

# Results of the Prototypes Electron-Beam welded Segment for the ITER Vacuum Vessel



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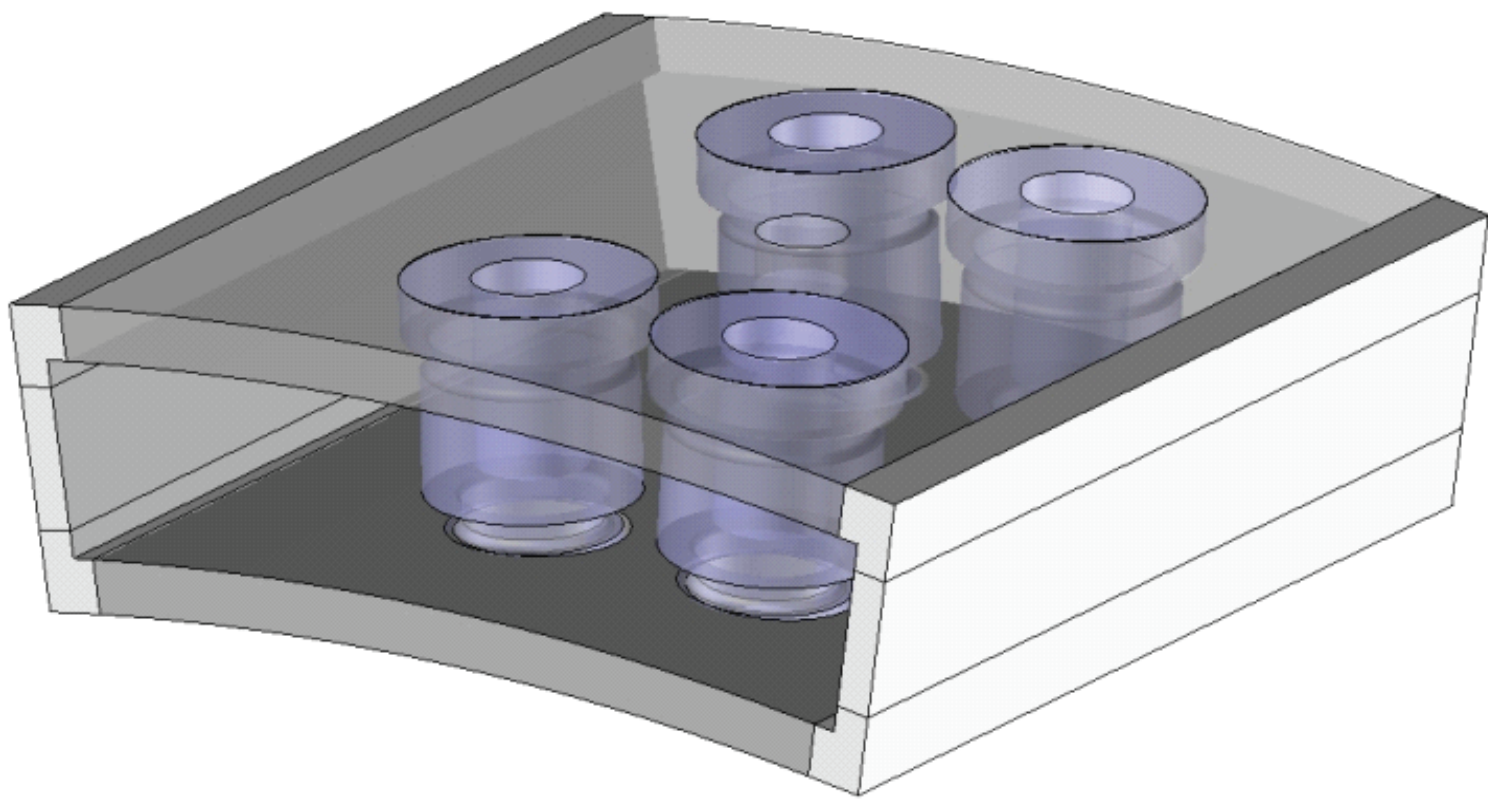
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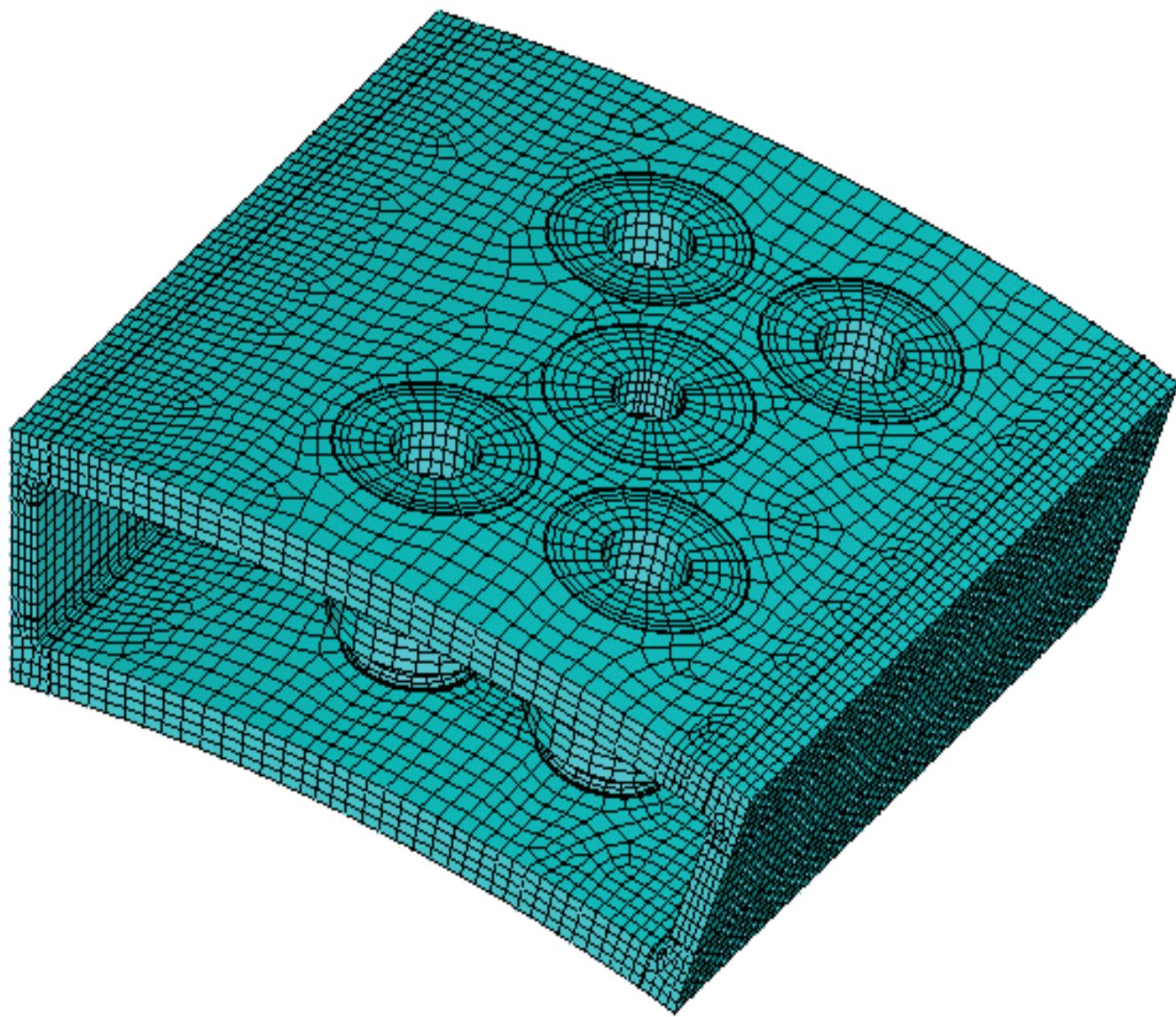
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Due to the challenging final tolerances of the fabrication of the ITER Vacuum Vessel, this Project was launched to demonstrate the feasibility to fabricate the ITER Vacuum Vessel with advanced welding technique Electron Beam welding, which creates much less distortions and is much quicker than conventional welding. Two 1:1 scale prototypes were used VEC and VATS

VEC mock up



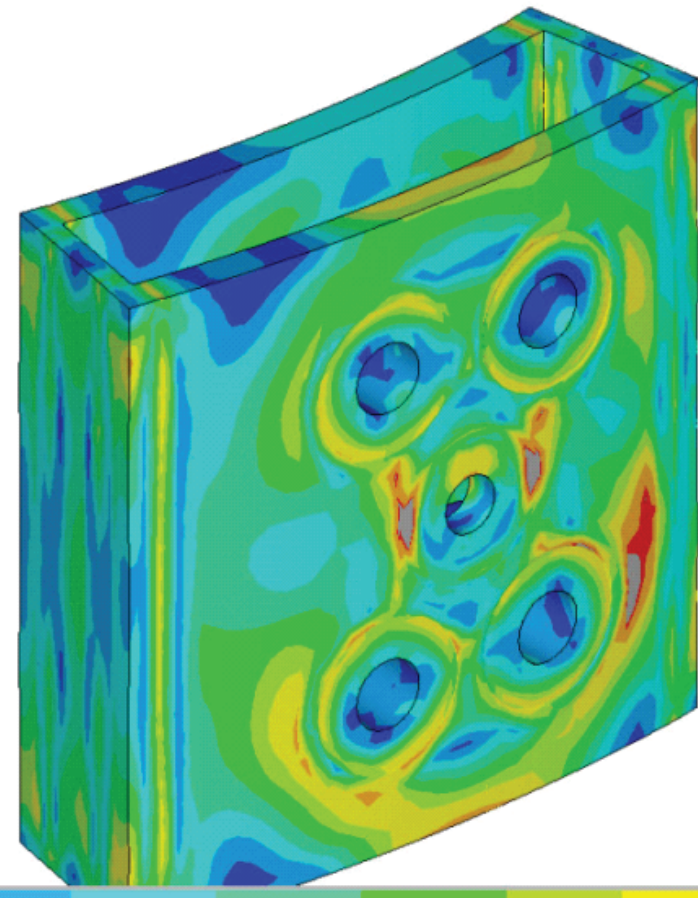
VEC 3D CAD Model



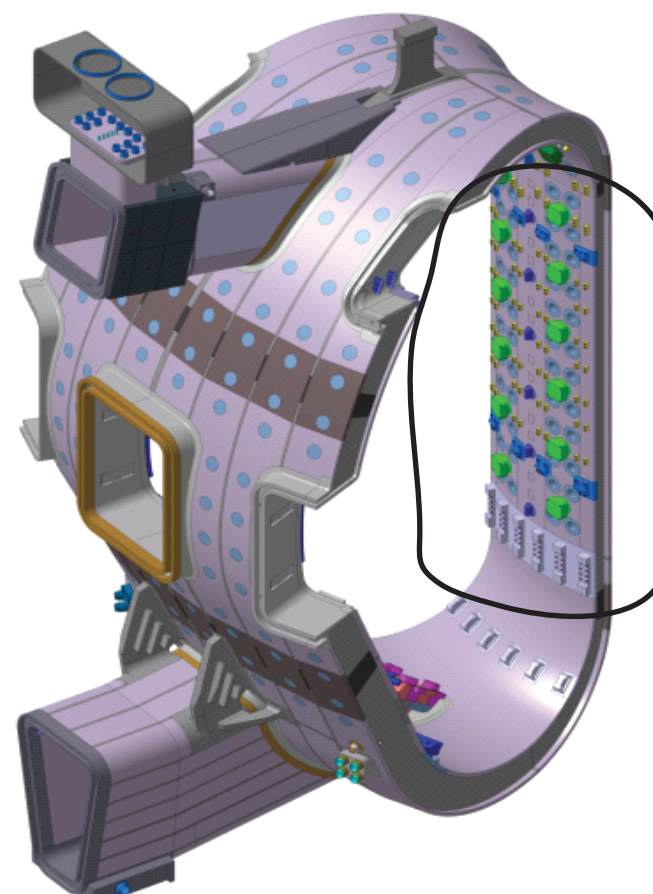
VEC Finite Element model



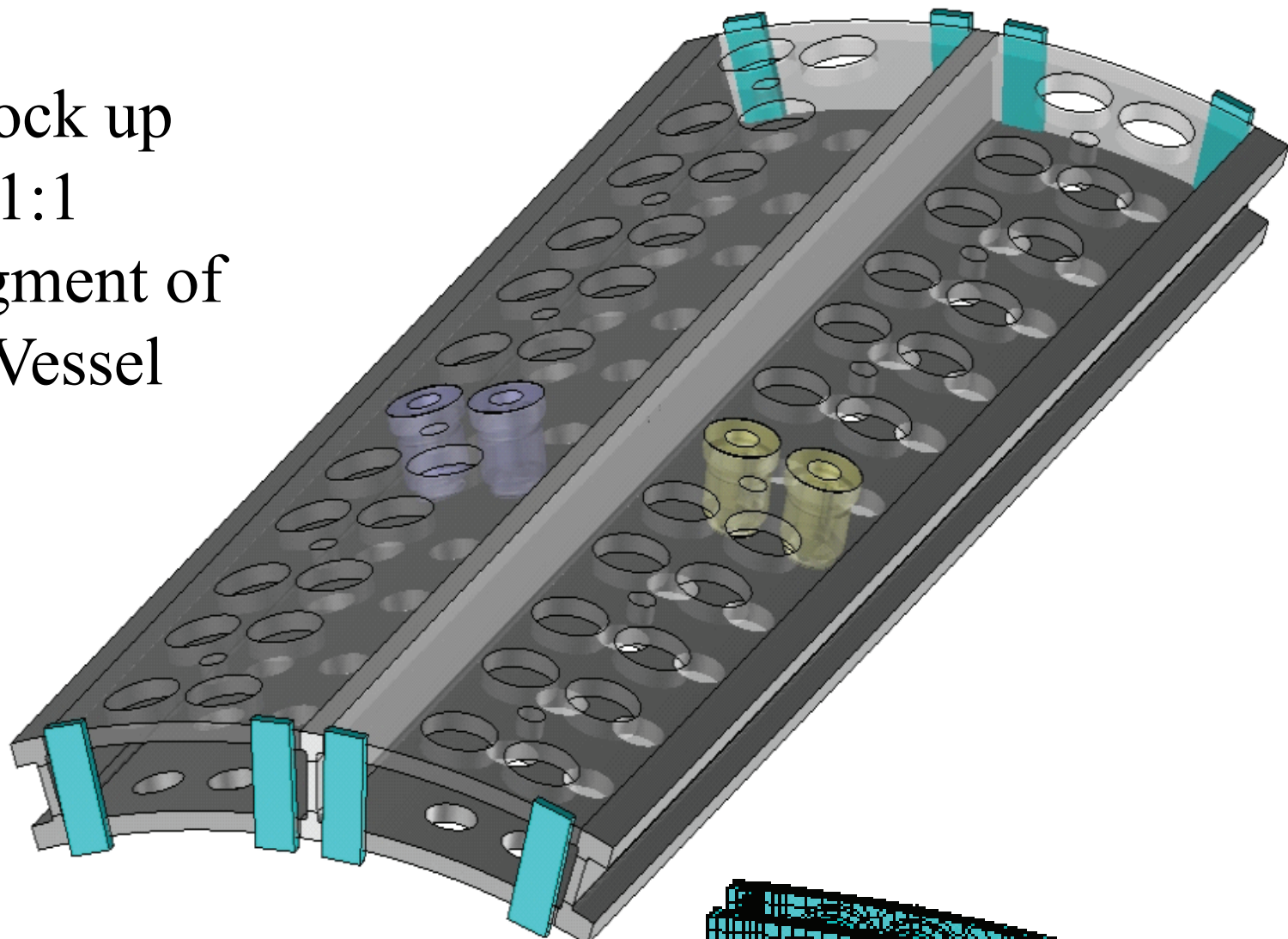
VEC during fabrication



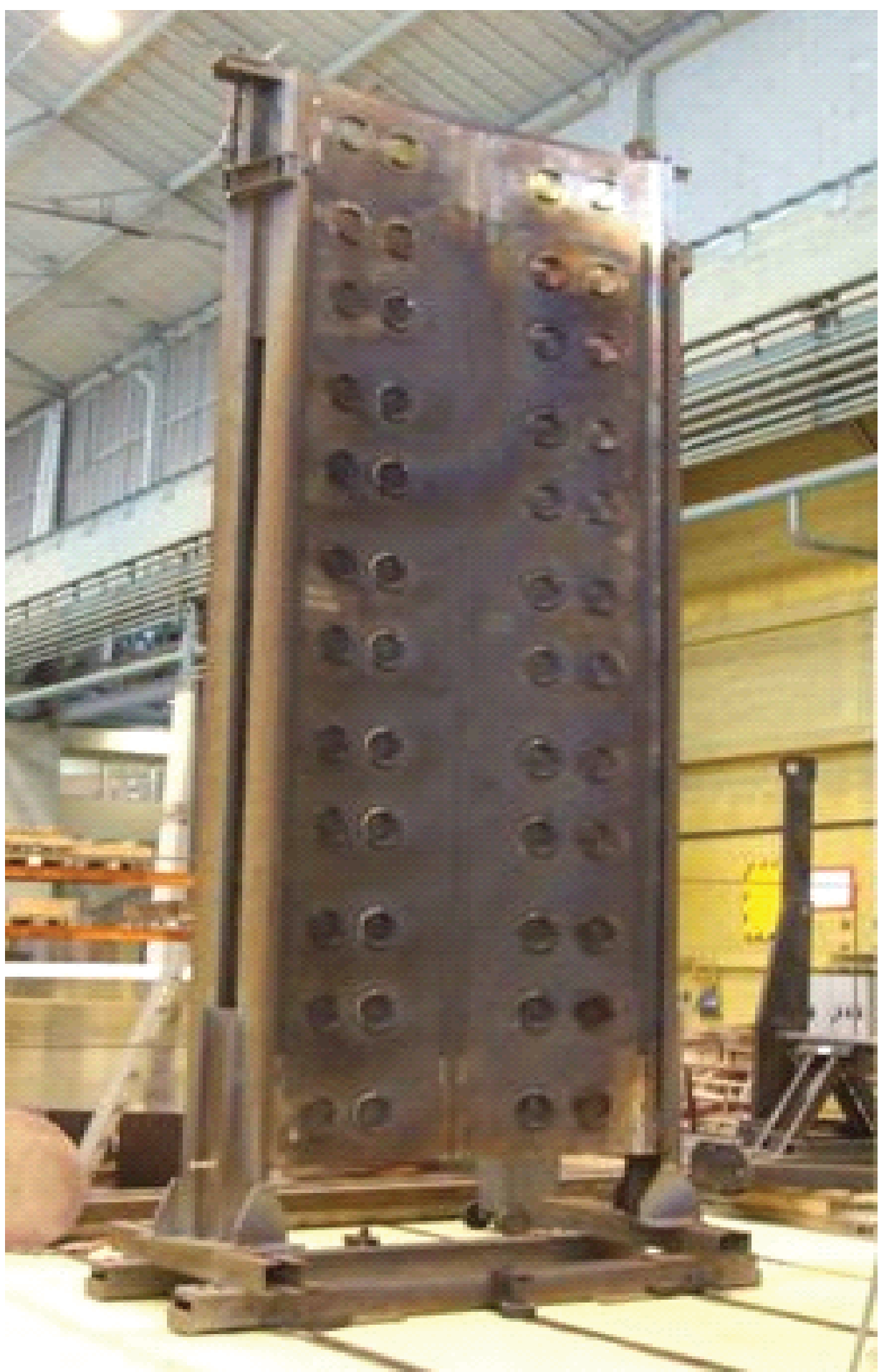
VEC Residual Stress Field



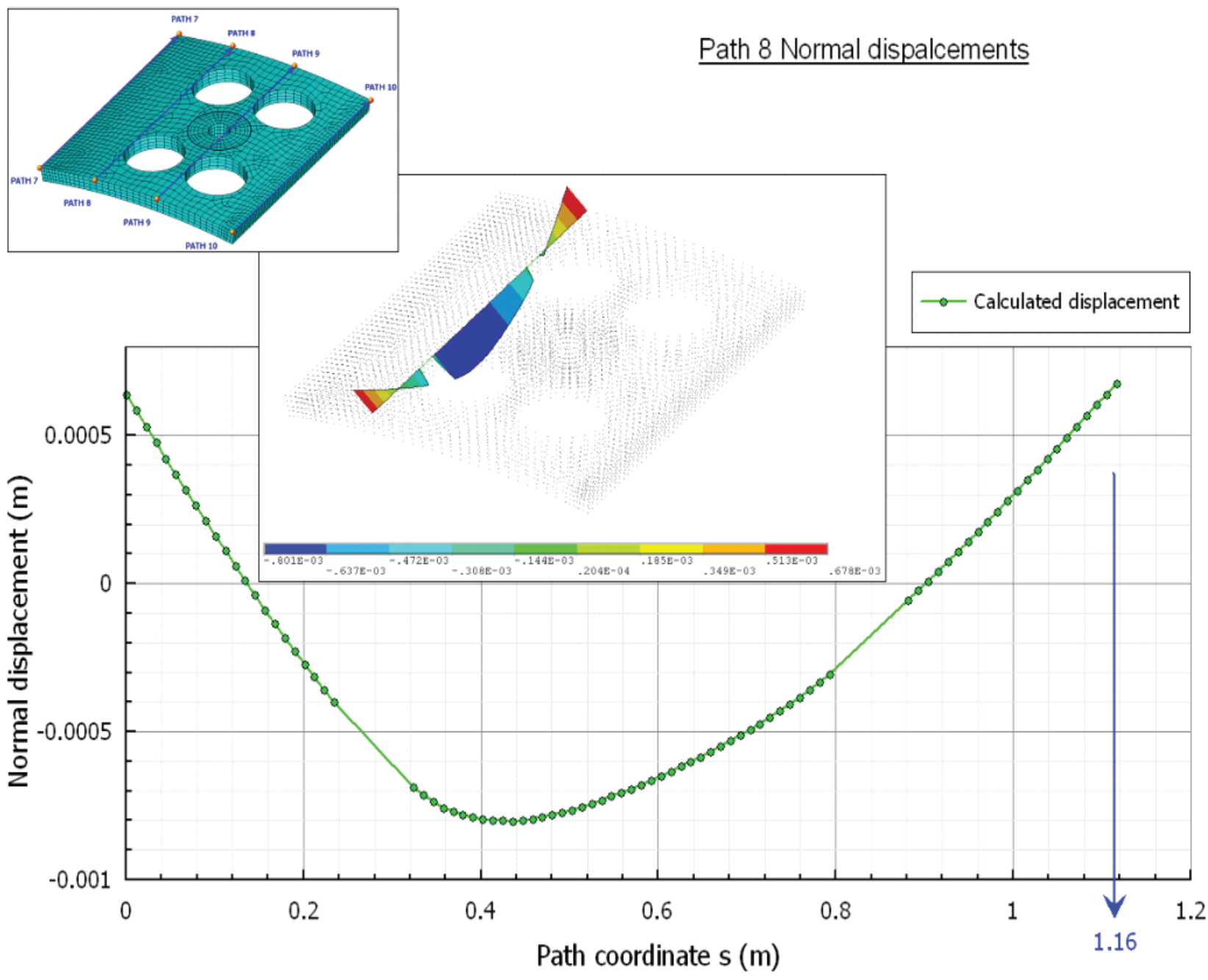
VATS mock up  
Scale 1:1  
Inboard segment of  
Vacuum Vessel



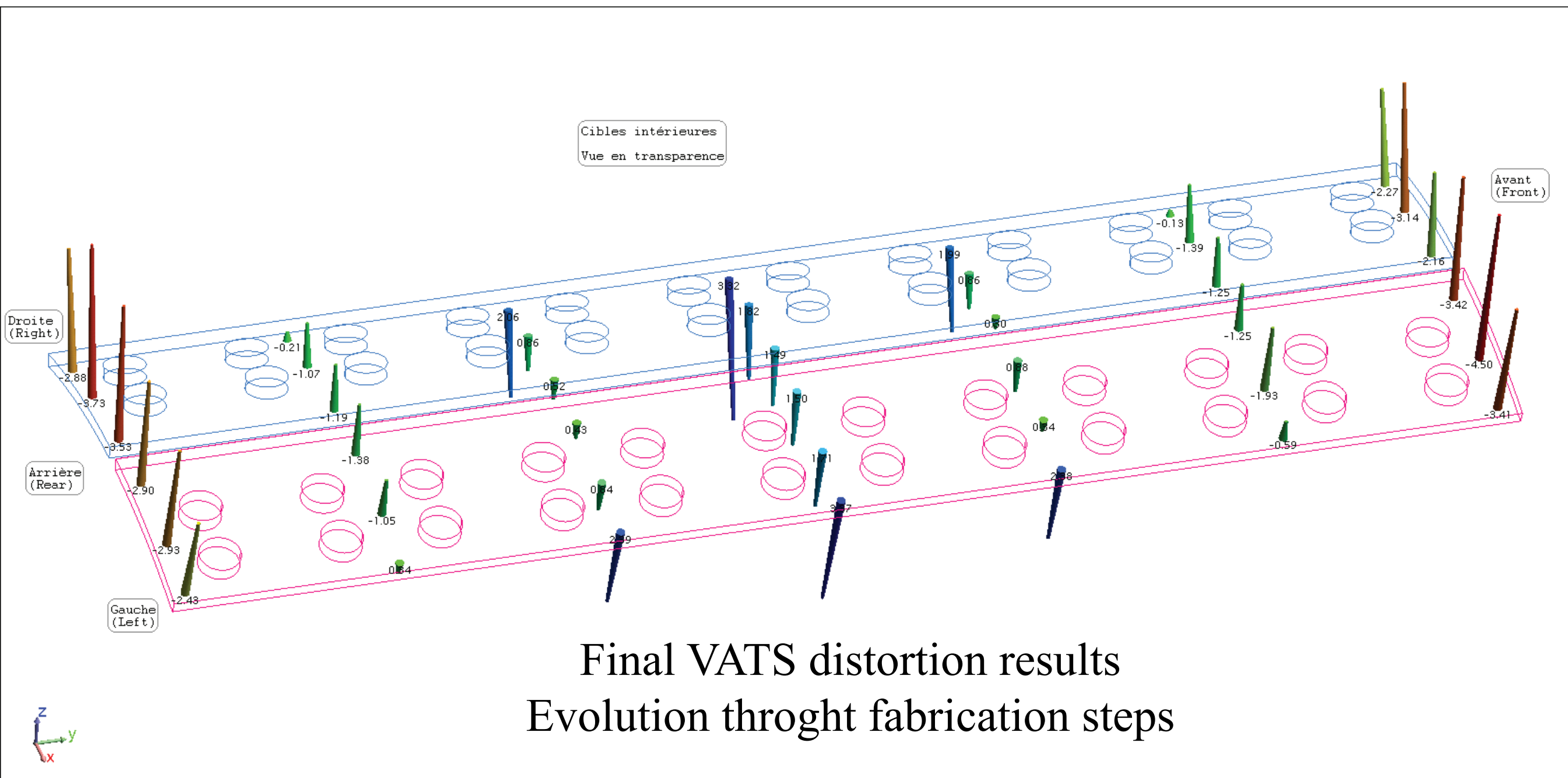
VATS CAD Model  
and Finite Element  
Model



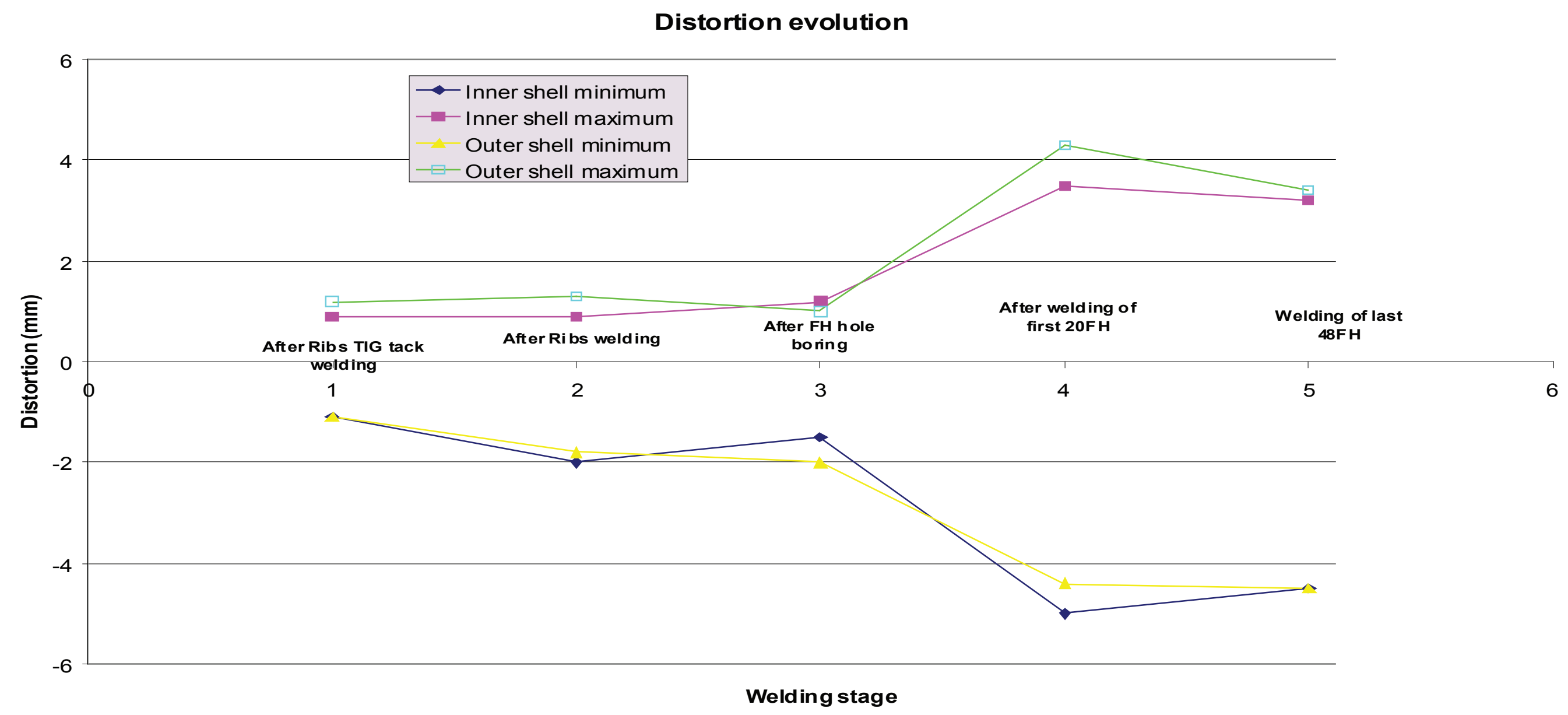
VATS during fabrication



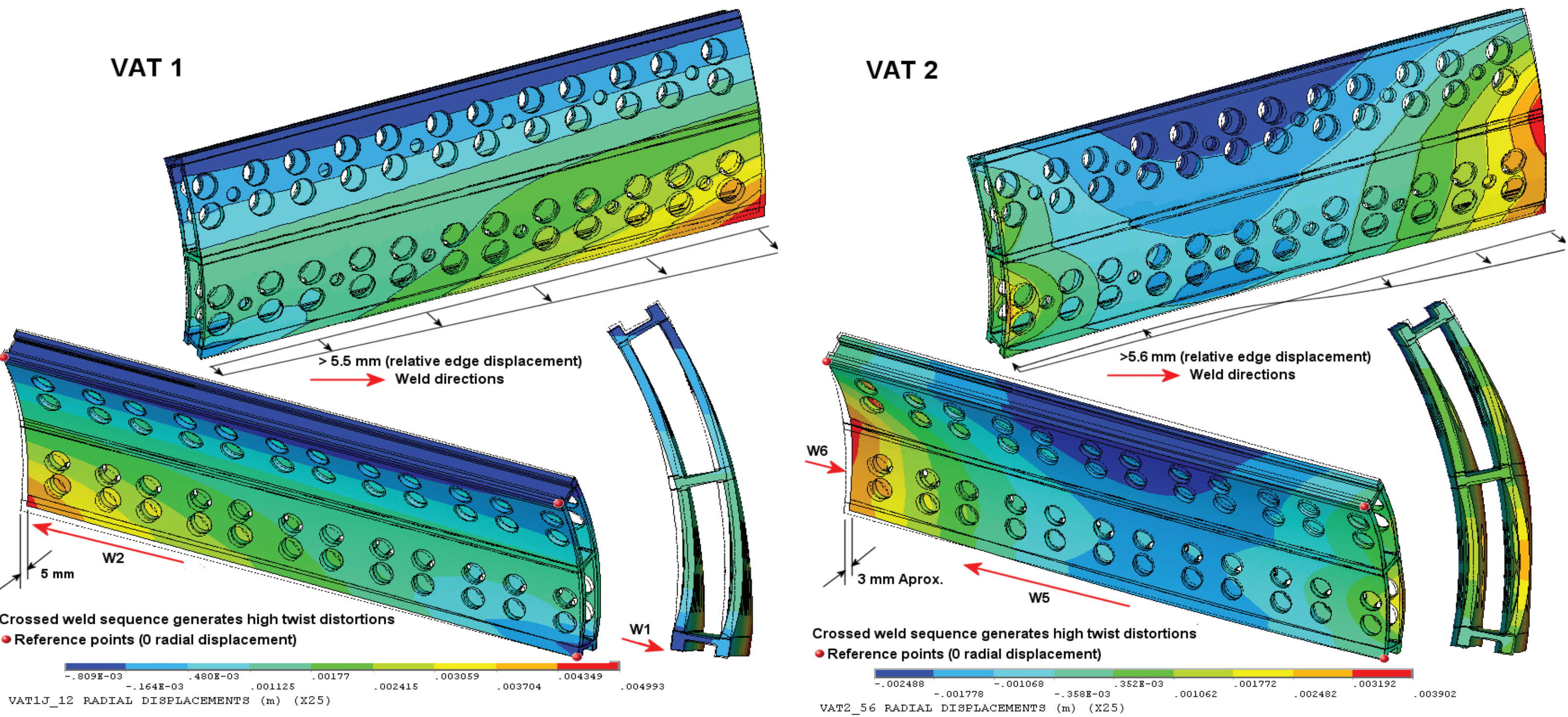
Calibration of Simulation for Circular Welds



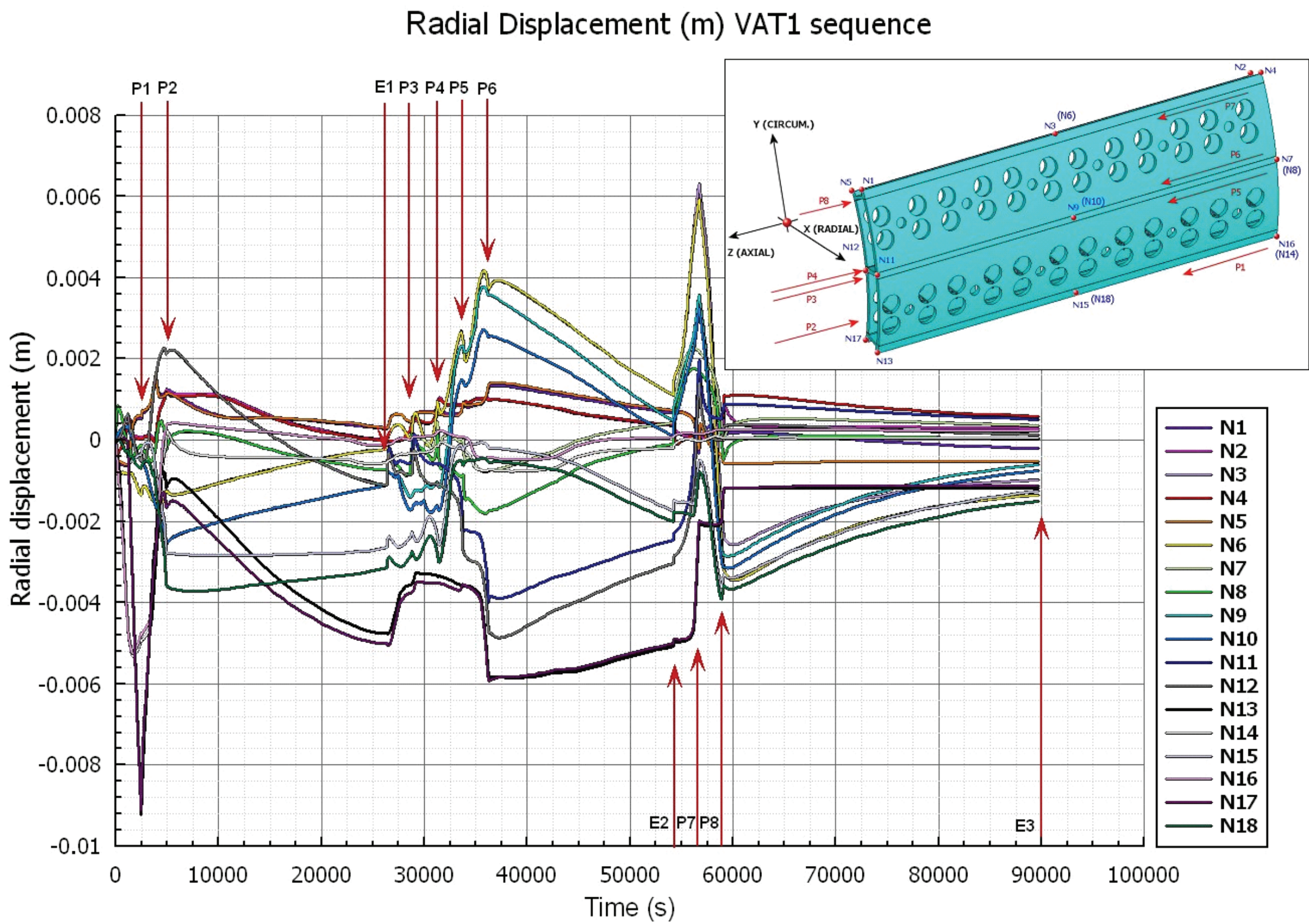
Final VATS distortion results  
Evolution throught fabrication steps



Comparison of distortions of different welding sequences for VATS



Displacements of VATS control points in time  
during the welding passes for one sequence



## Conclusion

The final distortion results comply with the tight tolerances and the simulations demonstrated to be a essential tool to predict distortions and optimize welding sequences.

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