Novel technologies to boost the shipyard industry

Development of an FSW Head for Steel

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ORGANIZED BY THE EU HORIZON 2020 PROJECTS:

FIBRE4YARDS SHIPYARD FOR THE FUTURE

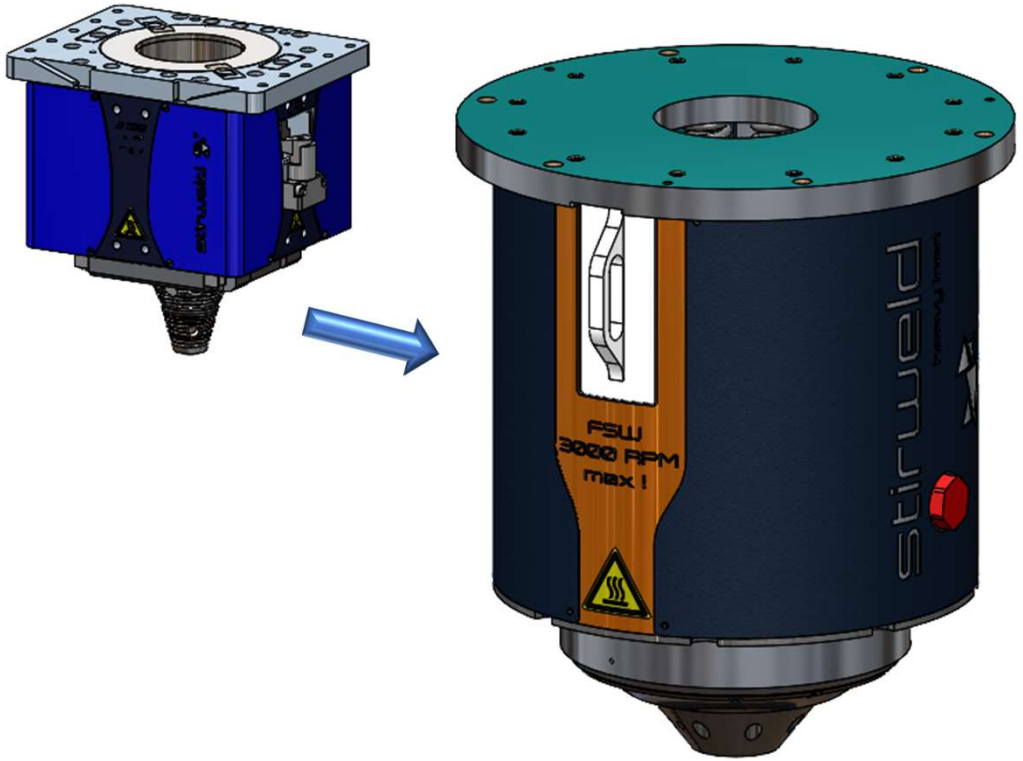
RESURGAM

MARI4YARD MARI4ALLIANCE

30th and 31st May 2023, RTD Innovation Dock, Rotterdam

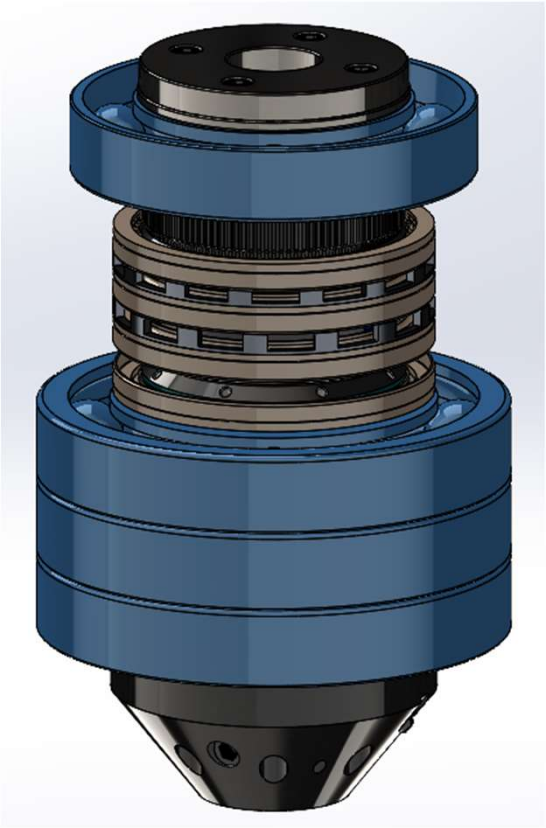
These projects have received funding from the European Union's Horizon 2020 research and innovation programme under grant agreements n° 101006860 (FIBRE4YARDS), n° 101007005 (RESURGAM), and n° 101006798 (Mari4_YARD).

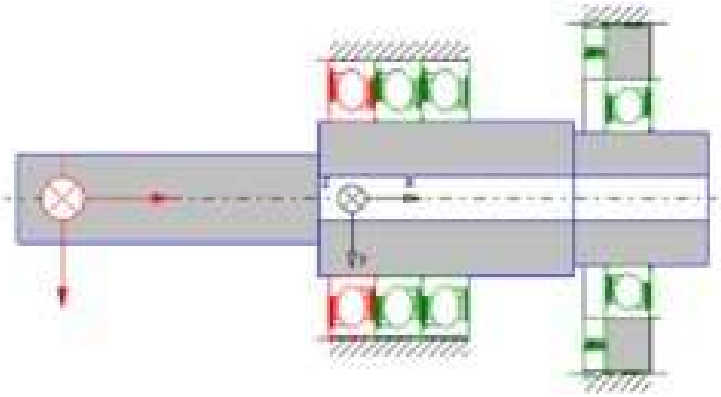
Retrofit of an FSW Head for Aluminium to FSW Head for Steel



Step 1:

Based on specifications choose correct ball bearings and perform stress and lifetime simulation





Roulement	Cas de charge	F_10_i h
B7228-E-T-P4S N° 1	Cas de charge 1	6000
	Cas de charge 2	8800
B7228-E-T-P4S N° 2	Cas de charge 1	6000
	Cas de charge 2	8800
B7228-E-T-P4S N° 3	Cas de charge 1	6000
	Cas de charge 2	8800
B7224-E-T-P4S N° 4	Cas de charge 1	7400
	Cas de charge 2	11400

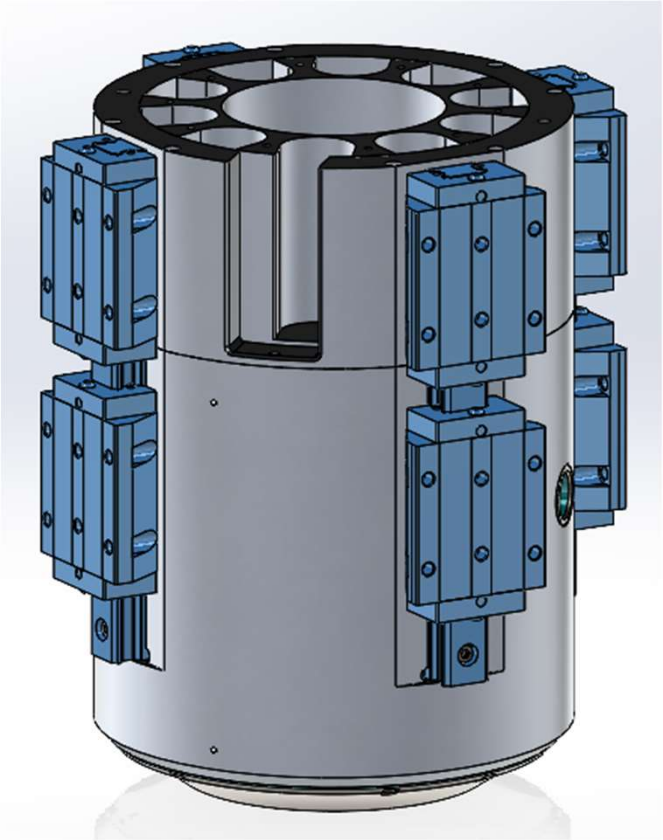
Arbre	Cas de charge	n_i 1/min	T_e °C	T °C
Arbre 1	Cas de charge 1	4000.00	55.0	60.0
	Cas de charge 2	3000.00	55.0	60.0
Arbre auxiliaire 2	Cas de charge 1	0.00	20.0	20.0
	Cas de charge 2	0.00	20.0	20.0

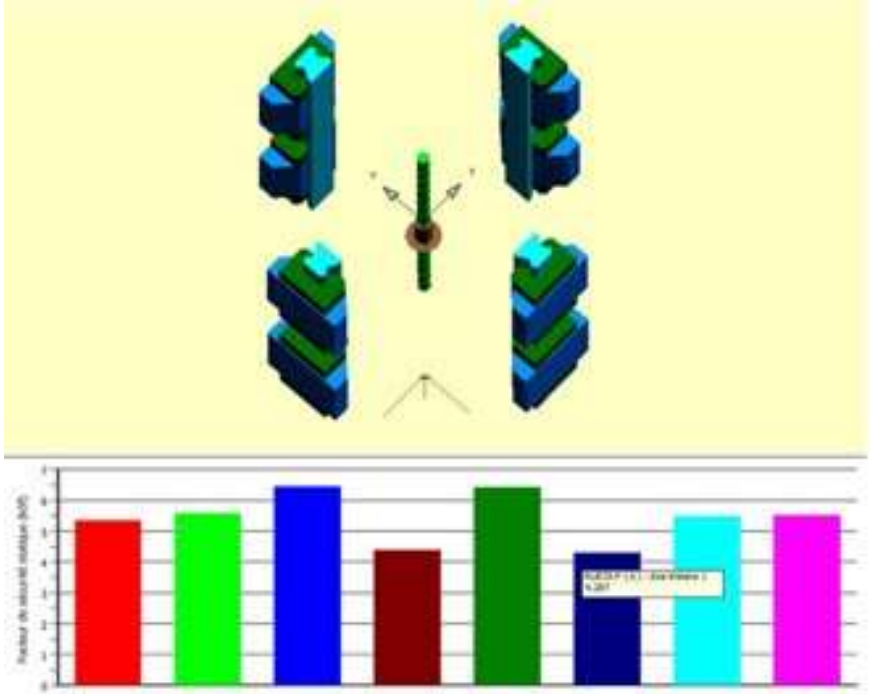
Cas de charge	q %	eG
Cas de charge 1	50.000	sans poids propre
Cas de charge 2	50.000	sans poids propre

Arbre	Charge fixe	Cas de charge	Fx N	Fy N	Fz N	Mx N m	My N m	Mz N m
Arbre 1	Charge fixe 1	Cas de charge 1	50000.00	17000.00	8500.00	0.000	0.000	0.000
		Cas de charge 2	50000.00	17000.00	8500.00	0.000	0.000	0.000

Step 2:

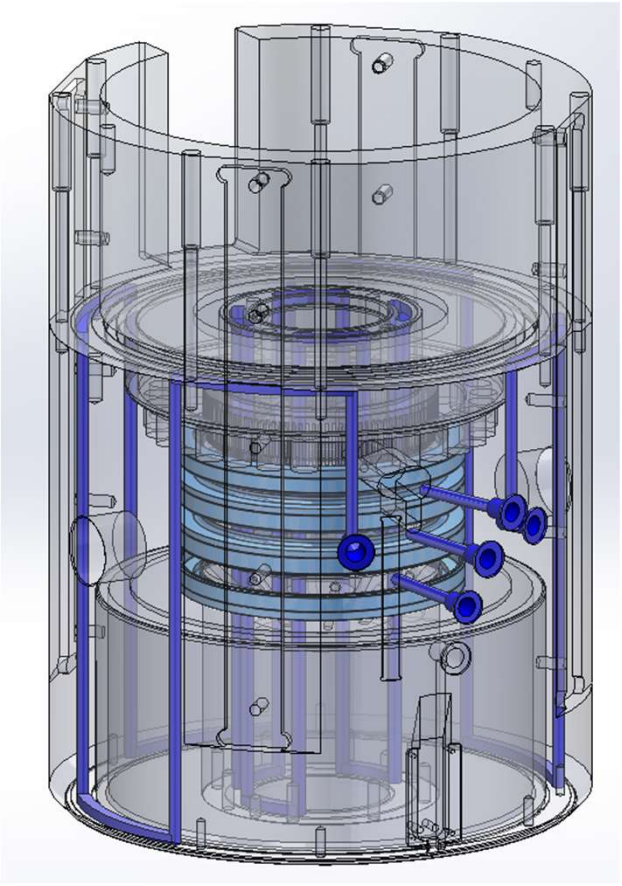
Based on specifications choose correct linear guiding elements and perform stress simulation

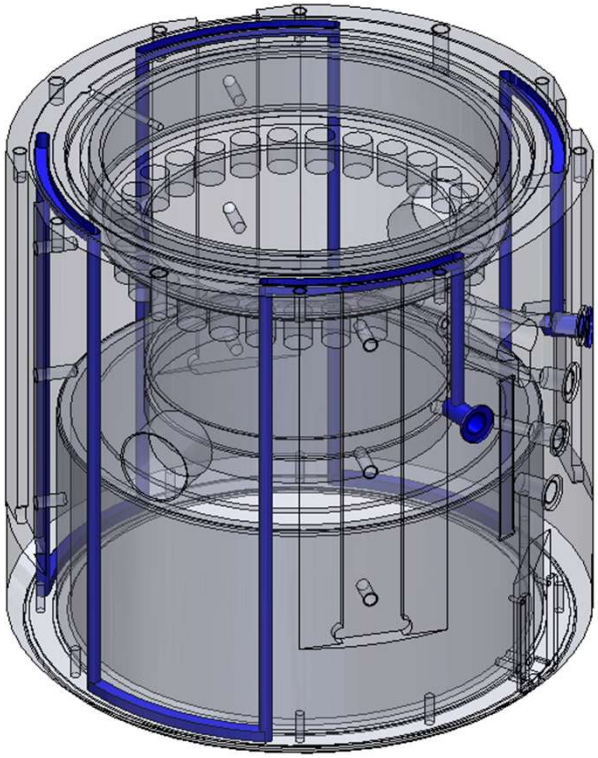


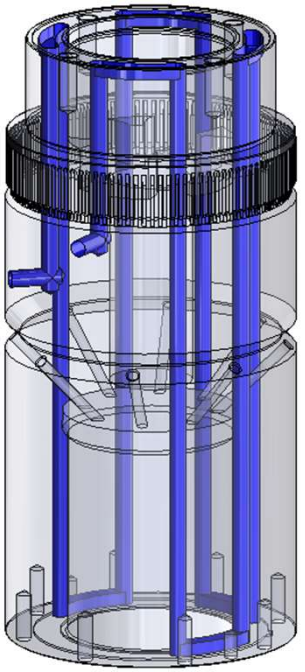


Step 3:

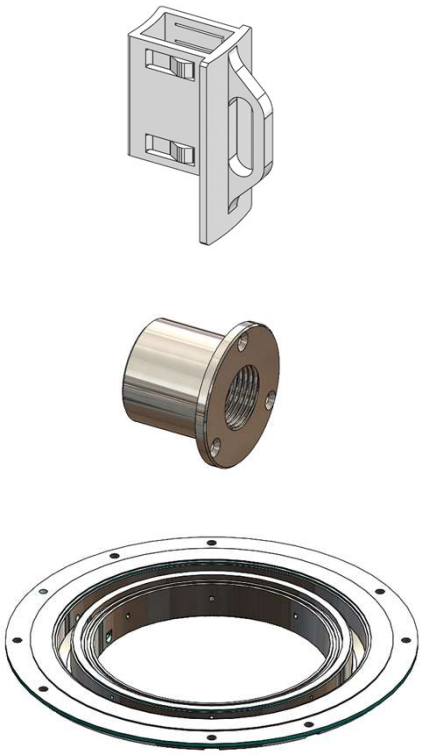
Design an efficient cooling system for the slider and the rotating shaft







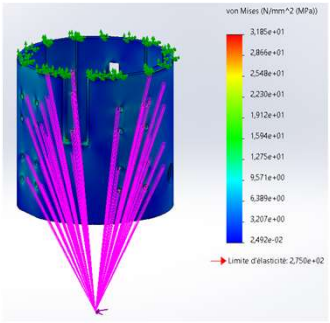
Step 4:
Design all other parts

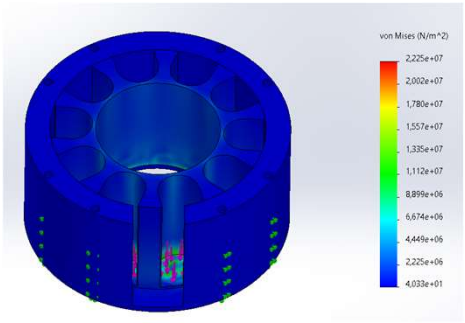


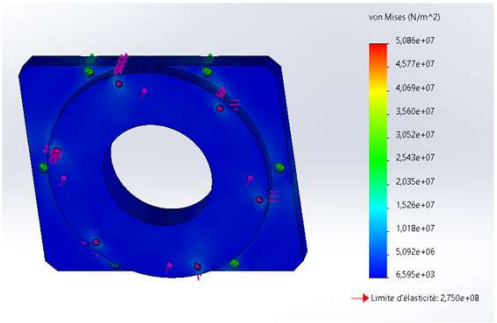
+ 320 parts

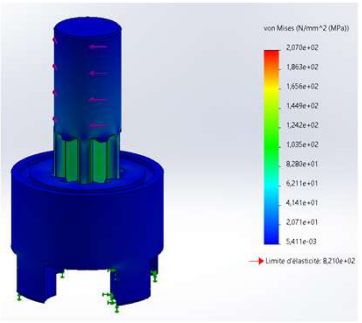
Step 5:

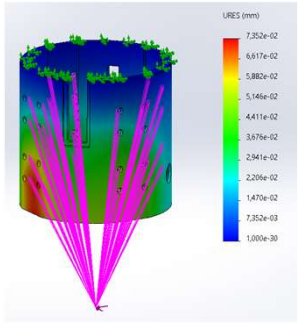
Perform stress simulations on critical parts and improve weight/strenght ratio

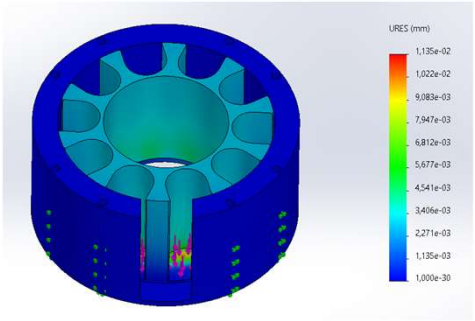


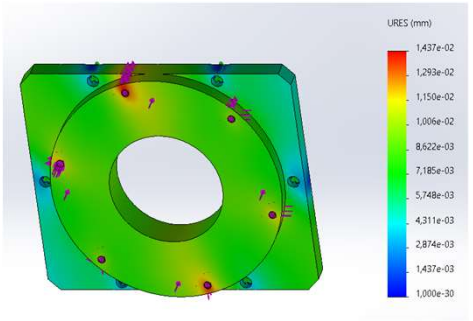


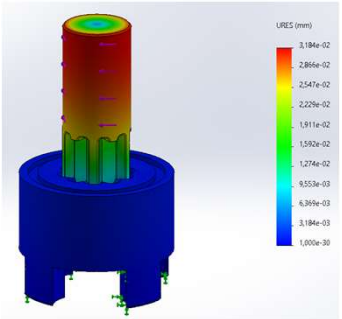






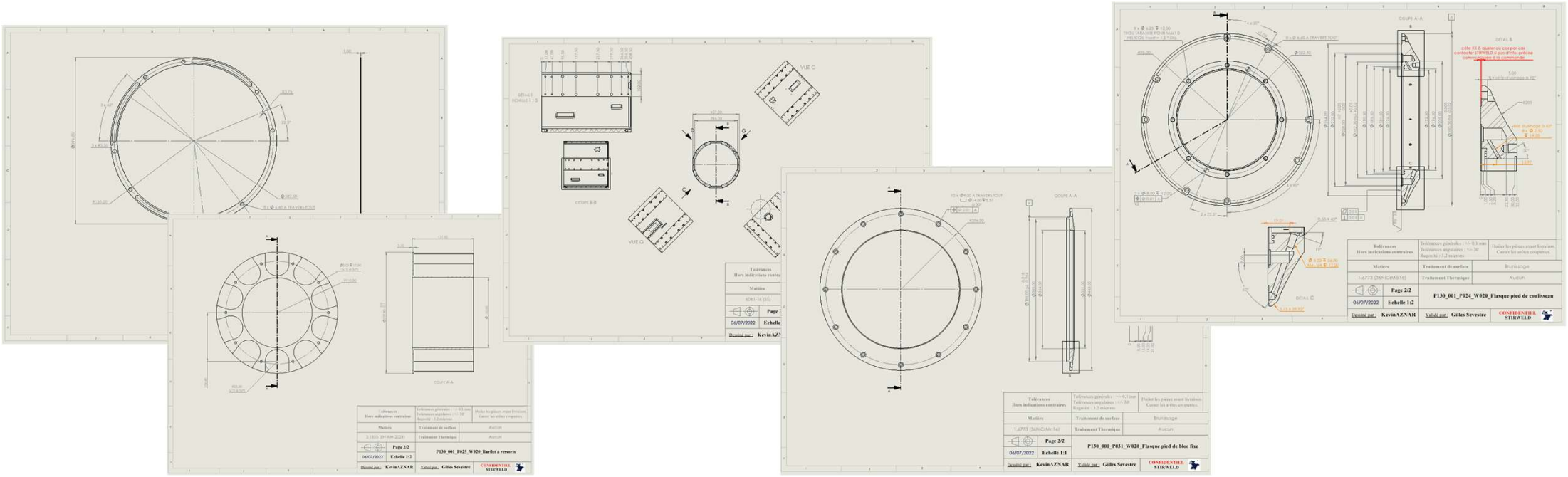






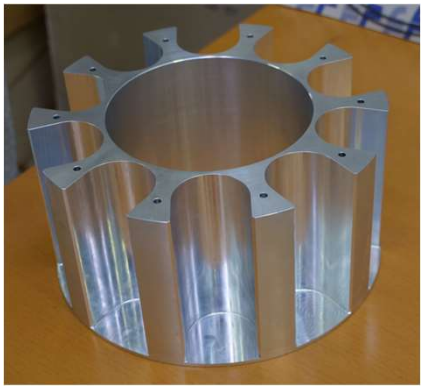
Step 6:

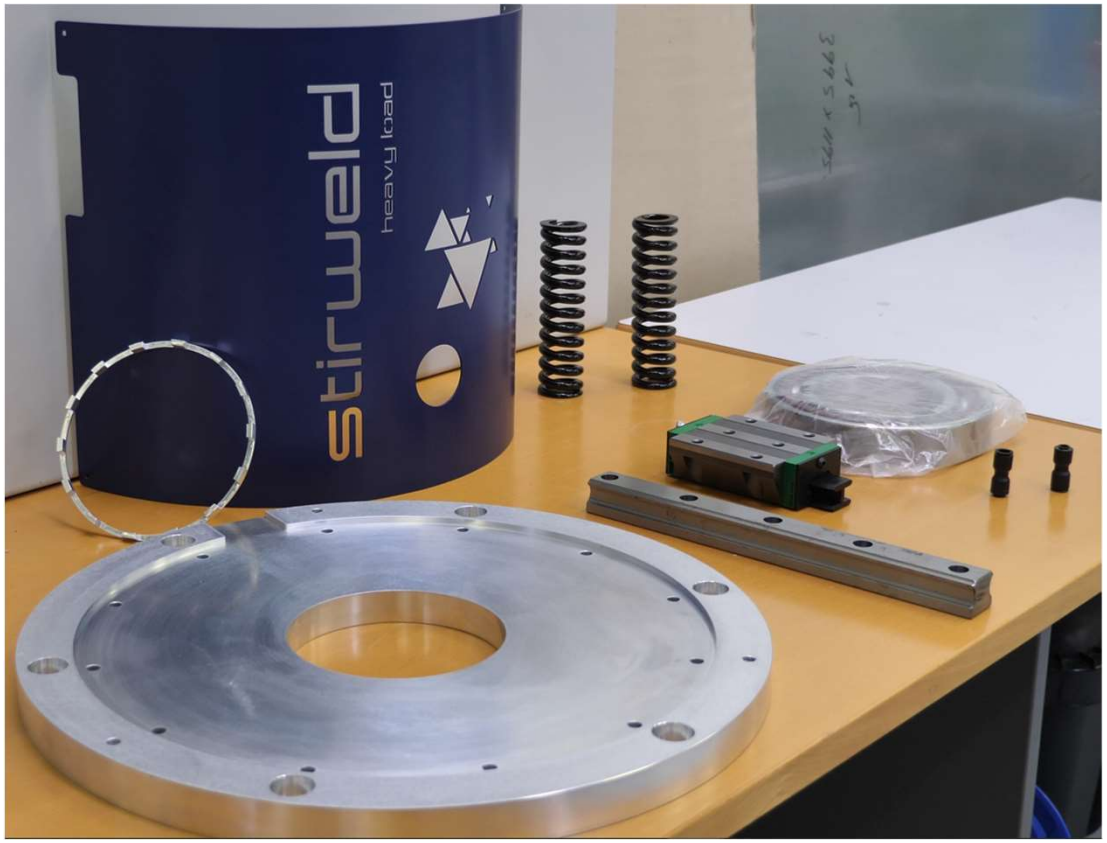
Draw plans for every single parts

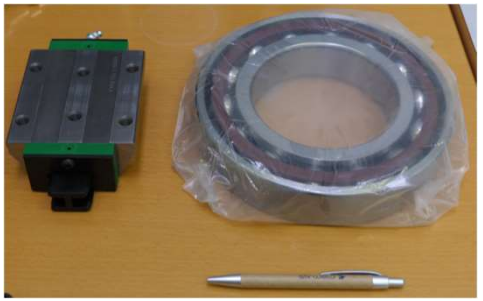


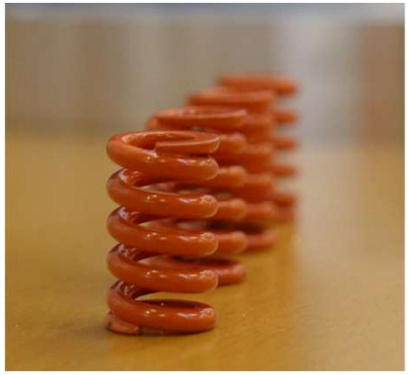
Step 7:

Order standards components and manufacture all parts



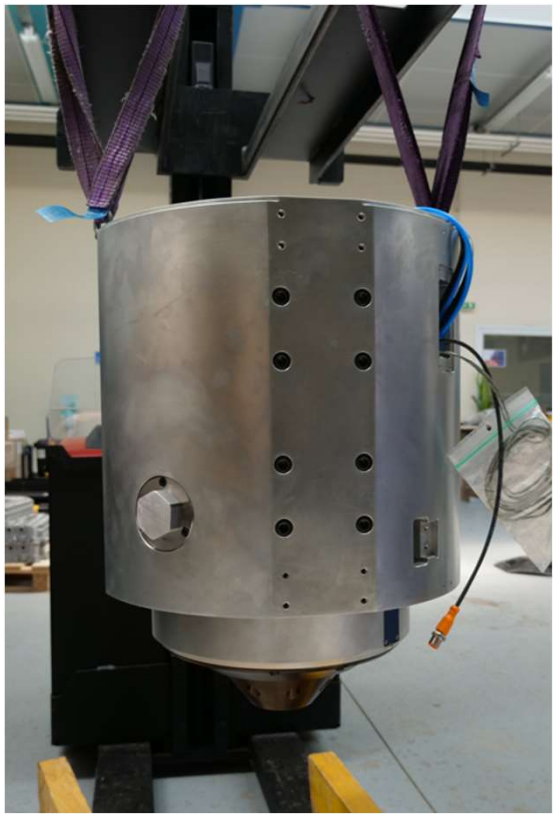






Step 8:

Assemble all parts together and perform leak tests



Step 9:

Enjoy and celebrate !

Encountered difficulties

- Shortage or very long delay on certain standard components
  - (eg: Ball bearings, Linear guides, Sealings)
- Very big parts to machine: Had to find new machinist with high level of accuracy
- Presence of leak during the first tests: Had to unmount and clean the Head and rework the design
- Our workshop is not well equiped to mount parts this size: Had to improvise on the lifting and assembly of the parts

THANKS
FOR YOUR ATTENTION

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