David Beneke Consulting
Finite Element Analysis for Engineering

ØPD SOLTIONS ROAD BARRIERS
Non-Linear Geometric Analysis

Date: January 2011 and 2012

Client: ØPD Solutions, Norway

Project Description:

David Beneke Consulting was commissioned by ØPD Solutions, Norway to undertake a finite element analysis (FEA) and material optimisation of interlocking road barriers. These road barriers are manufactured from linear low density polyethylene (LLDPE) using the rotational moulding process. The purpose of the FEA was to determine the minimum constant wall thickness when the barrier was filled with either non-potable water or soil.

The geometry for each tank was imported into Strand7 FEA software and meshed using QUAD4 plate/shell elements. Only a 1/2 model was created given that the barriers were singly symmetric about the longitudinal vertical plane. The material properties for the LLDPE material were essentially linear elastic with elastic modulus adopted being based on long term creep occurring in the material over a 20 year period.
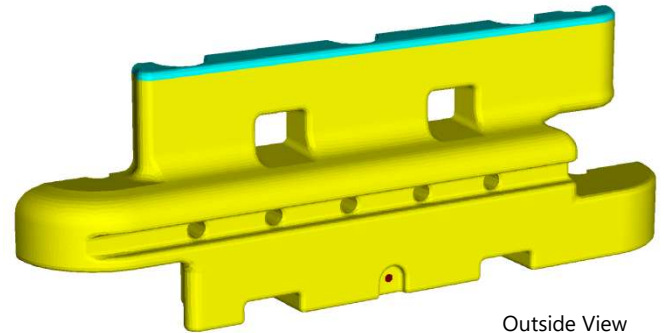
Based on a series of non-linear geometric analyses, the minimum wall thickness was derived which satisfied -

*   Minimum wall thickness requirements for
     AS/NZS4766,
*   Ultimate limit state and serviceability creep stress
     limits
*   Buckling instability at ultimate load &
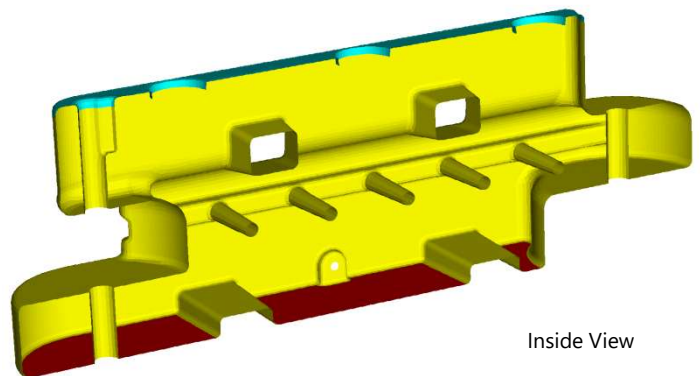*   Serviceability deflections

Modifications and improvements were made to the design (including multiple through-holes) based on limiting side wall deflections of the barrier so that encroachment into the adjacent roadway envelope could be prevented.
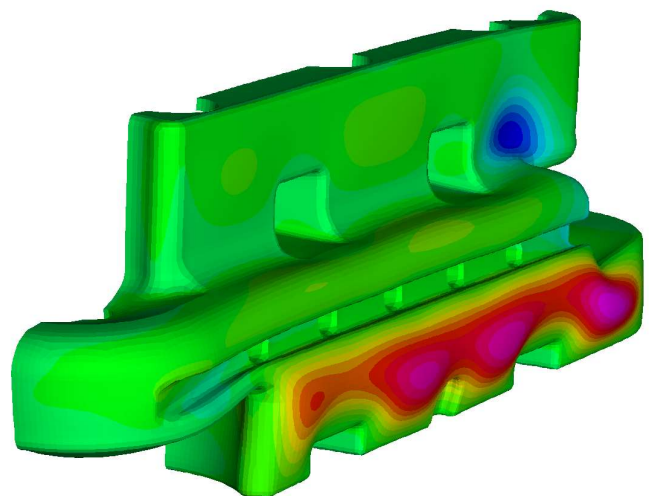

Outside View

Inside View

FEA Model of the road barrier.

Contour plot of transverse serviceability deflections.

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