Science & Technology Facilities Council

Warm Magnetic Shield Update

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Summary of MSL Meeting 18/08/16 & 25/08/16

Agenda

- Cryomodule overview & spatial constraints presented
- Tolerance-Gap requirement highlighted
- Design options discussed including options B & D for maximum clearance
  - B: 3-way bent panels (fewer parts)
  - D: flat panels (smaller, lighter parts)
- Branch tube cover discussion
  - Advised to use where possible
  - Particularly for large jumper penetration
  - Fringing effect = 1.5 x diameter
  - Floating cover options configuration
- Questions for MSL
  - Shield thickness options
  - Fastener size and spacing
  - Overlap jointing options
  - EM gaskets requirement lid/windows

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MSL Comments

- Fastening MuMetal directly to 304 not advised sue to magnetic issue, MuMetal – 316 OK

- Magnetic Isolator/Spacer required
  - Tufnal washer
  - Welded 316 shim
  - Mylar sheet

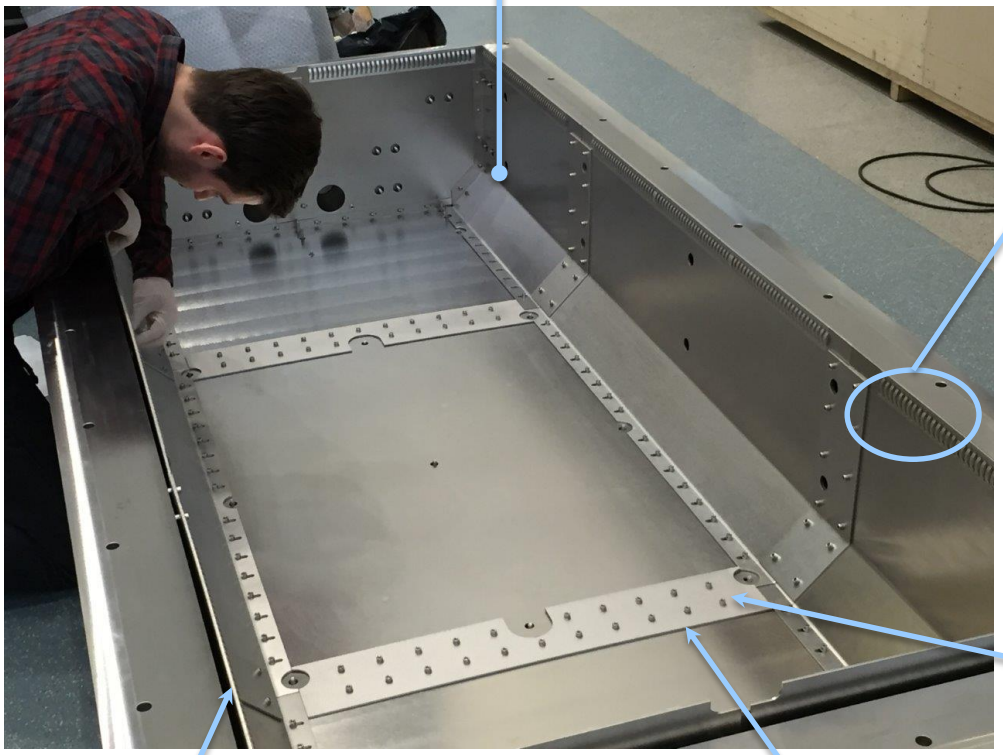
- 2 or 3 mm MuMetal thickness can achieve required performance
  - 2mm: lighter, cheaper, cold rolled
  - 3mm: stiffer can be tapped (M5), excess shielding material risk
  - Different size options and suppliers

- Manufacturing Notes:
  - Max available size 2x1m (minus edges for clamping)
  - Max Length for Heat Treatment 1.4m Vacuum Oven
  - 2m dry hydrogen oven available in Nov (slightly lower heat treatment properties)

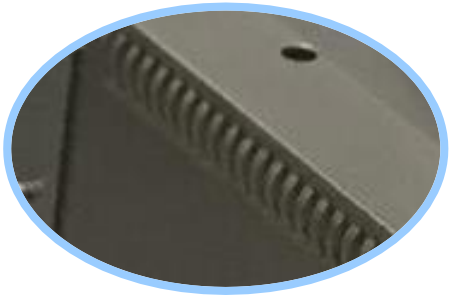
- Updated Option D concept is considered optimal – minimum components with high precision

Reference Photographs

Similar ‘clam shell’ shield



Electro-Magnetic gasket to ensure magnetic contact



Fabricated from 0.35mm MuMetal and spot welded to shield

M5x6 screws
40-60mm spacing

3mm thick mumetal
Tapped for shield connections

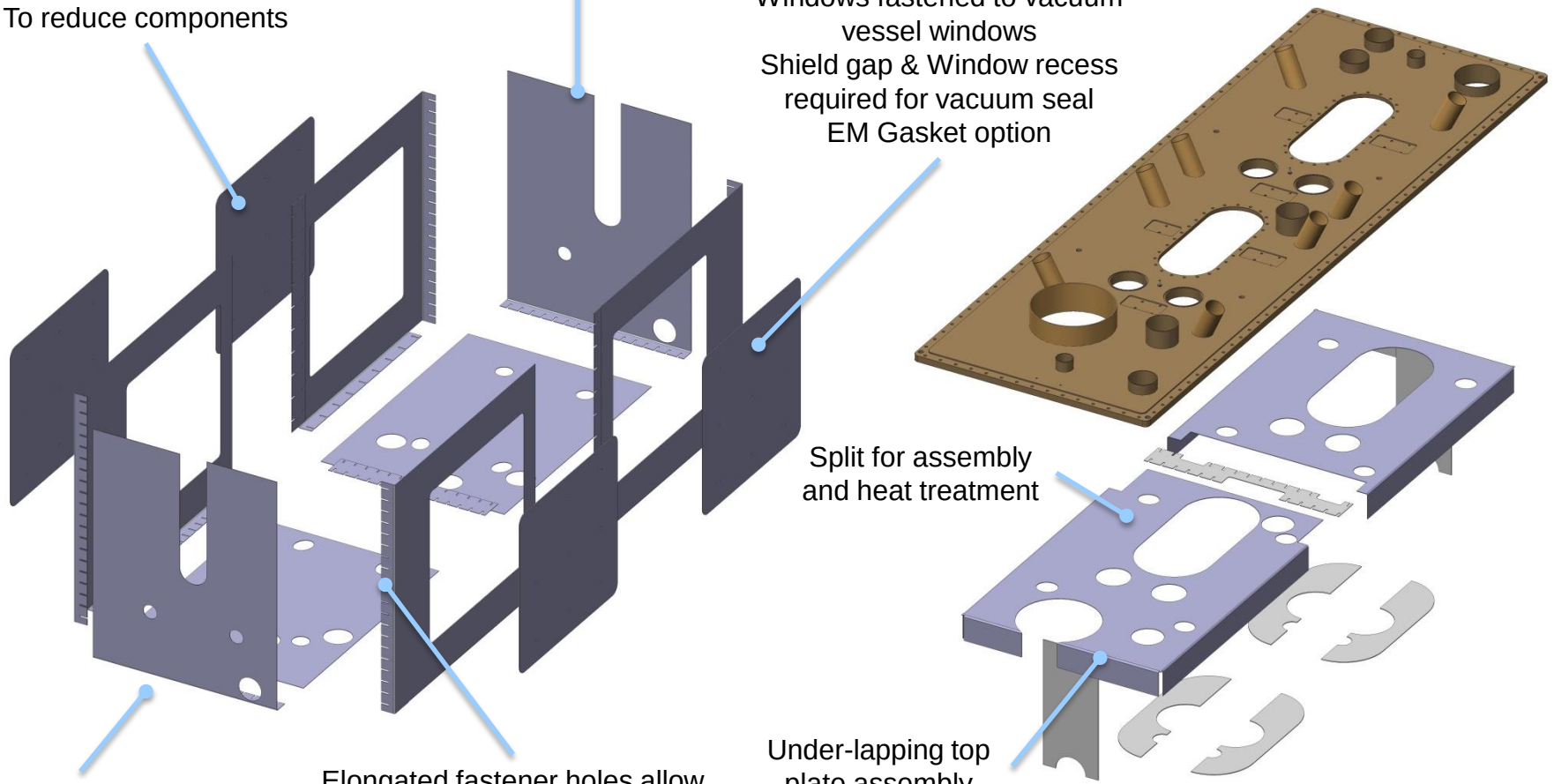
100mm wide cover strips

Updated Concept D

2mm thick MuMetal
(3mm duplicate to be produced
for simulation comparison)

Panels with integrated flanges
To reduce components

Windows fastened to vacuum
vessel windows
Shield gap & Window recess
required for vacuum seal
EM Gasket option



Split for assembly
and heat treatment

Under-lapping top
plate assembly

Reduced size for
1mm vessel spacing

Elongated fastener holes allow
adjustment for tolerance
50mm spacing

Max Panel Size: 1264 x 1066 mm
Max Panel Mass: 15kg

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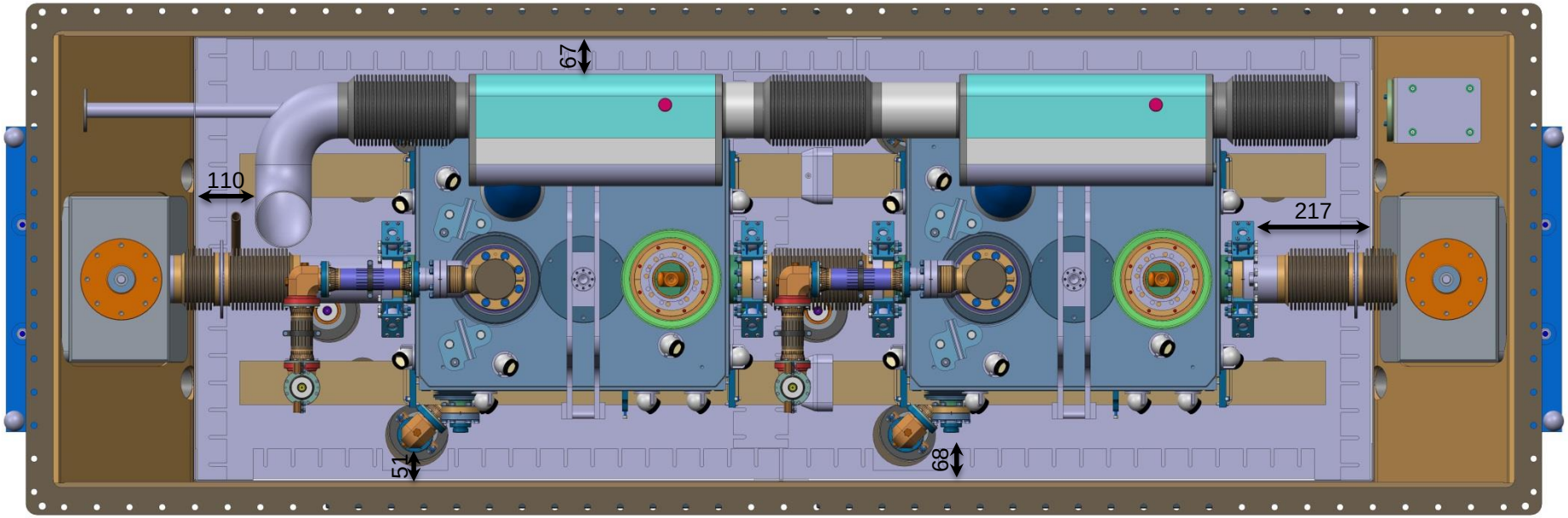
Cryo-string Clearance



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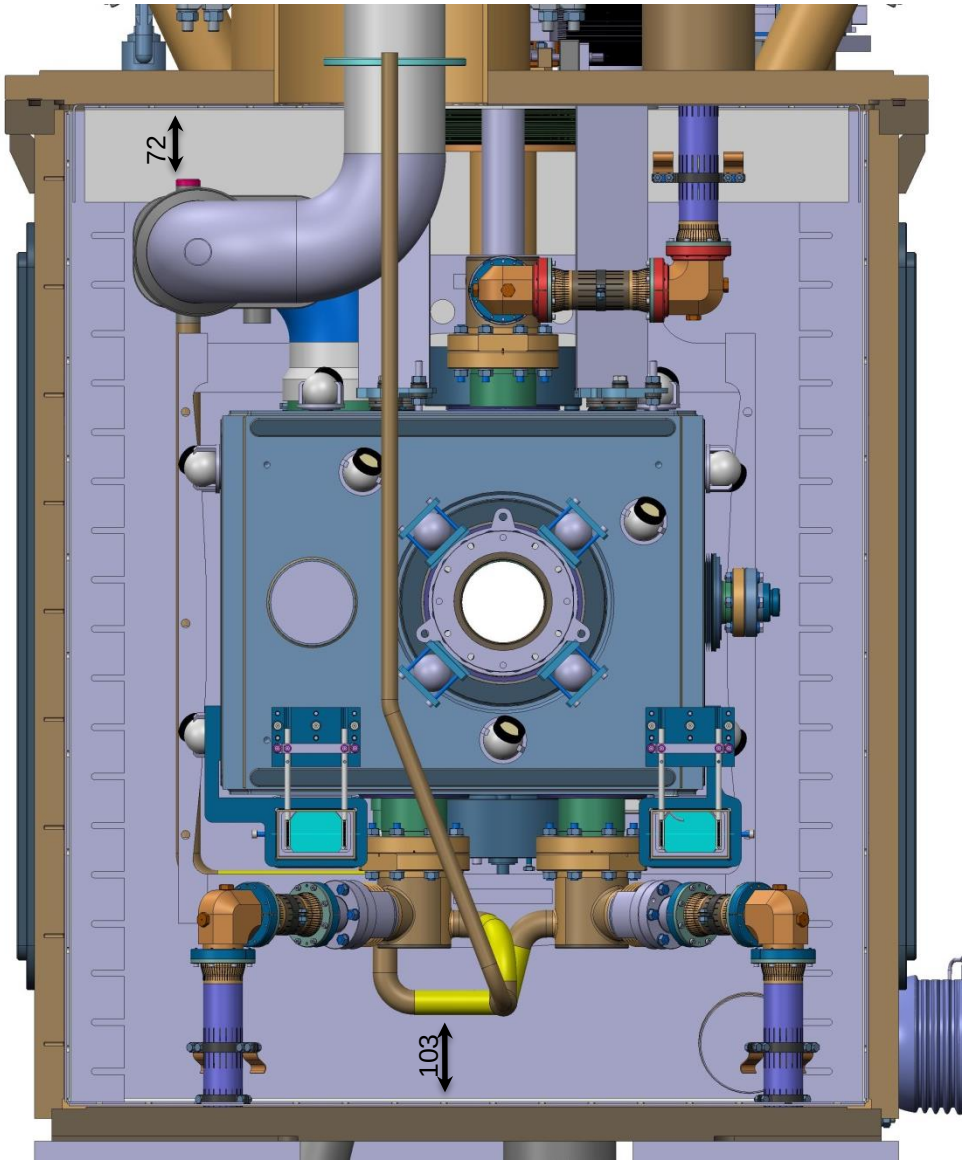

Further Work

- Produce models for simulation
  - 2mm
  - 3mm
  - With & Without EM gaskets for Magnetic Contact
- Revise Thermal Shield Geometry
- Thermal Shield with chamfered corners for joints