

Addressing Design Development Challenges Through Simulation Driven Platform

Auto Original Equipment Manufacturers (OEMs) are looking to their suppliers to be their development partners by moving up the value chain. Suppliers are expected to partake in joint Research & Development (R&D) activities by being involved right from the conceptual stage, thereby adopting a more collaborative approach to the entire product development process where they contribute at each stage of the development cycle.

The key factors for automotive supplier competitiveness are

- Reduced product development time.
- First time right products.
- High value offerings with superior technology at affordable costs.

To achieve these above mentioned goals, OEMs are insisting component suppliers invest in simulation technologies.

Focus on Simulation by Automotive Suppliers

Overcoming engineering challenges faced by automotive suppliers.

Automotive suppliers are facing many challenges in having in-house simulation capabilities compared to that of OEM's, the primary challenges being upper caps on budgets & constraints of hiring expert manpower and retaining them. Access to relevant data to validate the designs and establishing robust virtual/test methodologies to match OEM expectations is another concerning factor for the suppliers.

Simulation Tools that the Supplier Segment Needs

The majority of expectations are to find out cost effective, reliable methods and solutions which can lead to better, lighter, faster and low cost engineered products.

One of the ways to overcome these challenges is to invest in simulation technologies that require an affordable initial investment, the ownership cost of which is low, the codes are reliable & proven, and the suite of tools provide suppliers access to a broad range of solvers (a true multi-physics environment) helping them pick and choose the solvers as per their simulation requirements. Another important factor in consideration is that these tools need to be easy to use and the existing manpower should be able to learn quickly and develop proficiency so that they can harness the full potential and derive maximum benefits that these tools have to offer.

The need for solver technologies addressing various physics is very dynamic. Their usage cannot be accurately predicted in advance and therefore investing in multiple solvers is not a commercially viable solution for the organization. Altair HyperWorks®, through its patented units based licensing system gives customers access to multiple solvers under one umbrella. Users get access to different solvers addressing multiple physics, which helps them to apply the correct one based on the challenge at hand, thus making it a smart choice for the organization to achieve robust product design through reliable & accurate simulation tests, at an affordable investment. Meanwhile the major engineering decisions can be made easy with predictions through simulation.

About Endurance Technologies

Endurance Technologies is one of India's leading automotive component manufacturing companies. Starting with two aluminium casting machines in FY 1986, we have grown to operate 18 plants in India and 7 in Europe. Today, Endurance Technologies is the largest aluminium die casting manufacturer (Source: Aluminium Casters' Association of India) in India and one of the leading automotive component manufacturers in aluminium die casting (including alloy wheels), suspension, transmission and braking systems.

About Endurance R&D

Endurance Technologies, has Innovation & Technology as its key focus areas & believes that R&D activities are critical to maintaining a leadership position in the industry and providing a competitive advantage as it seeks additional business with new and existing customers. It has four dedicated R&D centers for each of its product businesses: three in Aurangabad (one each for suspension, transmission and braking systems) and one in Pune (for aluminium die casting). These R&D centers are supported by the Advance Engineering Group from CAE, RLDA, Electronic Control Systems, Failure Analysis, Advanced Materials & Tribology point of view. Endurance has a dedicated Intellectual Property (IP) cell which is actively involved in evaluating every possibility of patent registration. All R&D centers are approved by the Department of Scientific and Industrial Research (DSIR). It has expansion plans in Aurangabad, Maharashtra, India to develop an automotive proving ground (test track) spread over 29 acres, which it expects will be operational by the end of 2018. The proving ground construction activities have already commenced.



ENDURANCE
Complete Solutions



"The Endurance Group has four well-equipped R&D Centers recognized by the Department of Science & Industrial Research, Ministry of Science & Technology of government of India. The R&D infrastructure comprises of a large number of imported and indigenous equipment's, handled by a highly qualified team of over 175 R&D personnel."

The Centers focus primarily on applied Research & Development activities with integrated approach of Virtual & Experimental Analysis for New Product Development (NPD), Product & Process improvements, new technology developments."



Ravi Kharul
Chief Technology Officer
Endurance Technologies Ltd.

Simulation Implementation at Endurance Technologies

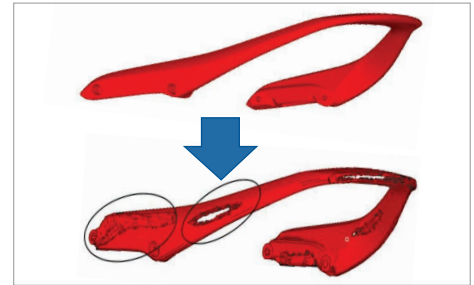
In the early stage of in-house simulation implementation at Endurance Technologies, HyperWorks was being adopted primarily for pre and post processing due to its extraordinary FE modeling solutions. During the stage of establishing high fidelity finite element modeling for our applications, HyperMesh® has been used extensively to build analysis models for Structural, Thermal, Computational Fluid Dynamics (CFD), and Multi-body solutions and OptiStruct® for durability analysis with HyperView® as standard post processing. With constant support, Altair team has helped us in exploring and implementing various HyperWorks solvers at Endurance Technologies.

Altair Solution Offerings

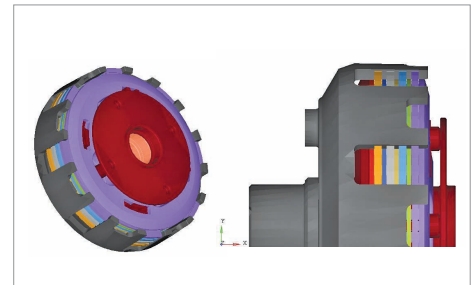
Altair HyperWorks offers a wide range of simulation applications – which includes Linear Static, Non Linear Implicit / Explicit, Multi-body Dynamics (MBD), CFD, Electromagnetic, Optimization etc. - in the form of HyperWorks Units (HWU), to address specific industry requirements. For example, most of HyperWorks applications are available for 50 HW Units. A user can access any application, which takes up requisite set of HWUs and returns them to the common pool on network server once he is finished with his work. This flexibility allowed us to start exploring HyperWorks solvers for different applications, involving Linear & Non-Linear analysis (OptiStruct), Crash & Impact simulations (RADIOSS®), Kinematic & Dynamics simulations (MotionSolve®), Flow Dynamics (RADIOSS FSI/AcuSolve®).

HyperWorks Solver Adoption

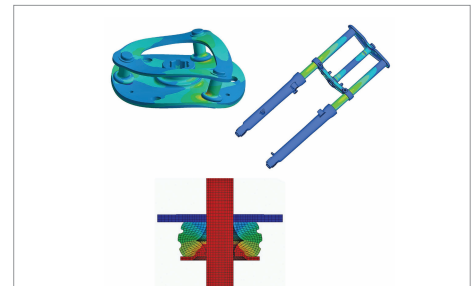
At the stage of solver evaluation, exploration and test validation process, there was a need of maximum hand-holding and knowledge transfer. A strong collaborative activity with Altair & DesignTech (business partner of Altair) technical team stretching over extended period over four years for a variety of simulation solutions helped us in benchmarking the appropriate simulation methodologies. Through these collaborative initiatives, we were able to establish a simulation approach suitable to our design and development process that ensured we developed better products faster and with greater accuracy than before.



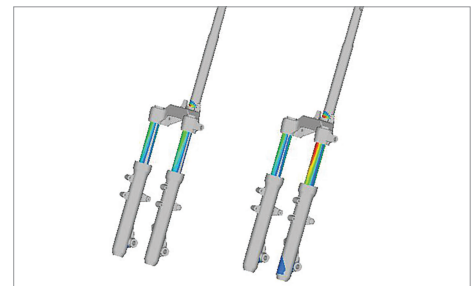
Design Optimization



Multi-Body Dynamics



Nonlinear FEA



Structural FEA

“ Altair India and DesignTech technical teams are extremely co-operative, responsive and competent for resolving day-to-day technical issues that occur in our regular simulation activities. This increased our confidence in capabilities of Altair simulation solutions, inspiring us to explore more offerings from Altair HyperWorks going forward ”

Girish Kokane, Asst. General Manager (R&D)-Advanced Engineering
Endurance Technologies Ltd.

Here are few of the real-time cases listed for which simulation approach has been well established at Endurance Technologies.

- Telescopic suspension virtual validation using RADIOSS & MotionSolve.
- Strength and Vibration analysis using OptiStruct.
- Design correlation with tests using HyperStudy® and HyperGraph®.
- Clutch performance studies using MotionSolve.

Altair HyperWorks helped in smooth implementation of variety of CAE simulations during product design & development stage at Endurance Technologies, India.

Endurance Achievement

Adoption of Altair simulation solutions effectively facilitated the achievement of reliable results, with test correlations, study product behaviour under several conditions and constraints, and also the exploration of various 'what-if' scenarios. These tools helped us articulate and measure the costs and effects of possible design errors, while helping us arrive at simple yet accurate solutions for our complex engineering problems. Today HyperWorks technologies are playing a vital role in product development cycle and simulation has become an integral part of NPD process at Endurance Technologies. Endurance has developed its own Virtual Verification Process which is automated with the help of Altair Enterprise Solutions Group in order to cut short simulation lead times & improve the results consistency.

Future Road-map on Simulation and HyperWorks at Endurance Technologies

Integration and automation of advance processes in HyperWorks will be a new area to explore as it would help companies capture & establish best practices or ideal approaches to address complex, frequently solved problems and thus reduce to a great extent the duplication of work or repetitive efforts. We plan to explore other offerings under HyperWorks solutions, viz. Click2Cast®, solidThinking Inspire®/Evolve®, which can strengthen our engineering judgments and shorten our design and development cycle on our product-line. Going forward, Endurance Technologies plans to venture into full vehicle level design activities and anticipates an increased application of HyperWorks technologies in the area of optimization and design of experiments. We believe that Altair's further research into HyperWorks solutions and continued investment in addressing newer physics will address emerging domains there by enabling Endurance address newer challenges upfront with simulation.