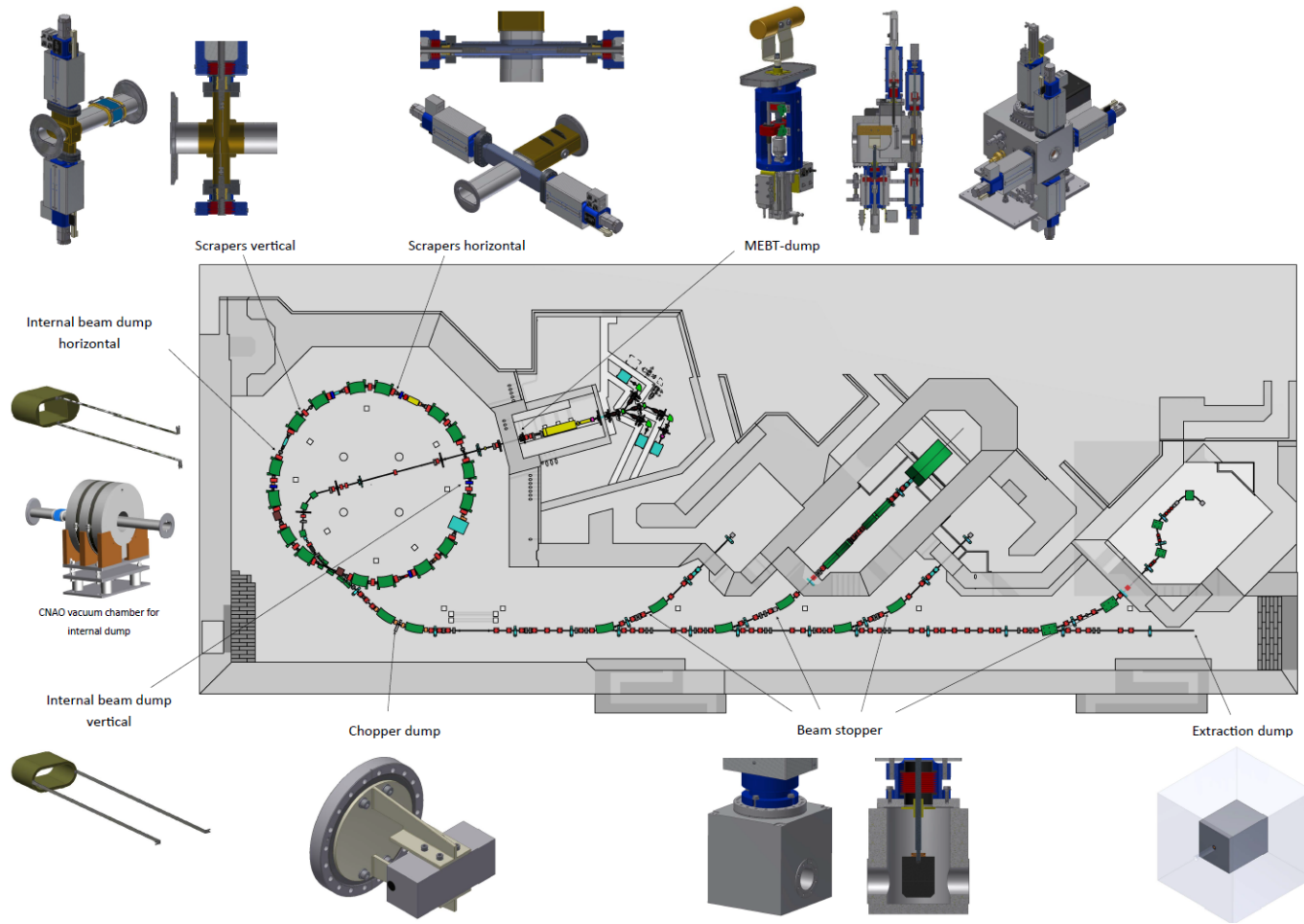
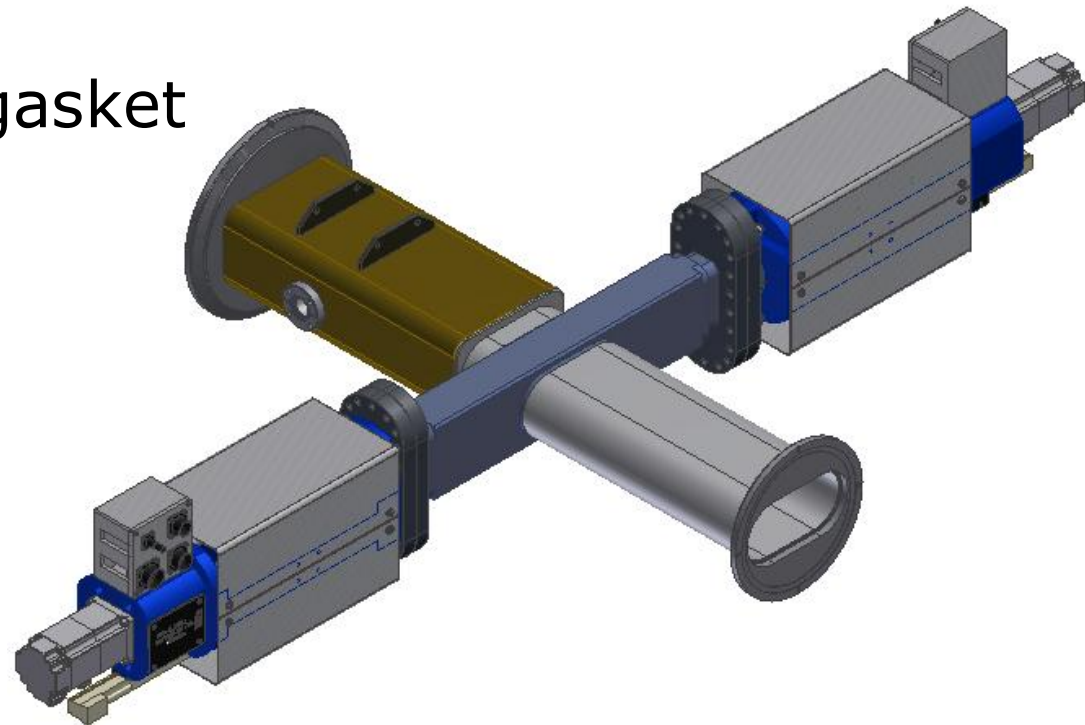


Conceptual and detailed design



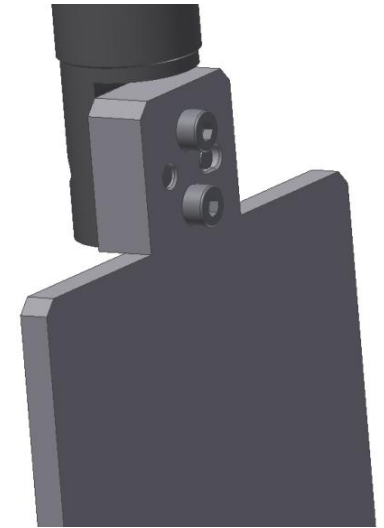
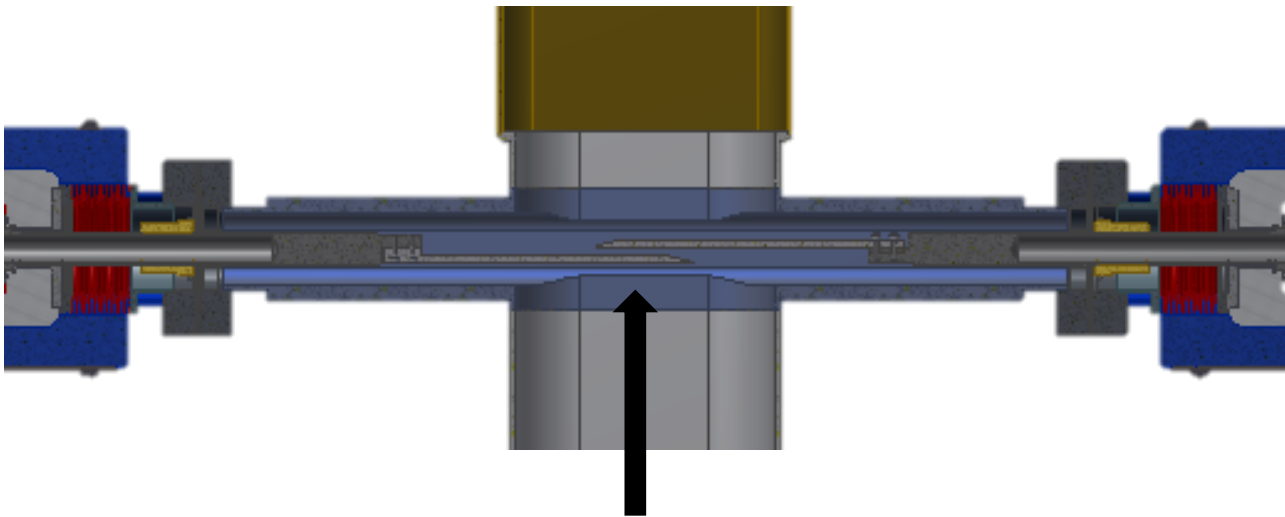
Scrapers horizontal

- basically copy-paste from CNAO
- moved by ball screw spindle
- design study with DN100 flange and gasket



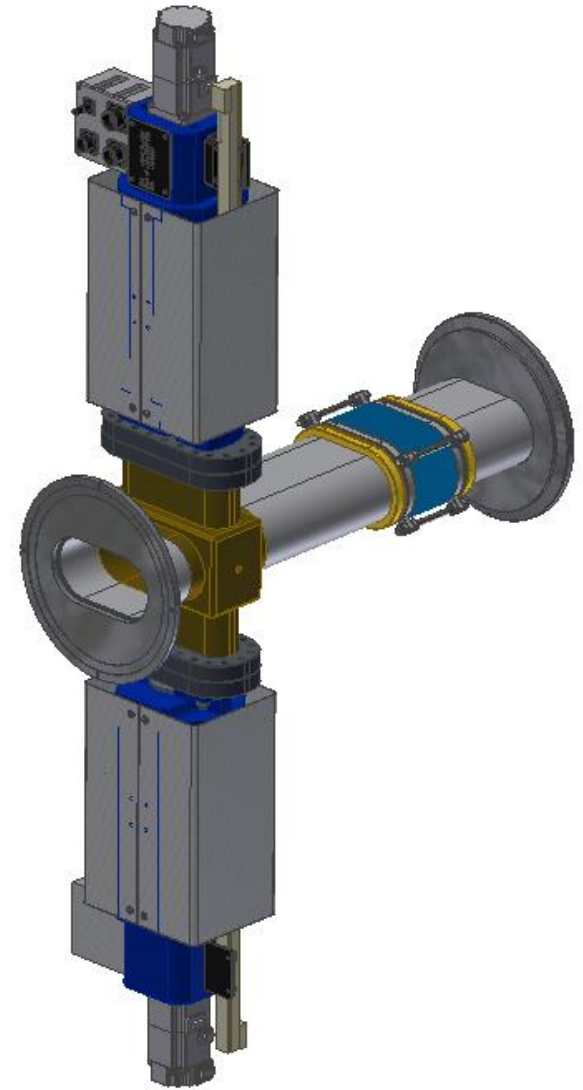
Scrapers horizontal

- pins for positioning



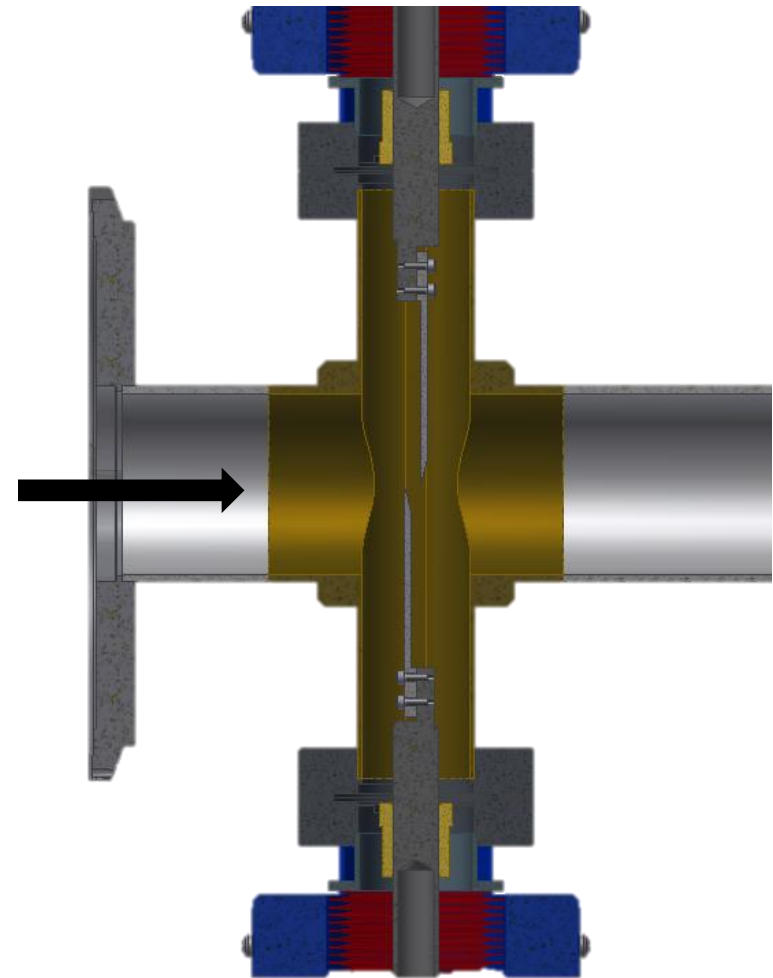
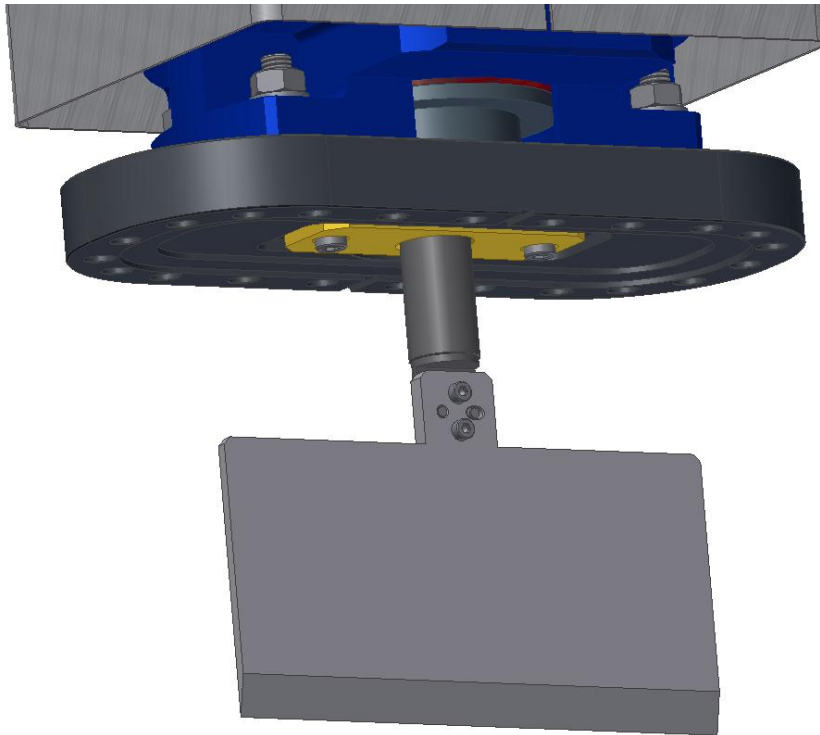
Scrapers vertical

- basically copy-paste from CNAO
- moved by ball screw spindle
- design study with DN160 flange and gasket



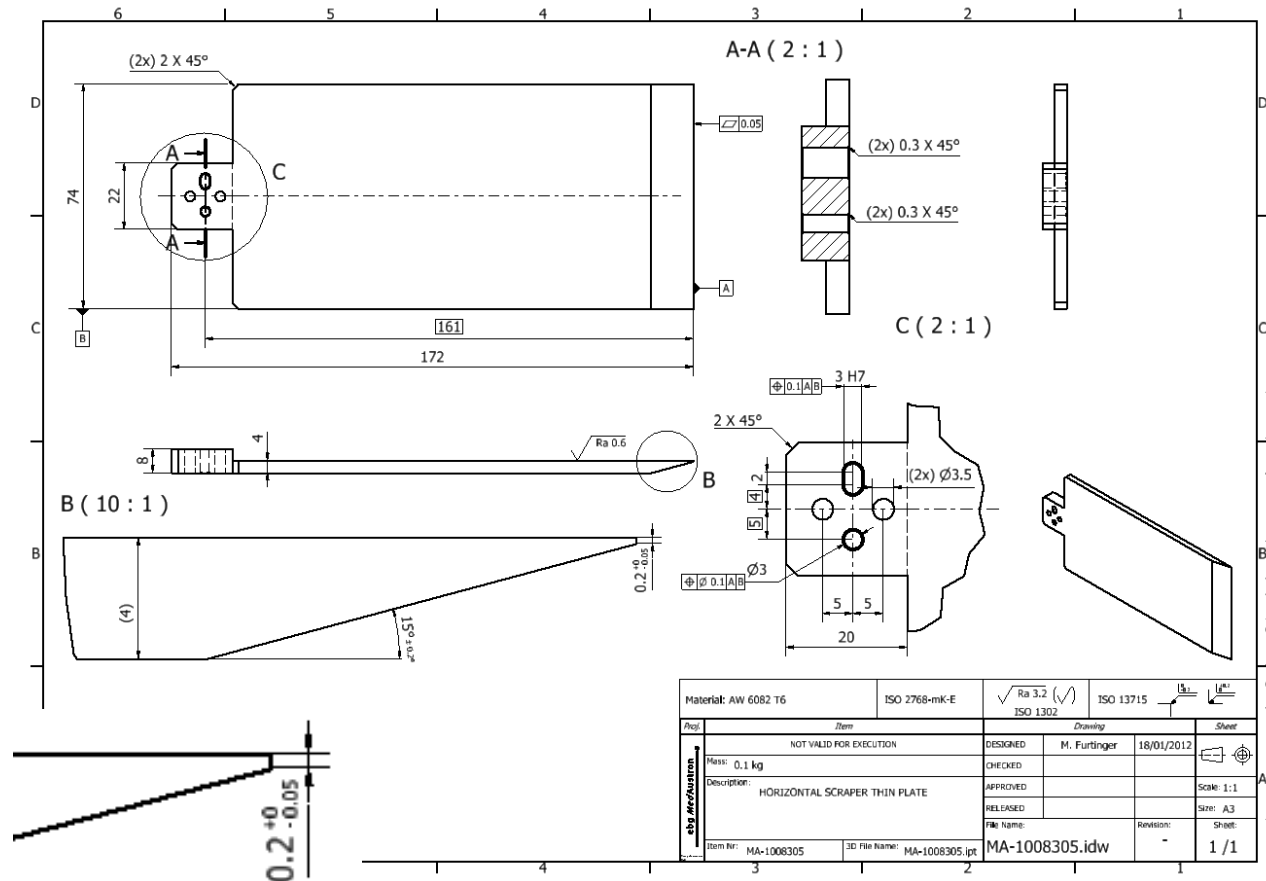
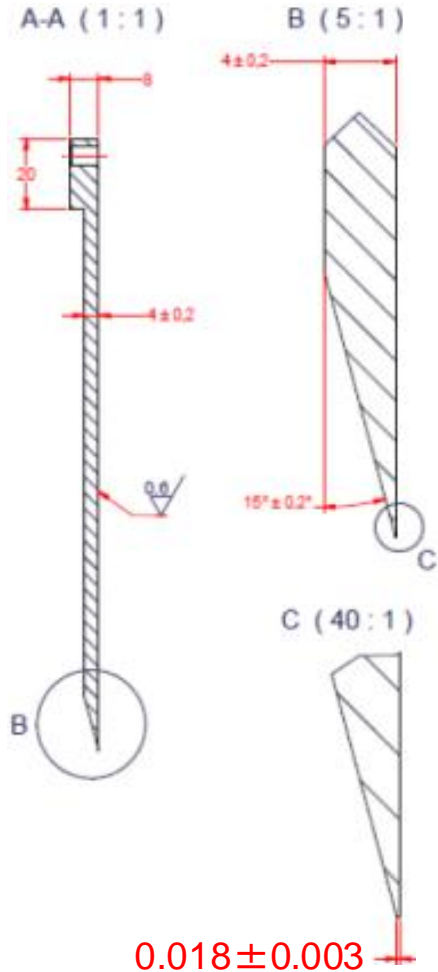
Scrapers vertical

- pins for positioning

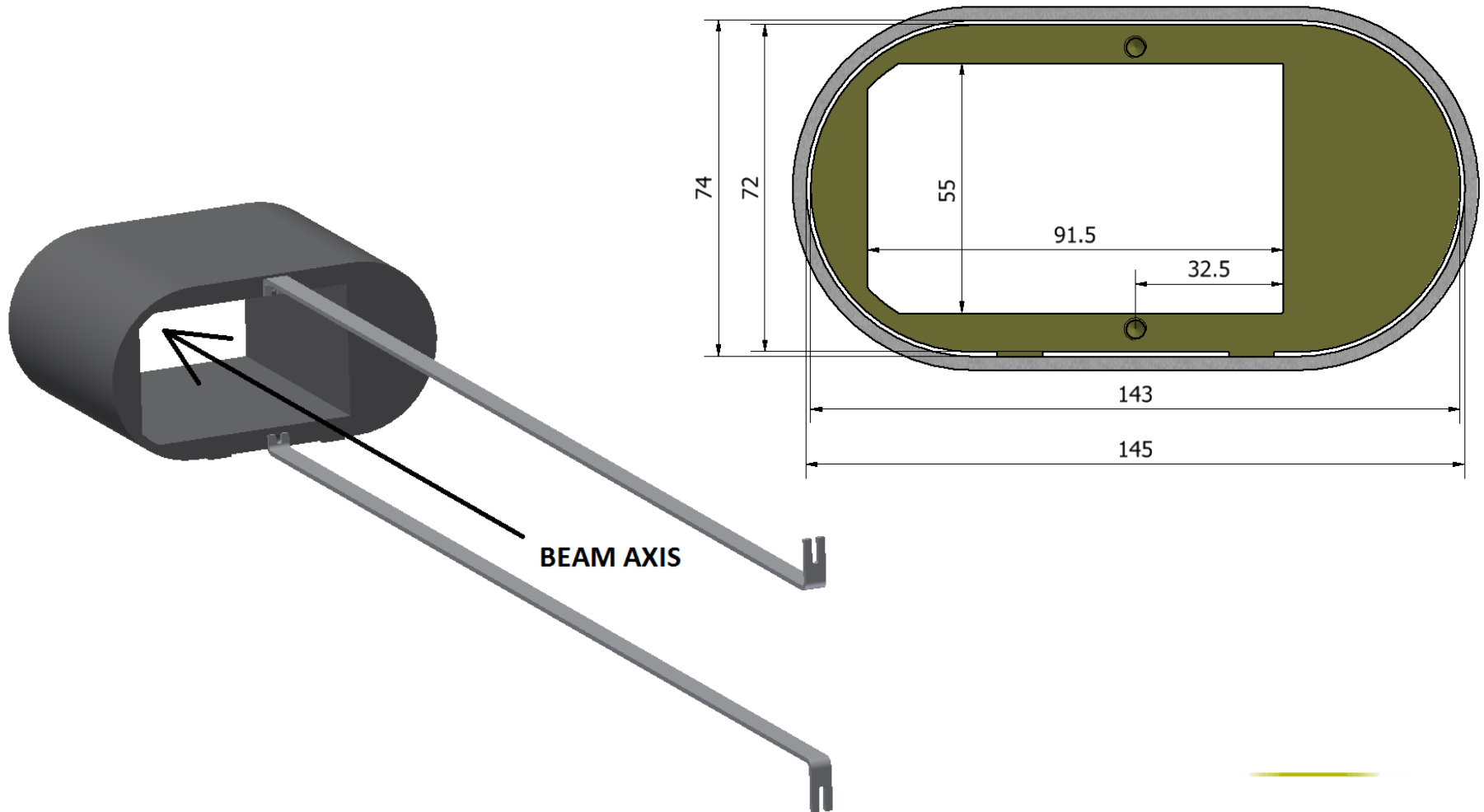


Scrapers

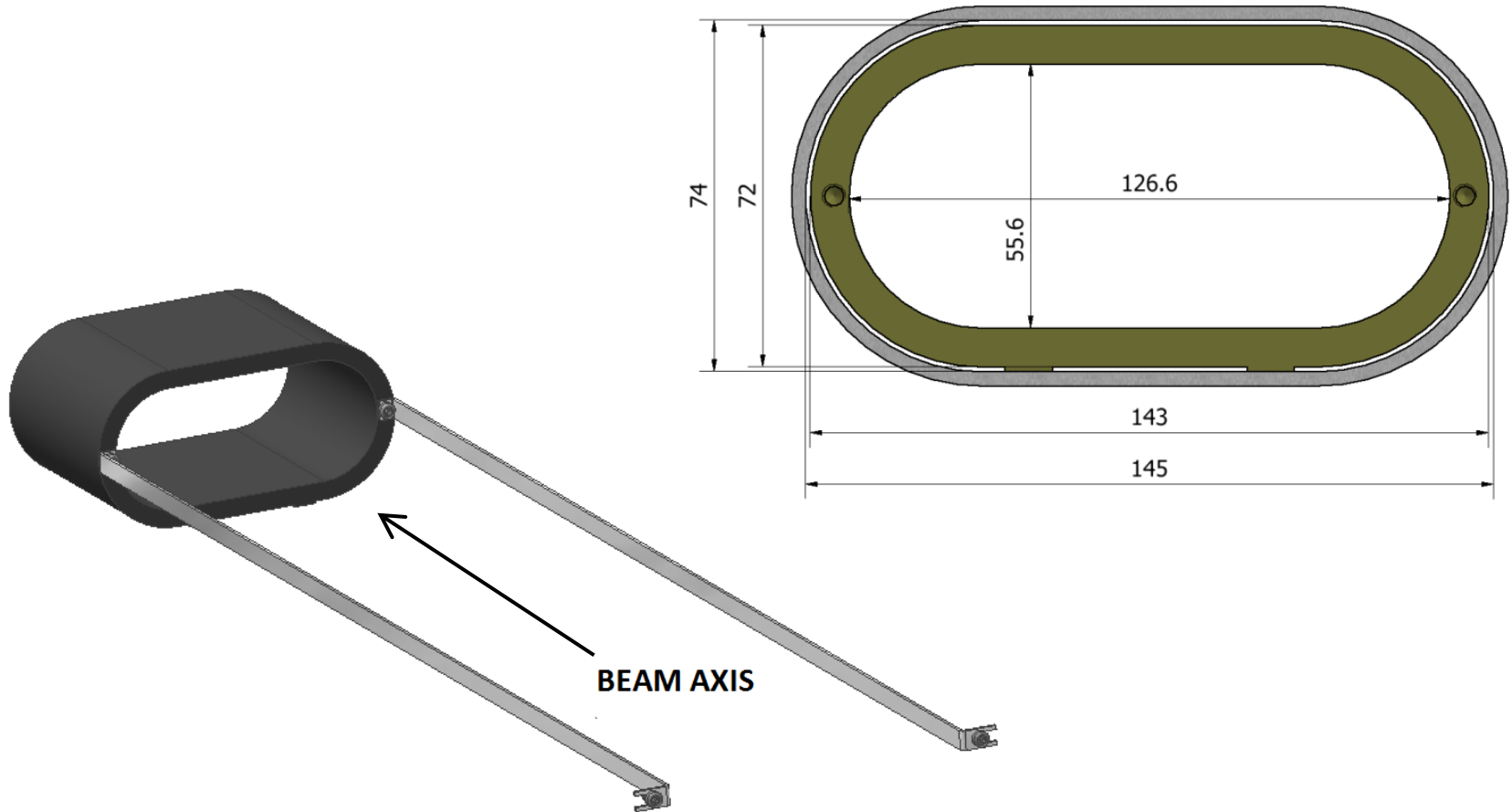
Feasibility of scraper blade checked with EN/MME workshop.



Internal Dump horizontal

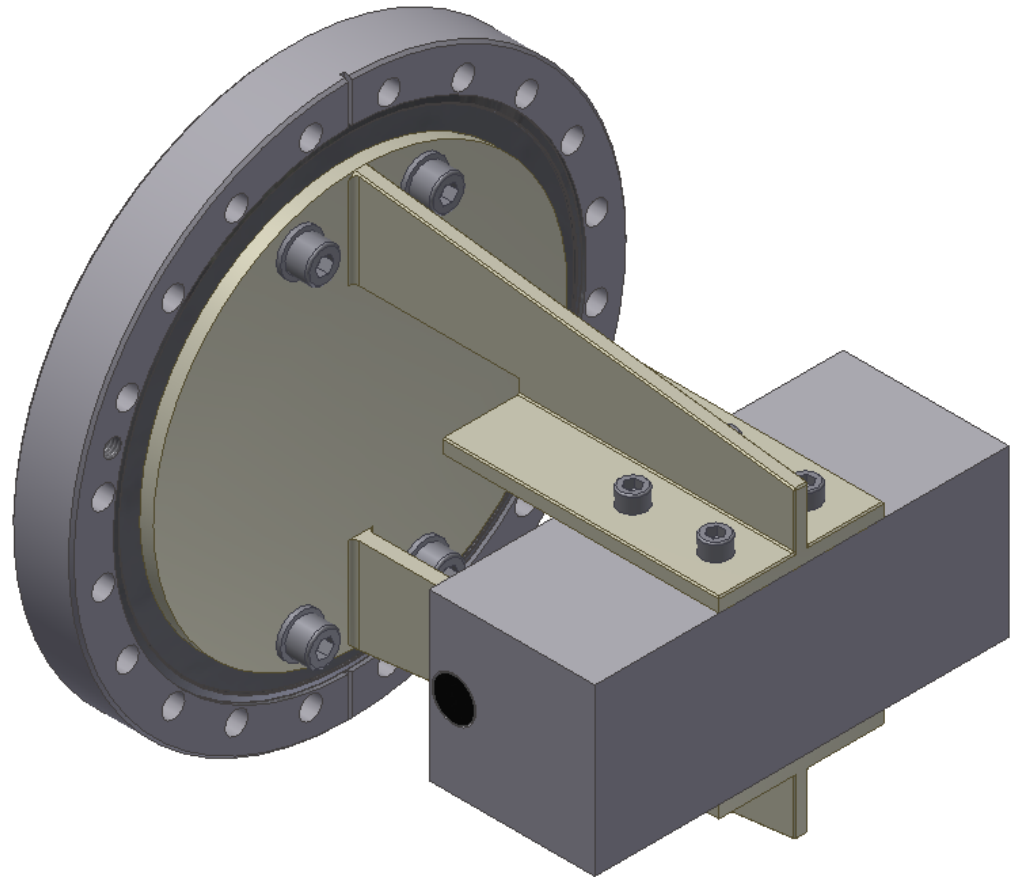


Internal Dump vertical



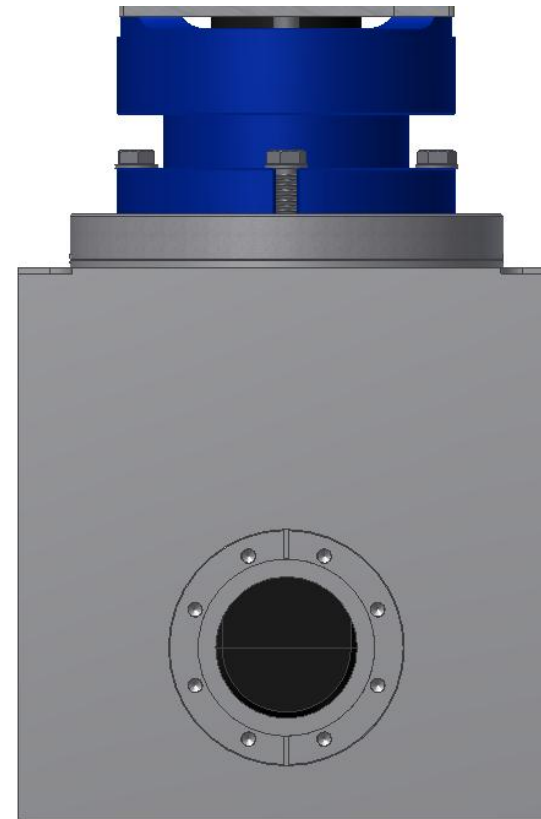
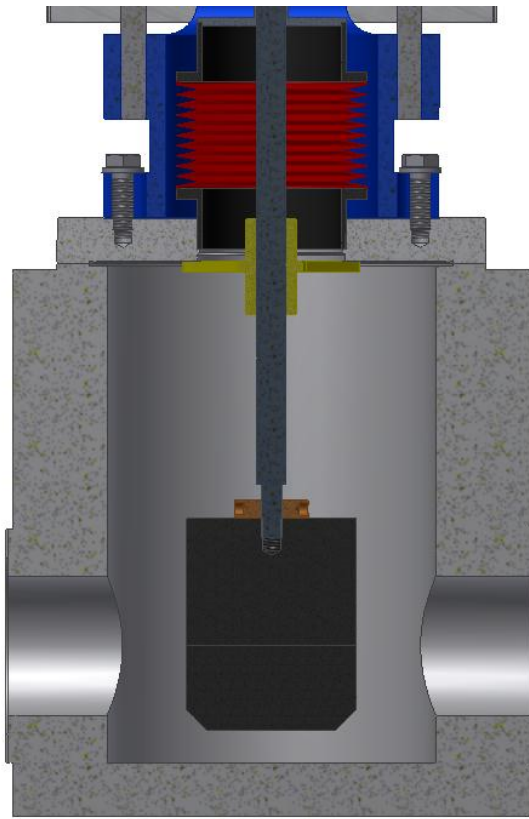
Chopper Dump

- DN160 flange
- tank in design



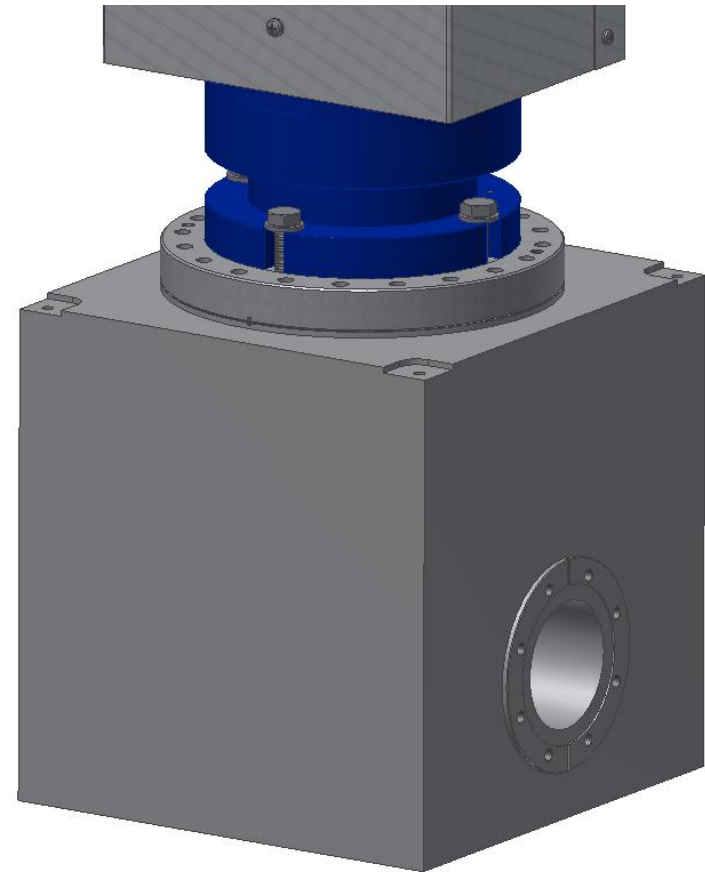
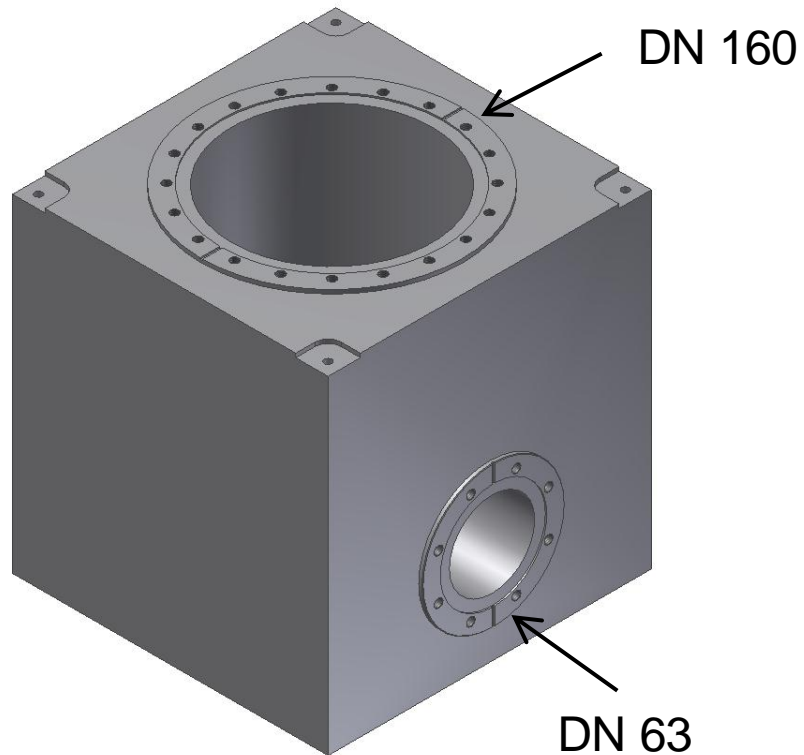
Beam Stopper

- Movement by pneumatic jack



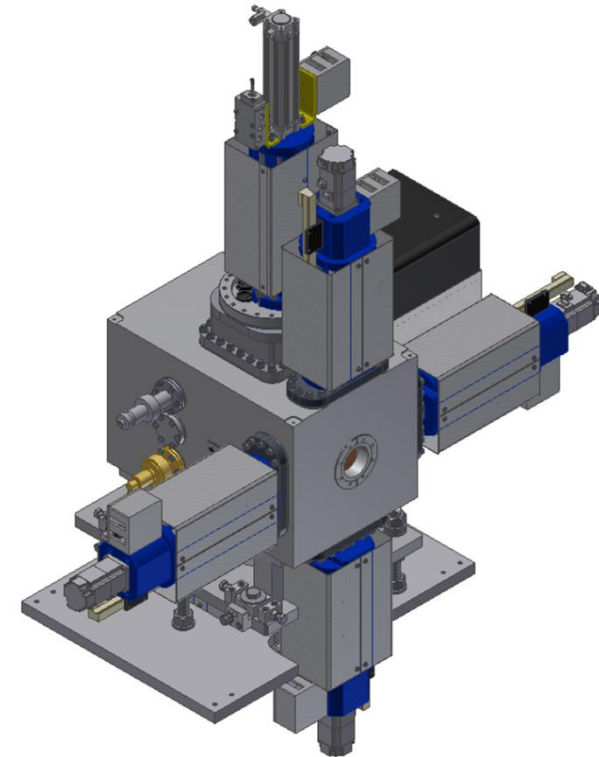
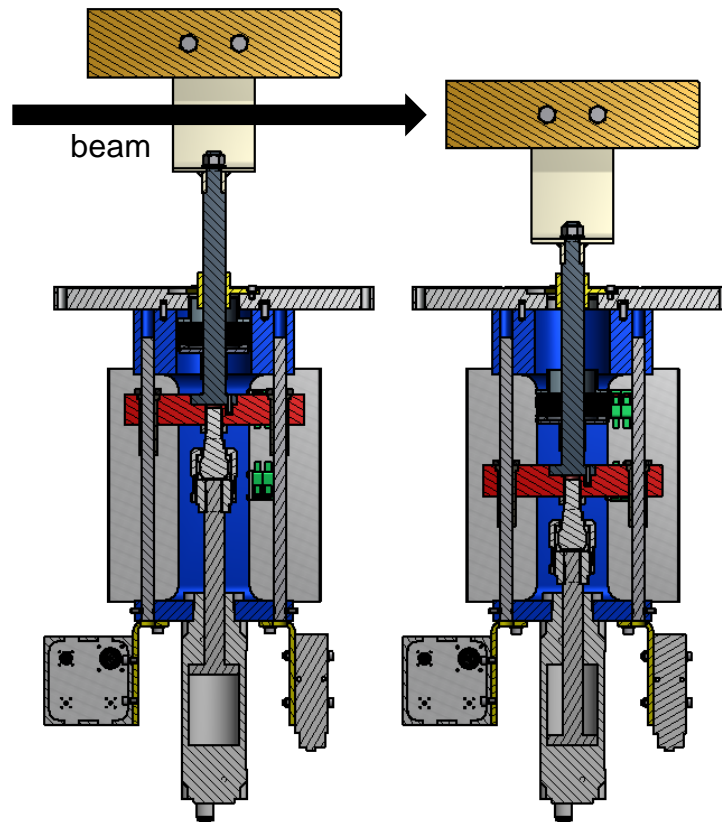
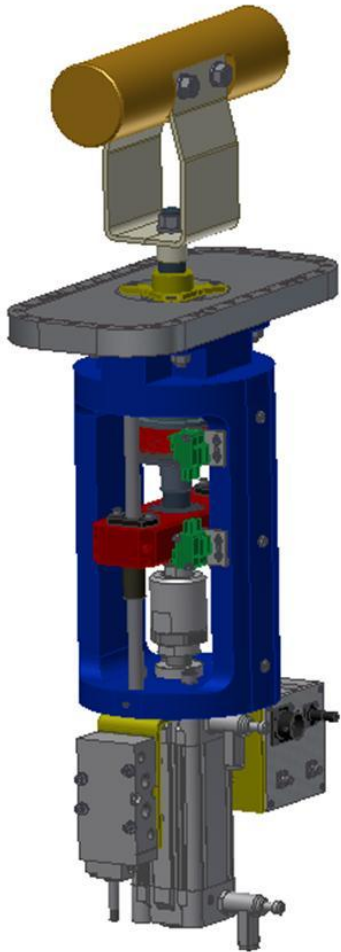
VDT-Q for Beam Stopper

- Flange to flange 250mm



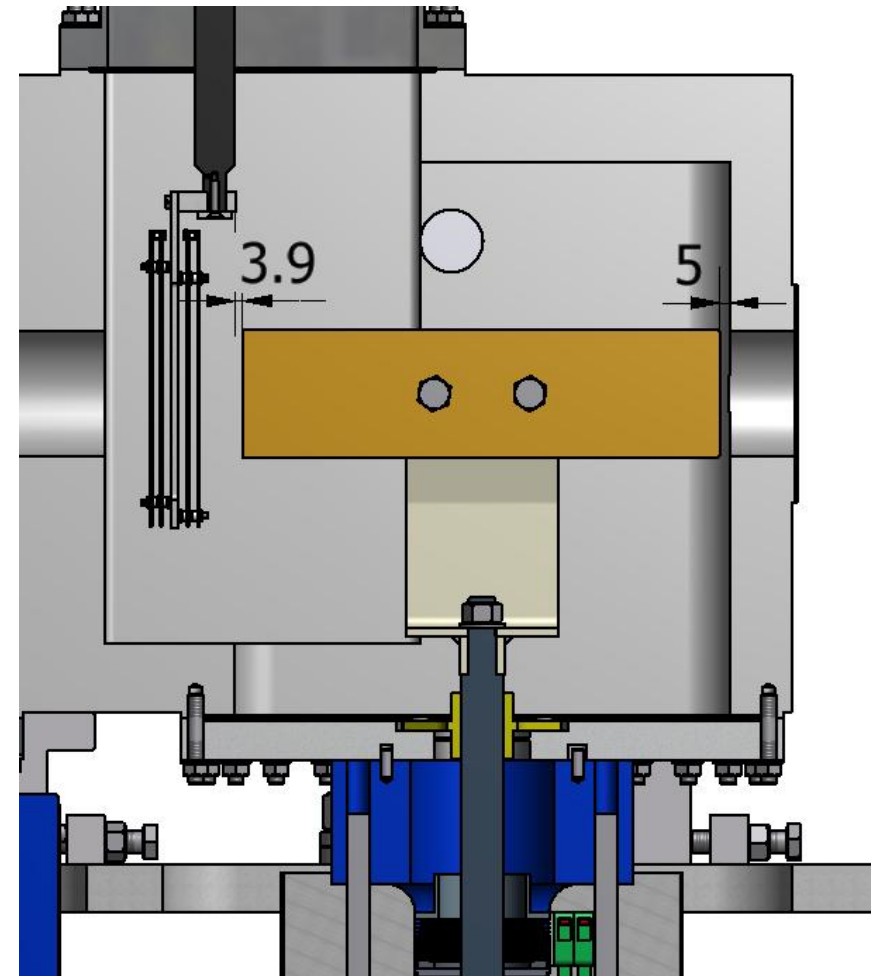
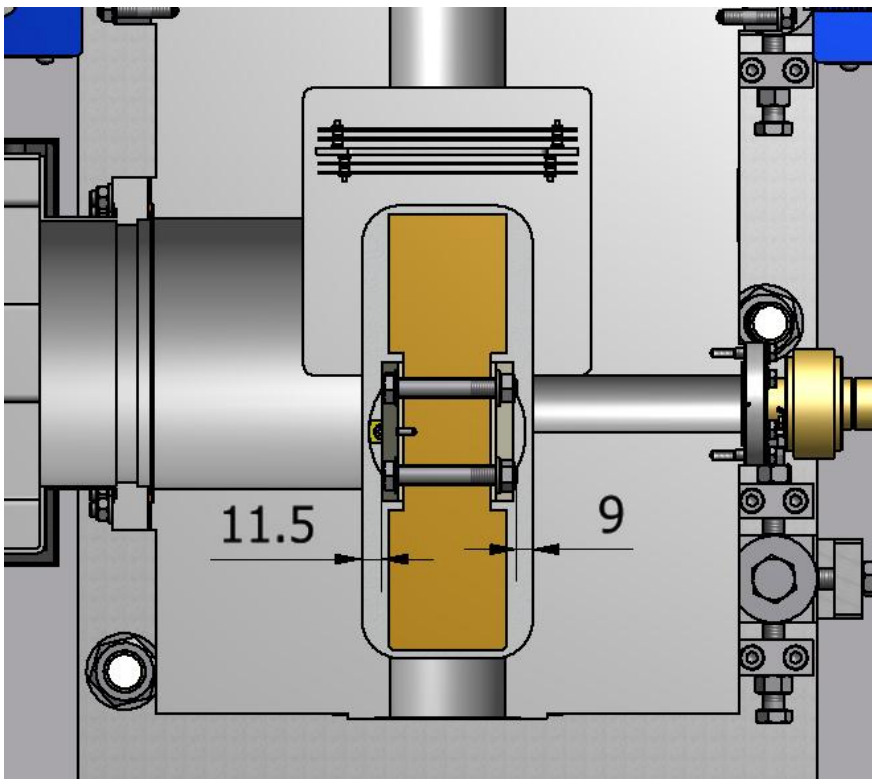
Mebt-Dump

Integrated in VDT-H



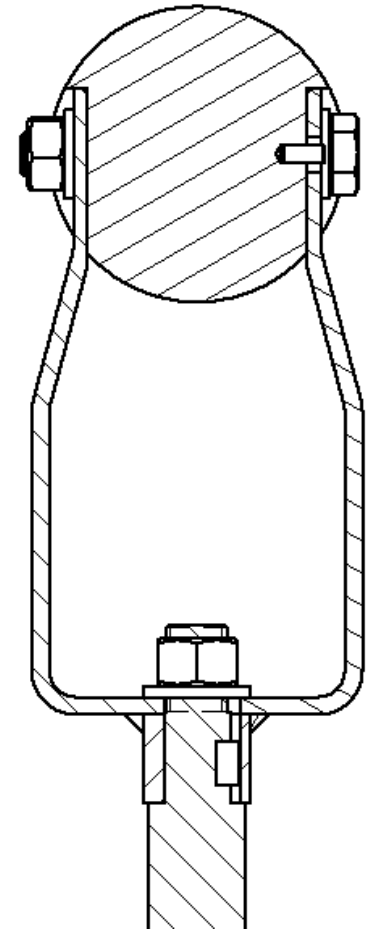
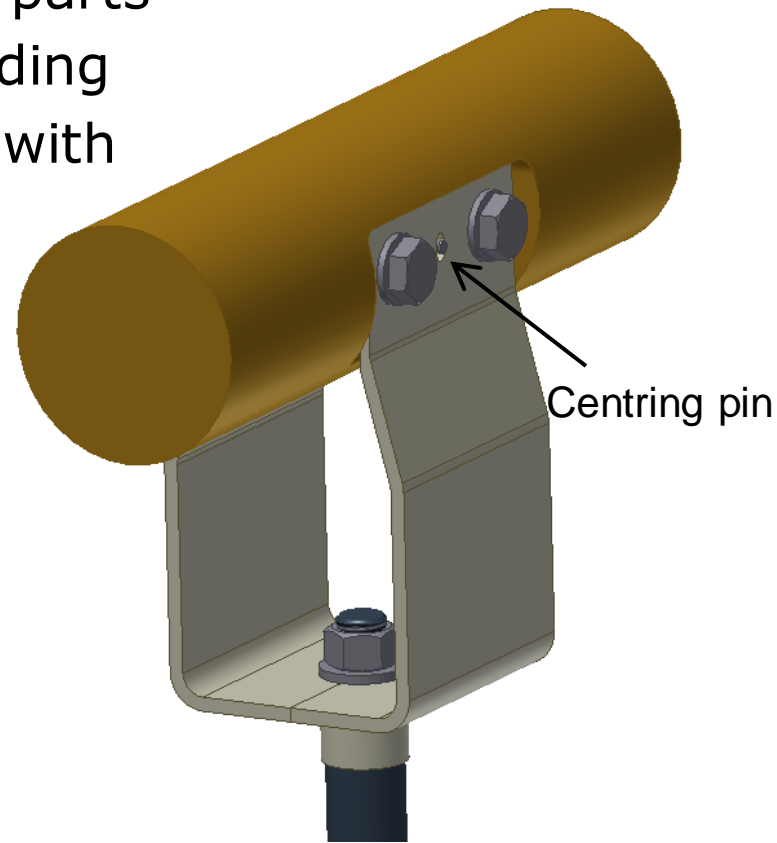
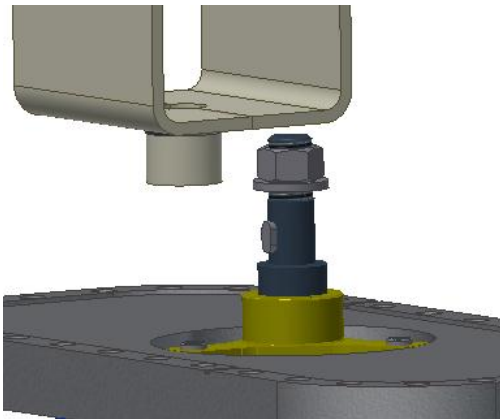
Meht-Dump

- VDT-H section view



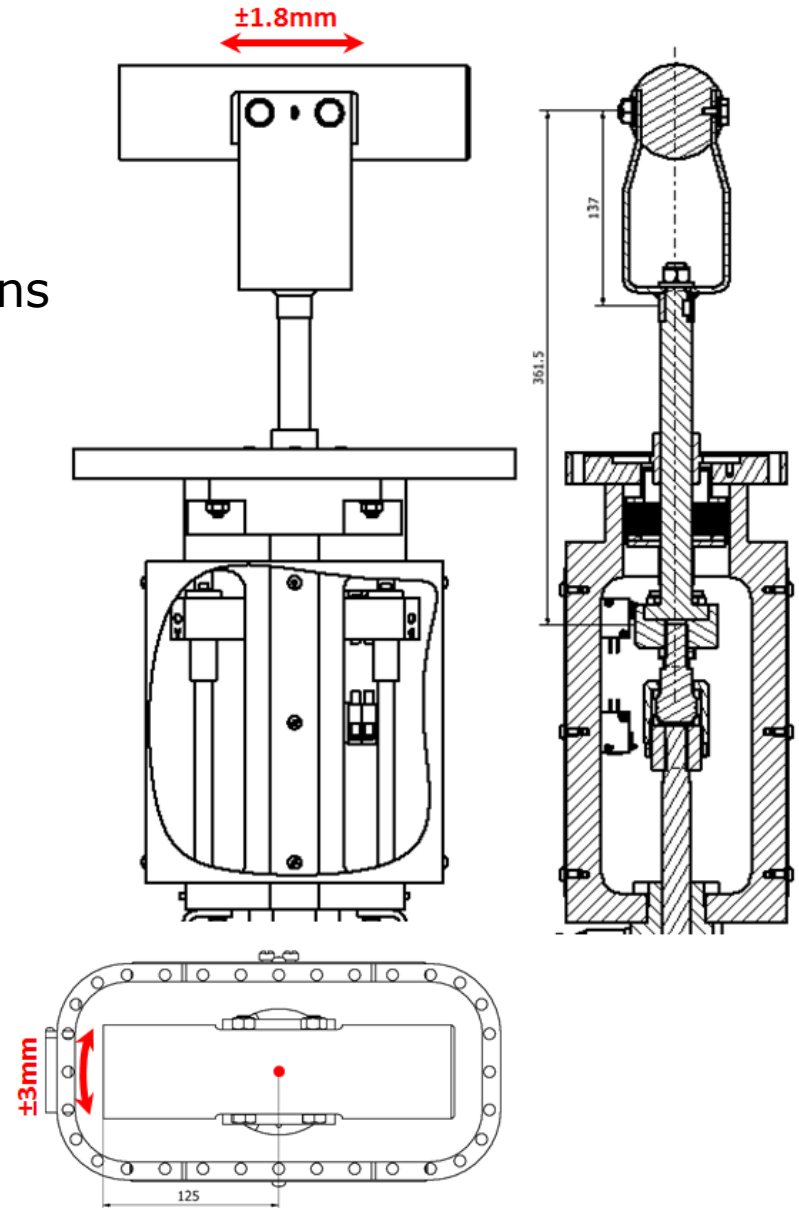
Shaft to fork

- anti-rotation by parallel key
- fork welded from 3 parts
- machined after welding
- Feasibility checked with EN/MME workshop



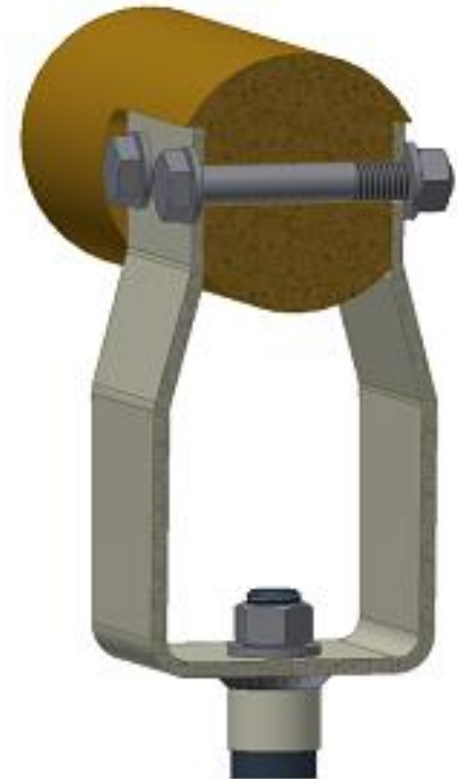
Tolerances

- Max displacement between 7 parts
- Sum of worst displacements/rotations
- Reality will be less



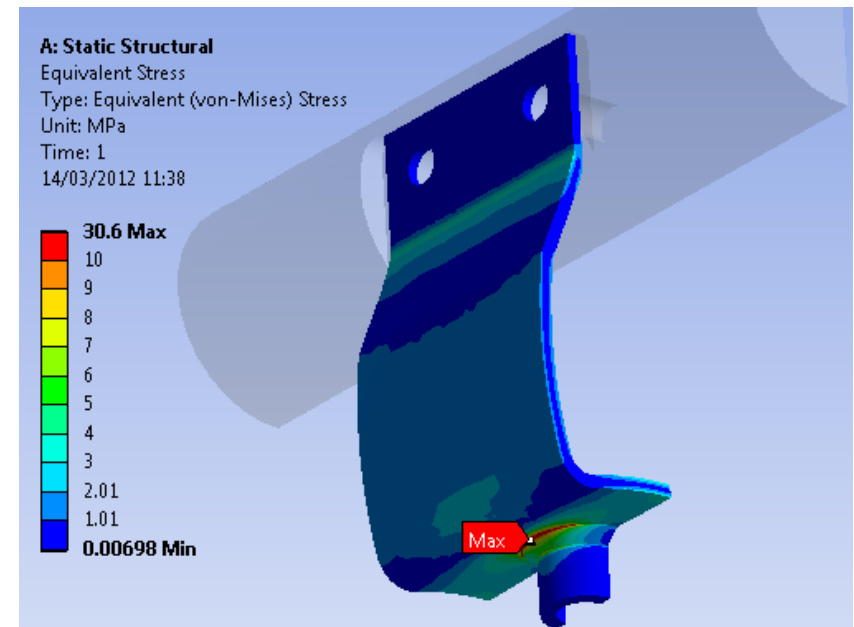
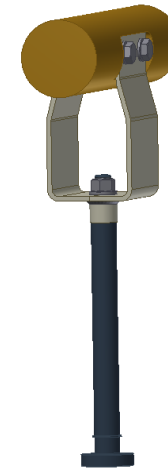
Calculation

- Screws:
 - M10 A4-70
 - max Torque: 32N
 - safety factor at 200°C: 1.3
 - pressure on contact area between fork and dump: 11 N/mm²
- Nut on shaft:
 - stainless steel 316L
 - thread M14
 - max Torque: 26Nm



Calculation

- Buckling of the shaft
 $d=22\text{mm}$ $l= 210\text{mm}$
 buckling safety factor ~ 200
- Fork
 - Max stress: 30MPa
 - Safety factor at 200°C ~ 4



Assembly breakdown structure

- Witch assemblies/parts used
- Where produced/ordered
- Who is responsible
- ...

Item	Part Number	QTY	Title	Description	REV	Type	Material
0	MA-1009900	1	MEBT Dump		-	Assembly	
1	MA-1011350	1	BEAM DUMP FOR MEBT		-	Assembly	
1.1	MA-1011355	1	FLANGE ASSEMBLY		-	Assembly	
1.1.1	MA-1002921	1	BELLOWS ASSEMBLY		C	Assembly	
1.1.1.1	MA-1002918	1	BELLOWS END DOWN		B.1	Part	St. Steel 316L
1.1.1.2	MA-1002757	1	BELLOWS END UP		B.1	Part	St. Steel 316L
1.1.1.3	MA-1002626	1	BELLOWS	ID 46 - OD 71 - STROKE 112mm	C	Part	St. Steel 316
1.1.2	MA-1011358	1	WELDING ADAPTER		-	Part	St. Steel 316L
1.1.3	MA-1009918	1	BELLOWS SHAFT		A	Part	Stainless Steel
1.1.4	MA-1010008	1	RECTANGULAR FLANGE	FOR TUBE OD 70mm	-	Part	AlW 6082 T6
1.1.5	MA-1016569	1			-	Part	Bronze Duralit 110
1.1.6	ISO 4762 - M5 x 8	3	Hexagon Socket Head Cap Screw	Hexagon Socket Head Cap Screw	-	Part	Stainless Steel, 440C
1.2	MA-1005505	1	CONNECTOR BOX ASSEMBLY	BURNDY 12 PIN + 2x SMA + SHV	-	Assembly	
1.2.1	MA-1005358	1	CONNECTOR BOX		-	Part	AlW 6082 T4
1.2.2	MA-1005504	1	COVER FOR CONNECTOR BOX	WITH BURNDY 12 PINS CONNECTOR	-	Part	AlW 6082 T4
1.2.3	1707-	1	SHV CONNECTOR		-	Part	-
1.2.4	R125-403-000	2	SMA CONNECTOR		A	Part	-
1.2.5	UTG01412P	1	12 PIN CONNECTOR		B	Part	-
1.2.6	ISO 7045 - M3 x 10 - 4.8 - H	4	Pan head screw with cross recess	Pan head screw with type H cross recess - product grade A	B	Part	Stainless Steel, 440C
1.2.7	ISO 7045 - M3 x 8 - 4.8 - H	4	Pan head screw with cross recess	Pan head screw with type H cross recess - product grade A	A	Part	Stainless Steel, 440C
1.2.8	ISO 7045 - M2 x 6 - 4.8 - H	12	Pan head screw with cross recess	Pan head screw with type H cross recess - product grade A	-	Part	Stainless Steel, 440C
1.3	MA-1016584	1			-	Assembly	
1.4	MA-1015981	1	STOP BUSH	For FCH-B	B.1	Part	Bronze Duralit 110
1.5	MA-1007178	2	SNAP-ACTION SWITCH	Vacuum tank	D	Part	Default
1.6	CHERRYCORP D453-V1RA	1	SOLENOID VALVE		A.3	Part	Default
1.7	FESTO MFH-5-1/4-B	2	ONE-WAY FLOW CONTROL		A.1	Part	Default
1.8	FESTO GRLA-1/4-QS-8-R5-B	1	SUPPORT FOR THE CONNECTOR BOX		B.1	Part	AlW 6082 T4
1.9	MA-1005506	1			-	Part	AlW 6082 T4
1.10	MA-1016560	1			-	Part	AlW 6082 T4
1.11	BN 666	4	STUD		-	Part	Stainless Steel
1.12	MA-1015901	1			-	Part	AlW 6082 T6
1.13	MA-1015902	1			-	Part	AlW 6082 T6
1.14	MA-1015542	1			-	Part	AlW 6082 T6
1.15	MA-1015904	2			-	Part	Stainless Steel
1.16	MA-1003363	2	COVER		D	Part	AlW 6082 T4
1.17	MA-1003330	1	SOLENOID VALVE SUPPORT		B.2	Part	AlW 6082 T4
1.18	MA-1003329	2	SWITCH SUPPORT		C	Part	AlW 6082 T4
1.19	MA-1003350	1	END TRAVEL		-	Part	AlW 6082 T4
1.20	ISO 4032 - M5	4	Hexagon nuts	Hexagon nuts, style 1 - Product grades A and B	-	Part	Stainless Steel, 440C
1.21	ISO 7045 - M3 x 10 - 4.8 - H	4	Pan head screw with cross recess	Pan head screw with type H cross recess - product grade A	B	Part	Stainless Steel, 440C
1.22	ISO 7045 - M3 x 25 - 4.8 - H	2	Pan head screw with cross recess	Pan head screw with type H cross recess - product grade A	A	Part	Stainless Steel, 440C
1.23	ISO 7045 - M3 x 16 - 4.8 - H	4	Pan head screw with cross recess	Pan head screw with type H cross recess - product grade A	A	Part	Stainless Steel, 440C
1.24	ISO 7089 - 3 - 140 HV	6	Plain washer	Plain washers - Normal series - Product grade A	A	Part	Stainless Steel
1.25	ISO 4032 - M3	4	Hexagon nuts	Hexagon nuts, style 1 - Product grades A and B	-	Part	Stainless Steel, 440C
1.26	ISO 4032 - M4	4	Hexagon nuts	Hexagon nuts, style 1 - Product grades A and B	-	Part	Stainless Steel, 440C
1.27	ISO 7089 - 4 - 140 HV	4	Plain washer	Plain washers - Normal series - Product grade A	A	Part	Stainless Steel
1.28	ISO 4762 - M4 x 12	4	Hexagon Socket Head Cap Screw	Hexagon Socket Head Cap Screw	A	Part	Stainless Steel, 440C
1.29	ISO 4028 - M5 x 12	2	Hexagon socket set screws	Hexagon socket set screws with dog point	-	Part	Stainless Steel, 440C
1.30	ISO 4762 - M6 x 25	4	Hexagon Socket Head Cap Screw	Hexagon Socket Head Cap Screw	A	Part	Stainless Steel, 440C
1.31	ISO 4762 - M5 x 45	4	Hexagon Socket Head Cap Screw	Hexagon Socket Head Cap Screw	-	Part	Stainless Steel, 440C
1.32	ISO 4762 - M5 x 10	2	Hexagon Socket Head Cap Screw	Hexagon Socket Head Cap Screw	A	Part	Stainless Steel, 440C
1.33	ISO 4762 - M6 x 12	4	Hexagon Socket Head Cap Screw	Hexagon Socket Head Cap Screw	A	Part	Stainless Steel, 440C
1.34	ISO 7089 - 6 - 140 HV	4	Plain washer	Plain washers - Normal series - Product grade A	A	Part	Stainless Steel
1.35	ISO 7045 - M5 x 10 - 4.8 - H	6	Pan head screw with cross recess	Pan head screw with type H cross recess - product grade A	A	Part	Stainless Steel, 440C
1.36	ISO 7045 - M4 x 8 - 4.8 - H	4	Pan head screw with cross recess	Pan head screw with type H cross recess - product grade A	A	Part	Stainless Steel, 440C
1.37	ISO 2338 - 3 m6 x 18 - A	1	Parallel Pin	Parallel Pin	-	Part	Stainless Steel
1.38	ISO 4762 - M8 x 35	4	Hexagon Socket Head Cap Screw	Hexagon Socket Head Cap Screw	-	Part	Stainless Steel, 440C
1.39	ISO 7089 - 5 - 140 HV	4	Plain washer	Plain washers - Normal series - Product grade A	A	Part	Stainless Steel
1.40	ISO 4032 - M8	4	Hexagon nuts	Hexagon nuts, style 1 - Product grades A and B	A	Part	Stainless Steel, 440C
1.41	ISO 7089 - 8 - 140 HV	4	Plain washers	Plain washers - Normal series - Product grade A	-	Part	Stainless Steel
2	MA-1009913	1	DUMP ASSEMBLY		-	Assembly	
2.1	MA-1015677	1			-	Assembly	Stainless Steel
2.1.1	MA-1010092	2	DUMP SUPPORT		-	Part	St. Steel 304L Vacuum
2.1.2	MA-1015079	1			-	Part	St. Steel 304L Vacuum
2.2	MA-1009869	1	TUNGSTEN	L=250 mm	-	Part	Tungsten
2.3	ISO 4032 - M82	1	Hexagon nuts	Hexagon nuts, style 1 - Product grades A and B	-	Part	Stainless Steel, 440C
2.4	ISO 7089 - 12 - 140 HV	1	Plain washers	Plain washers - Normal series - Product grade A	-	Part	Stainless Steel
2.5	ISO 7089 - 8 - 140 HV	4	Plain washers	Plain washers - Normal series - Product grade A	-	Part	Stainless Steel

Screw locking test

Spring washer

versus

Nord-Lock



results

	Screw 1	Screw 2	Screw 3	Screw 4
	M8 x 1.25, Stainless steel A4-70			
Washer	Spring washer	Spring washer	Nord-Lock	Nord-Lock
Tightening torque	15 Nm	15 Nm	+20% : 18 Nm	+20% : 18 Nm
Untightening torque	10 Nm	10 Nm	13 Nm	14Nm

Nord-Lock: higher unscrewing torque, kind of glue between parts

Spring washer: after unscrewing torque still some resilience, better for vacuum beak out

Things to do

		MEBT Dump BDM	Scrapers SCV & SVH	Internal Dumps BDH & BDV	Chopper Dump BDC	Beam stoppers BST 1-4	Extraction Dump BDE
Beam specification	MedAustron	Done	Done	Done	Done	Done	Done
Conceptual design	Manuel	Done	Done	Done	Done	Done	Done
Functional specification	Ramon	Done	In progress	In progress	In progress	Done	In progress
Pre-calculation	Melanie/Manuel	Done	Done	Done	Done	Done	Done
FLUKA studies	Asen	In progress	Not required	Not required	Done	Not required	Not required
Detailed calculations	Melanie/Manuel	In progress	Not started	Not started	Not started	Not started	Not started
Approval 3D model	Manuel	Done	In progress	In progress	In progress	In progress	Not started
Detailed design	Manuel	In progress	Not started	Not started	In progress	In progress	Not started
Driving system definition	Ramon	Done	Done	Not applicable	Not applicable	Done	Not applicable
Control definition (XML)	Ramon	Done	Not applicable	Not applicable	Not applicable	Done	Not applicable
Materials ordering	WP BID	Not started	Not started	In progress	Not started	Not started	Not started
Manufacturing	WP BID	Not started	Not started	In progress	Not started	Not started	Not started
Assembly	WP BID	In progress	Not started	Not started	Not started	Not started	Not started
Final test	WP BID	Not started	Not started	Not started	Not started	Not started	Not started
Delivery target	WP BID	Jan 2013	Feb 2013	Feb 2013	Apr 2013	May 2013	June 2013

- Done
- In progress
- Stand-by
- Not started

