



courtesy of

**HENNIGES**  
AUTOMOTIVE



Success story

## modeFRONTIER bolsters Henniges Automotive's seal performance

Henniges Automotive uses modeFRONTIER optimization and robustness evaluation methods to improve seal design

*In recent times, car sealing systems design has seen major technological advances in both materials and manufacturing techniques. Getting the design just right involves satisfying a multitude of specifications and dealing with factors that impact performance and, most importantly, requires close collaboration between the manufacturer and the customer. Henniges Automotive, a leader in vehicle sealing and anti-vibration solutions, has technical centers in North America, Europe and China that cater specifically to regional requirements.*

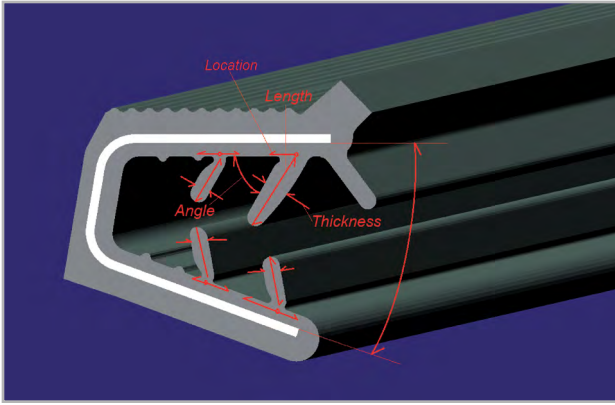
### Challenge

Seal design must take into account various **customer specifications** such as low door closing effort, easy part installation, secure part retention, low glass seal drag and much more, while at the same time, satisfying both **short and long-term sealing performance**. Moreover, engineers need to optimize seal design to ensure **robust performance** under vehicle sheet metal variation as well as variations in material and geometry that occur in the rubber manufacturing process.

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## Solution

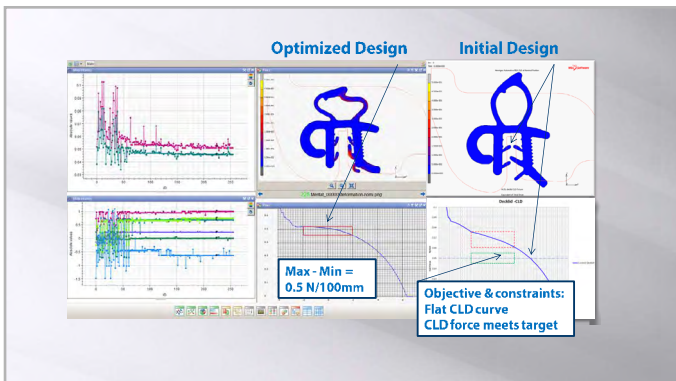


Through the successful integration of MSC MARC and Altair HyperMesh in the **modeFRONTIER workflow**, Henniges engineers were able to **automate the simulation** of seal behavior with different geometry configurations. In just two days, more than 1600 design configurations were analyzed by modifying 13 grip fin variables including length, thickness, angle and location (Figure 1). “Thanks to modeFRONTIER we could consider a large amount of possibilities; an impressive result for our customers”, says Ken Ogilvie, CAE Manager. More importantly, modeFRONTIER provides Henniges engineers with the necessary tools to go through the hundreds, even thousands, of designs to find not only better but also more robust solutions.

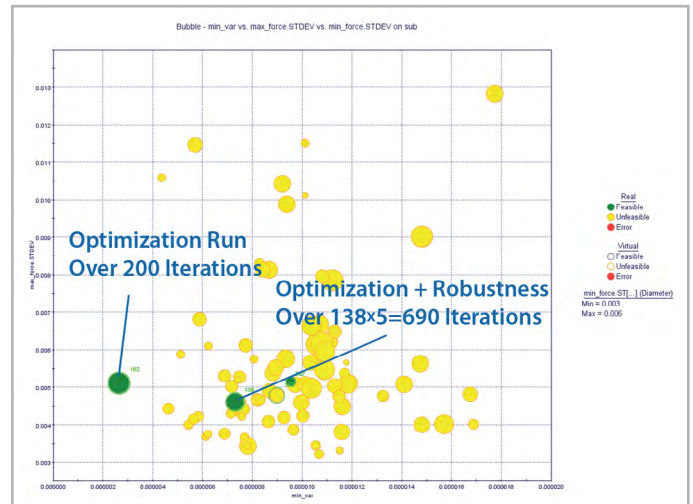
Seal geometry.

## Benefits

“It’s difficult to make a part exactly to client specifications due to the variability in the rubber extrusion and molding process. Robustness therefore becomes very important when designing automotive seals. That’s why we choose modeFRONTIER; for its optimization and robustness capabilities,” says Fan Sheng, CAE Technical Specialist at Henniges. Looking to the future, Ogilvie says **“modeFRONTIER helps us make significant improvements in the quality of our designs**; without modeFRONTIER, it’s just trial and error based on past experience.”



Baseline and optimized designs - modeFRONTIER Run Analysis.



modeFRONTIER Pareto Bubble Chart - Robust Optimization.

## About Henniges Automotive

**Henniges Automotive** provides world-class **vehicle sealing and anti-vibration solutions** for the global automotive industry. Since its inception in 2007, Henniges has been committed to its strategy of flawless execution – driving innovative solutions for its customers through flexibility, agility and transparency. Headquartered in Auburn Hills, Michigan, Henniges utilizes the talents of associates located in six countries and across three continents to meet customers’ growing global needs. [www.hennigesautomotive.com](http://www.hennigesautomotive.com)



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