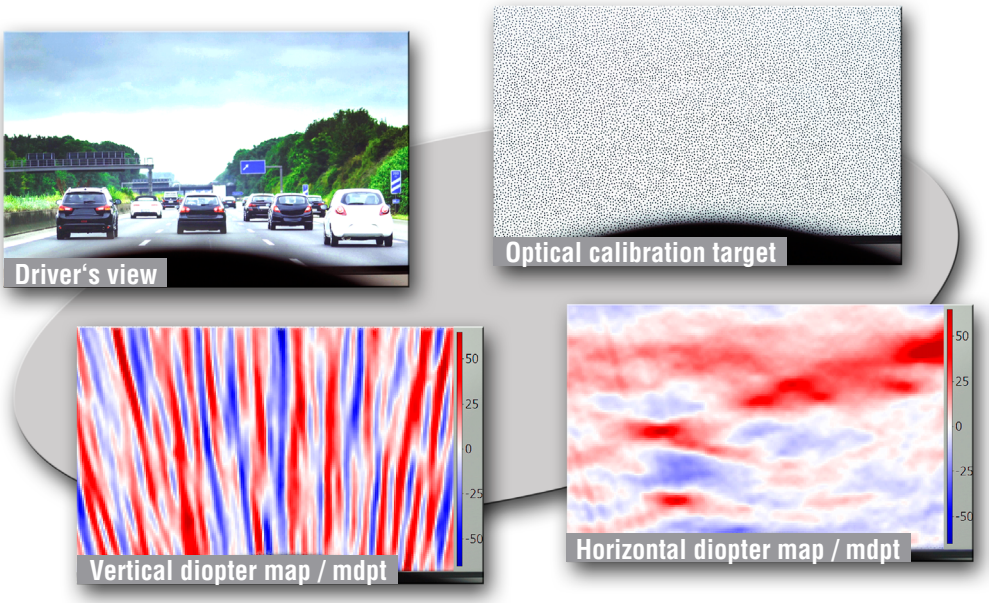
LaVision
FOCUS ON IMAGING

Car Glass Inspection

ADAS Image Quality Testing

Flexible and comprehensive imaging technology for safer automotive driving

LaVision's **Automotive Imaging** system combines in an innovative way automotive glass inspection with image quality testing of Advanced Driver Assistance Systems (ADAS). The applied full-field imaging technique measures optical transmission distortion of windshields already installed on the car or on glass laboratory test benches. The whole-field imaging technique allows flexible field of views and measures accurately the optical power of local distortions in milli-diopters with highest spatial resolution. The diopter map of the driver's viewing zone is captured as well as the ADAS camera view port with an adapted magnification for highest resolution.



Multi-purpose diopter imaging system

Compared to the established scanning Moiré technology the applied background imaging technique is focusing on a calibration target generated on a high resolution wide-screen monitor. System setup is uncritical for alignment allowing fast installations at different measurement locations. The pattern of the calibration target is automatically switched for the different measurement options.

Mounted on a robotic arm and equipped with autofocus capability the **Automotive Imaging** system is very flexible to use. Changing the test setup or focusing on localized details is easily implemented. Programmed sequences make your test scenario repeatable.

Automotive Imaging *on a windscreen test bench and applied from inside of the car.*

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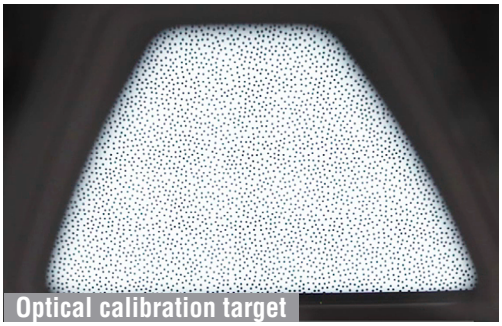
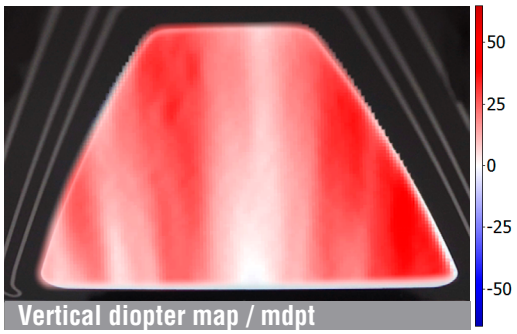
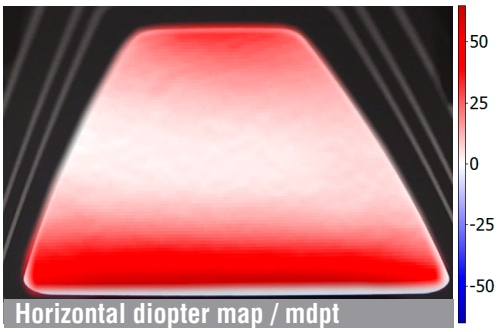
ADAS imaging performance check

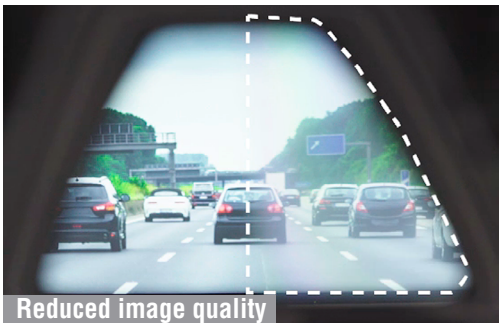
Furthermore, the same imaging system quantifies the image quality of the ADAS camera performance in terms of the Modulation Transfer Function (MTF) line pair analysis, image contrast and brightness (transmission). Other image quality indicators can be added to the test sequence.

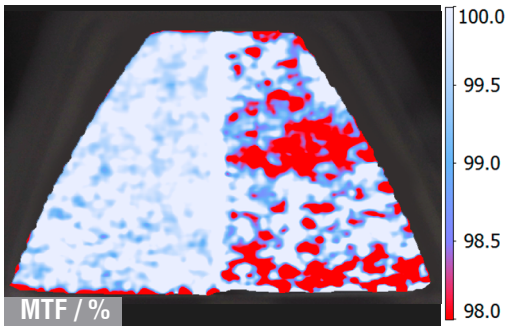


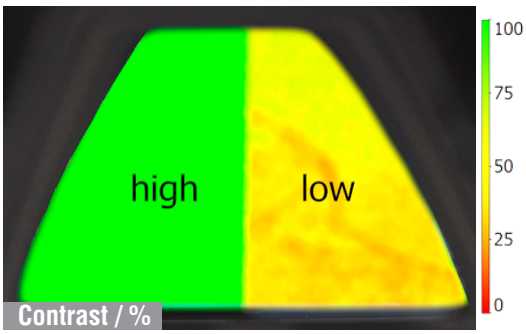


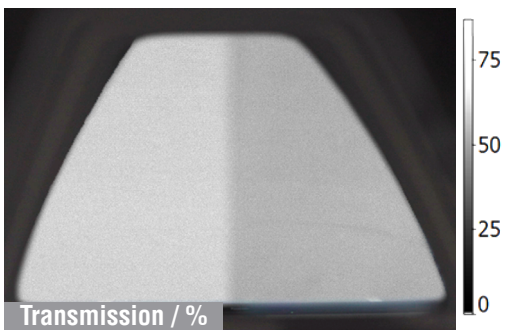


Testing ADAS image quality









***Automotive Imaging** applied on the ADAS camera viewport to measure the diopter map of the windshield sector as well as the overall image quality of the ADAS system in terms of MTF, image contrast and light transmission (image brightness). A transparent foil attached to the right side of the image field is used to reduce the image quality.*

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2D map of Modulation Transfer Function (MTF)

The MTF of the ADAS camera system describes its so-called spatial frequency response and provides information about the optical performance of the camera system. The MTF as a universal and standard measure indicates to what extent details from the scene in front of the car are transferred to the camera image. The ISO standard ISO12233:2014 defines one way for correctly performing MTF measurements.

Left and right image of an ADAS camera system taken with different lens apertures. The corresponding MTF maps are overlayed.

LaVision's approach for MTF measurement is going far beyond this standard: The **Automotive Imaging** system captures the MTF as a 2-dimensional map with high spatial resolution across the entire camera view.

ADAS camera testing

All these image quality tests as well as diopter measurements are also possible using an already installed onboard ADAS camera supporting image transfer to the **Automotive Imaging** system. In this real test scenario, the system software is matching with high precision stored test chart calibration data with actual image data of the ADAS camera.

The information generated hereby contains the total effect to the ADAS camera image throughout the entire optical path. The image distortion from the windshield is captured exactly at the correct viewing angles and light ray paths, which are different when just looking straight through the ADAS windows, as done with conventional scanning systems.

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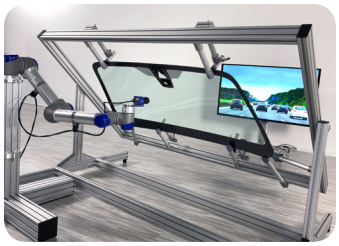
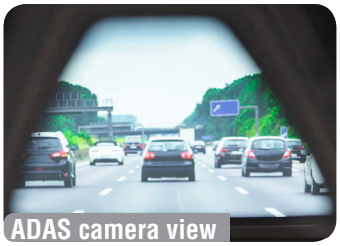
Multiple test scenarios





Automotive Imaging *on a windscreen test bench, applied from inside of the car and for ADAS image testing using the original installed onboard camera.*

Automotive Imaging System features

- multi-functional **Automotive Imaging** system: glass distortion and ADAS image quality testing
- flexible use: on optical test benches or on installed windshields
- multiple test scenarios: windshield test bench, driver's view, original ADAS camera
- simple system setup, fully automated operation
- image quality: 2D MTF analysis, image contrast and brightness
- fast measurement sequence for dynamic measurements
- customized measurement reports

System benefits

- quality control to improve the complete imaging chain for safer (autonomous) driving
- root cause analysis to localize weak points in the automotive imaging chain
- reducing research and development times, faster and efficient prototyping
- real test conditions for autonomous driving

LaVision: Focus on imaging

LaVision's imaging systems are based on innovative measurement technologies realized with advanced imaging hardware and intelligent state-of-the-art image processing software.

LaVision takes part in the ongoing transformation process of automotive mobility.

movie and more

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