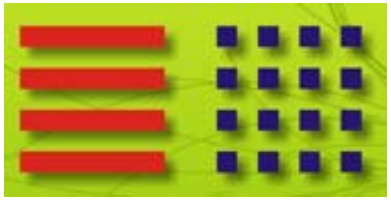
PXD (VXD) Mechanics

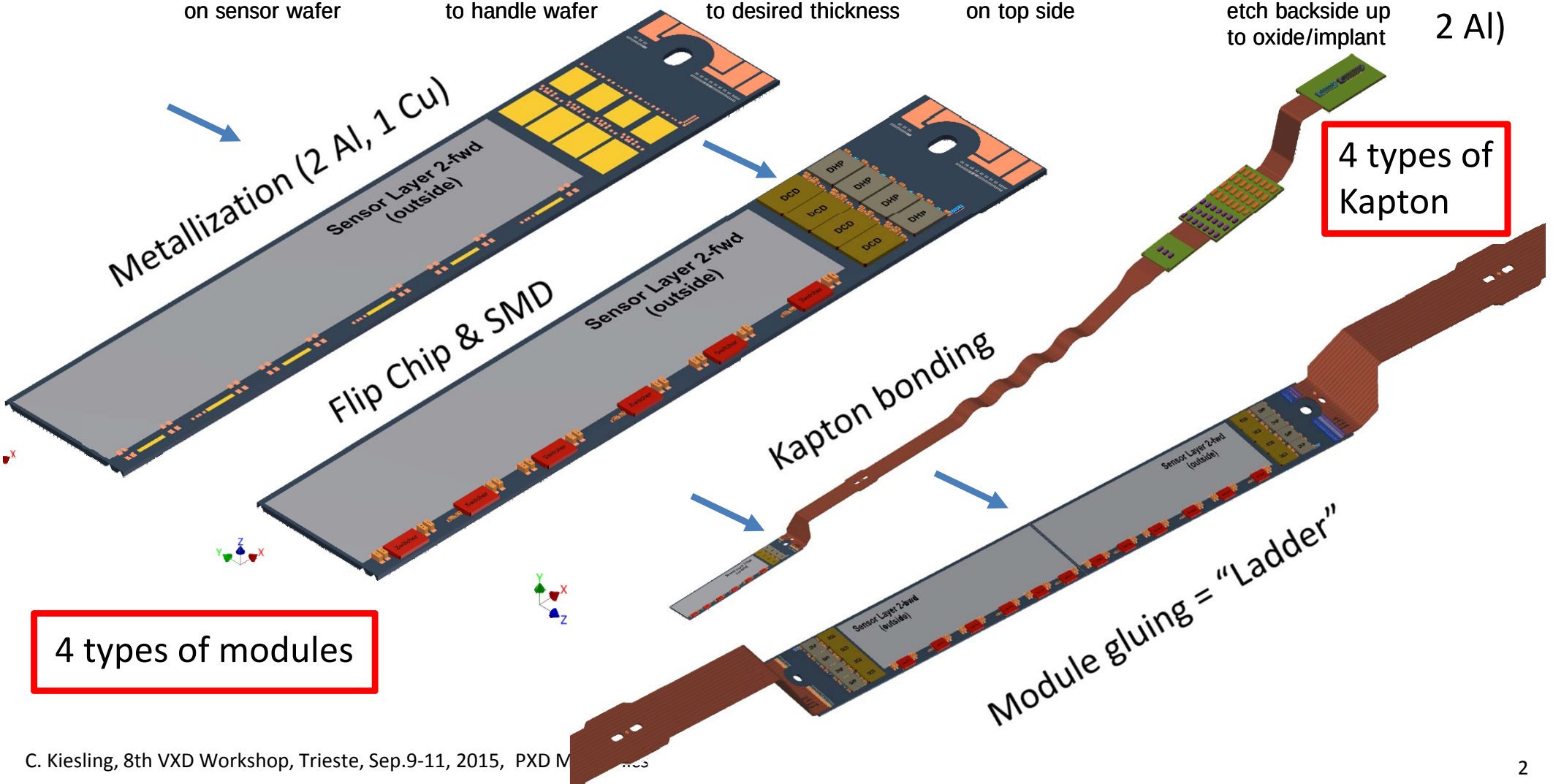
CK for Tscharlie Ackermann



- PXD Assembly Tools
- BEAST Phase 2 Mechanics Design
- Radiation Sensor (Diamond) Location
- VXD Assembly
- Service Space Studies

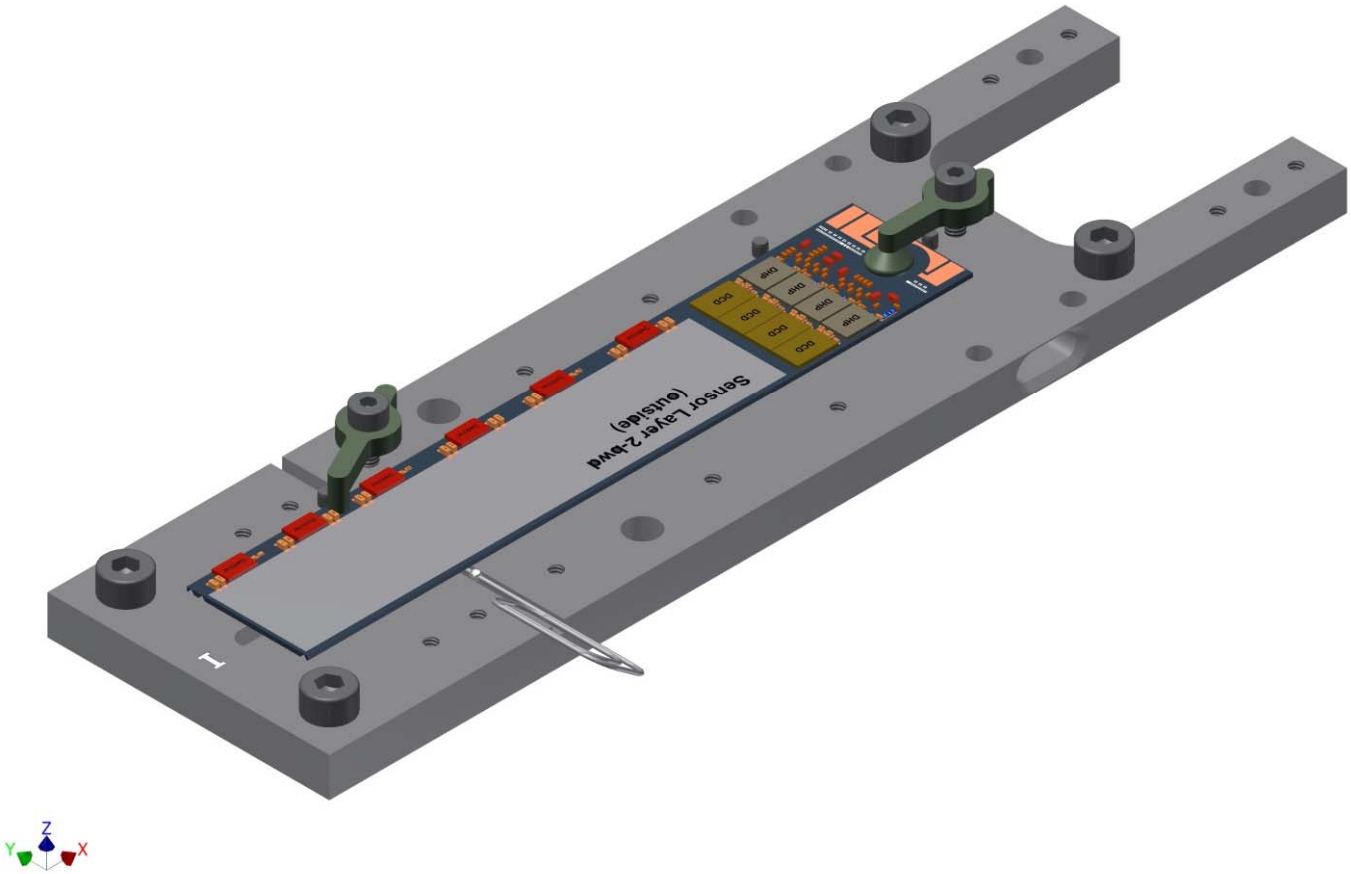
(IBBelle & AIM discussed separately)

Production Steps of PXD Ladders



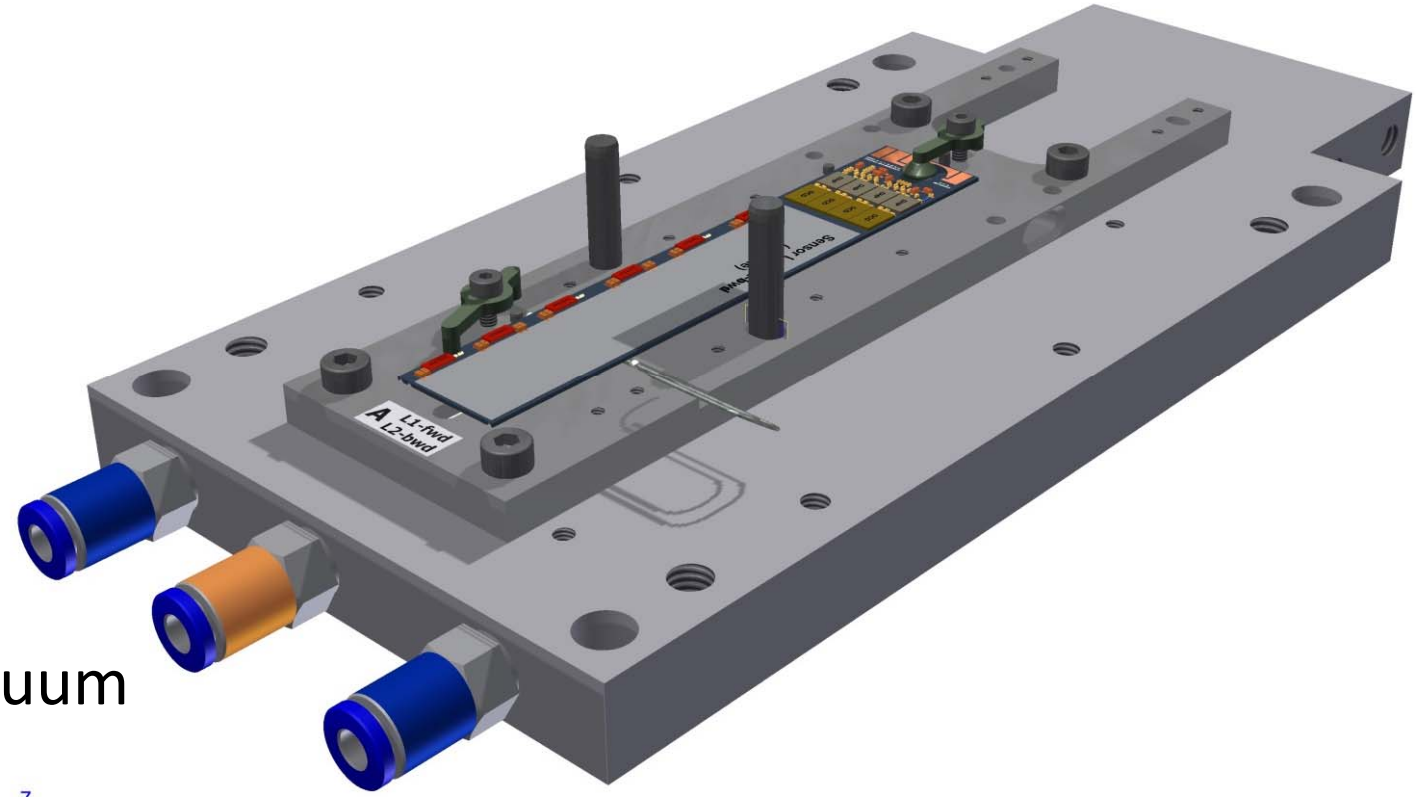
Mechanics: Ladder Assembly Tools (I)

Principle: Sensor fixed in variable transport jig,
will not leave the jig until installed on the SCBs



Mechanics: Ladder Assembly Tools (II)

transport jig mounted on cooling plate
(for electrical tests)

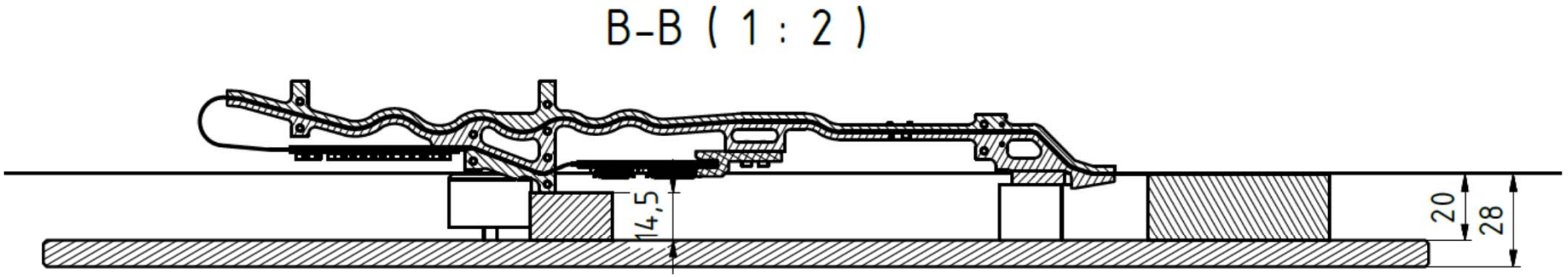


Cooling line in vacuum

Cooling line out

Mechanics: Ladder Assembly Tools (III)

Added complexity: how to manage the long Kapton cable

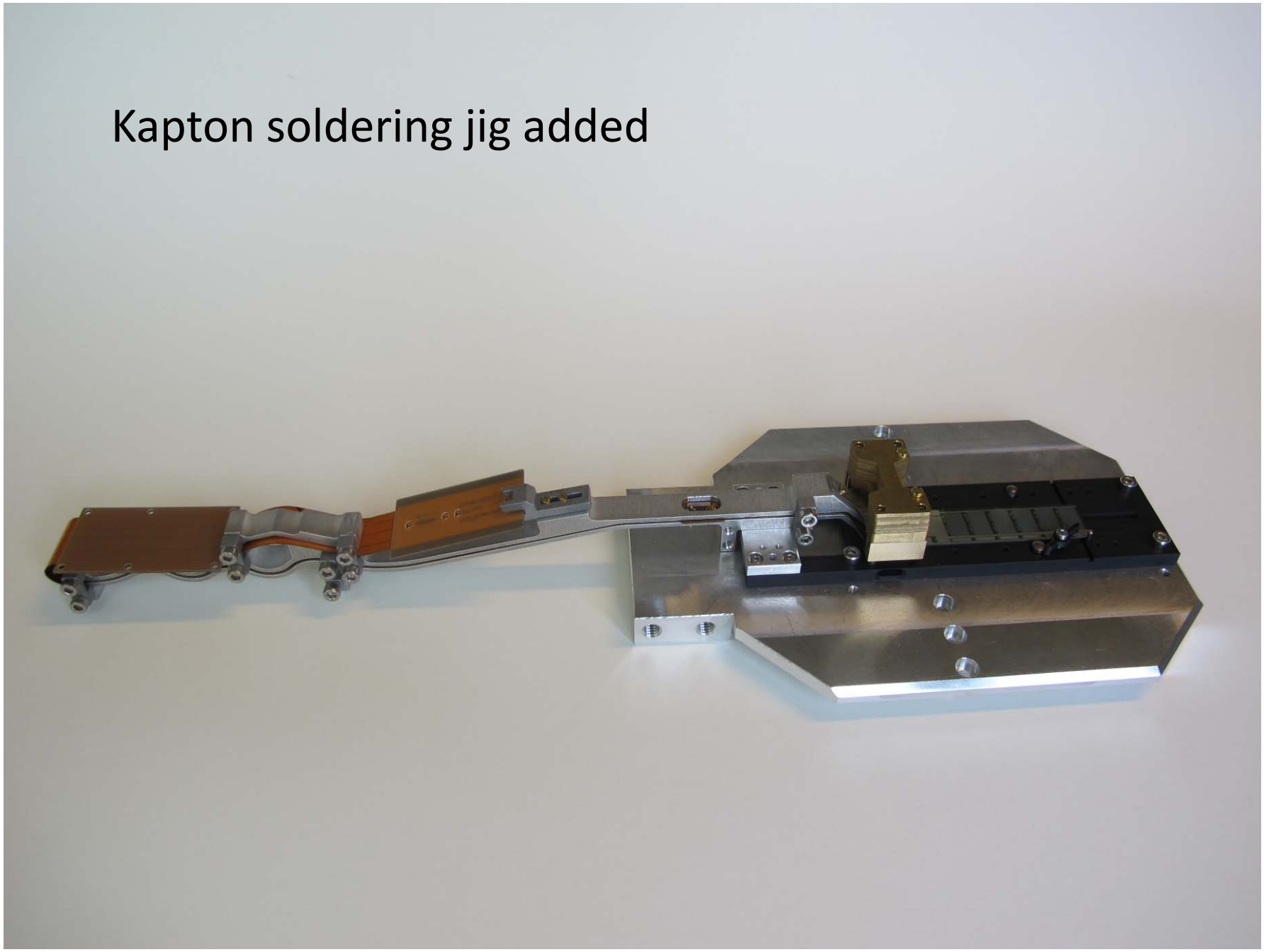


Aufbau für Kapton L1-fwd

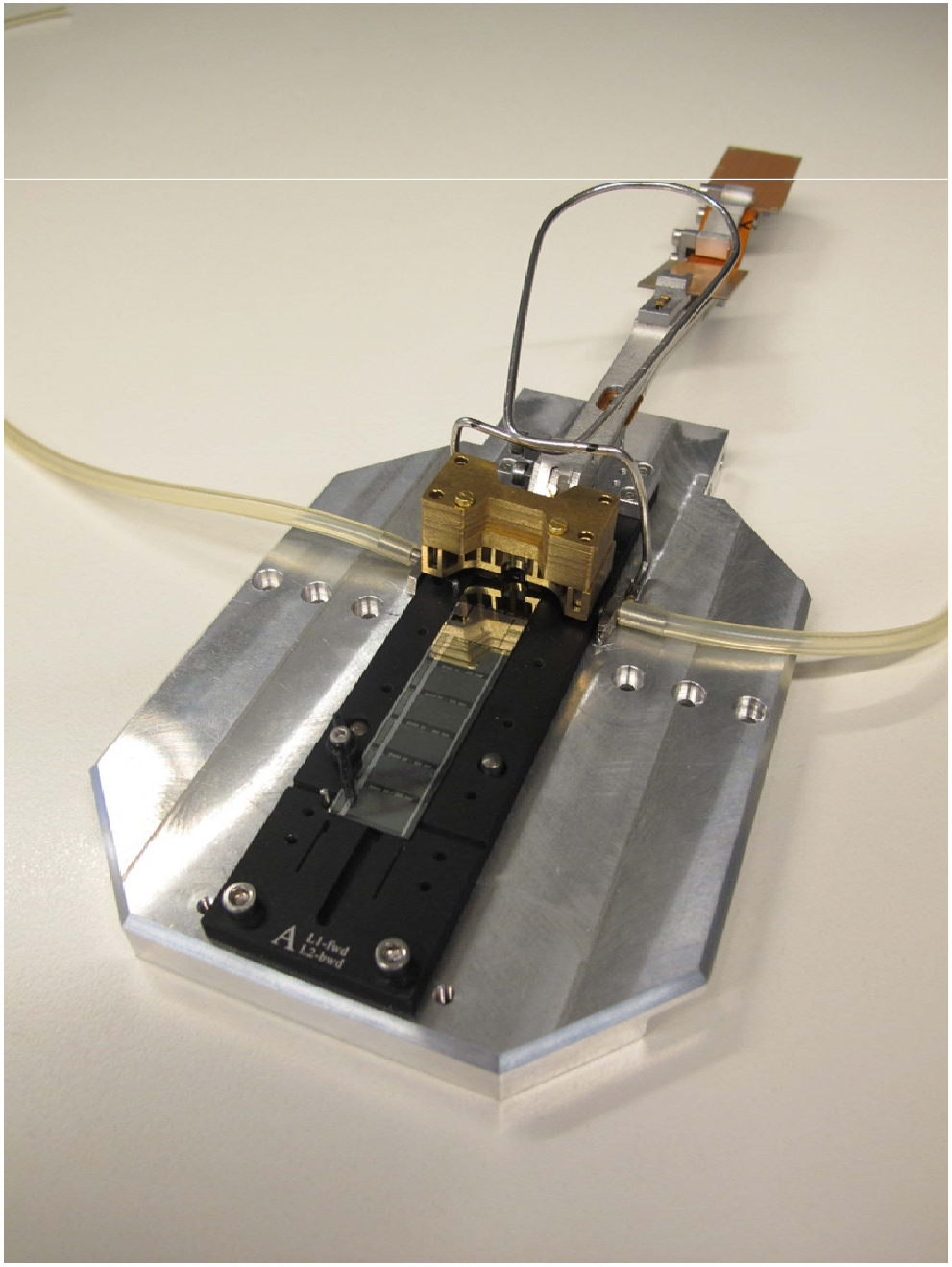
Jig needed to solder Kapton onto the sensor

afterwards wire bonding of Kapton to pads on sensor

Mechanics: Ladder Assembly Tools (IV)



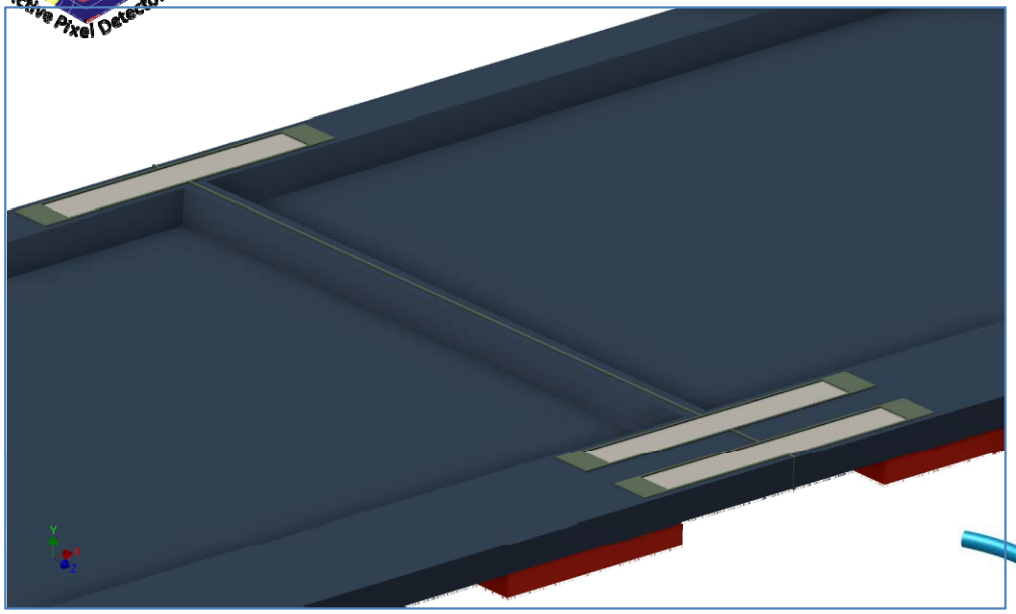
Mechanics: Ladder Assembly Tools (V)



Jig complete for Kapton soldering step

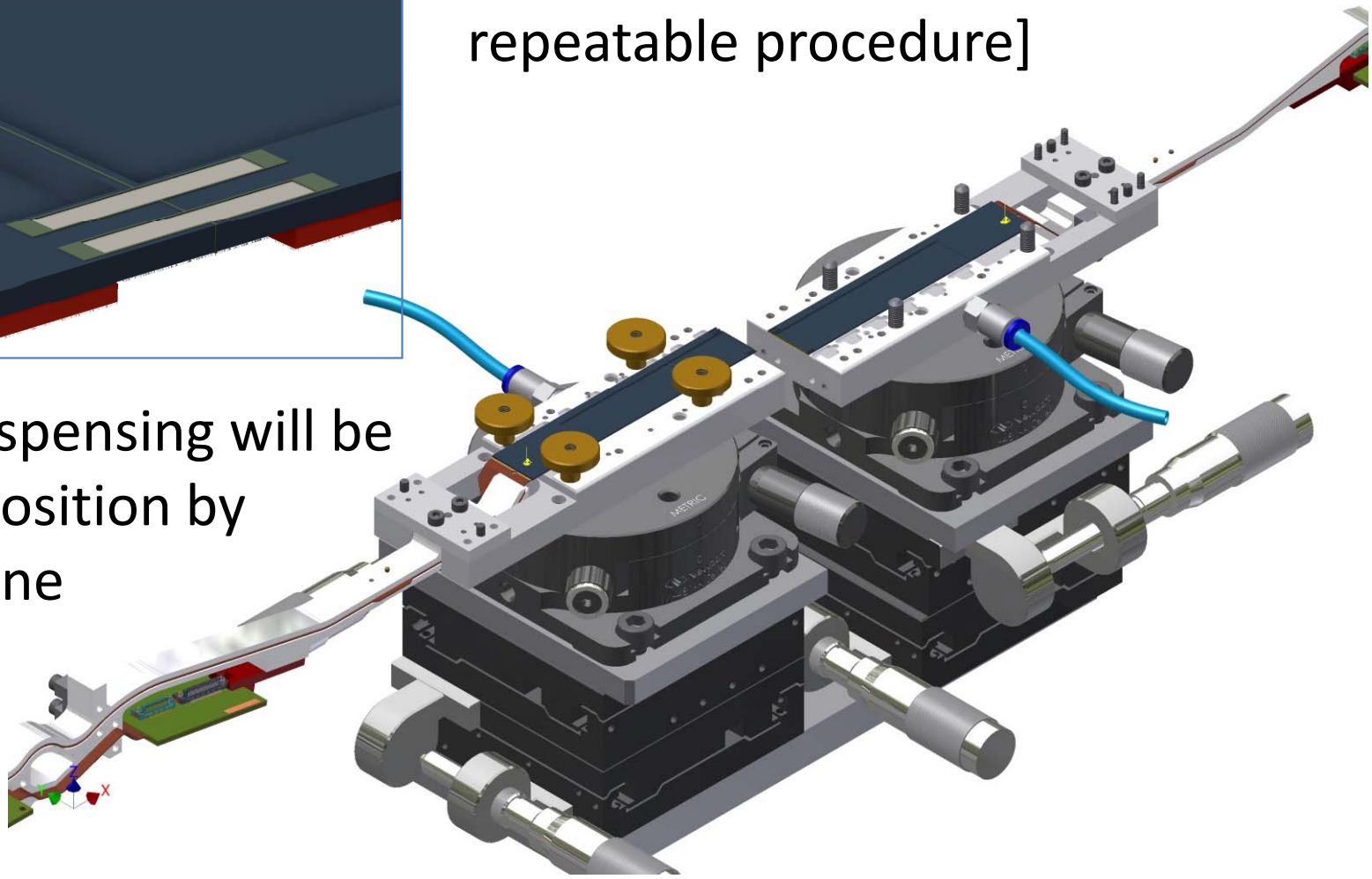
including air cooling lines for controlled cool-down after soldering

Ladder Assembly: Glueing Jig



[replace old “hand-made” process by controlled and repeatable procedure]

Glue (Araldite) dispensing will be done in upright position by dispensing machine

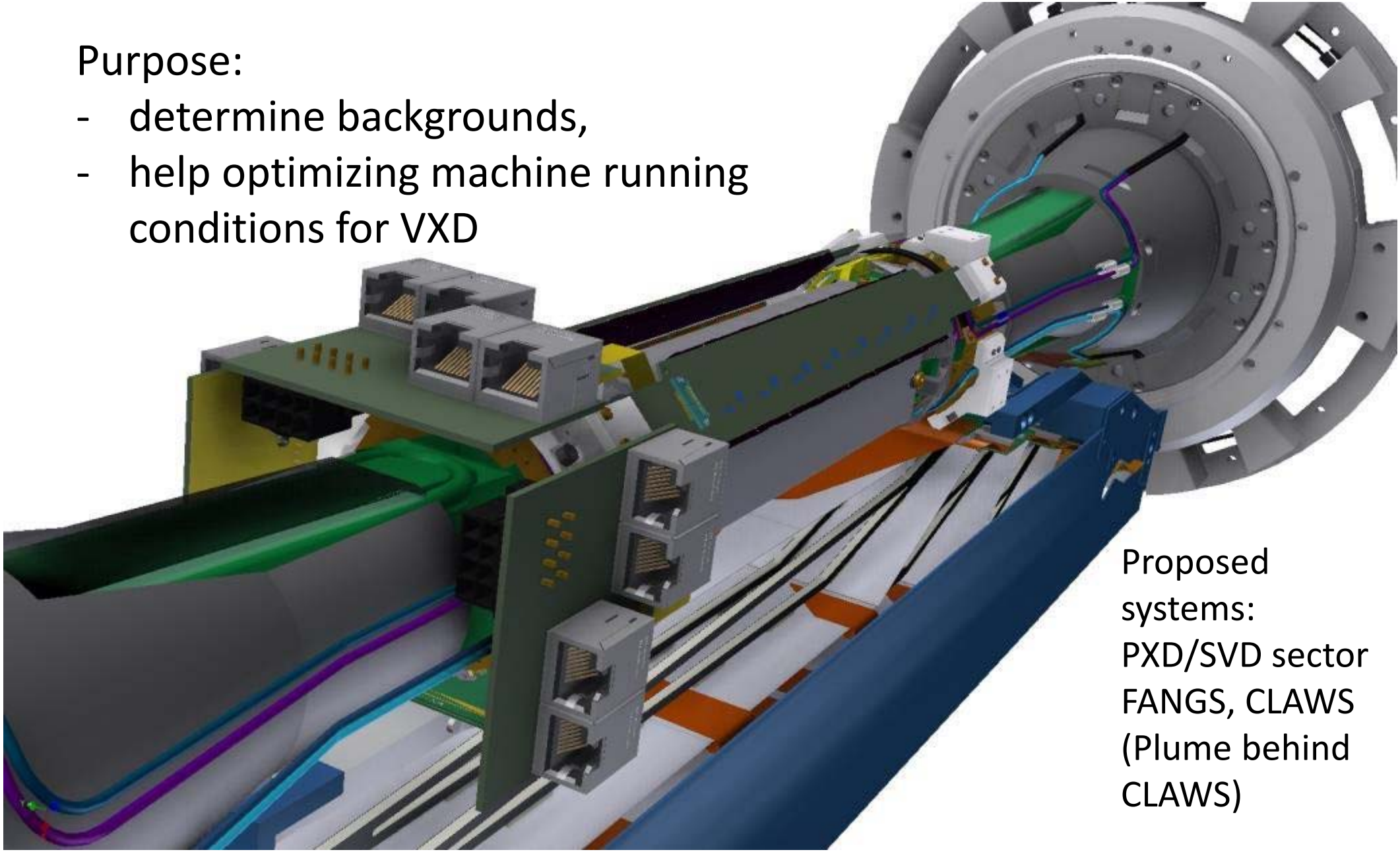


Japanese company (German branch) contacted

BEAST Phase 2

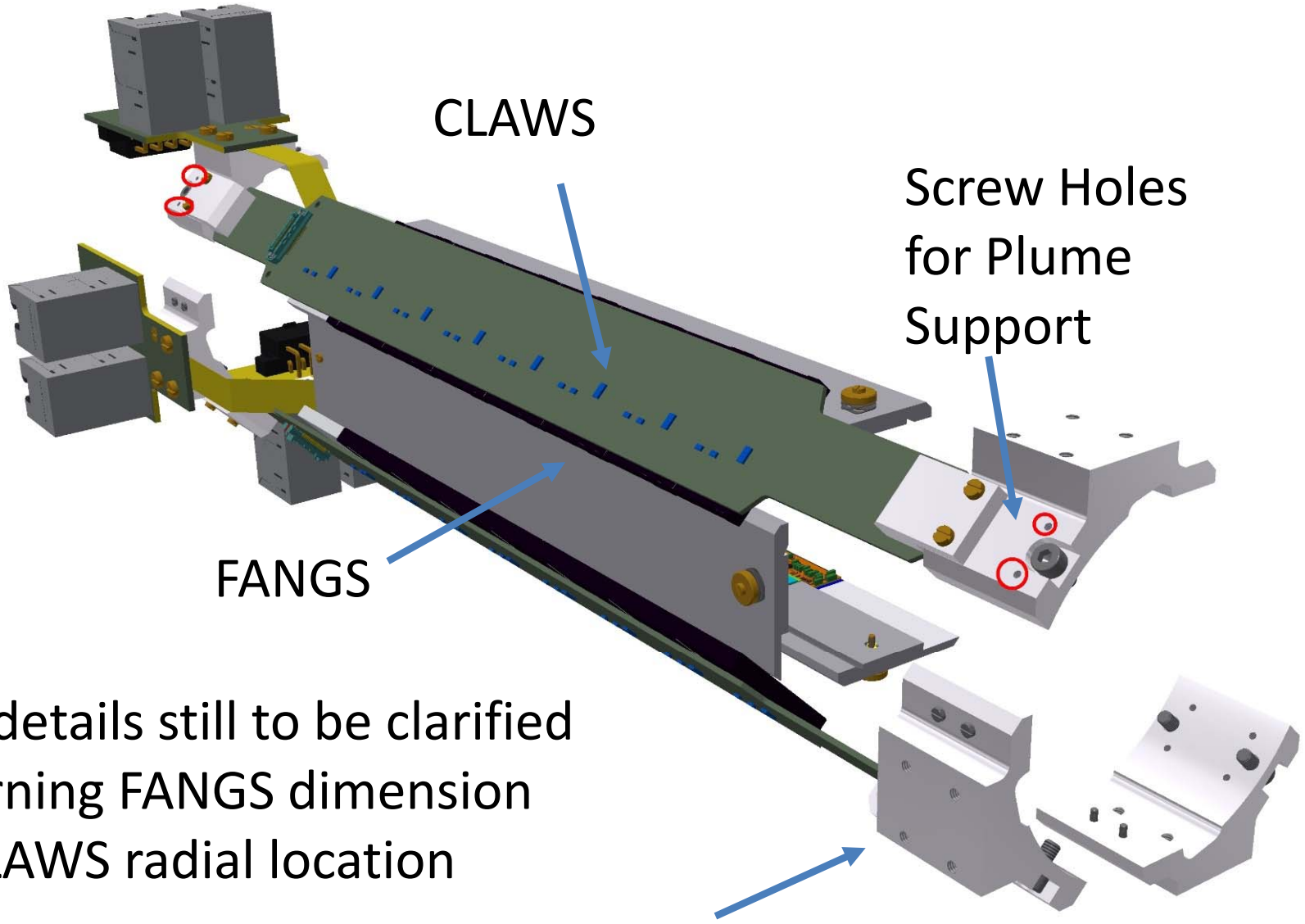
Purpose:

- determine backgrounds,
- help optimizing machine running conditions for VXD



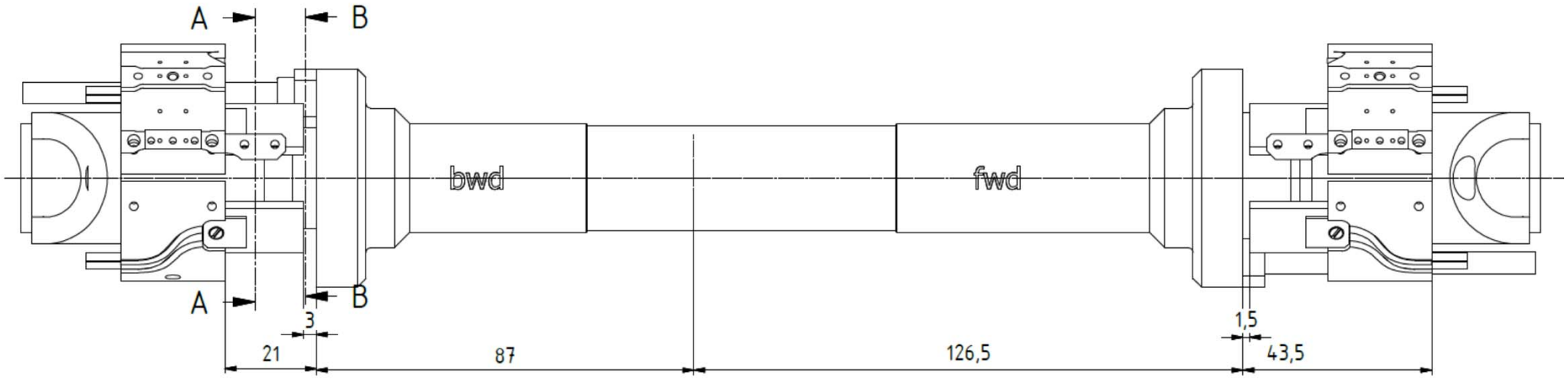
Proposed systems:
PXD/SVD sector
FANGS, CLAWS
(Plume behind CLAWS)

Mechanics: BEAST Phase 2 Assembly

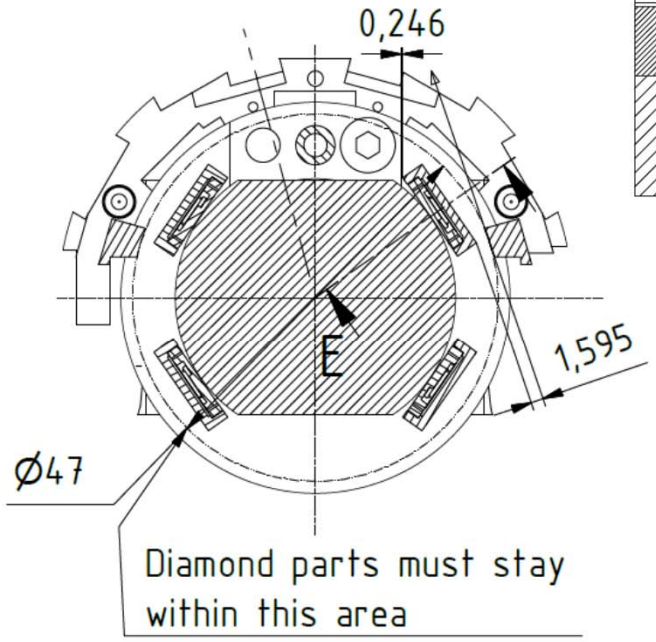


Some details still to be clarified concerning FANGS dimension and CLAWS radial location

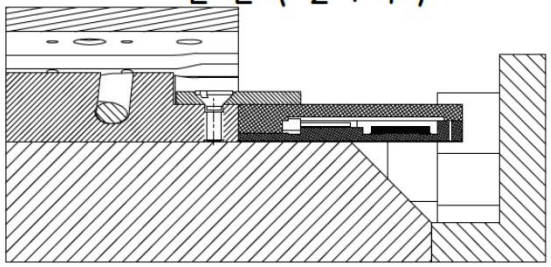
BEAST Phase 2 : Diamond Support



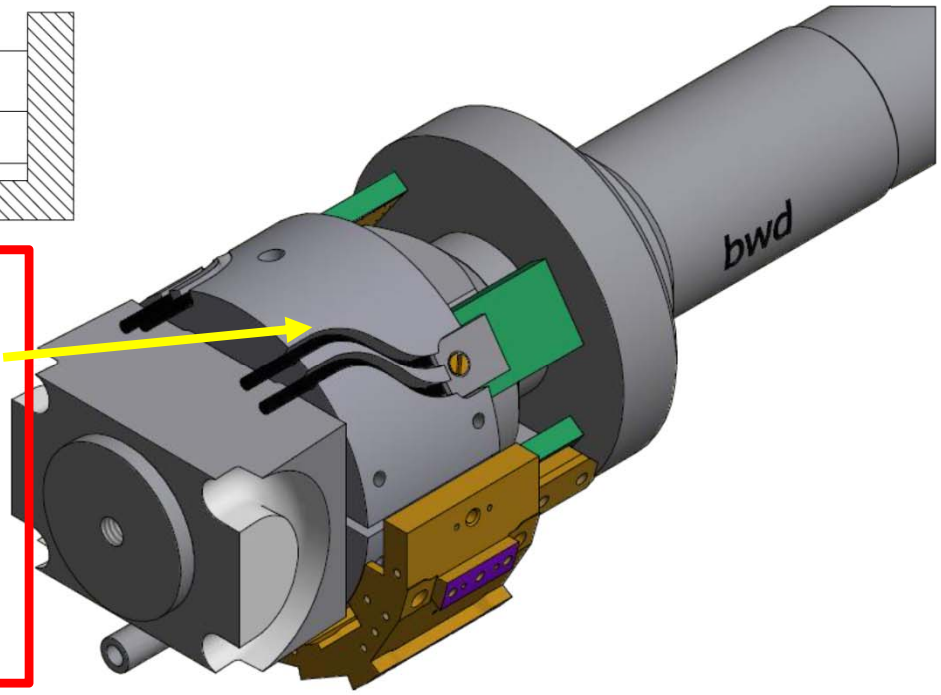
A-A (1 : 1)



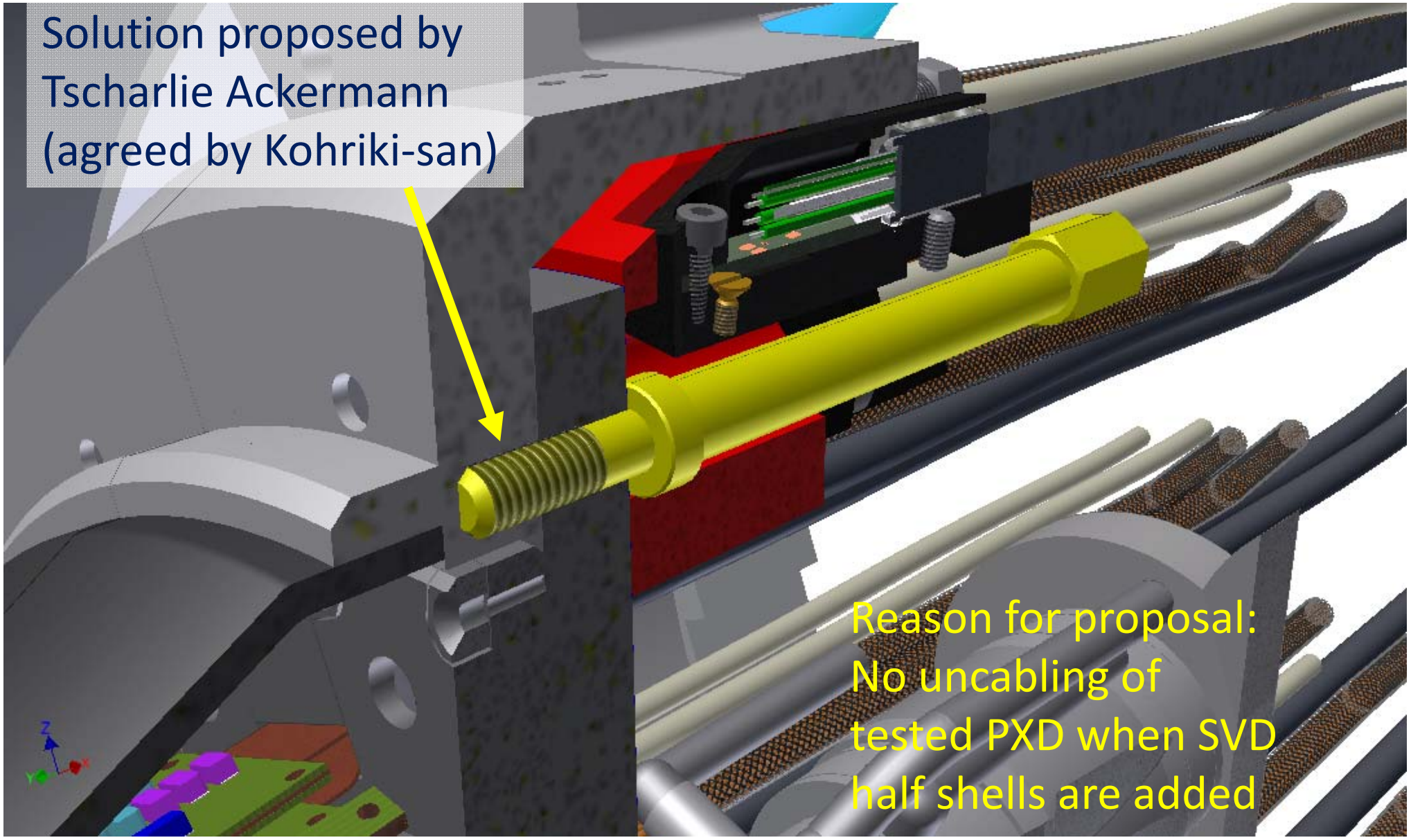
E-E (2 : 1)



Grooves need to be carved into SCB support and HV surface



Mechanics: VXD Assembly



Recently: modification suggested by Kohriki-san, needs clarification

Services for VXD (I)

Services for VXD and Beampipe

7.9.15 compiled by C. Kiesling /

checked during VXD mech meeting

VXD up to Dock boxes

Service Nr.	Component	Name	Material / shape	Diameter (mm)	# (BWD)	# (FWD)
1	**Beampipe**					
1.1	Be part	paraffine cooling lines	stainless steel, round	6.0	1	1
1.2	crotched part	water cooling	stainless steel, round	6.0	4	4
1.3	crotched part	BPMonitors	coax	3.2	8	8
1.4	Bellows	water cooling	stainless steel, round	6	8	8
1.5	PT 100	temp sensor	coax	2.0	8	8
1.6	Radiation monit.	diamonds	lemo coax	1.6	8	8
	total				37	37
2	**PXD**					
2.1	20 Half ladder	Power cables	multiwire + cover	9.6	20	20
2.21	20 Half ladder	Signal cables	multiwire + cover	9.4	20	20
2.22	20 Half ladder	CAT 7	multiwire + cover	5.9	20	20
2.31	3 FOS (position)	fiber optic cable	cladded fibre, round	1.0	4	4
2.32	4 FOS (environm.)	fiber optic cable	cladded fibre, round	1.0	8	0
2.41	1 Cooling Block	CO2 pipe (in)	ss (with insulation)	2.6	2	2
2.42	1 Cooling Block	CO2 pipe (out)	ss (with insulation)	4.0	2	2
2.5	1 Cooling Block	Air cooling pipes	ss (with insulation)	2.6	4	4
2.6	PT100	Temp. Probes	lemo coax	0.8	24	24
2.7	suction pipe		ss (with insulation)	6.5	1	1
	total				105	97

Services for VXD (II)

Services for VXD and Beampipe

7.9.15

compiled by C. Kiesling /

checked during VXD mech meeting

VXD up to Dock boxes

Service Nr.	Component	Name	Material / shape	Diameter (mm)	# (BWD)	# (FWD)
3	**SVD**					
3.1	ladders	signal/power cables	ribbon	32.0 x 1.0	222	122
3.2	6 Radiation monit.	diamonds	lemo coax	1.6	12	12
3.3	End rings	CO2 pipe (in)	ss (with insulation)	2.6	6	2
3.4	End rings	CO2 pipe (out)	ss (with insulation)	4.0	6	2
3.5	Dry N2 in	cold dry vol.	ss (with insulation)	6.0	0	4
3.6	1 Suction pipe	suction pipe (on end flange)	ss (with insulation)	6.5	1	1
3.7	64 NTCs	temperature	twisted pair (ribon)	32.0 x 1.0	4	2
3.8	FOS	temp.		1.0	38	0
	total				289	145
4	**VXD**					
4.1	Common Ground bus		Cu (with insulation)	20.0 x 2.0 (?)	1	0
4.2	SVD Ground bus to docks		Cu (with insulation)	1.0 x 1.0	5	3
4.3	FOS	temp. (outer cover)		1.0	6	0
4.4	sniffing pipe	hum. meas. warm dry vol.	ss (with insulation)	6.0	1	1
	total				13	4

Services for VXD (III)

Services for VXD and Beampipe

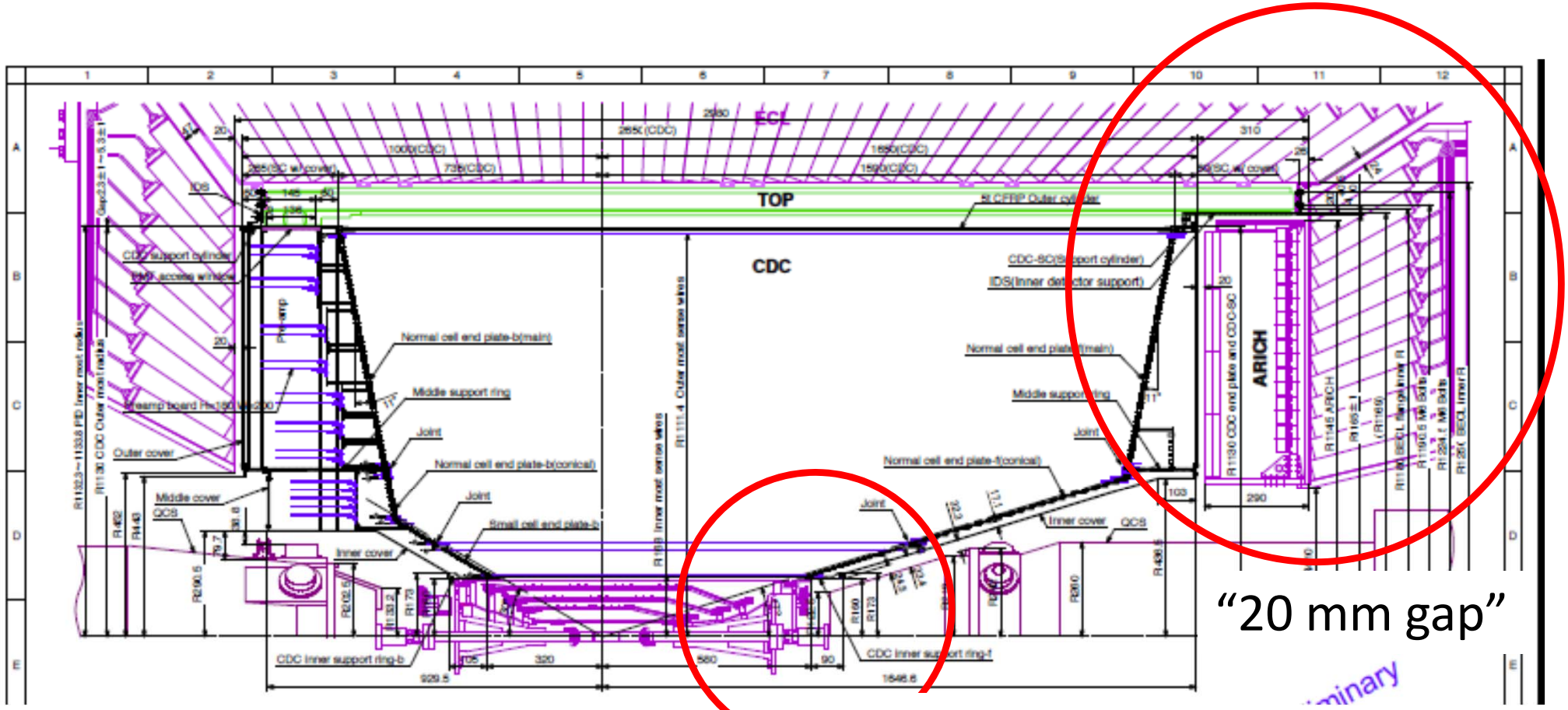
7.9.15 compiled by C. Kiesling /

checked during VXD mech meeting

VXD up to Dock boxes

Service Nr.	Component	Name	Material / shape	Diameter (mm)	# (BWD)	# (FWD)
5	**RVC**					
5.1	2 pressure lines			6.0	2	2
5.2	operation handle			8.0	2	2
5.3	EDI hooks			4.0	0	2
5.4	leak search pipes			3.0	2	2
5.5	endoscope channel			10.0	2	2
	total				8	10
6	**QCS**					
6.1	Gap sensor			?	4	4
6.2	BG sensors			2.5	8	8
	total				12	12
	Grand Total				**464**	**305**

VXD Service Area Studies

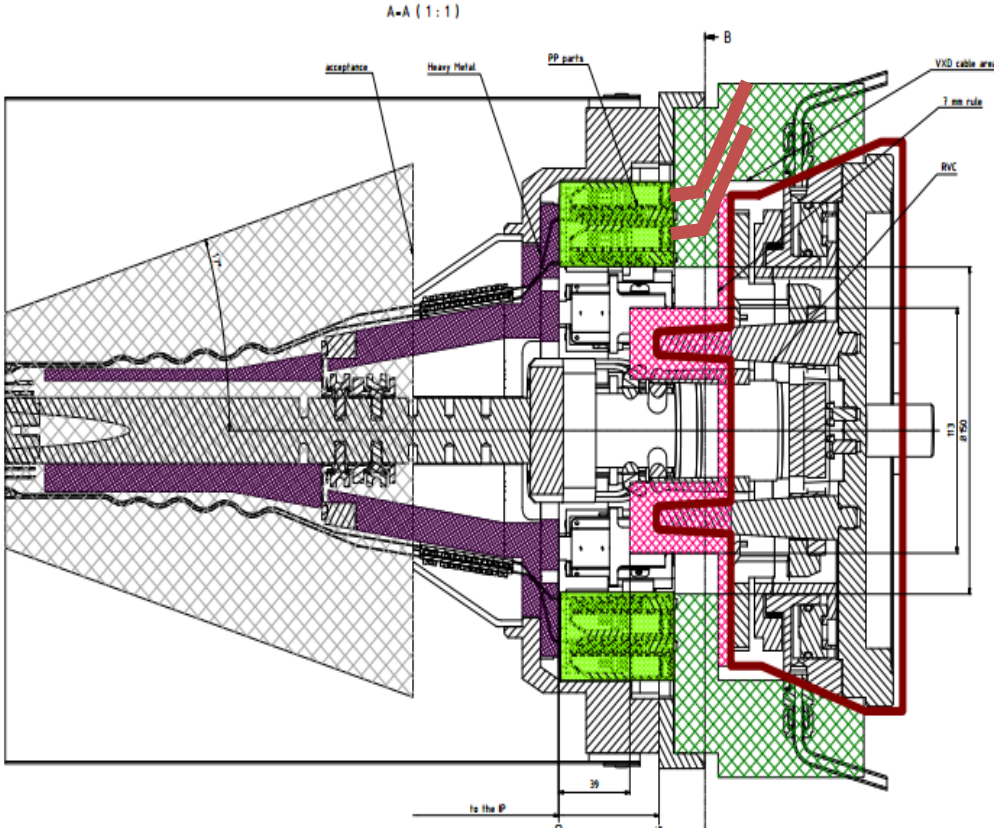


Two areas of concern:

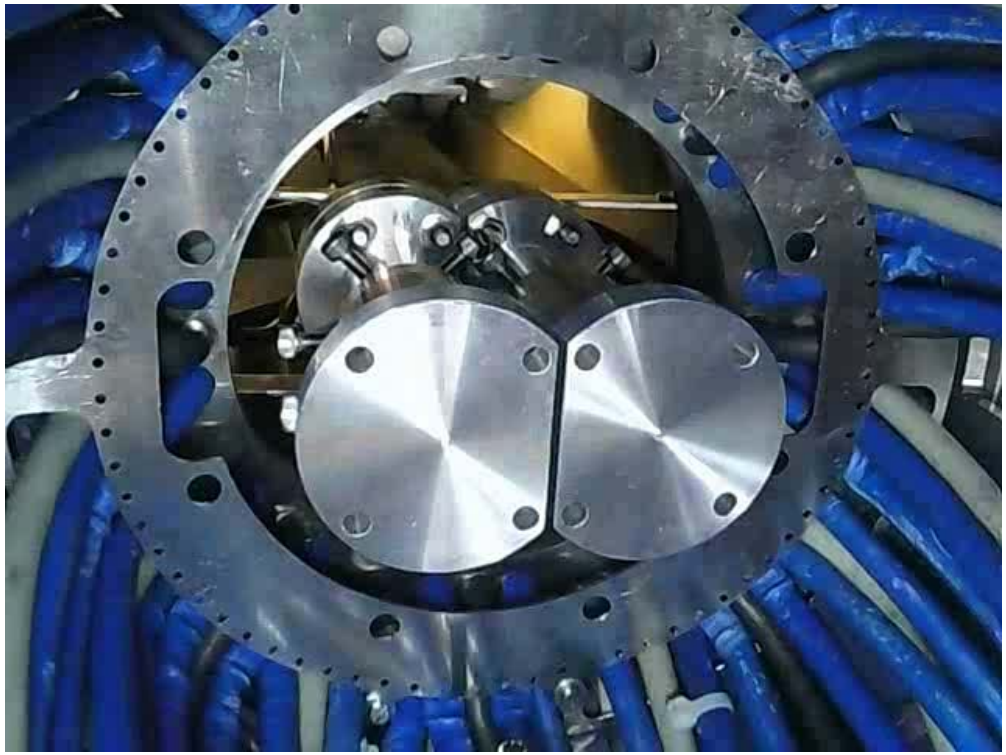
- region from VXD endflange towards Dock Boxes (FWD side)
- "Chicane" from Dock Boxes to the Belle II platform on top (FWD and BWD)

FWD Service Area

FWD region is most limited in space: services squeezed between inner CDC wall and QCS head (24 mm gap, but need to obey “7 mm rule” of free space between surface defined by services and QCS surface

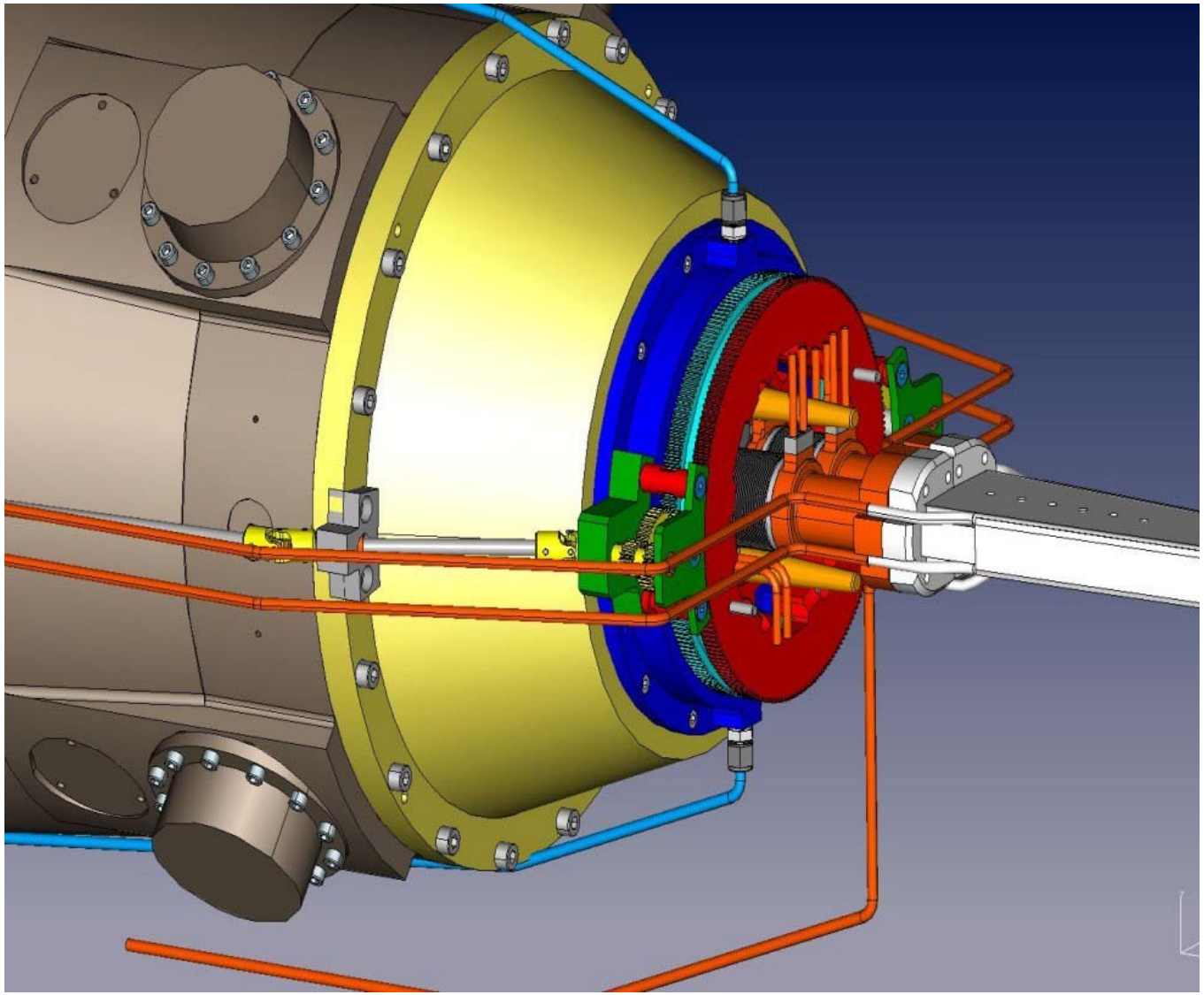


Very careful cable arrangement required + cable cage (clearance)



First try in AIM mockup, but CAD needed before next iteration

FWD Service Area



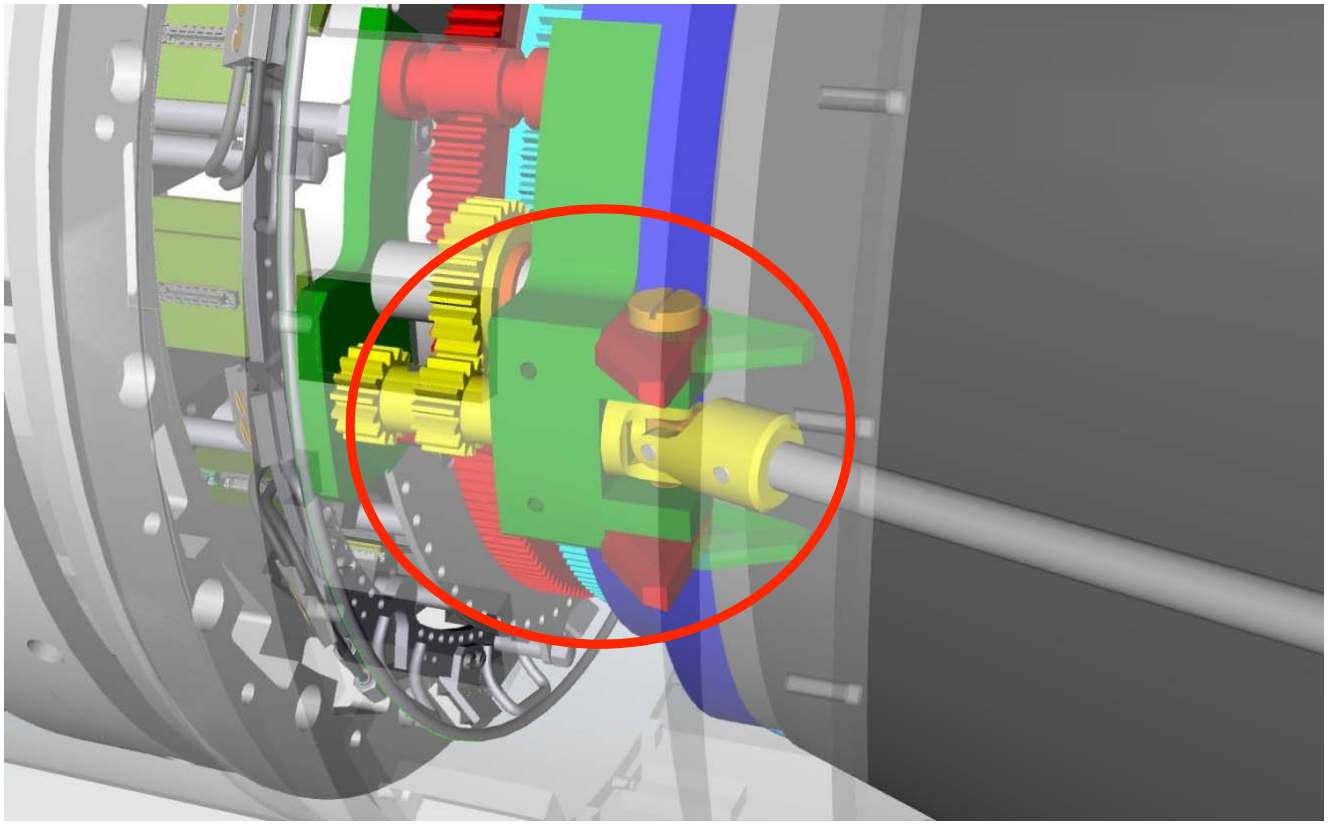
New CAD file for RVC available

Tscharlie will try to fit all services into the restricted volume, obeying the “7 mm rule”

(will be provided by the next B2GM)

BWD side not critical,
“only” needs work

FWD Service Area



Example of area where space MIGHT be gained, if needed

In case this fails, Karsten Gadow will try to reduce the volume of the RVC.

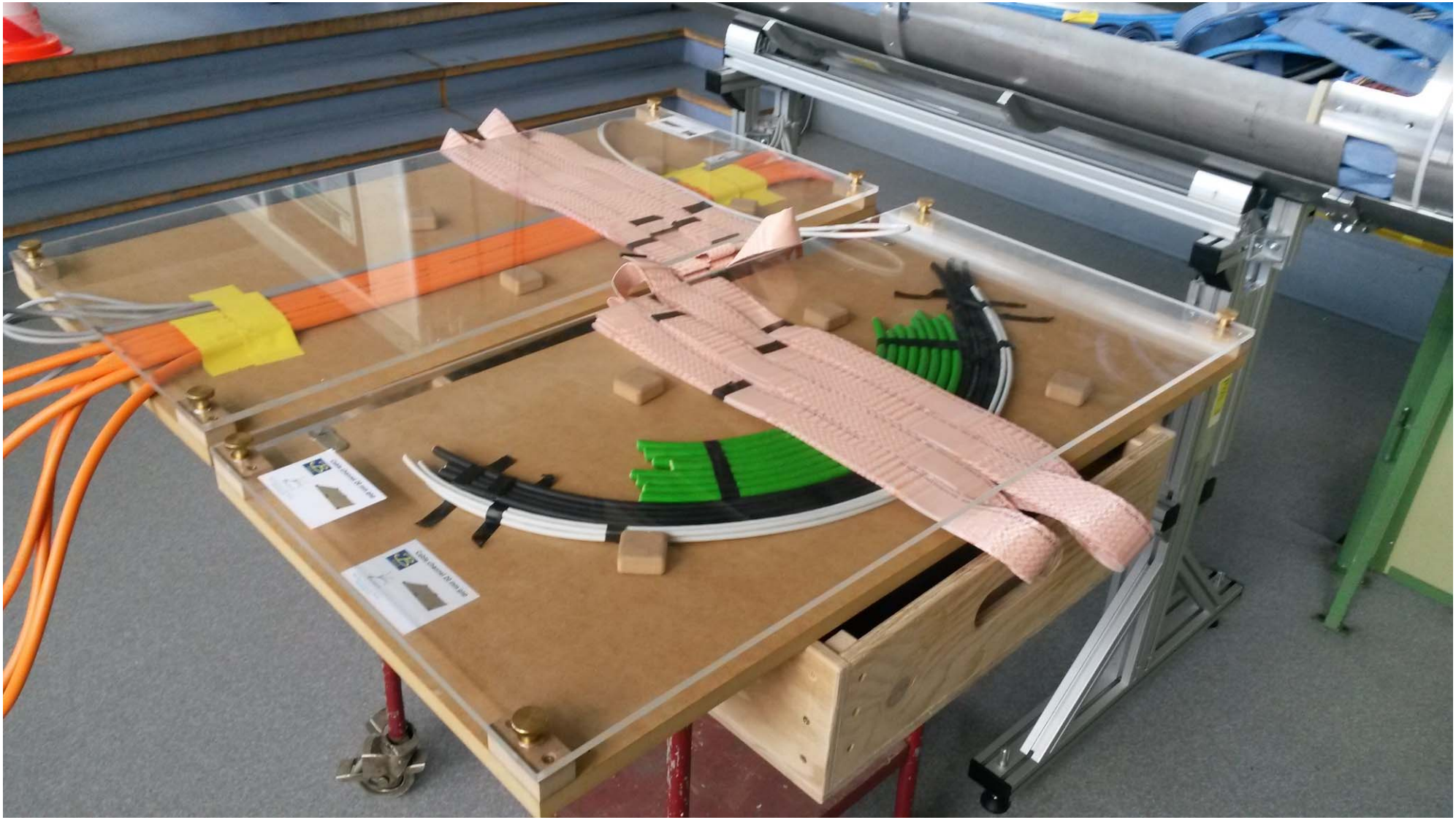
This can only be done after a mechanical test in November this year.

After this:
next iteration

Service Space beyond Docks

Service Space beyond Docks

Testing the “20 mm gap” (mockup by MPI acutally < 20 mm)
(at endplate of CDC)



[PXD] Mechanics: Next Steps

PXD:

- Finalize ladder gluing procedure
- Prepare mounting tools (ladders on SCB, PXD on beampipe)

VXD:

- Clarify reason for changing agreed SVD connection to end flange
- Find solution for cable/services routing on the FWD side with present design of RVC
- Look for alternative in case of failure (possibly reduce space required by RVC)

Not discussed here, but important:

- Establish list of micro connectors (“Streuli”) within VXD volume (cooling lines)
- Study possibilities to correct for VXD sag relative to beam