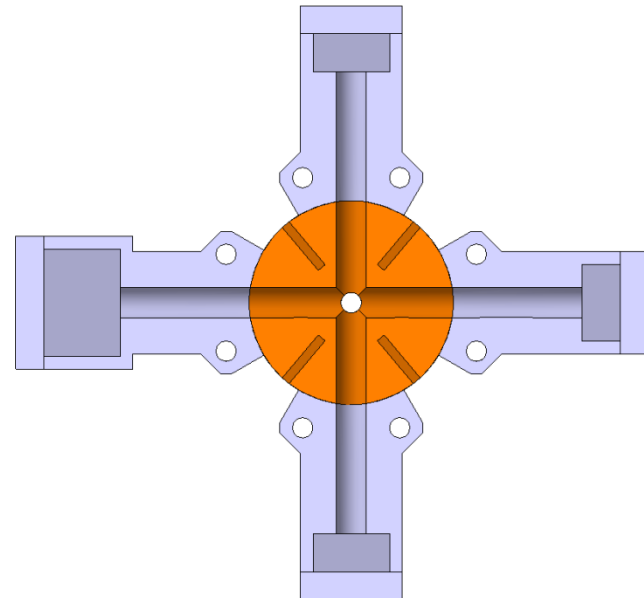
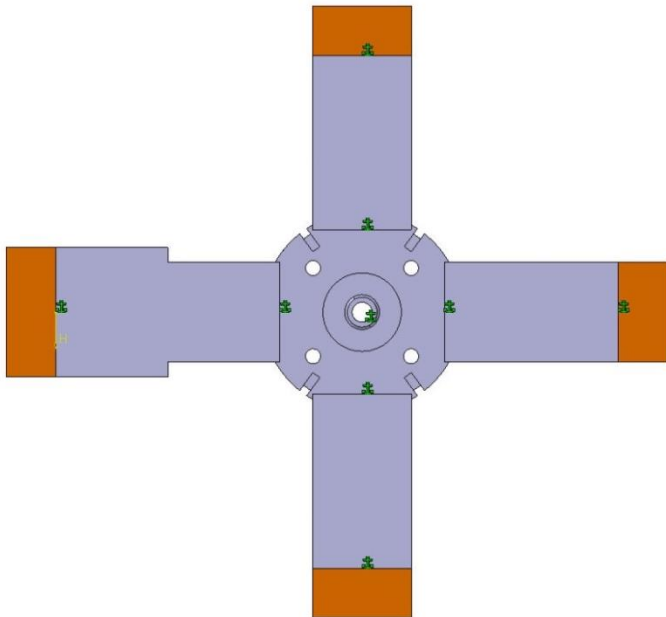
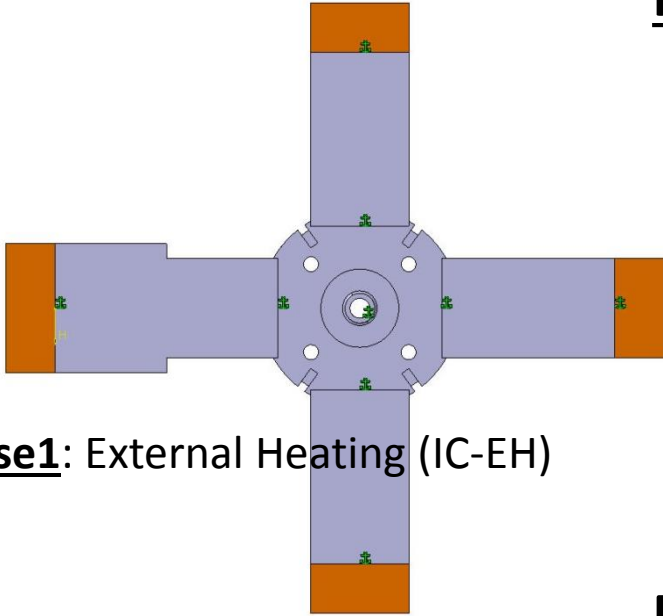


# Selection Of Optimized Heating and Cooling Arrangement for SAS Mock-Up

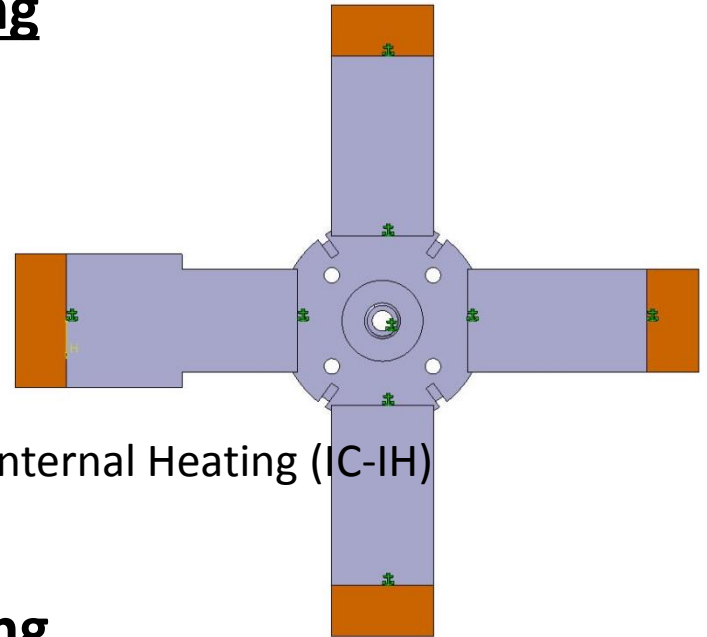
- **IC:** Internal Cooling (cooling channels in the core)
- **EC:** External Cooling (cooling channels in the manifold)
- **IH:** Internal Heating (heating source at the centre of the core)
- **EH:** External Heating (heating source in the slots)



## Internal Cooling

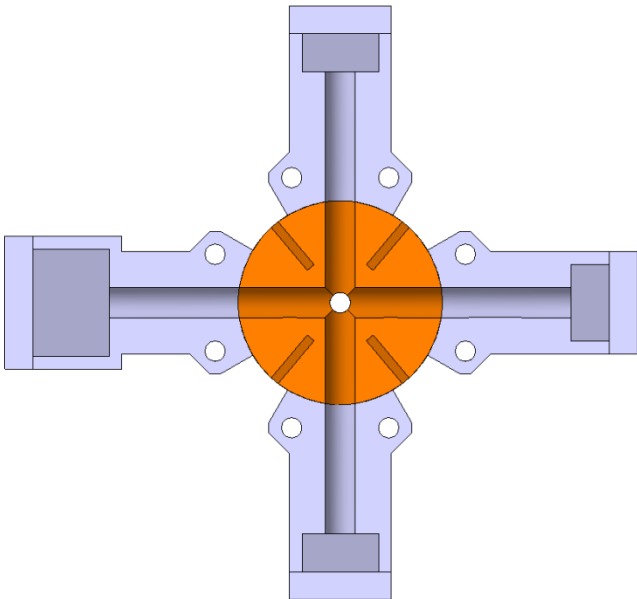


**Case1**: External Heating (IC-EH)

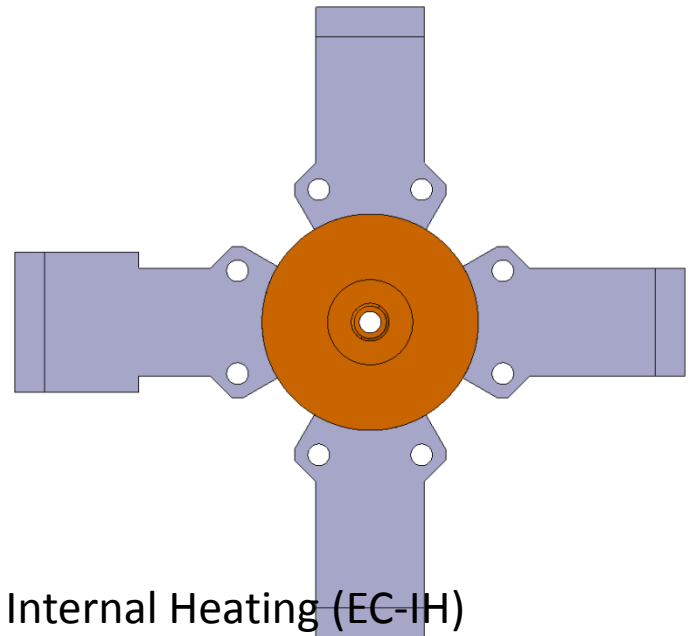


**Case2**: Internal Heating (IC-IH)

## External Cooling



**Case3**: External Heating (EC-EH)

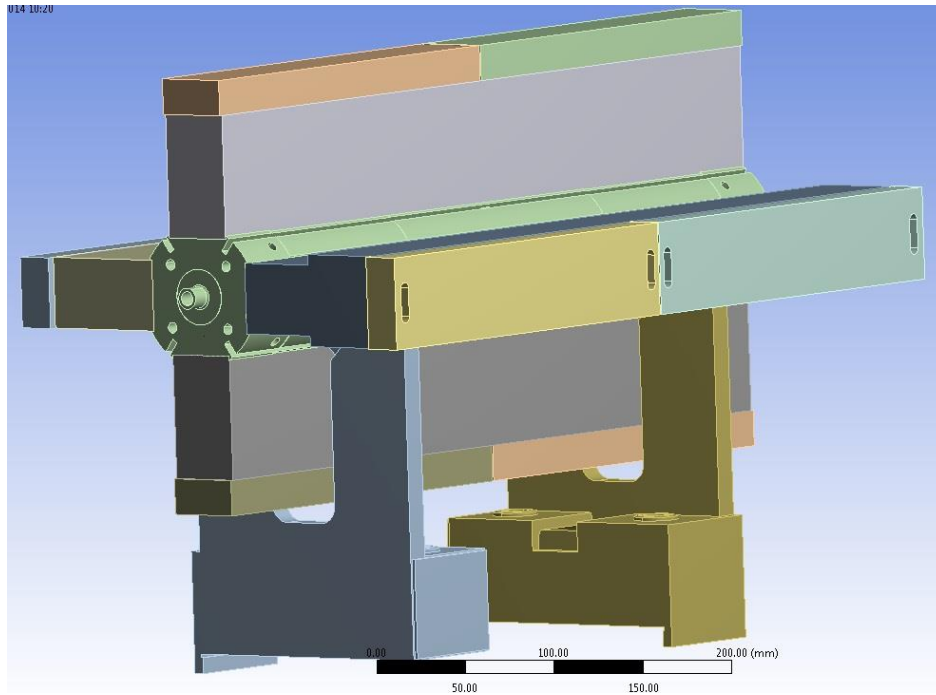


**Case4**: Internal Heating (EC-IH)

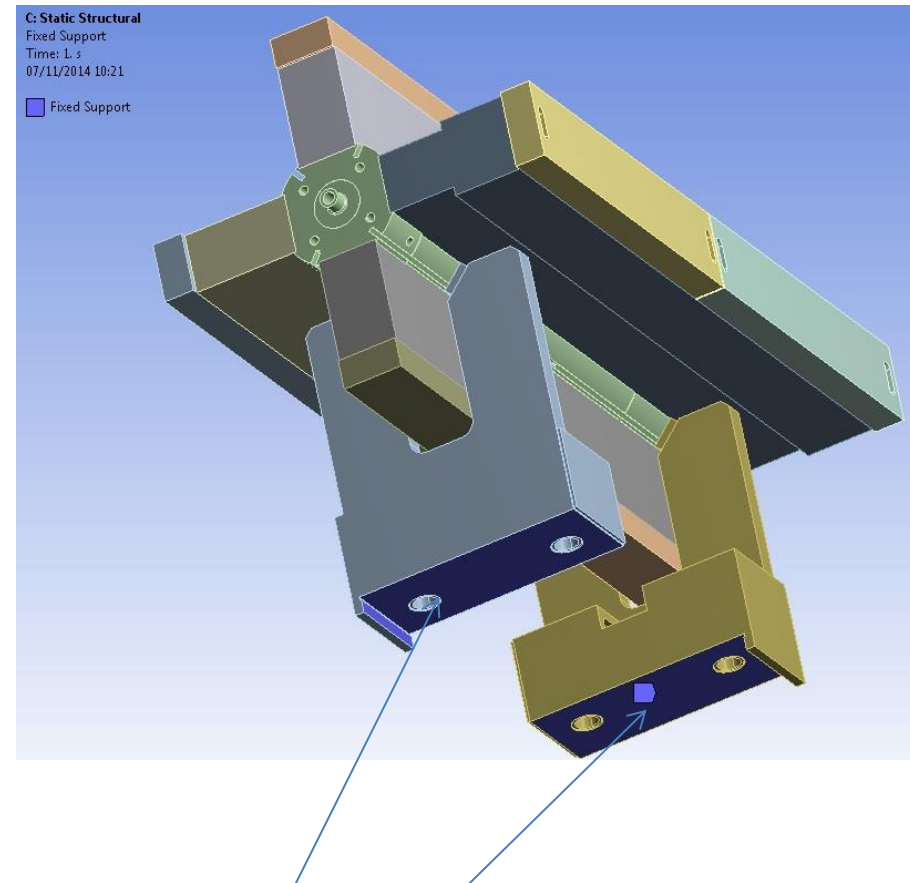
## Boundary Conditions

- Power 820 Watts
- Natural Convection  $4 \times 10^{-6} \text{ W}/(\text{mm}^2 \text{ C})$  (Air) at 20°C
- Forced Convection  $4 \times 10^{-3} \text{ W}/(\text{mm}^2 \text{ C})$  (water cooling) 25°C

# Geometry and Fixed Supports



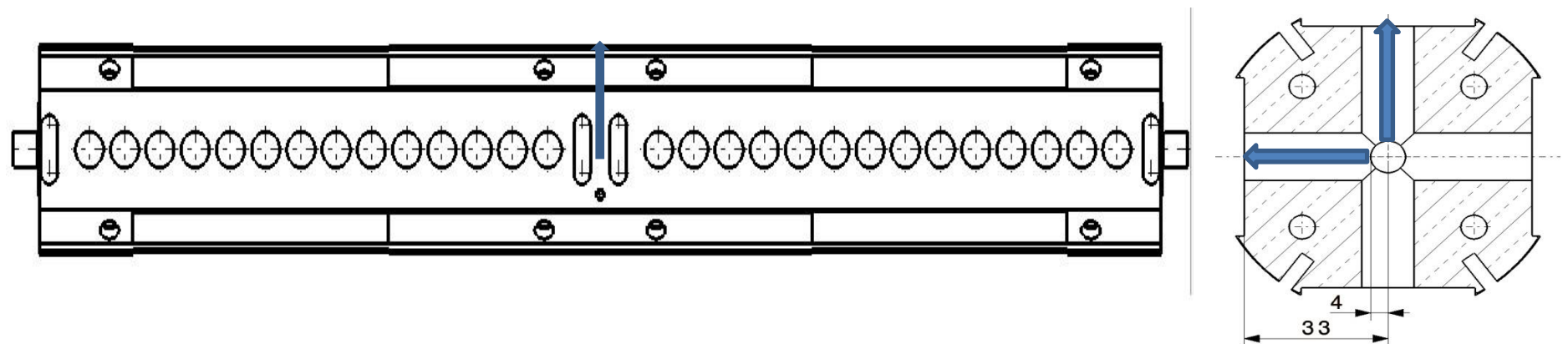
Mock-up with V-supports



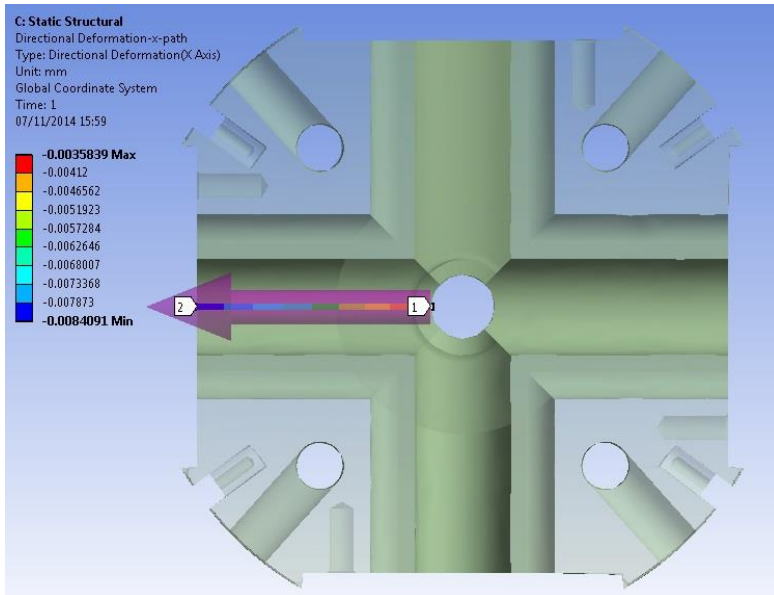
Fixed supports for static analysis

# Definition of Paths

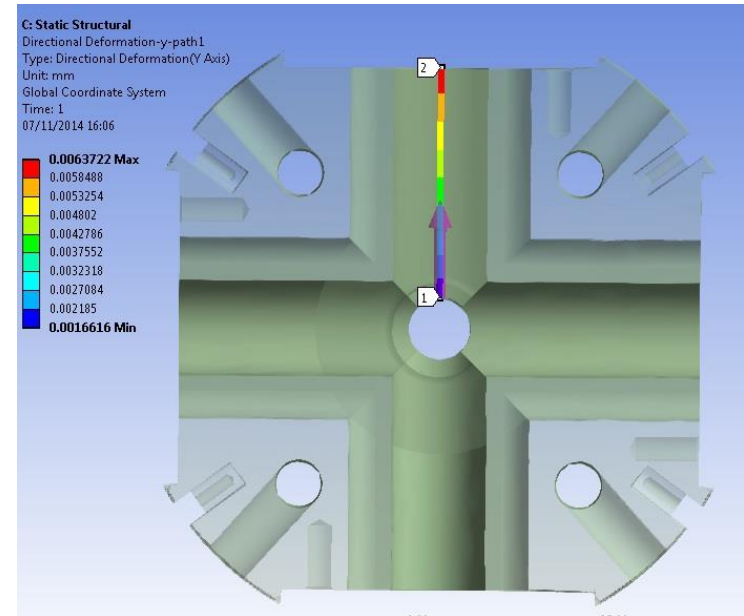
- The paths for deformations result are taken in lateral directions (both horizontal and vertical)
- Vertical direction is in the direction of V-Supports.
- Results are shown for radial distance ranges from 4 to 33 mm and at the centre of the core as shown below.



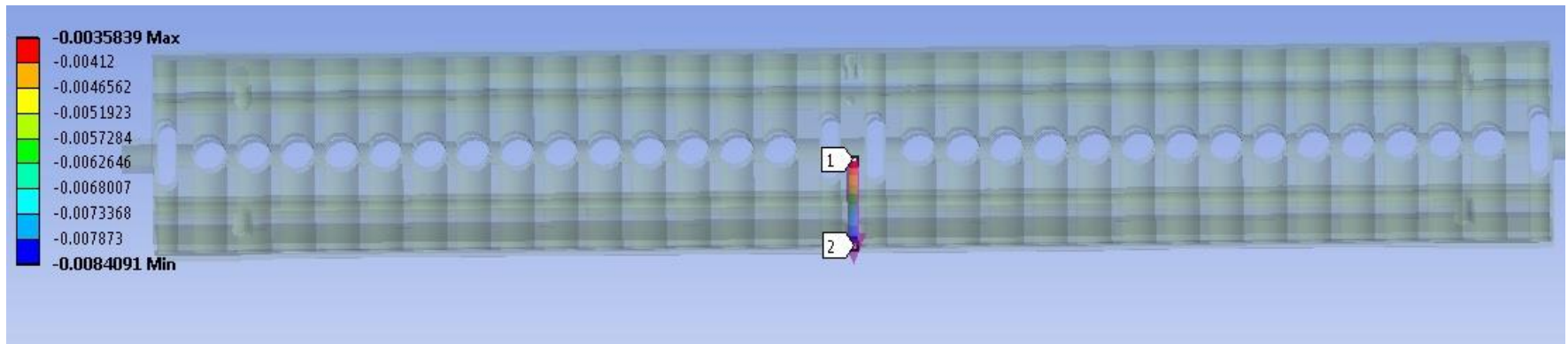
# Definition of Paths



Horizontal direction

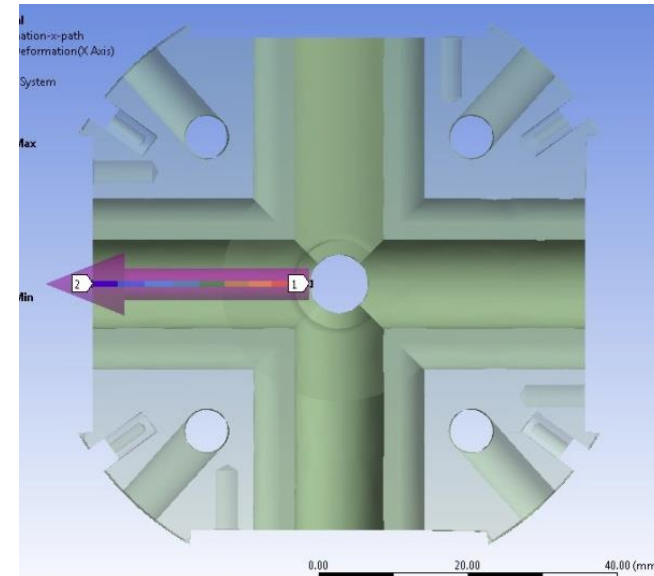
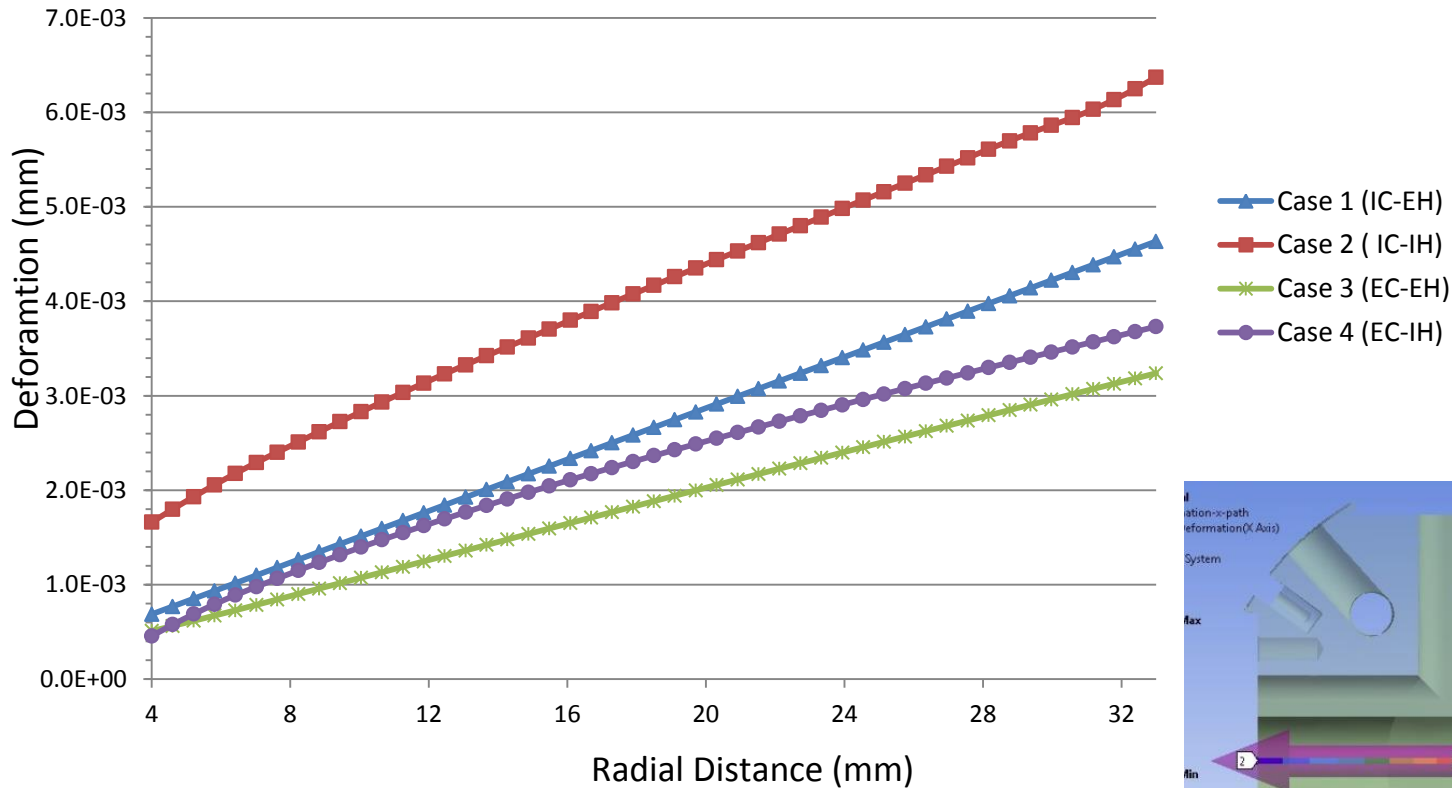


Vertical direction

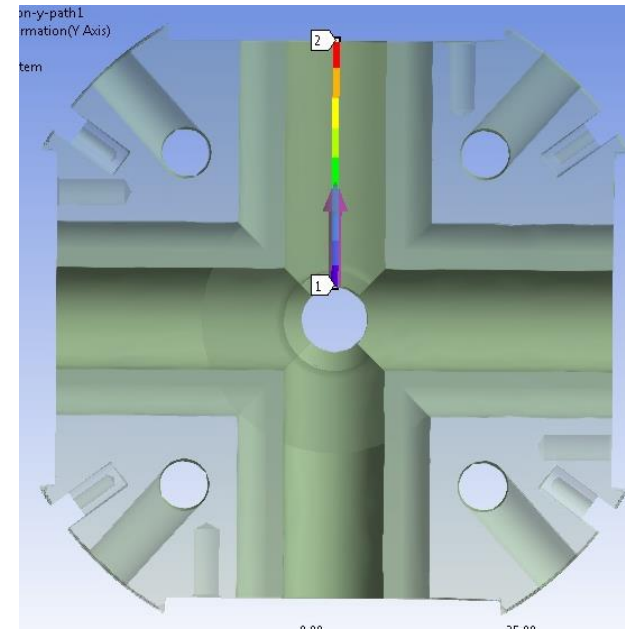
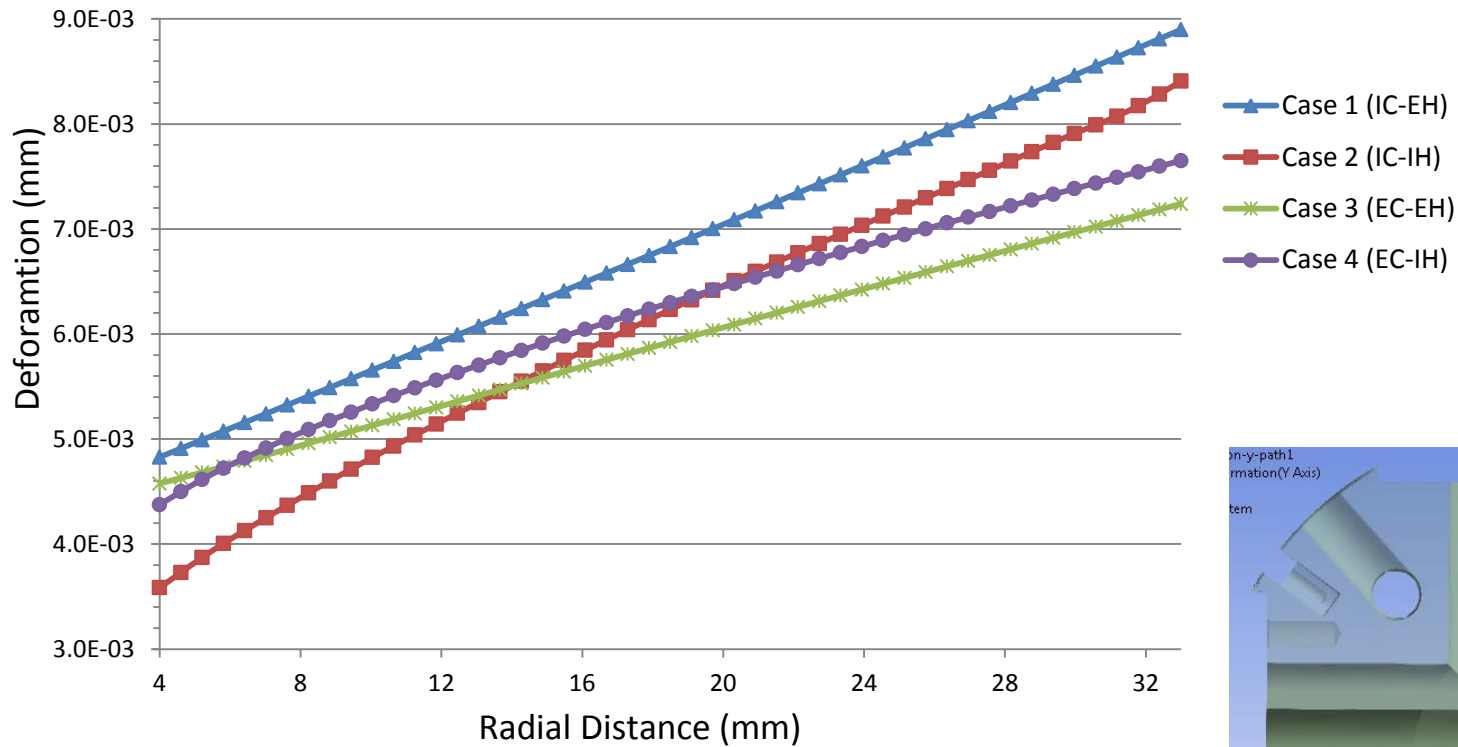


Center of Core

# Deformation in Horizontal Direction

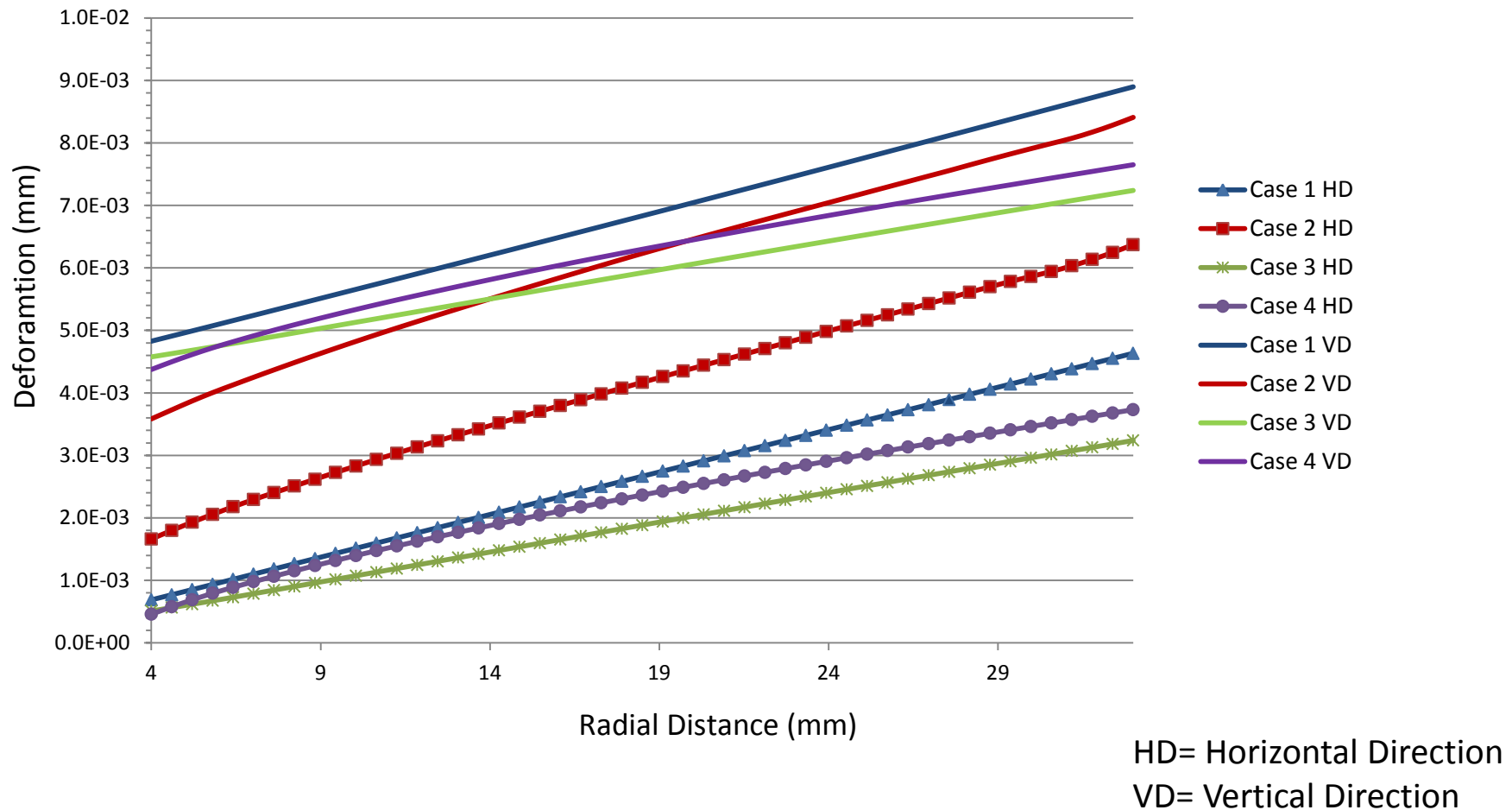


# Deformation in Vertical Direction



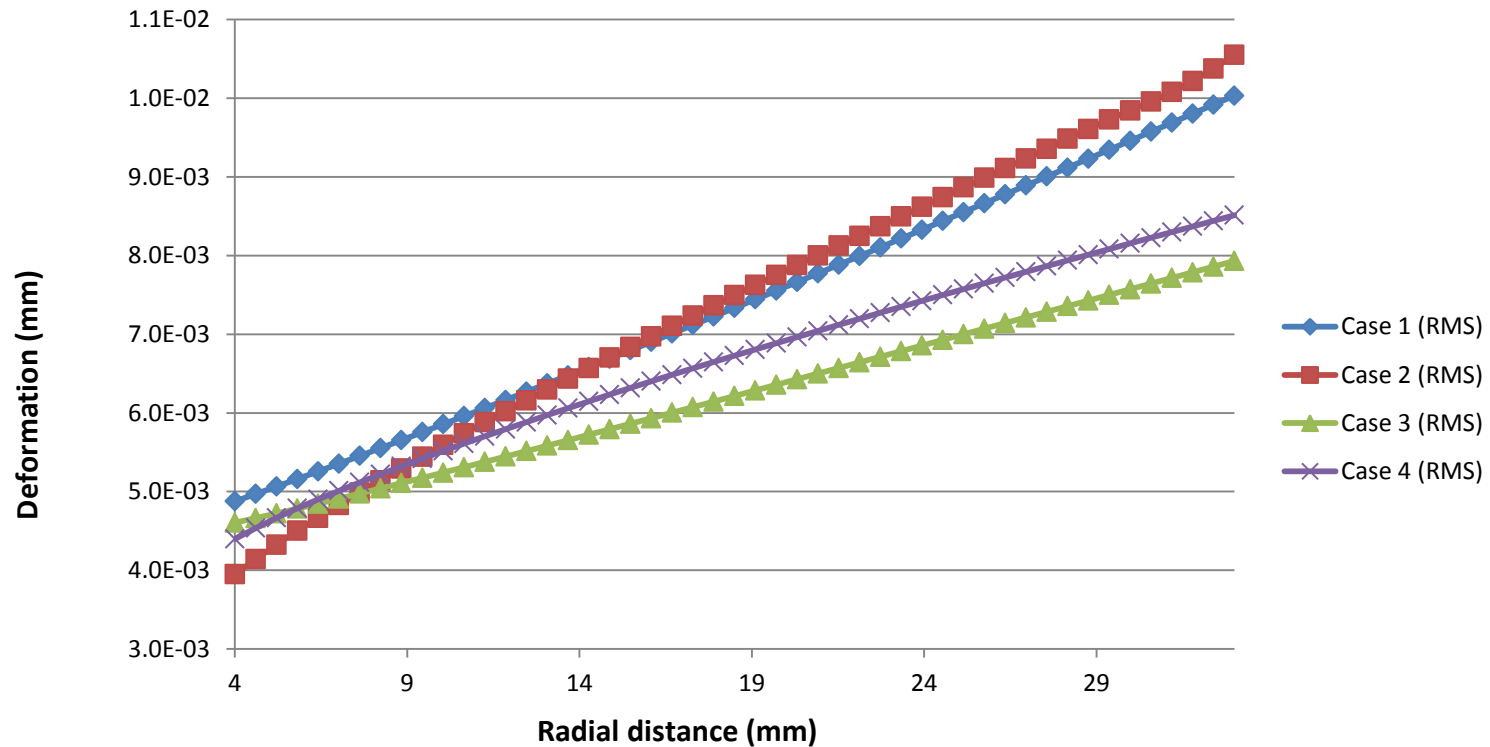


# Deformation in both Horizontal & Vertical Directions



# RMS values of Deformation in horizontal and vertical direction

- $RMS = \{(HD)^2 + (VD)^2\}^{1/2}$



# Conclusion

- All the values shown are taken in radial direction at the centre of the mock-up.

## Horizontal Direction

- Case 2 (IC-IH) has the maximum deformation at centre
- Remaining cases have almost similar deformation at the centre

## Vertical Direction

- Case 2 (IC-IH) has the minimum deformation at centre
- Case 1 (IC-EH) has the maximum deformation at the centre

## RMS

- Case 2 (IC-IH) has the minimum and Case 1 (IC-EH) has the maximum deformation at the centre