



Case Study : Mackay Consolidated Industries

Using ANSYS as an integral part of the design process



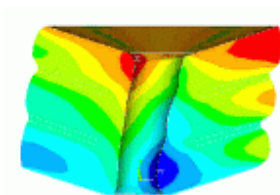
—Excellence by Design—

Mackay Consolidated Industries, a 100% Australian owned private company, specialise in the design and manufacture of a diverse range of engineered rubber based products for a broad spectrum of industries. Incorporating hoses, bushes, suspension mounts, isolaters, seals and more, their products are used in automotive, rail, mining, marine, packaging and defence applications.

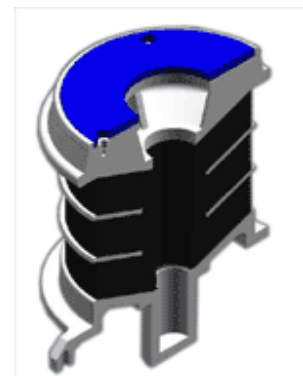
Mackay view themselves as problem solvers as well as manufacturers. Their workflow includes CAD, analysis and physical testing along with final production. Mackay have considerable experience in the use of ANSYS to assess structural behaviour as part of the design process. This case study gives an overview of some of the applications in which Mackay have used ANSYS.

SMRT Layer Spring

The SMRT Layer Spring is a secondary suspension mount. Mackay wanted to use ANSYS to accurately predict the deflection and strain behaviour of the unit under full load. The analysis was used to pinpoint the most likely location of failure and suggest improvements on the design.



Elements allowing hyper-elastic behaviour (using a Mooney-Rivlin material model) were combined with mild steel material elements. ANSYS caters for a wide range of material models to simulate nonlinear behaviour.

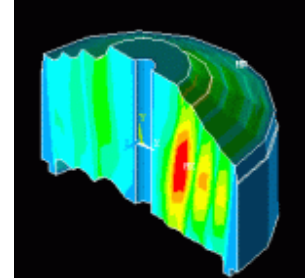


Symmetry boundary conditions were used to result in a smaller run-time than a full 360 degree model. Multiple load steps simulated compression followed by deflection of the compressed body.

Conical Mount

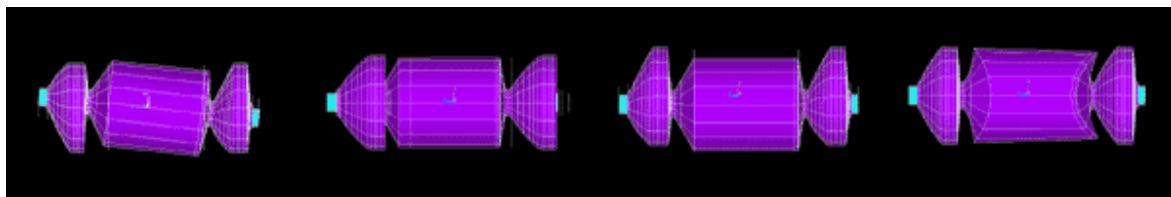


The secondary suspension conical mount analysis was similar to that of the SMRT Layer Spring in that it involved hyper-elastic material models, large deformation behaviour and multiple load steps to capture the effect of shearing an already stressed body with another load.



Radial Mass Damper

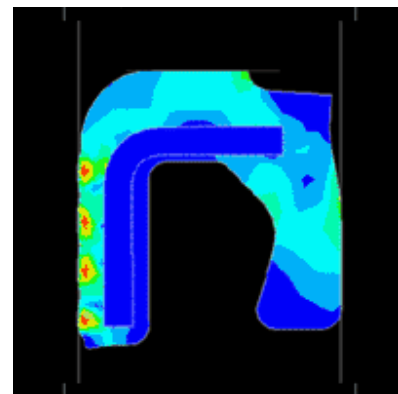
ANSYS Modal analysis was used to assess the natural frequency characteristics of the radial mass damper involving a combination of significantly different material types.



Airseal

An airseal analysis involved ANSYS' powerful nonlinear contact capabilities, multiple material models and the use of axi-symmetric behaviour to reduce runtime.

Nonlinear contact caters for bodies coming into contact, separating and sliding with friction behaviour if required. Surface to surface, line to line, node to surface and other contact types are all catered for in the one environment.



The wide ranging simulation capabilities of ANSYS make it a powerful tool in the Mackay design process. Including nonlinear materials, large deformation, nonlinear contact, modal analysis, multiple load steps, combinations of steel and hyperelastic materials and more, it helps give Mackay confidence that their products are designed to their own exacting standards.