

Client: [Webasto](#)

Description: Webasto is a global innovative systems partner to almost all automotive manufacturers and among the top 100 suppliers in this industry sector. In 2019, the company generated sales of around 3.7 billion euros and had almost 14,000 employees at more than 50 locations. The Webasto product portfolio covers, among other things, sunroofs, hardtops for convertibles, heating and cooling systems, as well as charging solutions and battery systems for electromobility. Products and services from Webasto offer added comfort, safety, and efficiency.

Problem: Finding solutions and technologies for problem detection and failure prevention in convertible roofs and vehicles with sunroofs to guarantee the highest quality and comfort for users.

NL Solution: The ultrasonic NL Camera for measuring, visualizing, and analyzing noise sources in convertible roofs and sunroofs—in addition to the NL Sense for predictive monitoring of imminent errors in convertible systems during durability testing (cycle testing).



Results: Thanks to its abilities to accurately pinpoint noise sources and help locate completely new problems and potential optimizations, the NL Camera is now standard equipment in Webasto's validation, benchmarking, and fault-finding processes. The NL Sense continues to find sound trends and deviations as well as predict outcomes in Webasto's durability testing.

THE ULTRASONIC CAMERA BY NL ACOUSTICS: BETTER, FASTER RESULTS FOR WEBASTO

NL Acoustics' ultrasonic camera and the NL Sense for automated asset monitoring were welcomed with great interest at Webasto. The technologies' efficiency and comprehensibility had already convinced the Webasto engineers. They were further impressed by the NL Solutions' simple and easy set-up process that did not require extensive training, robust design, and the NL Cloud software's analytic capabilities.

The Ultrasonic Camera Aids in Future Design

Webasto first discovered the NL Camera back in 2018. They needed a solution that could localize possible noise sources in the convertible roof systems and vehicles with sunroofs while operating the roof or driving. In a test setup at Webasto's sinus test track, the ultrasonic camera helped the Webasto engineers discover an issue in a convertible roof they had not been aware of previously: the camera

located a sound source coming from the inner lining rubbing over the roof's insulation.

"This helps us design for the future," says Magnus Sviberg, the Head of Advanced Engineering and Concepts at Webasto.

The NL Camera's accompanying cloud software, outfitted with its advanced analytics, delivered Webasto valuable information and results. While other methods may have

found the issues NL Acoustics' ultrasonic camera detected so effortlessly, they would have required considerably more time and complicated analysis.

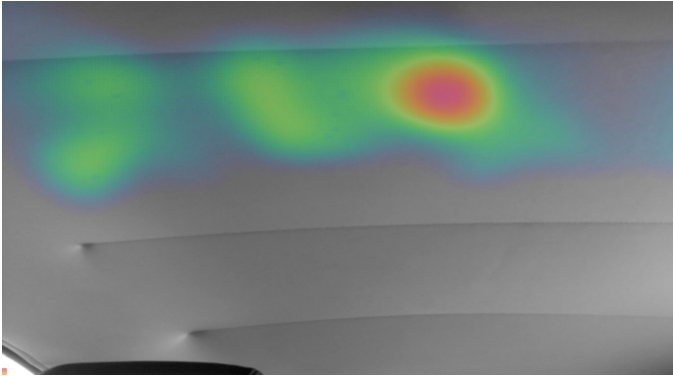


Image 1. As this convertible roof was being tested at Webasto's sinus test track, the NL Camera found a sound source caused by the relative movement between the roof's inner lining and insulation.

The NL Sense Detects the Start of Failure Chains

The NL Sense, a solution for real-time asset monitoring, was simple to integrate into Webasto's test fixture for testing the endurance of convertible systems. Webasto engineers placed NL Sense's sensors and precision microphones on the convertible roof so that they could analyze the sound data in real time in the machine learning-powered NL Cloud.

"We could find trends and predict outcomes using sound in durability testing, which could significantly improve validation for future projects," Sviberg explains.

"Perhaps we could have found the problems with some other methods, but only through much more complex analysis and more time spent."

- Magnus Sviberg, Head of Advanced Engineering and Concepts at Webasto

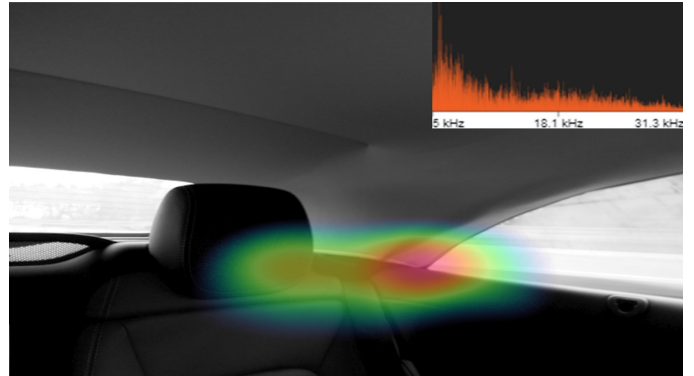


Image 2. The NL Camera also discovered a low frequency sound source between the vehicle's roof and interior during tests.

How did the NL Sense do this? After learning the normal sounds of operating a convertible roof, the NL Sense could then detect even the smallest deviations and slight changes in the convertible roof's noises. These changes signaled the beginning of a failure chain, even before the failures became detectable otherwise in the test object.

"We are now also investigating the use of NL Sense as end-of-line quality assurance for damage-free product analysis," Sviberg adds.

Webasto continues to deliver high-quality and efficient products with NL Solutions as an important part of their toolkit.

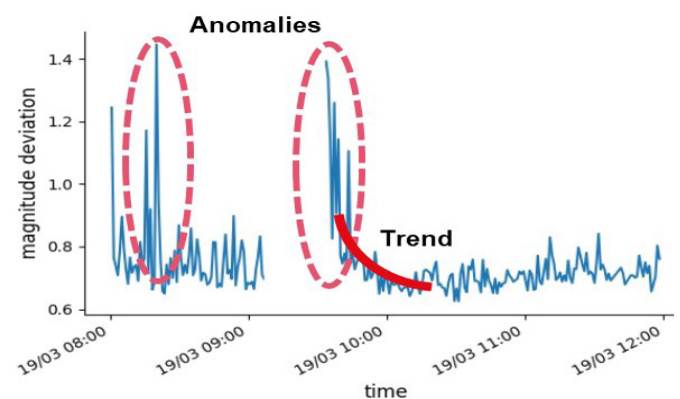


Image 3. By using the NL Sense in durability tests, Webasto was able to find sound trends in the convertible roofs' operation.