

# Status of the AFC at RAL

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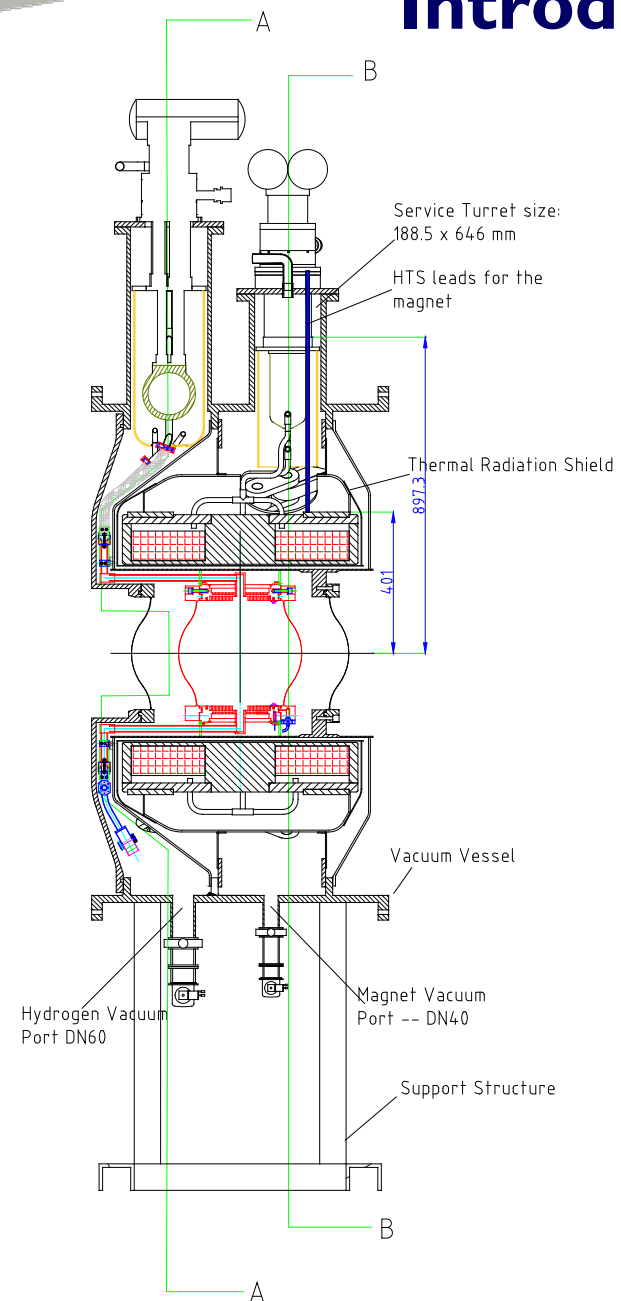
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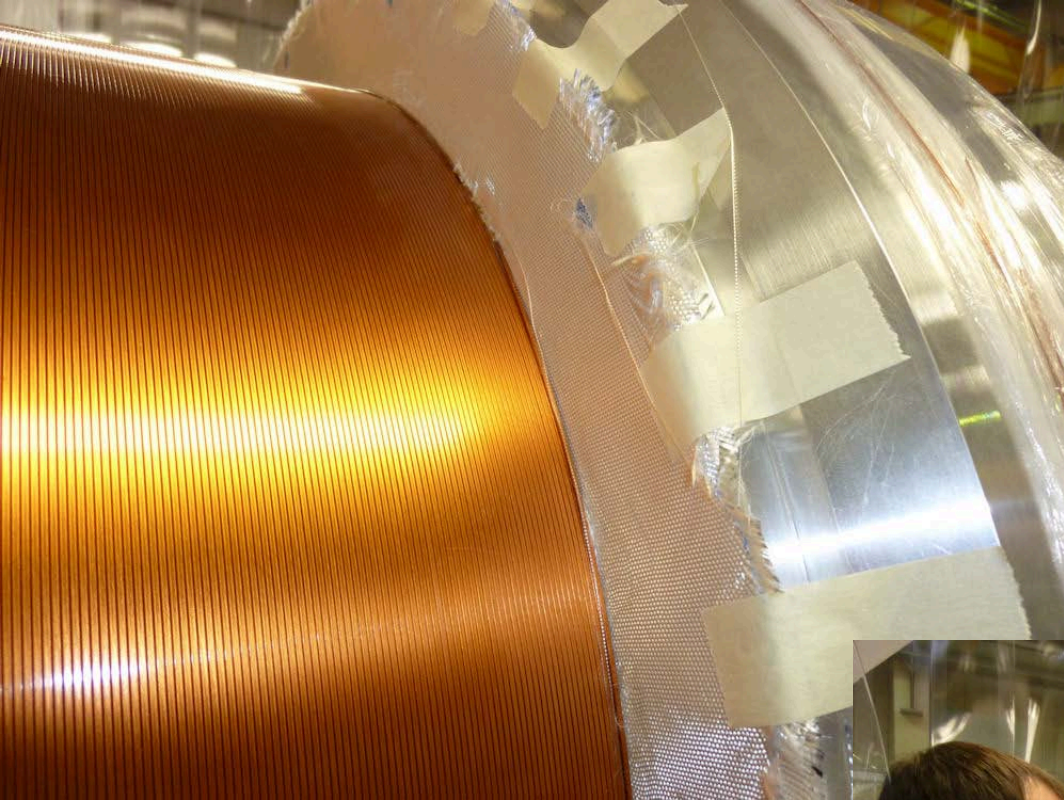
**MICE Collaboration  
Meeting CM30**

## Talk will cover

- Recent progress at TESLA
- Cryocooler testing
- Alignment
- Tasks required to get AFC ready
- Schedule



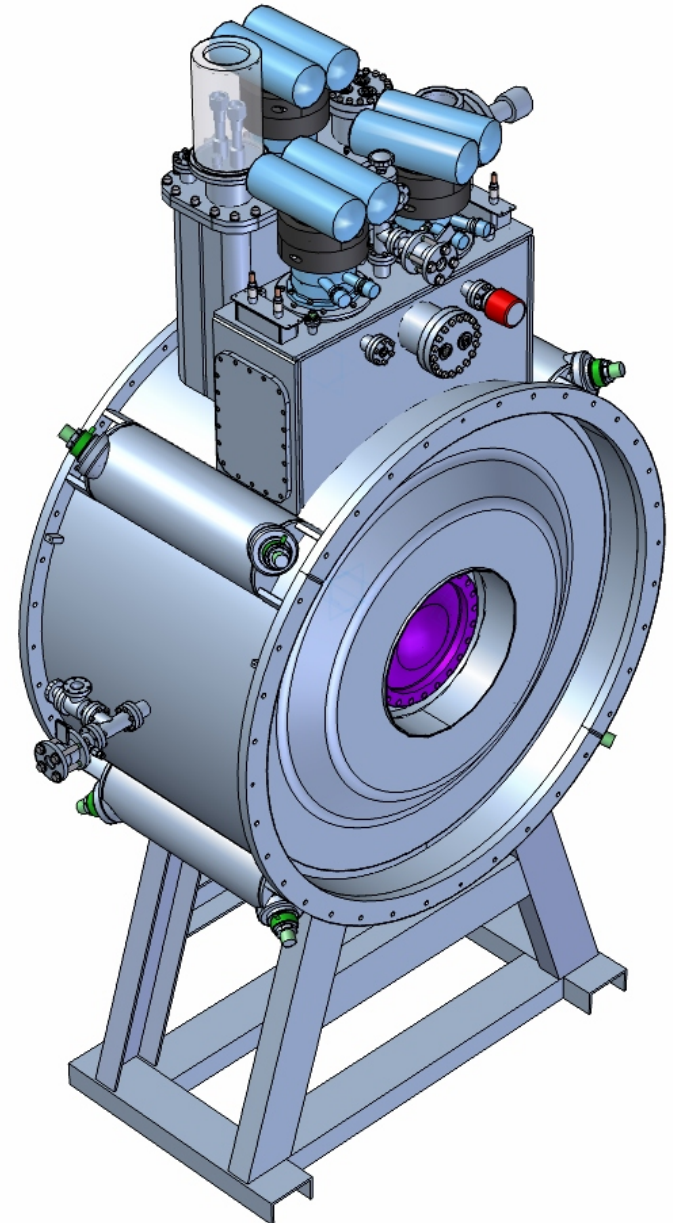




Winding of AFC I  
is complete and  
looks to be of very  
good quality



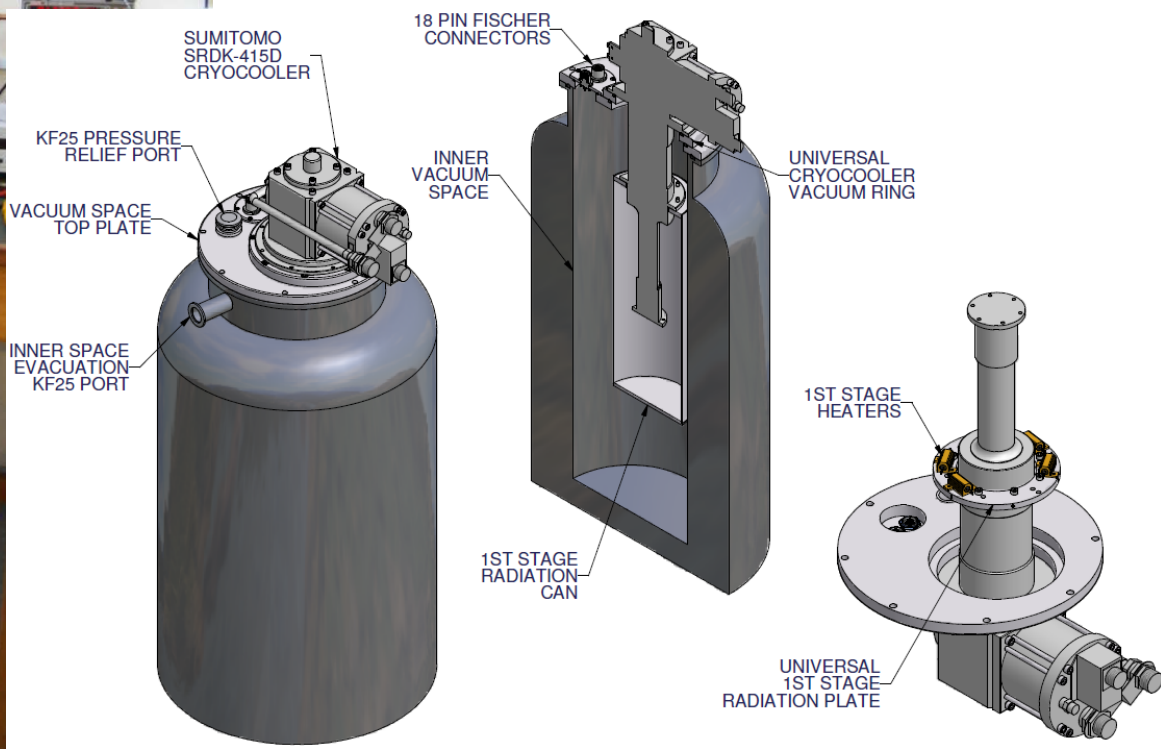
- Assembly sequence “story board” is still being refined
  - Getting the cold mass centre line accurately in the module is proving a challenge – but important for MICE. Have a solution to this which involves part assembly of the radiation shields
  - We will get magnetic centre line from field mapping activities.
- Need Mississippi to scrap a safety window to act as a test piece.
- Cryocooler testing (before installation) is underway



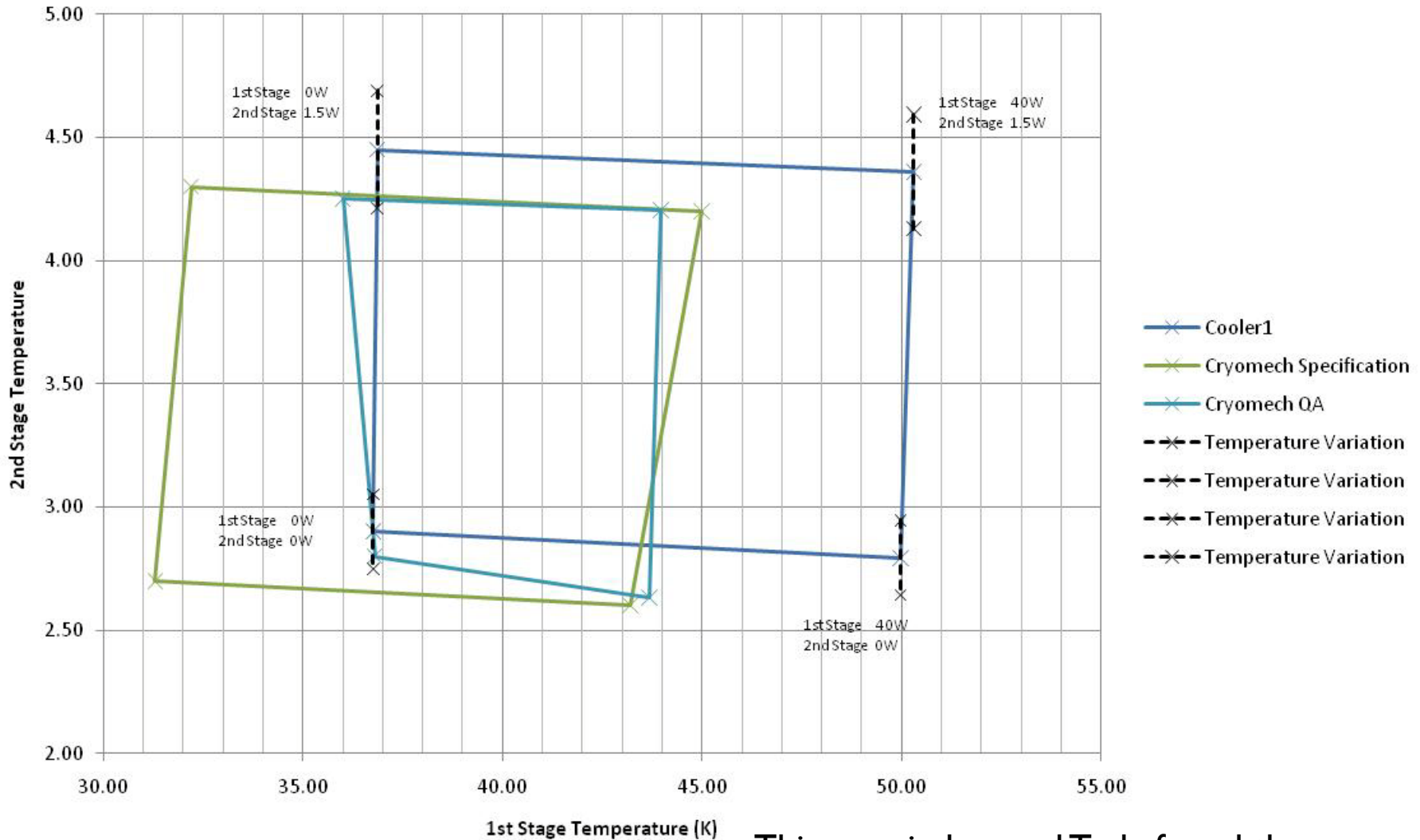




- We have a test cryostat for checking that the cryocoolers meet specification before installation.
- This is now at Tesla and cryocooler testing is in progress.



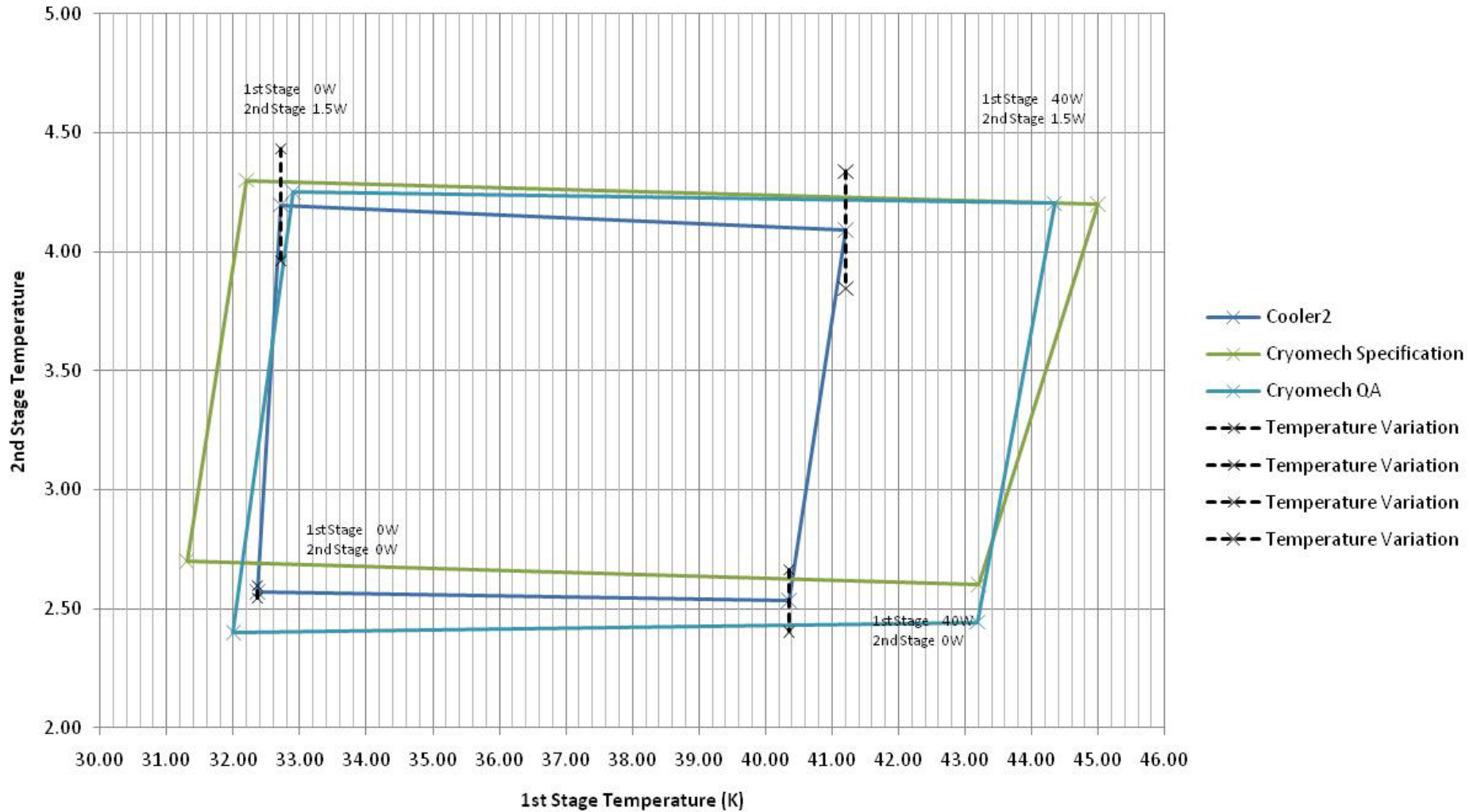
# Cooler 1



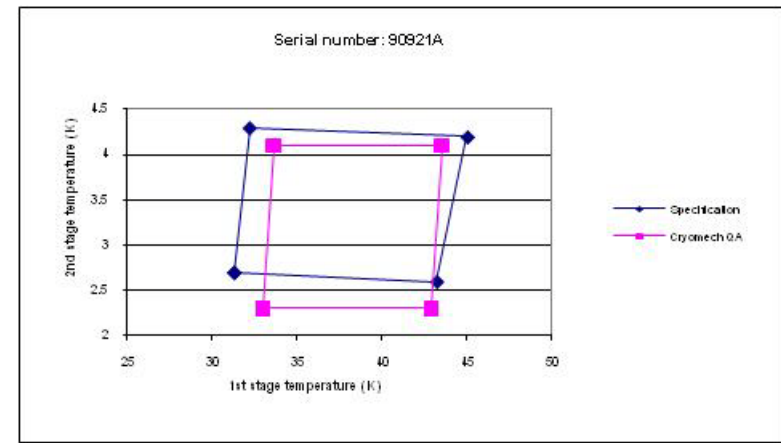
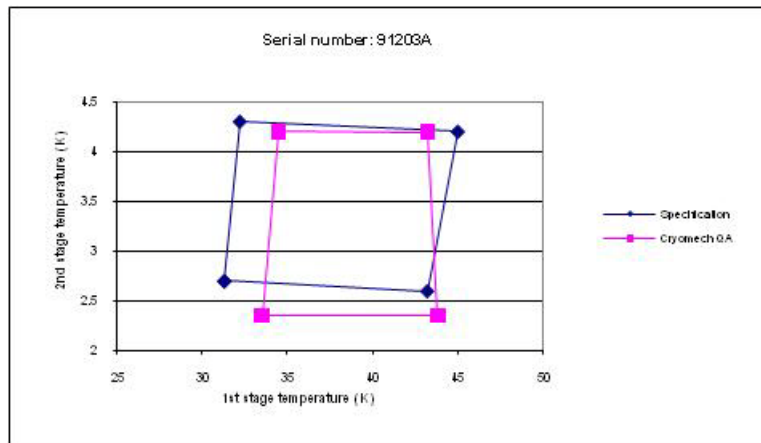
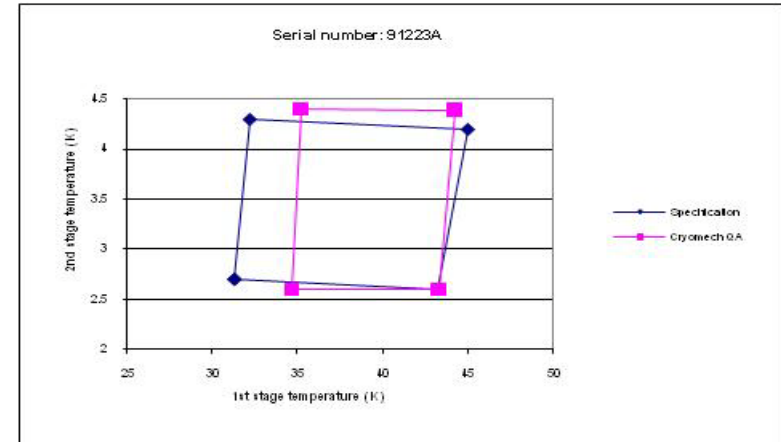
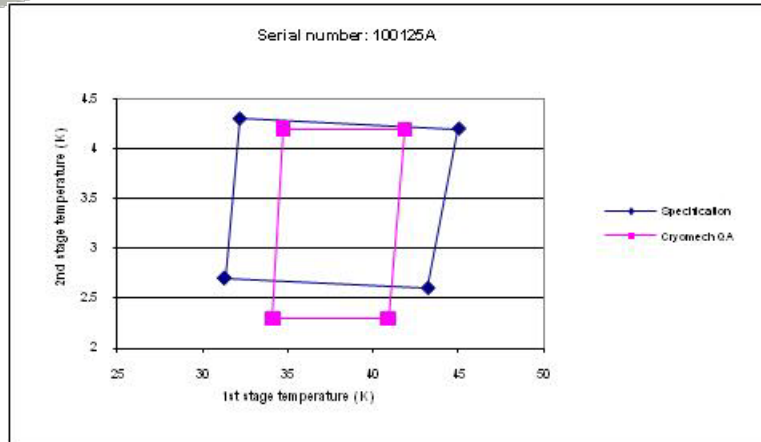
This cooler is quite bad and doesn't meet specification – even on Cryomech QA plots.

This worried us and Tesla found the Cryomech QA plots “hidden” in the packing which we then had a good look at .....

## Cooler 2



We haven't tested the other coolers but we have compared the Cryomech "QA" plots with the specification ...



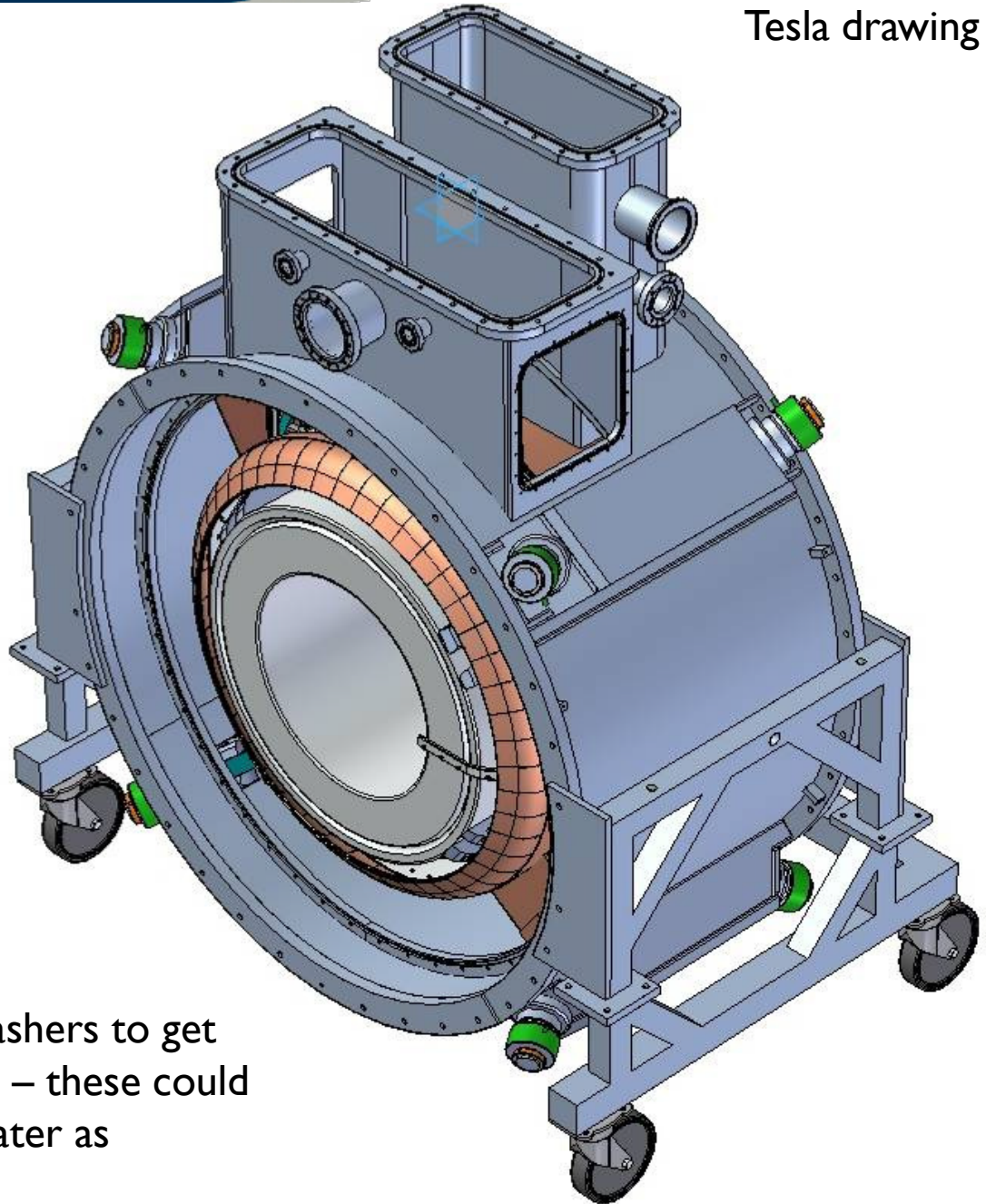
It appears that the no-load performance is not correct – this probably doesn't worry us too much ... But performance needs checking...

Will probably select best coolers for He system and put worst on Hydrogen system. Tesla "In discussion" with Cryomech..

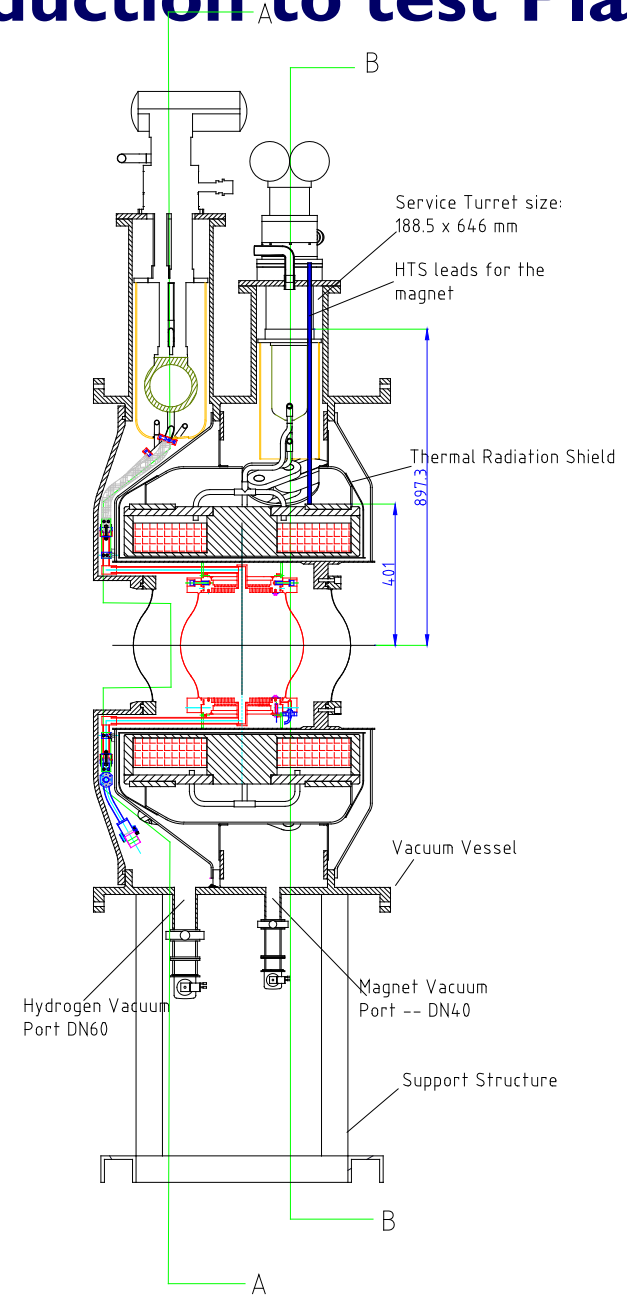


- Remove Assembly from CM assembly Stand;
- Align Cold Mass to OVC using CMM, Alignment blocks and adjustment of Support fasteners; n.b. Alignment can be carried out after installation of He turret assembly in stage 13.
- After Alignment, complete middle link support radiation shield and cover with MLI

Using thrust washers to get correct tension – these could be monitored later as necessary.



- Test plan for the AFC when at RAL
- Special conditions of testing without the lattice means that a support structure will be required for operation of the magnet in the MICE Hall (Item is top heavy and same/similar support will be required for transport).
- Assume that the tests will first be done with hydrogen and the absorber. It may be that the absorber will have to be taken out at the end of the tests to fit a solid one.



- Tesla on-site commissioning and acceptance test at RAL – either in the MICE Hall or in R9
  - Installation
  - Connection of services
  - Cool down
  - Ramp up current

These are the tests which are contractual and represent the final milestone for the delivery of the AFC. It is also an opportunity for us to learn how the system will operate.

Ideally we would like to conduct these tests with the final MICE AFC magnet control system – need to get a move on with this.



- **Field Mapping at full field**
  - Set-up
  - Mapping
- **Absorber integration**
  - Fit absorber - check for interferences
  - Integrate with Transfer line
  - Leak check and pump
  - Instrumentation check
- **Safety windows**
  - Installation
  - Leak check
- **Cover plate installation**
  - Install
  - Pump down and leak check

This will be done by CERN with OU involvement

We have some tight fitting pipework

Different pump port as normally this would be the MICE vacuum

- Preliminary cool-down
  - Base temperature test
  - Helium condensation
  - Cooling power at 20K
  - Warm-up H2 system
- Hydrogen System test
  - Cool down
  - Part fill with hydrogen
  - Warm-up H2 system
  - Purge
  - Cool & Fill with hydrogen
  - Hold for two days
  - Ramp up field and hold
  - Warm-up H2 system
  - purge

This is a test without hydrogen to test operation and instrumentation. Also the test will thermally cycle the system to check joints.

This first part of the test checks the hydrogen fill with a minimum amount of hydrogen to reduce risk.

Second part includes full operational check together with magnetic field in the AFC

Module/Activity	Due Date
AFC1 at RAL	October 2011 – trying to improve on this
Absorber integration and test	+3mths elapsed
AFC2 at RAL	Late December 2011 – trying to improve on this
Absorber integration and test	<3mths

Gantt charts are available ..  
Undergoing a schedule review with Tesla at the moment dates may change