

# Overcoming engineering challenges using simulation

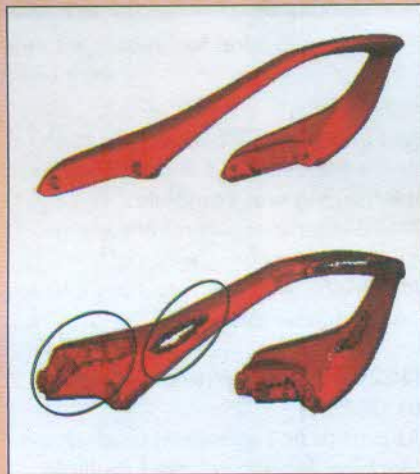
Endurance Technologies, one of India's leading automotive component makers, addresses design development challenges through simulation driven platform

**A**uto 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; and High value offerings with superior technology at affordable costs. To achieve these goals, OEMs are insisting component suppliers invest in simulation technologies.

### Focus on simulation by automotive suppliers

Automotive suppliers are facing many challenges in having in-house simulation capabilities compared to that of OEMs, the primary challenges being upper caps on budgets &



Design optimisation

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

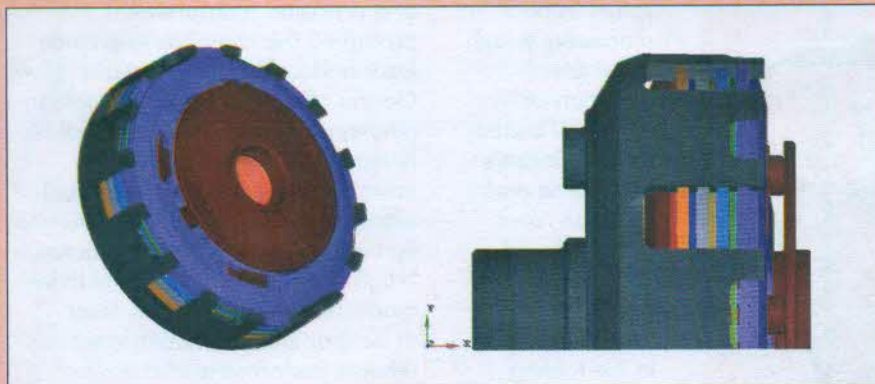
lead to better, lighter, faster and low cost engineered products.

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 organisation. 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 organisation 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



Multi-body dynamics



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

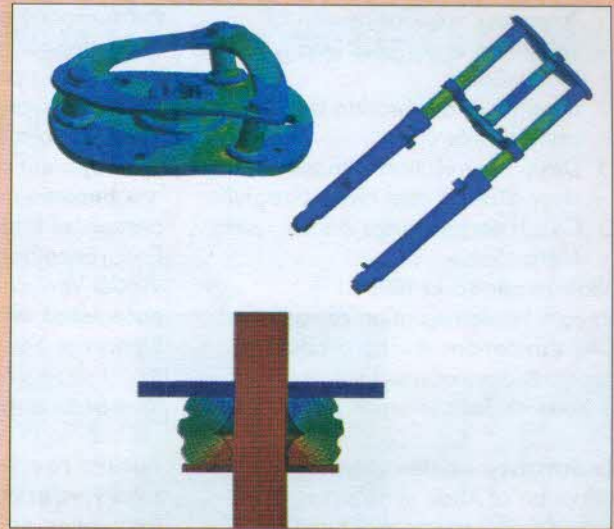
Endurance Technologies has innovation & technology as its key focus areas & believes that R&D activities are critical to maintaining a leadership position in the industry and providing a competitive advantage as it seeks additional business with new and existing customers. It has four dedicated R&D centers for each of their 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 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) 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.

**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 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, optimisation 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



Nonlinear FEA

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®), and 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 handholding 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 Endurance Technologies in benchmarking the appropriate simulation methodologies. Through these collaborative initiatives, Endurance Technologies was able to establish a simulation approach suitable to its design and development process that ensured the company developed better products faster and with greater accuracy than before.

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

“ 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**, Assistant General Manager (R&D) - Advanced Engineering, Endurance Technologies Ltd



- ❑ 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.

### **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 Endurance Technologies articulate and measure the costs and effects of possible design errors, while helping

the company arrive at simple yet accurate solutions for its 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**

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. Endurance Technologies plans

to explore other offerings under HyperWorks solutions, viz Click2Cast®, solidThinking Inspire®/ Evolve®, which can strengthen the company's engineering judgments and shorten its design and development cycle on the 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 optimisation and design of experiments. Endurance believes 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. **IPF**

*Article courtesy: DesignTech Systems Ltd*

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