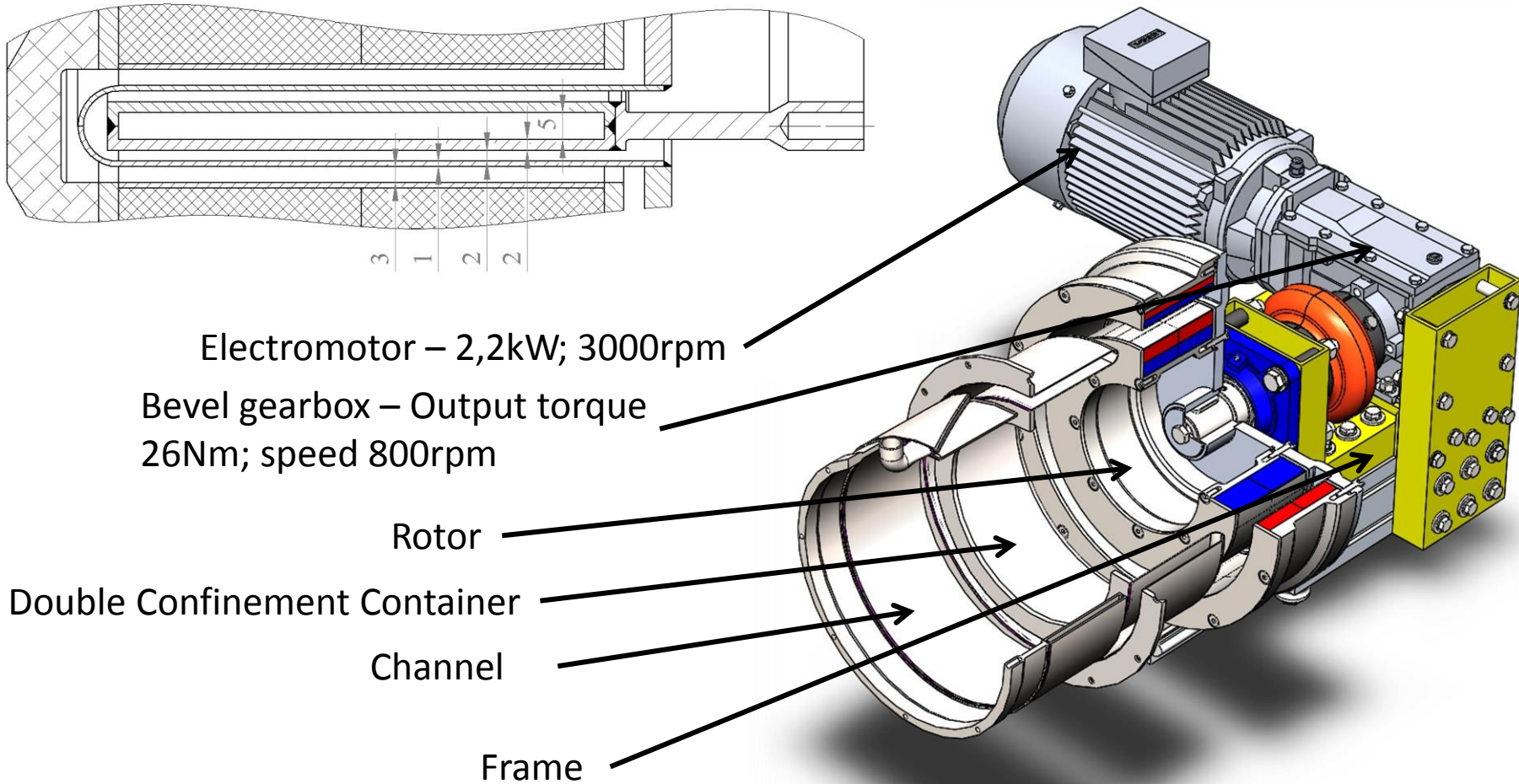
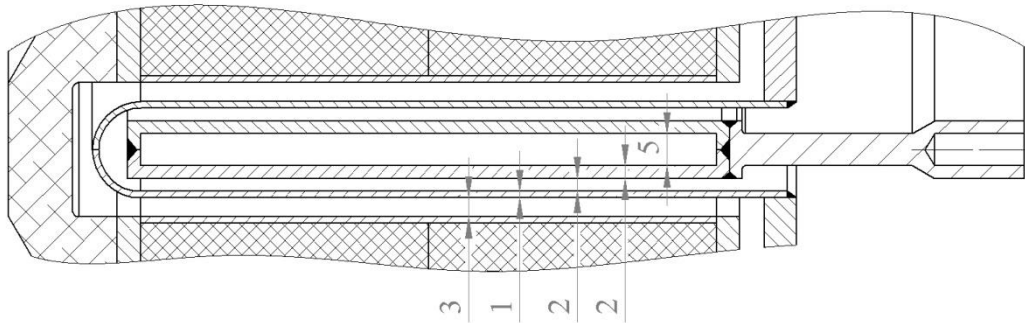


Pump design

LIEBE project coordination meeting

Overall design

Active part - Cross section



Electromotor – 2,2kW; 3000rpm

Bevel gearbox – Output torque
26Nm; speed 800rpm

Rotor

Double Confinement Container

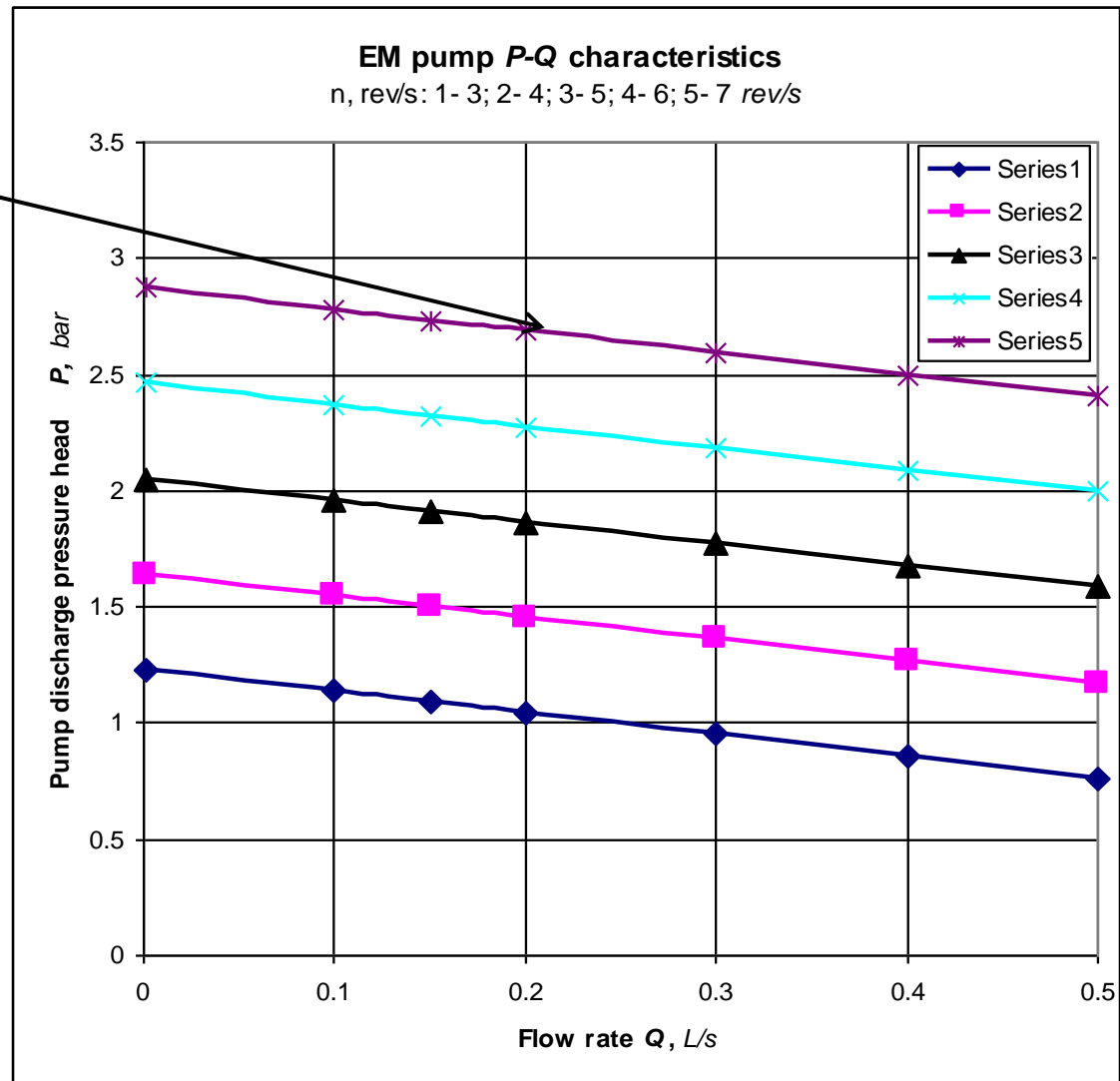
Channel

Frame

Pumps characteristics

Necessary parameters
achieved at rotation speed
 $7 \text{ rev/s} = 420 \text{ rpm}$

There is power reserve,
because the rotor max speed
is 800 rpm



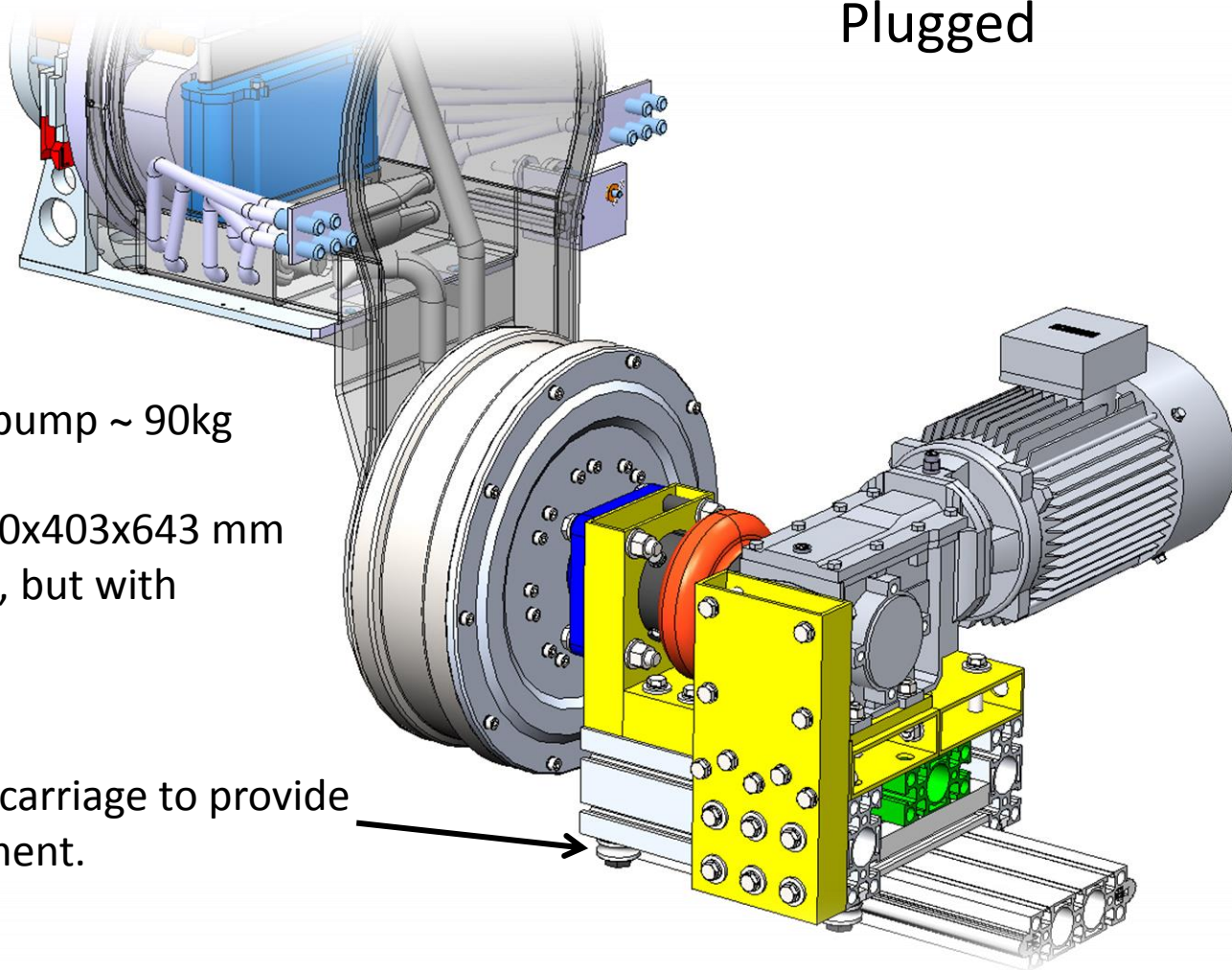
Pump in the assembly

Plugged

Weight of the pump ~ 90kg

Dimensions 480x403x643 mm
(without guide, but with
channel)

Guides and carriage to provide
easy movement.

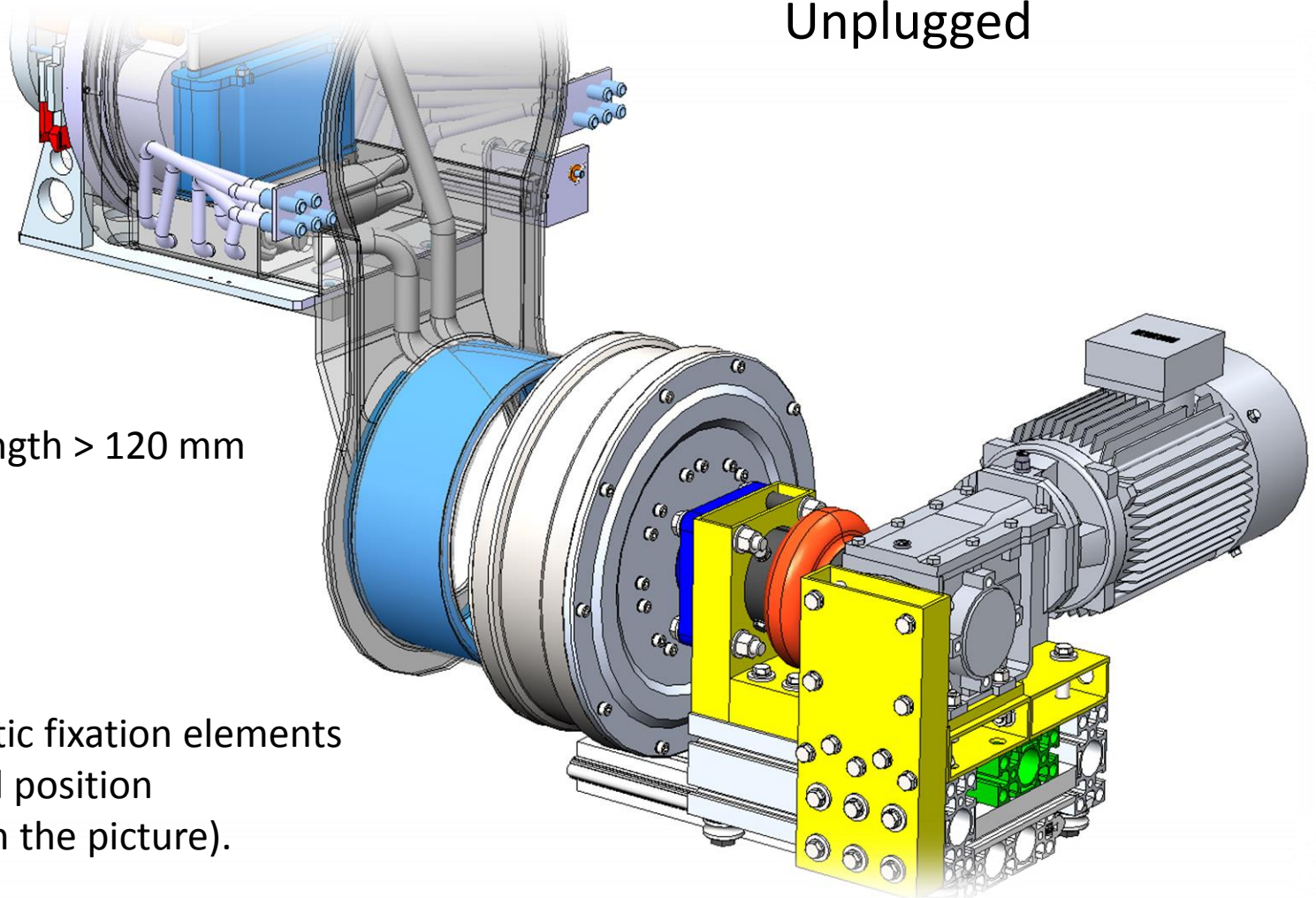


Pump in the assembly

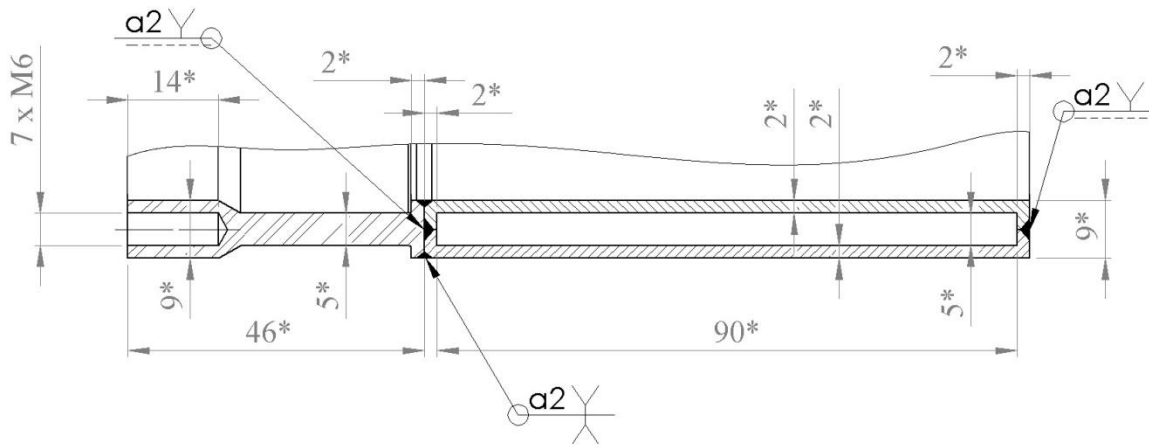
Unplugged

Movement length > 120 mm

Electromagnetic fixation elements
at the plugged position
(not present in the picture).



Channel



Dimensions of channel cross section 90x5 mm

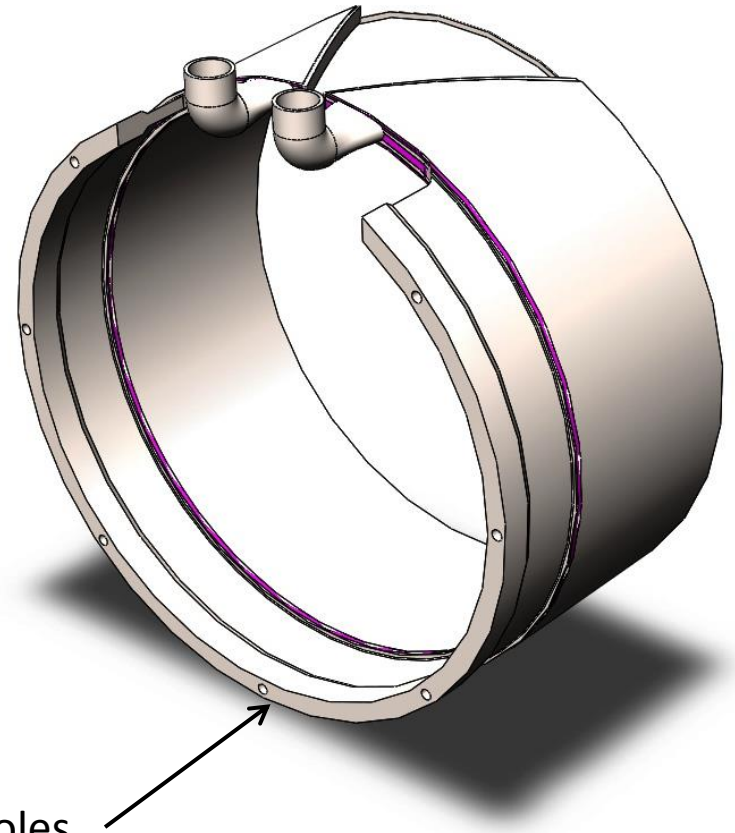
Cross section area 4,5 cm²

Max velocity in channel 1 m/s
at flow rate 0,23 L/s

Welds tested with helium leak detector, by x-rays and over pressure.

Considered – thermal expansions – channel diameter expands by 2,7 mm

Fixation plane and screw holes



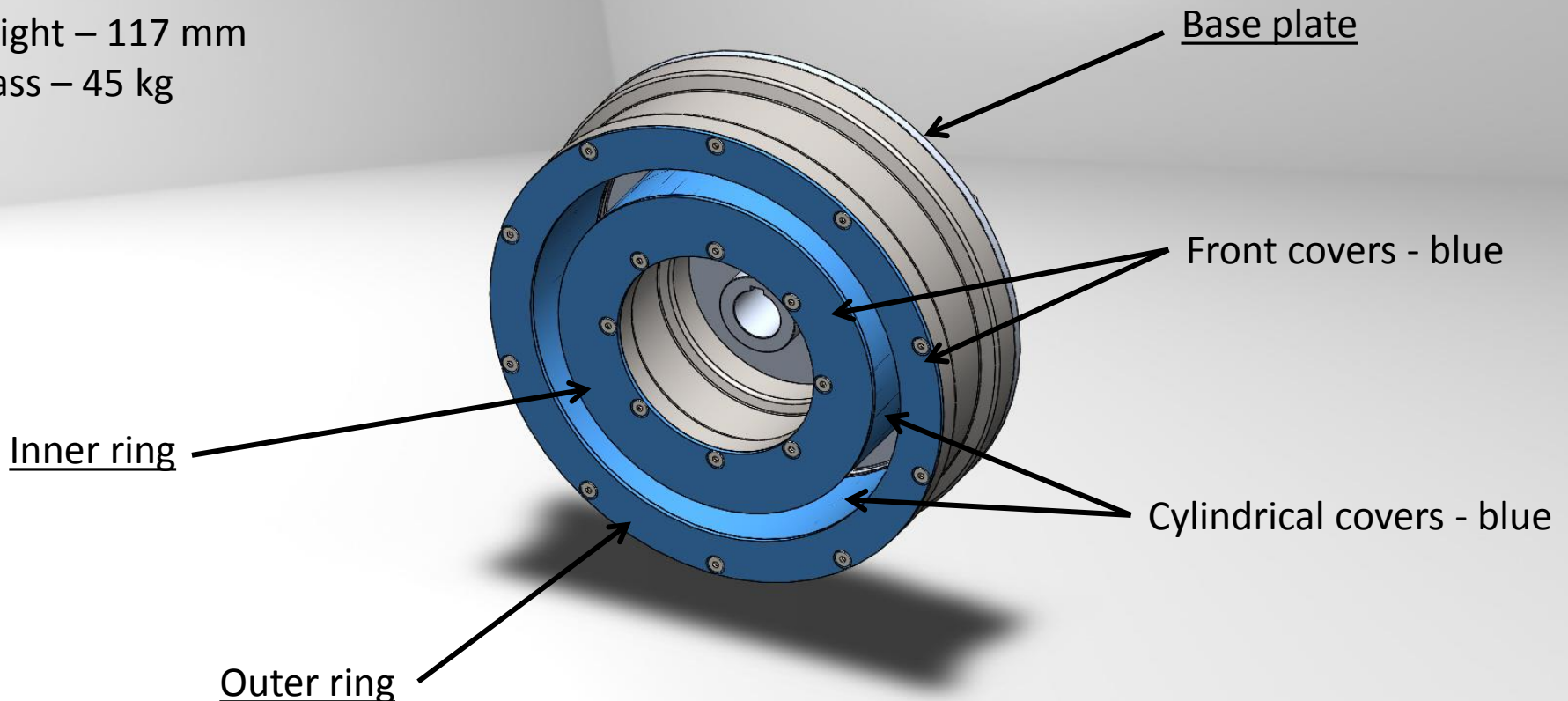
Specifications - rotor

Double Halbach magnet array - axisymmetric

Diameter – 348 mm

Height – 117 mm

Mass – 45 kg

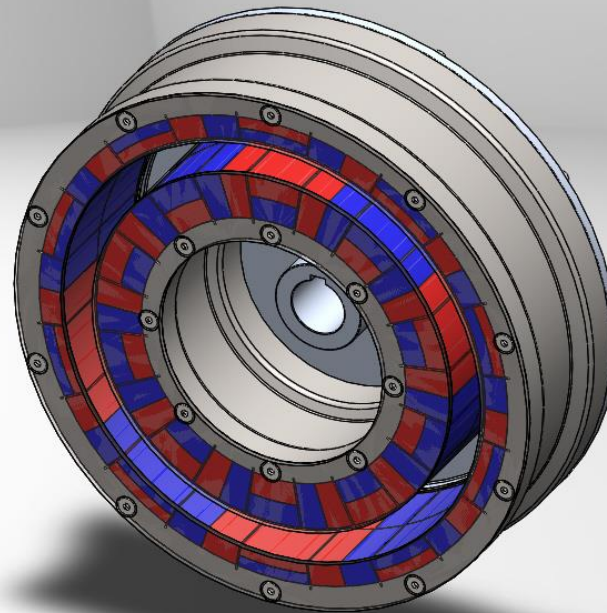


Specifications - rotor

Covers made transparent.

Red – north; blue – south pole of magnets.

Double Halbach array.



Samarium-Cobalt magnets

$B = 1,1T$

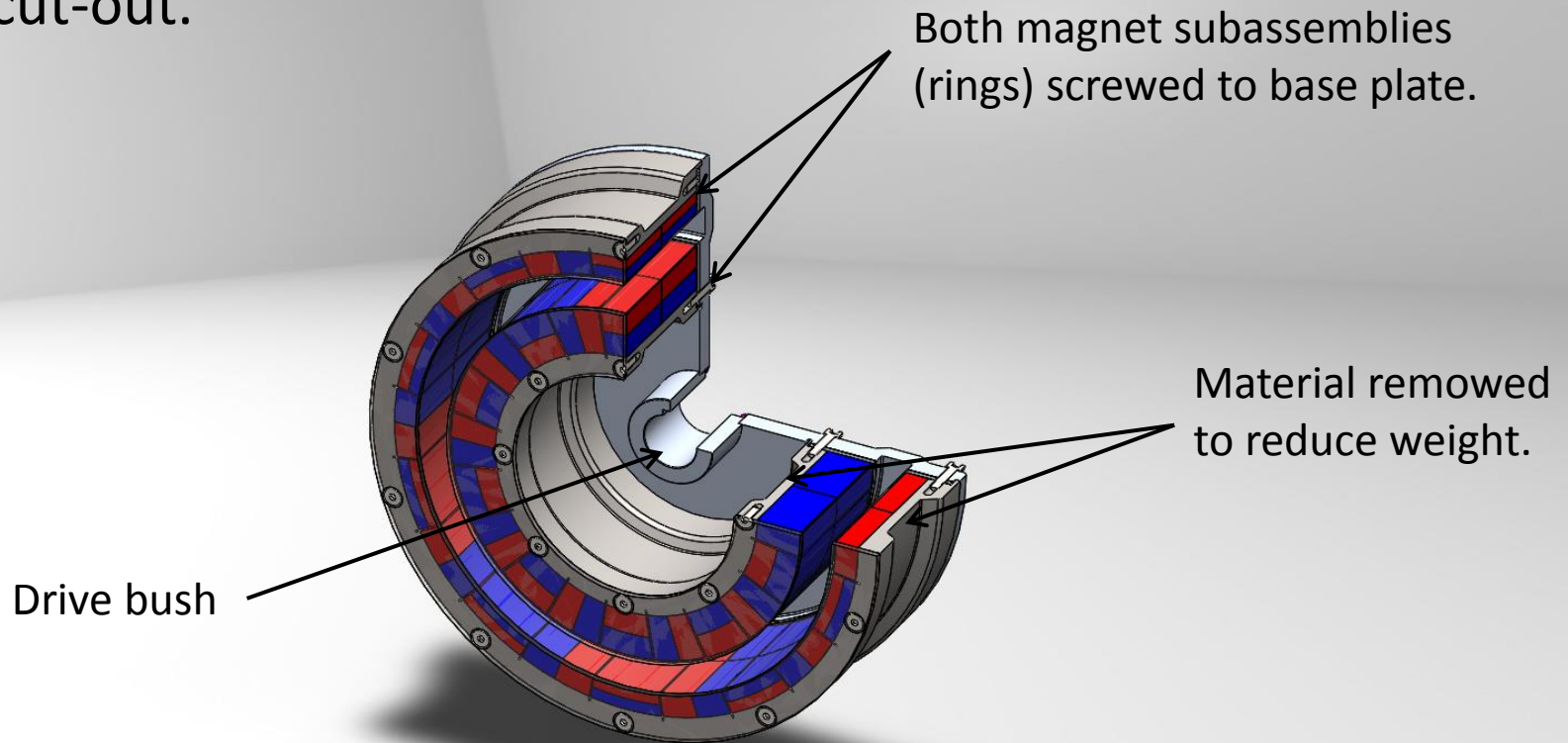
Max T. = $300^{\circ}C$

SmCo magnets – 20 on inner ring and 20 on outer ring.

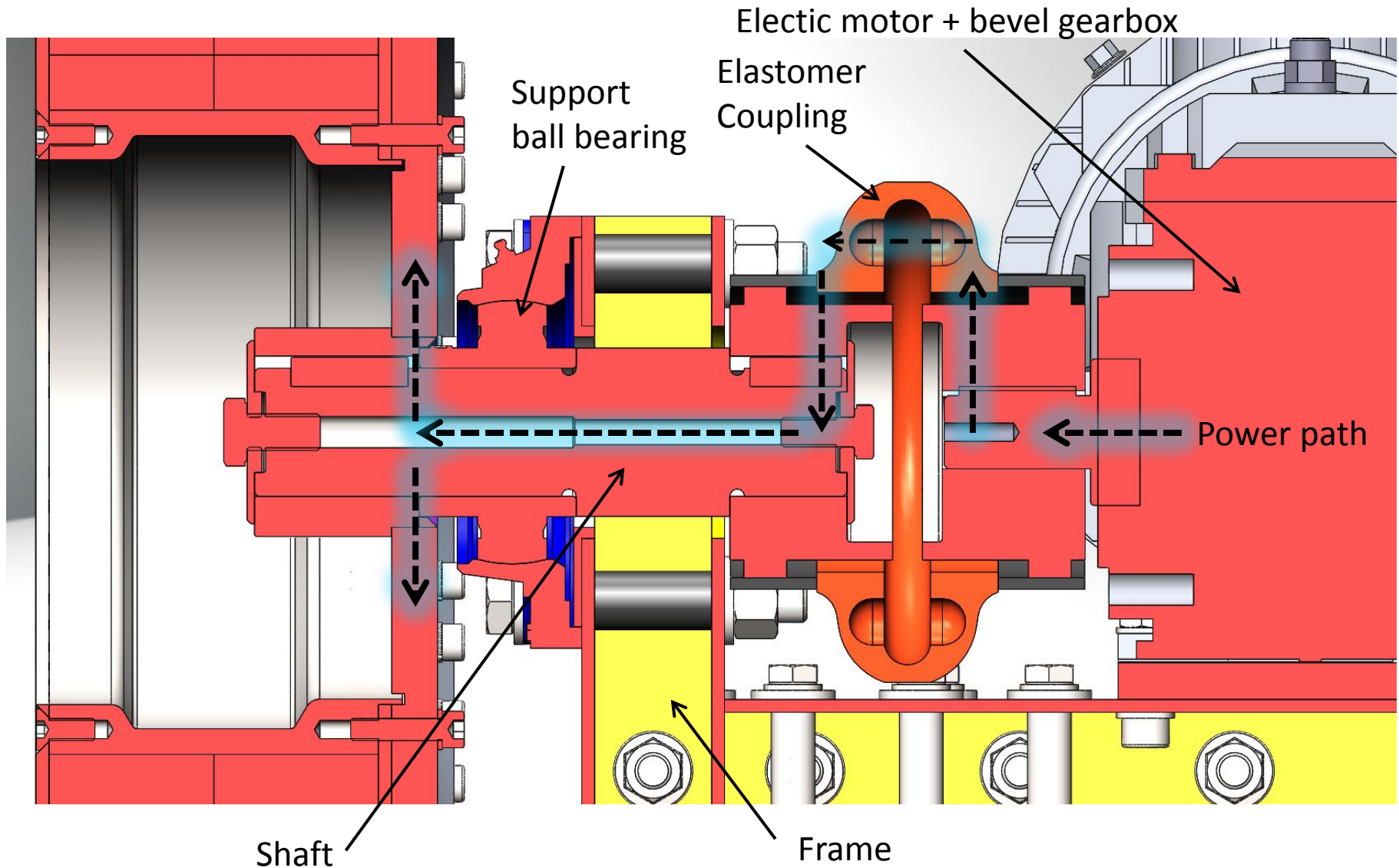
Weight of magnets : inner – 14,8 kg; outer – 10,85 kg.

Specifications - rotor

Quarter cut-out.



Specifications – drive



Specifications - frame

Overall mass ~ 42 kg

Dimensions, without guide

580 x 303 (axial) x 390 mm

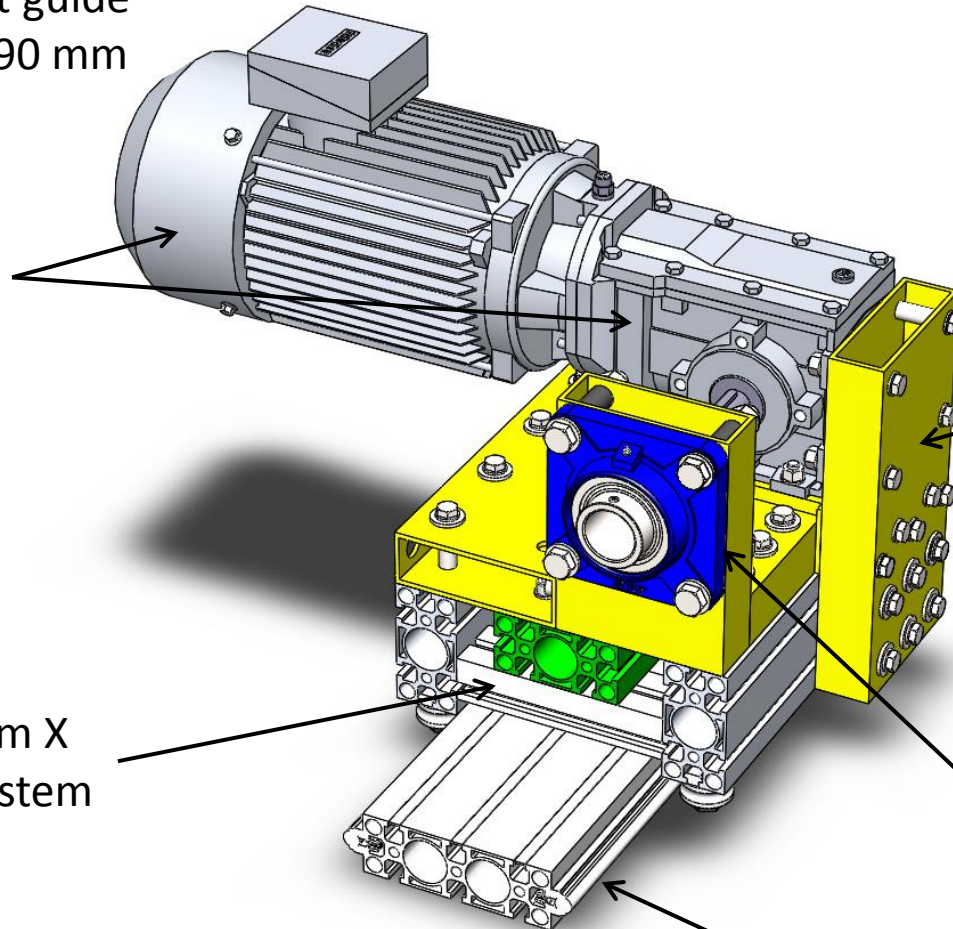
Electric motor +
bevel gearbox
Mass ~ 25 kg

Steel frame

Aluminium X
profile system

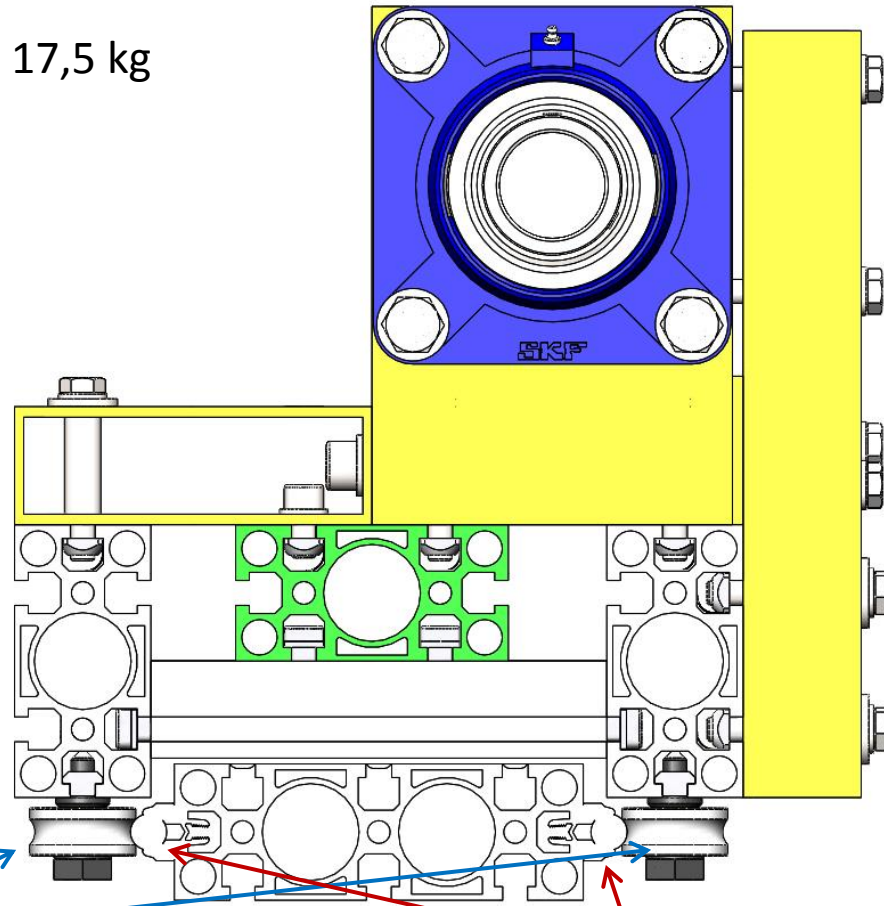
Support ball bearing.
Inner D = 35 mm

Guide



Specifications - frame

Weight of carriage 17,5 kg



Ball bearing wheels

Guides – D12 mm shaft

Conclusion

Pumps weight 90kg ; Dimensions 480x403x643 mm (without guide)

Pump can be manufactured in 6 weeks.

Dynamic tests is done in IPUL facilities [P-Q] characteristic.

Thanks for attention!



Questions ...