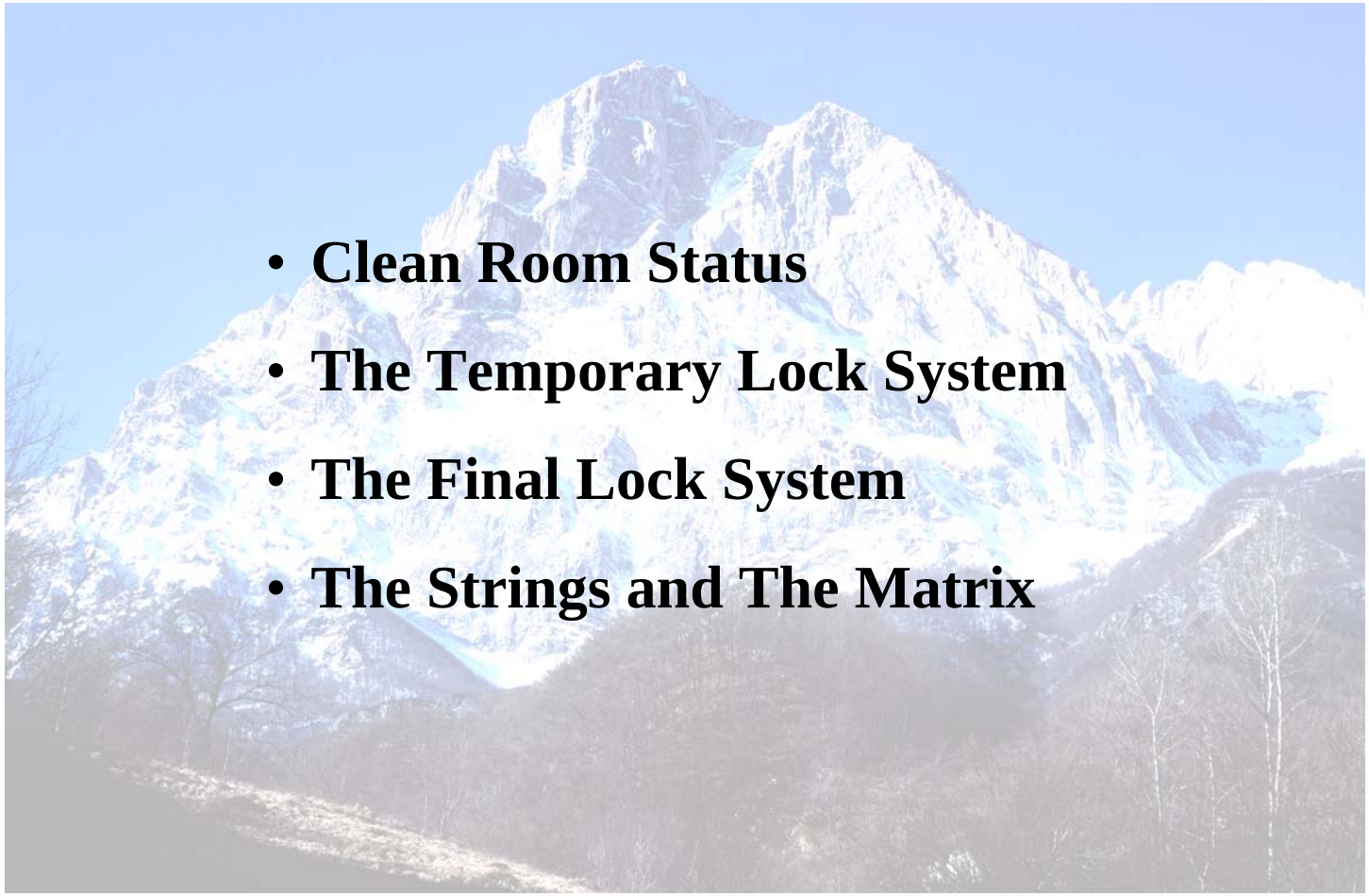
TG5 Review: Infrastructure on top of the tank



- Clean Room Status
- The Temporary Lock System
- The Final Lock System
- The Strings and The Matrix

A tender story: The Clean Room

Three companies were invited to hand in an offer in March 2008

Offers from two companies were received:

•Lindner Reinraumtechnik GmbH and

•Becker Reinraumtechnick GmbH.

Both offers were 80% above the allocated budget

→ Tender was closed in August 2008

Both bidding companies were invited to recalculate their offer on basis of

- Decreased steel price (world economical crisis)

- Slightly modified construction (floor)

- Slightly modified boundary conditions

→Second offer was handed in by both companies 13th and 14th of Oct. 2008.

→ Both offers considerably cheaper, comparable in price but stilll 40% above budget!

A tender story: The Clean Room

Substantial difference between the two offers:

Becker Reinraumtechnik GmbH handed in offer for clean room as before, the only modification: the steel price.

In addition Becker Reinraumtechnik GmbH specified options on how to decrease the price:

1) Different floor solution

2) Different boundary conditions (Temperature and Humidity stability, lights)

3) Different initial cleaning and test run

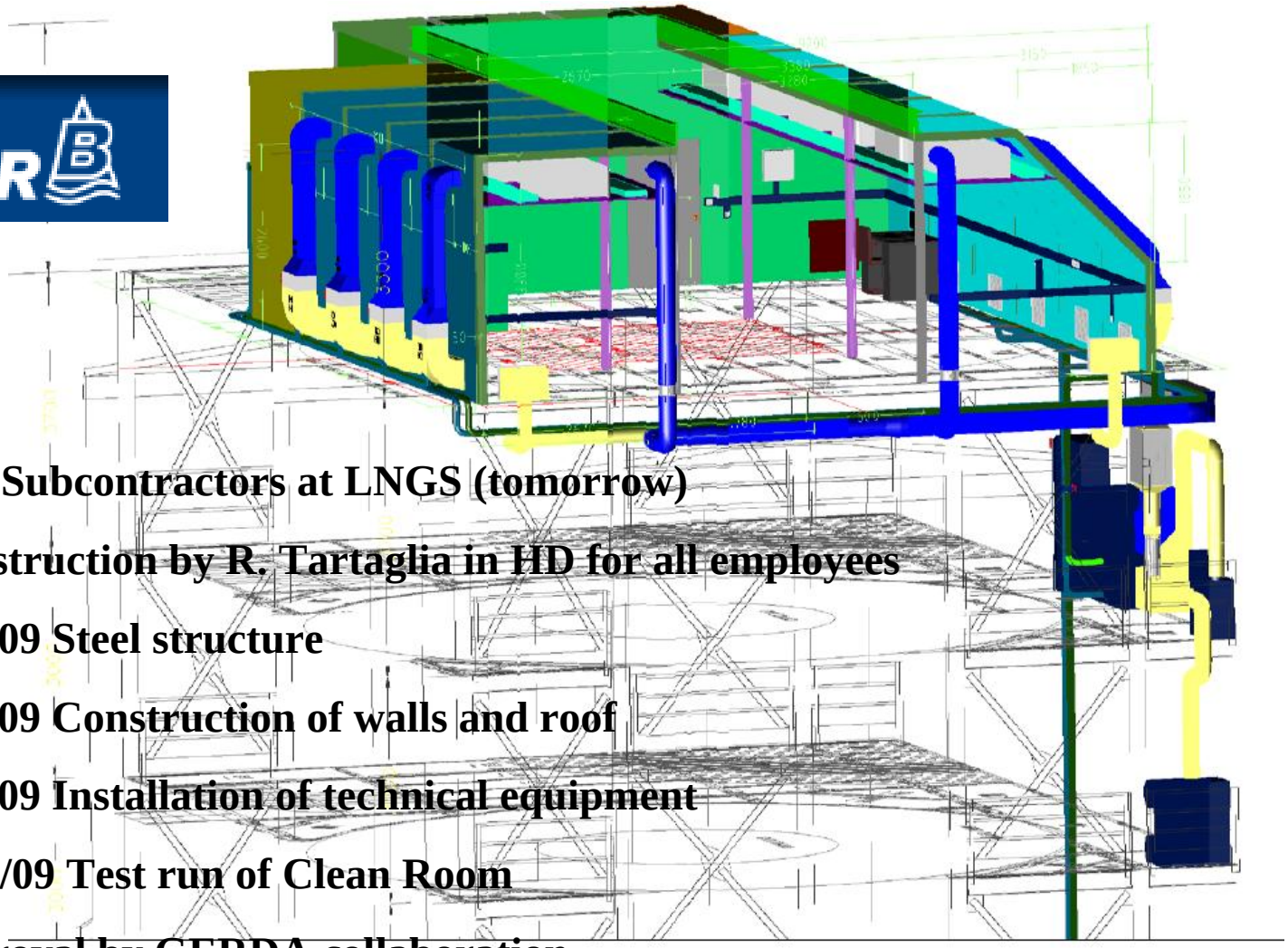
→Further price reduction.

→Now only 25% above budget

Becker Reinraumtechnik GmbH was chosen as our copmany

The general administration of MPG does cover the extra cost.

A tender story: The Clean Room



Time schedule:

11.11.08 Visit of Subcontractors at LNGS (tomorrow)

Dec.08 Safety instruction by R. Tartaglia in HD for all employees

CW3/09 – CW4/09 Steel structure

CW3/09 – CW5/09 Construction of walls and roof

CW6/09 – CW9/09 Installation of technical equipment

CW10/09-CW11/09 Test run of Clean Room

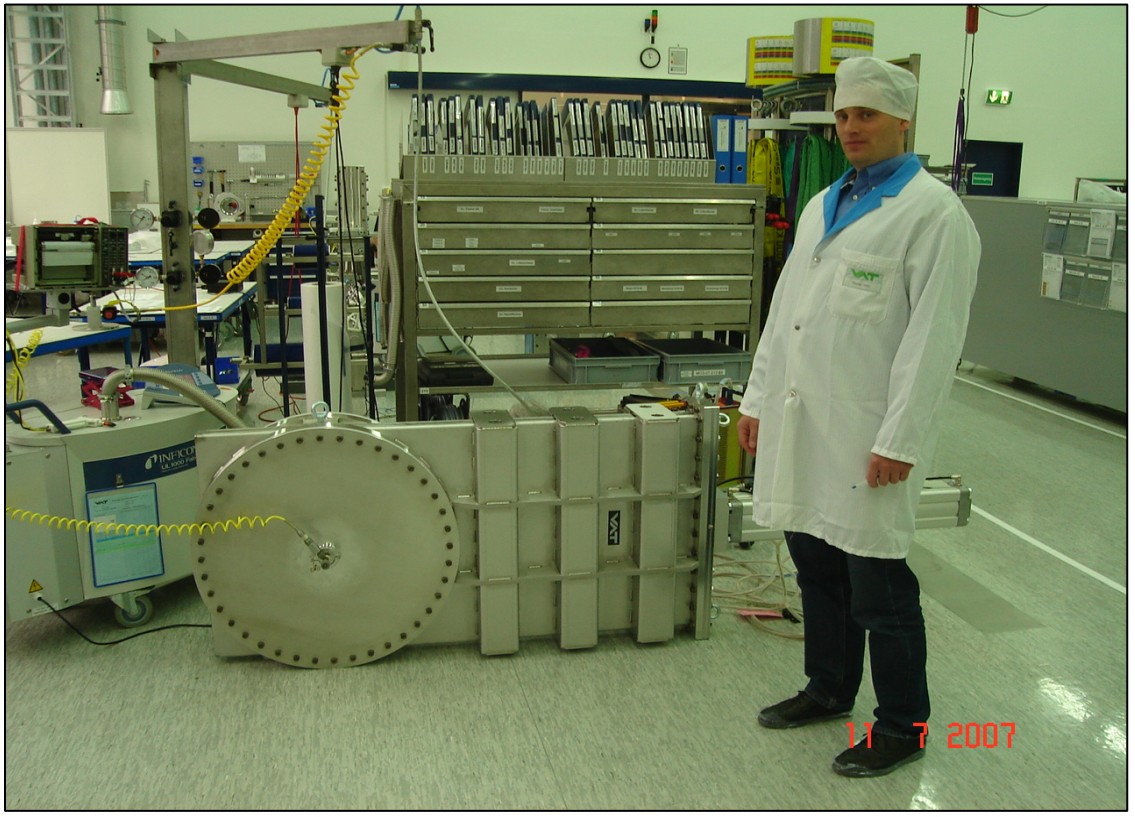
CW12/09 – Approval by GERDA collaboration

The Circular Shutter:

If clean room is available, circular shutter needs to be installed

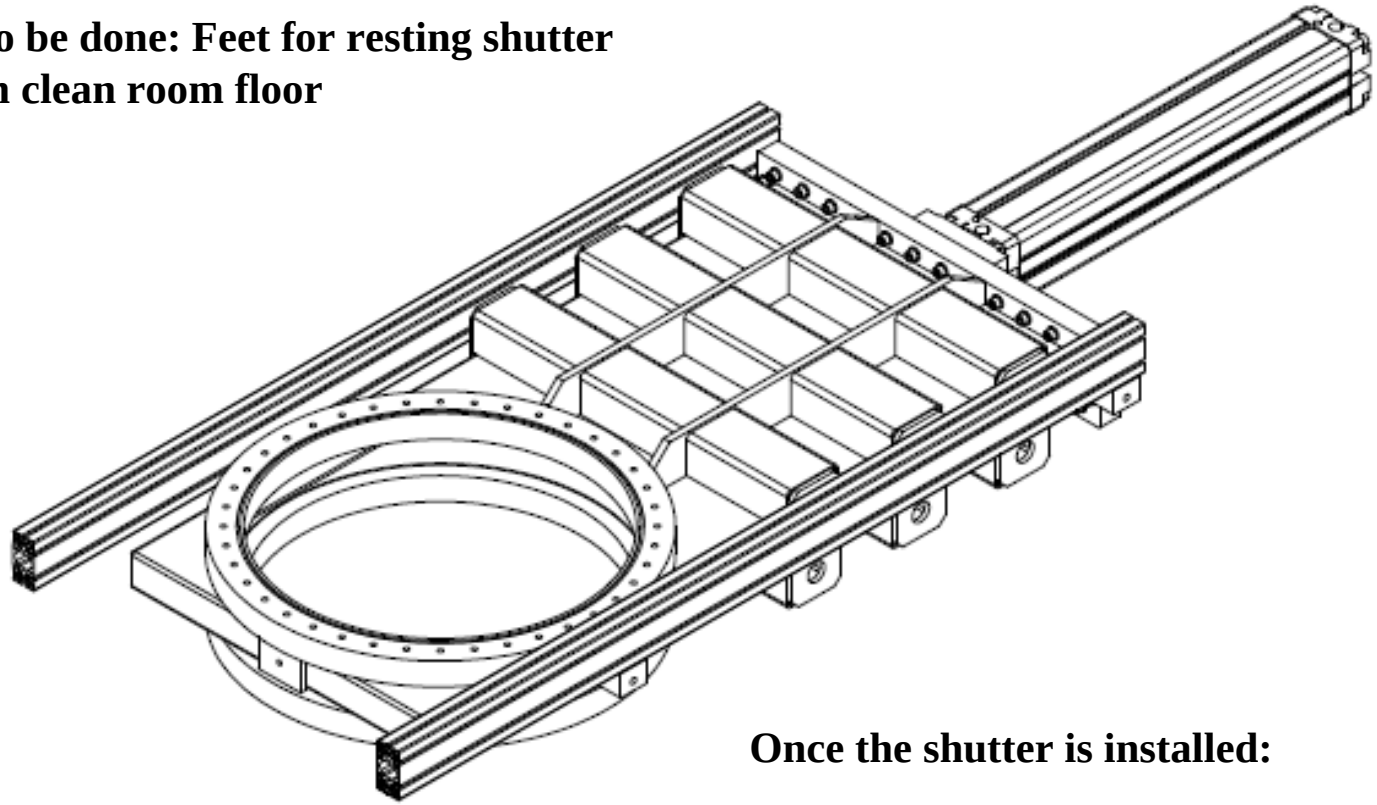
Sequence of initial shutter installation

- **make sure floor can support shutter weight**
- **Use Spanner nuts to straighten/align bellow uper flange**
- **Mark final position on spanner nuts**
- **Shutter is moved to clean room with crane**
- **Install fine movement device onto clean room crane**
- **Put shutter onto clean room crane**
- **Put in helicoflex - protect helicoflex**
- **Lower onto floor**
- **Adjust feet on shutter to align shutter to final position**
- **Put screws from below, lose fixation**
- **release bellow spanner nuts**
- **Tighten screws of Helicoflex**



The Circular Shutter:

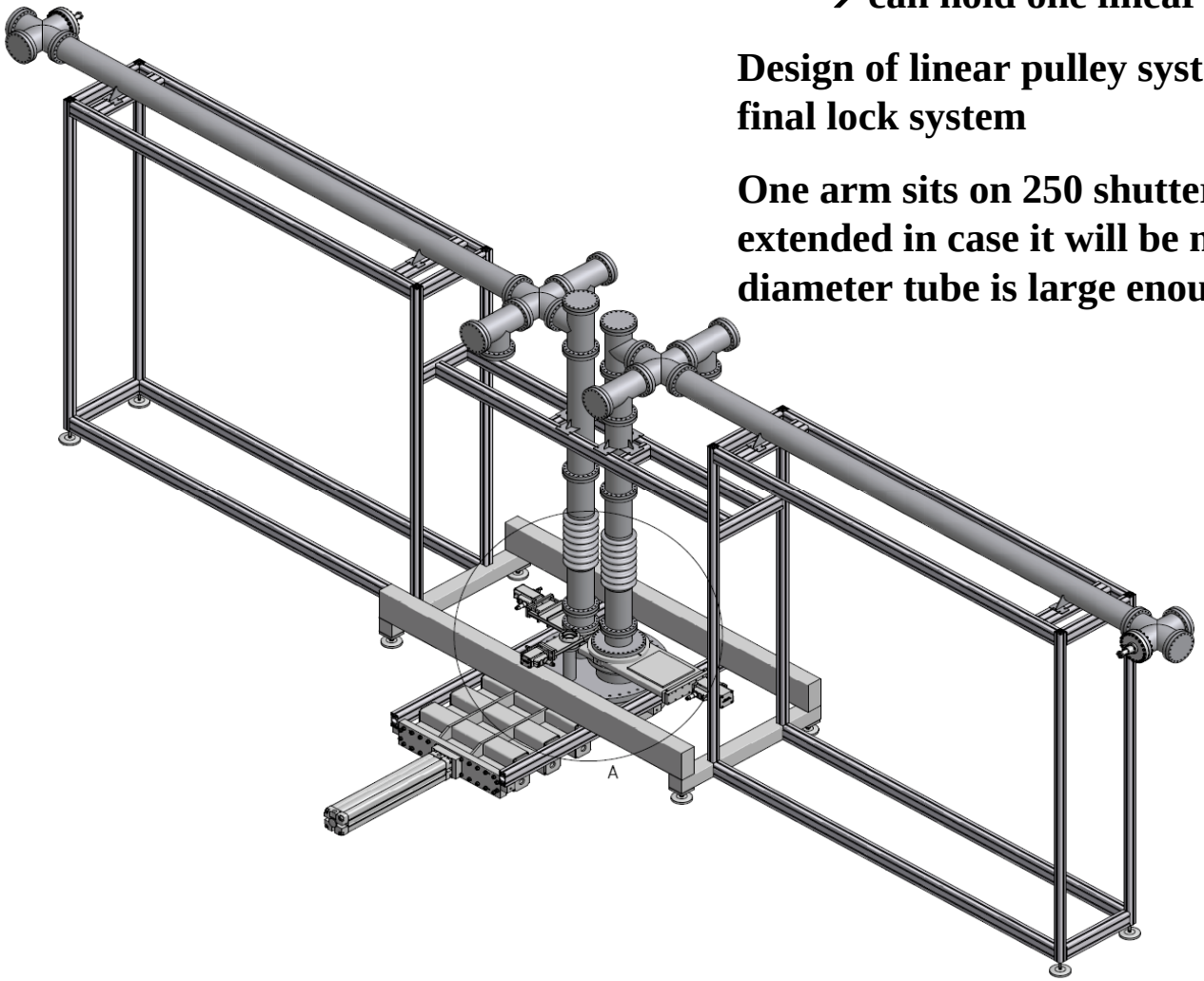
To be done: Feet for resting shutter on clean room floor



Once the shutter is installed:

Cryostat ready for filling!

The Temporary Lock System: Design



Two independent cable arms with dia. 150mm
→ can hold one linear pulley each.

Design of linear pulley system exactly the same as for the final lock system

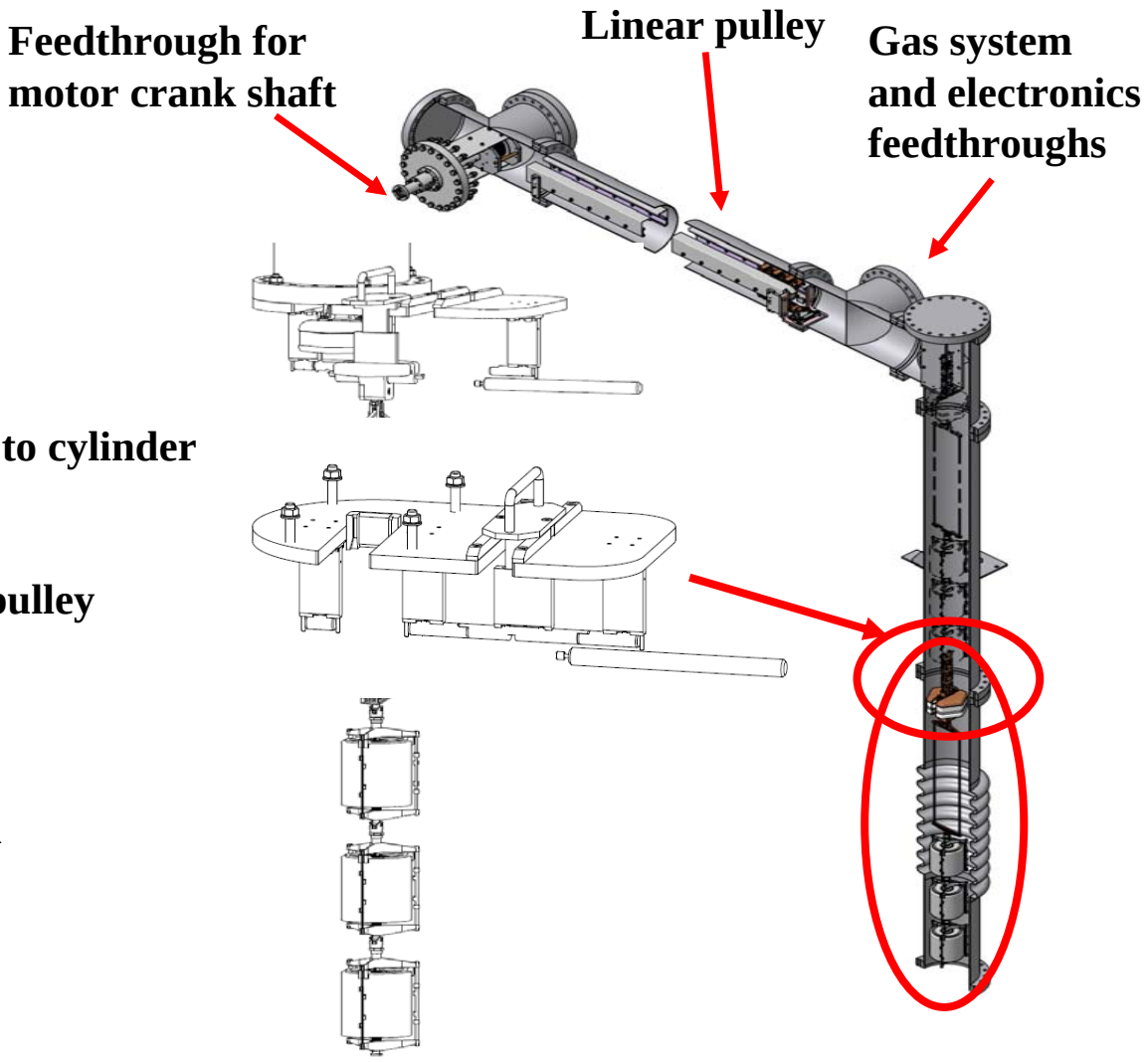
One arm sits on 250 shutter and flange and can thus be extended in case it will be needed for longer time: 250mm diameter tube is large enough to house three strings.

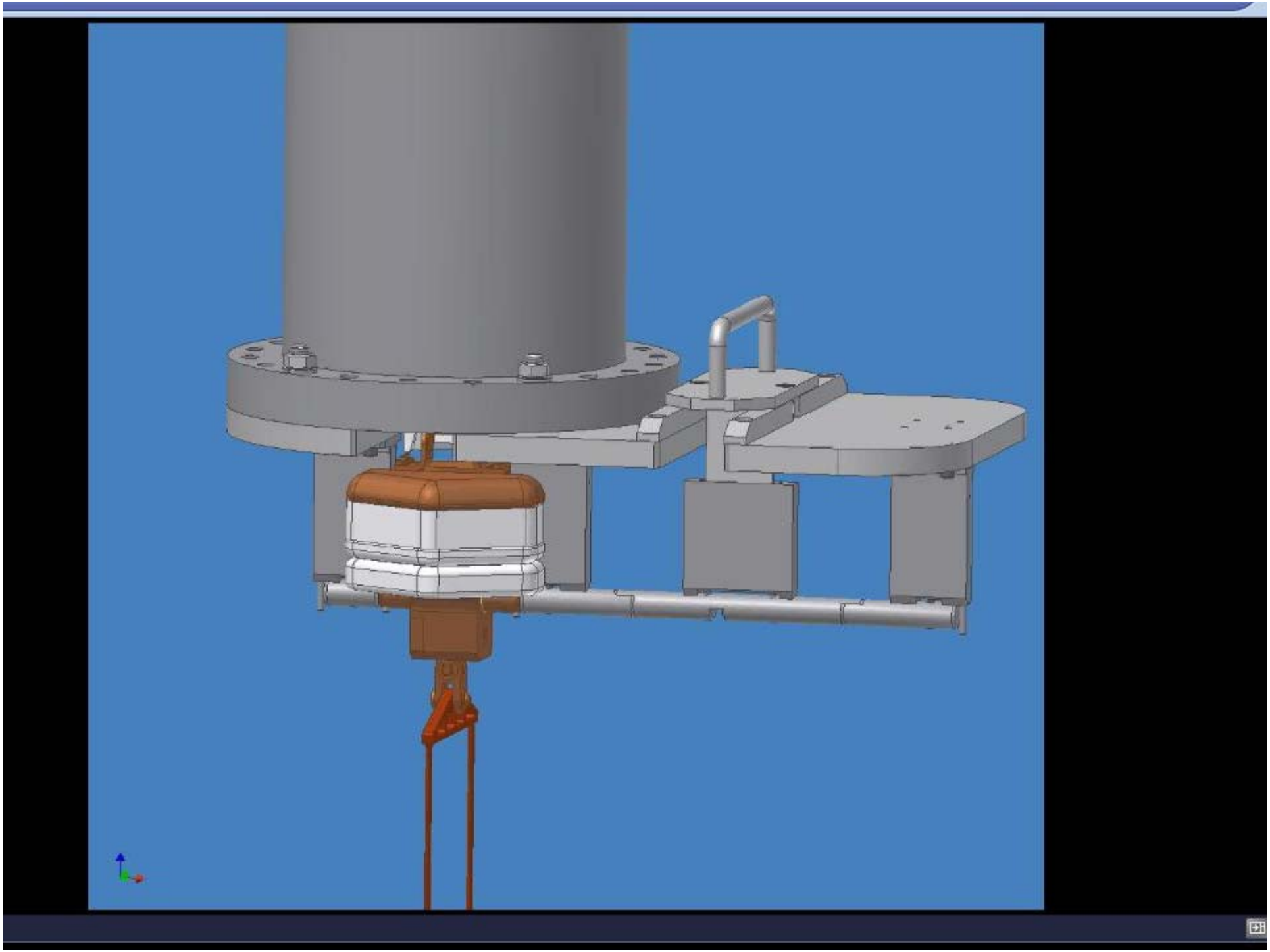
Not yet taken care of:
linear pulley is designed for one string
- **Weight restrictions**
- **Cables through cable chain**
- **Strain relief**
- **Adapter**

The Temporary Lock System: Design

Linear Pulley – String Adapter:

- **Linear pulley in upper position**
- **Uninstall removable cylinder**
- **Mount linear pulley –string adapter to cylinder**
- **Place string onto adapter**
- **Move string from adapter to linear pulley**
- **Slightly lower linear pulley**
- **Remove adapter**
- **Bring linear pulley to upper position**
- **Close removable cylinder**

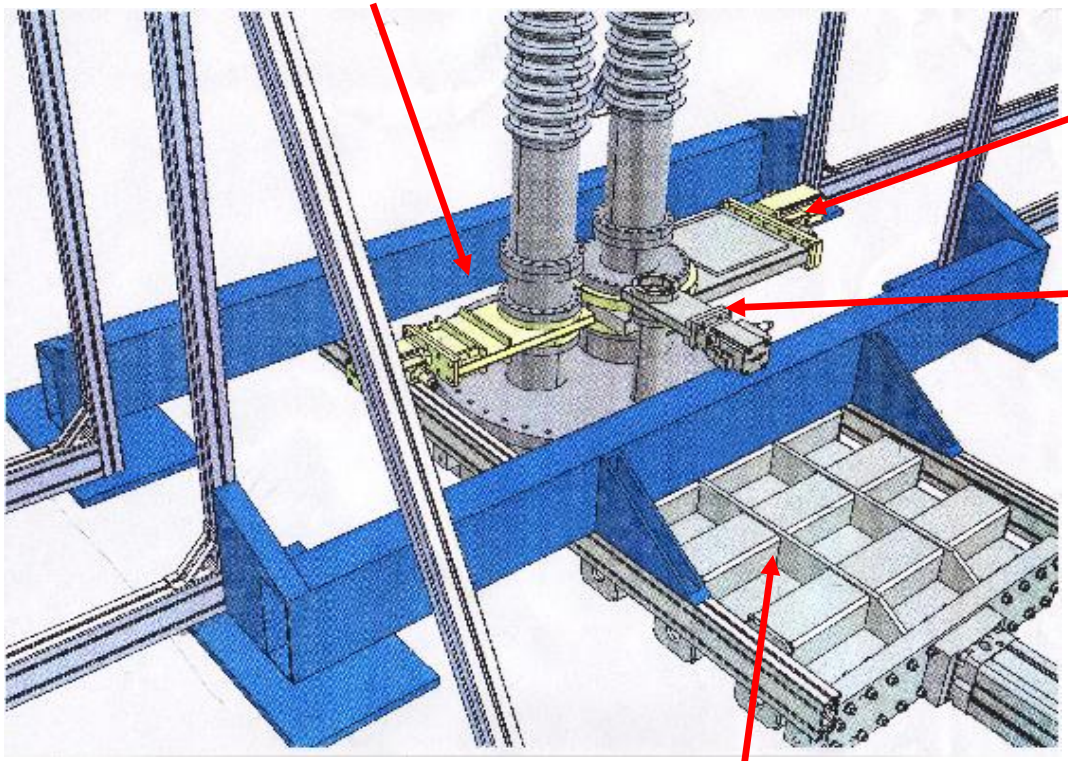




The Temporary Lock System: Design

During temporary lock phase iso630 shutter will be supported by lock support structure.

ISO 160 shutter

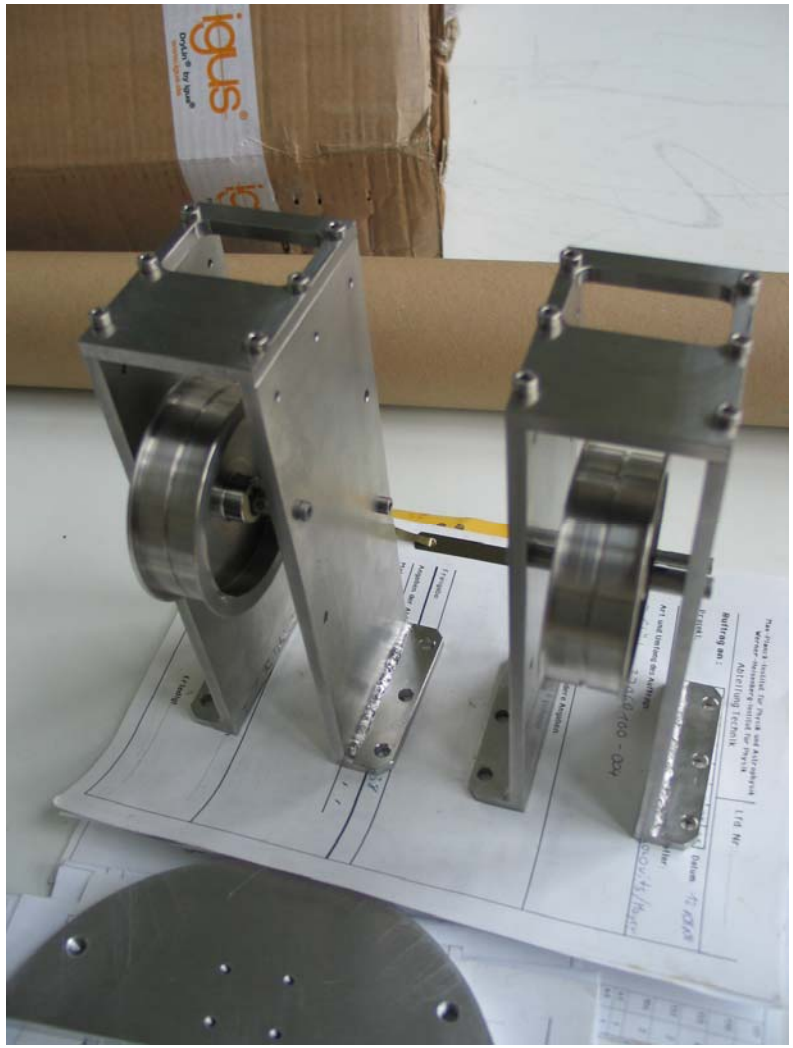


ISO 250 shutter

ISO 63 shutter: Port for calibration source (LNGS design)

ISO 630 shutter

The Temporary Lock System: Construction



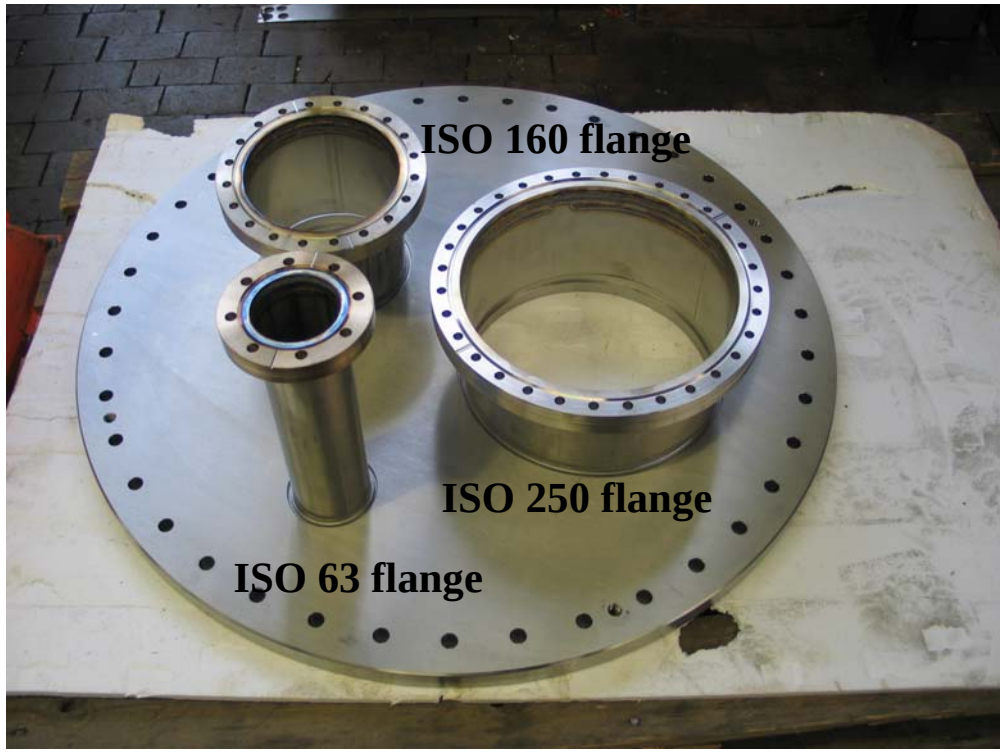
All mechanical parts have been manufactured.
All vacuum parts have been delivered

Welding is currently ongoing.
Treatment of welds: Electropolishing (by company Polygrat)

Emanation tests of weld treatment currently ongoing at MPI-K HD:
Blank, untreated, electropolished, different tungsten electrodes, etc.
Results will be important for final lock

All parts will be degreased in ultrasonic bath, kept in clean room afterwards.

The Temporary Lock System: Construction



The cluster flange is close to being finished.
→ Send to HD for emanation test of ISO630 shutter

The Temporary Lock System: Support Structure

Class 100.000 clean room cabin installed at MPI Munich for installation of temporary lock and final lock system!
Particle merasurements have shown: Empty room has calss 1000!

Temporary Lock Support Structure has been designed by LNGS (Donato Orlandi) and erected at MPI Munich by Donato Orlandi and Leo Tatananni inside the (then not yet cleaned) clean room cabin

The Temporary Lock System: Support Structure

The Temporary Lock System: Support Structure

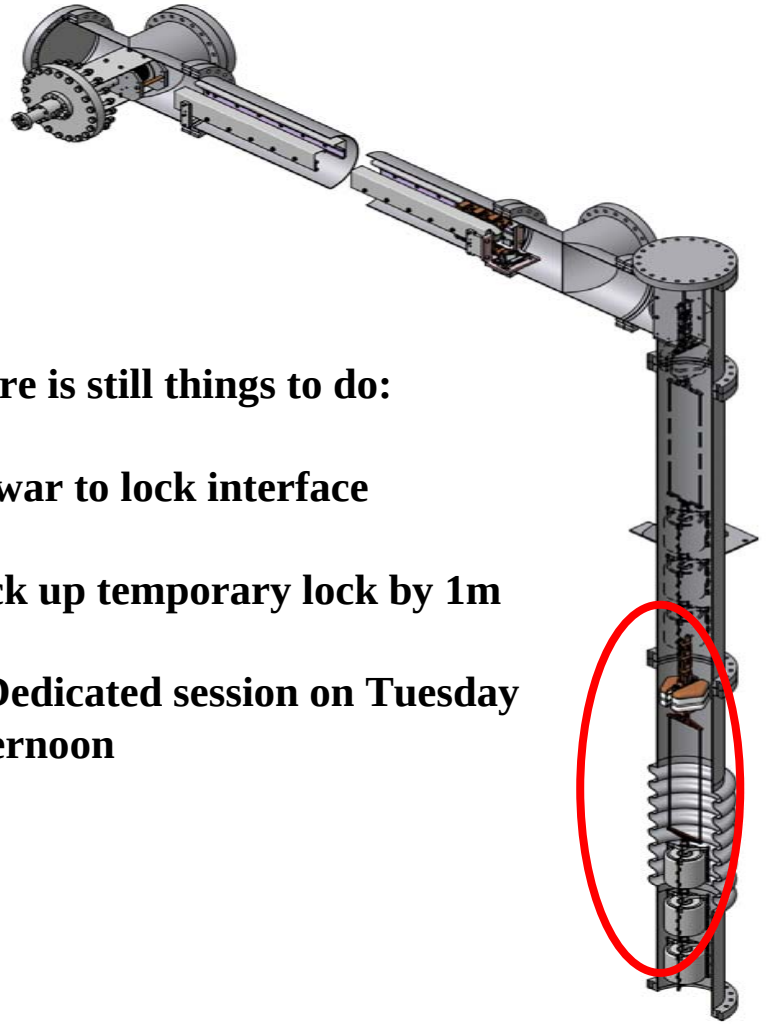
The Temporary Lock System: Support Structure

Temporary lock system should be finished by this year!

The Temporary Lock System: Detector Test

The temporary lock system will be available in Munich in the first quarter of 2009 → Tests with real detectors foreseen:

- **Linear pulley in upper position**
- **Uninstall removable cylinder**
- **Install string to linear pulley**
- **Bring linear pulley to upper position**
- **Move dewar underneath the linear pulley (instead of cylinder)**
- **Attach lock system to dewar**
- **Fill dewar witrh LN/LAr**
- **Lower detector (string) to cryoliquid**



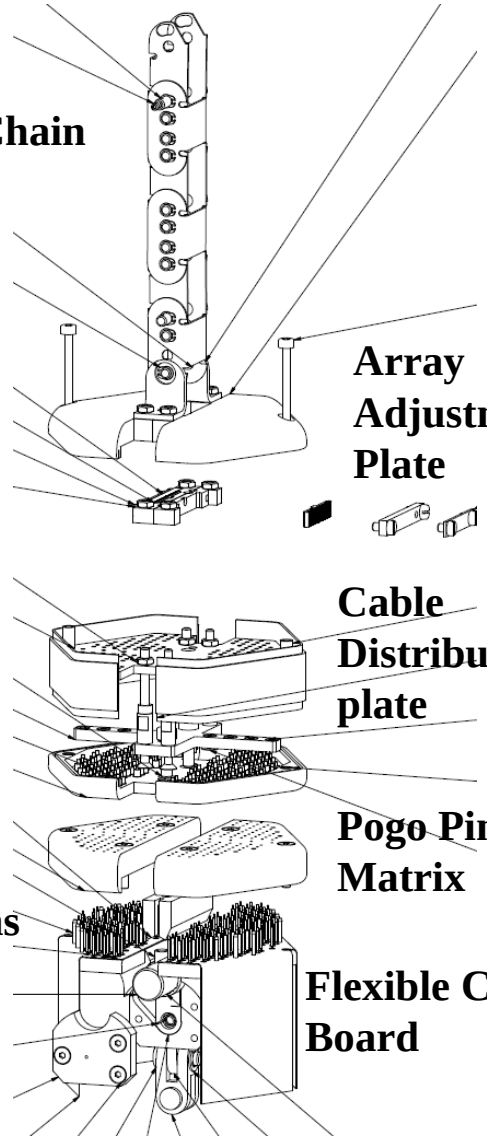
There is still things to do:

•Dewar to lock interface

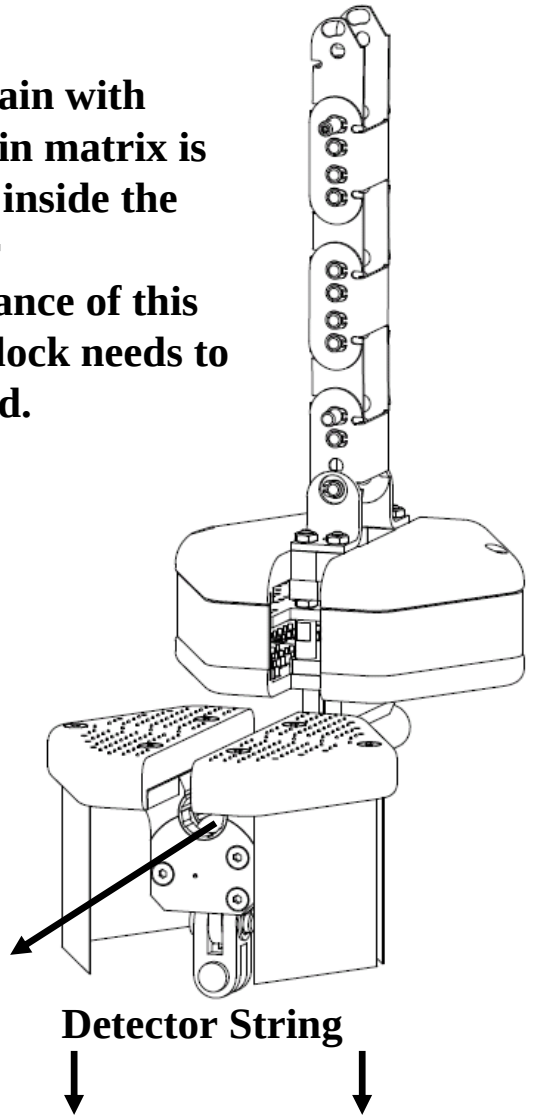
•Jack up temporary lock by 1m

→ Dedicated session on Tuesday Afternoon

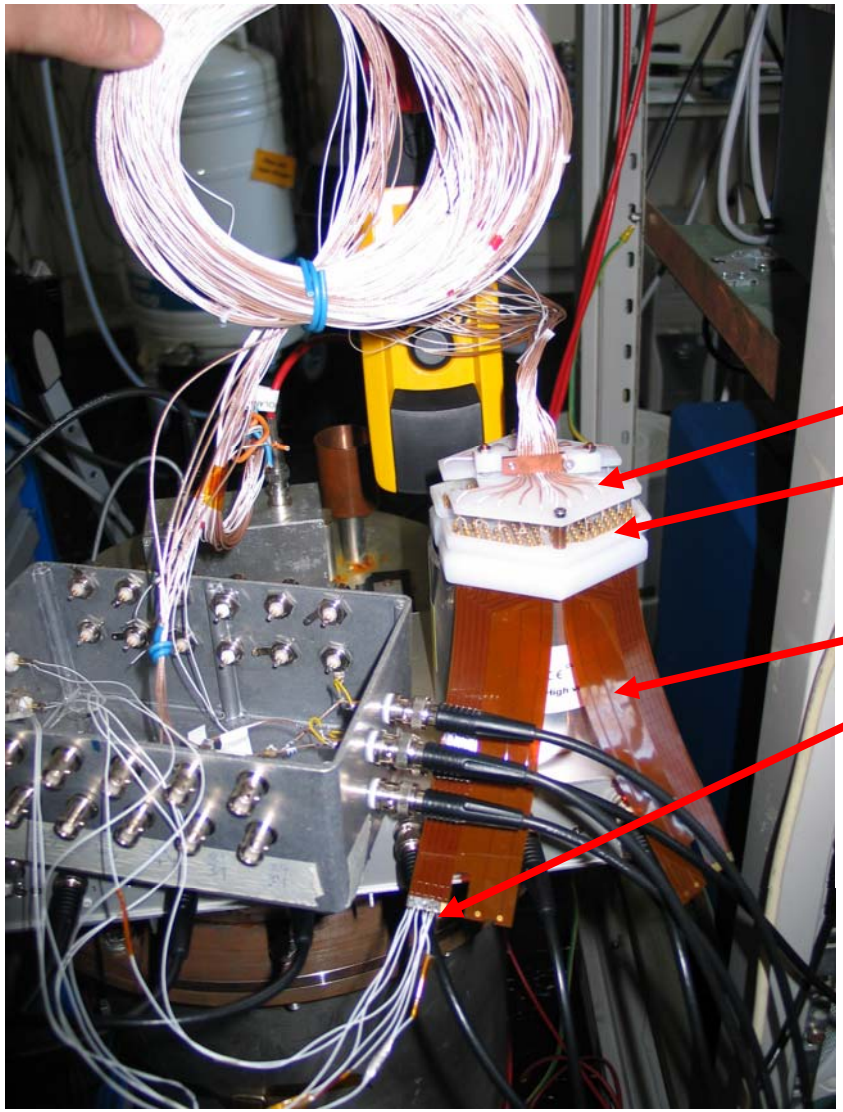
The Connecting Matrix:



Cable chain with copper pin matrix is installed inside the lock. For Maintenance of this part the lock needs to be opened.



The Connecting Matrix:



Transmission line design is ugly: too many connections, too many components!

Coax cables

Copper Pin

Pogo Pins inside Plastic (screened)

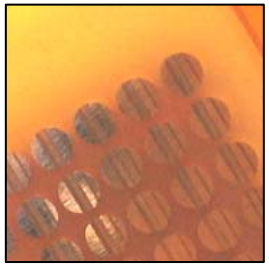
Kapton flat cable

Signal cable

The Connecting Matrix:

But: It works….should be sufficient for commissioning phase.

Whoever has a realistic (!) better idea, let us know!



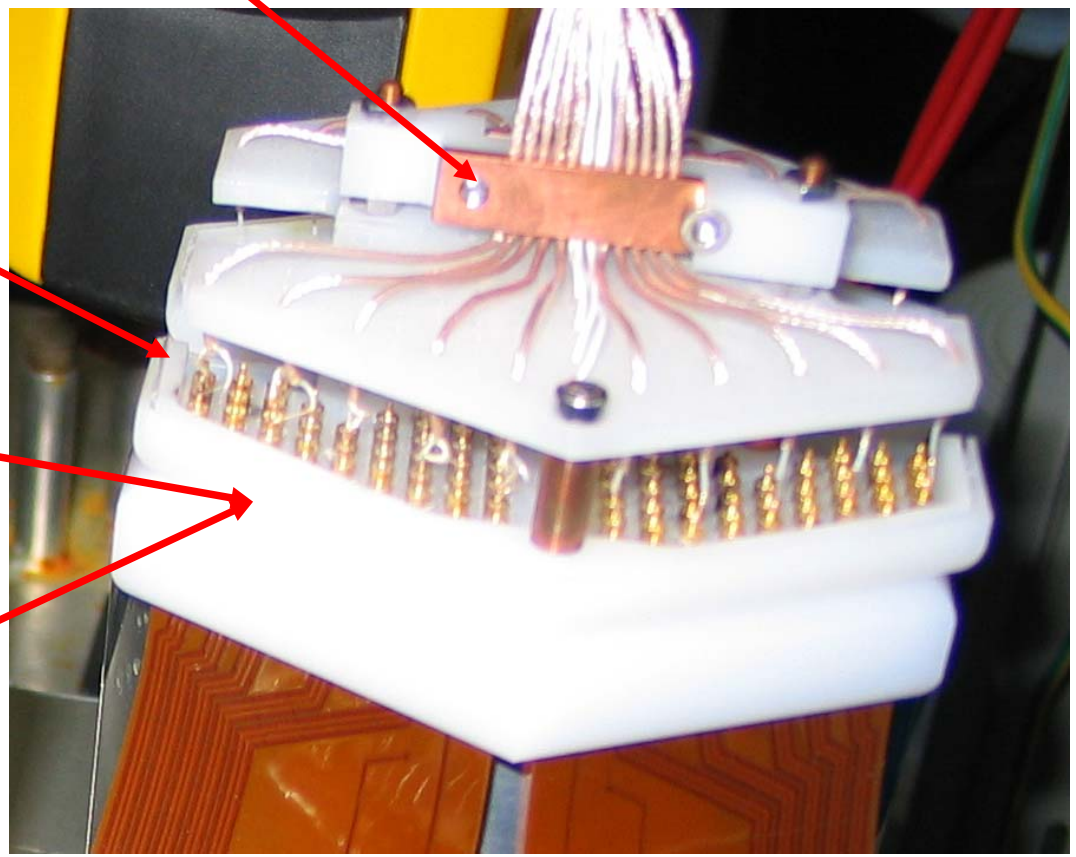
Cables laser welded to copper pins

Contact surface of Copper pins Ni Au plated

Pogo pin matrix

Strain relief

Coax cables



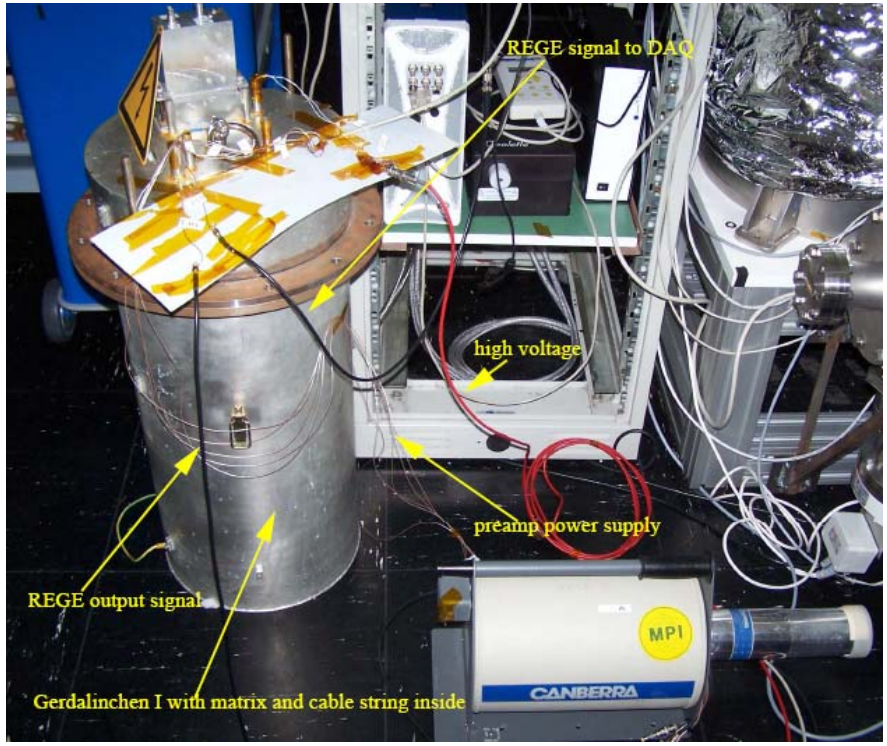
Kapton flat cable

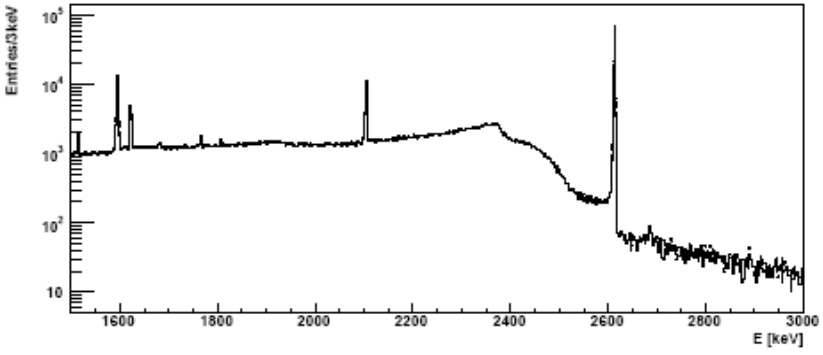
The Connecting Matrix:

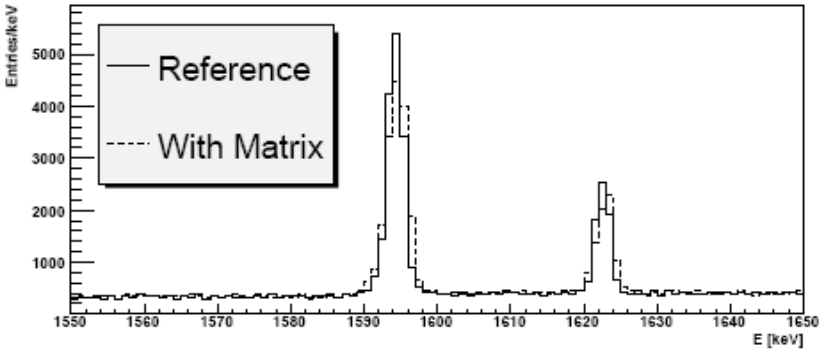
Signal, HV and preamp power supply have been fed throughy the full cable chain!

GSTR-08-013, GSTR-08-019

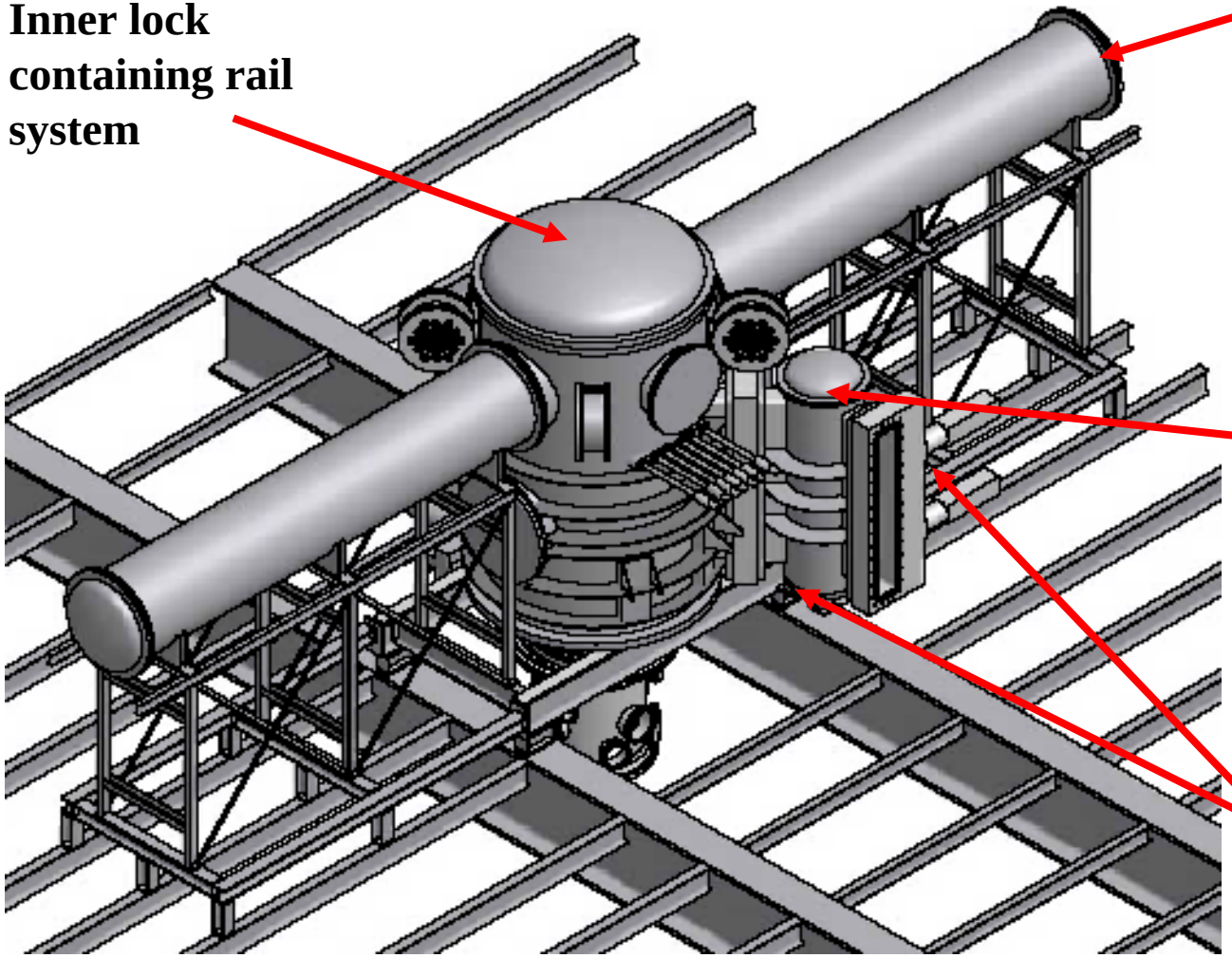
FWHM [keV]; REGE 2			
peak [keV]	reference I	with matrix II	preamp III
1173.0 (Co)	2.140 ± 0.037	1.976 ± 0.030	2.208 ± 0.041
1332.0 (Co)	2.175 ± 0.035	2.135 ± 0.032	2.267 ± 0.045
1460.0 (bg)	2.220 ± 0.061	2.016 ± 0.016	-
2614.0 (bg)	2.630 ± 0.152	2.820 ± 0.038	-







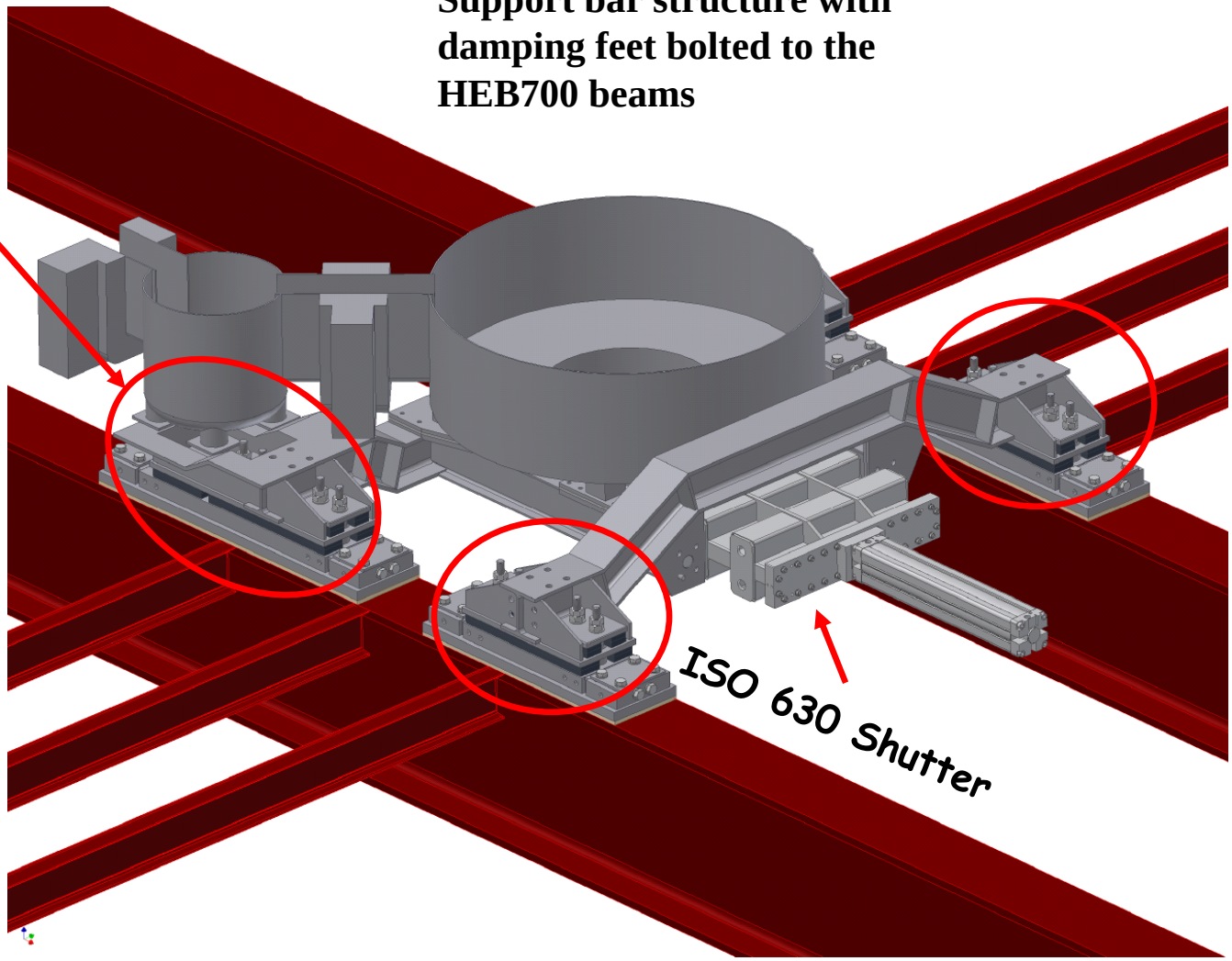
Reminder: the Lock



Superstructure-Lock Interface

Support bar structure with damping feet bolted to the HEB700 beams

Damping material Sylomer



Superstructure-Lock Interface

Lock support structure design is finished.

There is a displacement of the cryostat neck with respect to the center between the HEB700 bars. Neck is 30mm out of center

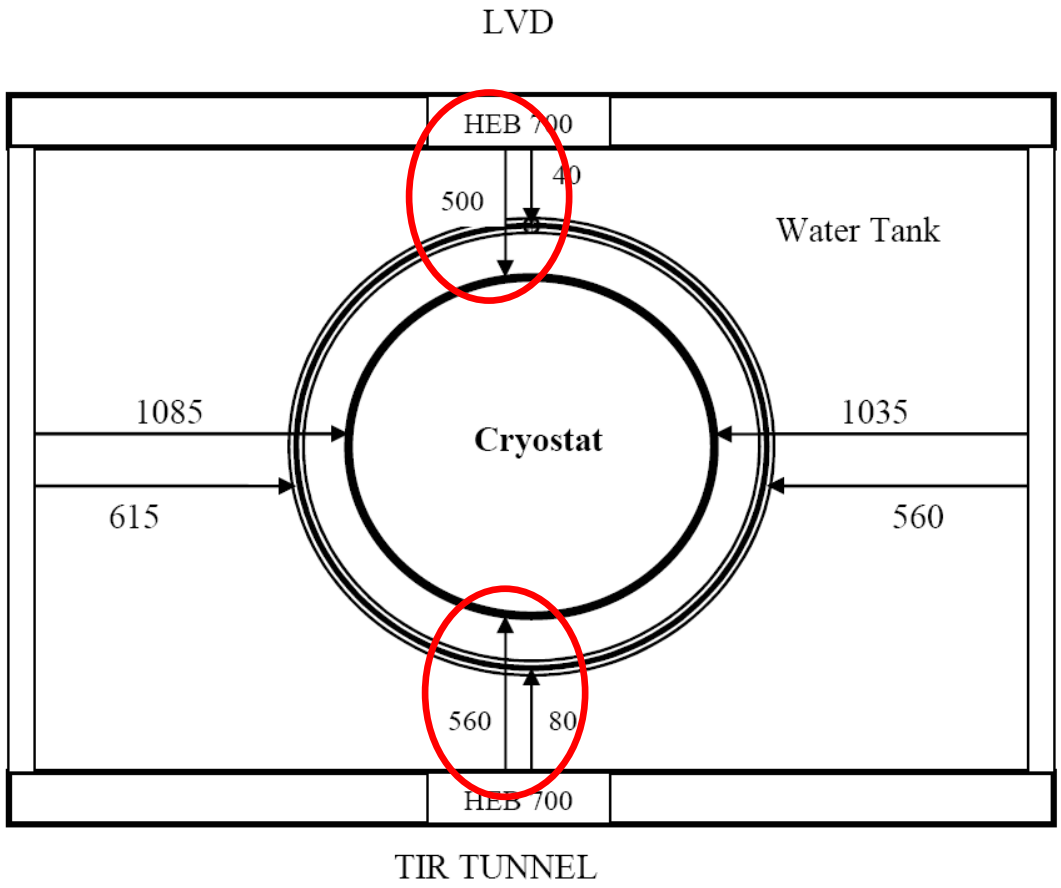
→Need slight redesign of support structure

However:

Cryostat is now empty. It will move once filled with LAr

What direction? Where to?

→Need to wait with redesign until cryostat is filled



The Final Lock: Linear Pulley Status

Feedthroughs for pulley motors: technical Production drawings available.

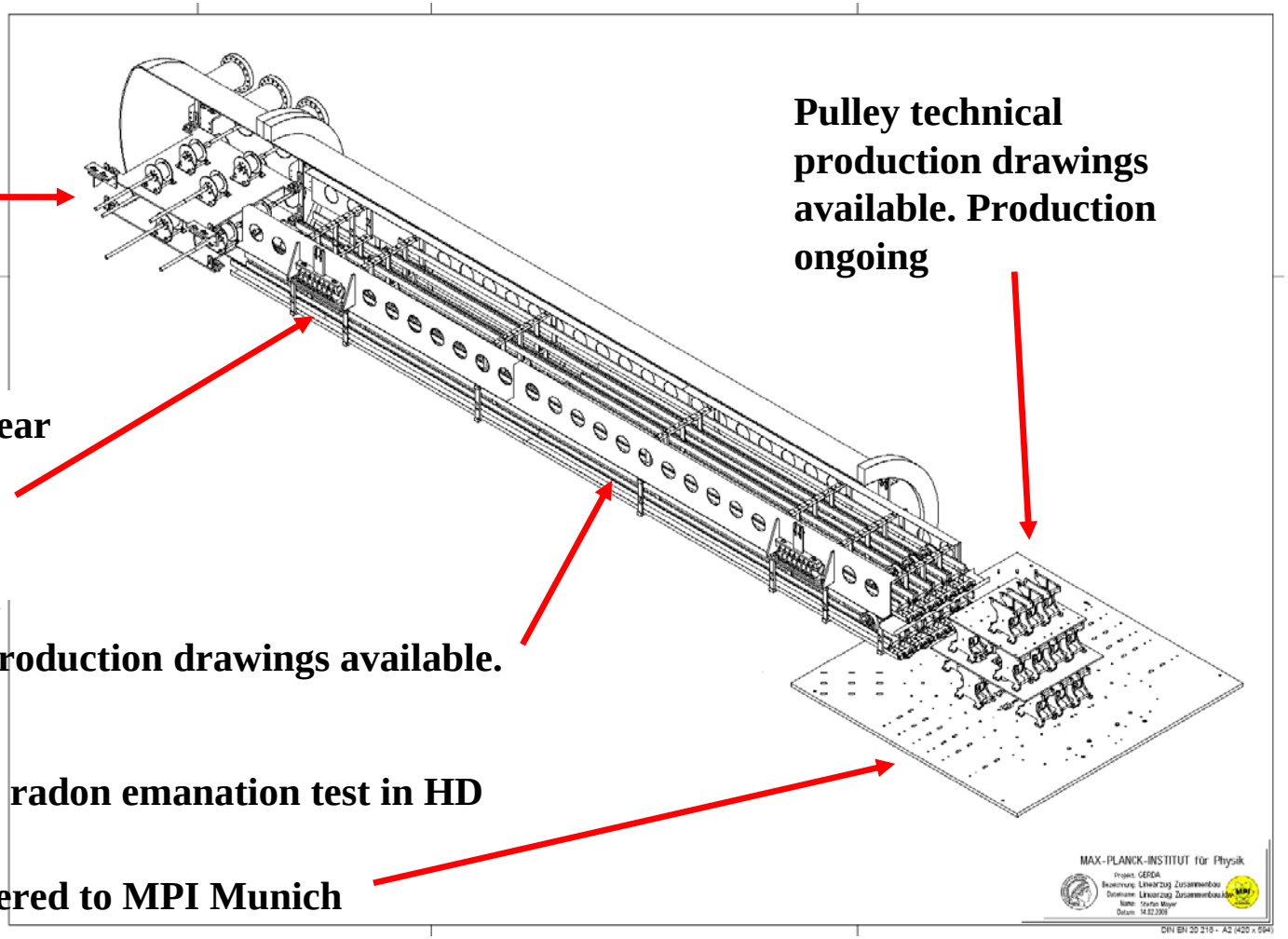
O-rings have been measured for emanation

Spring suspension for linear pulley presently being manufactured at MPI Munich workshop

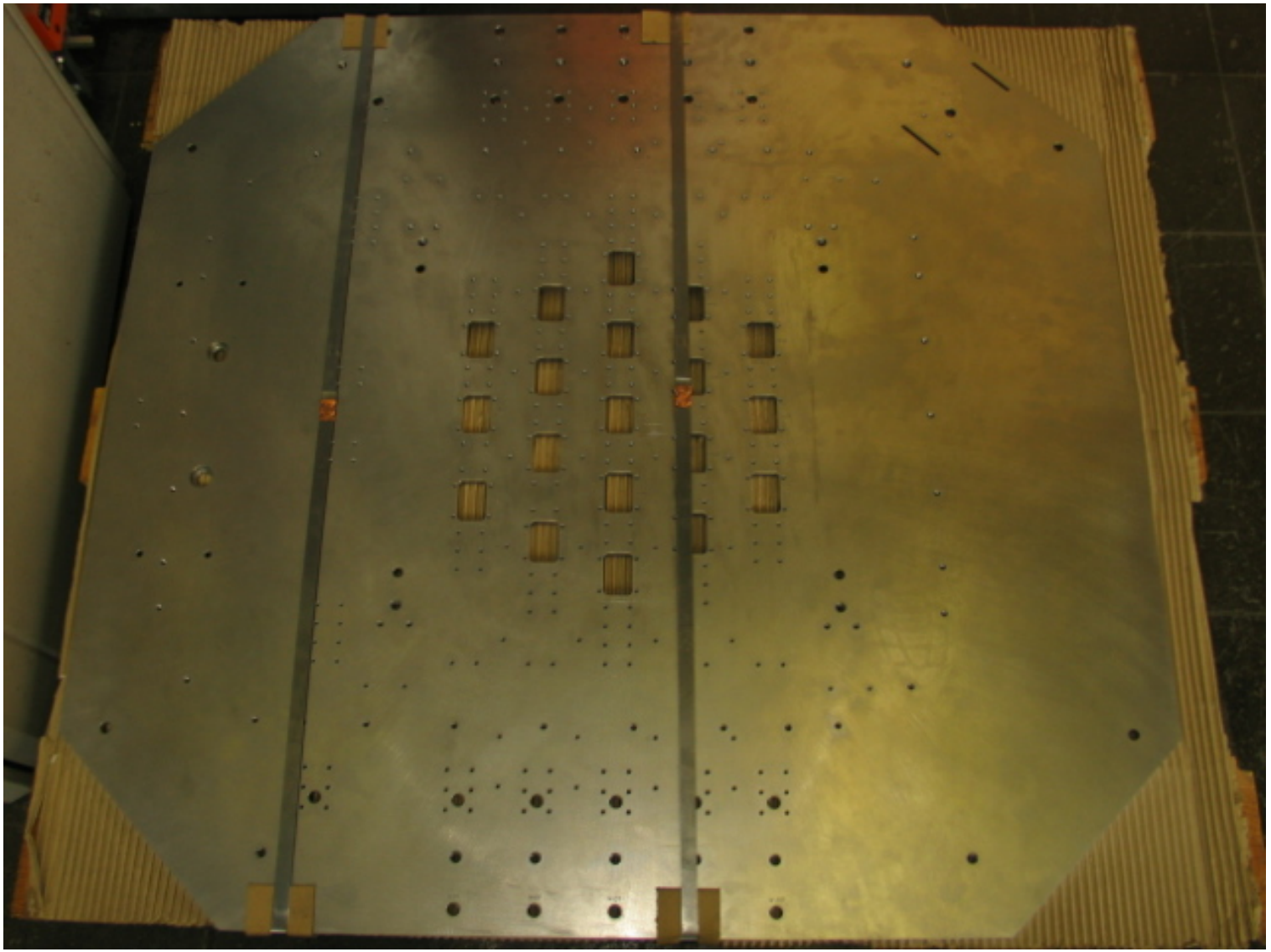
Linear Pulley technical production drawings available. Production ongoing

Sliding parts presently at radon emanation test in HD

Base plate has been delivered to MPI Munich

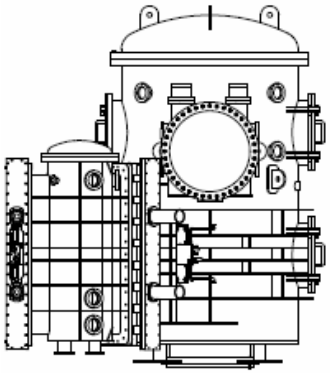


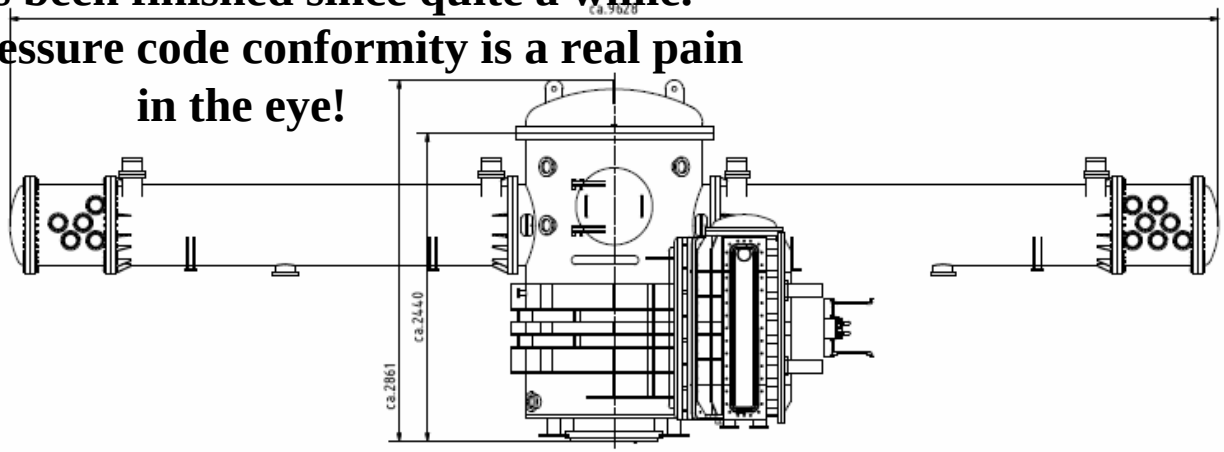
The Final Lock: Base Plate



The Evertendering Story: The Final Lock

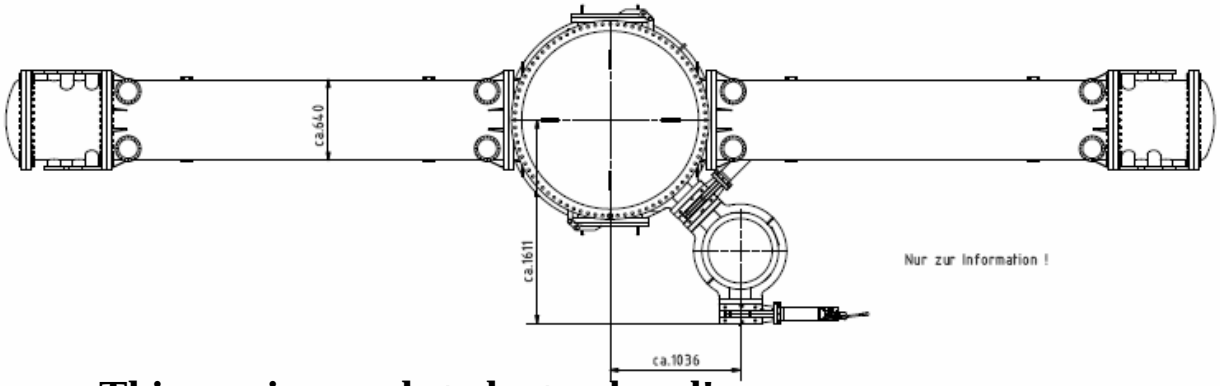
Design has been finished since quite a while.
However, pressure code conformity is a real pain in the eye!





External company is doing it:

- → **Extraction of technical production drawings from model**
- → **Calculation of deformation at vacuum and at 1.5bar (2.2bar) overpressure**
- → **Adjustment to pressure code conformity**
- → **Welding instructions**
- → **Approval of design by TueV**
- → **Tender documentation**
- → **Accompanying production**
- → **Final TueV approval**



This service needs to be tendered!

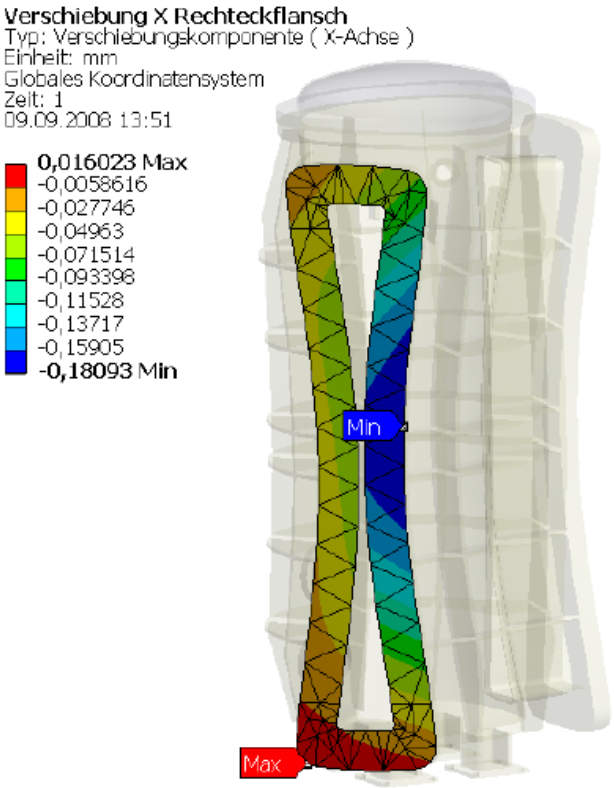
Deadline for offers is this Wednesday, 13th of Nov.

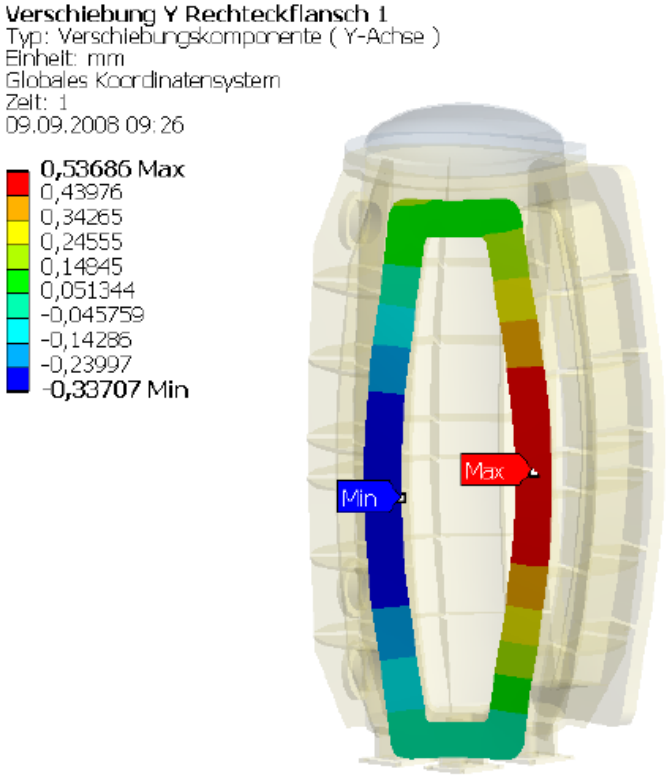
The Evertendering Story: The Final Lock

The outer lock FE calculations have already been done independently:

For vacuum and 2.2 bar forces and deformations (flanges) have to be under control!

→ All forces and deformations within allowed ranges





The Machine-Human Interface: Slow Control

Conclusion

- Clean Room order has been signed
- Clean Room construction will start CW03/09
- Construction of Temporary Lock system close to being finished
- Readout test with detector with temporary lock?
- Final lock system still on its stony way