1.SCR-Forum Weißenburg

GOM 3D Metrology Systems

Christopher Funke | 11/10/2016
ATOS Test Setup - Q7 SCR Tank
GOM 3D Metrology Systems

ATOS
Full-field 3D Scanning

TRITOP
Mobile Optical CMM

ARAMIS
Optical 3D Deformation Analysis

ARGUS
Optical Forming Analysis

PONTOS Live
3D Motion Analysis & Component Positioning

GOM Inspect

GOM Inspect Professional

GOM Correlate

GOM Correlate Professional
ATOS and TRITOP

ATOS
Full-field
3D Scanning

TRITOP
Mobile
Optical CMM

GOM 3D Metrology Systems
ATOS System

ATOS Triple Scan is based on state-of-the-art camera sensors and innovative measuring and projection technology:

High-resolution 3D Scanner for small to large components

Measuring areas from 38 mm to 2000 mm

Industrial sensor head

Blue Light Technology

When used in combination with TRITOP, the ATOS System is capable of scanning parts of over 30m with a high local resolution
ATOS
Applications

3D Inspection and Quality Control

Reverse Engineering

Rapid Prototyping

Component Positioning and Assembly
ATOS ScanBox System

Standardized measuring machine

Complete solution from GOM

Optimized industrial components

Compact layout

Mobile

GOM 3D Metrology Systems
TRITOP
Optical 3D Coordinate Measurement System

Precise Measurement Using High Resolution Digital Images, Image Processing, and Photogrammetry

Quality control of large objects

Verification and recording of jigs and fixtures

Deformation analysis of car and climatic chamber tests

The measured data can be compared with CAD data

Typical results are:
- False-color representations
- Deviation of individual points as labels
- Sections, angles and distances
- Diameters and flatness
**TRITOP**  
Optical 3D Coordinate Measurement System

**Application**

Inspection of sheet metal parts and car bodies

Verification of plastic parts

Measuring of models and prototypes

Measuring of reference point fields
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GOM Inspect Software

Christopher Funke | 11/10/2016
Evaluation Software for 3D Point Clouds

3D Inspection
- CAD import
- CAD measurement plan import
- Alignments
- Element construction
- CAD comparison: Surface, Points, Curves/sections
- GD&T analysis
- Trend and SPC analysis
- Airfoil inspection
- Point-based inspection
- Deformation analysis
- Reporting: screenshots, tables, PDF export, ...

Mesh Processing
- Import of point clouds (STL, ASCII, ...)
- Polygonization of point clouds to meshes
- Smoothing meshes
- Thinning meshes
- Hole-filling in meshes
- Refinement of meshes
- Extracting curvature lines from meshes
- Export as STL, ASCII, ...

Viewer
- For ATOS Professional, TRITOP Professional and GOM Inspect Professional
- 3D viewing and presentation
- Further analysis, inspections functions and report generation
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ATOS Triple Scan - Measuring Principle and Process

Christopher Funke | 11/10/2016
ATOS Measuring Principle

Stereo camera setup with digital and calibrated projector for 3D geometry acquisition

Triangulation principle

Fringe projection technique principle

Fringe projection technique for full-field geometry acquisition
GOM Reference Point System

Strategies for transformation of single measurements
GOM software offers both options

Measuring without Reference Points

Only possible with sufficient object geometry

No process reliability

Measuring with Reference Points

Also possible on continuous surfaces

Process-reliable measuring strategy
Functionality and Measuring Process

Fringe projection provides precise 3D coordinates for each pixel
Functionality and Measuring Process

Fringe projection provides precise 3D coordinates for each pixel.

Approx. 2 seconds for each single measurement of 16 million points.
Functionality and Measuring Process

1. Fringe projection provides precise 3D coordinates for each pixel

2. Approx. 2 seconds for each single measurement of 16 million points

3. Measuring from different directions
Functionality and Measuring Process

1. Fringe projection provides precise 3D coordinates for each pixel.

2. Approx. 2 seconds for each single measurement of 16 million points.

3. Measuring from different directions.

4. Automatic transformation of individual measurements.
Functionality and Measuring Process

1. Fringe projection provides precise 3D coordinates for each pixel.
2. Approx. 2 seconds for each single measurement of 16 million points.
3. Measuring from different directions.
4. Automatic transformation of individual measurements.
5. Polygonization of single measurements to eliminate overlapping areas.

ATOS Triple Scan
Functionality and Measuring Process

1. Fringe projection provides precise 3D coordinates for each pixel.
2. Approx. 2 seconds for each single measurement of 16 million points.
3. Measuring from different directions.
4. Automatic transformation of individual measurements.
5. Polygonization of single measurements to eliminate overlapping areas.
6. Result: a complete 3D point cloud (STL polygon mesh).
ATOS Test Setup - Q7 SCR Tank
ATOS Scan – Q7 SCR Tank
ATOS - Results
Polygonized Point Cloud (STL)
ATOS - Evaluation
Surface Comparison to CAD
TRITOP - Measuring Principle and Process

Christopher Funke | 11/10/2016
Circular markers, adapters or markings are used as measuring points
Applied to object in the areas of interest.
Images are taken freehand from different viewing angles
TRITOP - Workflow

Marking

Photographing

Automatic Evaluation

Results

Image coordinates, the camera positions and the 3D coordinates of the measuring points automatically calculated.
3D coordinates of measured points are precisely calculated.
Graphical visualization and comparison to CAD.
Export to standard formats or directly loaded into the ATOS software.
TRITOP Test Setup – Q7 SCR Tank
TRITOP Measuring – Q7 SCR Tank
TRITOP – Results
Point 3D-Coordinates
TRITOP - Evaluation
Points with Deviation Labels

[Image of a 3D model with deviation labels and color scale]
ATOS and TRITOP - Results

**ATOS**
Polygonize Point Cloud (STL)

**Measuring Time:**
approx. 3 min.

**Results:**
Point Cloud
approx. 300,000 Points

**TRITOP**
Point 3D-Coordinates

**Measuring Time:**
approx. 1:30 min.

**Results:**
Single Points
approx. 40 Points
ATOS and TRITOP - Evaluation

ATOS

Surface comparison to CAD

Every point of the surface comparison can be measured with a deviation label

TRITOP

Points with deviation labels

Only the position of a reference point marker can be measured and analyzed with a deviation label
GOM – Precise Industrial 3D Metrology

Thank you for your attention.

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Antastende Vermessung - schnell, flexibel und hochgenau

Für dieses Messverfahren setzen wir auf Geräte der Firma Zeiss.

Vorteile:
-CNC-fähig
-schnell, flexibel und hochgenau
-dimensionale Aussage über eine Maßangabe, vektoriell als auch flächig
-Statistiken über Flächenpunkte
Zeiss Prismo 7
Messsoftware: Zeiss HOLOS NT + UMESS
Messbereich: 1200mm x 900mm x 700mm
Zeiss ACCURA
Messoftware: Zeiss Calypso
Messbereich: 1200mm x 1800mm x 1000mm
Zeiss PSM / DSE 601421
Messsoftware: Zeiss Holos NT + UMESS
Messbereich: 6000mm x 1400mm x 2100mm
Multisensor Messtechnik

- DR. Schneider PSM 300
- Messsoftware: Dr. Schneider Saphir
- Messbereich: 300mm x 300mm x 300mm
- Optische Vergrößerung: 45 fach
Mobiler Messarm: FARO EDGE+QUANTUM
+ HD Scanner
Messsoftware: POLYWORKS
Messbereich: 2400mm bis 3700mm (im Raum)
Oberflächen und Rauhigkeitsmessgerät
Hersteller: Fa. Hommel
Messbereich: 120 mm x 60 mm x 400 mm
Drehmomentvermessungen an Schraubverbänden
  - Anzugsmoment
  - Sicherungsmoment
  - Streckgrenzenvermessung

  - Drehmoment Messbereiche: 0,1 Nm bis 260Nm
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