Instrument Laboratorium

I-Lab

Det matematisk-naturvitenskapelige fakultet

I-Lab's primær oppgaver

- Støtte forskergrupper med utvikling og produksjon av instrumenter som støtter den eksperimentelle forskningen på fakultetet- fra ide til ferdig produkt

- Være en lavtersekel resurs for hele MN fakultetet

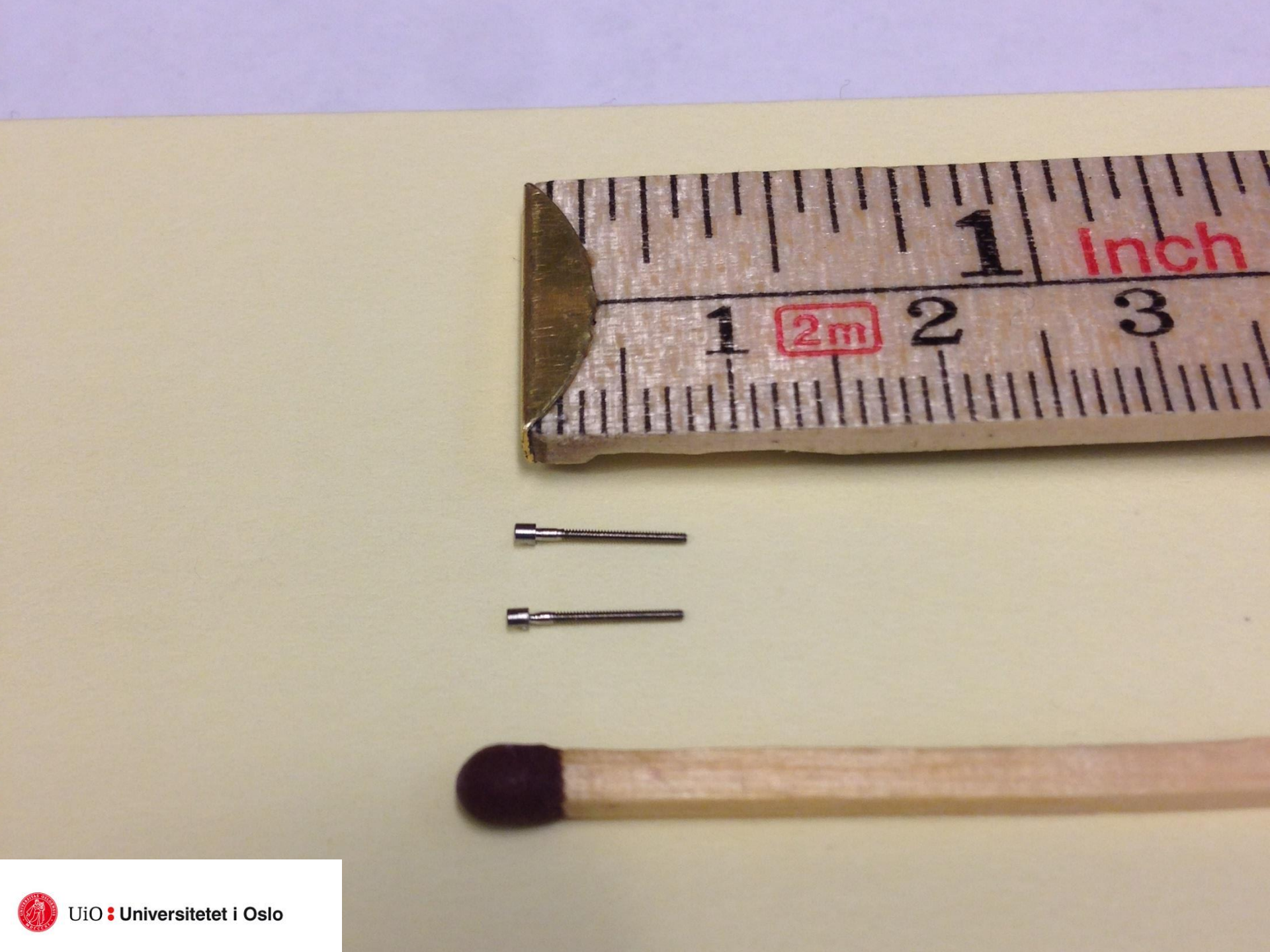
- Være en støtte for eksprimentelle master og PhD studenter.

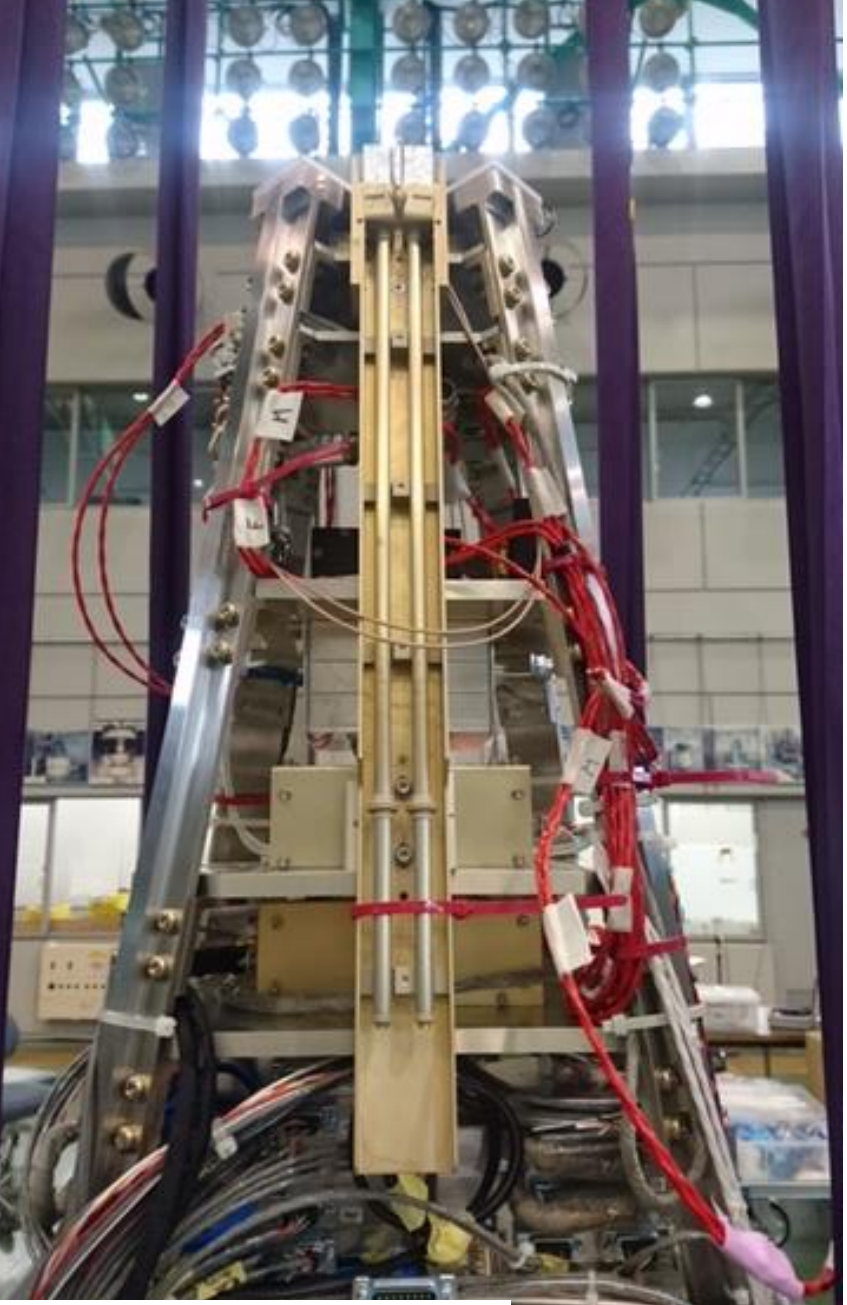
Tidslinje ved dannelsen av MN fellesverksted, nå I-Lab

1/1-2016
De tre verkstedene på FI, KI og IBV blir samorganisert under navnet MN Fellesverksted
31/7-2016
Verkstedet på Kjemi stenger og en person flyttes til IBV. Alle flyttes organisatorisk til Fysisk institutt
1/1-2018
MN Fellesverksted bytter navn til Instrumentlaberatorium, I-Lab

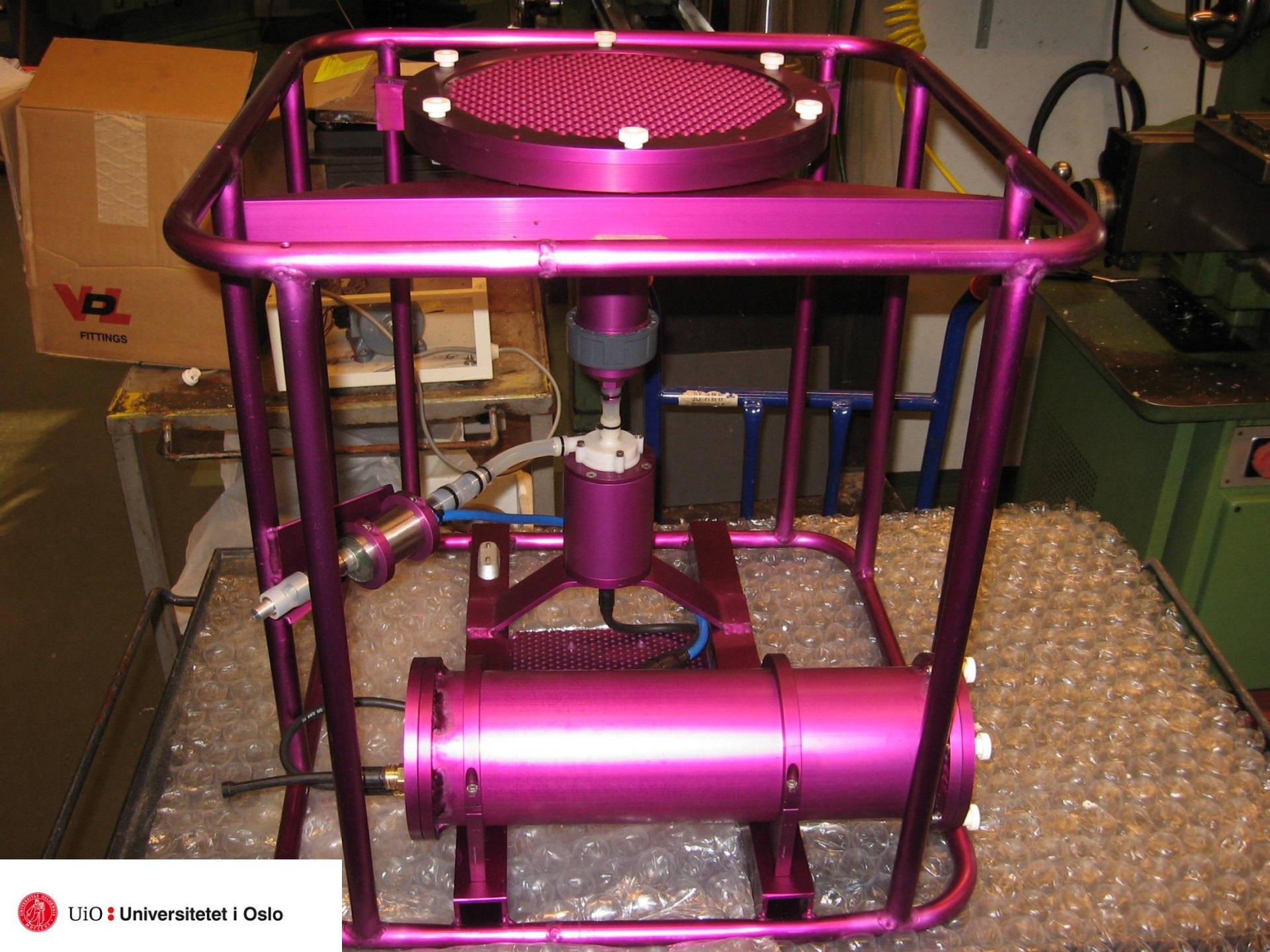
Hvem er vi som jobber på I-Lab

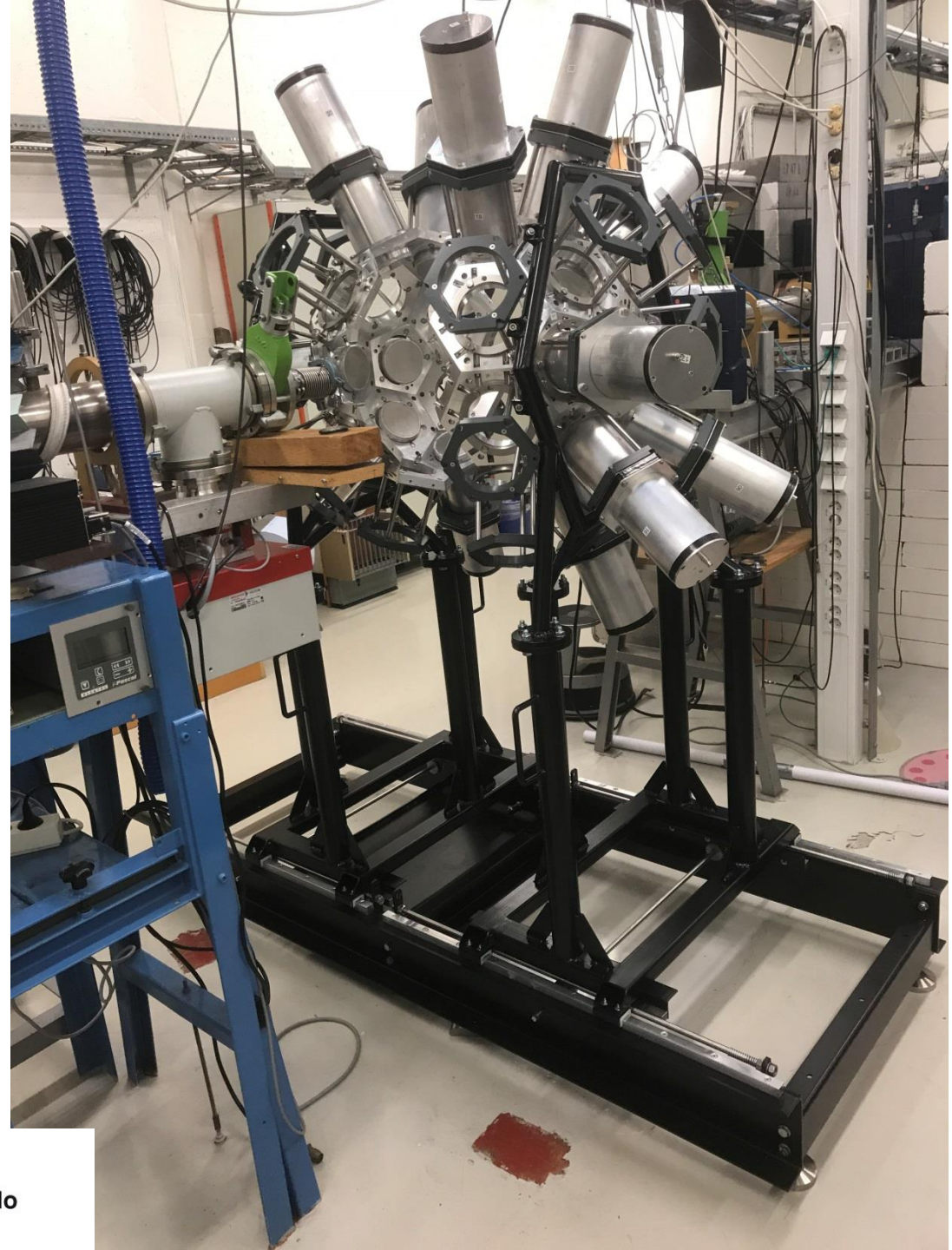
- Vi er 13 personer som jobber på I-Lab.
- 9 Har deres utdannelse som finmekanikere
- 1 Er utdannet CNC operatører
- 2 Har master i maskin, prosess, produktutvikling og industrielt design
- 1 Lærling i finmekaniker faget

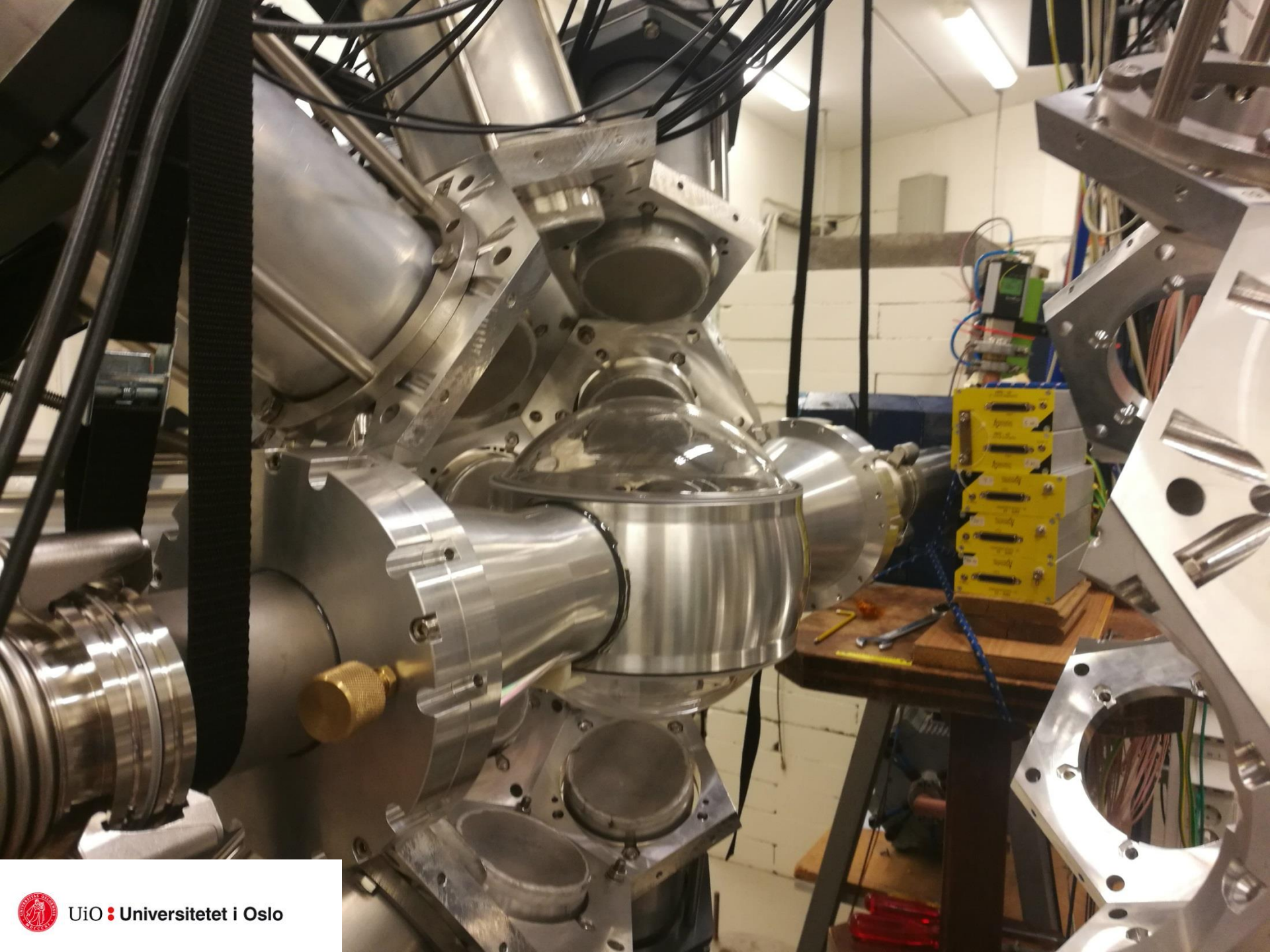




UiO : Universitetet i Oslo


FITTINGS





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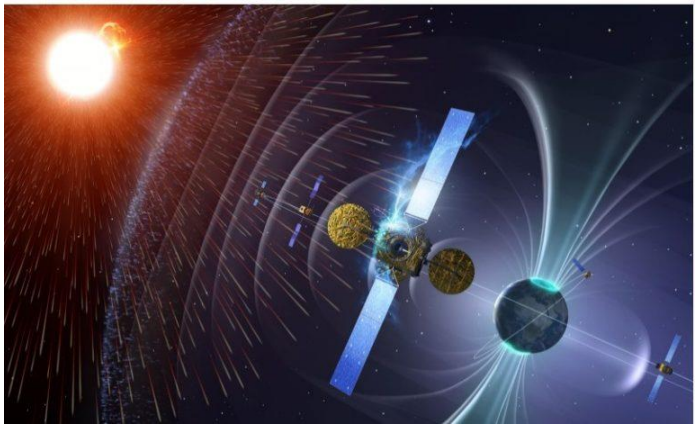
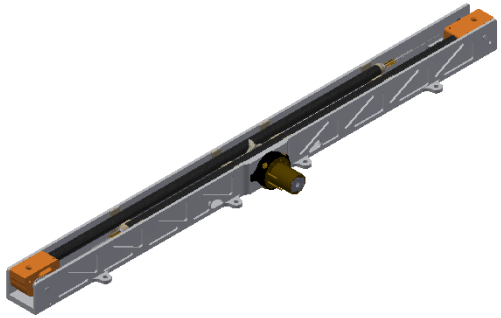


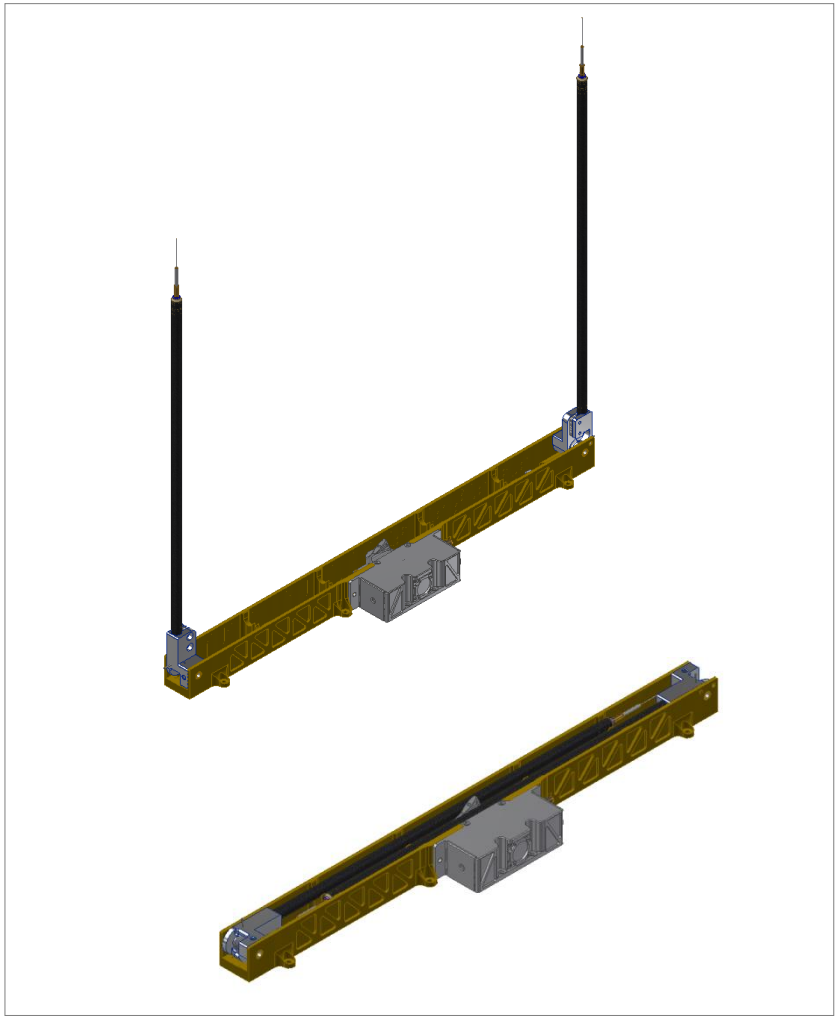
The intended operational environment for the m-NLP system is Low Earth Orbit (LEO) up to 1000 km altitude.



Langmuir probe system for high spatial resolution measurements of ionospheric electron density, together with measurements of the spacecraft floating potential.

Overview of Previous and New Model

m-NLP Norsat Boom System

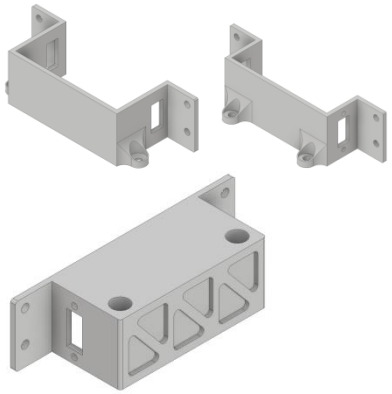


m-NLP Modular Boom System

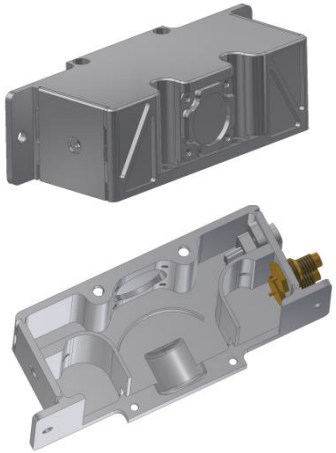
Product development

Bracket

Concepts:

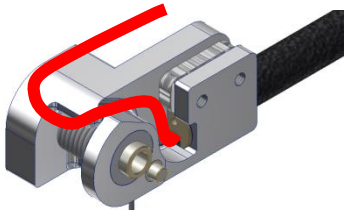


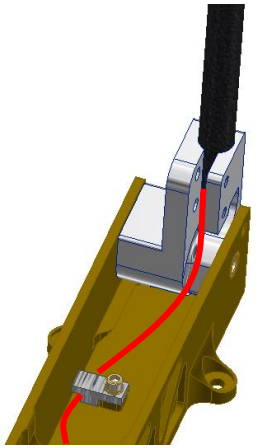
Final design:



Boom Holder

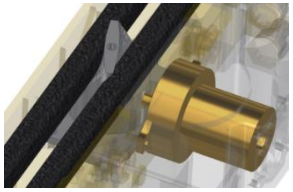
- Concept phase
- 3d print models
- Function test

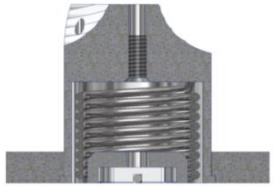




Release Mechanism

From tension springs to helical torsion springs.





Hand calculations (Mathcad):

$L_{allowed\_pinpuller} := 7\ lbf = 31.138\ N$

$L_{max\_release\_mech} := \frac{2}{3} \cdot L_{allowed\_pinpuller} = 20.758\ N$

The max torque applied by a spring is obtained at arm length, 1 mm out from center. For the release mechanism springs, the arm lenght is 8 mm.

$arm := 8\ mm$

$M_{spring\_total} := L_{max\_release\_mech} \cdot arm = 166.067\ N \cdot mm$ Max total spring torque (2 springs)

$M_{spring} := \frac{M_{spring\_total}}{2} = 83.033\ N \cdot mm$ Max spring torque (1 spring)

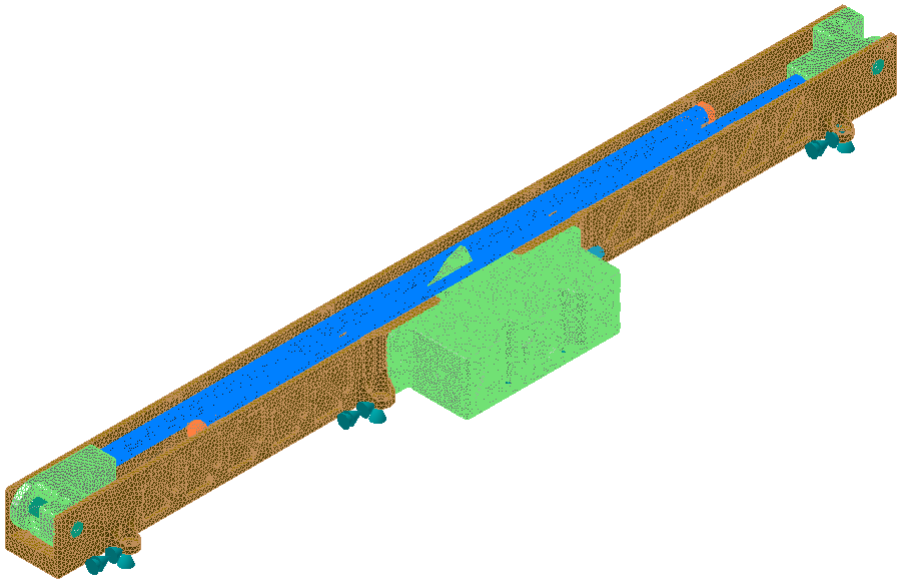
Allowed momental force is $148.333\ N \cdot mm$ for each spring.

Total torque of 53.64 Nmm x 2 = 107.28 Nmm. (Elgiloy material)

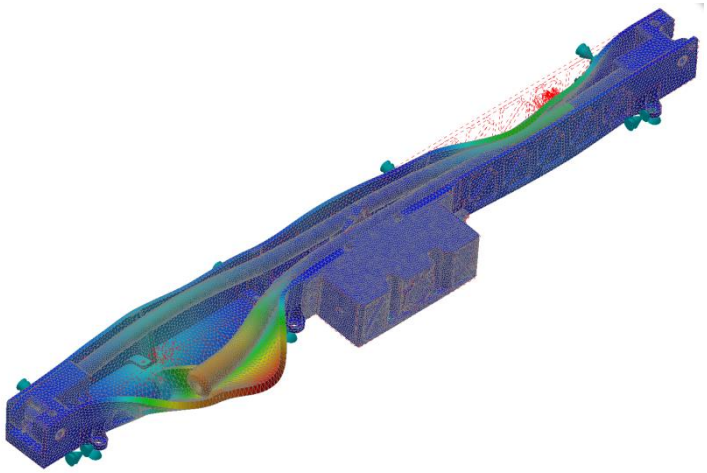
Inventor Nastran In-Cad

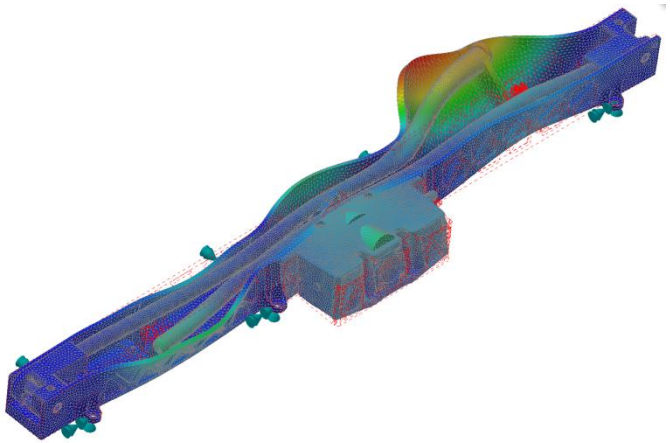
Vibration analysis

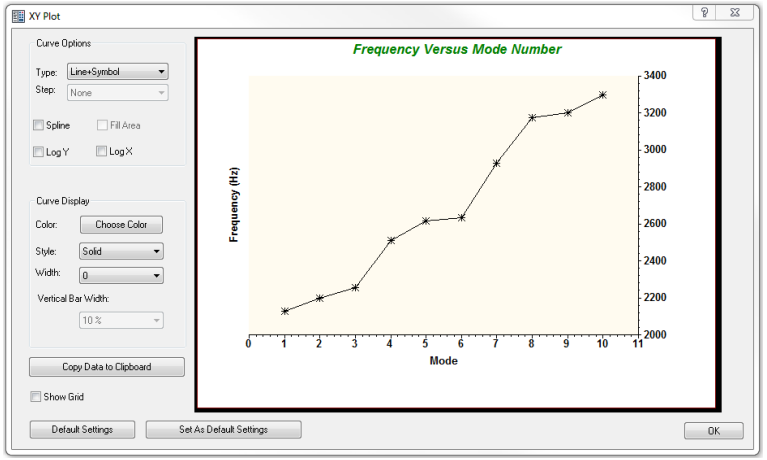
- Normal modes
- Random vibrations
- Stress
- Displacement



Normal modes - Resonance frequencies

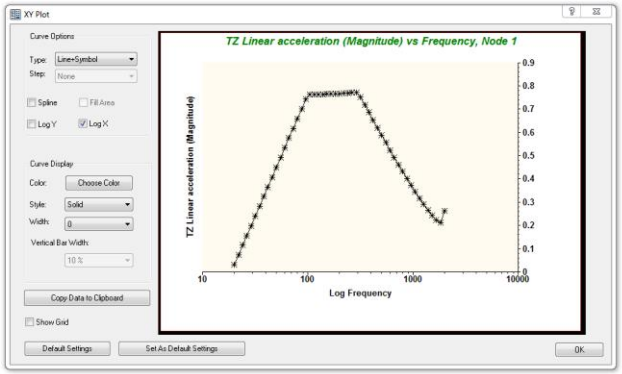


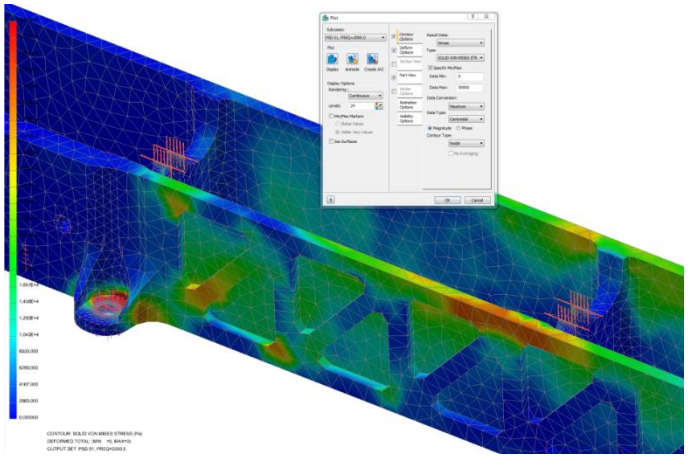


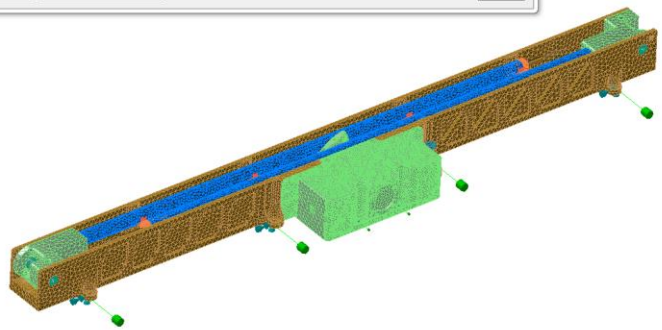


Random Vibrations

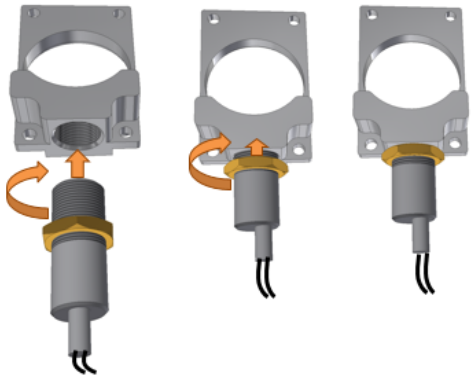
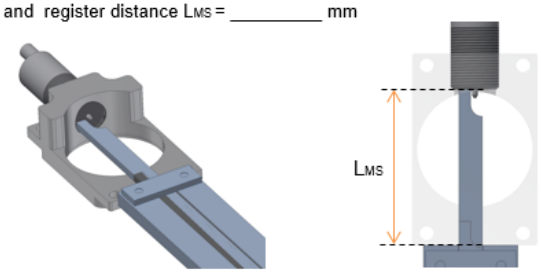
- Simulering av strukturens akselerasjonsrespons ved oppskyting



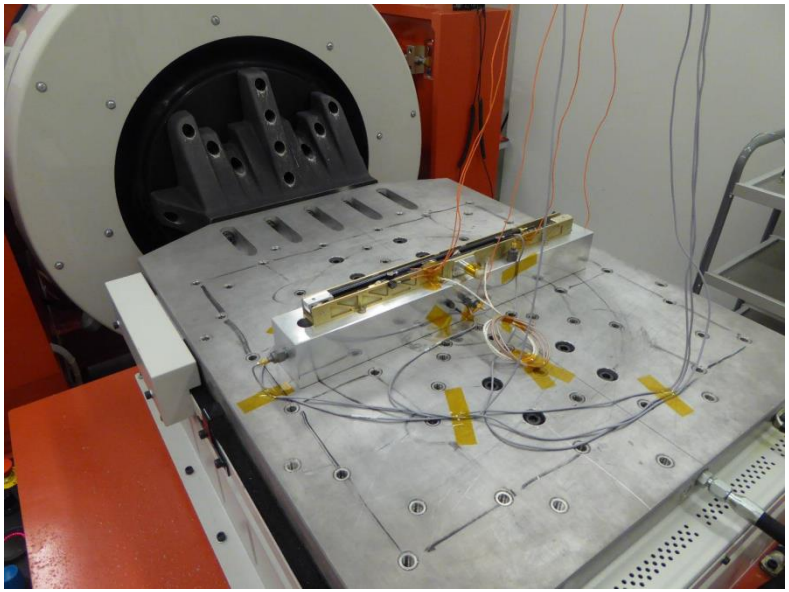




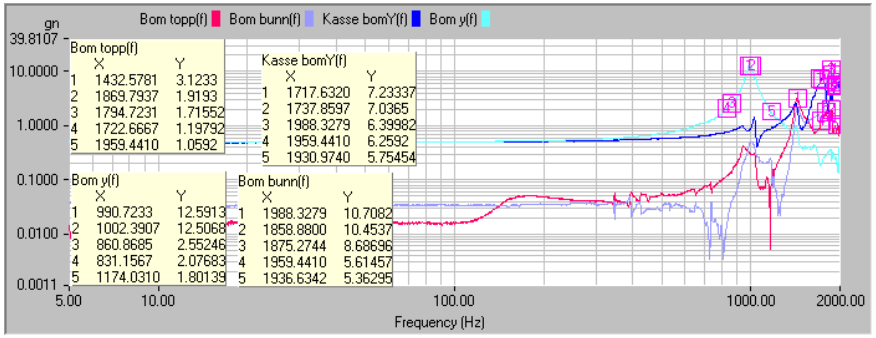
Assembly Procedure

Step	Instructions	Signature
10.	Config. A Thread the Micro Switch (item 6) into hole interface in the Release Mechanism Restrainer.  Distance L_{MS} shall be 26.9±0.1 mm. Use a Caliper [RE17] to measure, and register distance L_{MS} = _____ mm  Use 10 mm Special Socket Tool [RE22] to fix the Switch in correct position by tightening the Nut (item 6) with a torque of 1.5 Nm. Ensure that the Switch do not move during this tightening process, by controlling distance L_{MS}.	

Test procedures



Boom System, Sine and Random, Y-direction



BS Modal Survey 5 | Post-Sine Y-direction / Pre-Random Y-direction