

TTi 18,000 LITRE CARTAGE TANK Non-Linear Analysis – Geometric and Boundary Contact

Date: July 2025

Client: TransTank International

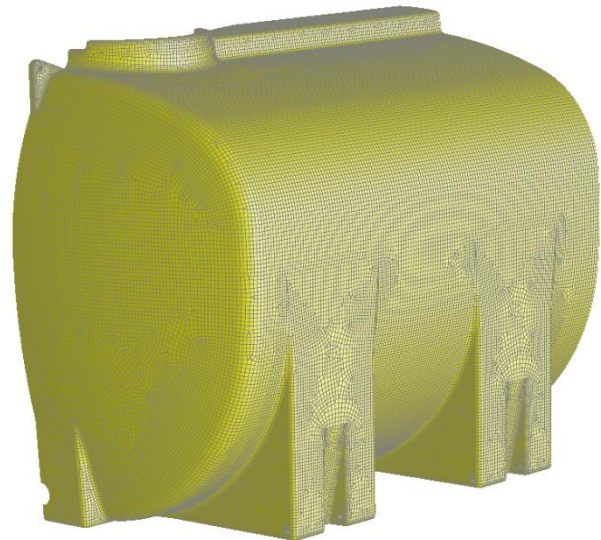
Project Description:

David Beneke Consulting was commissioned by Transtank International (TTi) to undertake a finite element analysis (FEA) of a 18,000 litre cartage tank rotationally moulded from Nova RMS245 high density polyethylene. This tank was mounted on a structural steel frame which was then mounted on a truck trailer.

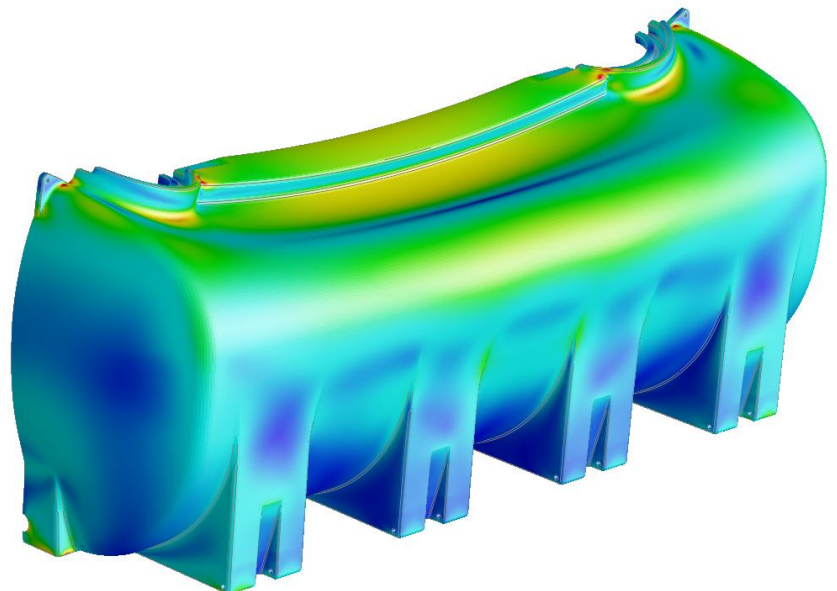
A critical component about the design of this tank was that it was exposed to not only internal pressure loads from the stored liquid (water of $S_g=1.0$) but it was also exposed to road transport loads of up to 0.8g for longitudinal deceleration and 0.5g transverse acceleration.

The analysis of the tank used the non-linear static solver of Strand7 R3.1.6 incorporating geometric and boundary contact non-linearity. The boundary contact was restricted to the contact surface along the base of the tank as well as that around the locking pins at each leg.

The final area of analysis was in terms of the wind loads during road transport for the critical case where the tank is empty. The wind pressures were applied on the windward, leeward and side walls of the tank consistent with a maximum speed of 130 km/Hr. This analysis was undertaken to determine if the stresses induced by the wind loads are at acceptable levels and the windward wall is not prone to buckling instability.



FEA Model of the 18,000 litre cartage tank - outside view
(1/4 of the model)



FEA model of the result of the full live load combined with longitudinal braking.

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