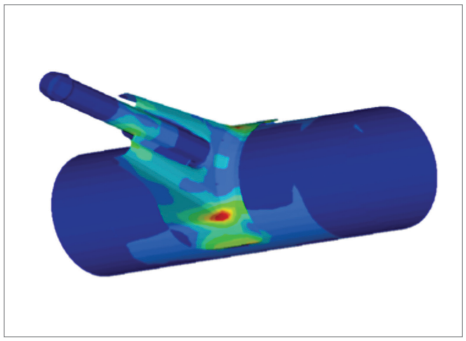
Sharda Motors – Usage of Altair CAE Solution for Durability Analysis

Overview

Sharda Motor Industries Limited (SMIL) is the market leader in the country in the manufacturing of exhaust systems, catalytic converters, independent suspension systems, seat frames, seat covers (two and four wheelers), soft top canopies, and stamped part for white goods products. At the core of the SMIL philosophy is the belief that customer is king and that it is their duty not only to satisfy but delight all corporate clients and also the end users with their products and services by meeting the respective product requirements promptly and accurately. The company does this by always maintaining the highest quality standards in the entire product development life cycle. Their state-of-the-art manufacturing facilities help them to continuously focus on new products, innovation, technology upgradation, and research & development.

SMIL started their most-advanced R&D Center, ensconced in the famed Mahindra World City, in the year 2010. This state-of-the-art facility is fully equipped to design, test, and validate exhaust systems for passenger vehicles, commercial vehicles, and non-automotive applications. The facility seamlessly caters to various emission norms ranging from BS4, BS6, and Tier 4. The Management and Engineering Teams at SMIL proactively engage with leading universities and technical institutions to develop emission and NVH technologies for the future.

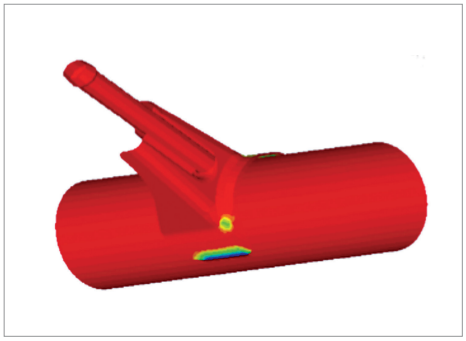
SMIL is proud to supply exhaust systems to Mahindra, TATA, Hyundai, Force Motors, and SML ISUZU in the country. They support all their clients through cutting-edge research and enable them to produce world-class engineering products that in turn delight their respective end customers.



Stress Contour of Hanger for Vertical

"The Altair Suite works best for us! We are now very familiar with HyperMesh™ and can hence convert CAD Models into FE Models quickly, clearly, and efficiently. We are grateful for Altair and its partner DesignTech's continuous support to Sharda Motor Industries. With the power of Altair Simulation suite, we can graduate in our manufacturing environment with perfect alignment of all missions"

Dr. S. Rajadurai
Head - R&D, SMIL - Chennai



Life Contour of Hanger for Vertical

The Challenge - Evaluating Durability of Exhaust Components

In the automotive industry, timely product development and time-to-market is of acute essence. SMIL wholeheartedly understands this and hence, to enable their clients from the industry to stay at the top, they always look forward to embracing innovation in product development to improve product accuracy and achieve client targets vis-à-vis product development time and respective end-customer satisfaction. With this in mind, the company decided to do away with the traditional mode of concept and product design & development and go ahead with modern simulation methods instead.

Their challenge was to evaluate the durability of exhaust system components within the given time frame along with high accuracy. They were expected to carry out finite element analysis and also explain the results for typical exhaust system components. On top of this, they also had to consider durability loads such as engine vibration loading and

proving ground road-loads. Also, other durability issues associated with exhaust system components such as the muffler-pipe system, brackets, and hanger designs were required to be analyzed. In the end, the SMIL team was also expected to explain in detail their analysis of various exhaust components.

The Solution - Using Altair HyperWorks™ during Exhaust Systems' Production

To fulfill all their simulation software needs for concept and product design and development, they decided to go ahead with the Altair Suite. This was because Altair's product features looked promising and the team could see that the suite will save them time, effort, and cost and also enable them to provide innovative solutions to clients.

The SMIL team evaluated the durability of exhaust system components by CAE simulation using Altair HyperWorks. In this, they carried out finite element analysis and explained the results for typical exhaust system components considering various types of durability loads. They also examined durability issues related to other exhaust system components.

Not stopping at this, the team went ahead and carried out Finite element modeling for passenger car exhaust systems using Altair's pre-processing tool HyperMesh™ and performed Static Analysis by using OptiStruct™ FEA for exhaust components to determine high-stress regions. They followed this up by using the S-N approach for calculating the fatigue life of exhaust system components with the help of HyperWorks and Fatigue Process Manager (FPM) in OptiStruct FEA.

The team viewed the results through Altair's post-processing tool HyperView™. They observed that the Altair Suite along with their approach produced comparable results with simplified pre and post processing and also resulted in impressive reduction in solving time.

Results - Meeting the Metrics

For SMIL, Altair HyperWorks gave much better and accurate results and enabled them to achieve the desired project objectives. It reduced the product development cycle time and improved their productivity considerably.

For example, in one of the OEM project - images shown here- the team modified the rear pipe thickness from 1.6 mm to 1.2 mm and obtained the Max. Von Misses stress value (1.6 mm = 143.2 Mpa and 1.2 mm =158.003 Mpa) from the Static 4G Analysis for the full system by using OptiStruct FEA.

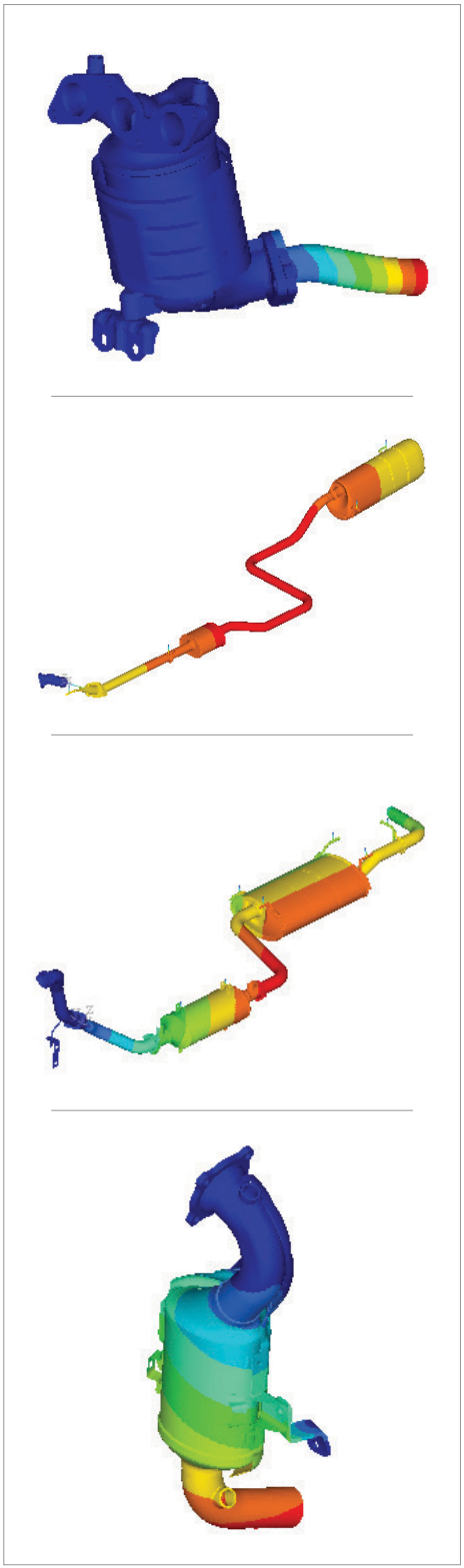
Key Highlights

Industry
Automobile

Challenge
To reduce product design & development cycle time, effort, cost and provide innovative products to clients by using simulation, automation, and optimization technologies in the development of exhaust components and systems at SMIL.

Altair Solution
Using Fatigue Process Manager (FPM) for durability analysis as an important part of the product development cycle.

Benefits
- FPM is a user-friendly and effective process for durability analysis.
- It reduces product development time, cost, and effort.



BS IV Systems of Passenger & Commercial Vehicles

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