

Optimizing assembly for the ITER VV vessel sectors

July 21, 2009

This report describes how extremely large shell segments for the ITER vacuum vessel can be realized with a high accuracy. Figures 1-6 show the approach in outline.

The explosive forming die surface can be adjusted for each part for achieving maximum accuracy.

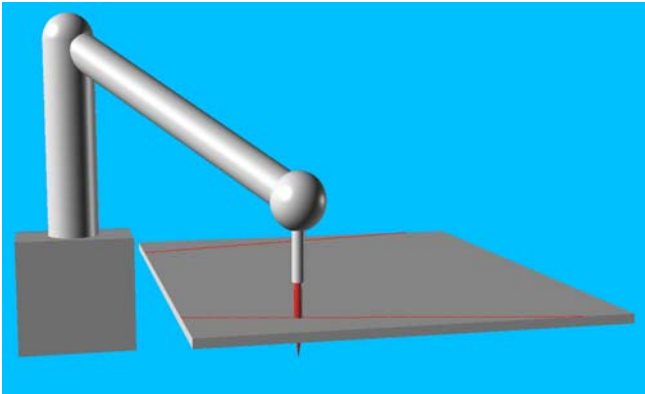


Figure 1. Plasma cutting

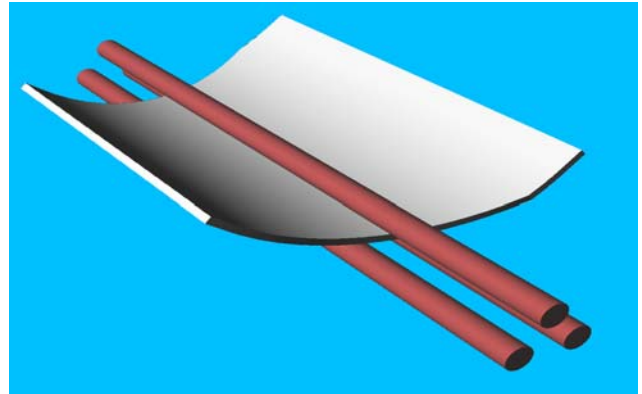


Figure 2. Bending

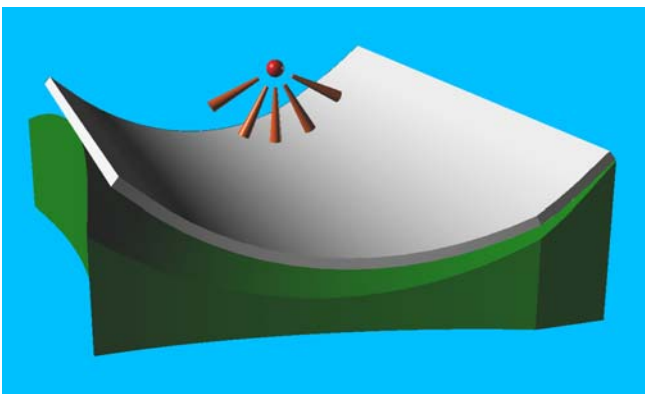


Figure 3. Explosive forming

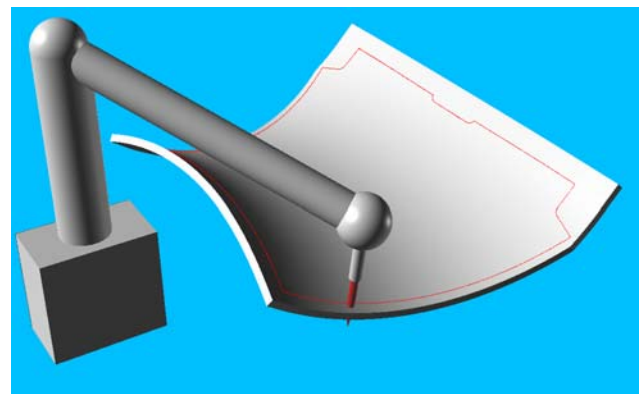


Figure 4. Plasma cutting near the edges

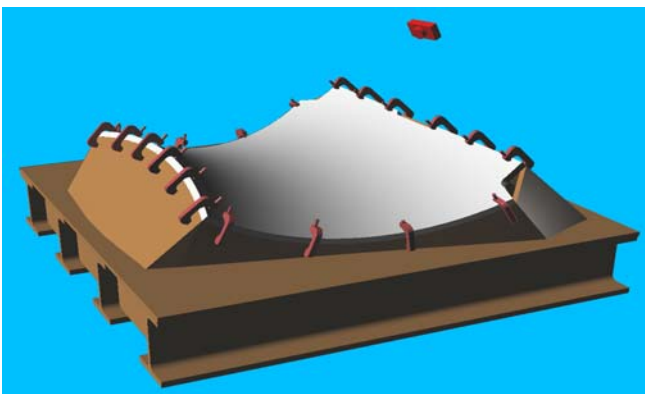


Figure 5. Clamping on jig.

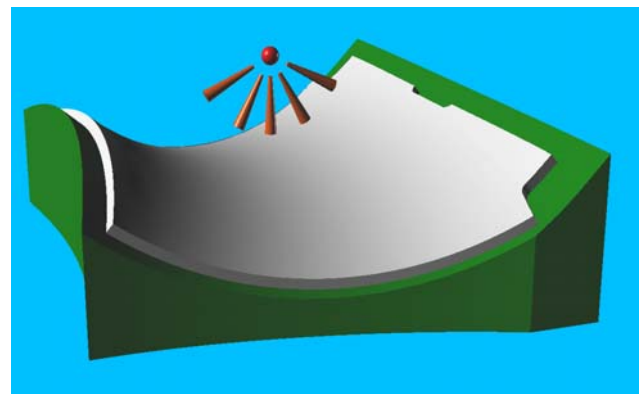


Figure 6. Calibration by explosive forming

The ITER vacuum vessel panels can be manufactured by Explosive Forming in accordance with the RCC-MR code. This was demonstrated by Exploform in the framework of an EFDA task together with Dutch research institutes NRG and TNO. *Figure 7* shows a panel that was manufactured in this task.

Explosive forming allows forming of much larger panels saving expensive welding and, therefore, reducing the distortion of the shape due to the welding.

An overview for a possible application of extremely large panels is shown in *figure 8*.



Figure 7. a VV panel in accordance with a reference ITER design of 2007; photogrammetry measurement

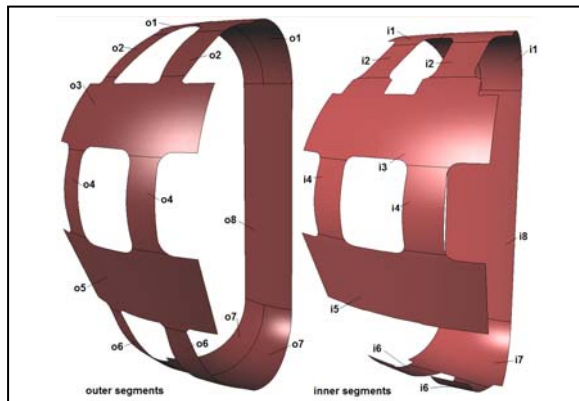


Figure 8. an indicative overview of shell elements for VV sector wall

The proposed approach is clarified in the pictures of *figures 1-6* for panel i7 of *figure 8*.

Figures 9 and 10 show a jig that was applied for the assembly of panels that are comparable to the ITER panels. The jig was used for keeping the panel in shape during cutting and during assembly.



Figure 9. Assembly jig for panels comparable to ITER panels



Figure 10. One of the clamps of the assembly jig

Please contact us for discussing this solution!