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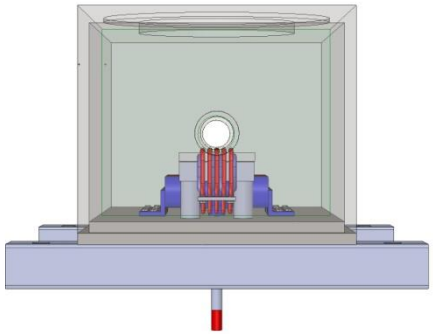

MEBT – BEAM DUMPS

BEAM DUMP BODY ASSY
ALUMINUM ALLOYS

by:

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Wednesday, 24 October 2012

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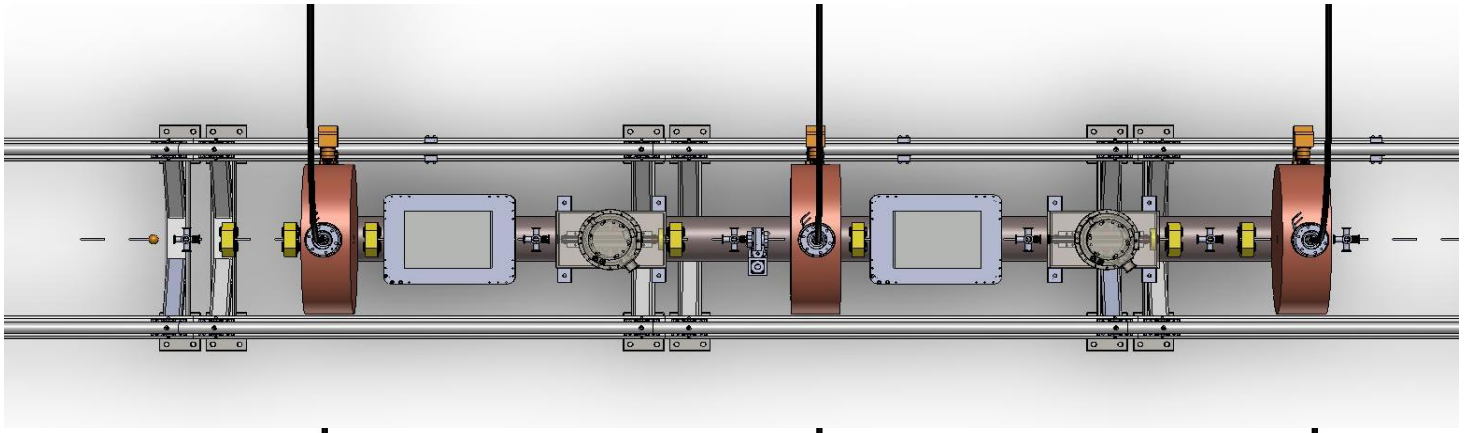
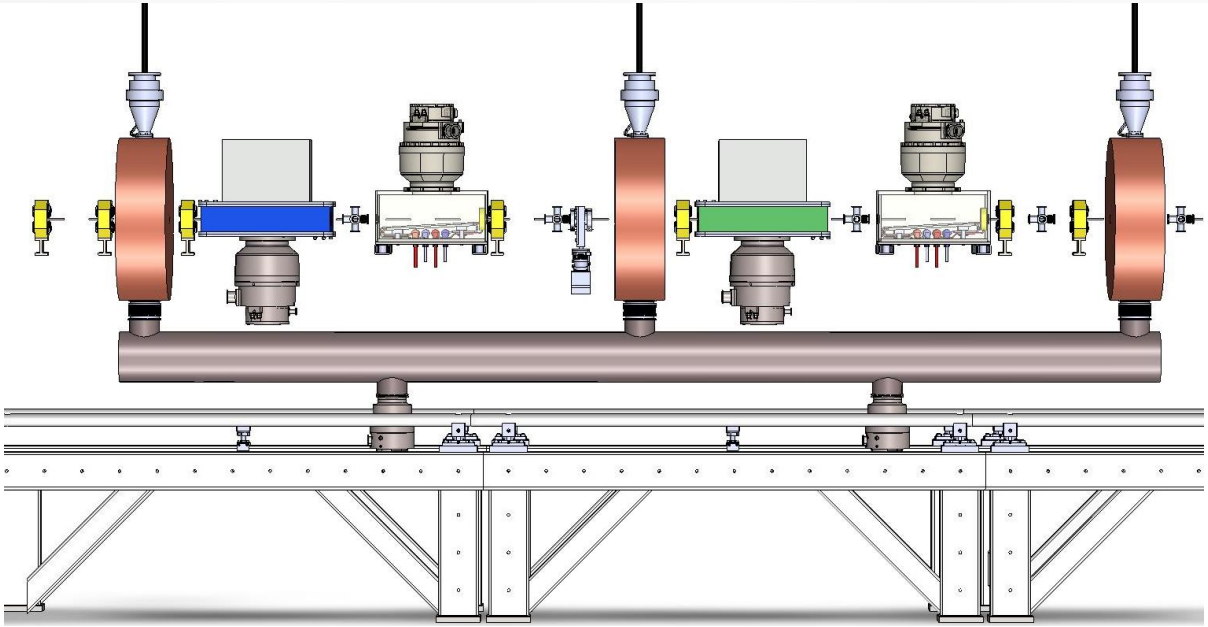
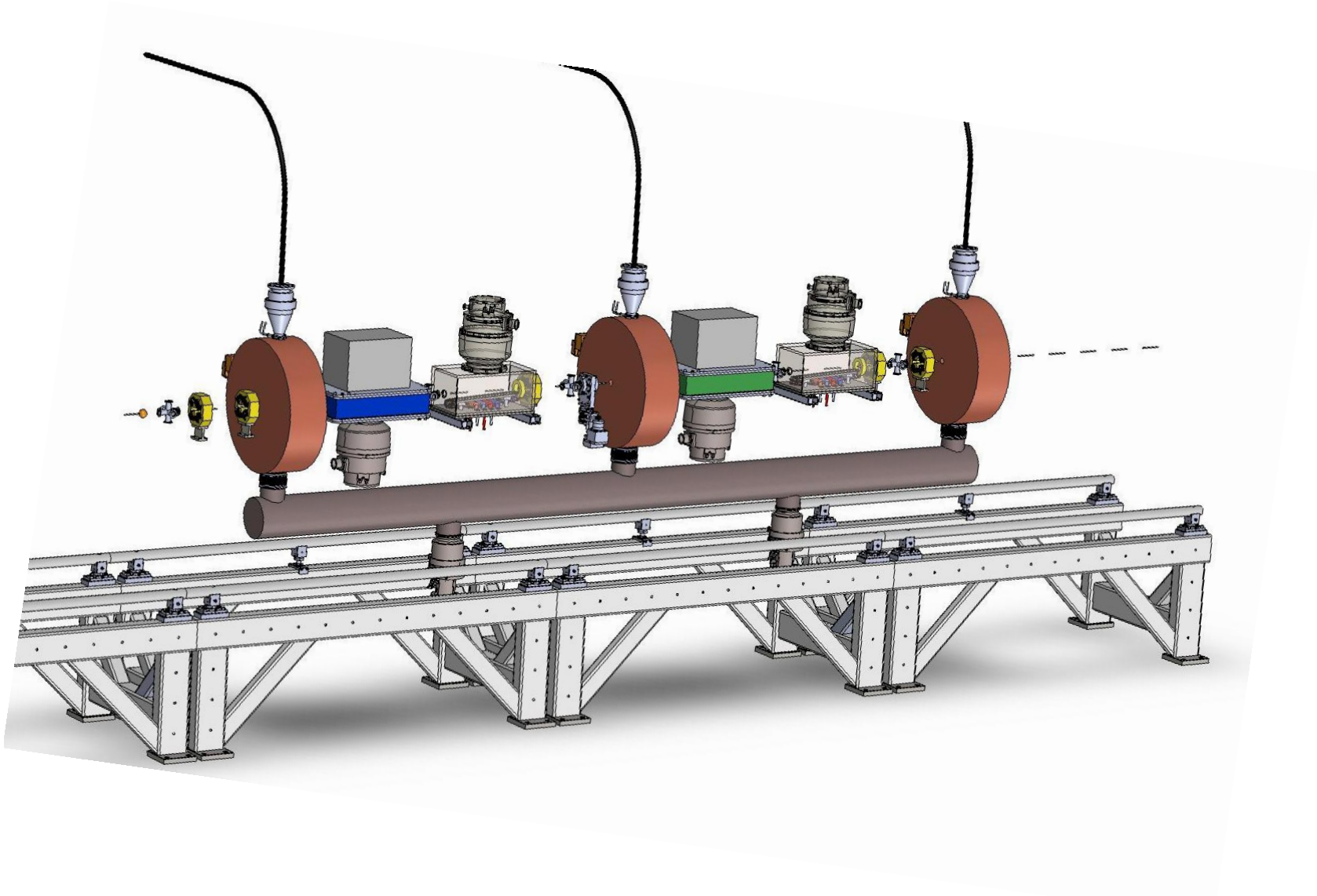
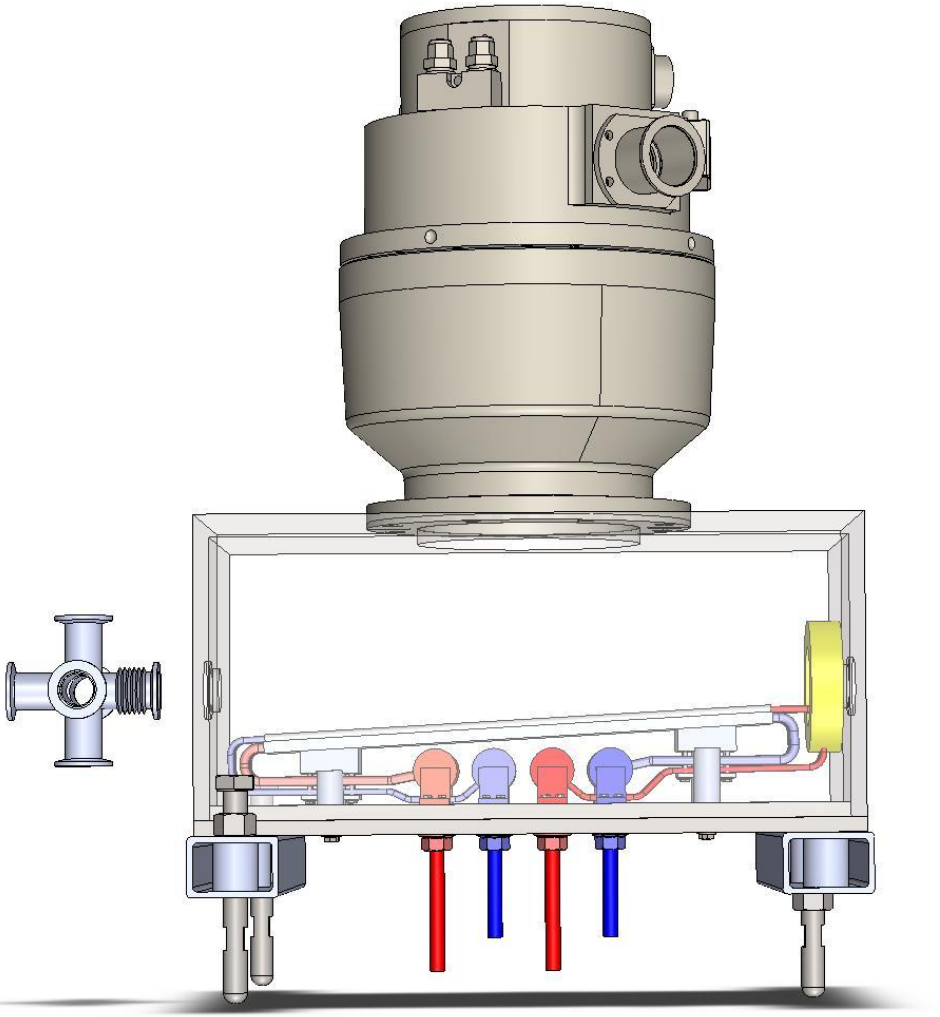




1. Overview MEBT



2. Beam dump body



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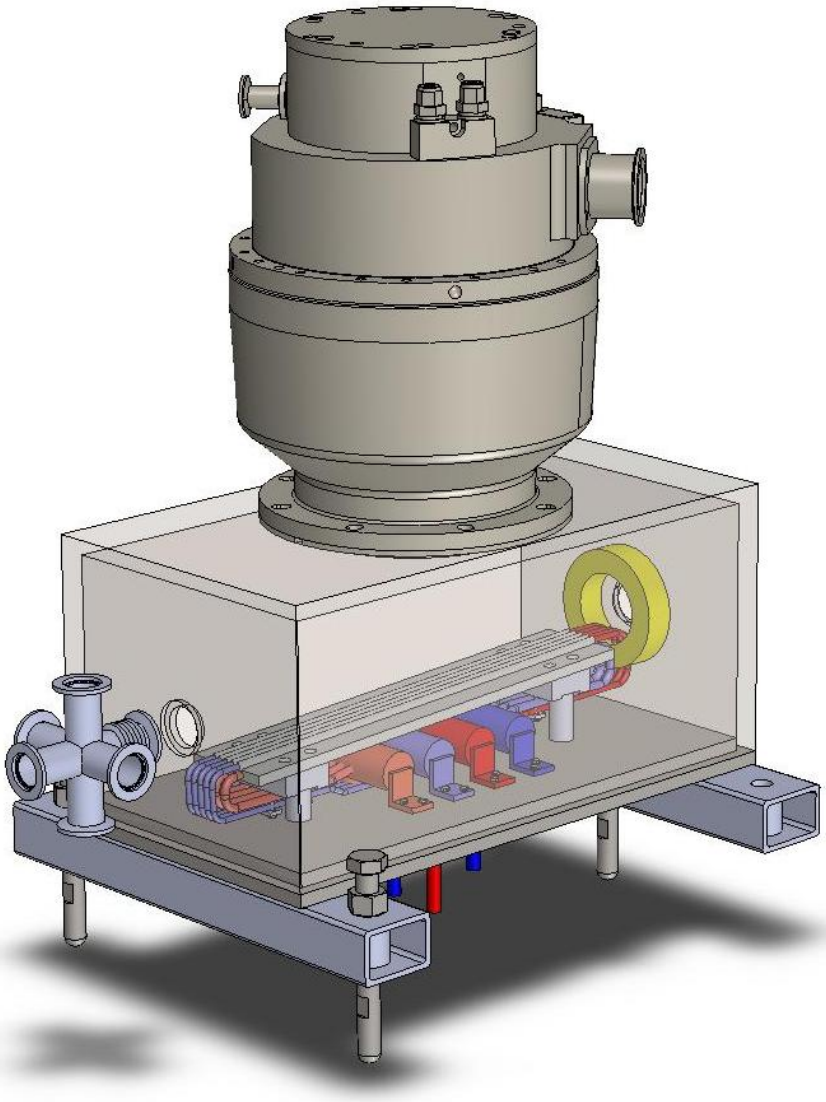
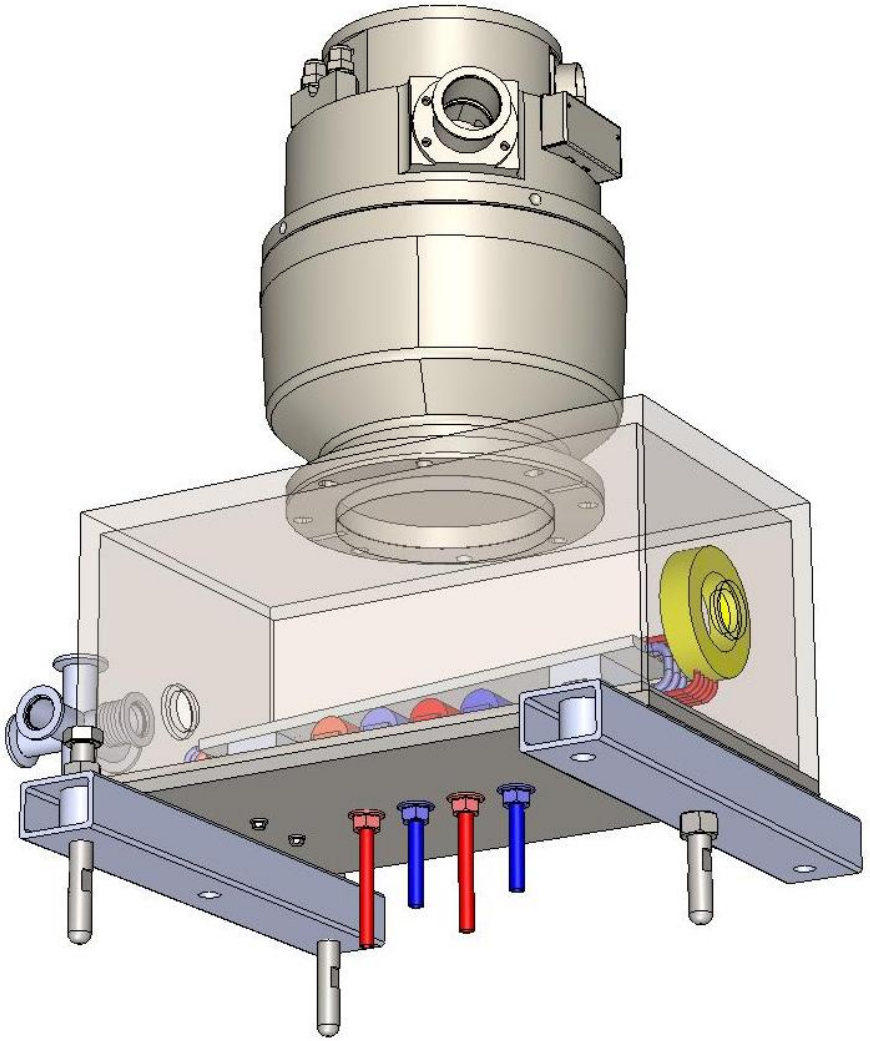
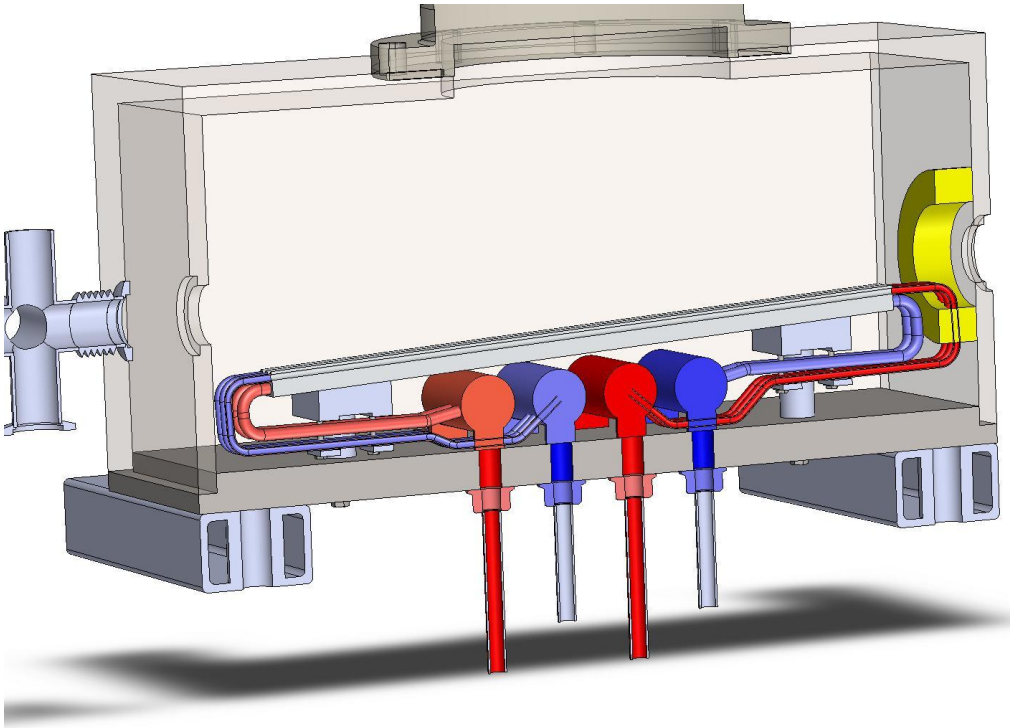
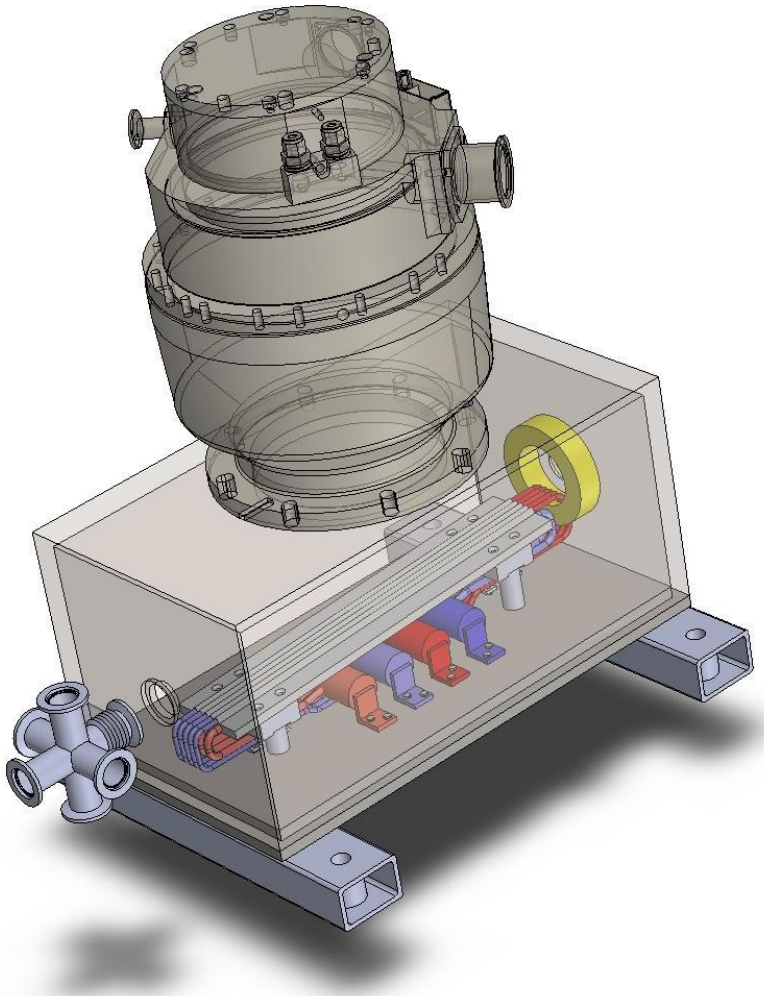


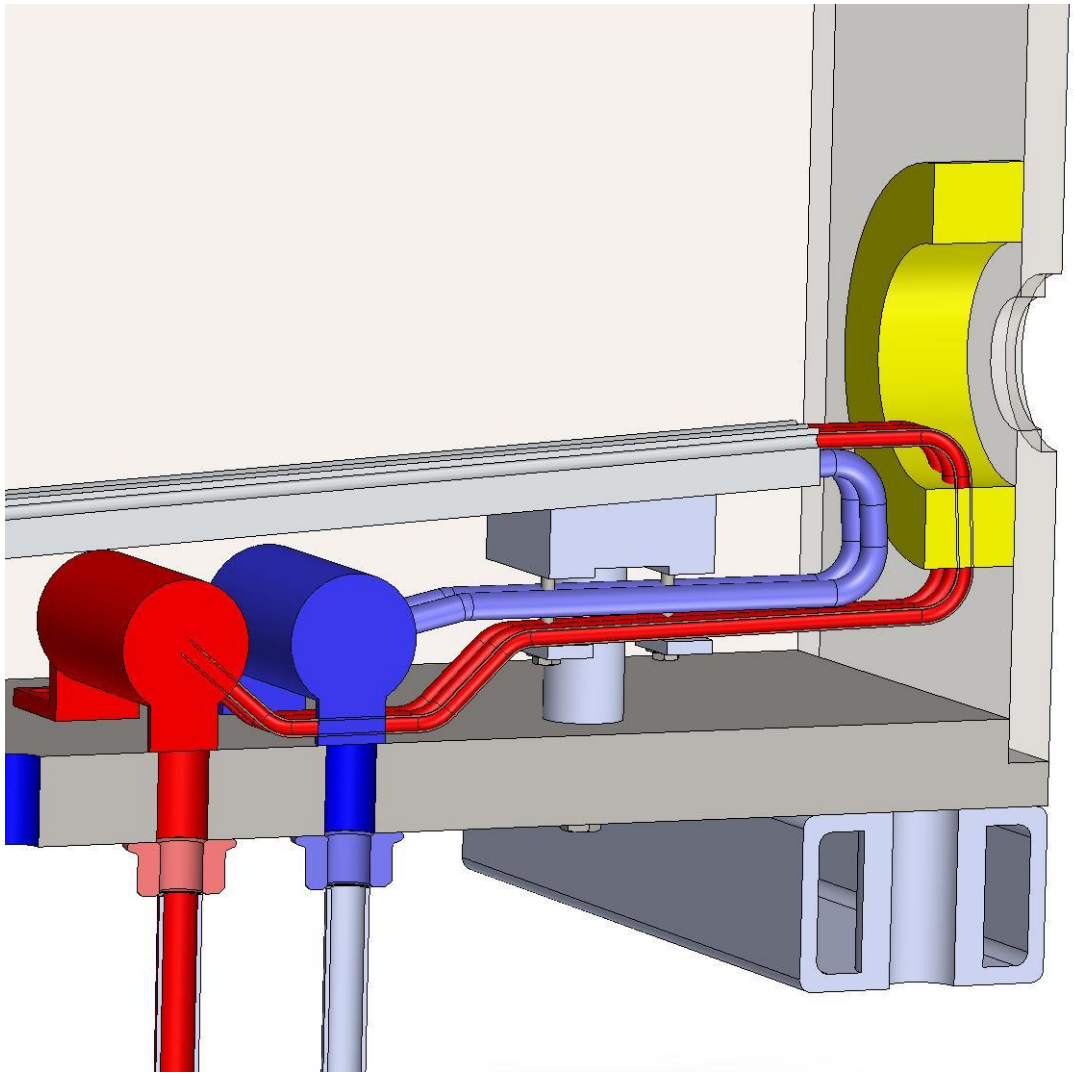


2. Beam dump body

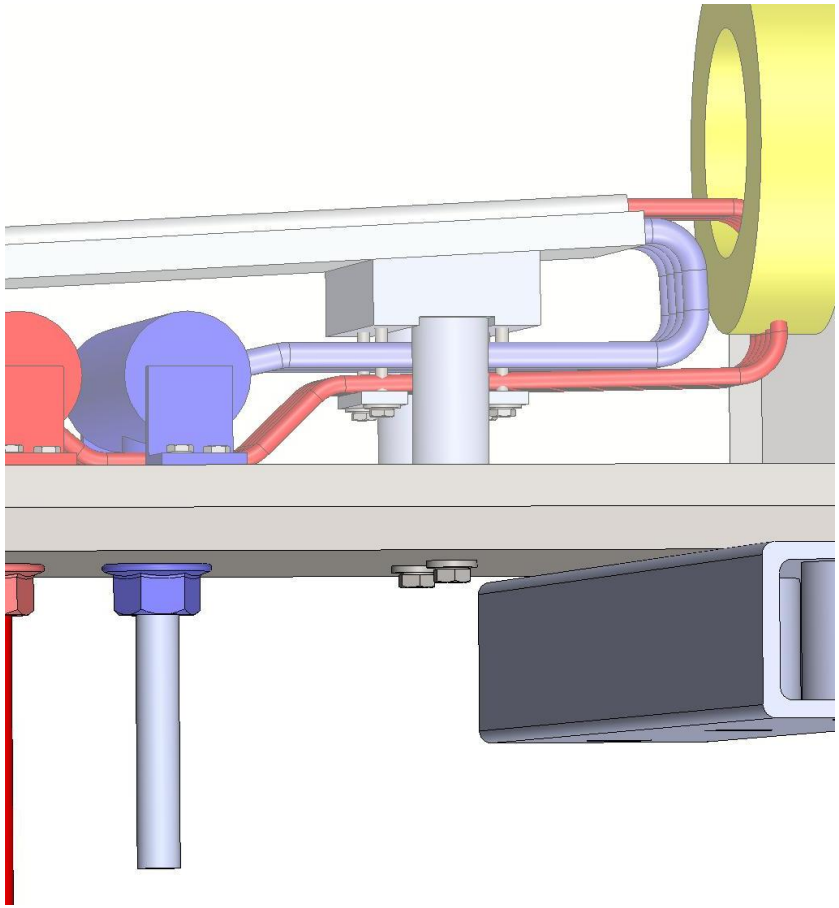


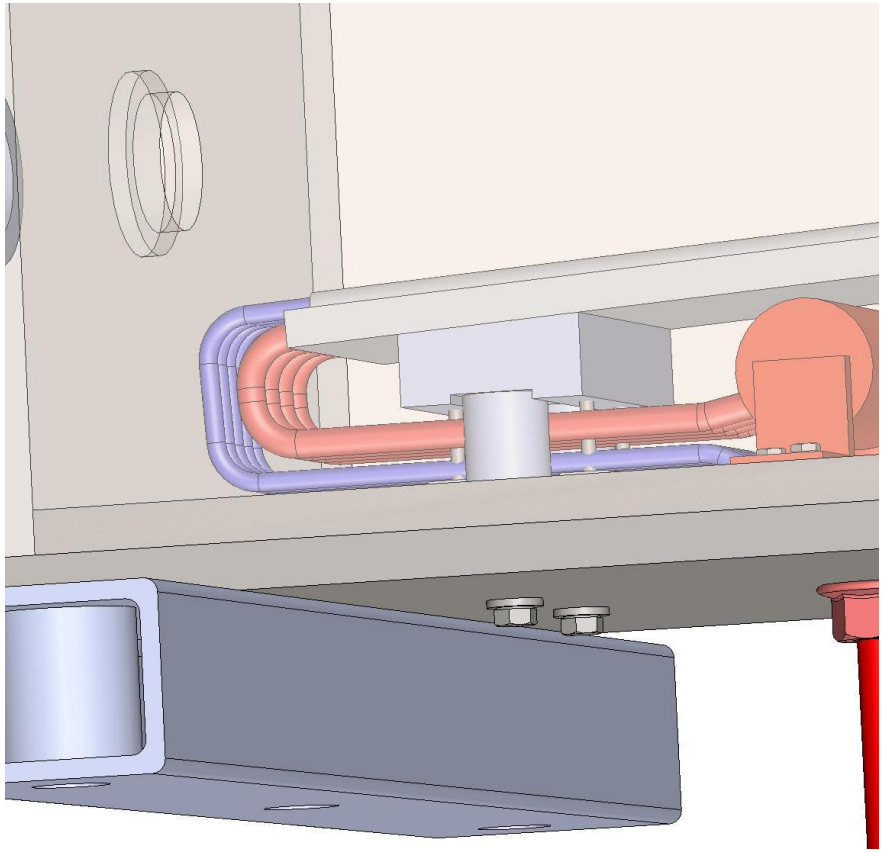


3. Collimator?



4. Supports





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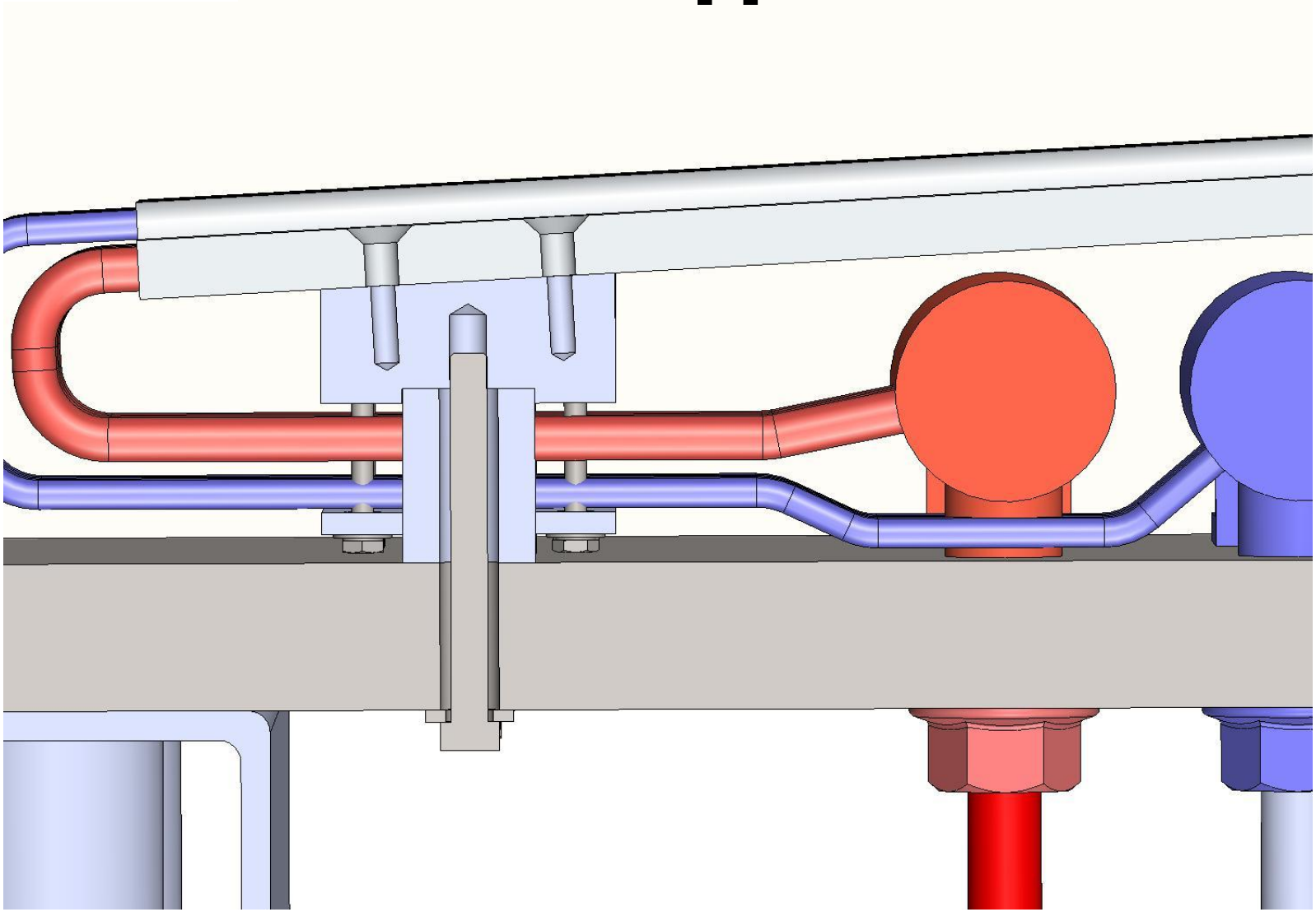
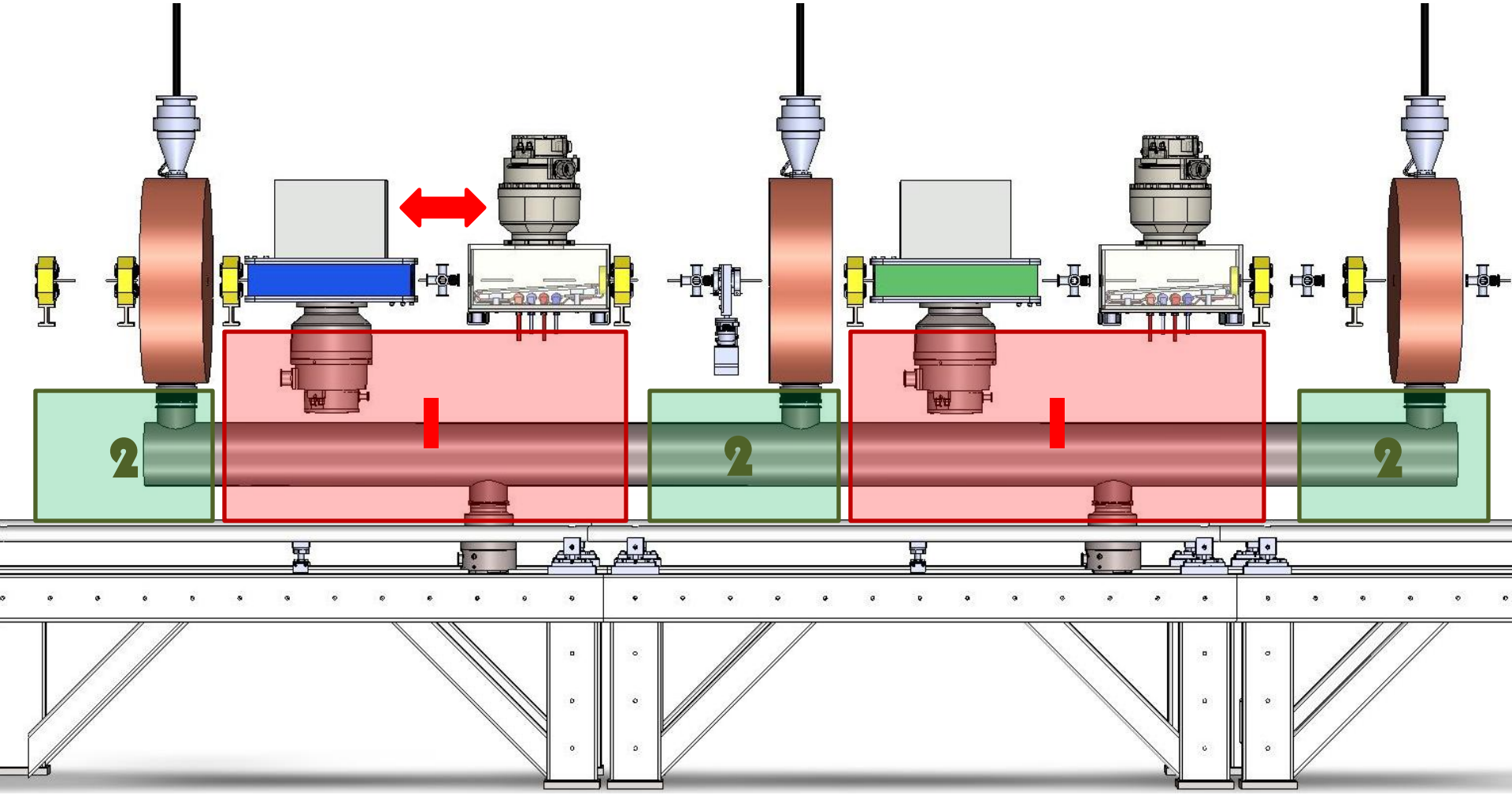


5. framework proposal



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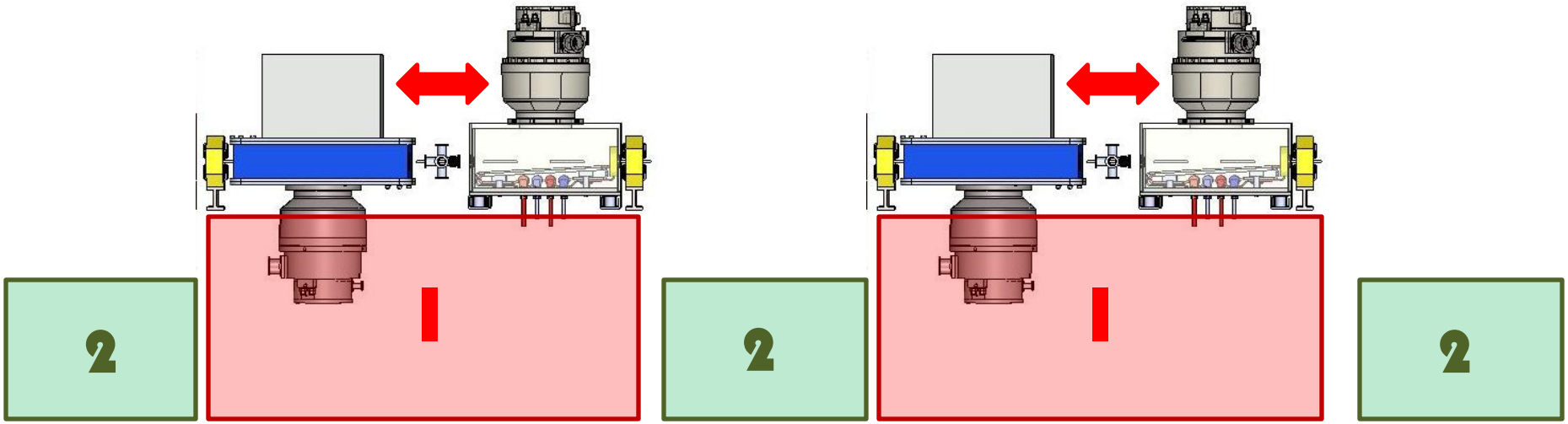
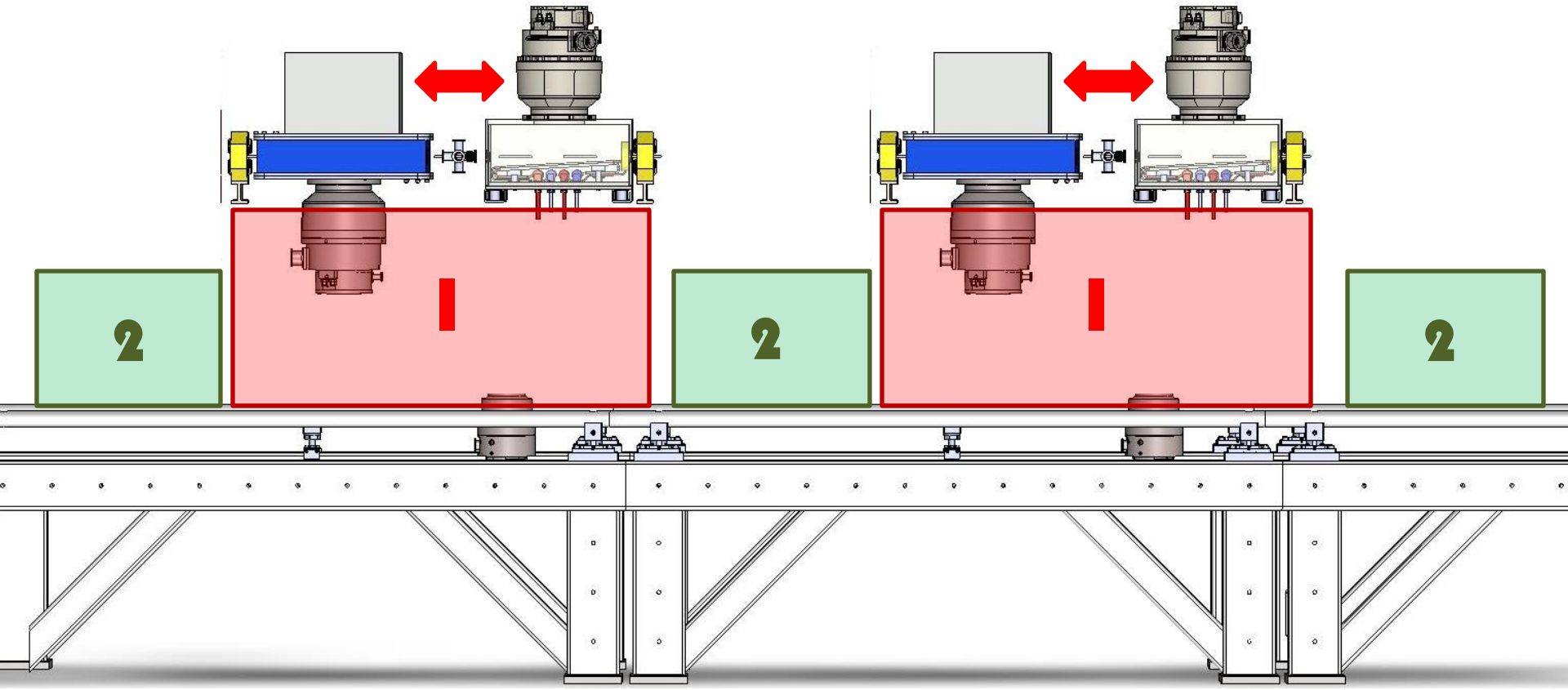


5. framework proposal



6. Aluminum alloys

TYPICAL PROPERTIES ALUMINUM	
PROPERTY	**VALUE**
Young modulus	69 -70 (kN / mm2)
Poisson´s ratio	0,33 - 0,34
Shear´s modulus	25-26 (kN / mm2)
Thermal expansion coefficient	2,3 - 2,4 e-5 (K-1)
Density	0,0027 gr/mm3
Specific heat (approx.)	850-900 (J / kg K)
Melting point	660 (~600) ºC
THERMAL CONDUCTIVITY	**varies**
ULTIMATE TENSILE STRENGTH	**varies**
TENSILE YIELD STRENGTH	**varies**

HEAT TREATMENT DESIGNATIONS	
TERM	**DESCRIPTION**
T1	Cooled from an elevated temperature shaping process and naturally aged
T2	Cooled from an elevated temperature shaping process cold worked and naturally aged
T3	Solution heat-treated cold worked and naturally aged to a substantially
T4	Solution heat-treated and naturally aged to a substantially stable condition
T5	Cooled from an elevated temperature shaping process and then artificially aged
T6	Solution heat-treated and then artificially aged
T7	Solution heat-treated and overaged/stabilised

OTHER DESIGNATIONS	
TERM	**DESCRIPTION**
F	As fabricated
O	Annealed wrought products
T	Heat treated
W	Solution heat treated
H	Non heat treatable alloys Either "cold worked" or "strain hardened" These are: 3xxx, 4xxx & 5xxx

6. Aluminum alloys

ALUMINUM ALLOYS - DESIGNATIONS & PROPERTIES								
ALLOY	ALLOYING ELEMENT	PROPERTIES	TEMPER	THERMAL CONDUCTIVITY W / m K	ULTIMATE TENSILE STRENGTH MPa (N/mm2)	TENSILE YIELD STRENGTH MPa (N/mm2)	SHEAR STRENGTH MPa (N/mm2)	ELONGATION A5 (%)
1XXX	None (99% + Aluminum)	Excellent formability Excellent weldability Excellent corrosion resistant Low strength						
1050			H16	230	130	120	80	7
1050			H18	230	150	140	85	6
2XXX	Copper	Excellent machinability Poor formability Poor weldability Poor corrosion resistance High strength *Usually called FMA (Free machining alloy) due to its excellent machinability*						
2011			T3	-	365	290	220	15
2011			T6	155	395	300	235	12
3XXX	Manganese	Formable Good corrosion resistance Good weldability Moderate strength						
3103			H14	159	155	140	90	9
4XXX	Silicon	Formable Good corrosion resistance Good weldability						
4015			H16	138	225	155	-	2
4015			H18	-	250	180	-	2

6. Aluminum alloys

ALUMINUM ALLOYS - DESIGNATIONS & PROPERTIES								
ALLOY	ALLOYING ELEMENT	PROPERTIES	TEMPER	THERMAL CONDUCTIVITY W / m K	ULTIMATE TENSILE STRENGTH MPa (N/mm2)	TENSILE YIELD STRENGTH MPa (N/mm2)	SHEAR STRENGTH MPa (N/mm2)	ELONGATION A5 (%)
5XXX	Magnesium	Formable Good weldability Excellent corrosion resistance						
5083			H32	137	330	240	185	17
5251			H26	-	255	215	145	9
5754			H24	134	270	215	160	14
5754			H26	-	290	245	170	10
6XXX	Magnesium + Silicon	Formable Weldable Corrosion resistant *Very good for outgassing - vacuum applications* *Commonly used in Science & Astrophysics apps*						
6063			T6	209	245	210	150	14
6082		*Usually supplied in plates form*	T4	-	260	170	170	19
6082			T6	-	340	310	210	11
6262		*Usually supplied in bar form*	T6	-	290	240	-	8
6262		*Instead of 2011 due to its good machinability too and good corrosion resistance*	T9	-	360	330	-	3
7XXX	Zinc	Excellent machinability Poor corrosion resistance Poor weldability High strength *It is known as well as one of the best for machining*						
7050			T73510	155	495	435	-	-
7050			T7651	153	550	490	-	-
7075		*It can be supplied in plates form*	T6/T651	130	570	505	350	5
8XXX	Lithium	Excellent formability		-	-	-	-	

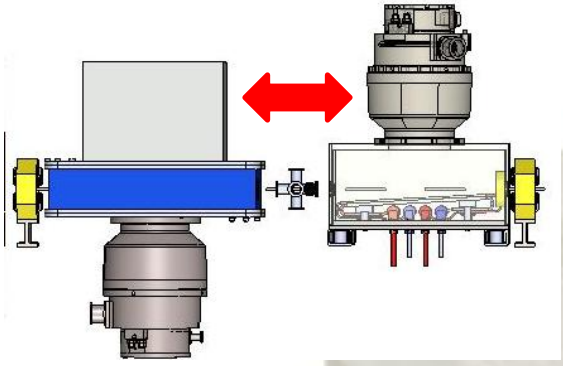
6. Aluminum alloys

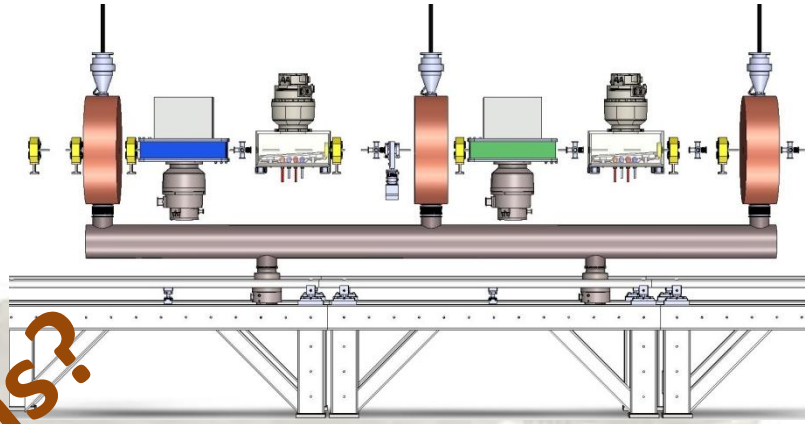
Normas EN AW	Denominaciones ALU-STOCK	% Si	% Fe	% Cu	% Mn	% Mg	% Zn	% Ti	% Pb	% Cr	%	% Otros	% Al
1050 A	Puraltok 99,50	0,25	0,40	0,05	0,05	0,05	0,07	0,05				0,03	99,50
1060	Puraltok 99,60	0,25	0,35	0,05	0,03	0,03	0,05	0,03				0,03	99,60
1080 A	Puraltok 99,80	0,15	0,15	0,03	0,02	0,02	0,06	0,03		Ga 0,03	V 0,05	0,02	99,80
1100	Puraltok 99,10	0,95 Si+Fe		0,05-0,20	0,05		0,10					0,05	99,00
1200	Puraltok 99,00	1,0 Si+Fe		0,05	0,05		0,10	0,05				0,15	99,00
1350 A	Elect-pural 99,5	0,25	0,40	0,02	0,05		0,05				0,03Cr + Mn + Ti + V	0,03	99,50
* 2007	Cobrealtok 07	0,80	0,80	3,30-4,60	0,50-1,00	0,40-1,80	0,80	0,20	0,80-1,50		Bi 0,20	0,30	Resto
2011	Cobrealtok 11	0,40	0,70	5,00-6,00	0,05	0,05	0,30	Ni0,05	0,20-0,40		Bi 0,20-0,60	0,15	"
2014	Cobrealtok 14	0,50-1,20	0,70	3,90-5,00	0,40-1,20	0,20-0,80	0,25	0,15		0,10		0,15	"
2018	Cobrealtok 19	0,50-0,90	0,50	3,90-5,00	0,40-1,20	0,40-0,80	0,25	0,15		Bi 0,2-0,6	0,20 Zr + Ti	0,15	"
2017 A	Cobrealtok 17	0,20-0,80	0,70	3,50-4,50	0,40-1,00	0,40-1,00	0,25			0,10	0,25 Zr + Ti	0,15	"
2024	Cobrealtok 24	0,50	0,50	3,80-4,90	0,30-0,90	1,20-1,80	0,25	0,15		0,10	0,25 Zr + Ti	0,15	"
2618 A	Cobrealtok 18	0,15-0,25	0,90-1,40	1,80-2,70	0,25	0,40-0,80	0,15	0,20	Ni (0,8-1,4)	0,10	0,25 Zr + Ti	0,15	"
* 2030	Cobrealtok 30	0,80	0,70	3,30-4,50	0,20-1,00	0,50-1,30	0,50	0,20	0,80-1,50	0,10	Bi 0,20	0,15	"
3003	Almantok 3003	0,60	0,70	0,05-0,20	1,00-1,50		0,10	+Zr 0,20		0,10		0,15	"
3004	Almantok 3004	0,30	0,70	0,25	1,00-1,50	0,80-1,30	0,25					0,15	"
3103	Almantok 3103	0,50	0,70	0,10	0,90-1,50	0,30	0,20	0,10Zr + Ti				0,15	"
3104	Almantok 3104	0,60	0,80	0,05-0,25	0,8-1,4	0,80-1,30	0,25	0,10			0,05	015	"
3005	Almantok 3005	0,60	0,70	0,30	1,0-1,5	0,2-0,6	0,25	0,10		0,10	0,05 V	0,15	"
3105	Almantok 3105	0,60	0,70	0,30	0,30-0,80	0,20-0,80	0,40	0,10		0,20		0,15	"
5005	Magnealtok 10	0,30	0,45	0,05	0,15	0,70-1,10	0,20			0,10		0,15	"
5050	Magnealtok 15	0,40	0,70	0,20	0,10	1,10-1,80	0,25	0,15		0,10		0,15	"
5052	Magnealtok 25	0,25	0,40	0,10	0,10	2,20-2,80	0,10	0,20		0,15-0,35		0,15	"
5019 (5056 A)	Magnealtok 50	0,40	0,50	0,10	0,10-0,60	4,50-5,60	0,20			0,20	0,10-0,6Mn + Cr	0,15	"
5083	Magnealtok 45	0,40	0,40	0,10	0,40-1,00	4,00-4,90	0,25	+Zr 0,20		0,05-0,25		0,15	"
5086	Magnealtok 40	0,40	0,50	0,10	0,20-0,70	3,50-4,50	0,25	0,10 - 0,20Zr		0,05-0,25		0,15	"
5154 A	Magnealtok 35	0,50	0,50	0,10	0,50	3,10-3,90	0,20	+Zr 0,20			0,10-0,50Mn + Cr	0,15	"
5251	Magnealtok 20	0,40	0,50	0,15	0,10-0,50	1,70-2,40	0,15	0,15		0,15		0,15	"
5454	Magnealtok 31	0,25	0,40	0,10	0,50-1,00	2,40-3,60	0,25	0,20		0,05-0,20		0,15	"
5754	Magnealtok 30	0,40	0,40	0,10	0,50	2,60-3,60	0,15	0,15		0,30	0,1-0,6Mn+Cr	0,15	"

6. Aluminum alloys

Normas EN AW	Denominaciones ALU-STOCK	% Si	% Fe	% Cu	% Mn	% Mg	% Zn	% Ti	% Pb	% Cr	%	% Otros	% Al
6005 A	Simagaltok 05	0,50-0,90	0,35	0,10	0,50	0,40-0,70	0,20	0,10		0,30	0,12-0,5 Mn+Cr	0,15	Resto
* 6012	Simagaltok 12	0,60-1,40	0,50	0,10	0,40-1,00	0,60-1,20	0,30	0,30	0,40-2,0	0,30	Bi 0,7	0,15	"
6026	Simagaltok 26	0,60-1,40	0,70	0,20-0,50	0,20-1,00	0,60-1,20	0,30	0,20	0,40	0,30	Bi 0,5-1,5		Resto
6060	Simagaltok 60	0,30-0,60	0,10-,030	0,10	0,10	0,35-0,60	0,15	0,10		0,05		0,15	"
6061	Simagaltok 61	0,40-0,80	0,70	0,15-0,40	0,15	0,80-1,20	0,25	0,15		0,04-0,35		0,15	"
6063	Simagaltok 63	0,20-0,60	0,35	0,10	0,10	0,45-0,90	0,10	0,10		0,10		0,15	"
6082	Simagaltok 82	0,70-1,30	0,50	0,10	0,40-1,00	0,60-1,20	0,20	0,10		0,25		0,10	"
6101	Simagaltok 01	0,30-0,70	0,50	0,10	0,03	0,35-0,80	0,10	-				0,15	"
6106	Simagaltok 06	0,30-0,60	0,35	0,25	0,05-0,20	0,40-0,8	0,20	0,10		0,20		0,15	"
6181	Simagaltok 81	0,80-1,20	0,45	0,10	0,15	0,60-1,00	0,20			0,04-0,14	Bi 0,4-0,7	0,15	"
* 6262	Simagaltok 62	0,40-0,80	0,70	0,15-0,40	0,15	0,80-1,20	0,25		0,40-0,70	0,04-0,14	Bi 0,40-0,7	0,15	"
6351 A	Simagaltok 51	0,70-1,30	0,50	0,10	0,40-0,80	0,40-0,80	0,20	0,20				0,15	"
7003	Alzintok 03	0,30	0,35	0,20	0,30	0,50-1,00	5,00-6,50	0,20	Zr 0,05-0,25	0,2		0,15	"
7020	Alzintok 20	0,35	0,40	0,20	0,05-0,50	1,00-1,40	4,00-5,00	-Zr0,09-0,25		0,10-0,30	Ga 0,08-0,2	0,15	"
7022	Alzintok 22	0,50	0,50	0,50-1,00	0,10-0,40	2,60-3,70	4,30-5,20	+Zr 0,20		0,10-0,30		0,15	"
7049 A	Alzintok 49	0,40	0,50	1,20-1,90	0,50	2,10-3,10	7,20-8,40	+Zr 0,25		0,05-0,25		0,15	"
7050	Alzintok 50	0,12	0,15	1,90-2,50	0,10	2,00-2,70	5,90-6,90	0,06		0,04	0,08-0,15Zr	0,15	"
7075	Alzintok 75	0,40	0,50	1,20-2,00	0,30	2,10-2,90	5,10-6,10	+Zr 0,20		0,18-0,28		0,15	"
7175	Alzintok 175	0,15	0,20	1,20-2,00	0,10	2,10-2,90	5,1-6,1	+Zr 0,20		0,18-0,28		0,15	"
-	Moldeal-tok	0,12	0,15	1,50-2,60	0,10	1,80-2,60	5,70-6,70	0,06		0,05	Zr 0,08-0,15	0,15	"

END





questions?