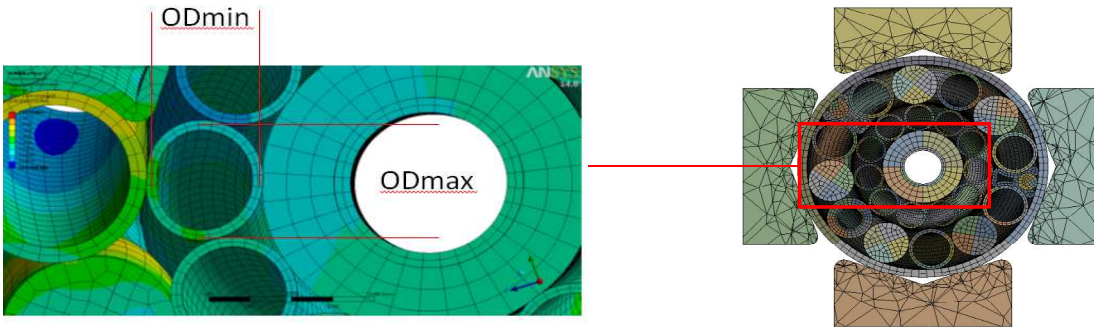


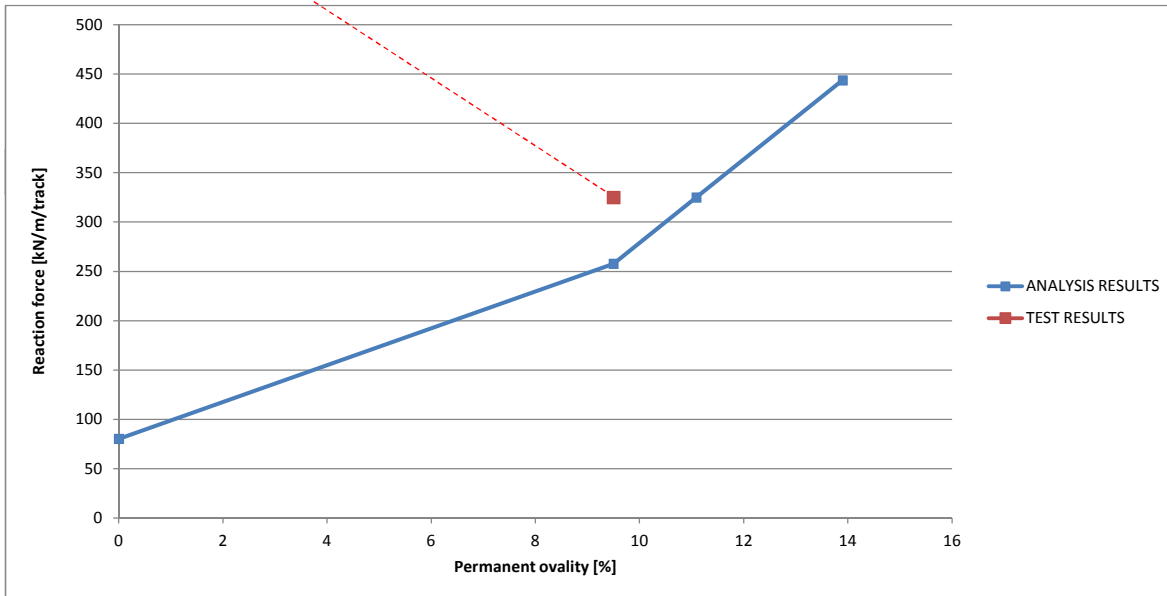
**RE.: Third Party Verification - Offshore Vertical Tensioner Test of Umbilical**

**ANSYS Crush Load Analysis**



**OFFSHORE VERTICAL TENSIONER TEST RESULT:**  
 Crushing Load: **325** kN/m/track  
 Permanent ovality (plastic): **9.5** %

$$Ovality = \frac{(OD_{max} - OD_{min})}{OD_{nom}}$$



TABULATED RESULTS	Crush Load [kN/m/track]	Ovality [%]
Offshore Vertical Tensioner Test Result	325	9.5
ANSYS Crush Analysis Result	325	11.1

**Analysis results gives an ovality which is 1.6% larger than the offshore tensioner test at equal crush load. Conservative analysis results are expected due to the following:**

Analysis results are based on specified minimum yield stress and worst case orientation of steel tube layers.

Tensioner test performed on steel tubes with actual yield (higher than SMYS). The steel tube layer orientation is random.