

AUTOMOTIVE AND TRANSPORTATION

Hitachi Automotive Systems

Using Simcenter Engineering and Simcenter Testlab to reduce testing time by 66 percent

Product

Simcenter

Business challenges

Provide an accurate prediction of steering system noise for an in-vehicle component

Meet the consumer demand for quieter cars

Measure noise, vibration and harshness data provided by simulation software

Keys to success

Partner with Simcenter Engineering to improve testing methods

Use component-based transfer path analysis to determine how the steering system impacts overall vehicle noise

Work with Simcenter Engineering to interpret and analyze Simcenter Testlab data

Results

Reduced testing time by 66 percent

Expanded engineering team's capabilities and bandwidth

Created product improvement guidelines for future development efforts

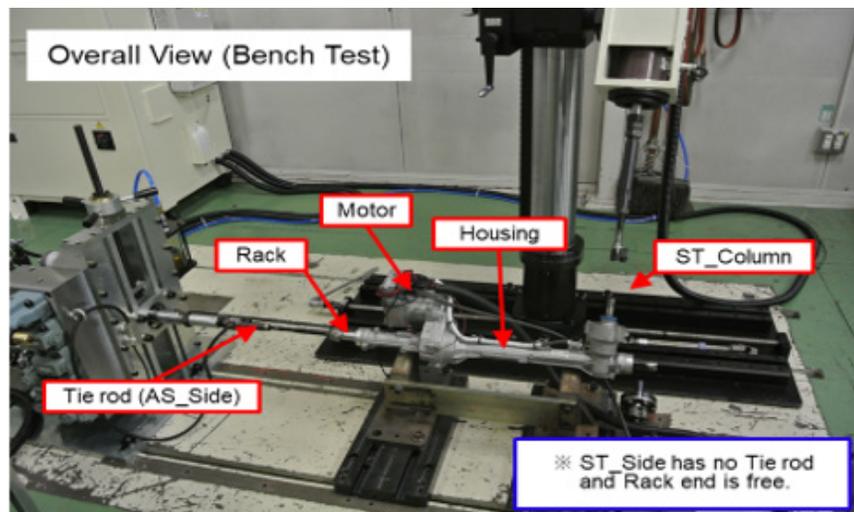
Siemens solutions enable Hitachi Automotive Systems to significantly extend its engineering team's capabilities

Engineering the cars of tomorrow

As cars are being transitioned from human-controlled and gas-powered to autonomous and electric, their engines are becoming smaller and quieter. The cars of yesterday came equipped with large, noisy engines that masked the sounds and vibration coming from other components such as steering systems.

The movement to autonomous cars also means the driver no longer needs to focus on the road. With the driver's mind free to pursue other activities while the car is in motion, various sounds will seem much louder and more noticeable than in the past.

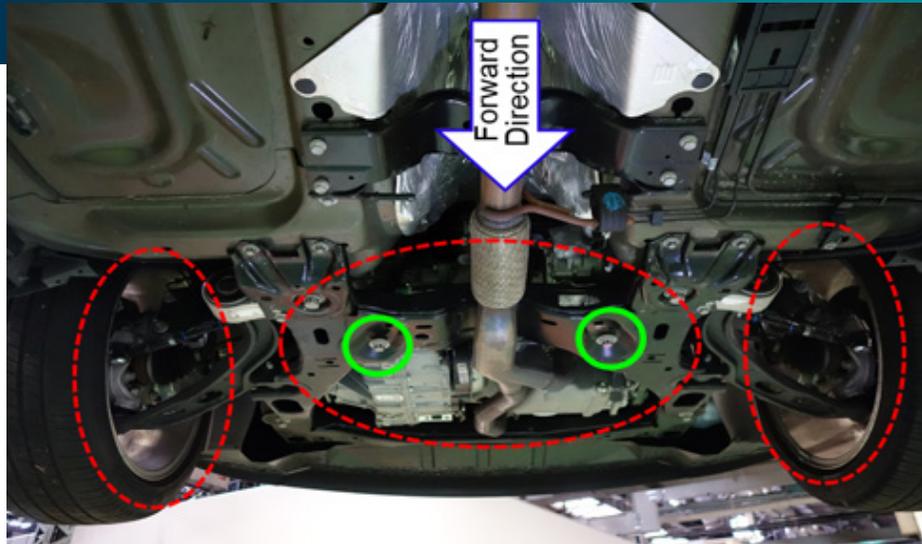
Until recently, noise was an issue that automotive original equipment manufacturers (OEMs) and their suppliers did not need to think about. However, in order to stay competitive, automakers must prioritize noise, vibration and harshness (NVH) and integrate it into their designs much earlier than they have traditionally done.



Traditional steel test bench condition.

“By shifting the vehicle testing from our team to Siemens, we have been able to significantly reduce our product development costs. Product improvement guidelines have been created and we will begin to apply them to new products as well.”

Aoi Nakanome
Staff Engineer
CAE Technology Development
Department
Hitachi Automotive Systems,
Ltd.



Monitoring vehicle conditions.

Out with the old

Engineers have traditionally used steel test benches to analyze NVH in automotive components. However, once the component is moved from the bench to a car, the vibration often increases significantly. As a result, it is extremely difficult to predict noise and vibration levels alone.

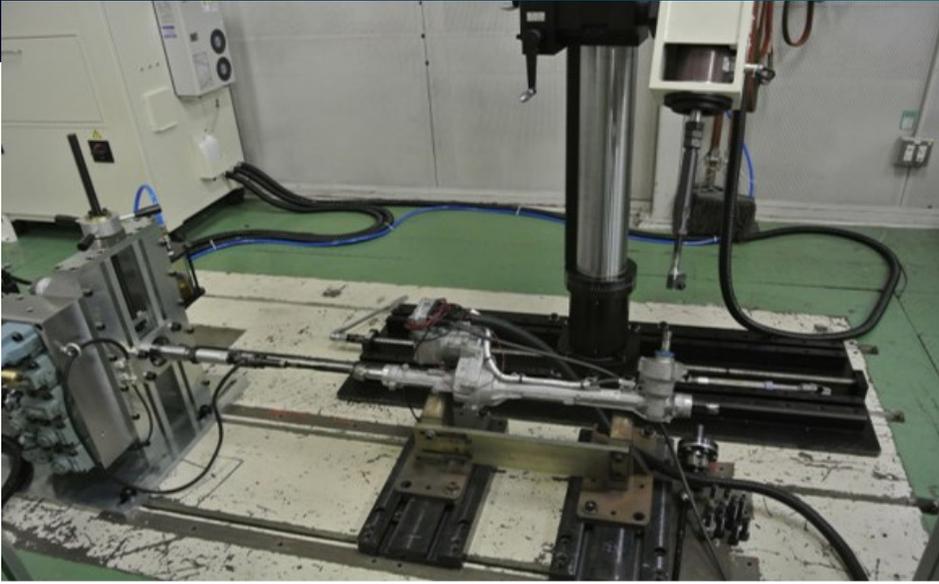
Additionally, due to the relatively new nature of quiet cars, noise and vibration has historically been one of the last areas

that automakers have analyzed. This means that NVH issues are often only addressed right before production, which is disruptive and expensive.

“With limited in-house resources, it is difficult to do technology development on top of applied development,” says Hayuru Inoue, senior engineer in the CAE Technology Development Department at Hitachi Automotive Systems, Ltd.

// We will continue to use Simcenter. With Simcenter we can start from computer-aided design and seamlessly transition to acoustic simulation.”

Hayuru Inoue
Senior Engineer, CAE Technology Development Department
Hitachi Automotive Systems, Ltd.



Hitachi Automotive Systems achieved more realistic design targets for its components.

The steering system engineering team at Hitachi Automotive Systems set out to find a better way to predict NVH.

In with the new

Hitachi Automotive Systems partnered with Simcenter™ Engineering to use component-based transfer path analysis (TPA) to predict the steering system's NVH inside an actual vehicle rather than just analyzing the data on a testing bench. Siemens worked with Hitachi Automotive Systems to "split" the components apart to see how the steering system was behaving and how that affected overall NVH in the vehicle.

The Hitachi Automotive Systems team also had access to the component-based TPA tool inside of Simcenter Testlab™ software, which is part of Xcelerator™ portfolio, the comprehensive and integrated portfolio of software and services from Siemens Digital Industries Software. Although it is possible to perform TPA inside this tool, many teams struggle with measuring the data.

The engineering team at Siemens was able to provide the expertise that Hitachi Automotive Systems needed to not only generate data, but measure and interpret it.

Extending the team

Working with Siemens, Hitachi Automotive Systems was able to significantly extend its engineering team's capabilities. By partnering with Simcenter Engineering, Hitachi Automotive Systems gained access to the latest applications and methodologies, freeing up its time to focus on NVH prediction for each component.

"By shifting the vehicle testing from our team to Siemens, we have been able to significantly reduce our product development costs," says Aoi Nakanome, engineer at Hitachi Automotive Systems. "Product improvement guidelines have been created, and we will begin to apply them to new products as well."

"We anticipate this initiative with Siemens will allow us to reduce the number of prototypes from at least four to just two. That would result in a 50 percent time reduction in prototyping, component testing."

Hayuru Inoue
Senior Engineer
CAE Technology Development
Department
Hitachi Automotive Systems,
Ltd.

"If we can consider the subjective rating of the noise, analyze it using metrics and improve that noise in Simcenter, we will be able to greatly improve the development efficiency."

Aoi Nakanome
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Solutions/Services

Simcenter Engineering
[siemens.com/
simcenter-engineering](https://www.siemens.com/simcenter-engineering)

Simcenter Testlab
[siemens.com/simcentertestlab](https://www.siemens.com/simcentertestlab)

Customer's primary business

Hitachi Automotive Systems, Ltd. is engaged in the development, manufacture, sales and services of automotive components, transportation-related components, industrial machines and systems, and offers a wide range of automotive systems, including powertrain systems, chassis systems and advanced driver assistance systems. www.hitachi-automotive.co.jp/en/

Customer location

Kanagawa
Japan

Inoue expects that by partnering with Siemens, tests that used to take three days can be reduced to just one. "We anticipate this initiative with Siemens will allow us to reduce the number of prototypes from at least four to just two. That would result in a 50 percent time reduction in prototyping, component testing and vehicle testing," he states.

Looking forward to the future

"We believe the NVH restrictions for automobiles will only get stricter," says Inoue. "Noise that is not only loud but also uncomfortable for passengers will become more of an issue."

The Hitachi Automotive Systems team is planning to work with Siemens to develop subjective ratings for noise. "If we can consider the subjective rating of the noise, analyze it using metrics and improve that noise in Simcenter, we will be able to greatly improve the development efficiency," Nakanome explains.

"We will continue to use Simcenter. With Simcenter we can start from computer-aided design and seamlessly transition to acoustic simulation," says Inoue. The team plans to connect its models from Simcenter to test to make proposals for future product improvements.

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Aoi Nakanome
Staff Engineer, CAE Technology Development Department
Hitachi Automotive Systems, Ltd.

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