

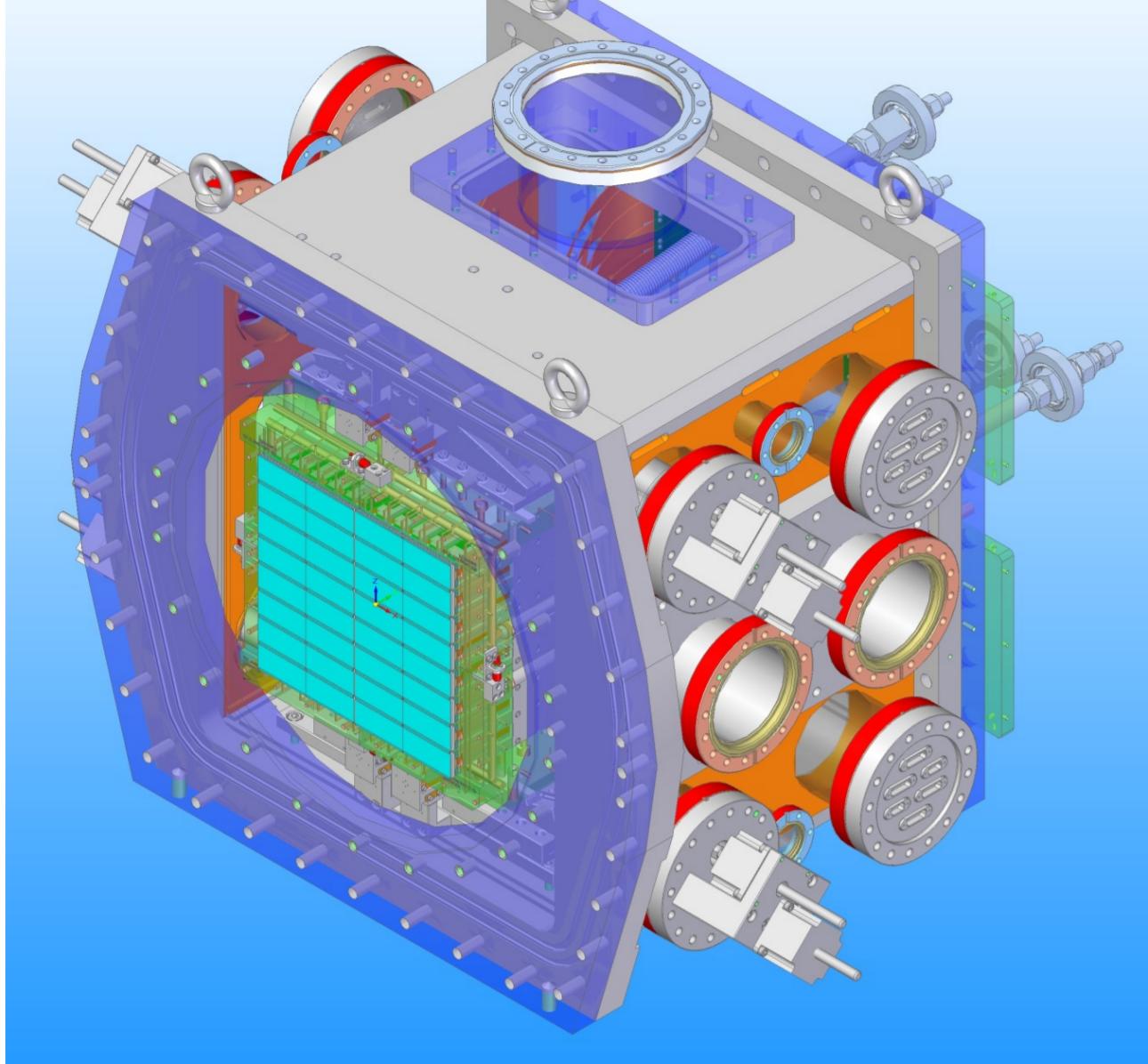
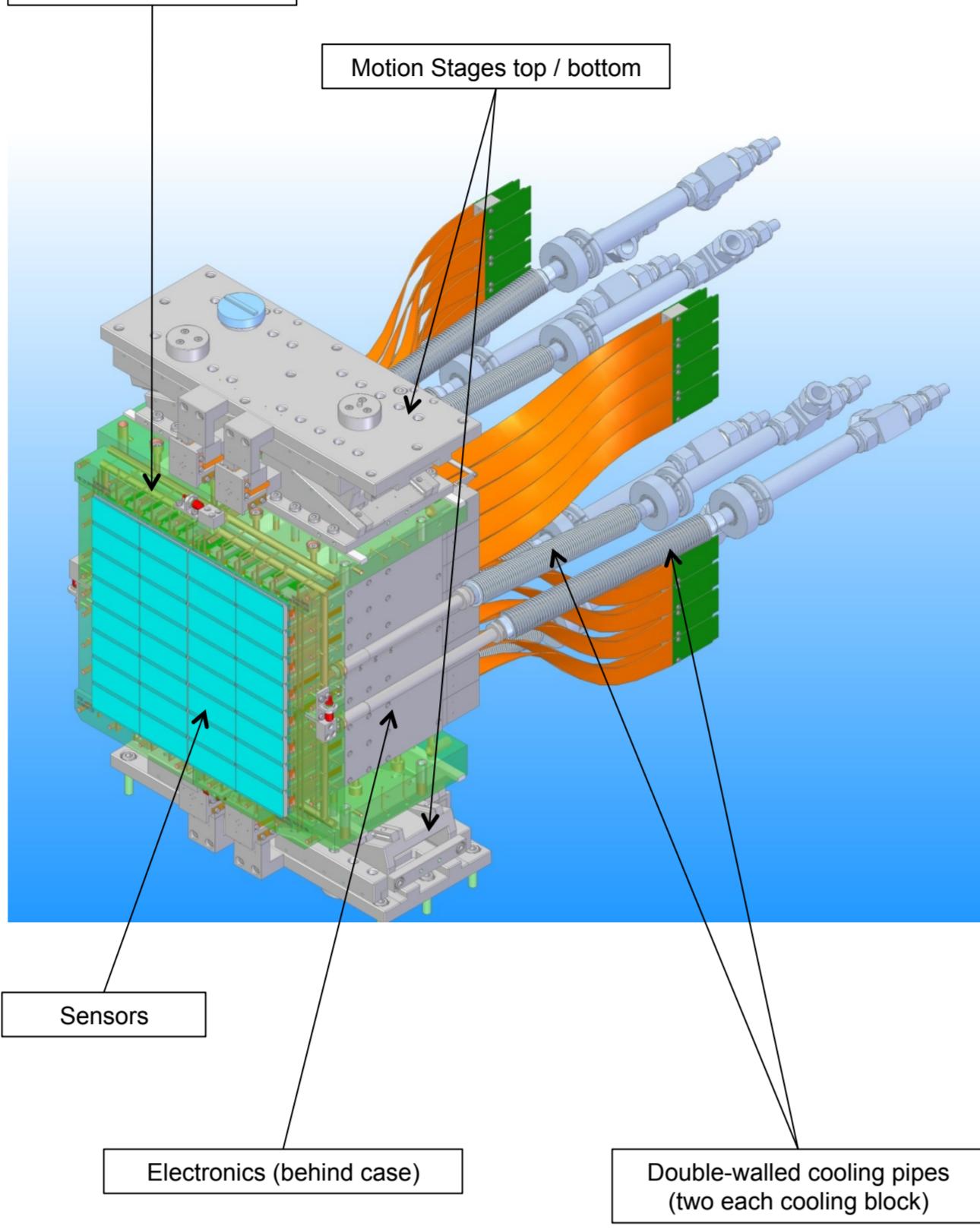
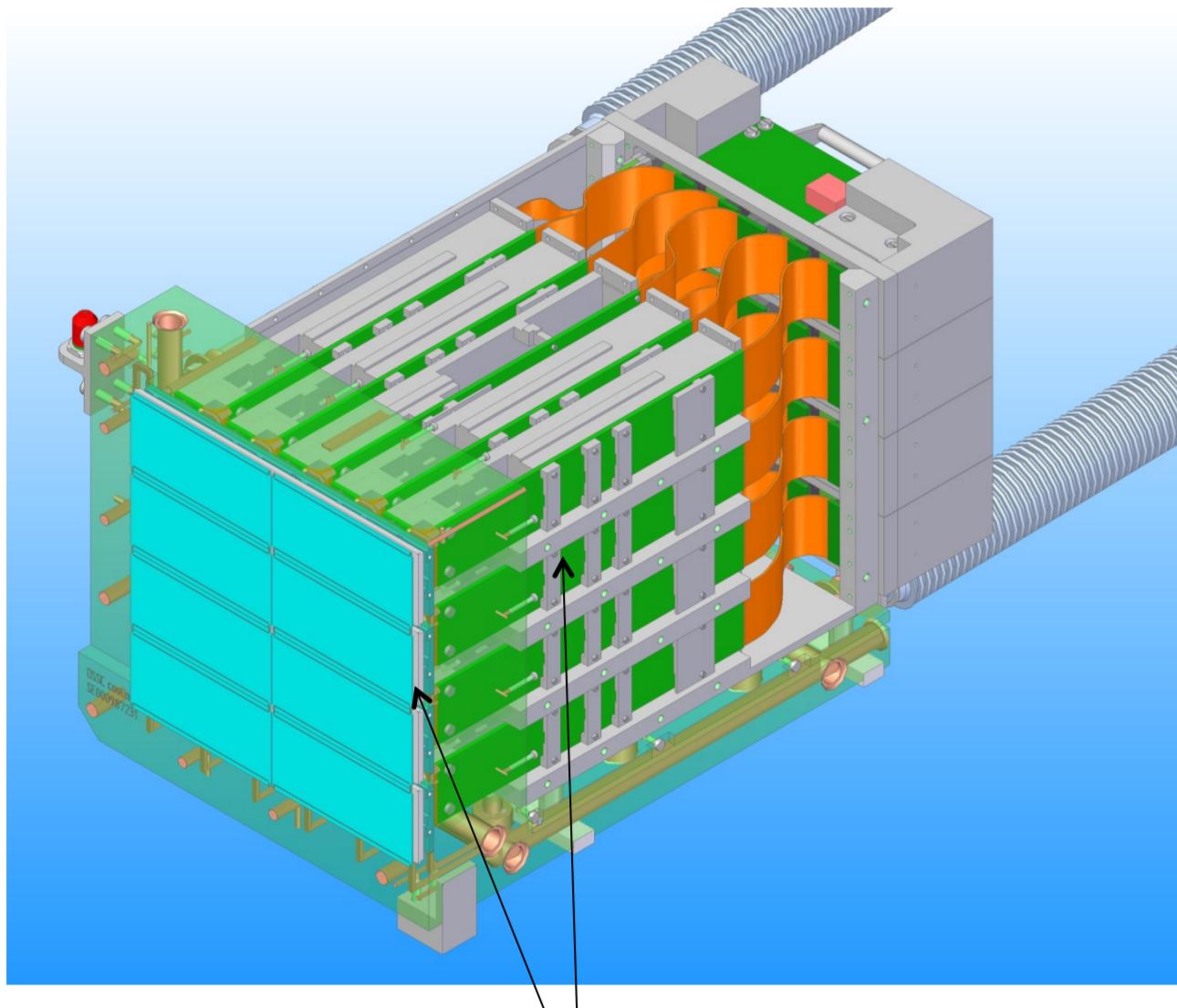
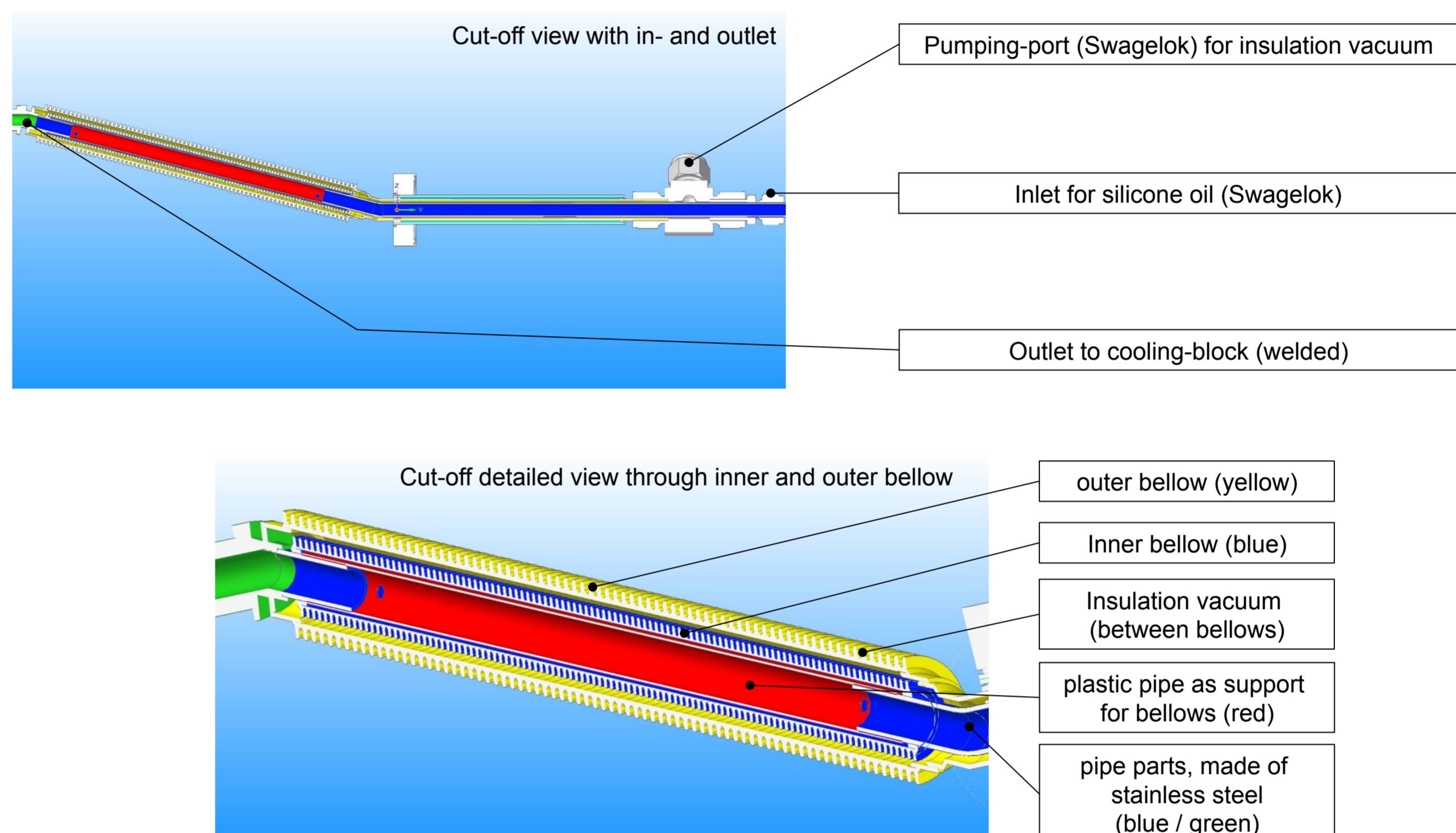
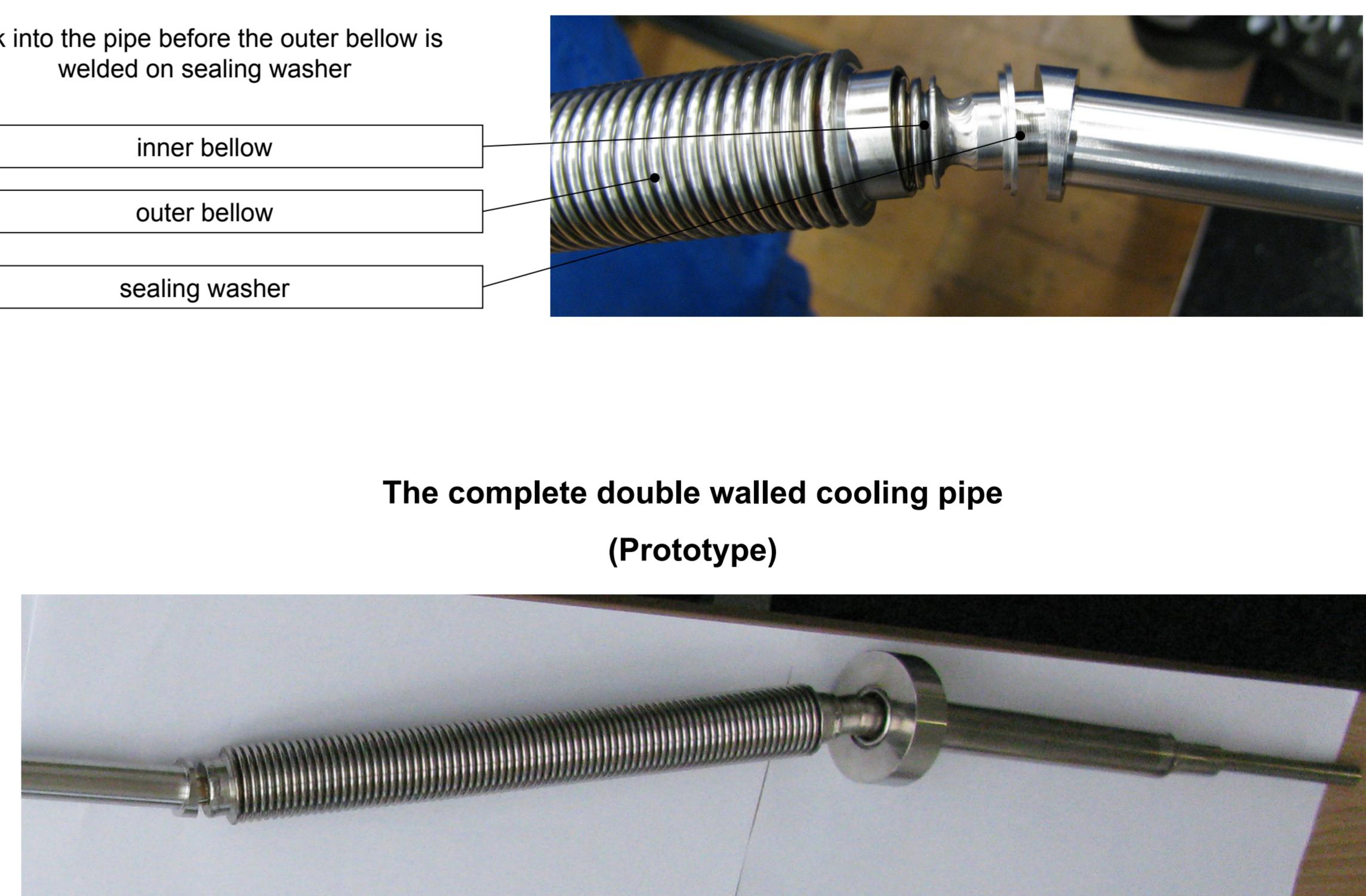
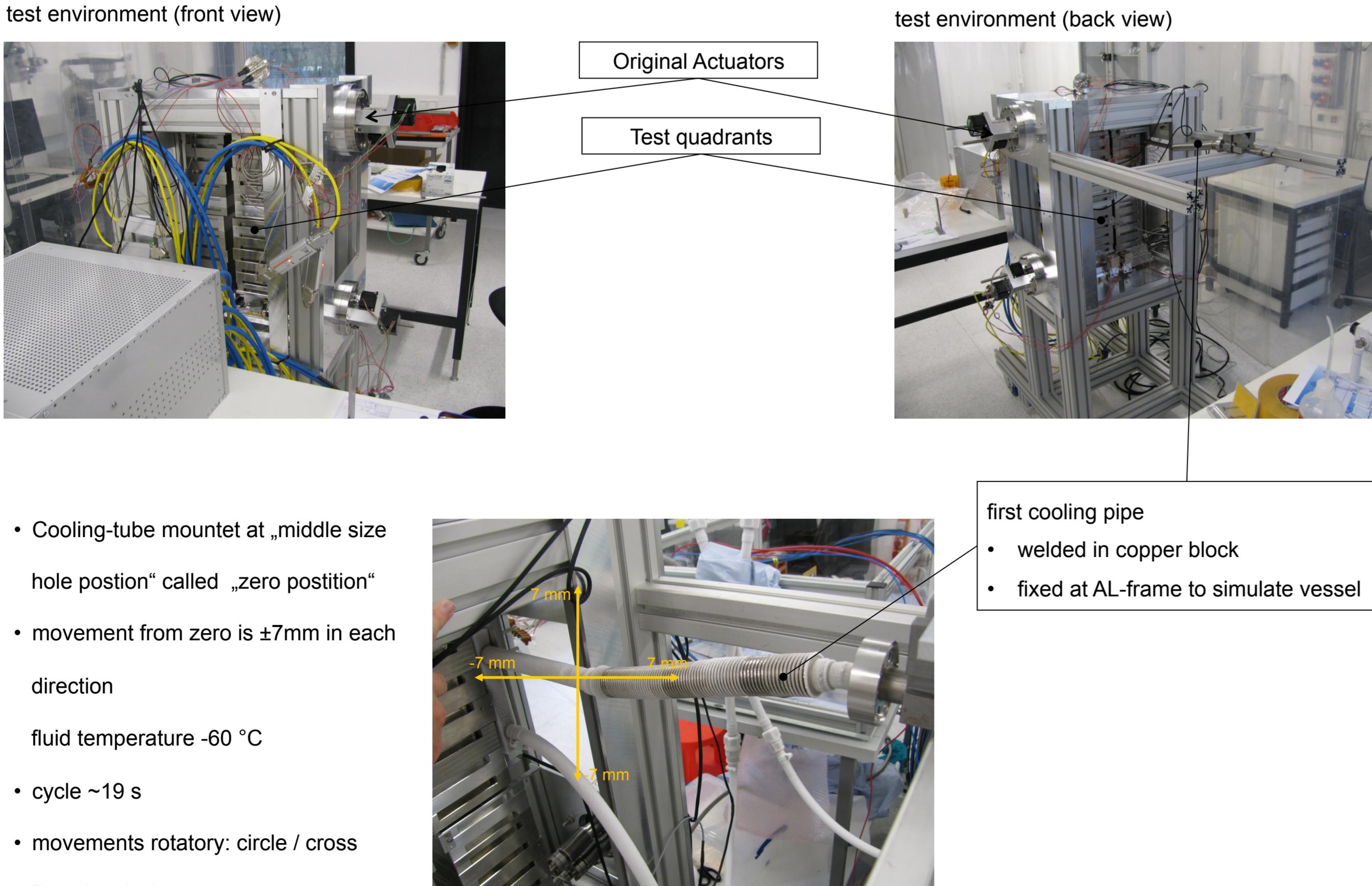
Design of double-walled bellow cooling pipes for silicone oil used for the DSSC Detector project @ European XFEL.

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DSSC Detector introduction  <ul style="list-style-type: none">DSSC (DEPMOS Sensor with Signal Compression)non-linear gain DEPFET Sensorenergy range 0.5-6 keVwith ~40000 μm^2 hexagonal pixels <p>The picture above shows the complete DSSC-Detector with vacuum vessel, Actuator- and Feedthroughflanges, Motionstages completed with cooling-block and electronics</p> <p>This is a development project for Eu-XFEL led by the MPG's Semiconductor Laboratory.</p>	Inner parts of DSSC  <ul style="list-style-type: none">Cooling blocks (4x)Motion Stages top / bottomSensorsElectronics (behind case)Double-walled cooling pipes (two each cooling block)	Movement of quadrants  <p>maximum-hole medium-hole (called „zero position”) minimum-hole service-position</p> <ul style="list-style-type: none">Quadrants moves ± 7 mm in each direction by medium-hole-positionCooling pipes are in fixed position at the back mainflange of the vesselCooling pipes are welded to connectors in copper-blocksthis means that the pipes itself catch this movement without bring some force into the connection points in the cooling block
Cooling-block with included electronics  <ul style="list-style-type: none">the aim is to achieve -20 °C Sensor Temperature at every point of surfaceSilicone fluid has an operation temperature by -40 °C <p>presents a challenge particularly because ~400 W are put out by the electronics in the in-vacuum detector head (by sensors and electronics boards)</p>	Requirements to cooling pipes <ul style="list-style-type: none">sufficient cross-section for cooling performance, enough flow of silicone fluidStainless-steel (weldable / vacuum compatible)liquid safe enclosedcatch up the movement from the quadrantsno force to connection points at the copper-blocksreliability about many years of user operation	from CAD-Model to real parts  <p>Cut-off view with in- and outlet Pumping-port (Swagelok) for insulation vacuum Inlet for silicone oil (Swagelok) Outlet to cooling-block (welded)</p> <p>Cut-off detailed view through inner and outer bellow outer bellow (yellow) inner bellow (blue) Insulation vacuum (between bellows) plastic pipe as support for bellows (red) pipe parts, made of stainless steel (blue / green)</p> <p>look into the pipe before the outer bellow is welded on sealing washer inner bellow outer bellow sealing washer</p>  <p>The complete double walled cooling pipe (Prototype)</p>
Cooling Pipe Test with moving  <ul style="list-style-type: none">Cooling-tube mountet at „middle size hole position“ called „zero position“movement from zero is ± 7 mm in each directionfluid temperature -60 °Ccycle ~19 smovements rotatory: circle / crossDuration 24 h	Summary <ul style="list-style-type: none">Test result is very goodno problems with feasibilityCooling performance should be tested with final copper-block <p>We will use this part at DSSC Detector Project</p>	Acknowledgements <ul style="list-style-type: none">Martin Lemke, DESY ZM1, Construction DepartmentMatthias Bayer, formerly DESYCompany Witzenmann, Corrugated Bellows, www.witzenmann.de

