

STRUCTURAL ANALYSIS FOR STRENGTH AND FATIGUE LIFE OF HALF COUPLING WELDMENT FOR LARGE COOLING WATER PIPES (FIP/P3-32)

- ITER cooling waters system consists of large piping network to remove the heat load of about 1100 MW through various branched connections.
- Many of the branches are connected to main pipes by half coupling full penetration weld joints.
- There is requirement is to have full penetration for all the joints, however quality classification (QC-2), recommends only 10% testing of the total weldments. In view of this it is expected that there can be some joints with little or no penetration.
- The above requirement demands for the structural strength and fatigue life assessment to ascertain that components is not failing even if there is no weld penetration.
- The design by analysis approach is considered for structural and fatigue life assessment, for maximum expected loads combination case.
- The weld joint is structurally qualified using ASME code. Fatigue life of weld joint is calculated using both ASME Section VIII Div.2 and RCC-MR RR3261.12.
- The maximum stress and fatigue life observed for full penetration case is 92 MPa and 315766 cycles as per ASME and 200000 cycles as per RCC-MR. Whereas, in no penetration case, the stress is 188 MPa and fatigue life is 137210 cycles as per ASME and 1500 cycles as per RCC-MR.
- It is concluded in the paper that weld joint is safe for both the case in most severe load case combination.