

Automotive Fact Sheet

Shorter product cycles and cost optimization today force companies to be more efficient in their development, first article inspection and production process optimization. GOM's Optical Metrology Systems in combination with GOM's professional inspection software package reduces Try-Out periods and first article inspection times from weeks to hours.

Scan-Xpress has significant sales and service experience in the automotive design, material testing & simulation, press & body shop, power train, plastic components, test stands & component testing and assembly sectors.

• Automotive Design

Clay Modelling Studios

The development process has to harmonize the vision of perfect design with economic and functional requirements. Innovative design concepts must be quickly translated into digital data for CAD/CAM software. The ATOS 3D Digitizer is ideal for

- Quick and precise scanning of exteriors & interiors within a few hours
- Obtaining a perfect database for reverse engineering, particularly class A surfacing
- Capturing surfaces & tape lines
- Speeding up design concepts & mock-up phases



Rapid Technologies

ATOS 3D scanning data is also used in rapid technologies and CNC manufacturing for:

- Direct scaling and copy milling of STL data
- Optimizing CFD computations
- Fast switching to different sizes and materials



• **Material Testing & Simulation**

Material Properties: Metal Alloys - Polymer Compounds - Composites

Optical metrology analyses the mechanical properties and behaviour of all kinds of materials in various test scenarios. GOM's ARAMIS and PONTOS systems can be integrated into existing test environments, test benches and testing machines. The non-contact sensors measure full-field 3D strain and deformation of soft and rigid materials under mechanical or thermal load. Thus conventional extensometers and strain gauges can easily be replaced by GOM's real-time 3D surface deformation analysis systems.



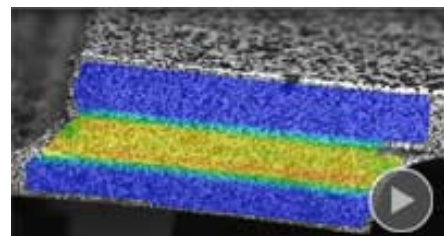
Knowledge of material properties is important

- In product design, for wall thickness and reinforcements, etc.
- To fulfil all requirements regarding product safety and reliability
- To provide long-term benefits by gaining know-how for future projects
- To provide essential information for calculating realistic models in simulation processes and virtual test programs

Joining Technology: Gluing, Riveting, Welding

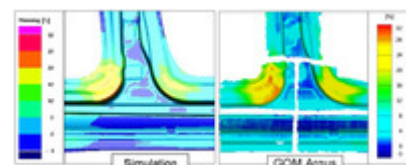
GOM's ARAMIS and PONTOS sensor systems are also used for testing and analysis of joining and bonding techniques such as

- Tensile test on rivet joints
- Tensile test on welded joints
- Shear test on glued joints
- Improved simulation models for CAE (Computer Aided Engineering)



FEA & Simulation Verification

GOM systems and software support the optimization and validation of simulation processes. Improvement of simulation tools and processes builds up long-term knowledge for further projects and results in faster time-to-market.

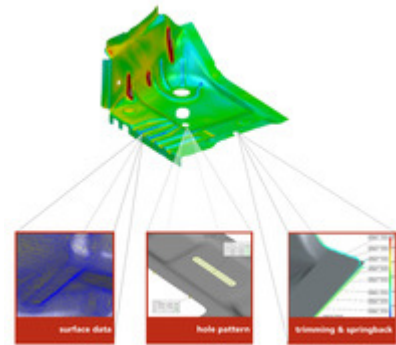


- Comparison of simulation with real measuring results (strain, movement, buckling, etc.)

- Determination of material properties as input for realistic simulation
- Mesh optimization for finite element analysis including CAD converter
- Numerical simulation verification

- **Press and Body Shop**

Quality management and assurance are steadily gaining importance in industrial development and manufacturing. Decentralized component production by suppliers means that tight specifications have to be met in order to guarantee problem-free final assembly and produce a high-quality product. The ATOS optical digitizing system from GOM is tried and proven in the inspection of metal sheets as well as body-in-white analysis.



With the sensor and software all developed in-house, GOM has created a comprehensive solution and secure workflow for the sheet metal inspection process, enabling surface and sharp-edged features to be verified with one system.

Complete Sheet Metal Part Inspection

The ATOS optical 3D digitizer captures the surface geometry of an entire component on the basis of a high-resolution point cloud. Additionally, sharp-edged features can be measured with sub pixel precision using algorithms developed specially for this purpose. This comprehensive concept makes it possible to verify the complete surface as well as hole patterns, trim and spring-back, tornado lines, gap & flush, and other typical sheet metal features. Thanks to the concept of "teaching by doing" and inspection planning based on CAD data in the GOM Inspect Professional Software, multiple part inspection can be automated as of the second part.



ATOS brings together high-quality measured data and flexibility, so that it can be used not only in measuring rooms but also in pressing plants and raw production environments. Regardless of object size, ATOS creates precise 3D coordinates and delivers complete measuring and inspection reports.

Automated Quality Control

Industrial production processes require automated measuring cells to enable higher throughput (more parts in less time, better planning) and higher repeatability (process safety). As a single-source provider of industrial measuring sensors and parametric inspection software, GOM's automation team opens the way to standardized and centralized part inspection management with parametric and traceable inspection workflows.



Gages, Jigs and Fixtures

Stable parts can be measured without jigs or fixtures using the contact-free ATOS Digitizer, because the alignment of measured data to CAD data is controlled using RPS points in the GOM inspection software. If a sheet metal component is digitized when free

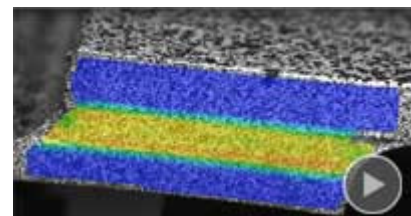


standing and once installed, deformations can be measured and visualized. Variable alignment is possible due to the dense data volume, and contributes to fast problem resolution during sheet metal assembly analysis. For the measurement of clamped sheet metal components, the contact-free measuring techniques enable an adaptive fixture concept, thus saving costly gauges. For example, a simple holding jig can replace six measuring gages. Since it can be used in parallel for various parts, storage space and production time are saved.

Joining Technology: Gluing, Riveting, Welding

Joining technology plays a significant role in body-in-white production. GOM's ARAMIS and PONTOS sensors are also used to test and analyse joining and bonding methods such as:

- Tensile test on rivet joints
- Tensile test on welded joints
- Shear test on glued joints

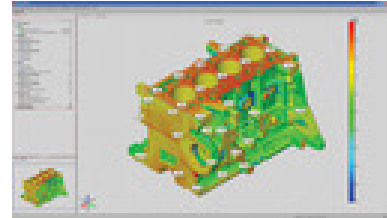


GOM's systems improve simulation models for CAE (Computer Aided Engineering) in order to optimize the final product's crash behaviour.

- **Power Train**

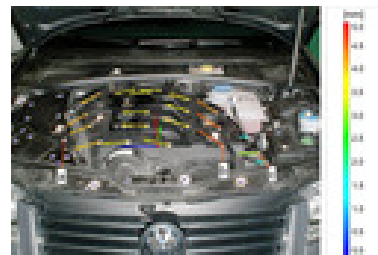
Inspection of Cast and Forged Parts

The ATOS optical surface measuring system is widely used by auto makers and their suppliers to analyse the shape and dimensions of cast and forged parts. The ATOS 3D digitizer allows full-field measurement of models & patterns, dies & moulds, first articles as well as cast and forged parts. The fast surface fringe pattern projection system can be combined with a handheld touch probe in order to inspect hidden surfaces. Both data acquisition and data evaluation can be automated for the quality assurance process flanking production.



Analysis of Motion Behaviour

Reducing noise and vibration is a major requirement in modern car design. PONTOS, GOM's fast, non-contact 3D deformation measuring system, examines the mechanical deviation of parts in motion (e.g. at engine start-up). Simple part preparation and integration in all test environments enable complex motion analysis and 3D online result evaluation. Unwanted dynamic component behaviour can be pinpointed and eliminated quickly.



- **Plastic Components**

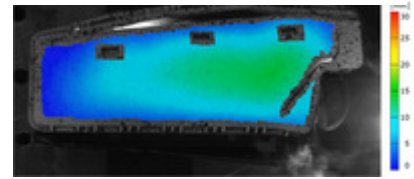
Shape & Dimension Control

GOM's optical non-contact measurement systems support fast, easy and full-surface testing of door linings, trims, dashboards, bumpers, fenders, etc. Incoming parts from suppliers can be inspected in order to identify batches with problems or inconsistencies. And since it makes warp and bending immediately visible, full-surface metrology is also used for full gap and flush analysis on movable parts in the troubleshooting process.



Deformation Analysis

More and more car parts are made of plastic and rubber materials. Fast and non-contact 3D measuring techniques are required to examine the mechanical behaviour of moving or safety-relevant parts in operation.



• Test Stands & Component Testing

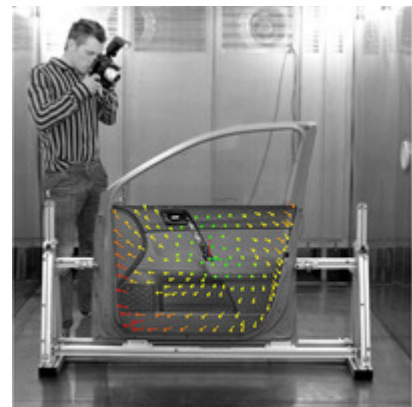
Real-time and online measuring & evaluation supports dynamic deformation analysis during function and behaviour tests for entire components. GOM's high- & standard-speed measuring systems can be easily integrated in standard test stands such as:

- Climate chambers
- Crash & fatigue tests
- Wind tunnels
- Tire test benches

The evaluation of torsion, bending, displacement, velocity and acceleration factors makes it possible to analyse safety risks, part lifetimes, creep & aging processes as well as visual appearance over time and usage. Optical metrology therefore detects bad part behaviour and assists root cause analysis, e.g. disturbing noises, vibrations and complex movements, delivering specific feedback for fast design/product improvements.

Deformation results are supplied via enhanced reporting:

- Images
- Displacement vectors
- Diagrams
- Videos



- **Assembly**

Portable CMM

GOM's portable metrology solutions monitor mounting processes on the assembly line. Since results are available immediately, deviations can be detected at an early stage and corrective action taken quickly. Thus plant assembly processes can be improved with process capability studies, training for fitters can be optimized, and scrap and rework times significantly reduced.



Full Surface Analysis

During assembly GOM coordinate measuring systems help with fast root cause analysis and pinpointing for solving of functional problems, e.g. 3 dimensional compression of sealing's, gap and flush measurement and other problems introduced by assembly processes.

