



CASE STUDY

OptiStruct Technology Application in early Concept Design Stage enables Weight Reduction of Cast and Forged Parts

Overview

Using Altair OptiStruct, India based Ashok Leyland was able to reduce cost and improve reliability of the components in their stride towards design and development of innovative, optimal and robust design solutions. Leveraging OptiStruct's technology, Ashok Leyland was able to take quick and reliable design directions on the track rod lever.

Business Profile

Ashok Leyland (www.ashokleyland.com) is one of India's leading commercial vehicle manufacturers and a flagship company of the Hinduja Group. Ashok Leyland currently has close to 70 different models catering the commercial goods, defence and passenger vehicles.

Challenge

The track rod lever is a vital component of the steering system especially for heavy commercial goods and off road vehicles which are constantly subjected to extreme loads. The consequences of any failure could be disastrous. Hence, the component should be durable and reliable. Designing the track rod lever to withstand these loads and find ways to reduce the weight of the component manually was a difficult task, use of OptiStruct optimization solution helped reduce the mass by 11% with no increase in stress value.

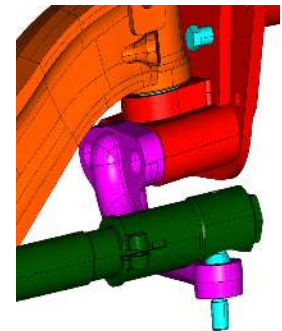


Figure 1
The Track rod lever connected to the steering system



Ashok Leyland

"Altair's OptiStruct gives an insight on arriving at creative non-intuitive designs rapidly and helped reduce the weight by 11% on the track rod lever"

Technical Team
Ashok Leyland



Solution

The optimal material distribution within the design space for the given loading conditions was derived using OptiStruct's topology optimization. The objective was to minimize the mass of the design space with constraints on displacement of the ball pillar-midpoint. Ashok Leyland applied Altair OptiStruct for enforcing manufacturing constraints like draw direction to obtain designs without holes and undercuts. OptiStruct retains material in regions of high strain energy density from which a conceptual design can be built. The design proposal from Topology optimization was then converted to surface data using OSSMOOTH and exported in IGES format to further detail with a CAD software. The model was re-meshed and shape optimization was performed to fine tune the design. Mesh morphing features in HyperMesh were used to create multiple shapes which were saved as design variables to perform shape optimization.

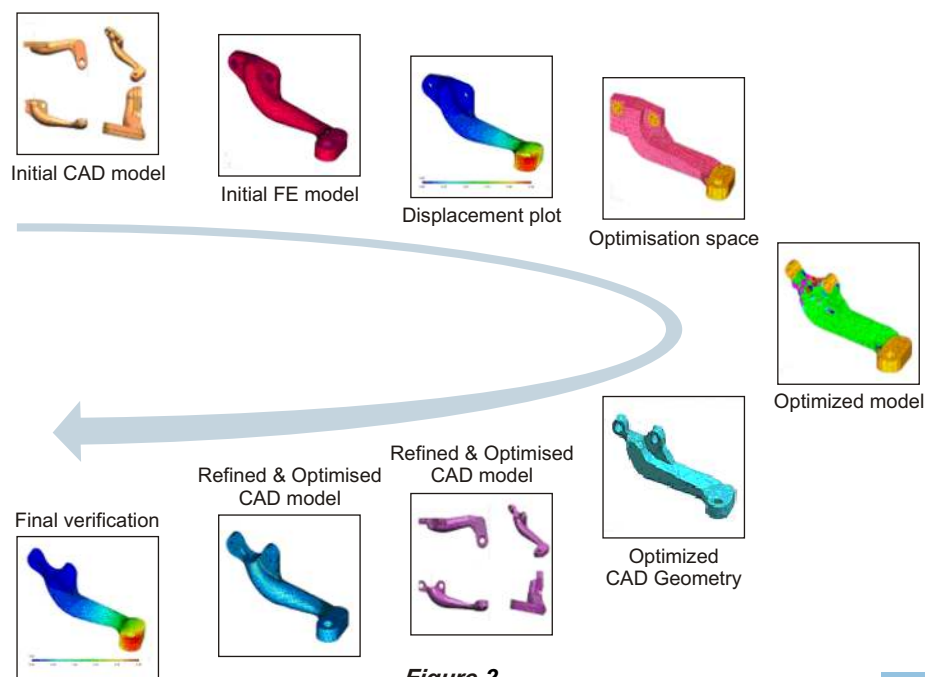


Figure 2
The Optimization process followed from the existing design to final optimized Design

Results

The mass of the track rod lever was reduced by 11% with displacement and stress values maintained within permissible limits.

Benefits

Concept generation using OptiStruct helped Ashok Leyland reduce development time significantly with improved stress and displacement levels using Morphing and Shape Optimization techniques. Topology and Topography is widely used by designers for new and existing parts as they provide new insights about the product performance and also numerous design options.

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