Design and Analysis of SST-2 Vacuum Vessel

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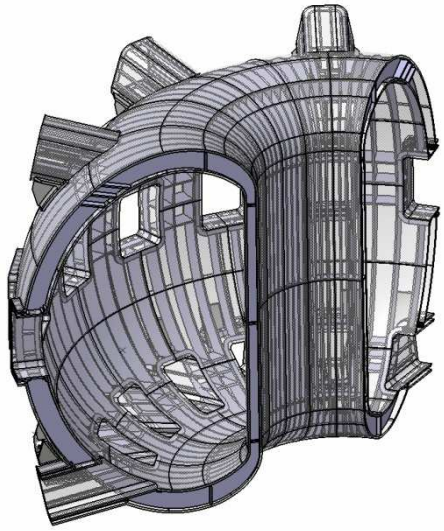
- SST-2 fusion reactor is the next medium sized device
- The device is built for realizing the following
  - Reactor technologies
  - Test bed for qualifying reactor components
  - D-T fuel cycle.

This paper gives an insight into the

- Engineering requirements and design basis with the identified thermal, seismic and structural loads on the double walled 'D' shaped vacuum vessel for SST-2.

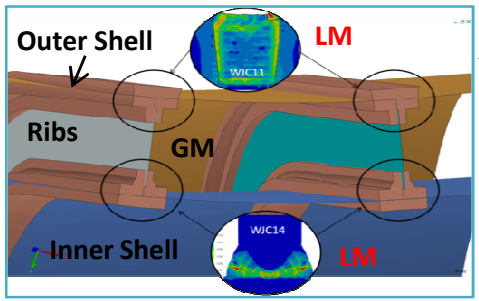


Structure of SST-2 Vacuum Vessel

- Parametric modeling of VV as a 2D surface geometry modeled in CAD environment, while the actual thickness of shell and ribs were defined at the time of FEM sensitivity analyses

- The preliminary assessment of the impact of these events has been performed on the structural margins calculated to guarantee the Vacuum Vessel's structural integrity with regards to the RCC-MR code.

- To predict welding distortion and optimize the manufacturing sequence of VV, computational simulations were carried out considering multiple factors like process, weld parameters, geometry, type of joint, sequence, clamping conditions, welding direction, thermal, metallurgical, mechanical material behavior and the local-global approach



Local-Global welding simulation

GM – Global Model ; LM – Local Model

20° VV Sector

Major dimensions		Weight 40° Sector (ton)	
Outer diameter (m)	17.0	Vessel + Ports	127
Height (m)	10.5	Shielding	354
Double wall thickness (m)	0.35–0.64	Coolant	40
Shell Thickness (mm)	50	Gussets	3
Rib Thickness (mm)	40	Total	524