GOM Training
Basic and Advanced Courses

Basic metrology training
Product training for first-time and advanced users
eLearning – supplementary online training material
GOM offers practice-oriented training courses with different levels to enhance users’ knowledge and skills. The multi-level training concept responds to the challenges in industry and allows participants to broaden their application knowledge in the field of 3D metrology.

The courses are held by certified GOM trainers in training rooms equipped with state-of-the-art technology, therefore ensuring a productive learning environment. Being experts in their field, GOM trainers have extensive knowledge and years of experience in specialist fields, which enables them to respond to specific questions.
GOM recommends a professional metrological training to form the basis of all training courses. As a certified partner of AUKOM, GOM provides system-independent training courses for measurement engineers. In product-specific basic training courses, participants learn how to operate the systems and the software and gain insight into theoretical basics. Advanced training courses serve to deepen the knowledge acquired in basic courses. In expert courses, participants learn to use GOM systems for applications in their individual areas of expertise.

GOM’s training model consists of one-day to multi-day training courses that can be individually combined. The supplementary training material includes data of the software projects elaborated during the training as well as comprehensive and detailed software manuals covering far more contents than discussed in the training. In addition, GOM developed an eLearning concept offering a wide range of webinars and video tutorials which allow users to broaden their knowledge flexibly.

Training Model
Learning Concept

GOM training courses follow a standardized concept, which was developed in cooperation with customers and partners from all over the world. The immediate vicinity to GOM’s development facilities guarantees a high standard of training contents and a direct link to practice.

The application-based learning concept covers all types of learning methods, guaranteeing maximum learning. The training courses begin with theoretical basics and continue with practical exercises involving GOM’s measuring systems, in which participants solidify the acquired knowledge. By transferring the acquired knowledge in their individual workflows and discussing specialist queries, participants expand their understanding of the given subject areas.

Entire range of training courses and registration for individual courses at:
www.gom.com/training

Note: The practical training exercises are completed in groups with neutral GOM training objects. GOM’s “training on the job” concept enables customers to discuss specific issues and individual tasks with GOM experts at the customer’s site on consulting days.
Overview of Training Courses

GOM’s multi-level training concept comprises successive and interrelated training courses that are adapted to each required level of expertise. Participating in a training course requires the successful completion of the preceding training courses.

Expert courses

- Optical Quality Control in Sand Casting Processes
  - B1 required
- Automated Sheet Metal Inspection
  - A1 required

Advanced training

- Kiosk Interface
  - A1 and A3 required

Basic training

- Automation VMR
  - B1 required
- GD&T – With GOM to GPS
  - B1 IM required
- GOM Scripting
  - B1 IM or B2 IM or B3 IM required

AUKOM training

System-independent basic metrology training

*separately bookable
As a member of AUKOM, GOM is a certified partner and training provider of AUKOM training courses. The AUKOM association promotes comprehensive training in the field of coordinate measuring technology by providing globally comparable courses that end with a certified and globally recognized exam.

AUKOM training and registration at:
www.gom.com/training/aukom

Overview of AUKOM Training Courses

The multi-level AUKOM training courses comprise successive and interrelated courses providing system-neutral knowledge in combination with practical exercises.
AUKOM Level 1

The training course provides information on dimensional tolerancing, programming basics, measurement process planning and the machine and sensor technology used. Participants gain a deeper understanding of the measurement tasks and influencing parameters and therefore learn how to reduce measurement uncertainties.

Main topics:
- Standard units – base quantities and derived quantities
- Coordinate systems and geometric elements
- Sensors and coordinate measuring systems
- Metrological basics and dimensional tolerancing

Prerequisites: No special knowledge required

Target group: Beginners in the field of production measurement technology

Exam and certificate: AUKOM Level 1

Duration: 5 days
AUKOM Level 2

The training course enlarges knowledge about production measurement technology. Participants learn in-depth details of form and positional tolerances, test plan interpretation, programming, and monitoring. By gaining a clearer understanding of the measurement tasks and influencing parameters, participants learn how to achieve more reliable and comparable measuring results.

**Main topics:**
- Geometric dimensioning and tolerancing
- Measurement strategy – efficient measurement of parts
- CNC programming – building up measurement programs
- Evaluation – criteria and methods

**Prerequisites:** Passed exam of AUKOM Level 1

**Target group:** Advanced production metrologists

**Exam and certificate:** AUKOM Level 2

**Duration:** 5 days
AUKOM GD&T

Participants of the course are given in-depth information on geometric dimensioning and tolerancing according to ISO and ASME for measurement engineers who work at interfaces to other departments. Design engineers, developers, and production engineers gain insight into geometric dimensioning and tolerancing from the measurement engineer’s point of view, who has to implement drawing specifications metrologically.

**Main topics:**
- Basics of the ISO standard on Geometrical Product Specification (GPS)
- Geometric Dimensioning and Tolerancing (GD&T)
- Principles of tolerancing I and II
- Tolerances of form, orientation, location and run-out – ASME

**Prerequisites:** Passed exam of AUKOM Level 2

**Target group:** Advanced production metrologists

**Certificate:** AUKOM GD&T

**Duration:** 3 days

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AUKOM Level 3

In the training course, experienced measurement engineers broaden their advanced metrological knowledge, with particular regard to form and positional tolerances, test plan interpretation, programming, monitoring as well as mechanical engineering and sensor engineering. By gaining a deeper understanding of the measurement tasks and influential variables, measurement engineers learn how to reduce measurement uncertainties and to achieve more reliable and comparable measuring results.

**Main topics:**
- Geometry, production technology and CAD
- Point clouds and computer tomography
- Creation of measurement programs
- Digital filtering and evaluation
- Measurement uncertainty and measuring process suitability
- Quality and measuring room management

**Prerequisites:** Successful completion of AUKOM GD&T

**Target group:** Advanced production metrologists

**Exam and certificate:** AUKOM Level 3

**Duration:** 5 days
Basic Training
Product Training for First-Time Users

Basic training courses provide product-specific system and software skills in the field of 3D metrology and 3D testing. The courses are especially recommended for users who would like to learn how to use GOM measuring systems or who would like to refresh their knowledge of GOM systems and software. Before participating in a basic training course, GOM recommends attending the AUKOM Level 1 training, which serves as a basis in the field of coordinate measuring technology.

Basic training courses and registration at:
www.gom.com/training/basic
**ATOS Professional System Basic Training**

The training course comprises an acquisition module and an inspection module. Participants learn all basic strategies for scanning parts of different sizes using an ATOS sensor. In the inspection module, participants learn to use the GOM Inspect Professional software for shape and dimension analyses, 3D inspections and mesh processing of the scanned 3D measuring data.

**Prerequisites:** Basic knowledge of window-based programs, fundamentals of coordinate measuring technology (AUKOM Level 1 recommended)

**Certificate:** ATOS Professional System Basic Training

**Target group:** Users of ATOS sensors and ATOS Professional

**Duration:** 3 days

### Acquisition module

**Integrative part of the ATOS Professional System Basic Training**

**Main topics:**
- Introduction to ATOS sensor and software
- Sensor handling and measurement strategies
- Setup and calibration of hardware
- Digitization of measuring objects

**Target group:** Participants of the ATOS Professional System Basic Training

**Duration:** 1 day

### Inspection module

**Inspection Basic Training – 3D Metrology**

**Main topics:**
- Introduction to the software
- Simple inspection and parametric inspection
- Inspection planning and project templates
- Reporting and data import/export

**Target group:** Users of ATOS Professional or GOM Inspect Professional

**Certificate:** Inspection Basic Training – 3D Metrology

**Duration:** 2 days – separately bookable
TRITOP Professional System Basic Training

The training course consists of an acquisition module and an inspection module. The acquisition module deals with all basic strategies for the photogrammetric acquisition of 3D coordinates of selected points of a measuring object using a TRITOP photogrammetry camera. The inspection module covers all essentials required for evaluating measuring data.

Prerequisites: Basic knowledge of window-based programs, fundamentals of coordinate measuring technology (AUKOM Level 1 recommended)

Certification: TRITOP Professional System Basic Training

### Acquisition module
Acquisition Basic Training – Photogrammetry

Main topics:
- Introduction to TRITOP camera and software
- Camera handling and image recording techniques
- Photogrammetry basics
- Manual photogrammetry of simple and complex parts

Target group: Users of TRITOP photogrammetry cameras and ATOS Professional or TRITOP Professional

Certificate: Acquisition Basic Training – Photogrammetry

Duration: 1 day – separately bookable

### Inspection module
Inspection Basic Training – Photogrammetry

Main topics:
- Introduction to the software
- Simple inspection and parametric inspection
- Evaluation of multiple stages
- Inspection planning and project templates

Target group: Users of TRITOP Professional or GOM Inspect Professional or PONTOS Live

Certificate: Inspection Basic Training – Photogrammetry

Duration: 2 days – separately bookable
ARAMIS Professional System Basic Training

The training course includes an acquisition module and an inspection module. All basic strategies for handling ARAMIS sensors and for capturing dynamic part specimens based on reference point markers or stochastic patterns are covered in the acquisition module. In the inspection module, participants learn how to carry out static and dynamic component tests based on the measuring results.

**Prerequisites:** Basic knowledge of window-based programs

**Certificate:** ARAMIS Professional System Basic Training

**Target group:** Users of ARAMIS sensors and ARAMIS Professional

**Duration:** 3 days

**Acquisition module**

Integrative part of the ARAMIS Professional System Basic Training

**Main topics:**
- Introduction to ARAMIS sensor and software
- Image acquisition with the stereo camera system
- Motion measurement of a part specimen
- Basics of digital image correlation

**Target group:** Participants of the ARAMIS Professional System Basic Training

**Duration:** 1 day

**Inspection module**

Inspection Basic Training – 3D Testing

**Main topics:**
- Introduction to the software
- Simple inspection and parametric inspection
- Coordinate systems
- Point-based and full-field inspection of dynamic part specimens

**Target group:** Users of ARAMIS Professional or GOM Correlate Professional

**Certificate:** Inspection Basic Training – 3D Testing

**Duration:** 2 days – separately bookable
Advanced Training
Product Training for Advanced Users

GOM’s advanced training courses provide in-depth background information on specific topics. Participants have the possibility to gain a deeper insight into the GOM software and to learn advanced functions for their applications. Participating in an advanced training course requires basic knowledge acquired in the preceding training courses.

Advanced training and registration at:
www.gom.com/training/advanced
The virtual measuring room (VMR) is a control and measurement planning software consisting of a virtual and functional representation of the real measuring environment. In the training course, participants carry out the entire measuring procedure in the VMR and create a complete measurement program offline that is subsequently run in the ATOS ScanBox.

After a comprehensive introduction to the VMR, participants learn how to position the measuring setup reproducibly. The inspection planning imparts the functional principle of the automatic position generation. Based on the imported measurement plan and CAD data, participants learn how to automatically create ATOS measurement positions and photogrammetry measurement positions along with the corresponding robot paths.

The training course covers all concepts, working methods and tips that are necessary and helpful when working with the virtual measuring room.

**Main topics:**
- Operation of the virtual measuring room
- Reproducible simulation of the real measuring setup in the virtual measuring room
- Fully automatic teaching of the robot
- Automated measurement planning
- Using the ATOS sensor in combination with a photogrammetry camera in the VMR
- Real movements and measurements in the VMR

**Prerequisites:** Successful completion of ATOS Professional System Basic Training

**Target group:** Users of ATOS ScanBox or automated project cells and ATOS Professional VMR or GOM Inspect Professional VMR

**Certificate:** Automation VMR

**Duration:** 2 days
GOM Scripting – Python Scripting for GOM Applications

The training course provides users with essential basic knowledge of recording operations executed in the software in a script. In addition, the course deals with methods to modify and extend scripts and shows how to access the element values of the project and how to create user-defined dialogs. The scripting functionality can be used in all Professional software versions.

Main topics:
- Arithmetic data types and calculations
- Simple text modification with strings
- Conditional execution and loop statements
- Structured data types “list” and “tuple”
- Functions and structuring of scripts
- Recording and modifying scripts
- Accessing element values of the project
- Creating user-defined graphical dialogs

Prerequisites: Successful completion of the inspection module of one of the basic training courses, knowledge of programming vocabulary, basic command of English

Target group: Users who are experienced in evaluating 3D objects in a GOM Professional software

Certificate: GOM Scripting – Python Scripting for GOM Applications

Duration: 2 days
**GD&T – With GOM to GPS**

Geometric dimensioning and tolerancing is today widely used in most industries around the globe. It is an engineering language that uses a library of symbols, rules, definitions and conventions to describe the functional intention of a part using unambiguous tolerances. GD&T is used throughout all steps of the process chain, like design, manufacturing and, of course, 3D metrology.

In collaboration with dim GmbH, GOM provides a sustainable training concept regarding Geometric Product Specification (GPS). The training consists of a comprehensive theory section on GPS and complementing practical exercises, in which participants apply the theoretical knowledge in evaluation tasks in the GOM Inspect software.

**Main topics:**
- Introduction to GPS and GPS basic standards
- Tolerance concepts
- Geometrical specifications
- Sizes according to ISO 14405-1/2/3
- Introduction to tolerance zones
- Concepts and rules according to ISO 1101
- Datums and datum systems
- Maximum material requirement
- Combined features
- Principles according to ISO 8015
- Measurement uncertainty

**Prerequisites:** Successful completion of Inspection Basic Training – 3D Metrology (inspection module of the ATOS Professional System Basic Training)

**Target group:** Users who are experienced in evaluating 3D objects in a GOM Professional software

**Certificate:** GD&T – With GOM to GPS

**Duration:** 3 days

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**Kiosk Interface – Setup and Customization**

In the training course, Kiosk users acquire all basics of the Kiosk Interface. Participants learn how to create templates for the automatic execution of measuring projects. In addition, the training course shows how to individually modify and extend the user interface using the scripting interface.

**Main topics:**
- Setup and configuration of the Kiosk Interface
- Setup of Kiosk Interface users
- Modification of the Kiosk Interface
- Extension of exports
- Advanced file operations in scripts
- Addition of project keywords
- Automatic selection of templates

**Prerequisites:** Successful completion of GOM Scripting and Automation (VMR)

**Target group:** Users who are experienced in evaluating and scripting with ATOS Professional

**Certificate:** Kiosk Interface – Setup and Customization

**Duration:** 1 day
For advanced users, GOM offers expert courses dealing with specific application tasks and challenges in industry. Expert courses combine methods and workflows as well as tips and tricks with technical background knowledge and practical exercises relating to the hardware and software. Furthermore, participants have the possibility to discuss specific issues with other users and experienced GOM trainers. Participating in an expert course requires profound knowledge acquired in the preceding training courses.

Expert courses and registration at:
www.gom.com/training/expert
The training course is especially designed for users in the sand casting industry. The content covers quality control in each individual process step to understand and fix occurring problems fast and efficiently. The course deals with typical errors in the process steps and shows how to investigate them. Moreover, it introduces measuring and inspection workflows, procedures and tips and tricks to master the application successfully with hands-on exercises on sensors, software and real life sand casting demonstrators. The applications range from root cause analysis and process optimization to process setup analysis and series inspection.

Optical Quality Control in Sand Casting Processes

The training course is especially designed for users in the sand casting industry. The content covers quality control in each individual process step to understand and fix occurring problems fast and efficiently. The course deals with typical errors in the process steps and shows how to investigate them. Moreover, it introduces measuring and inspection workflows, procedures and tips and tricks to master the application successfully with hands-on exercises on sensors, software and real life sand casting demonstrators. The applications range from root cause analysis and process optimization to process setup analysis and series inspection.

Main topics:
- Introduction to sand casting processes
- Inspection of pattern plates
- Virtual assembly of pattern plates
- Sand mold inspection
- Inspection of sand mold assemblies
- Analyzing sand cores
- Referencing and scanning of sand mold assemblies
- Actual sand core clearance
- Inspection of core box assemblies
- First article inspection on raw castings
- Material allowance in CNC alignments
- Online measurements and positioning in sand casting applications

Prerequisites: Successful completion of ATOS Professional System Basic Training

Target group: Users who are experienced in measuring with an ATOS sensor and evaluating 3D objects in ATOS Professional

Certificate: Optical Quality Control in Sand Casting Processes

Duration: 2 days
Automated Sheet Metal Inspection

The training course is particularly developed for users in the sheet metal industry. It deals with common issues faced by construction engineers, toolmakers, and experts from research and development as well as quality assurance in their daily work. Participants are provided with all necessary background information, procedures, workflows as well as tips and tricks required for measuring and inspecting sheet metal parts efficiently. Additionally, the training course includes exercises on creating detailed measurement and inspection plans for first article inspection and series inspection.

Main topics:
- Measuring and inspection workflow
- Impact of fixtures on measuring results
- Basics of constructing fixtures
- Creation of automated measurement templates
- Creation and modification of measurement plans
- Gray value features
- Hemmed edges
- Trimming & spring
- Design lines
- Burn-in process for series measurements

Prerequisites: Successful completion of Automation VMR

Target group: Users who are experienced in automated acquisition using ATOS ScanBox and in evaluating in ATOS Professional

Certificate: Automated Sheet Metal Inspection

Duration: 2 days

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In application tasks with real parts, participants practice inspecting parameters such as hole patterns, spring, and trimming in view of the required tolerances with subpixel accuracy. Inspecting cutting edges and analyzing parts with regard to the position and diameter of the hole pattern forms another integral part of the practical exercise.

In addition, participants learn to analyze hemmed edges of a part regarding its design specifications and specifications required for the subsequent assembly of several parts.

The exercises are complemented by statistical analyses in trend projects. In this way, participants learn to use the measurement and inspection plan to reduce scrap and wrap-up times in the automated series inspection of parts.
In addition to training courses, GOM also offers webinars and video tutorials. The eLearning modules deal with specific workflows and provide background information on software features, concepts, and applications. As all contents are available online, interested measurement engineers can broaden their knowledge flexibly and at their own pace.

eLearning contents at:
www.gom.com/training/elearning
Webinars

GOM webinars allow users to benefit from the specialist expertise of the webinar hosts. After free registration, participants learn essential operations and are provided with specific background information on software features and concepts as well as on the application fields of GOM systems. The recordings of webinars that have already taken place can be found in the archive.

Registration for live webinars and archive of former webinars at:
www.gom.com/training/webinars

Video Tutorials

GOM’s video tutorials provide a quick overview of the software functions. In five to ten minutes, viewers are provided with various operating sequences as well as tips and tricks for using the software. Step-by-step instructions help users to solve application issues in the long term.

By following single operating steps with additional explanations, users easily learn to start working with the software. Advanced users are provided with knowledge on specific subject fields, enabling them to handle their workflows more efficiently.

Video tutorials at:
www.gom.com/training/tutorials
Introduction Seminars
Insight Into the Free GOM Software Versions

The introduction seminars provide an insight into the full potential of GOM Inspect and GOM Correlate. In the seminars interested parties and users learn to start working with the free software.

Introduction seminars and registration at:
www.gom.com/training/seminars

GOM Inspect Introduction Seminar

The free GOM Inspect software is used for a wide range of applications, such as in the fields of quality control, design, and reverse engineering. In the GOM Inspect Introduction Seminar, participants find out how to benefit from the software for their individual measuring applications most effectively and discover the functions along with the entire range of applications.

GOM Correlate Introduction Seminar

The GOM Correlate software is especially useful for digital image correlation and 3D motion analysis in the field of component testing. In the GOM Correlate Introduction Seminar, participants gain insight into various evaluations that can be carried out in the free GOM Correlate software.
GOM Services

GOM provides its customers with support and advice throughout the entire product life cycle. GOM application engineers are employed worldwide to commission measuring systems for customers on site and in the local language, or to provide user-specific advice on a measuring task. By email and on the phone, the GOM Support Team not only provides answers to questions relating to software and hardware, but also to applications and processes. An individual update program allows GOM customers to benefit from the latest product developments.

The aim of GOM is not only to provide measuring systems, but also the corresponding technological expertise. GOM provides standardized training courses worldwide for beginners and advanced users for this purpose.

In the GOM Service Area under www.gom.com/service, registered customers are given access to user manuals and application-specific video tutorials. A knowledge database also provides various articles with information on hardware and software. In discussion forums, users also have the option of asking questions and exchanging their experiences with users and GOM experts.
GOM develops, produces and distributes software, machines and systems for industrial and automated 3D coordinate measuring technology and 3D testing based on the latest research results and innovative technologies.

With more than 60 sites and an employee network of more than 1,000 metrology specialists, GOM guarantees professional advice as well as support and service to operators on-site in their local language. In addition, GOM discloses knowledge on processes and metrology in training courses, conferences and application-based workshops.

GOM has been developing metrology applications in Braunschweig since 1990. In the respective research and development departments, more than 100 engineers, mathematicians and scientists are working on the metrology of the present and the future.

Today, more than 14,000 system installations improve the product quality and accelerate product development and manufacturing processes for international companies in the automotive, aerospace and consumer goods industries, their suppliers as well as many research institutes and universities.