

TIK-4.3 Irradiation Module

In-Kind Partner Team

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Outline

- Organization
- Highlights
- Near-term plans
- Risks and issues
- Concluding remarks

TIK 4.3 Organization

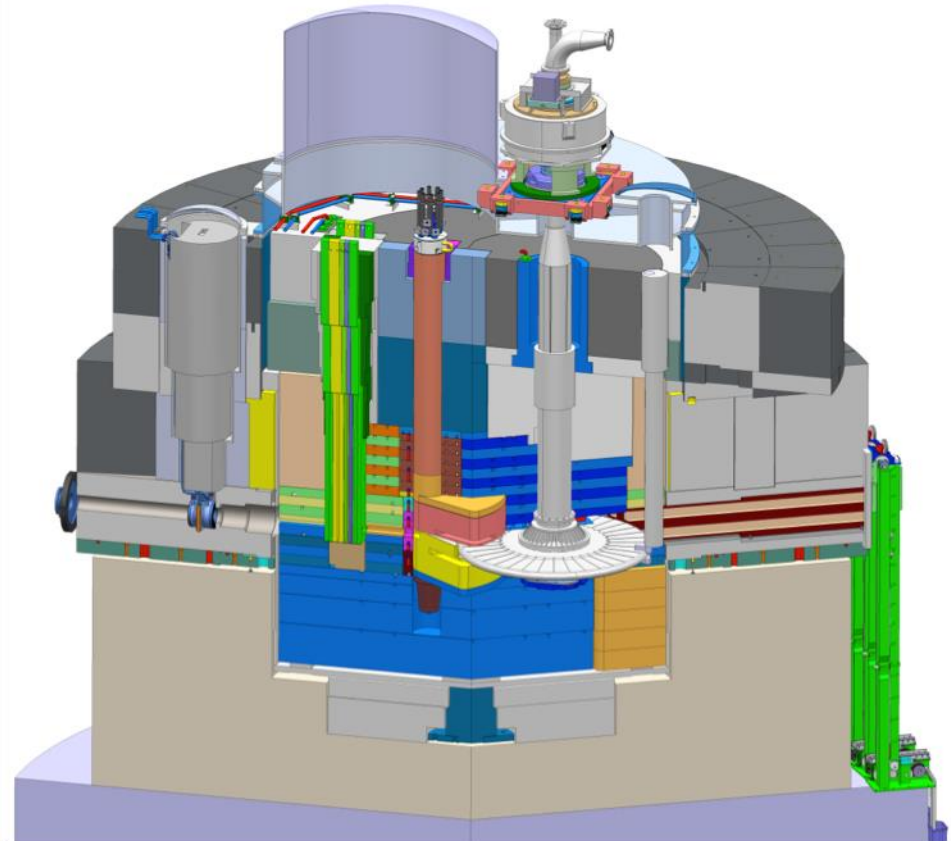
- In-kind partner (CNR): coordination from Roma Tor Vergata unit (R. Senesi) and Milano Bicocca unit (G. Gorini).
- *Units of personnel seconded at ESS: c/o Engineering (F. Masi) since March 2015; c/o Neutronics (J. Scionti, six months secondment).*
- In collaboration with ESS team (Target, Neutronics, Eng. Divisions) and Juelich team for the interface with moderator/reflector WBS 12.3 incl. TIK 3.1 and 3.2

Function

Irradiate samples of structural materials relevant for the facility and related applications through utilisation of the neutron radiation spectra characteristic for a spallation source.

Position

Irradiation samples shall be located as close as possible to the target material, in a position offering both a representative radiation spectrum and an acceptable disturbance of moderator performance.

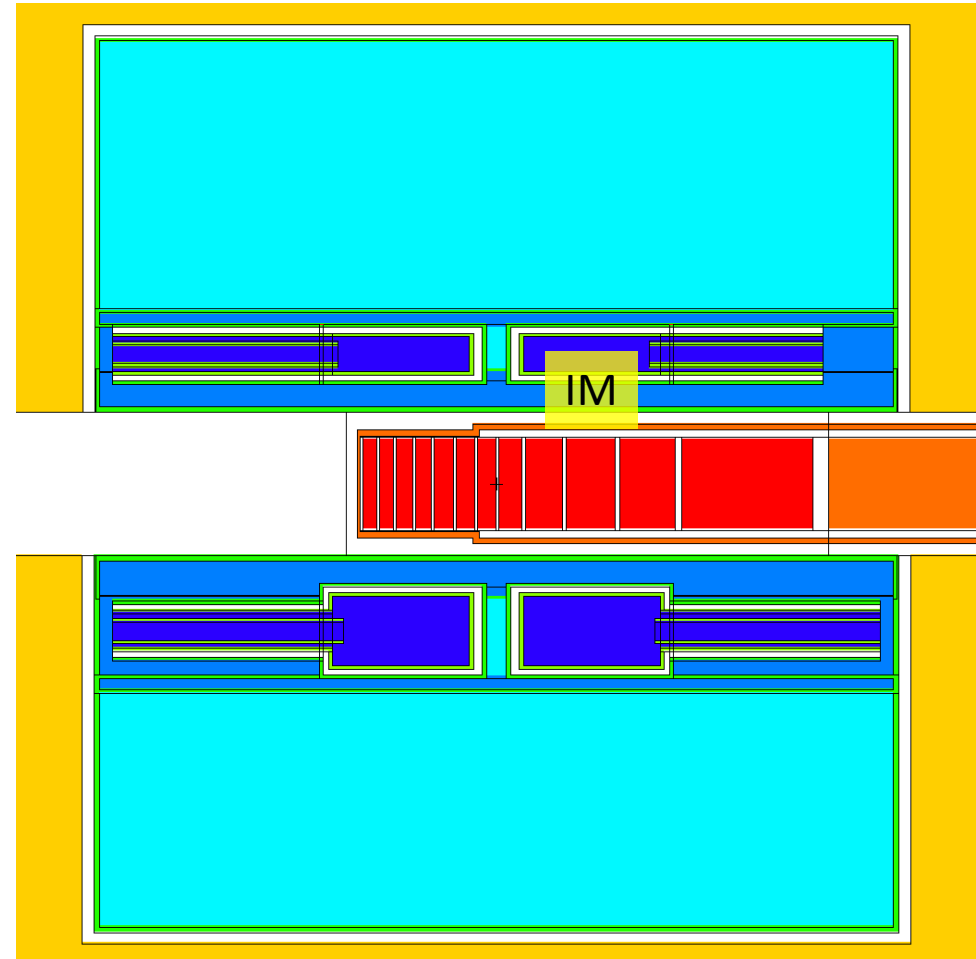


By using the fast neutron spectra, samples and components can be irradiated and used to support ESS's own program of target station R&D, and related applications.

Highlights of work since last meeting

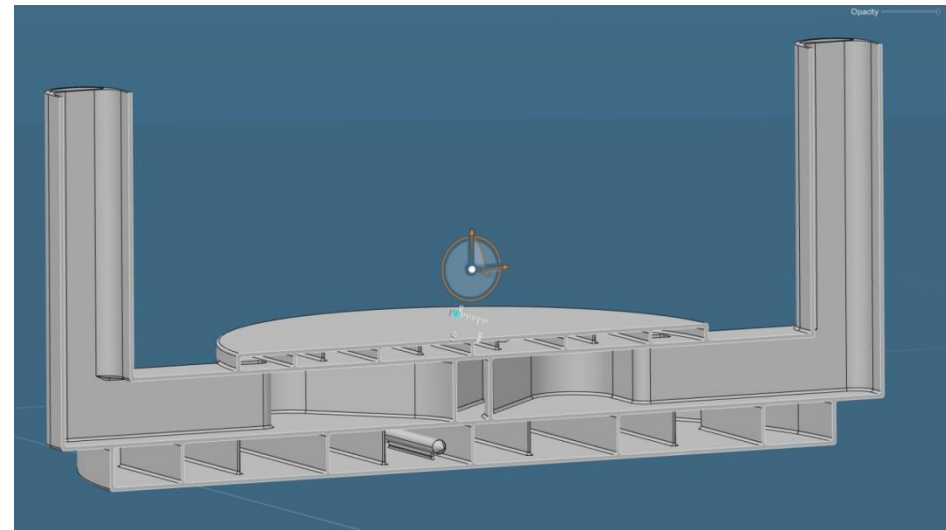
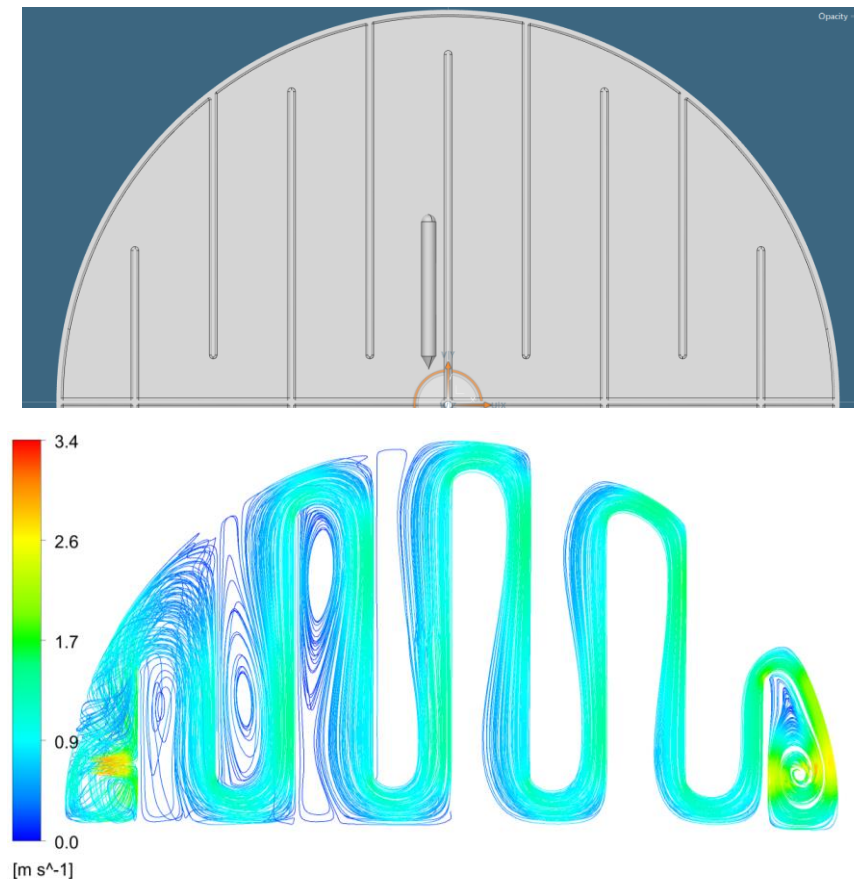
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- Locations have been prioritised
- IM will be located inside premoderator
- Indicate development paths



Highlights of work since last meeting October 2015

- Concept design has been finalised

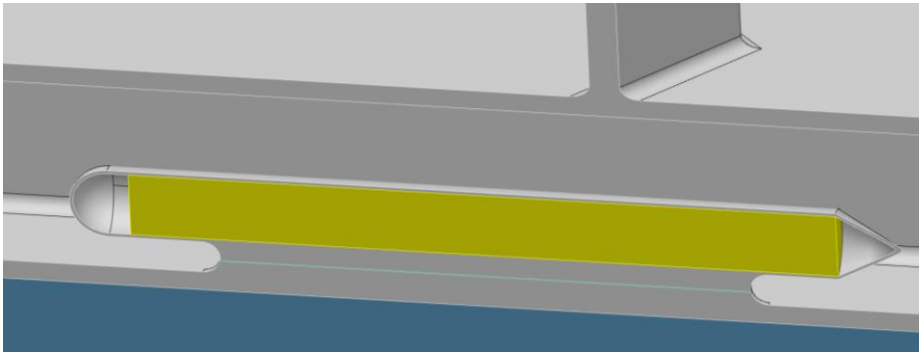


- Top/ Bottom moderator (option to be chosen)
- Outside of recirculation zones (white areas in left image)

Highlights of work since last meeting

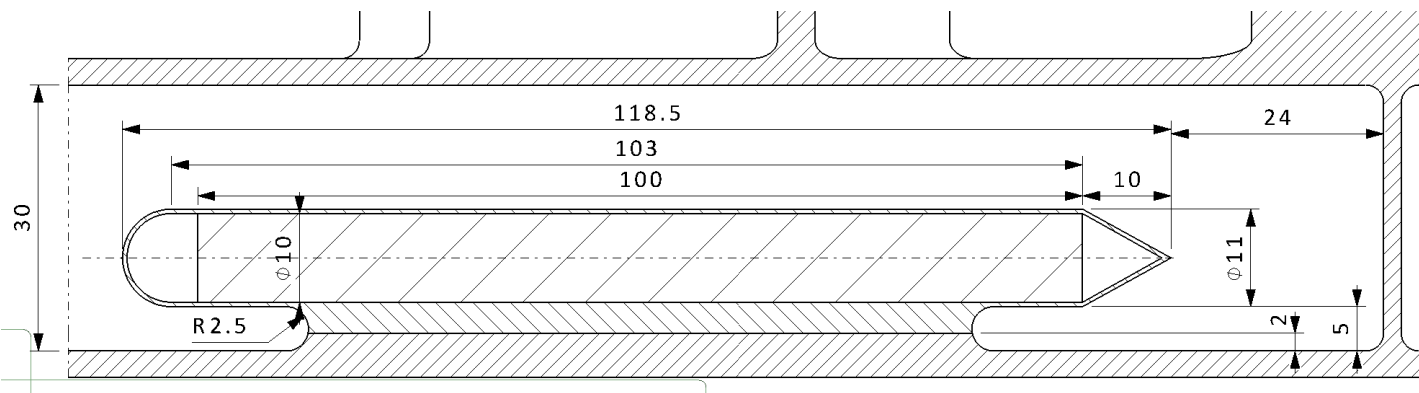
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Main dimensions



Geometrical features

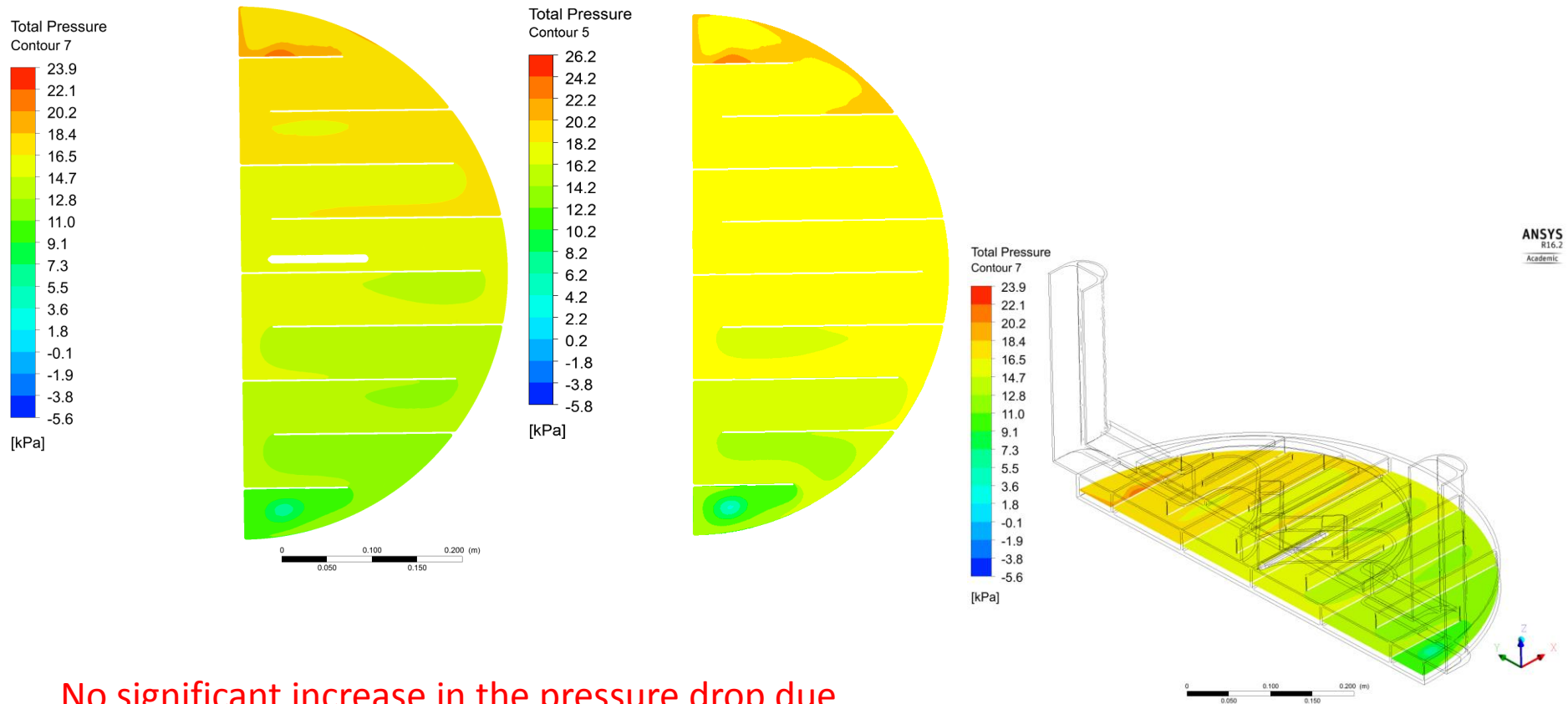
- Torpedo shaped container
- Outside dimensions: 10 x 118.5 mm
- Capsule dimension: 10 x 100 mm
- Distance container-lid: 5 mm
- Gap capsule-hemisp. plug: 3 mm (to prevent failure in case of heat induced capsule expansion)



Highlights of work since last meeting

October 2015

Computational Fluid Dynamics completed

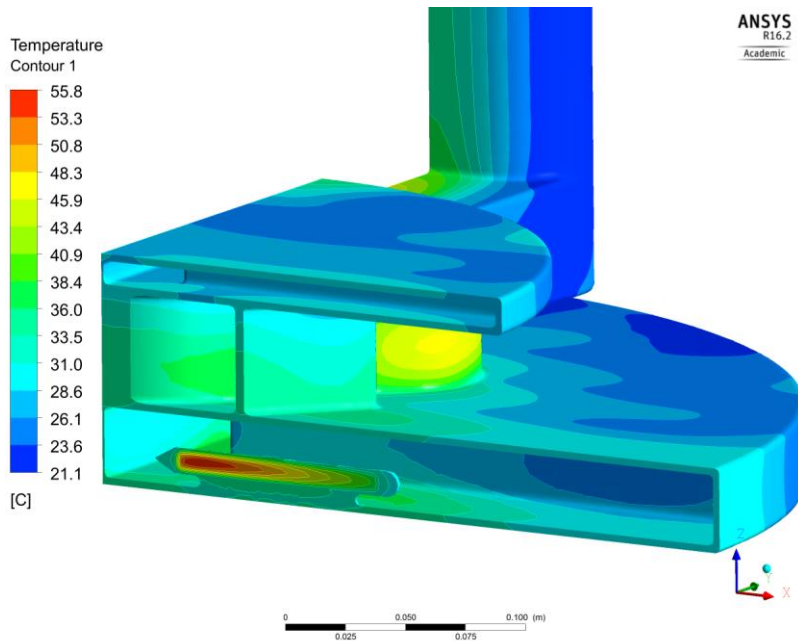


No significant increase in the pressure drop due to the IM

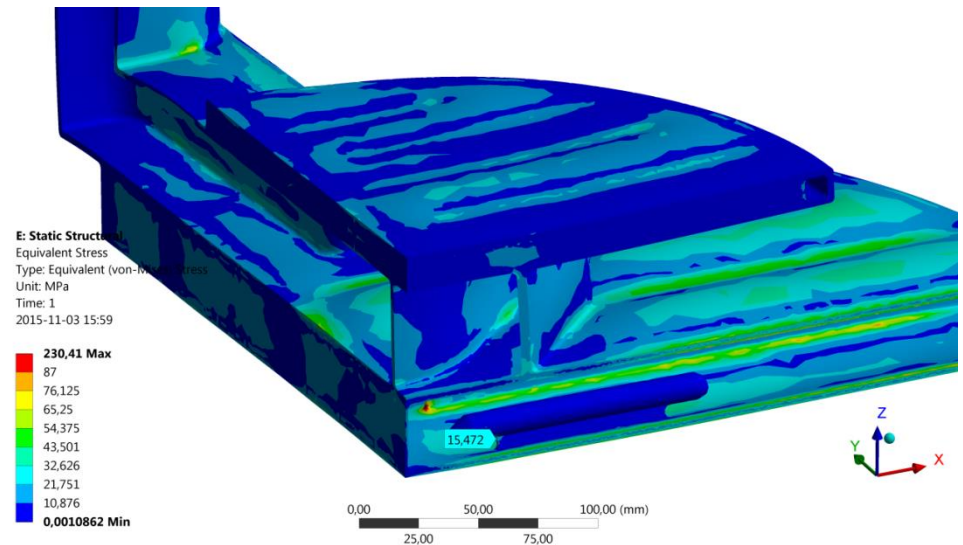
Highlights of work since last meeting

October 2015

Structural analysis completed

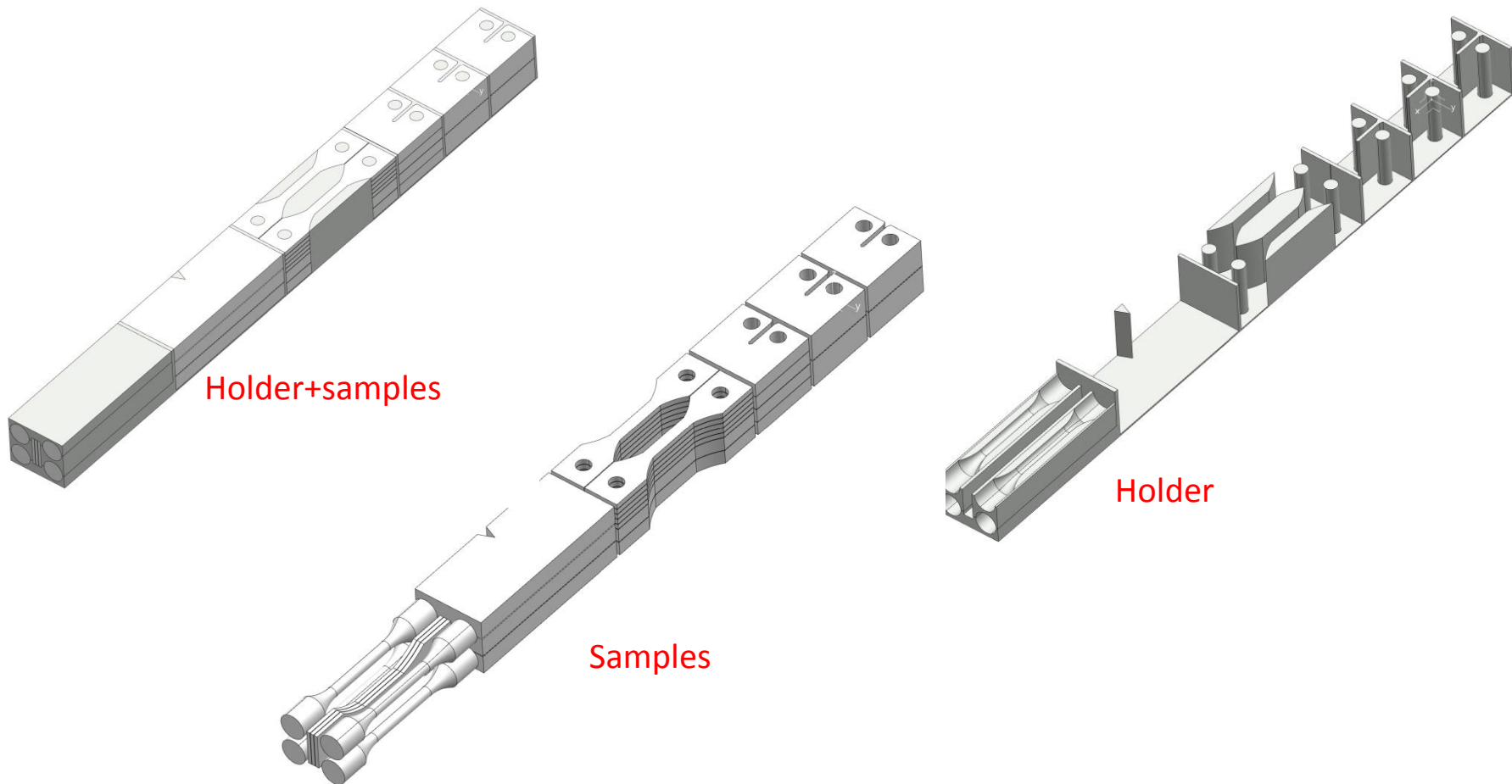


- IM average heat deposition: 50 W/cm^3
- Max temperature inside IM: 56 C (Max temp of samples in the capsule)
- Maximum stress due to the IM: 15 Mpa (small stress value , much lower than maximum stress in the premod – 230 Mpa)



Highlights of work since last meeting October 2015

Mini-samples concept design prepared



Highlights of work since last meeting

October 2015

- Concept design transmitted to Juelich through D. Lyngh-approved
- Task allocation proposal draft prepared
- Draft of Interface control document requirements prepared and submitted to WBS 12.3 Moderator Reflector Systems leader
- Draft cost estimate prepared

Near Term Plans (next 3 months)

- Neutronics calculations
- Prototype to be inserted into moderator/reflector prototype. Precision mechanics company has been contacted for estimates.
- Define sample preparation and testing procedures + task allocation
- Define interface with Remote Handling Systems (WBS 12.6 incl. TIK 6.1)

Risks and Issues

- Interface of IM embedded in premoderator with WBS 12.3 (Moderator and Reflector Systems) is relevant.
- **If** MR design is updated, we need efficient interface/inputs with WBS 12.3 (Moderator and Reflector Systems) to provide alternate options of minimized impact -in collaboration with IK partner for Mod. Refl. Systems and ESS team
- Opportunity: enlarge scope and extent of IM towards 2nd generation MR plug