Accelerator Mechanical Engineering Activities

G R Murdoch

Engineering Group Leader

Neutron Facilities Development Division

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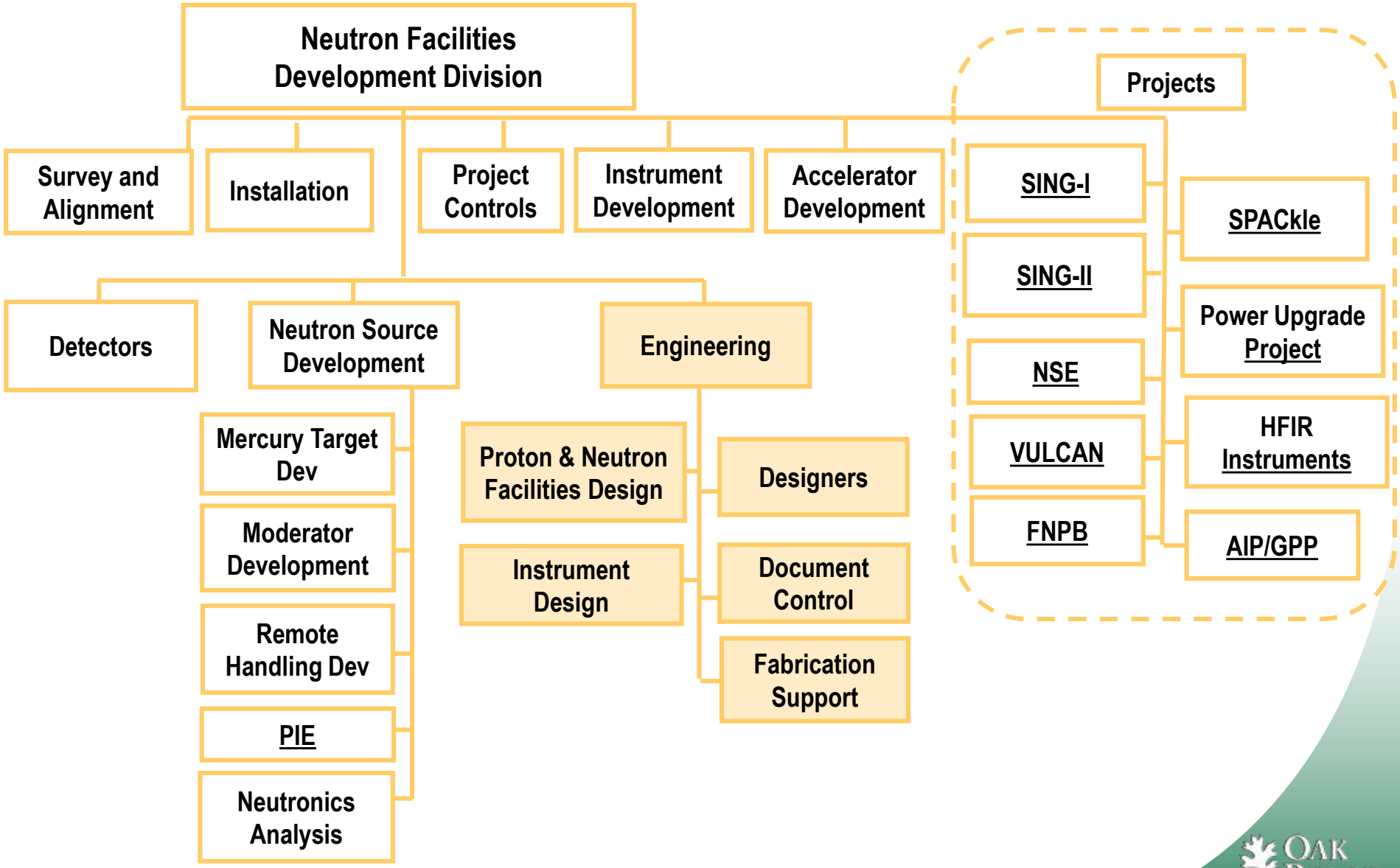


Engineering Group Mission

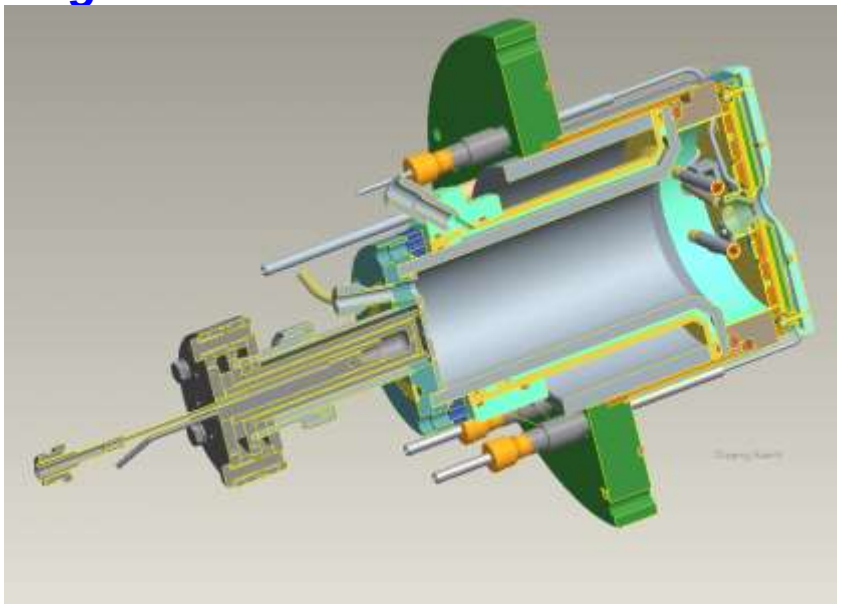
- **Provide a professional engineering service to the SNS Project**
  - Project/Design Engineering
    - *Accelerator*
    - *Target*
    - *Beamline Instruments*
  - Engineering Analysis
  - Engineering Systems Support
    - *Vacuum, Accelerator Systems, Magnets, Beam Dumps, Target Assembly, Utilities, Remote Handling, Shutters, Reflector & Core Vessel Assemblies*
  - Electrical Engineering (instrument oversight)
  - Document Control
  - Fabrication Support

Mechanical Engineering Management

- Accelerator design workload managed via a detailed spreadsheet of jobs (~70 listed)
- Prioritized by RAD Division Head & Group Leaders, monthly meeting with Senior Management to review all project design work (Accelerator, Target & Beamline Instruments)
- Typical prioritization:
  - Breakdown, operational support
  - Shutdown work
  - Accelerator Improvement Projects (AIP)
  - High, Medium & Low priority jobs
- Continually reviewing design process
  - Design criteria documents
  - Design procedures etc
- Currently 8 Engineers & 7 Designers working on accelerator work

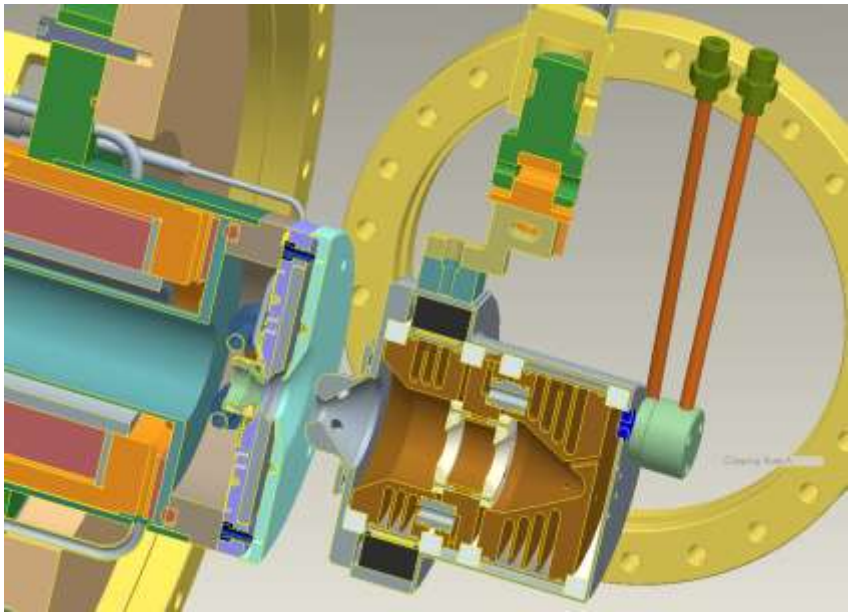
Current Accelerator Mech. Engineering Activities

- **Front End**
  - **Ion Source**
    - **Review & update baseline Ion Source drawings – *Status in progress***
    - **High power external antenna source - *Status in testing***
    - **Helicon H- source - *Status in design***
  - **LEBT**
    - **Modified electrostatic LEBT - *Status in testing***
  - **Magnetic LEBT**
    - **Solenoid magnets - *Status in design***
  - **RFQ**
    - **RF coupler support mounts - *Status in design***

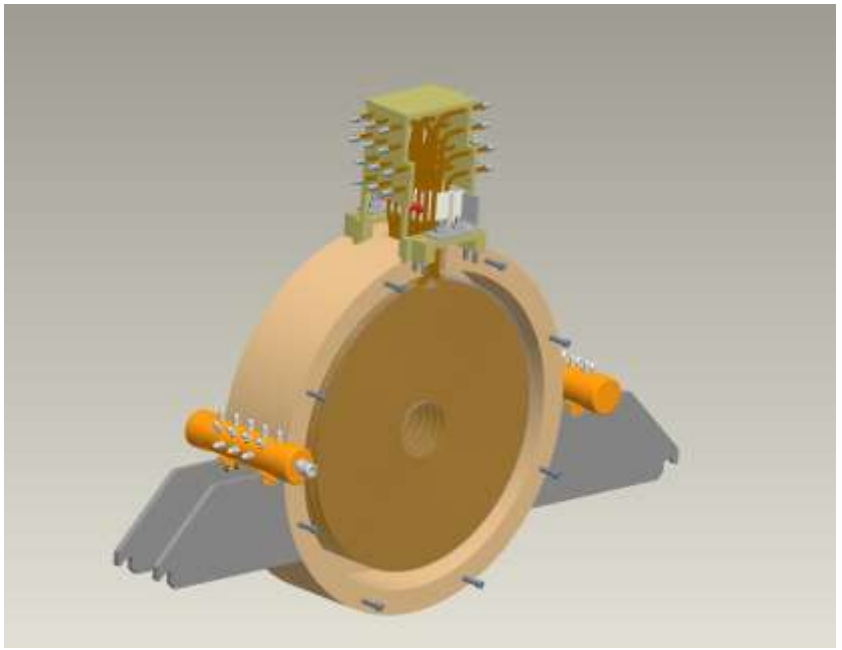


High Power External Antenna Source

Current Accelerator Mech. Engineering Activities



Helicon H- Source



Conceptual Design of Magnetic LEBT Solenoid

Current Accelerator Mech. Engineering Activities

- DTL & CCL Isolation Valve Failures
  - CCL and some DTL sector isolation valves were known to leak for an extended period of time
  - Valves of 2 difference styles from 2 different manufacturers (MDC and VAT) are leaking therefore a common mode of failure can be reasonably discounted
  - Work to be undertaken on CCL-4 prompted the repair of the CCL-4 gate valve in order that the leak tightness of the fast valve could be confirmed prior to commencing this work
  - CCL-4 Isolation Valve Failure
    - Note apparent loss of section of O-ring at bottom
    - Valve gate showed some localized discoloration in an area adjacent to the O-ring gap
    - Discoloration, slightly yellow or straw coloring, possibly indicating a temperature of about 280-340ºC
  - Potential Causes:
    - Beam induced?
    - High radiation?
    - High temperature?
  - *Status - Investigation Underway*
    - *Metal valves*
    - *Shielded valves*
    - *Re-design – withdraw valve further into body*

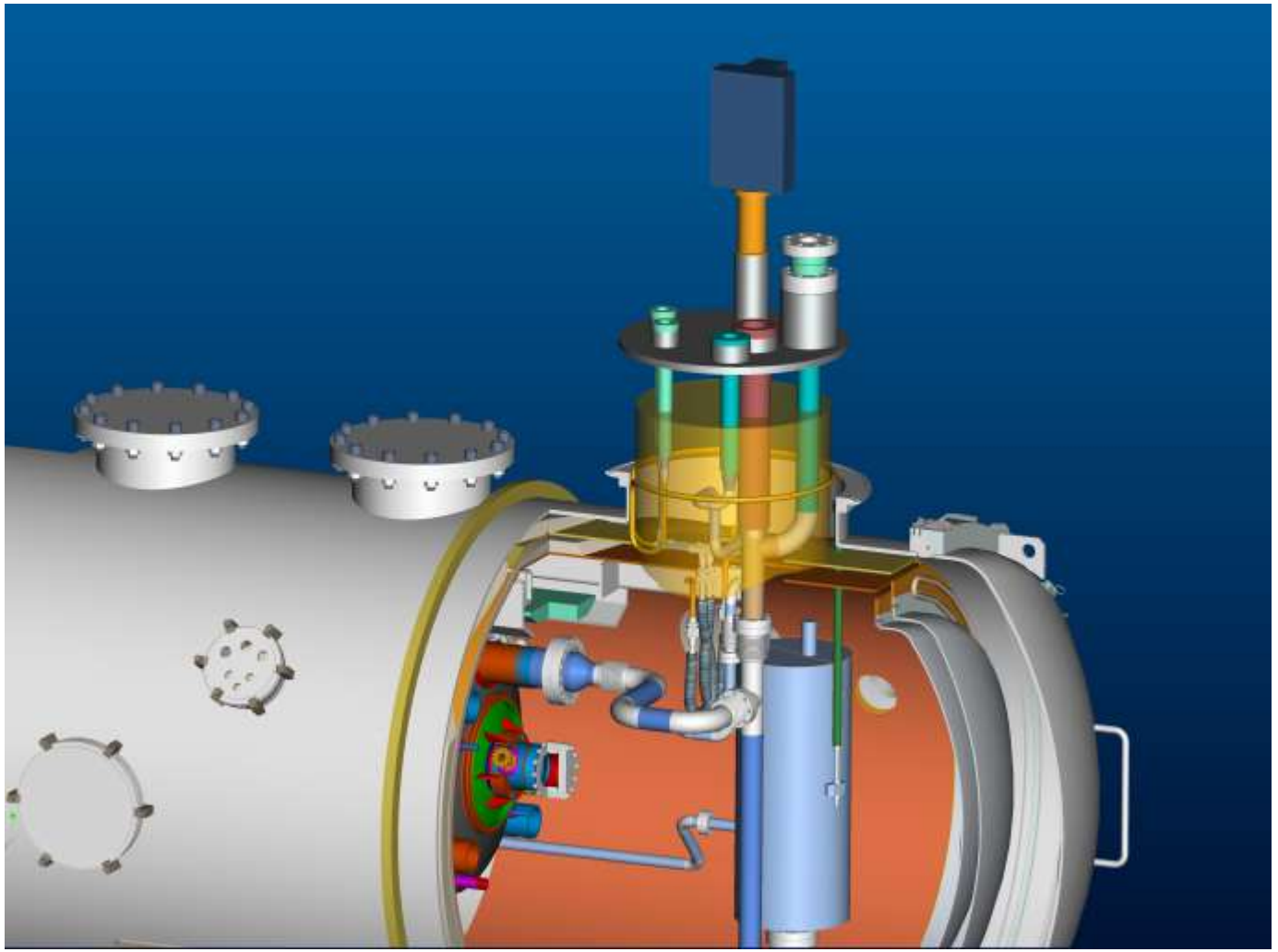
Failed CCL-4 Valve

Current Accelerator Mech. Engineering Activities

- **SCL Linac**
  - **New Cryomodule Procurement Activities**
    - **Preparing Drawing Package – Status in progress**
  - **10CFR851 Compliance Issues - Status in progress**
  - **Cryomodule Test Cave – *completed***
  - **Horizontal Cryostat – *Status in manufacture***

Horizontal Cryostat 3D Model

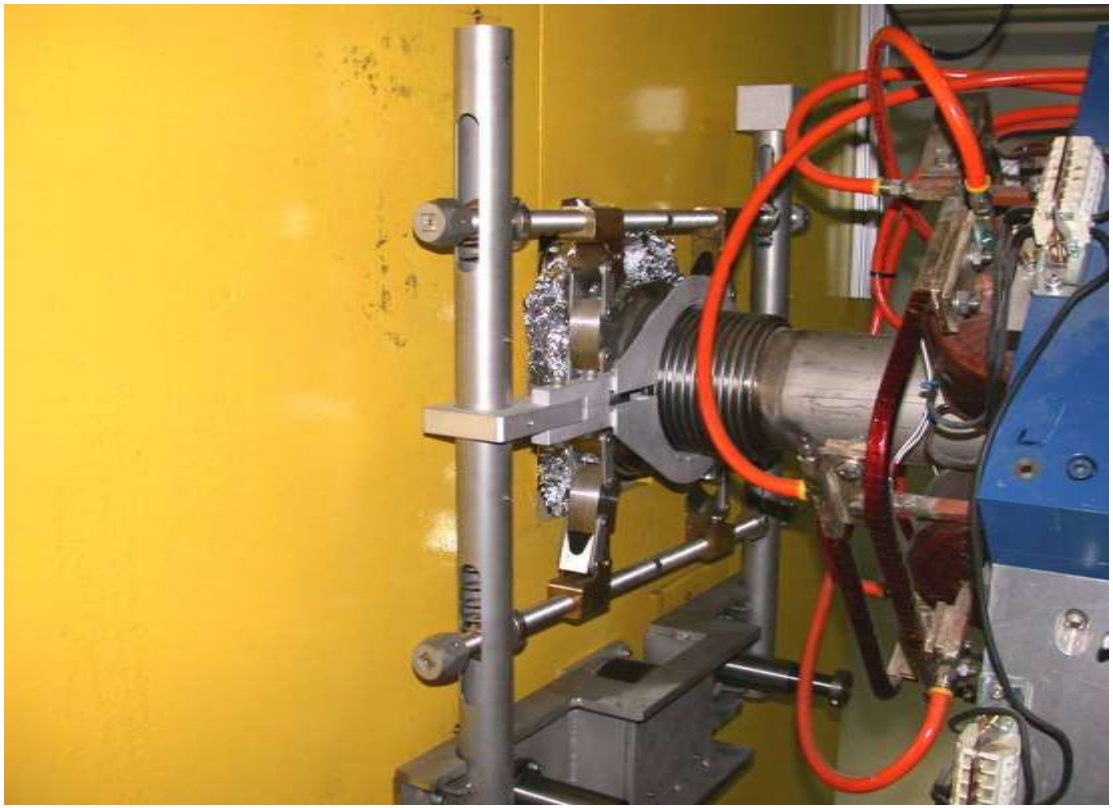
Current Accelerator Mech. Engineering Activities



X-section Horizontal Cryostat Feedthrough

Current Accelerator Mech. Engineering Activities

- **HEBT**
  - **Collimator remote vacuum clamps – Status installed**
  - **Modified Helicoflex Seal**



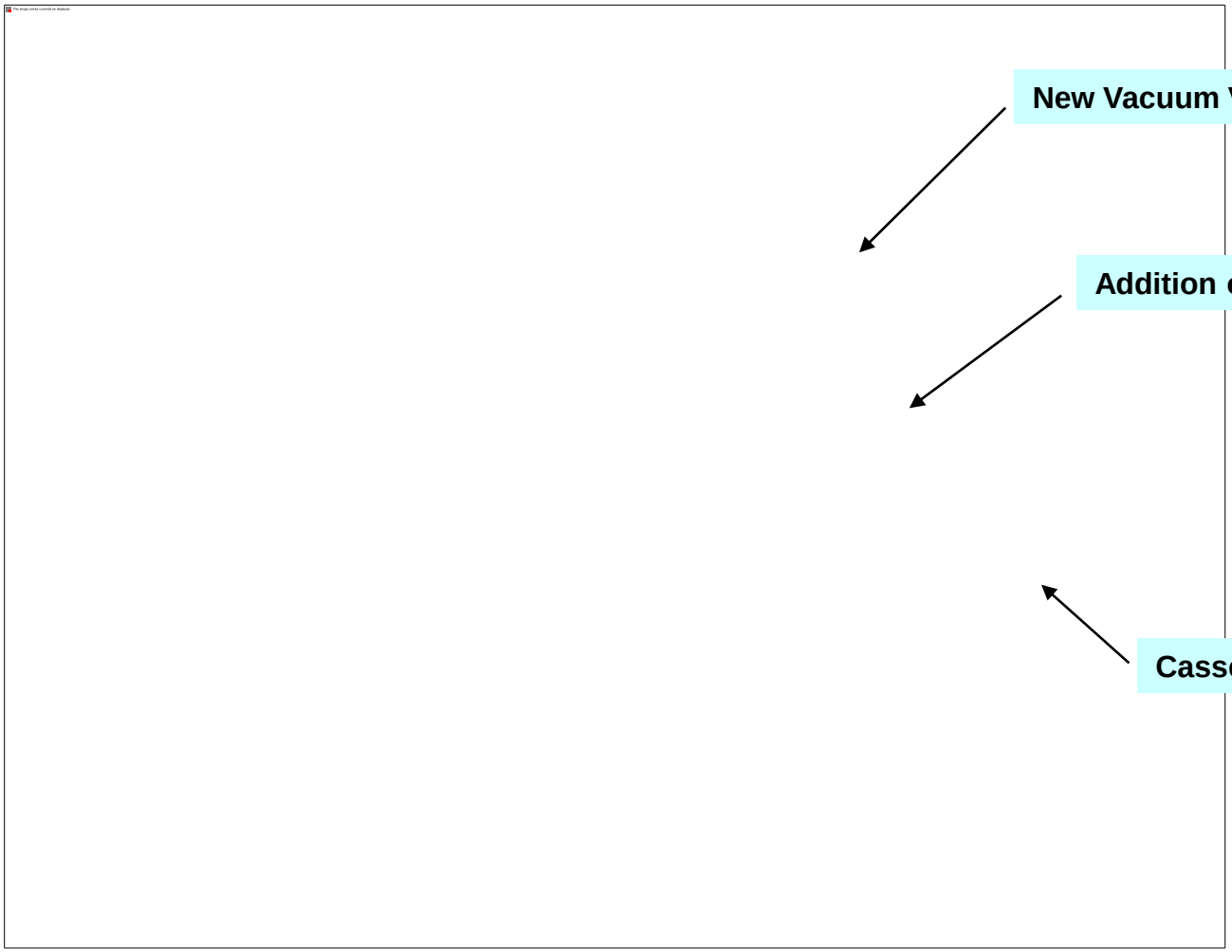
Clamp Mechanism Attached to Collimator Wall

Current Accelerator Mech. Engineering Activities

- **Ring**
  - **RID Septum Magnet Modifications (AIP) – *Status completed***
  - **New Vacuum Vessel for RID Septum Magnet (AIP) - *Status ready to install***
  - **New primary foil stripper assembly (AIP) - *Status in design***
  - **New secondary foil stripper assembly (AIP) - *Status in design***
  - **Collimator remote vacuum clamps (based on HEBT but different) – *Design completed***

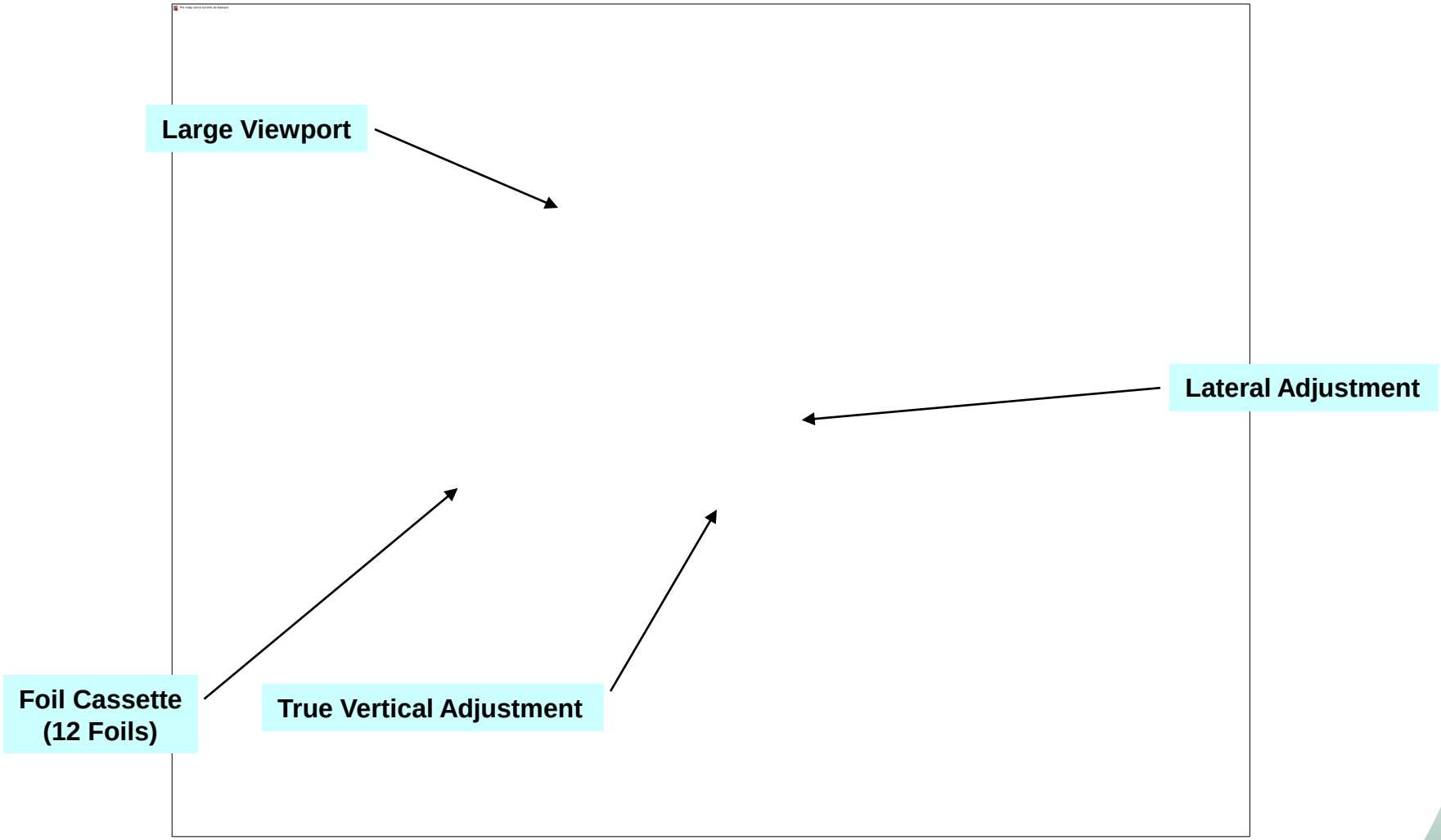
Magnet Measurement after Pole Modifications

Current Accelerator Mech. Engineering Activities



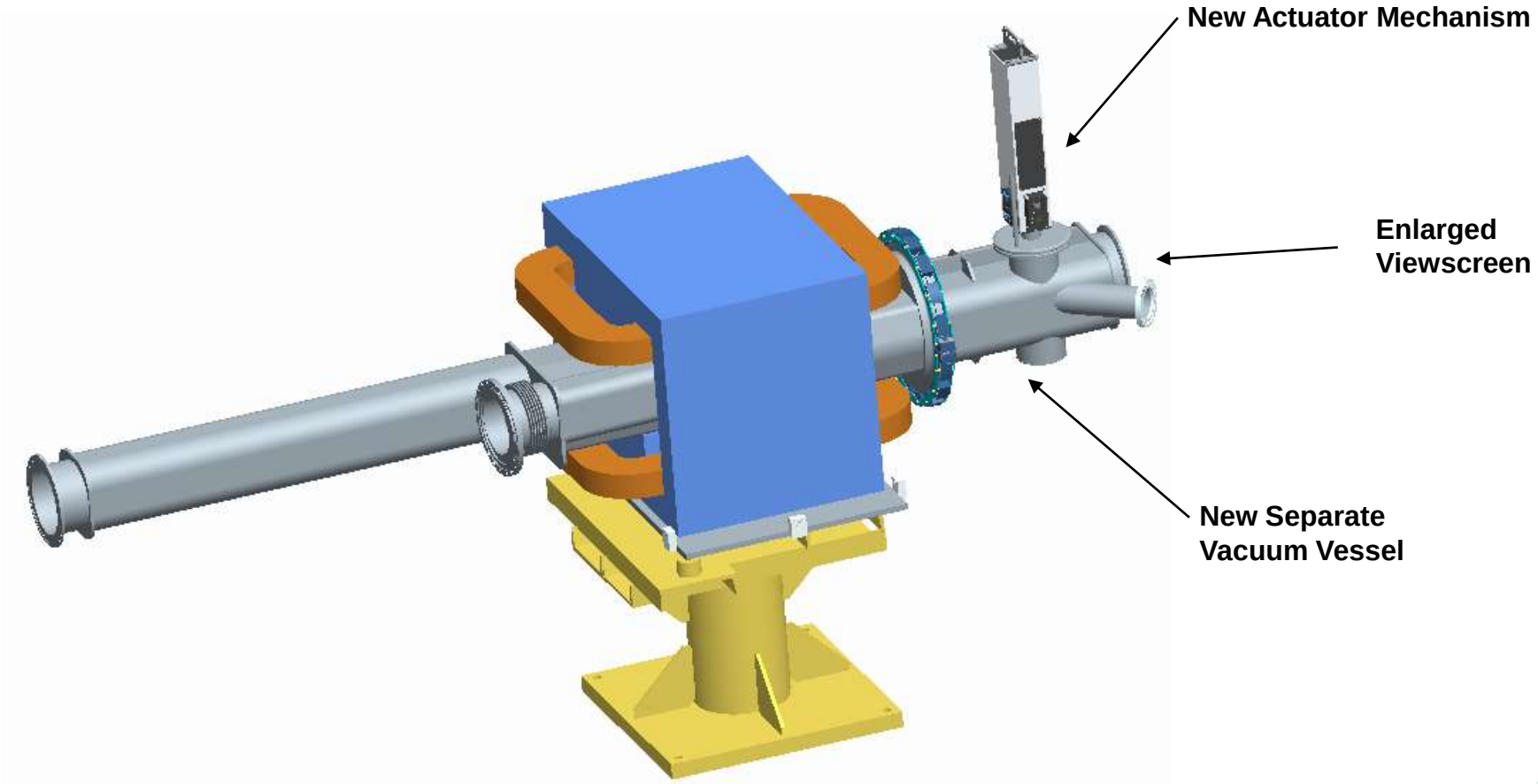
Conceptual Design of New Injection Septum Magnet

Current Accelerator Mech. Engineering Activities



Conceptual Design of New Primary Foil Changer

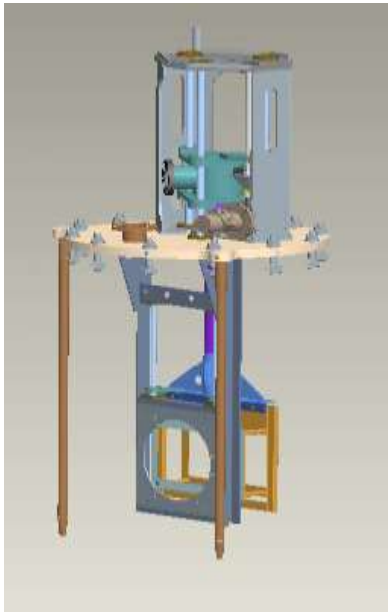
Current Accelerator Mech. Engineering Activities



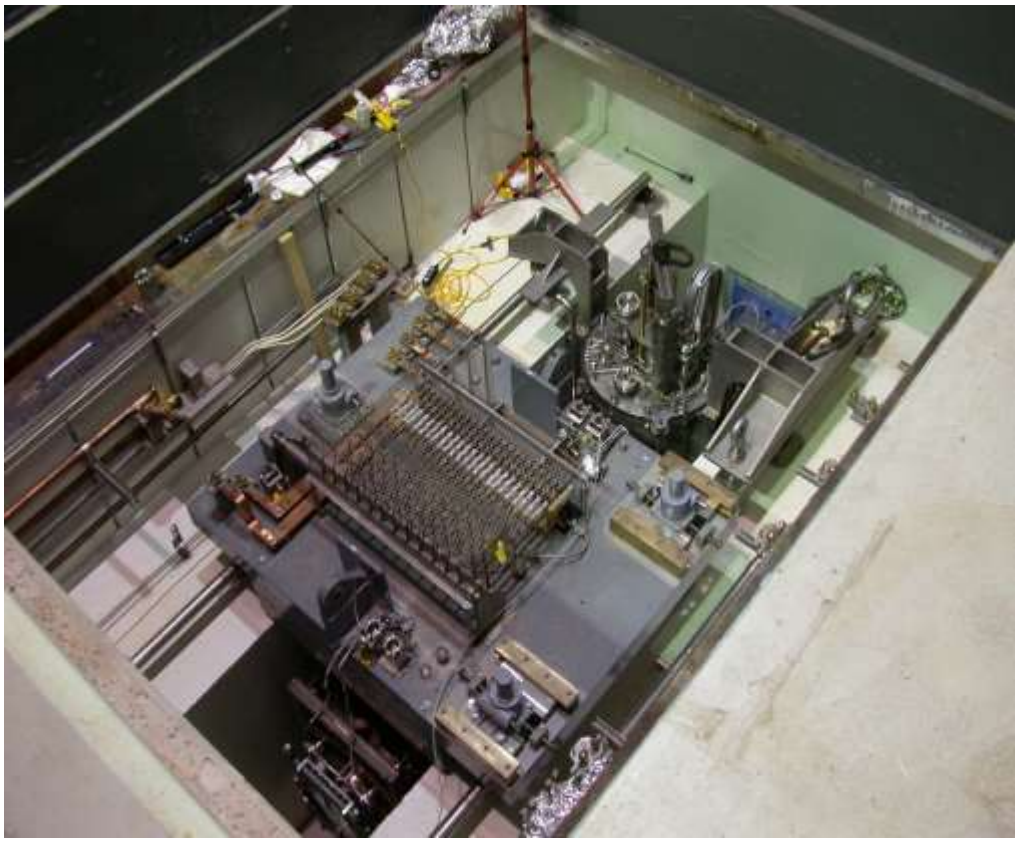
Conceptual Design of New Secondary Foil Stripper

Current Accelerator Mech. Engineering Activities

- **RTBT**
  - **New HARP Mechanism – *Status in manufacture***
  - **Collimator remote vacuum clamps (based on HEBT but different) – Status *prototype manufactured***

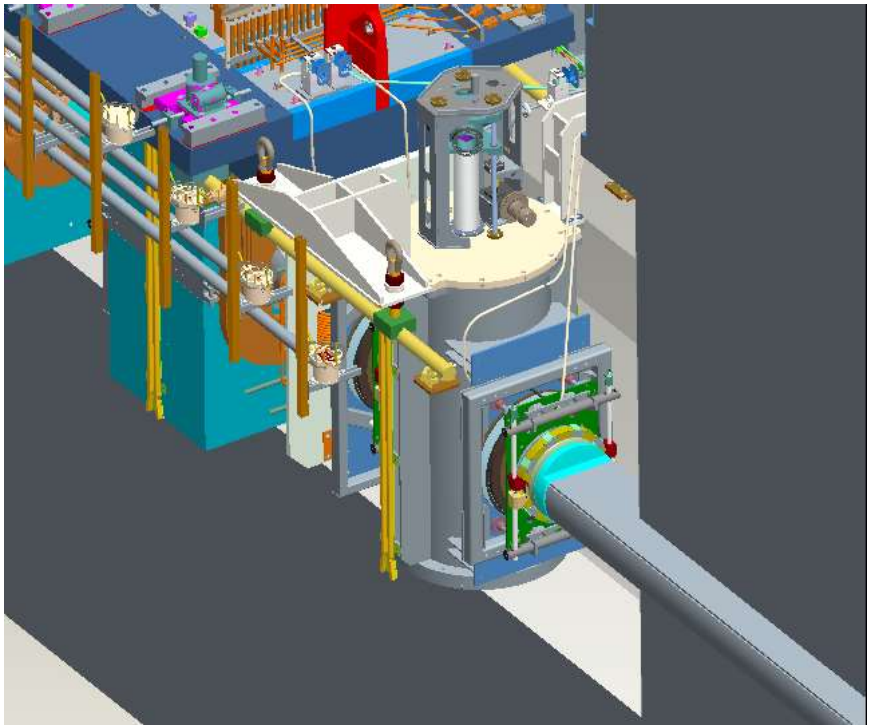


New HARP Mechanism

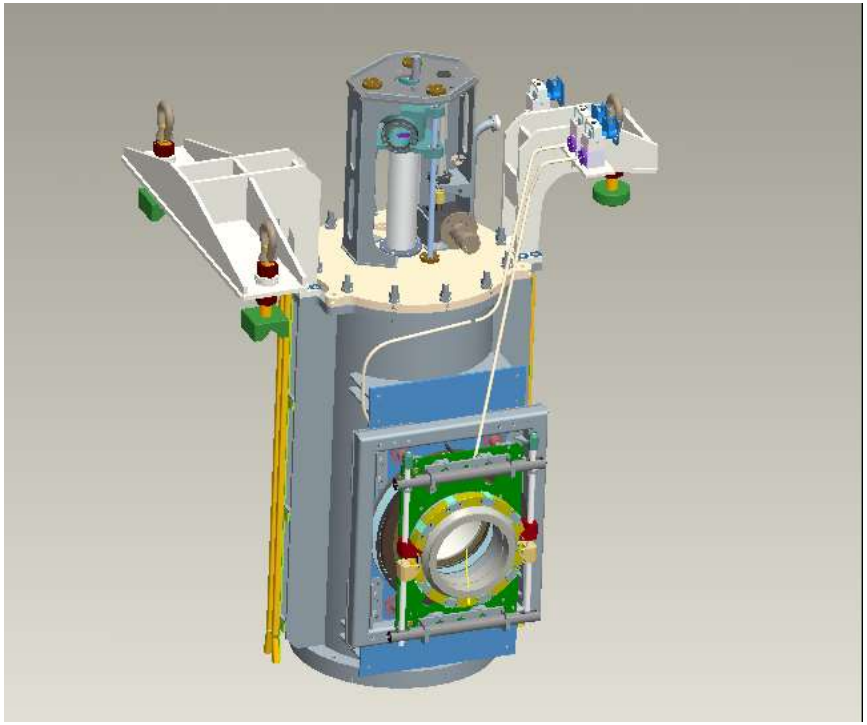


Q30 & HARP Mechanism Installed in RTBT

Current Accelerator Mech. Engineering Activities



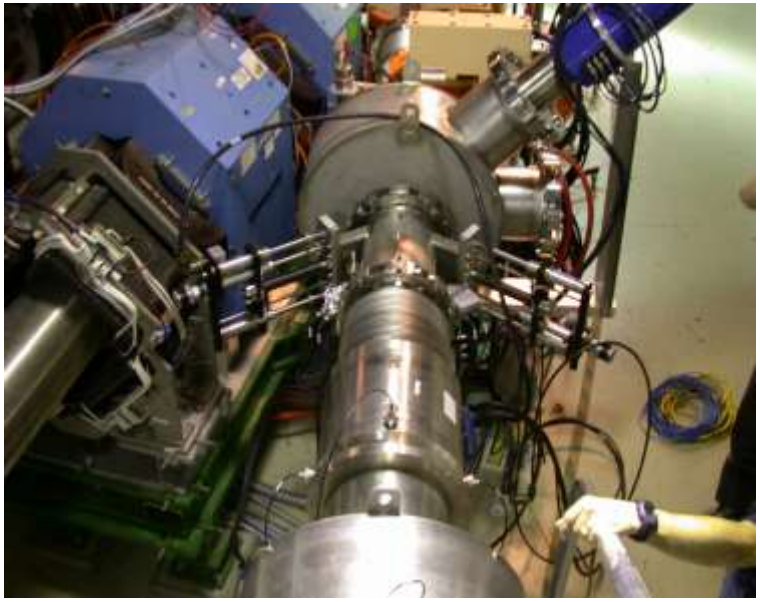
Q30 & HARP Assembly 3D Model



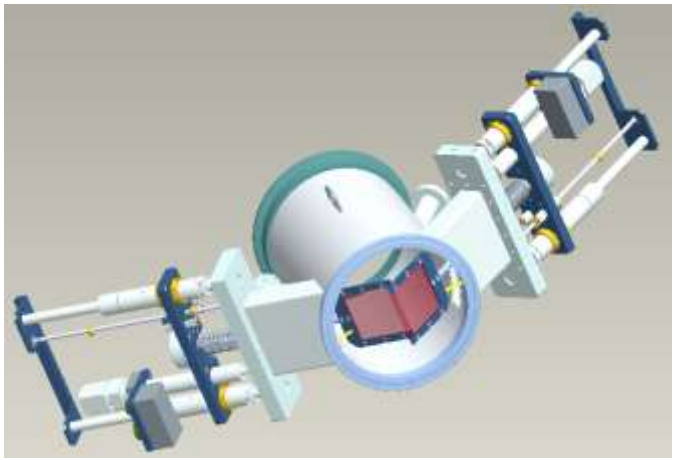
New HARP Mechanism & Vessel 3D Model

Current Accelerator Mech. Engineering Activities

- **Beam Instrumentation**
  - **RID view screen – *Status Installed***
  - **MEBT beam stop (AIP) – *Status in manufacture***
  - **MEBT scraper – *Status in design***
  - **MEBT wire scanners – *Status in design***
  - **RTBT phosphorous flag – *Status in design***
  - **Ring electron beam profile monitor (AIP) – *Status ready to install***
  - **Beam shape monitors (SCL & HEBT) - *Status ready to install***
  - **IR camera mounting for electron beam dump - *Status ready to install***
  - **DTL wire scanners - *Status in design***

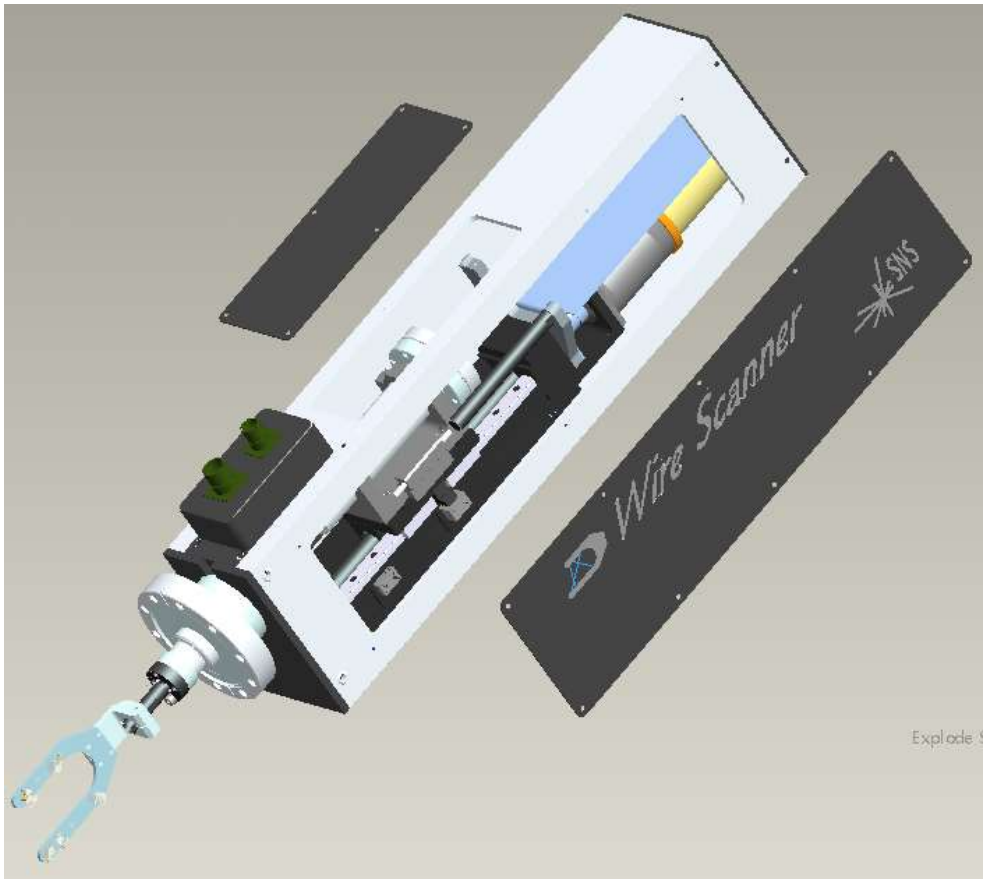


RID View screen Installed

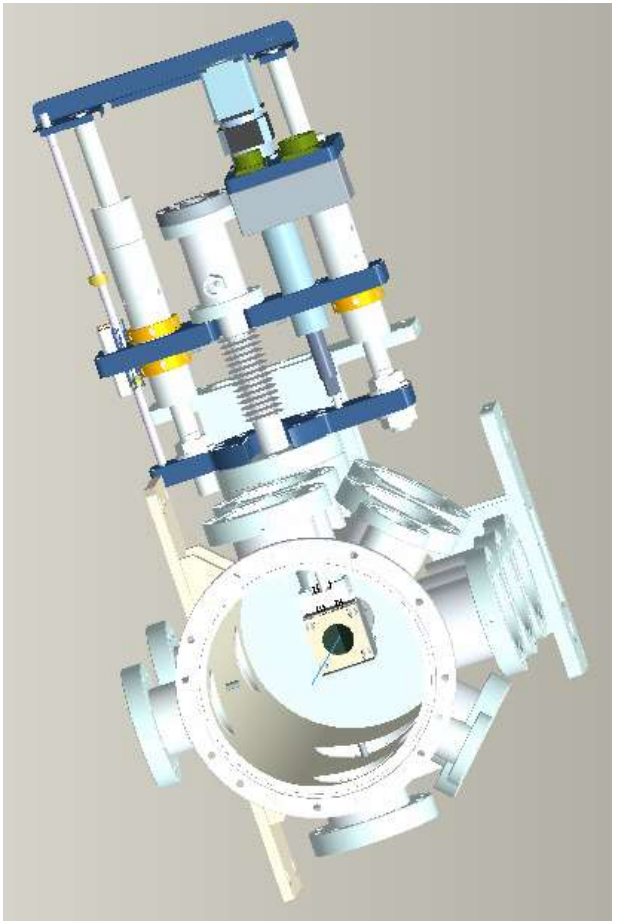


3D Model of RID View screen

Current Accelerator Mech. Engineering Activities

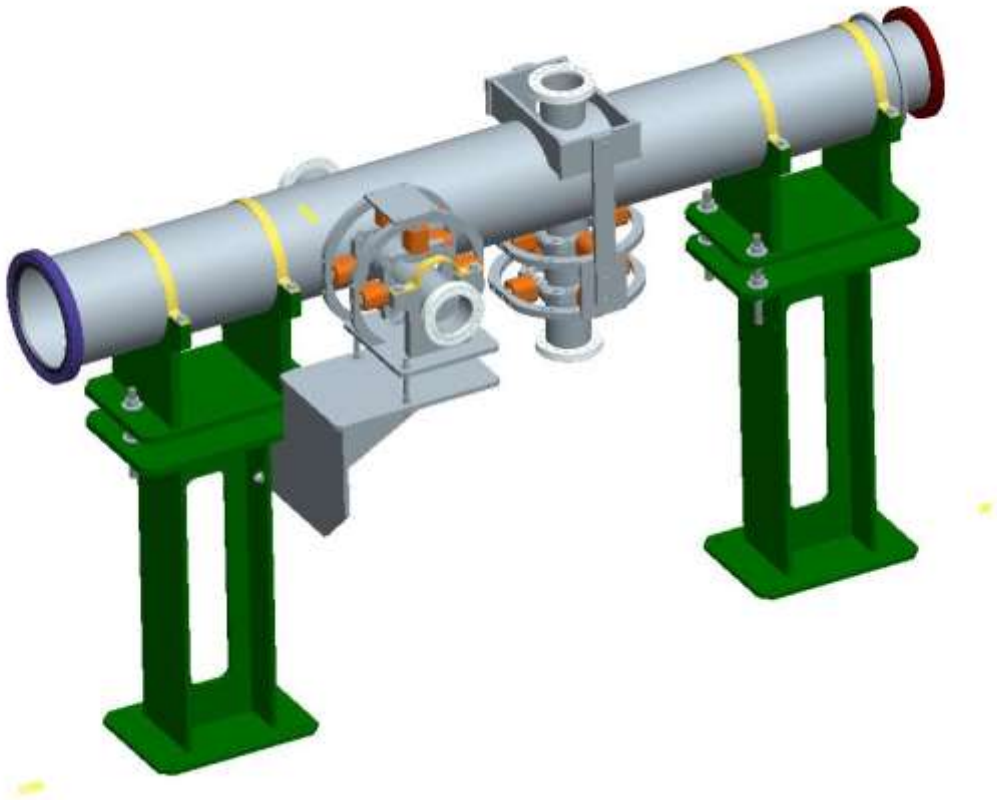


Typical Wire Scanner Design (common actuator)



MEBT Beamstop

Current Accelerator Mech. Engineering Activities



Ring Electron Beam Profile Monitor

Summary

- New organization with design engineering centralized
- Large workload that continues to expand
- Working with RAD to improve prioritization of accelerator work
- Talented team of engineers with several younger team members being mentored
- Design work in progress covers most key areas of the accelerator
- Improving engineering procedures and adopting across mechanical engineering function
- Busy & exciting times ahead!