

# Oil-canning Simulation of Outer Panel and Influence of Stamping Results

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## Abstract

*Oil-canning test is one of the most important measurements for outer panel stiffness. The methodology to analyze oil-canning of automotive outer panels using LS-DYNA® is studied and presented. Dynamic explicit method is used for stamping simulation and static implicit method is used for oil-canning simulation. The stamping results are carried over to oil-canning simulation. In one of the studies, displacement controlled indentation was applied to the panel and the contact force between the indenter and the panel was recorded. The Riks method was used in an alternative approach. Both approaches give the similar critical oil-canning resistance force which has good agreement with the measurement data.*

*The influences of stamping results, particularly thickness reduction and stress status, on oil-canning resistance were also studied. Firstly, oil-canning simulations with stamping result vs. without stamping result were compared. It's been found that stamping results could lower the oil-canning resistance force. The oil-canning analyses of panel with various levels of stamping results were also compared. Based on the research, the procedure for oil-canning simulation with LS-DYNA® was established to help optimize product and process designs satisfying with stiffness requirements.*

pf184step5d1s1pr for Oil canning Simula  
Time = 0.08

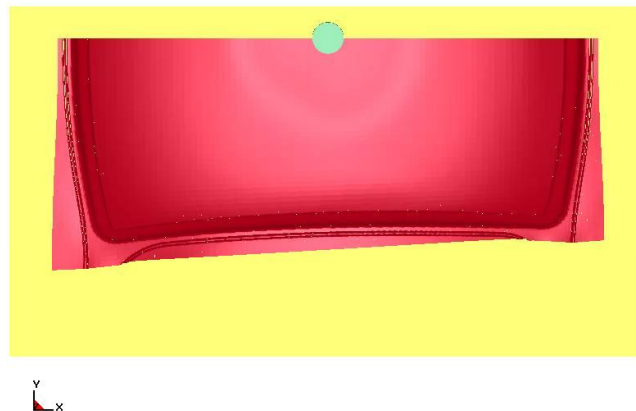


Figure 1. Oil-canning shape of an outer roof panel (symmetric model)

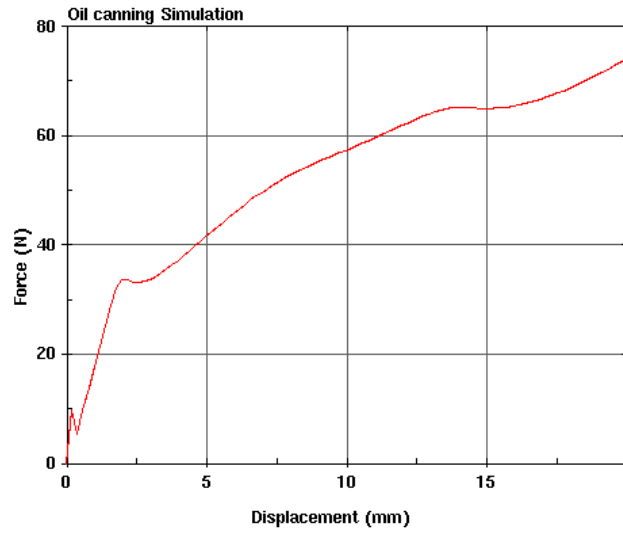


Figure 2. Oil-canning force vs. indentation