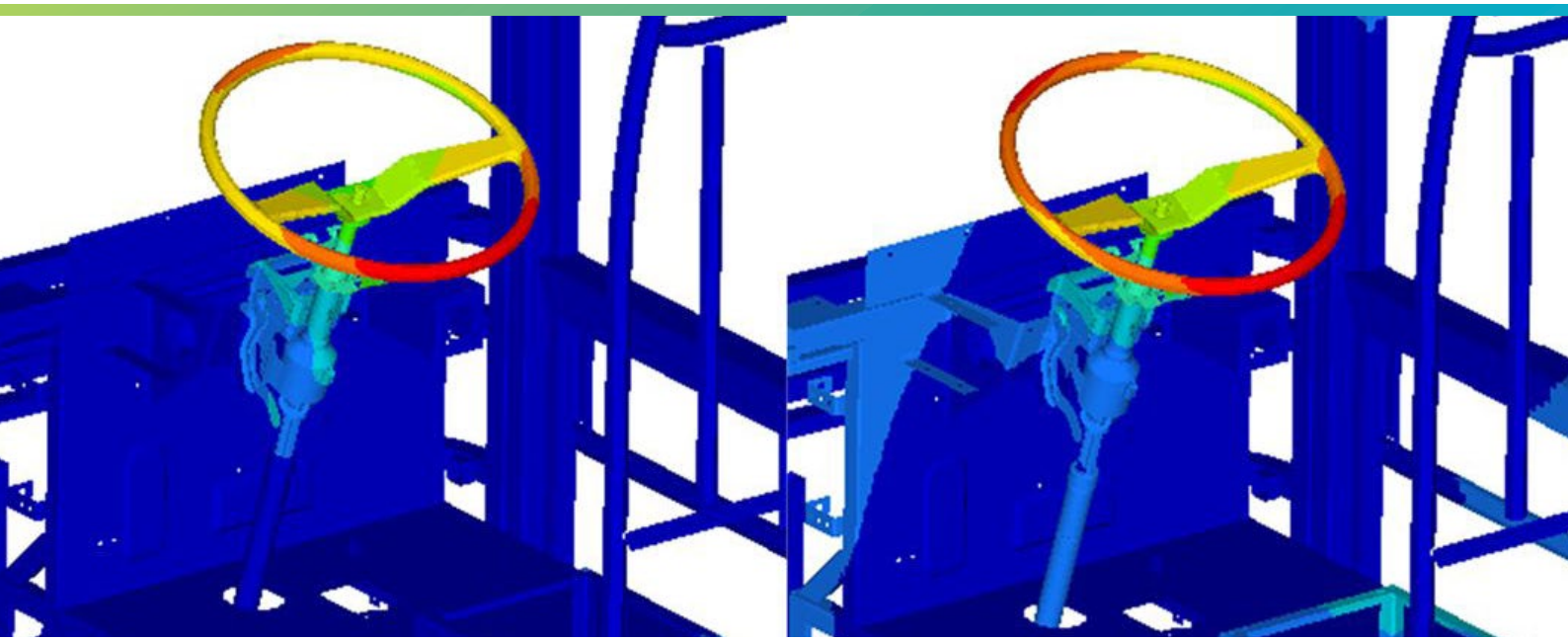
HEXAGON | MSC Software

Case study

Ashok Leyland

MSC Software's SimManager enables improved engineering productivity and lifecycle management at Ashok Leyland



There is realization of savings of 15% on Preprocessing, 80% in Post-processing in Crash, CFD, Durability and NVH with the automation implemented through SimManager.

Many design targets must be achieved before commercial vehicles such as trucks and buses are released to the market. An optimal design is one that best balances the many competing project targets: performance, regulatory, ergonomics, time to market, cost, warranty and others. Exploring potential design alternatives by building and testing physical prototypes is extremely time-consuming and costly.

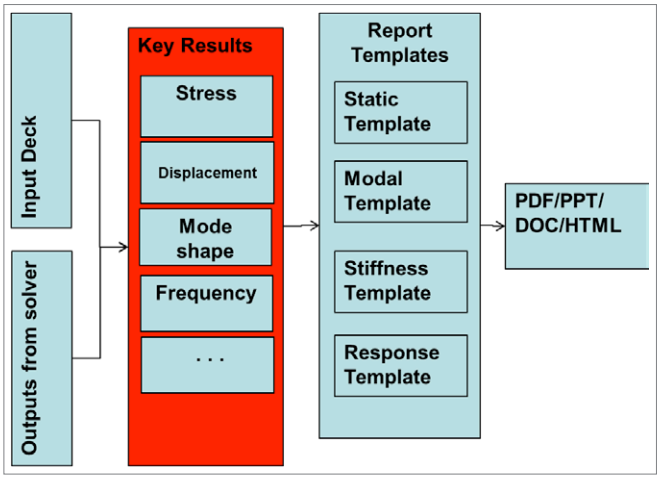
Instead, Ashok Leyland engineers use Multibody Dynamics (MBD), durability, crash and safety, Computational Fluid Dynamics (CFD), and Noise Vibration and Harshness (NVH), Computer Aided Engineering (CAE) tools to evaluate the performance of a wide range of design alternatives. After identifying the optimal virtual designs that meet the design targets, engineers move forward to build and validate the vehicle for the launch. This approach reduces engineering expenses, accelerates delivery to market, and meets or exceeds customer

Challenge

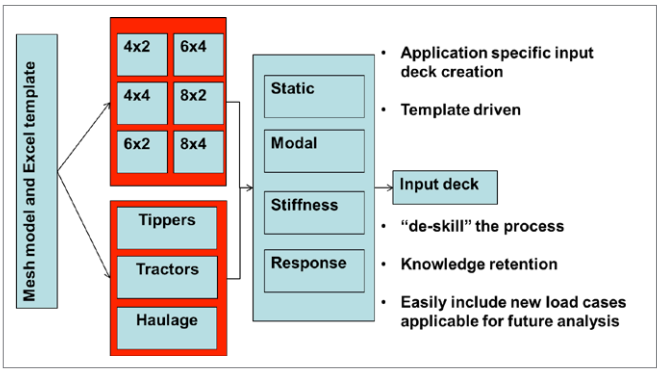
With CAE driving the design process at Ashok Leyland, the types of simulations performed as part of the vehicle development process is growing rapidly. Multiple simulation tools are required to address each of the different domains involved in vehicle development. Each tool requires a fairly complex process in which the user develops a model, inputs various engineering data, performs an analysis, reviews the results and authors a report to support design decisions. Ashok Leyland previously automated some of these steps for a few simulation tools using macros and scripts, but these point solutions were difficult to ensure the usage and maintain. The previous process relied on the skills of the individual analysts writing the scripts. These automations were not always shared, versioned or used consistently among engineering groups, resulting in inconsistent results from one analyst to another and lacked traceability. The lack of a common simulation structure meant that it was difficult to locate the results and understand the reasons for previous decisions; so work often had to be duplicated.

Solution

"We looked at a number of different tools for simulation process and data management (SPDM) from multiple vendors based on the existing CAE tools and technologies available at Ashok Leyland," said Haridas P.T. Assistant General Manager, Computer Aided Engineering at Ashok Leyland. "We identified three tools from leading vendors that were available for SPDM to address the need. The 'configuration' aspect of the SimManager convinced us in selecting the tool for SPDM at Ashok Leyland. Since the configuration part reduces the cost of implementation, maintenance and future upgrade and also reduces time for implementation, the decision to go with SimManager was obvious. We tried a pilot project with SimManager and we got up and running smoothly with minimal effort."



Frame analysis process – input deck creation

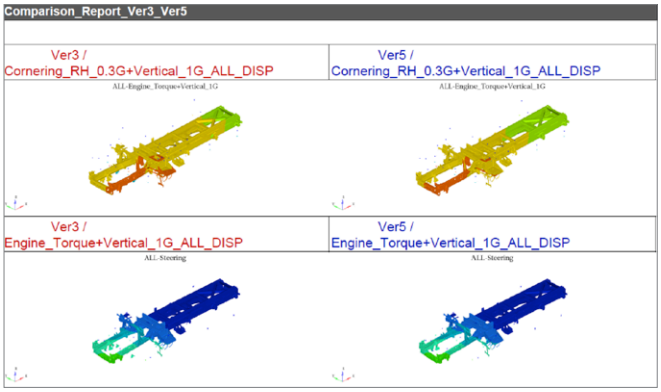


Frame analysis process – report generation

Ashok Leyland made the decision to utilize the SimManager simulation process and data management (SPDM) tool to manage the complete simulation process from project initiation through final report generation within CAE department. Within SimManager, Ashok Leyland automated many tasks related to pre-processing, solving and post-processing using products from MSC Software, third party vendors, and custom Perl and Tcl scripts. SimManager was also integrated with the Enovia V5 VPM (Virtual Product Management) and Enovia V6 PLM (Product Lifecycle Management) tools using an XML bridge. With this integrated solution, analysis requests are sent from the PLM system to SimManager requesting specific simulations on components / assemblies and analysis reports are sent from SimManager back to the PLM system. CAD files are pulled from VPM to SimManager through custom scripts.

SimManager has improved productivity, improved results consistency and traceability by automating the simulation process and providing a common user interface across all simulation domains. As an example, engineers can generate an input deck for a frame analysis by selecting the configuration, such as 4x2, 4x4, or 6x2, and the application, such as tipper, tractor or haulage. The application selects the appropriate template based on the type of analysis that is required, such as static, modal, stiffness or response. In

Key highlights:
Product: SimManager
Industry: Automotive
Benefits:
Reduce product development costs by avoiding expensive post-design changes
Reduce test/analysis iterations
Improve performance predictions



Typical report section

the above example, SimManager also streamlines the report generation process for frame analysis by automatically extracting the key results such as stresses, displacements, mode shapes and modal frequencies and inserting them into the appropriate application specific reporting templates. Similar templates were developed to extend the above processes, like pre-processing, solving and post processing for all the CAE domains for Component / Assembly / Vehicle level of analysis. Test results can be incorporated into the report and compared to simulation data.

The fully automated simulation process that has been developed with SimManager has provided dramatic improvements in productivity. The automated frame analysis process described in Table 1 has saved 4 to 5 man-days for simulation of the complete frame with superstructure, 3 to 4 man days saving for just truck cabin fatigue analysis and 1 man-day for individual components per iteration. Similar time savings have been achieved with other analysis tasks as summarized in the Table. As multiple iterations are required to develop a new product, very significant time savings are achieved in the product development cycle.

With respect to the savings for the overall activities of the CAE across all the domains, there is realization of savings of 15% on Preprocessing, 80% in Post-processing in Crash, CFD, Durability and NVH with the automation implemented through SimManager. About 60% savings in human effort is achieved in durability studies.

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>
> **Haridas P.T,**
> Assistant General Manager, Computer Aided Engineering, Ashok Leyland

About Ashok Leyland

Ashok Leyland is the second largest manufacturer of commercial vehicles in India, the fourth largest manufacturer of buses in the world and the sixteenth largest manufacturer of trucks globally. The company produces about 60,000 vehicles and 7,000 engines per year, had sales of $1.458 billion in 2013-2014. Buses produced by the company carry over 70 million passengers per year. Ashok Leyland produces trucks ranging from 7.5 to 49 tons and also has a joint venture with Nissan Motors that produces light commercial trucks under 7.5 tons. The company was founded in 1948 as Ashok Motors to produce Austin vehicles under license from the English company. It began manufacturing commercial vehicles in 1954 in partnership with Leyland Motors and has grown to become one of India's foremost commercial vehicle manufacturers.

Simulation process	Average savings per iteration
Fatigue analysis - frame with superstructure	4-5 man days
Fatigue analysis - Truck Cabin	3-4 man days
Fatigue analysis - component level	1 man day
Rollover analysis	2 man days
UPD analysis	1 man day
Structural stress analysis	1 man day
Modal analysis	0.5-1 man day
Dynamic stiffness	0.5-1 man day
Noise/vibration/harshness analysis	1-3 man days
Templated reports	0.5-1 man day
Mesh reuse	1 man day

Table 1: Savings per iteration

Hexagon is a global leader in sensor, software and autonomous solutions. We are putting data to work to boost efficiency, productivity, and quality across industrial, manufacturing, infrastructure, safety, and mobility applications.

Our technologies are shaping urban and production ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

MSC Software, part of Hexagon's Manufacturing Intelligence division, is one of the ten original software companies and a global leader in helping product manufacturers to advance their engineering methods with simulation software and services. Learn more at mscsoftware.com. Hexagon's Manufacturing Intelligence division provides solutions that utilise data from design and engineering, production and metrology to make manufacturing smarter.

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