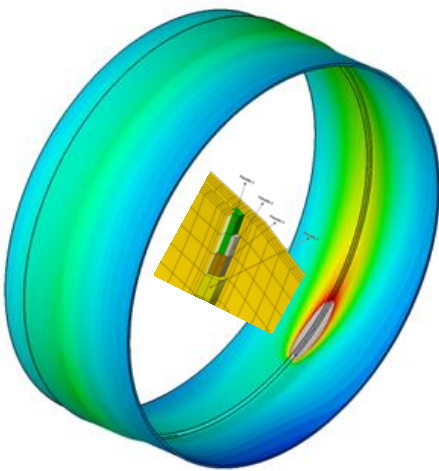




## Predicting the effects of welds in massive pieces

*Natec and F4E have developed a simulation and analysis tool for the design phase of big and complex welding assemblies in order to get the finest manufacturing process and develop the best jig structure. Industries dealing with massive and complex pieces, where the pattern of the manufacturing steps is crucial, are concerned, such as building and public work, space, electronic cases and plugs.*



### The technology

The Welding Distortion Analysis (WDA) is a step-by-step thermo-mechanical simulation of the welding process. This approach help to perform test, comparison and evaluation of different welding options during the design phase in order to control the manufacturing and ensure quality of the final equipment (dimensional tolerances for instance).

The company Natec has developed with F4E a step-by-step thermo mechanical simulation of the welding process for the walls of the ITER main chamber, including complex mechanical boundaries (jigs), assembly and welding sequences. Based on finite element analysis the simulation predicts the deformation caused by welding and the forces on supporting jigs

## Massive welds' deformation evaluation and jigs optimization

The main advantage of these WDA services is the applicability of distortion prediction to massive and complex assemblies. These services can be used in the design phase to lead to a compliant manufacturing route and to optimize jig structures from mechanical resistance and weld distortion point of view. Finally, it helps avoiding deformation due to thermal and mechanical effects of welding operations that may lead to misalignment of pieces, mismatching of the jigs and rejection of irrecoverable assemblies.

## Prediction of distortion in massive and complex assemblies

This simulation tool can be used in the design phase to lead to a compliant manufacturing route and to optimize jig structures from mechanical resistance and weld distortion point of view for fusion reactors for vacuum vessels, coil cases and port plugs. Some applications in space, nuclear and oil and gas facilities or in architecturally complex infrastructures (buildings, bridges and ports among other) are now considered.

## Collaboration opportunities

The technology is available through rendering of engineering support services and expert advice for interpretation of results.

*Fusion for Energy*  
Email:  
[technologytransfer@f4e.europa.eu](mailto:technologytransfer@f4e.europa.eu)