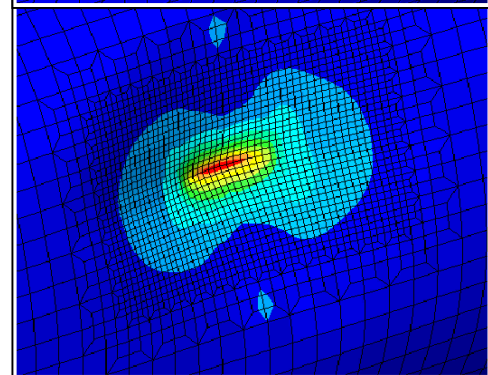
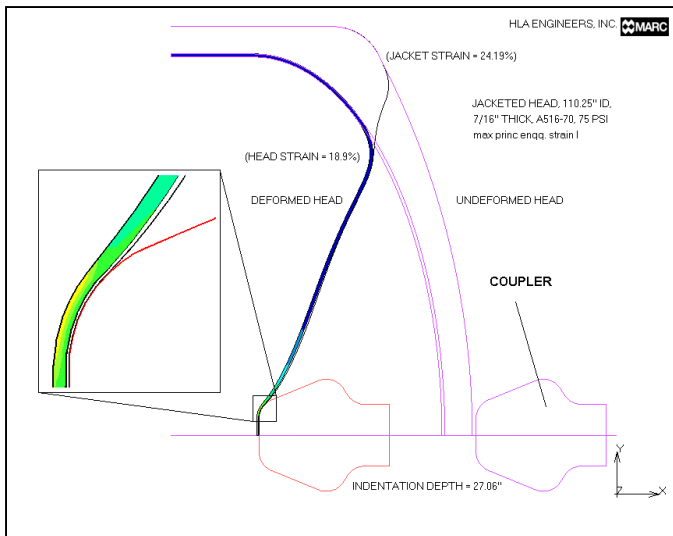
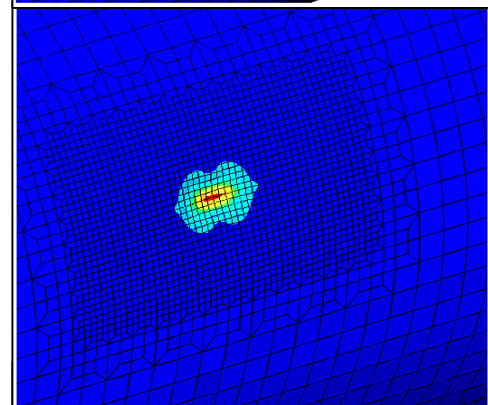
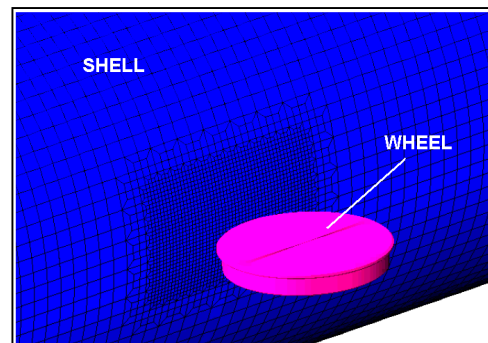
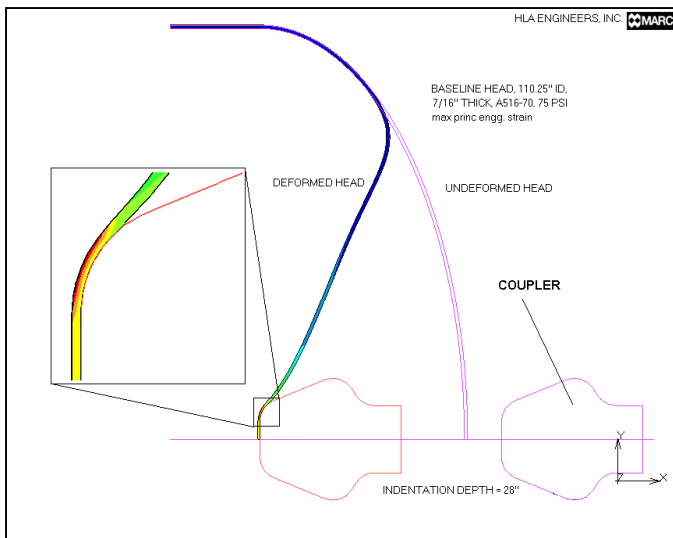


# PUNCTURE RESISTANCE OF TANK CARS

PURPOSE: Develop Equivalent Puncture Resistance for 286K GRL Tank Cars using an Analytical Approach.

The analysis is aimed at developing a practical and reasonable analytical approach to satisfy the FRA/TC requirement to provide equivalent puncture resistance for tank car tanks when increasing the gross rail load (GRL) from 263K to 286K. This analysis uses the FEA technique to compare the puncture resistance. Each model was analyzed using MARC. The criterion; increase the static equivalent strain energy by 9% while checking the maximum principal engineering strain of the head or shell material. If the candidate tank does not fail at a lower energy level, it has met the requirement. To determine their effect on improving the puncture resistance, design options like thicker shell/head, higher strength materials, jacket, larger diameter, and their combinations were considered.



HLA ENGINEERS, INC.  
7267 ENVOY COURT, DALLAS, TX 75247

(214) 267-0930 (214) 267-0970 FAX