

COMPANY

Guangzhou Automotive

CITY

Guangzhou, China

SOFTWARE

Autodesk® Moldflow®
Autodesk® Helius PFA®

Lightweighting the future of automotive

Guangzhou Automotive uses Autodesk Moldflow® and Helius PFA® to lightweight components accurately and with less waste

Based on accuracy simulation results of Moldflow and Helius PFA in products design period, we can optimize structure of product with not only favorable molding windows, perfect appearance quality but also excellent stiffness, strength and most simplified structure. In ensuring product quality, while the product lightweight was achieved.

—Jian Zhang

Senior CAE Engineer,
Guangzhou Automotive Group
Automotive Engineering Institute



Image courtesy of Guangzhou Automotive Group

Guangzhou Automotive is a Chinese partner of Toyota, Honda, Mitsubishi and Fiat Chrysler which covers the whole design and manufacturing of vehicles and parts for domestic and foreign markets.

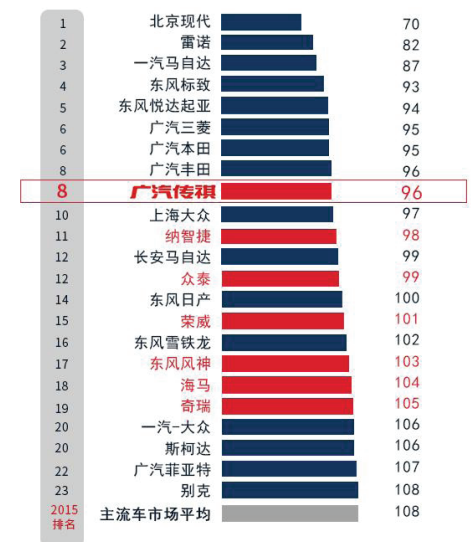
Founded in July 2006, Guangzhou Automobile Group CO., LTD Automotive Engineering Institute (GAC ENGINEERING) represents a major initiative for the GAC Group to pursue scientific development and independent innovation, enhance its core competitiveness, and achieve sustainable development. GAC MOTOR firmly commits itself to the development, manufacturing and sales of world-class quality vehicles, engines, components, auto accessories of its own brand, as well as to the research and development of automotive engineering technologies.

The Challenge

Trying to keep in mind the philosophy of "Make excellent cars for the loved ones and let the world full of love," and doing so while being selected by JD Power as a 5-star safety rated family of vehicles for 5 consecutive years is no easy chore. Adding on top of this remaining the number 1 ranked among all domestic brands for consecutive years and their social and environmental responsibility, GAC ENGINEERING has to remain on the cutting edge of automotive design.

Balancing all of these concepts while still producing a cost effective, fuel efficient and visually appealing vehicle has presented a number of challenges. As with many automotive companies, one solution GAC ENGINEERING is using to help address all of

2015年J.D. Power中国新车质量研究品牌排名——主流车市场



2015 J.D. Power Safety Ratings

注：分数越低，表明发生故障的频率越小，质量也越高。■ 自主品牌 ■ 合资/进口品牌

Image courtesy of Guangzhou Automotive

these concerns is lightweighting components using fiber filled plastics. This is not as simple as replacing existing parts with carbon copies with a different material. Not only do the new designs have to use materials strong enough to withstand accidents, but they also have to be manufactured accurately enough to make sure all of the vehicle components still fit while accounting for warpage after the molding process. The additional complexity of weld lines and depressions in the surface also have to be considered for aesthetics.

The Solution

With the use of Autodesk Moldflow Insight, GAC ENGINEERING is able to rapidly iterate on component design. This allows them to determine how much warpage a part will see after cooling based on the material, mold shape, wall thickness

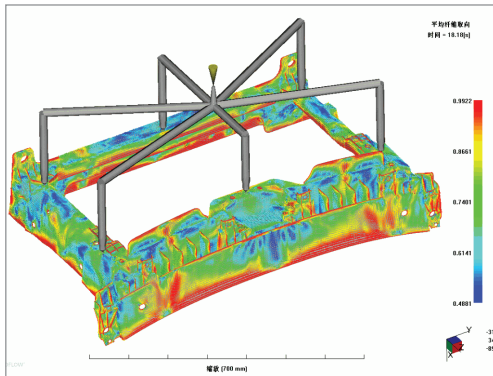


Image courtesy of Guangzhou Automotive

and a number of other properties. Going a step further, Guangzhou uses Autodesk Heliuss PFA, where residual strain results from Moldflow are able to be imported into an FEA package. From there, loads and boundary conditions can be applied to simulate bolted on conditions and providing the as built result for the components. This lets Guangzhou understand if parts will interfere and if sufficient clearance exists between all parts.

Guangzhou Automotive is also leveraging Autodesk Heliuss PFA to explore more advanced material models for their designs. Fiber reinforced polymers and other untraditional materials can be tested to continue to lower the cost of each part while ensuring that components will remain strong enough to serve their purpose. Parts ranging from tires to bumpers and oil pans to engine mounts are all being investigated in this fashion.

The Result

With one part in particular where benchmarking was performed to verify accuracy, the simulation resulted in an expected deflection of 0.58 mm. Comparing this to the physical results of 0.55 mm showed the values from Heliuss PFA were around 5%. These results were more accurate than any other solution tested, and improved on the existing results within 12% of the actual deflection. Because of this superior workflow the development cycle for both the mold and part have significantly been reduced. The part quality and consistency has also improved, allowing for less waste.

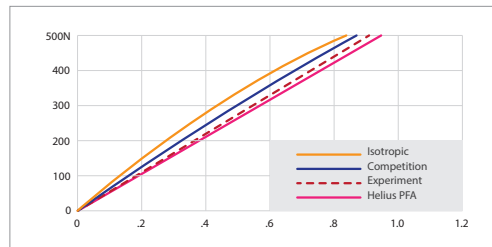


Image courtesy of Guangzhou Automotive

Moving forward, Guangzhou Automotive will be continuing to use Heliuss PFA for lightweighting automobile parts. Optimizing designs with thin walls is expected to continue to save significant money on material costs as well as molding cycle time.

The accuracy of numerical simulations affect immediately the development cycle, cost and quality of product. Only adequate, comprehensive and accurate input can ensure the accuracy of numerical simulation. It's a pity that the effects of glass fiber orientation on product strength were not considered in traditional structural analysis. Fortunately, the joint simulations with software Autodesk Heliuss PFA can compensate it and significantly enhance our product competitiveness.

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