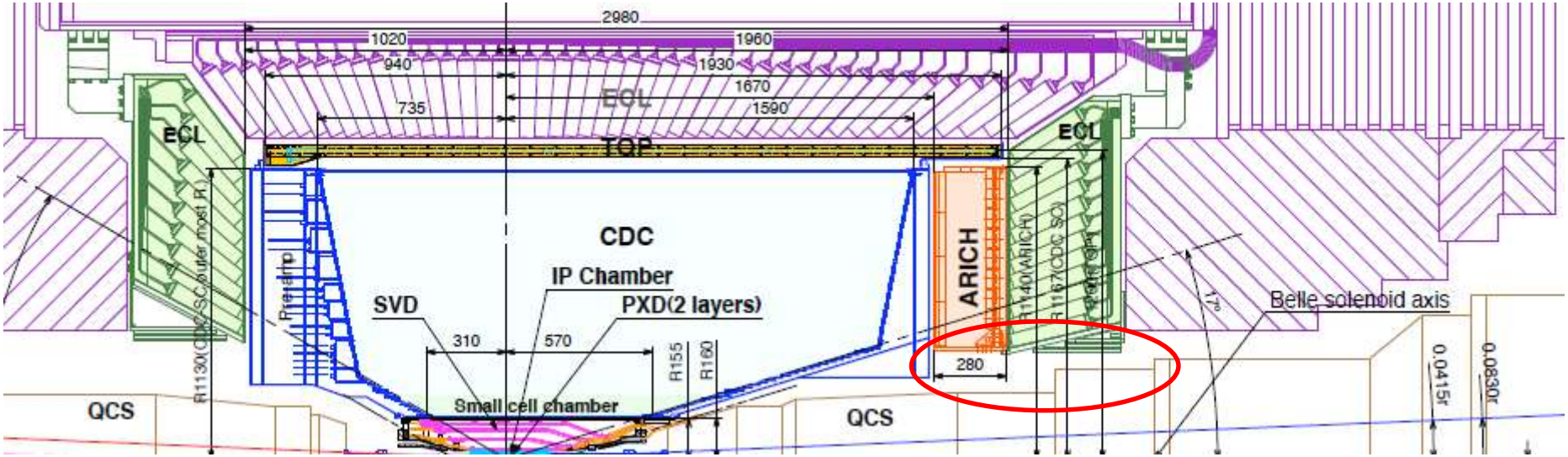
- Pushed by P. Krizan and Y. Ushiroda
  - VXD group need to show realistic VXD assembly milestones including contingency.
  - When VXD service installation will be confirmed by test?
    - In particular from Dock to KLM and between VXD and QCS
      - No way to solve this issue at a moment
- Pushed by machine group
  - How much tolerance of beam pipe position is required on VXD installation? (x, y and rotation)
    - SR simulation and beam optics simulation
  - How to align/verify the beam pipe position with respect to QCS flange after VXD installation?
    - Start discussion between I.Nakamura(Belle II) and machine alignment group
- Missing design (need to start production ASAP)
  - VXD dock ring
  - PXD/BEAST mount arm

B2GM plan

- There are three chance to discuss in the B2GM
  - 30th Jan. Gemba discussion
  - 1st afternoon VXD common gemba
  - 3rd afternoon VXD assembly and commissioning (discussion)
- Topics
  - VXD common topics
    - Schedule/milestone (for phase2/3)
    - VXD assembly procedure->installation with service
    - VXD service space(installation procedure)
    - B1 room layout and system test plan
    - VXD thermal test result-> VXD environmental control
  - Individual subjects
    - SVD assembly/ladder mount
    - PXD mount
    - BEAST/monitor mount
    - CO2 cooling (IBBelle installation/piping) preparation
  - Special Gemba? (@ machine control room to learn beam operation)

Thank you

Can we extract QCS with keeping Endcap at installed position?



- RVC mechanics require high pressure and gear control
  - It seems very hard work by remote control
- On the Bellows pipe replacement, service access around VXD is necessary. On this work, Endcap have to extract to enter a person.

BelleII VXD installation

Almost of all procedure is the same as Belle case
(but new tool of AIM and RVC)

Belle VXD Installation(2003/8/18)

Connecting pipes and cables (ARICH,ECL)

Closing Endcap (KEK)

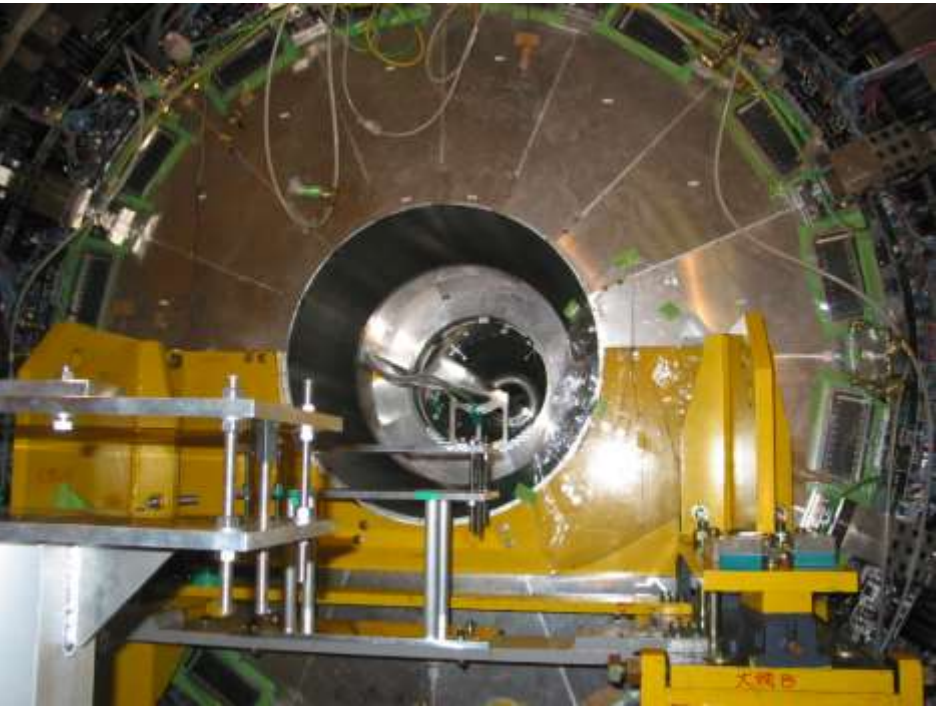
Installation jig test (w/o SVD)
MPI+KEK (on BelleII case)

Support Flame (KEK)

Installation tool (MPI)

VXD crane tool (MPI)


SVD cover was wrapped by metal foil

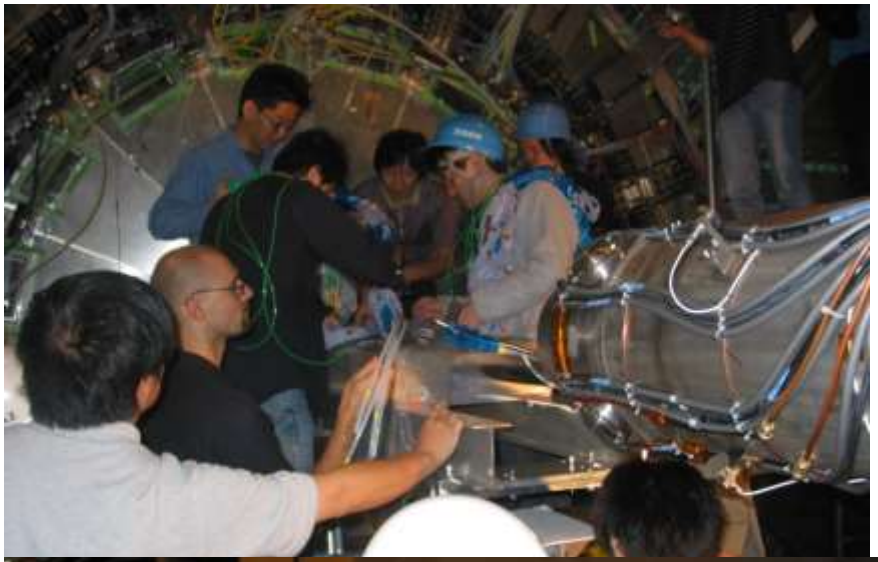


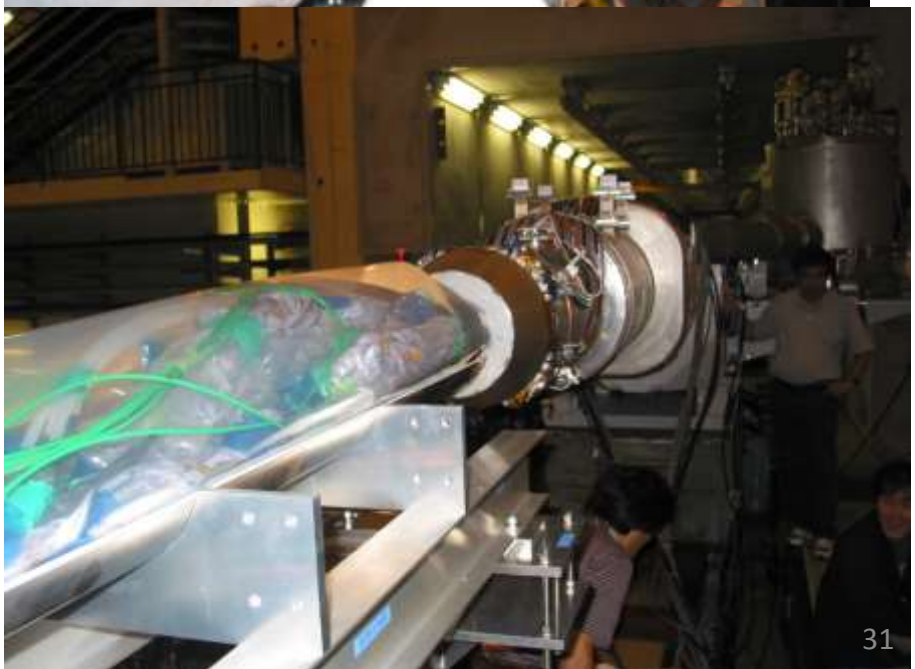

Dismantle of scaffoldings (KEK)

8/19

Cable packing on FWD side is after crane work

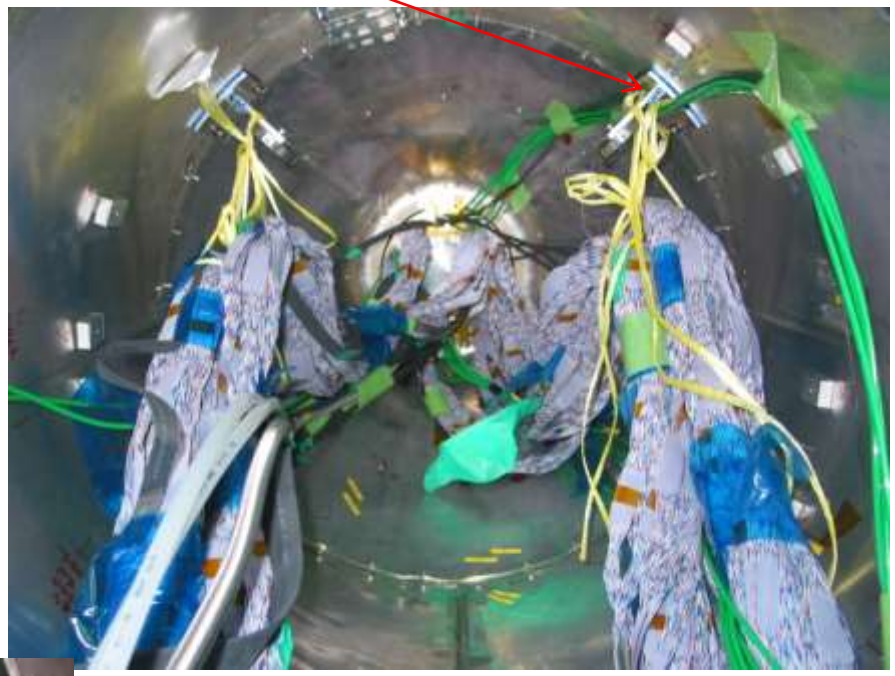
SVD installation (8/19)





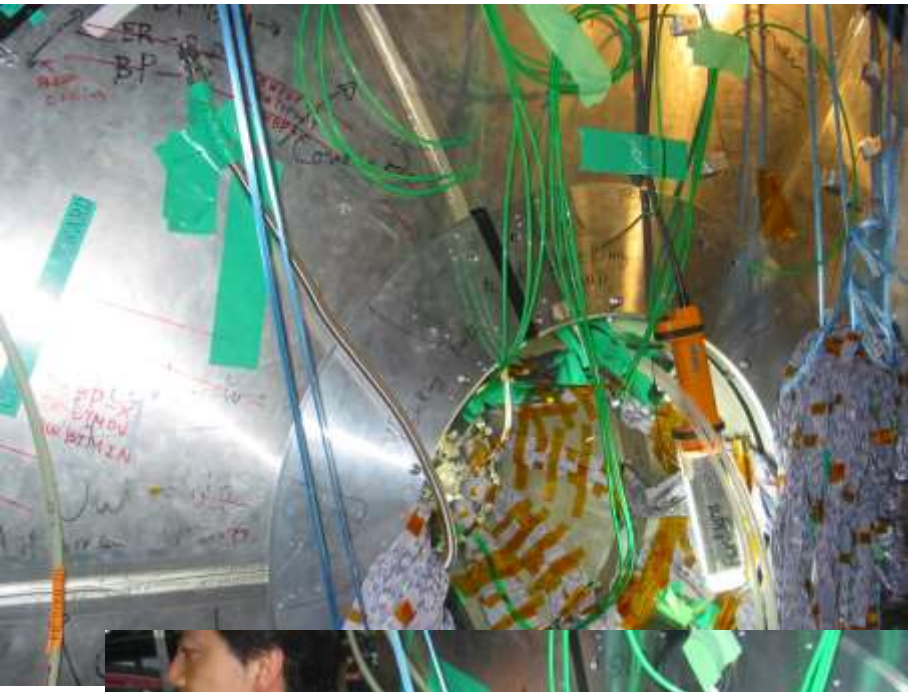
8/20

Gap sensor (machine alignment group)



After VXD installation, Endcap is opened for service work.

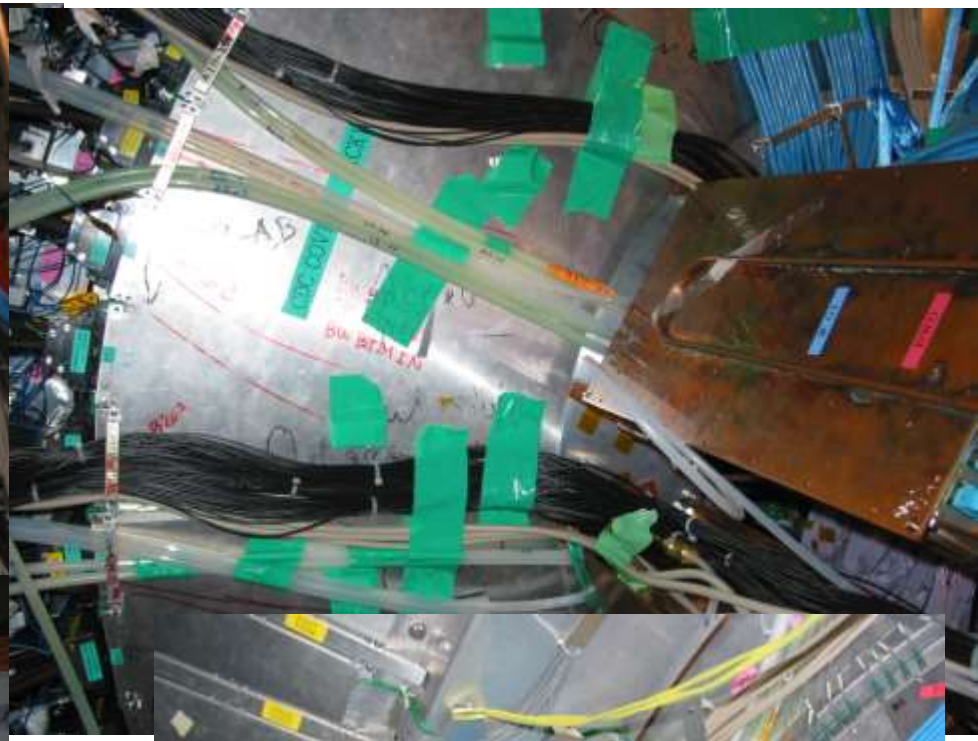
Cabling around dock area(8/23)

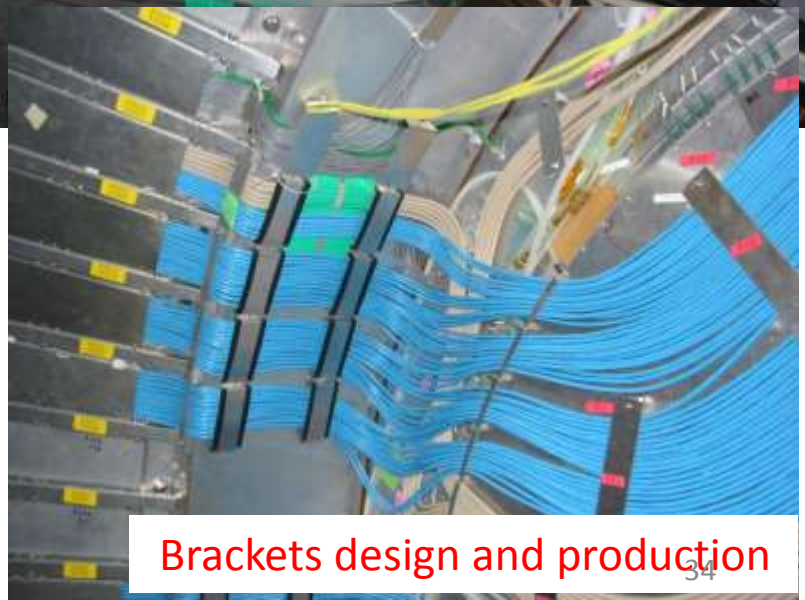


Dock support plate : MPI+KEK

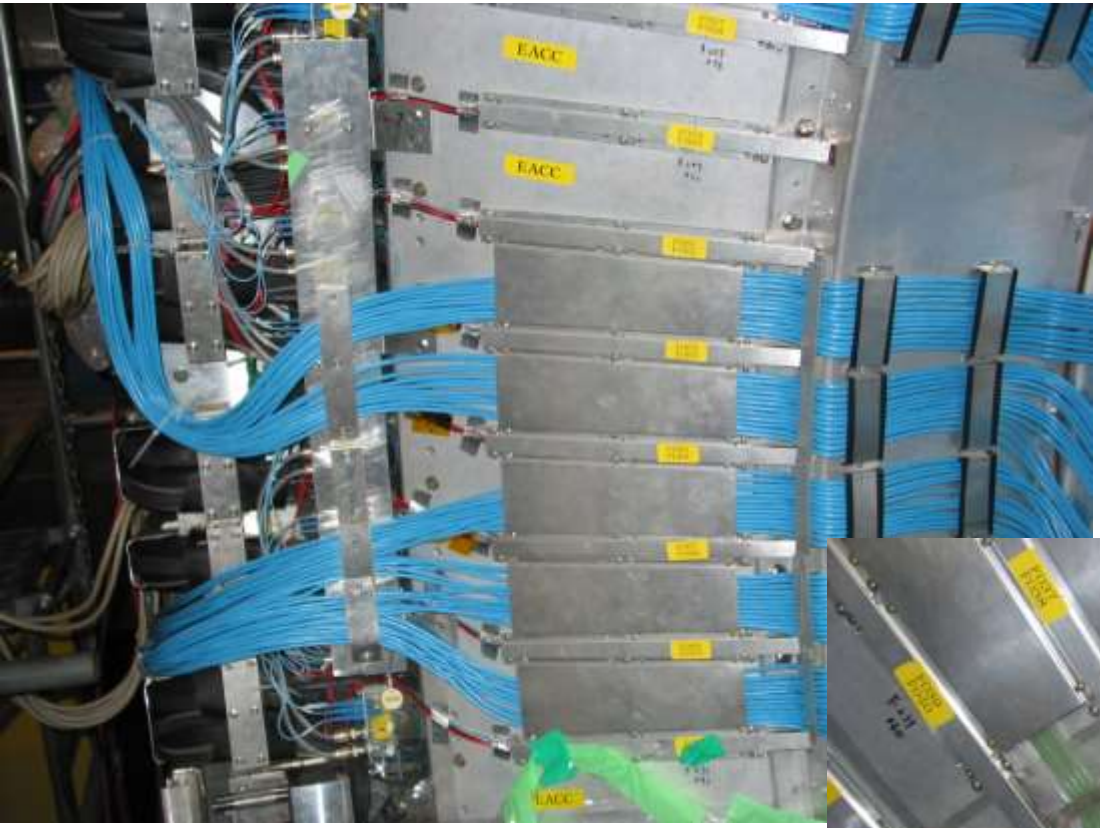
8/28

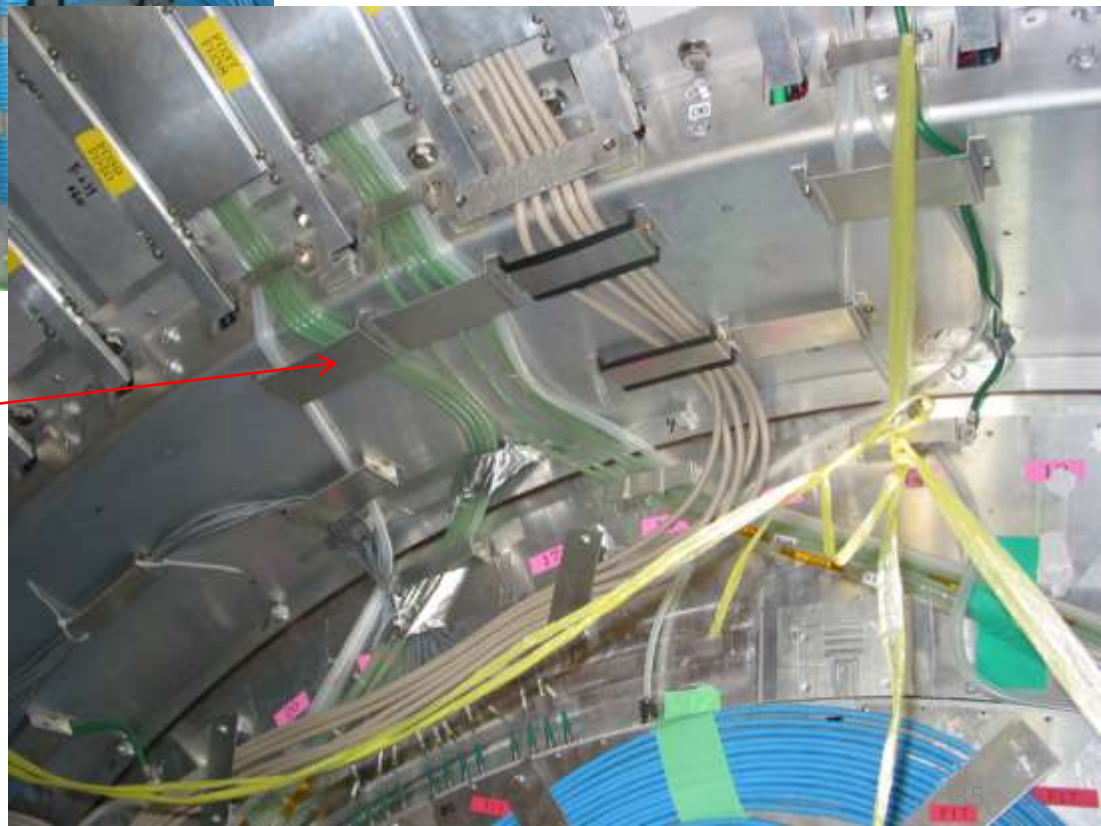
Need to verify cable space





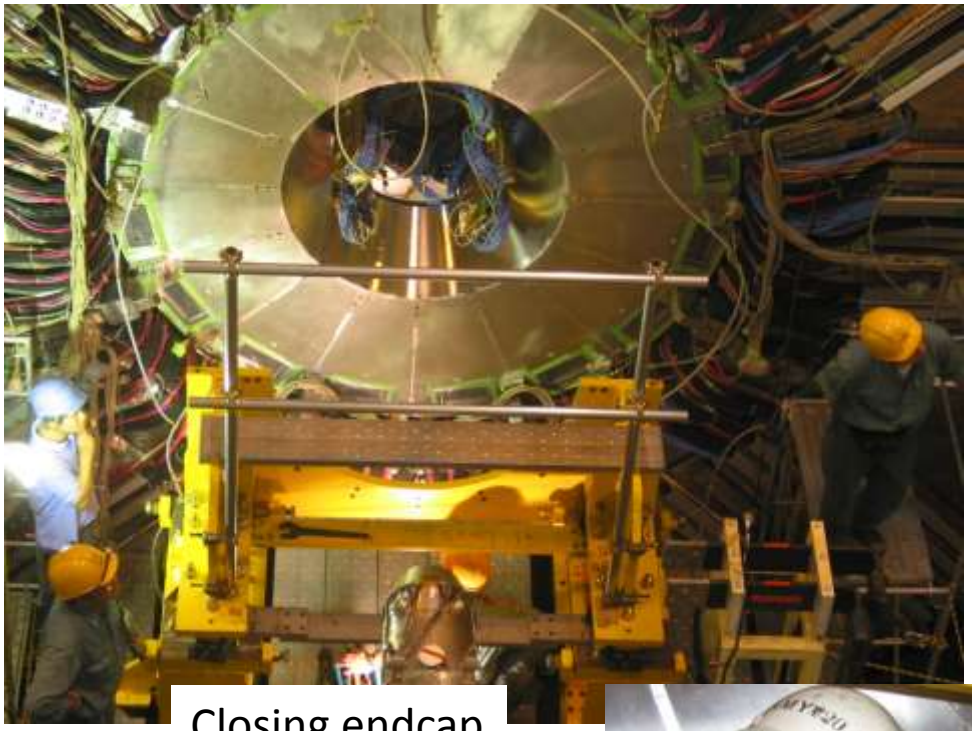
Brackets design and production



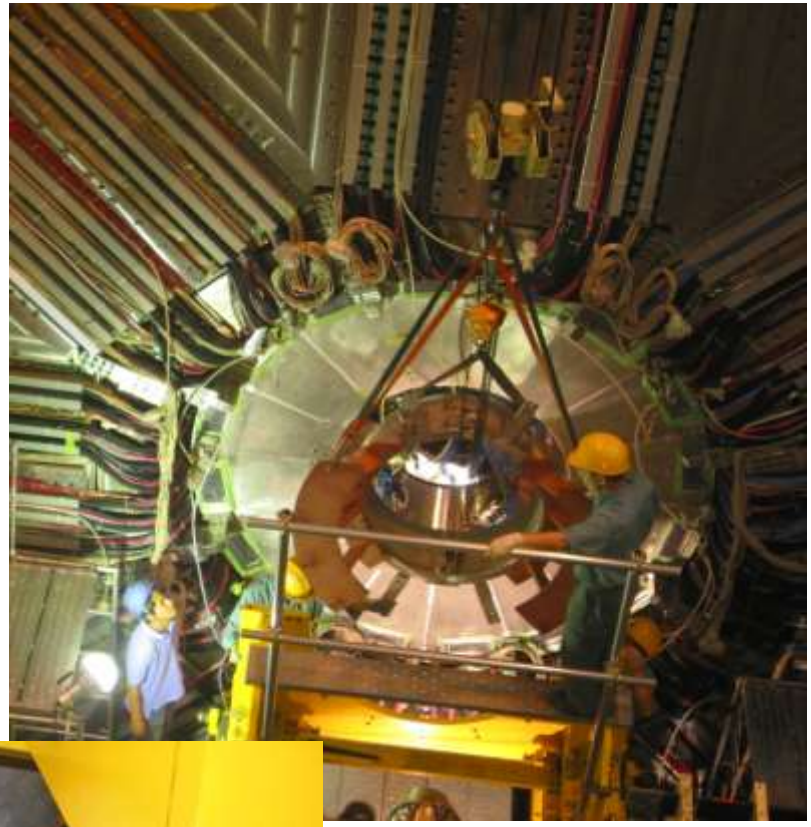


We should start discussion about cable Brackets

Lead shield installation(9/18)

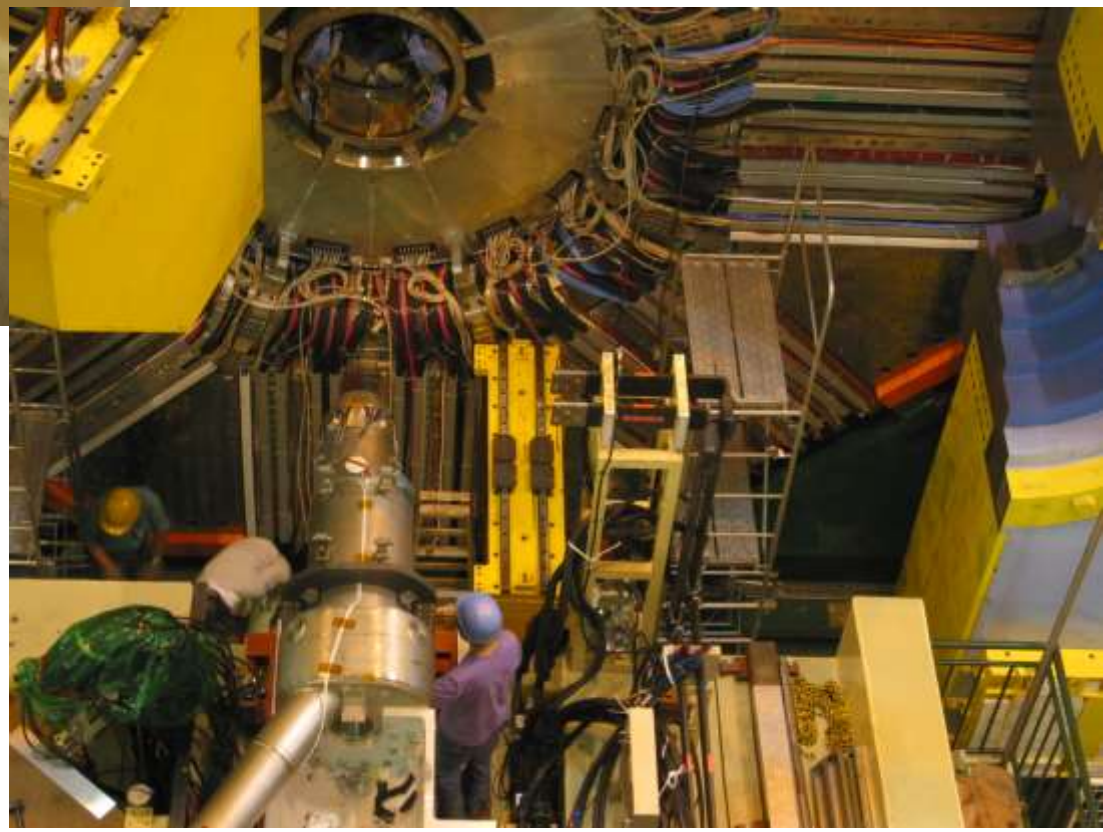


Closing endcap

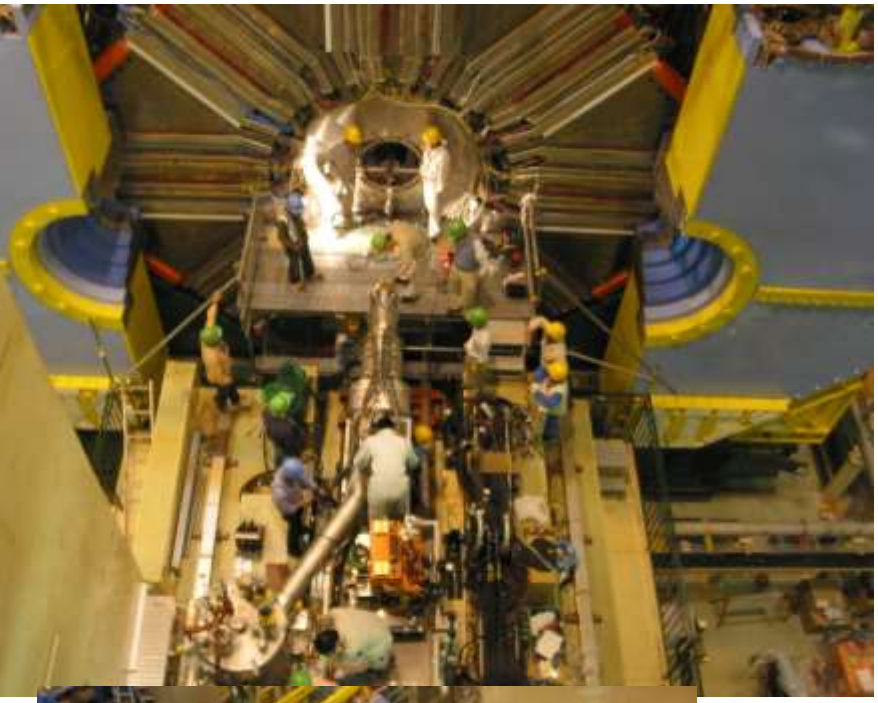


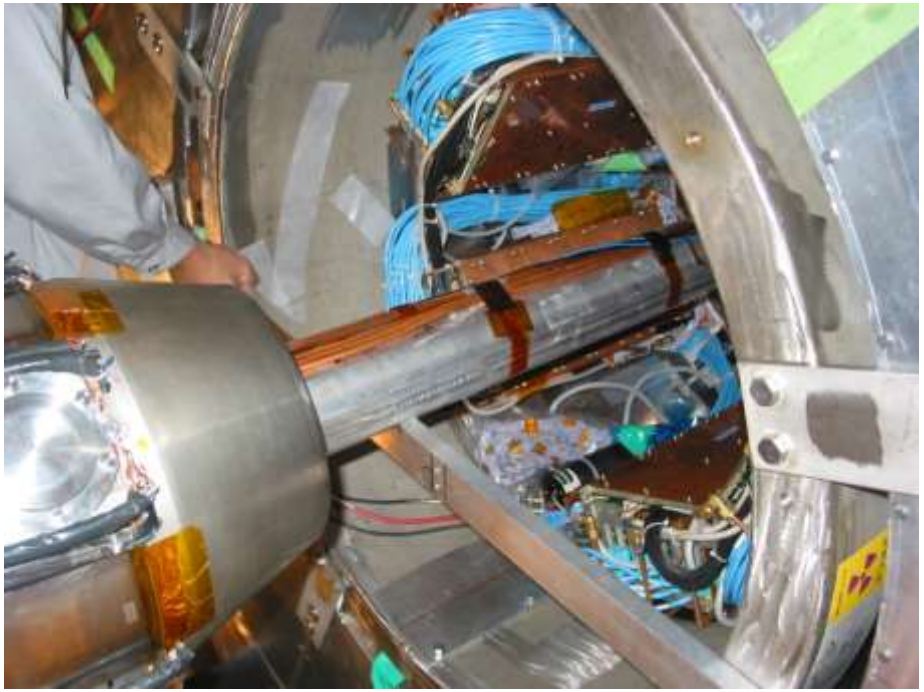
Cable connection
(Endcap detectors)

Disassembling Endcap support stage



QCS installation





On Belle case, beam pipe connection has finished before QCS installation.
On Belle II case, RVC is used for Beam pipe connection