Optical Testing Application Guide

Automotive 3D Testing

Materials & Structural Testing
Engines & Tires
NVH, & Crash

trilion

Save Labor, Costs and Schedule.
CAE Initial Conditions / Reality

Automotive Testing

the FEA of Testing

The perfect tool for Automotive Testing

ARAMIS, our 3D-DIC and Dynamic 3D Photogrammetry tool, provides precision optical measurements of real, complex materials and structures, providing full-field data for accurate validation of material behavior and structural response.

We provide our customers with cutting-edge capabilities high measurement accuracy and highly efficient controls with wraparound training and services to support them.

With tens of thousands of measurement points, ARAMIS is the ideal tool for measuring the dynamic structural response of your automotive components. Requiring a fraction of set-up time compared to traditional sensors, ARAMIS is essentially point and shoot, providing a holistic understanding of your vehicle and components.

Like a FEM (Finite Element Model), each measurement contains all points in the FOV, measuring areas of concern and even those you don't yet know need attention, this single full-field test can save customers millions of dollars in warranty claims.

Why Use

Cutting-edge Capability

Measures tens of thousands of points simultaneously in a fraction of traditional testing time

Ideal CAE Tool

From materials to complex components to entire vehicles, ARAMIS is the premiere tool for CAE model improvement

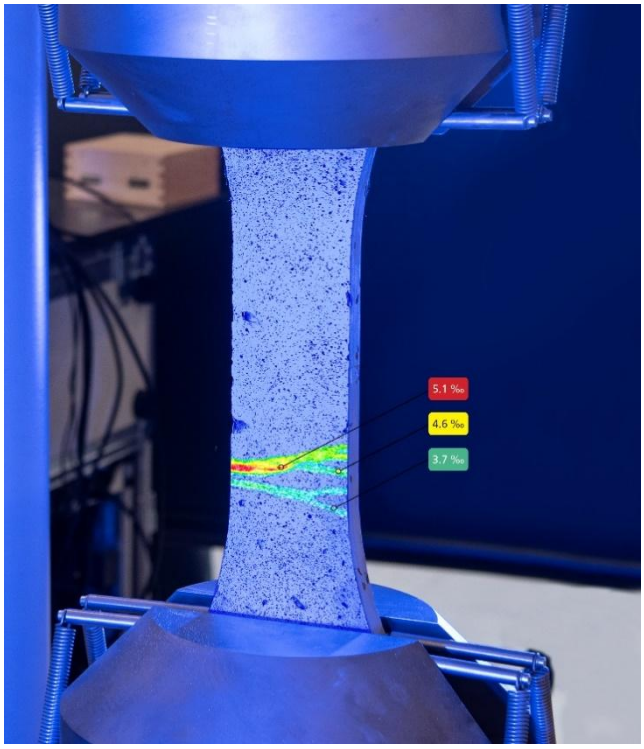
Finite Element Measurements

With 10,000 nodes of 3D shape, three axes of deformation, 6-DOF, and the full strain tensor (major, minor, and shear)

Finite Element Measurements

Required measurement for complex testing of engines/motors, suspensions, vehicle dynamics, wind/crush/crash

Material Properties Structural Testing

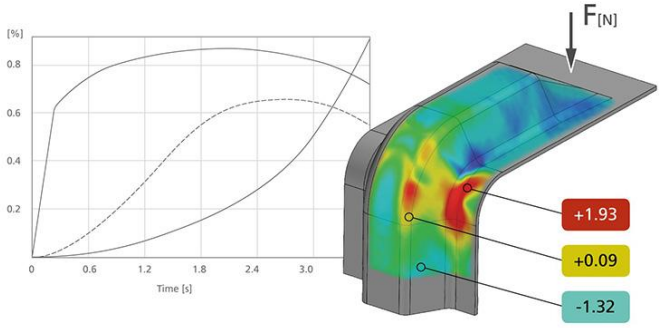


Precision Material Properties

are the most crucial parameters to understand in product design. ARAMIS Optical Strain is the ideal tool for measuring material properties, with its full-field, holistic capability. NASA Glenn Research Center says that ARAMIS provides the most consistent material properties. It is also the fastest, and requires less testing.

ARAMIS Optical Strain

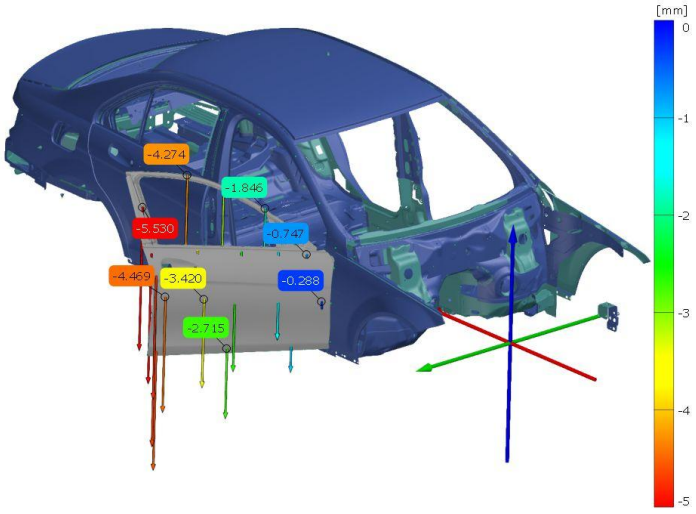
provides any desired virtual measurement, matching any clip gage, strain gage, or extensometer. 10,000 measurements are simultaneously taken in all three axes, providing the greatest possible accuracy in your material properties. ARAMIS's automated tools and standards templates allow you to determine all of your material properties, to industry standards.



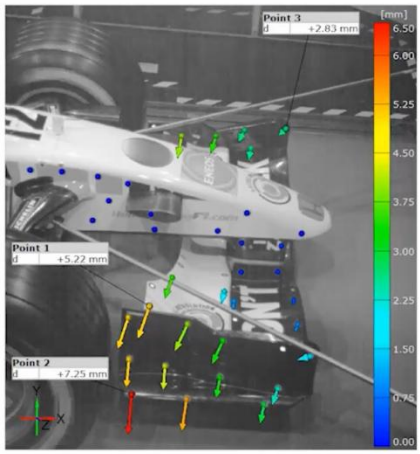
Structural Testing

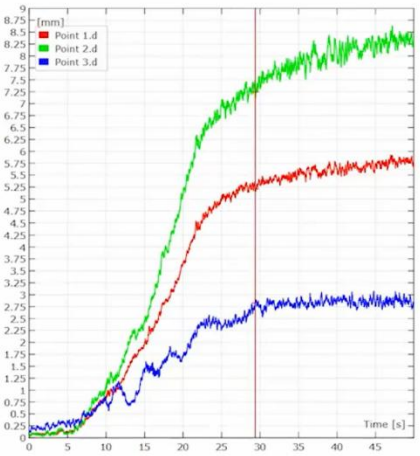
is core to the power of ARAMIS, providing a holistic understanding of a structure's response, allowing you to validate your structural response while saving time and money.

Currently, most automotive structural testing use archaic methods. CAE requires real world data to optimize the precision of their models. ARAMIS is 50x faster to implement {Boeing} than traditional mechanical sensors and provides 100x more and better data.



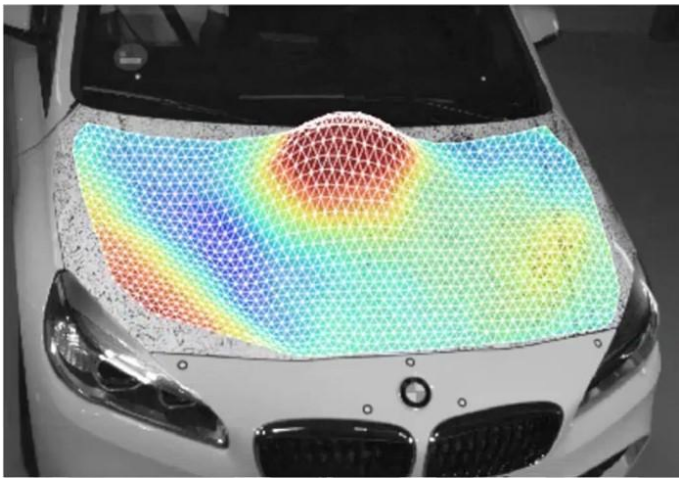
Noise Vibration & Harshness (NVH)





ARAMIS 3D Optical Strain

Photogrammetry allows for dynamic noise, vibration, and harshness testing of complex systems through a single test. From motors/engines to tires or the entire vehicle, the full-field nature of ARAMIS means anything in the FOV is measured, and can be used as reference for deformation measurements, eliminating any rigid body motion. The data is collected from the unstressed reference condition, and can be replayed at any time, placing gages where desired, for a better understanding of the event.

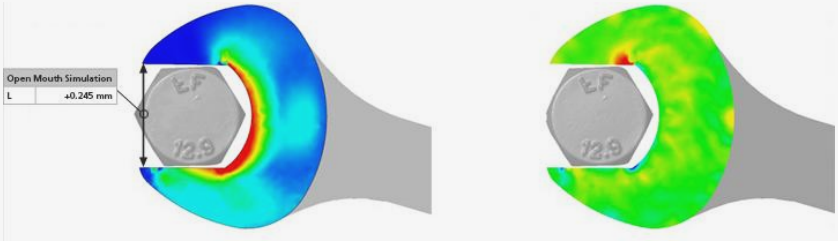


Wind Tunnel

Measurements are easy applications for photogrammetry from door gaps to component deflections; ARAMIS 3D photogrammetry measures anything in the FOV, relative to the body, floor or any other reference structure.

CAE Optimization

Requires real-world, full-field results to advance precision computer models. Component micro-motion, thermal strains, and weld vibrations are all critical measurements and impossible to make using traditional methods, making ARAMIS the ideal tool for validation needs.



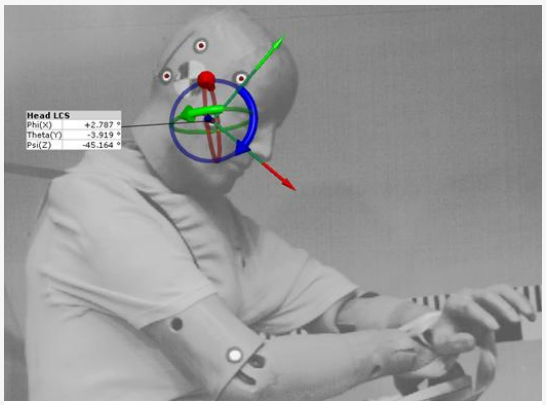
Structural Testing

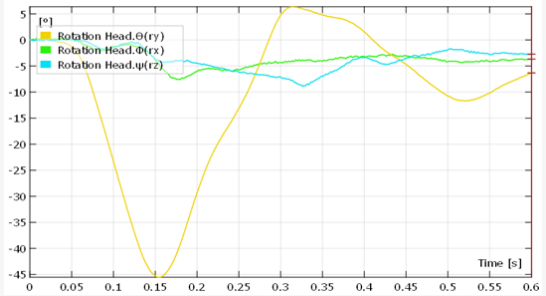
Traditional measurements use mechanical gages placed where you think a problem exists; ARAMIS sees all of the issues inside the field of view, in a fraction of the setup time of sensors.

Crash Testing & Test Track

Crash Testing

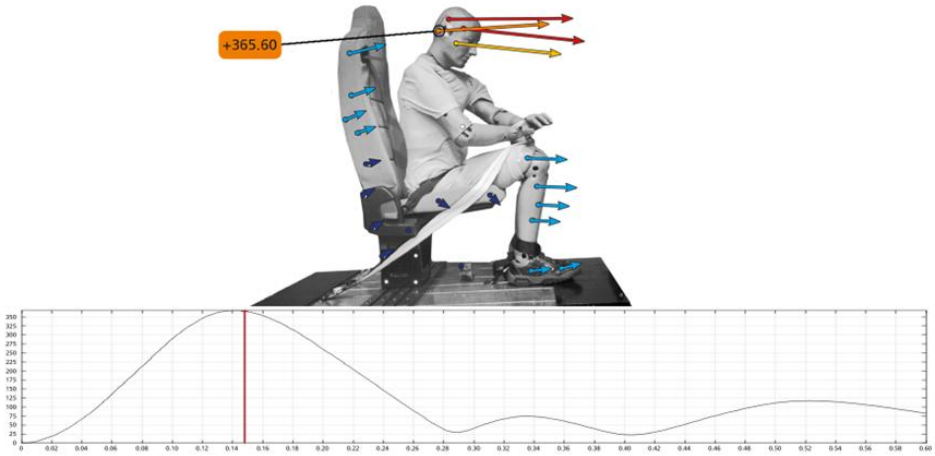
performed with ARAMIS High Speed, provides precision full-field measurements, for full 3D analysis of any motion captured in 6-DOF and dynamic 3D displacements and strains; true data to precisely iterate your models to reality.





Crash Testing

- High speed cameras
- Full 3D analysis
- 6-DOF (Degrees of Freedom)
- Dynamic 3D Displacements and Strains



No other technology is capable of enabling you to measure the complete response of your system in this way.

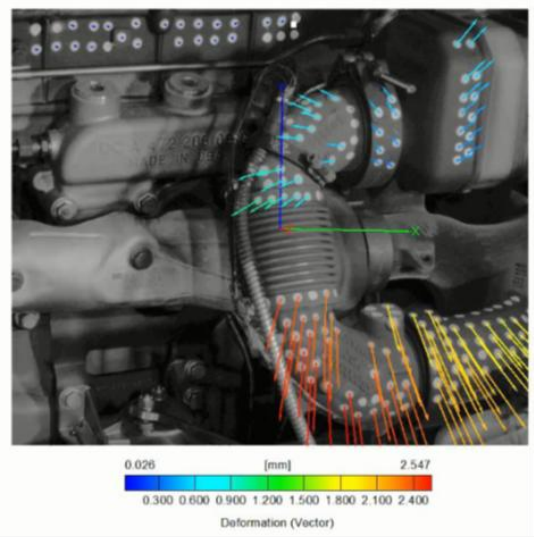
Track Testing

measurements are performed on-board the vehicle for dynamic displacement and strain measurements of body, wheel, suspension, engines, powertrain and exhaust systems. Setup takes a fraction of the time of traditional sensors and provides measurements of full-field displacements, strains and temperature for advanced model validation.

Engines & Motors

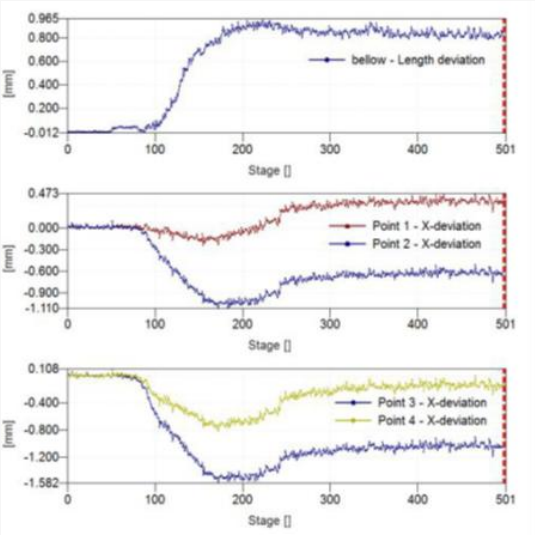
Optical Strain 3D-DIC Photogrammetry

being a fully non-contact optical method, enables ARAMIS Thermography to have unique abilities in extreme or hazardous environments, like engine test cells. Accurate high temperature measurements are readily achieved, making this method ideal for testing modern high temperature engines.



ARAMIS High-Speed

From automotive and aerospace crash tests to sport equipment design, ARAMIS High-Speed's full-field measurements of acceleration, displacement strains, and buckling rapidly generate meaningful data without installing contact sensors. Making your high-speed cameras precision 3D sensors.



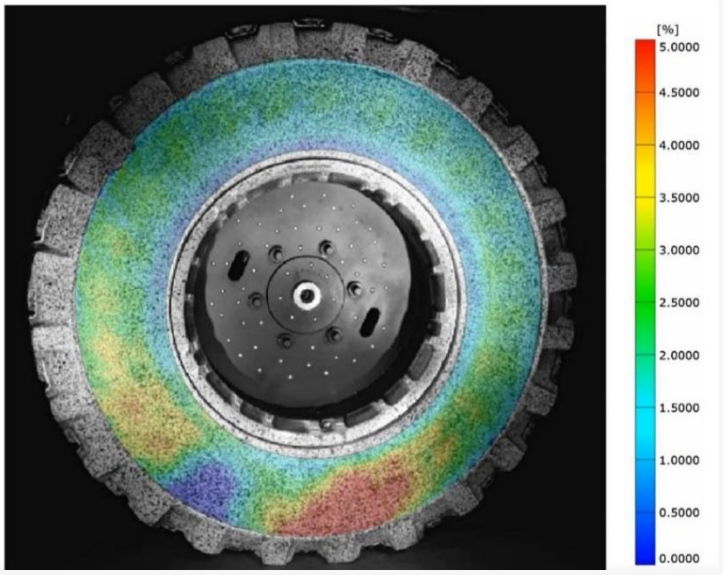
ARAMIS Thermography

is the key to precision measurement in real red-hot environments. This equipment allows for measurements of full-field thermal expansion and true mechanical strains (temperature corrected), as well as the full-field temperature in CAD coordinates.

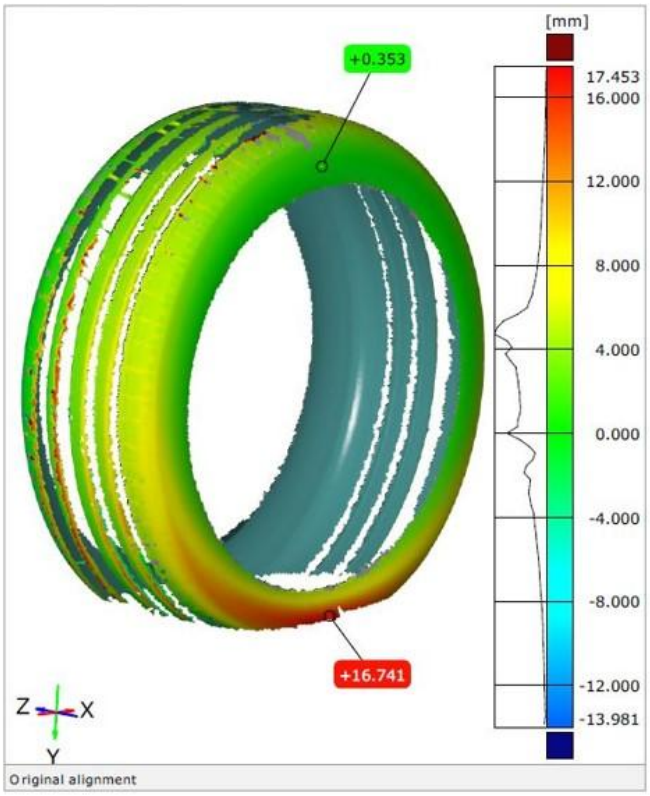
Tires & Suspensions

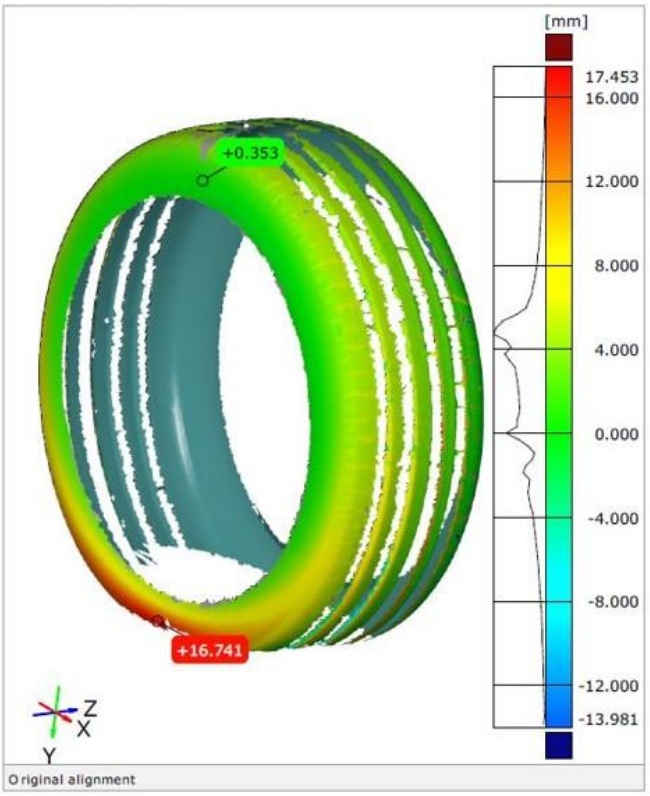
ARAMIS Pulsed optical metrology techniques have allowed for the first ever real-world 3D shape, deformation, and strains of tires and wheels at speed.

ARAMIS Optical Strain can be used to quickly produce the 3D shape, profile, displacements, strains and thermal response of tire sidewalls, under various loading conditions including slip, camber, load, and speed, using a simulated rolling road machine.



ARAMIS is a revolutionary solution that efficiently and accurately measures shape deformation in a highly dynamic environment.

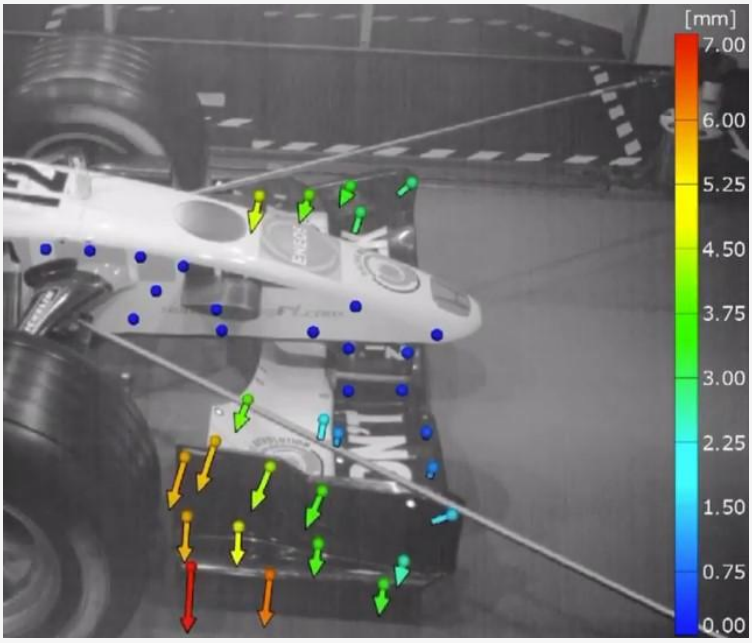


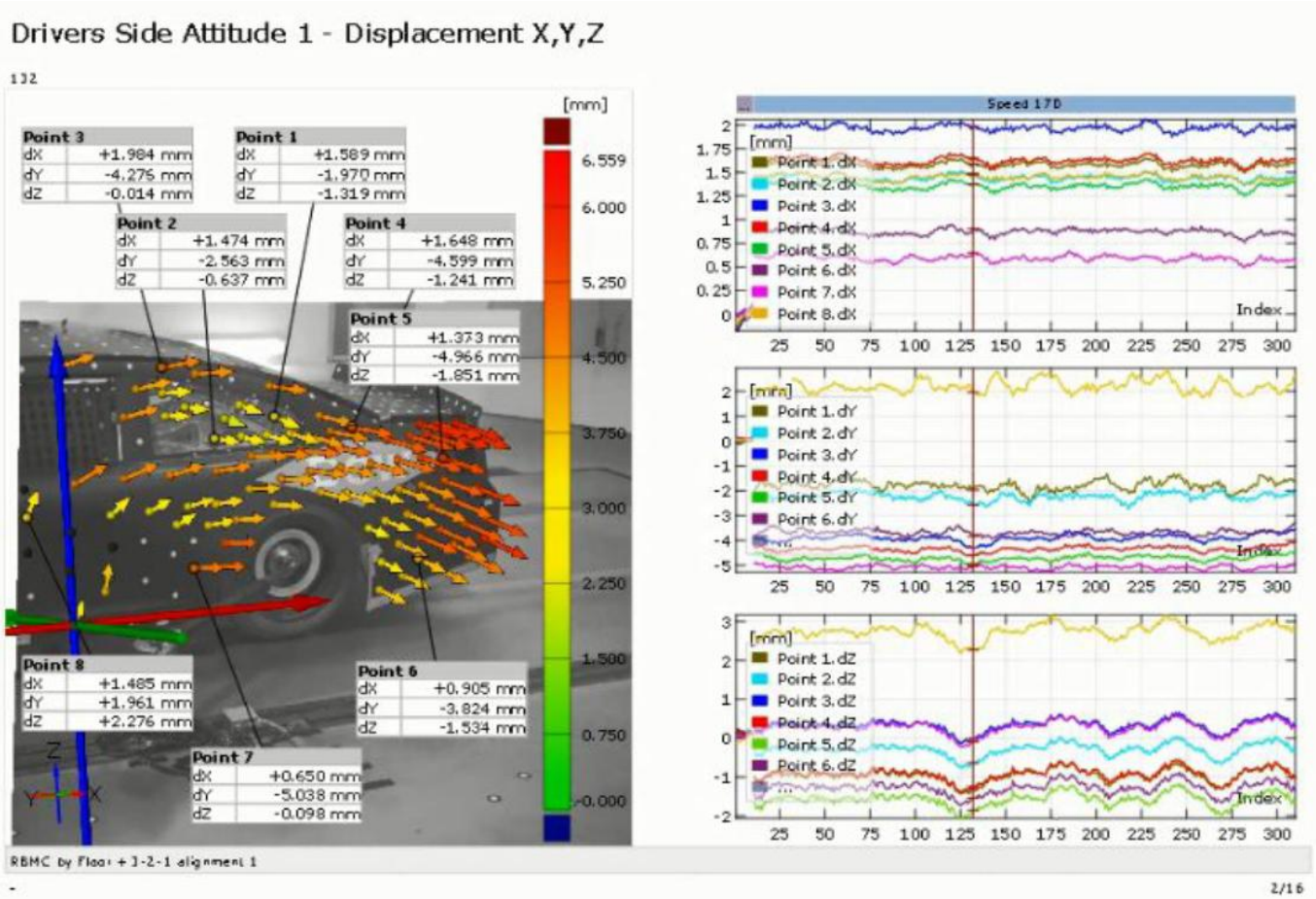


Wind Tunnel & Dyno

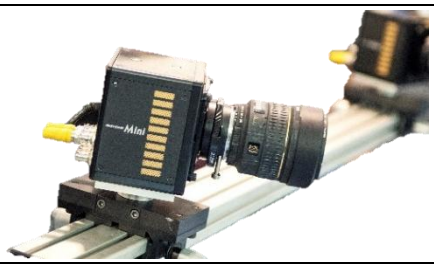
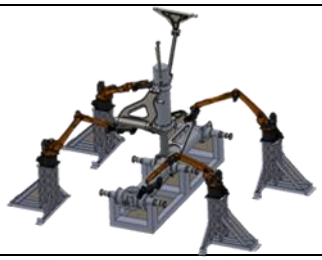
ARAMIS Photogrammetry is used extensively in wind tunnel testing due to its ability to get data across all surfaces of a vehicle in a simple, non-contact, precise 3D measurement.

Real-time data is produced with 6-DOF of the vehicle in the wind-tunnel relative to the tunnel floor, at any wind speed or vehicle pitch angle.





3D Metrology Toolbox

ARAMIS Optical Strain		ARAMIS Optical Strain is a full-field, non-contact measuring system based on 3D digital image correlation & dynamic photogrammetry.
ARAMIS High-Speed		ARAMIS High-Speed is the ideal 3D tool for high-speed measurements, shock vibration, dynamic testing, and analysis.
TRITOP CAM Photogrammetry		TRITOP system portably measures 3D coordinates of complex objects precisely and provides large area automatic stitching for ARAMIS & ATOS
ARGUS Forming Analysis		ARGUS Forming Analysis supports the optimization of the sheet metal forming process and optimization of tools. ARGUS Laser Etcher provides perfect etching; option: automated gantry.
ARAMIS Automation		ARAMIS Automation is the optimum tool for automated structural testing, bringing the full functionality of ARAMIS for less man hours and less testing effort.
ZEISS CT		ZEISS (CT 3D-X-ray) is a state-of-the-art metrology CT capable of the highest accuracy & resolution for internal dimensioning, SPC, AM, QA, etc.
ATOS 3D Scanners		The ATOS series of non-contact 3D scanners were developed for repeatable and precise measurements of 3D shape prior to testing.

Benefits & ROI

Industry 4.0 Automotive Testing

brings power to the automotive test engineer, meeting the precision testing requirements of advanced CAE computer models. Testing with single-point sensors no longer provides the quality of data necessary for precise model iteration, and ARAMIS Optical Strain is the solution.

Warranty Issues

arise with unexpected problems with products in the field, but utilizing ARAMIS Optical Strain to see full-field issues lets you discover problems through a holistic understanding of the vehicle. Engineers estimate that this one test can save companies millions by eliminating potential issues.

Engineering Design

needs models validated quickly, efficiently, and accurately. ARAMIS is reported to be 10X cheaper than traditional gages, 50X faster to use, and provides 100X more data for better model validation {Boeing}. Testing with ARAMIS is invaluable to this high precision work.

Lightweighting Designs and assemblies are critical in their design and function. ARAMIS provides full-field and integrated measurement of all components working together from fit to 3D displacements, and interface strains to vibrational responses. ARAMIS is a crucial tool for the automotive test.

Complex models precisely matching reality improves products and reliability.

10x less expensive than traditional gages

Takes 50x less labor

Provides 100x more data

(Findings from Boeing)

All-in-One Solution

For over 25 years, Trilion Quality Systems has been an industry leader in Optical Metrology Systems, developing and supporting unique applications throughout North America. Optical metrology brings long-awaited advanced Factory 4.0 capabilities to the design and manufacturing.

Trilion Engineering Services is the perfect solution for companies with complicated applications and data requirements. We provide measurement method development and precision measurements. Our experienced Level III engineers and precision optical measurement systems get professional results every time.

A manufacturing revolution, reducing costs and improving quality!

ARAMIS Optical Strain is the tool of choice for industry leaders.

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