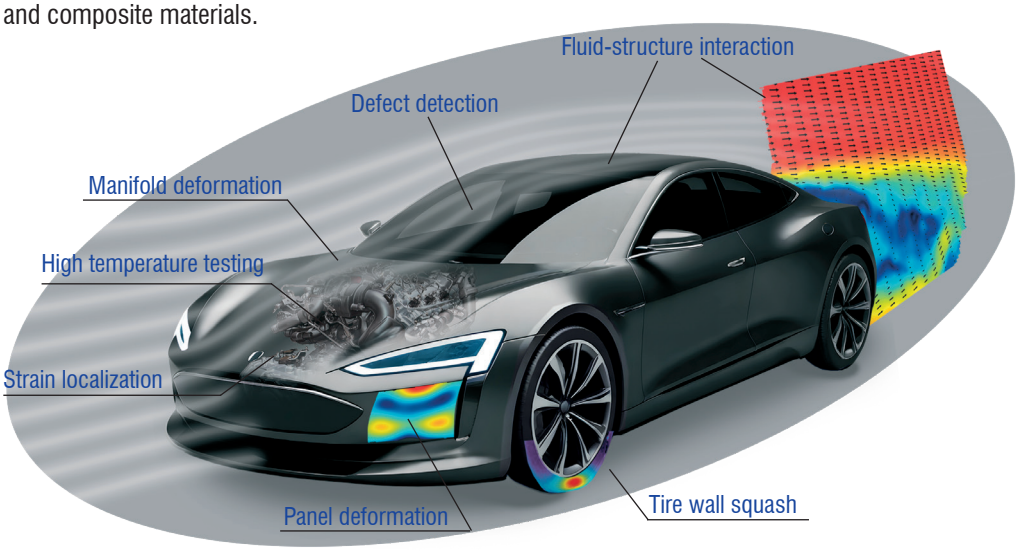
LaVision
FOCUS ON IMAGING

Automotive Materials Testing

Deformation and strain measurement in automotive testing

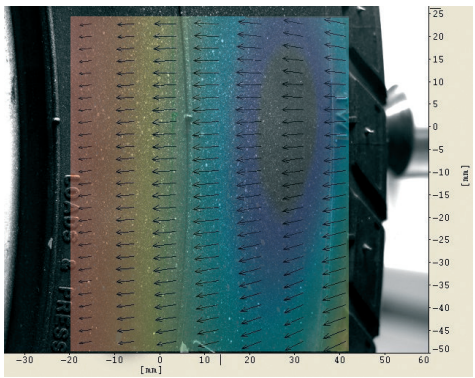
The performance of the materials used in the automotive industry, and of the components manufactured using those materials is critical to safety, and an important factor in creating a light-weight fuel efficient design. With ever increasing emissions targets, automotive engineers need to investigate every aspect of construction in modern vehicles, necessitating a deep understanding of the integrity of traditional and composite materials.



Digital Image Correlation (DIC) is a non-contacting full field measurement technique which allows a comprehensive evaluation of materials and structures within automotive applications

Applications

- Evaluate the dynamic response of panels
- Investigate gap movement between hot surfaces such as exhaust manifolds
- Measure tire deformation under static and rolling conditions
- Perform detailed aeroelastic response measurements by combining it with a PIV system
- Investigate localized strain effects and crack initiation
- Assess fatigue performance under long term cyclic loading



tire squash deformation under static or dynamic loading

LaVision's easy to use **StrainMaster** system uses an optical technique to measure the shape, deformation and strain on the surface of objects. The tests can be performed quasi-static, under cyclic loading using a phase locked trigger, or at kHz frame rates via high speed cameras. The intuitive output immediately reveals detailed deformation maps and strain localization.

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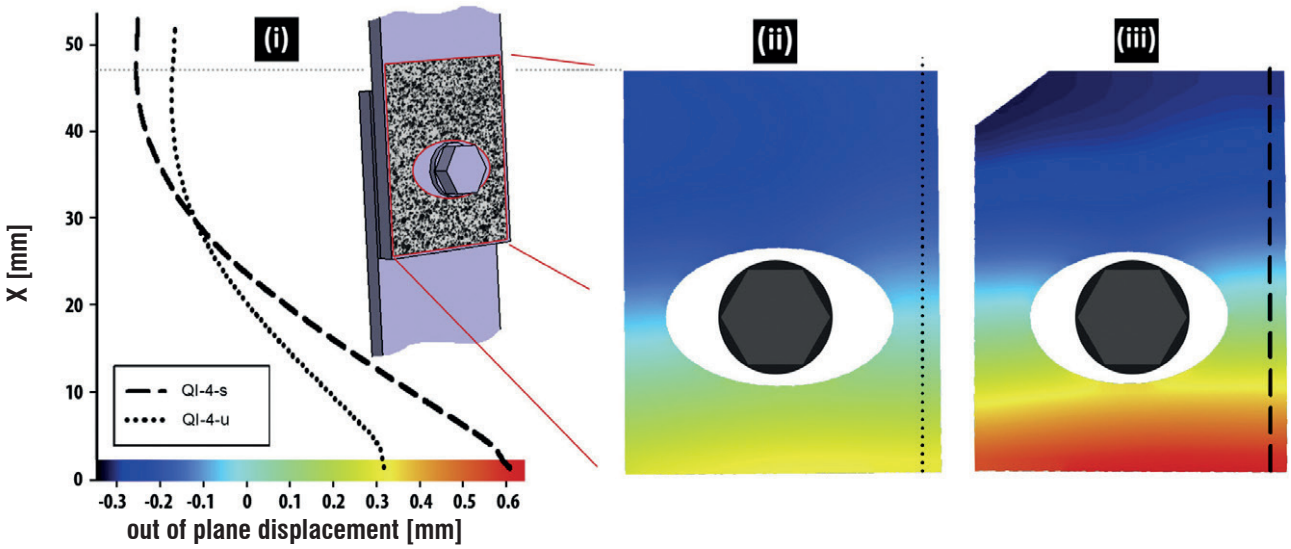

Courtesy of T.M. Young, Irish Centre for Composites Research (IComp), Materials and Surface Science Institute (MSSI), University of Limerick, Ireland

Out-of-plane displacement of composite joints at 8 kN load: (i) profile along vertical line, (ii) unshimmed, and (iii) shimmed specimen

The cameras observe the specimen surface and the software then processes the images to measure the displacement of the surface pattern with micron accuracy, such as shown above for the case of fastened panels. This calculation results in a full field map of material deformation and is then used to calculate strain field maps.

The robust nature of the technique and flexibility to work with specimens of widely varying physical scales means that **StrainMaster** has a huge range of application areas.

StrainMaster Specifications

- Equivalent to thousands of gauges on the specimen surface
- Validate finite element simulations
- Suitable in standard and harsh environments
- Exceptional strain range - from microstrains to 1000% strain
- Simple setup and calibration procedure
- High strain rate impact through to long term fatigue testing

LaVision is able to supply turn-key DIC systems or highly customized configurations linked to test cell control systems. To learn more about full field measurements in automotive applications and Digital Image Correlation, please contact LaVision.

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