



## ScanBox

Optical 3D Measuring Machine for Efficient Production Control



Seeing beyond



ScanBox

# Using Optical 3D Metrology in the Industry

Automated quality assurance processes play a central role for economic success in the production environment. They ensure that sources of error can be identified at an early stage and necessary correction measures can be implemented. The ScanBox optical measuring machine is the ideal solution for efficient quality control in the production process of both small and large parts.

The standardized ScanBox systems compare all of a part's actual 3D coordinates with the CAD model or the specifications from the measurement plan and create inspection reports right at

the production plant. The optical measuring machines come in 11 different models for different applications and part sizes – from locking hooks to complete car bodies – and enable fast and highly precise automated measurements. The systems deliver accurate and traceable results, guarantee high throughputs and are easy to operate thanks to an intuitive user interface and the virtual measuring room (VMR), i. e., the central control and measurement planning software. This makes ScanBox an all-in solution that covers all process steps – from programming to automated digitization to inspection and reporting.

# Five Reasons for Automated Quality Assurance

## Accelerated measuring times

Particularly for parts with complex geometries or freeform surfaces, the full-field measurement with ScanBox is faster than the traditional measurement by 50–80 %.

## Easy operation

It takes just a few clicks in the virtual measuring room (VMR) to plan your measuring procedures and execute them fully automated.

## Numerous applications

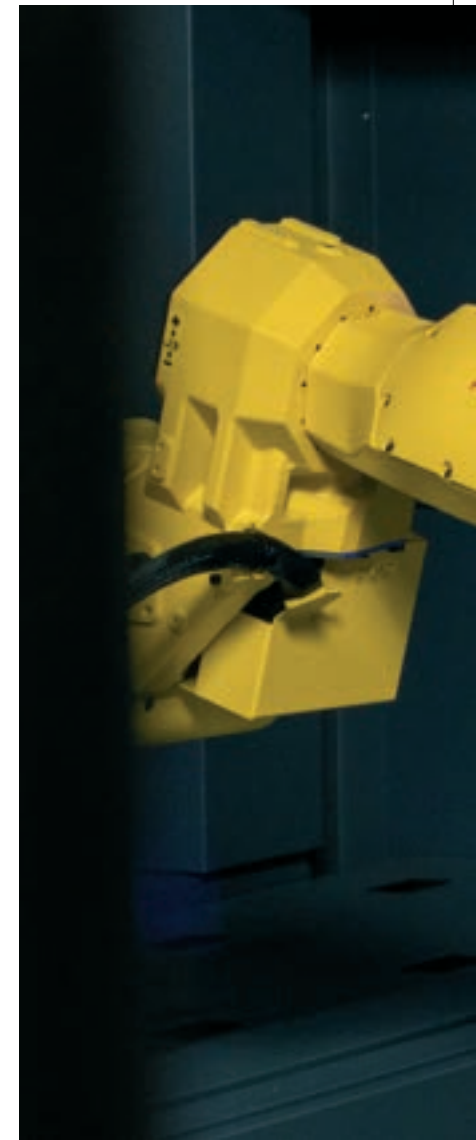
The various ScanBox machines for different part sizes are complete systems that can be directly integrated into production, saving routes, time and costs.

## Effective analysis tool

Strong combination of hardware and software: ScanBox covers all process steps from programming to automated digitization to inspection and reporting.

## Outstanding performance in numerous industries

ScanBox has established itself worldwide as the preferred measuring system for production control in a wide range of industries, such as automotive, aerospace or energy.







### High measuring speed

With each scan, ATOS sensors provide full-field 3D coordinates within a few seconds. Each individual measurement consists of up to 12 million independent measuring points. This is made possible thanks to the low noise level of the blue light equalizer. It increases the brightness of the light source, allowing for short exposure times.

### Laser light compressor

For extremely short exposure times, the light processing capacity of ATOS 5X has been enhanced with an additional laser light compressor. By concentrating several laser elements, it turns into a very bright light source based on laser light. This light is up to eight times brighter and especially resistant to ambient light influences, thus allowing for measuring areas of up to 1,000 mm<sup>2</sup>. This reduces the number of required scans, simplifies the measuring setup and speeds up the measuring time.



# ATOS Technology

Each ScanBox comes with an ATOS sensor. The high-resolution optical digitizers assist customers worldwide in increasing product quality, optimizing processes and thus making production more efficiently.

## Triple Scan Principle

The Triple Scan Principle ensures precise and complete measuring data, even with complex geometries and non-cooperative surfaces. The sensor's two high-resolution cameras and projection unit provide different views of an object in each measurement. To accomplish this, the projection unit projects a fine fringe pattern onto the part surface, which is captured by the two cameras operating on the stereo camera principle and used by the software to generate the digital geometric twin.

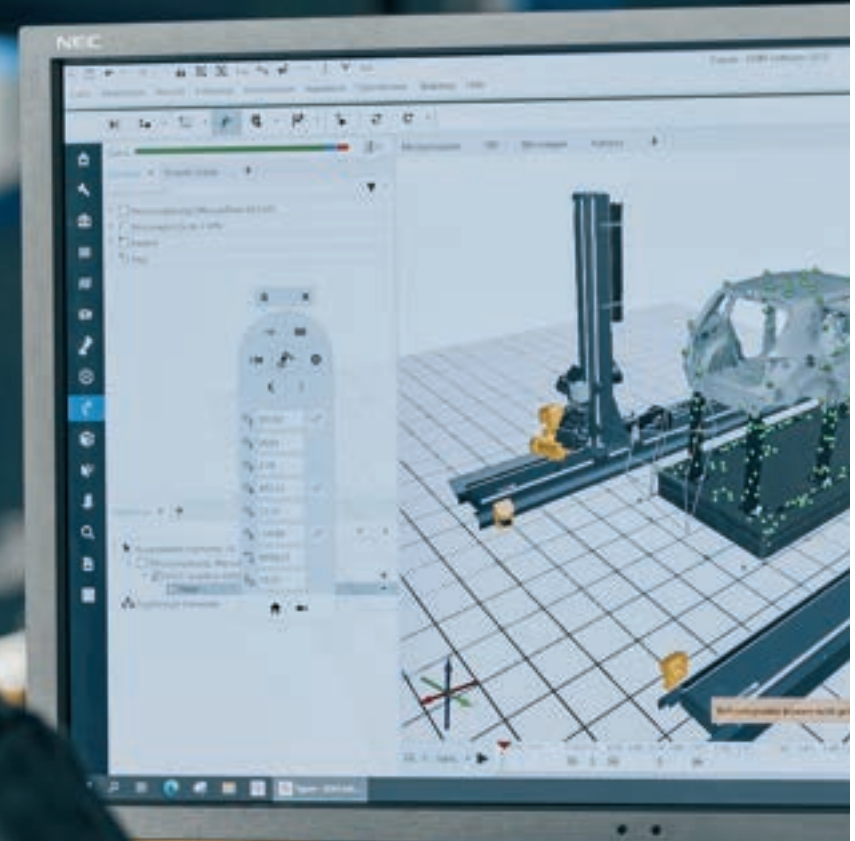
The stereo camera setup enables the system to perform a built-in, sensor-controlled monitoring of process reliability during measurement. In the software, the user continuously receives feedback on the calibration status, the transformation accuracy of the individual measurements, changes in the environment and part movements.

## Graphics card accelerates measurements

Thanks to GPU acceleration, ATOS 5 provides fast measuring results. The software uses the computing power of the graphics card. Due to the large number of cores on the GPU, individual scans are processed faster, significantly reducing the total measuring time. Due to this GPU acceleration in combination with its powerful light source and camera technology, ATOS 5 operates on a very high performance level.

# Virtual Measuring Room

The virtual measuring room (VMR) is the central controlling and measurement planning software for all elements of optical measuring machines. The VMR functionally represents the real environment, i. e., robot, sensor and part in the measuring cell, as a simulation. Programming includes the kinematics of the robot paths, the fixture and the measurement plan. Thanks to the VMR, no specific robot programming skills are required by the user. All robot movements are simulated and checked for safety before being performed in the actual environment.







## Advantages for the entire workflow

**Inspection planning:** The CAD data set is imported together with the corresponding measurement plan. The measurement principles stored in the measurement plan are automatically assigned to the inspection features. The report can also be prepared offline in advance.

**Process-reliable and runtime-optimized:** The Smart Teach functionality in the virtual measuring room simplifies the creation of robot programs. Measurement positions are automatically updated whenever the CAD model or single elements are modified.

**Burn-in procedure:** The measuring programs created are read in once-off with the help of an automated process. The robot approaches the measurement positions and defines individual measurement parameters at the real component.

**Serial measurement:** The measurement programs can be used for additional part testing. Due to the parameter-based software design, changes to the CAD data and the measurement plan can be easily updated with the touch of a button.

**Reporting with a single click:** Once inspection is complete, the results can be compiled into a customized report with photos, tables, diagrams, text and graphics.





ScanBox Series 4

# Measuring Small, Complex Parts up to 500 mm in Size

Injection-molded parts and die cast components as well as tools, molds, stamping and bending parts often show complex contours and connection geometries that must be checked during series and batch production ramp-up. For these applications, ScanBox 4105 is an efficient 3D measuring machine.



### **High detail resolution**

Small geometries such as locking hooks or catches for injection-molded parts are digitized in ScanBox 4105 with the optical ATOS Q 3D scanner. ATOS Q is available in two versions with different camera resolutions (12 M and 8 M). The accuracy, the resolution and the measuring area are fully customizable. Five precision lenses that cover measuring areas of various sizes are available. All this allows for measuring the smallest details with a size of tenths of millimeters.

### **Easy to use**

The ScanBox 4105 optical measuring machine can be programmed and controlled via an intuitive user interface, the so-called Kiosk Interface. Shop floor workers do not require any expert knowledge for operation. After the part has been inserted, the measuring program is selected, and the measurement is started at the touch of a button.

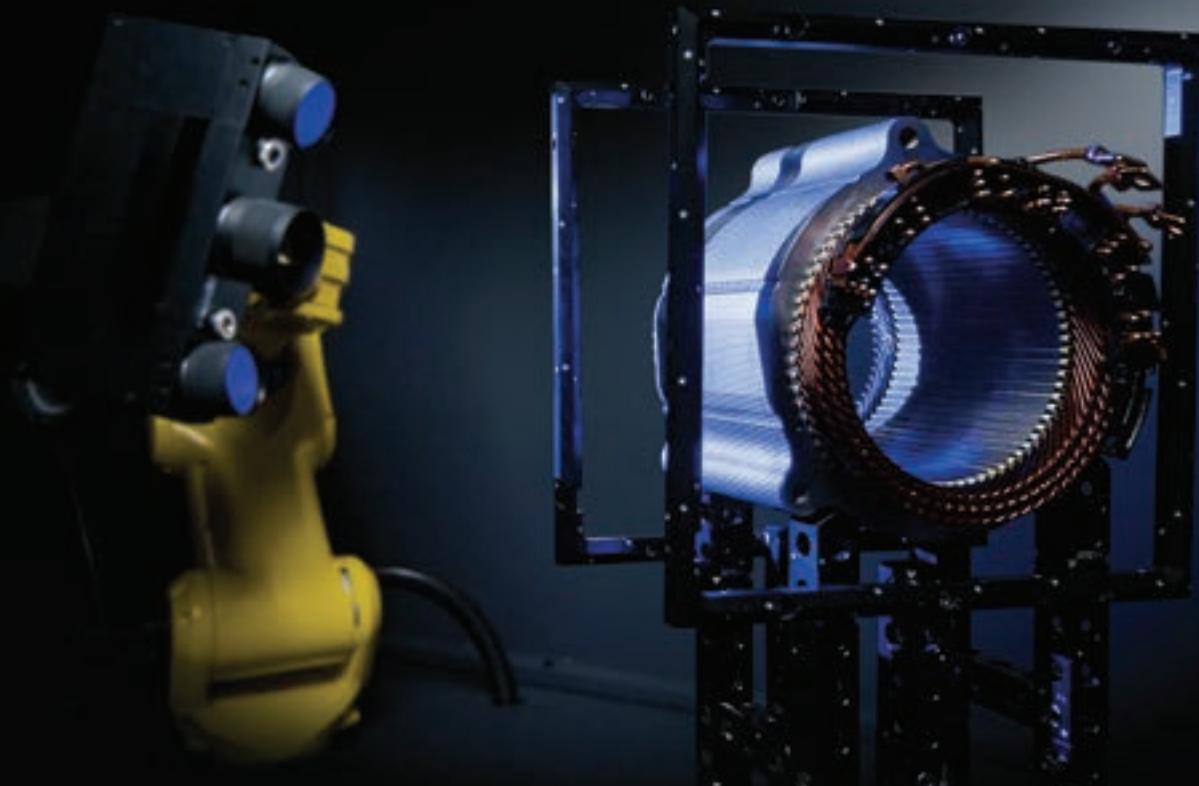


## Plug & Play

As the optical measuring machine needs a default 100–240V power supply and only weighs approx. 900 kg, the compact and mobile system can be set up almost everywhere. Four wheels allow for easy repositioning of ScanBox 4105 in the shop floor. The sliding door is designed so as to enable loading with a crane.

## Technical Data

	<b>ScanBox 4105</b>
Dimensions	1600 × 1200 × 2100 mm
<b>Max. part size</b>	<b>Ø 500 mm</b>
<b>Max. part weight</b>	<b>100 kg</b>
Opening width	685 mm
Sensor compatibility	ATOS Q



## ScanBox for eMotors

# Inspecting and Digitizing Hairpins and Stators

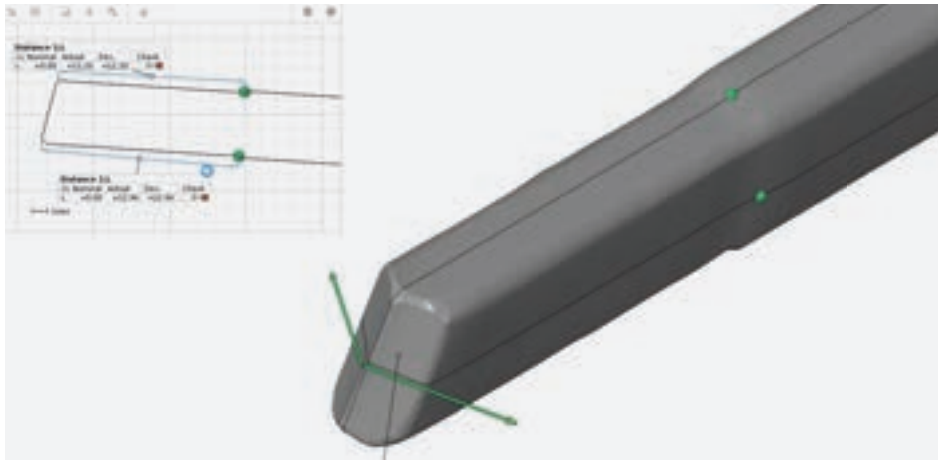
ScanBox for eMotors allows for inspecting entire stators including the hairpins – both a single hairpin as well as several hairpins at once – fully automatically in a minimum of time. No prior surface treatment is required. Afterwards, the acquired 3D measuring data can be visualized and analyzed in the powerful 3D Metrology software.

### **Digital assembly**

In the electric engine, stator and rotor must be precisely aligned to each other. With the help of the digital assembly, this can already be simulated and tested previously. The aim is to analyze the accuracy of fit of the measured parts.

### **Trend analysis**

Based on the automatic trend analysis, you can identify deviations from the ideal model at an early stage. This helps you to quickly detect changes in previous production steps by continuous measurement. Consequently, you can develop necessary corrections and implement them in previous production steps.



### Digital geometric twin


While a stator is inspected for cracking, deformations of the winding basket or the connection points, bendings, displacements and the roundness of the inner cylinder, among others, the hairpin inspection focuses on features such as deformations at the ends of the hairpin or the bending and edging process.



### Technical Data

#### ScanBox for eMotors

Dimensions	1600 × 1200 × 2100 mm
<b>Max. part size</b>	<b>Ø 500 mm</b>
<b>Max. part weight</b>	<b>100 kg</b>
Opening width	685 mm
Sensor compatibility	ATOS Q for eMotors

A photograph of a worker in a dark blue uniform operating a large, white, modular measuring system in a factory. The worker is standing to the right of the machine, looking at a control panel. The machine has a prominent blue 'ZEISS' logo on its side. The background shows a clean, industrial environment with large windows and a crane hook hanging from the ceiling.

ScanBox Series 5

# Modular Measuring System for Parts up to 3000 mm in Size

ScanBox Series 5 is an all-in solution for quickly capturing specific measurement features and geometries such as surface and edge points, holes or bores. Standardized and automated procedures increase the throughput of parts and reduce scrap.

The real-time trend analyses of the ScanBox Series 5 systems ensure a high process reliability during operation. Thus, changes within production can be quickly identified.





## Modular system

A functional design ensures efficient workflows and optimum ergonomics. The series comprises three models. The individual components are identical and therefore offer ideal possibilities for upgrading to different layouts.





### **Control tower module**

This module contains the entire control technology, including the computer unit and the robot controller.

The user interface is located on a flexible swivel arm, which can be ergonomically adjusted.



### **Robot module**

The robust industrial robot is designed for 24/7 use. Its six rotation axes get the ATOS 5 high-speed 3D scanning system to any desired measurement position.



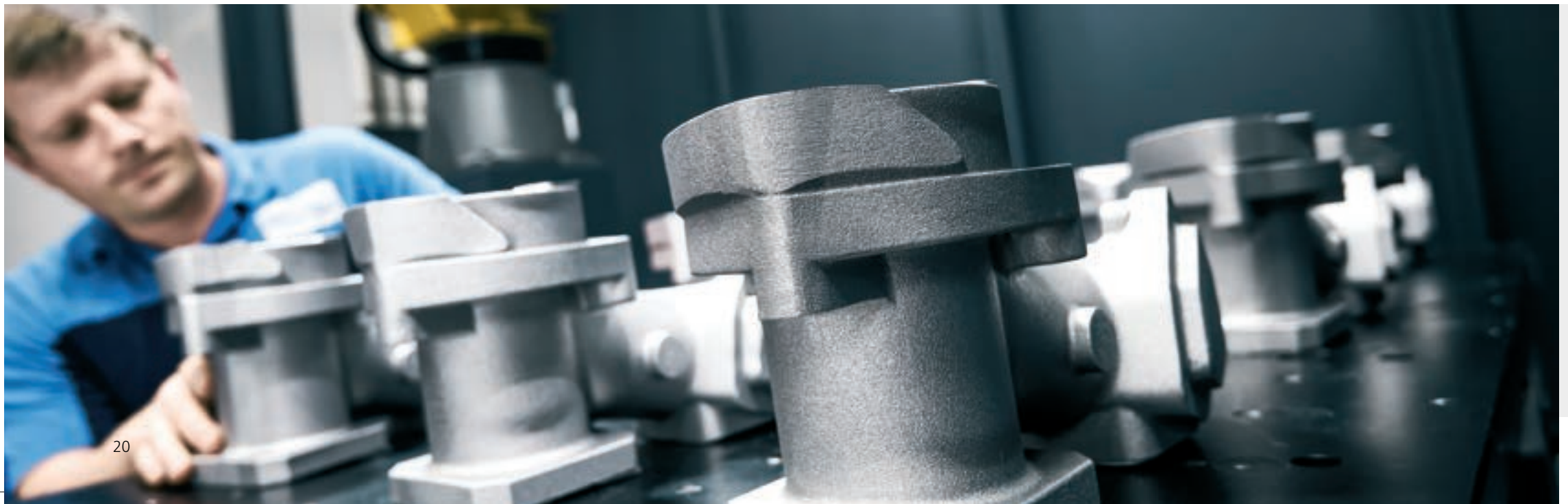
### **Rotation table module**

Regardless of whether it is used with a round, motorized rotation table in ScanBox 5110, with rectangular rotation tables in the larger models or with the optional pallet loading system – the module has a maximum load capacity of 2,000 kg.

## Optical serial measurement

All models of ScanBox Series 5 were designed for quality assurance and serial monitoring within production. ScanBox 5110 allows for inspecting parts with up to 1,000 mm in size, i.e., complex airfoils, fans or blisks. In ScanBox 5120 and

5130, larger hang-on parts such as hoods or trunk lids or battery modules are measured. These ScanBox systems are also frequently used in casting and forging applications, such as the inspection of cast parts, sand cores and models.





ScanBox 5110 D<sup>1</sup>



ScanBox 5120 D<sup>1</sup>



ScanBox 5110 LC<sup>2</sup>



ScanBox 5120 LC<sup>2</sup>



ScanBox 5130 LC<sup>2</sup>

## Technical Data

	ScanBox 5110 D/LC	ScanBox 5120 D/LC	ScanBox 5130 LC
Dimensions	2200 × 2850 × 3050 mm (D) <sup>1</sup> 2200 × 3550 × 3050 mm (LC) <sup>2</sup>	3600 mm × 3550 mm × 3050 mm (D) <sup>1</sup> 3600 mm × 4250 mm × 3050 mm (LC) <sup>2</sup>	4300 mm × 4250 mm × 3050 (LC) <sup>2</sup>
Max. part size	Ø 1000 mm	Ø 2000 mm	Ø 3000 mm
Max. part weight	2000 kg <sup>4</sup>	2000 kg <sup>4</sup>	2000 kg <sup>4</sup>
Opening width	950 mm (D) 1000 mm (LC)	2100 mm (D) 2400 mm (LC)	3100 mm (LC)
Sensor compatibility	ATOS 5 for Airfoil, ATOS 5 <sup>3</sup>	ATOS 5, ATOS 5 for Airfoil	ATOS 5

<sup>1</sup> D: Door; <sup>2</sup> LC: Light Curtain; <sup>3</sup> final setup check required; <sup>4</sup> The allowed application weight may be restricted by the selected rotation table plate.

ScanBox Series 6

**High Throughput  
with Parts up to  
3500 mm in Size**



HEISS

ScanBOX



ScanBox 6135 and 6235 are designed for large and heavy parts, e.g., cast parts, hang-on parts or molds with a size of up to 3.5 m. The rotation table module of the 3D measuring machines is designed for parts with a weight of up to 5,000 kg.



### **High throughput**

Parts and fixtures can be set up on changing pallets outside of the ScanBox Series 6 system. This results in a high throughput of parts and is ideally suited for serial production.

### **Loading and measuring at the same time**

The two working areas of ScanBox 6235 are able to be operated separately. This way, loading and measuring can be carried out at the same time. Both working areas and the rotation tables are designed for parts with a size of up to 3,500 mm, e. g., doors or trunk lids. Automatic doors ensure the safe operation of both working areas.

### **Fast part change**


Hang-on parts such as trunk lids and doors can be measured faster with the multi-part fixture because the fixture does not have to be changed. Using the Human Machine Interface (HMI), the fixture can be easily positioned so that it is possible to exchange parts at the front.





## Technical Data

	<b>ScanBox 6135</b>	<b>ScanBox 6235</b>
Dimensions	4500 × 4500 × 3250 mm	7665 × 4500 × 3250 mm
<b>Max. part size</b>	<b>Ø 3500 mm</b>	<b>Ø 3500 mm</b>
<b>Max. part weight</b>	<b>5000 kg</b>	<b>2 × 5000 kg</b>
Opening width	2850 mm	2850 mm
Sensor compatibility	ATOS 5, ATOS 5X	ATOS 5, ATOS 5X



ScanBox Series 7 is mainly used in car manufacturing, try-out tool manufacture and press shops. The optical measuring system performs complete analysis measurements for comparison in the try-out phase or is used for quality assurance in production.

The image shows a large industrial machine, the ScanBox Series 7, in a factory setting. The machine is primarily blue and grey. On the left, a large, perforated metal panel is visible, which is part of the machine's structure. The main body of the machine is a large, rectangular cabinet with a grey top and blue sides. The top of the machine is open, revealing a dark interior. On the right side of the machine, there is a control panel with a yellow emergency stop button and a multi-colored indicator light. The machine is situated on a grey concrete floor. The background shows a blue wall and a yellow door.

ScanBox Series 7

**Measuring Large and  
Heavy Components up  
to 6000 mm in Size**



### **Quality assurance for large parts**

The ScanBox system measures metallic side panels and hang-on parts for automotive vehicles with a size of up to 6 m. The full-field measuring data enable the analysis of hole patterns, trimmings and character lines. Heavy and large parts for other applications can also be measured and inspected with ScanBox Series 7. Special designs make it possible to measure parts of 10 m in size. The rotation table working area of ScanBox 7260 allows for measuring medium-sized parts.

### **Modular layout**

Uniform construction components and the modular setup of ScanBox Series 7 and 8 enable a demand-oriented ScanBox extension both within Series 7 and up to Series 8.

### **8-axis kinematics**


The 8-axis kinematics – a combination of a horizontal rail, a vertical lift and an articulated robot – guarantees for smooth full-field measurements of large and heavy parts. Thanks to 8 degrees of freedom, the ATOS sensor is very flexible in its positioning and measures 3D data of the smallest details in practically no time.



## Technical Data

	<b>ScanBox 7160</b>	<b>ScanBox 7260</b>
Dimensions	4750 × 10150 × 3900 mm	8750 × 10150 × 3900 mm
<b>Max. part size</b>	<b>6000 × 1250 mm</b>	<b>6000 × 1250 mm, rotation table up to Ø 3000 mm</b>
<b>Max. part weight</b>	<b>unlimited</b>	<b>unlimited, rotation table up to 2000 kg</b>
Opening width	3050 mm	3050 mm, rotation table 3400 mm
Sensor compatibility	ATOS 5, ATOS 5X	ATOS 5, ATOS 5X





ScanBox Series 8

# Two-Sided Measurement of Long and Wide Components

ScanBox Series 8 enables you to measure a whole vehicle both from the inside and the outside. The main application fields are analyses in master jig and cubing, inspections of completed vehicles and quality assurance in car body manufacturing. Measurements of several parts can be virtually merged to evaluate information on gap and flush in a linear manner.

## Loading concept

ScanBox Series 8 can be loaded with a driverless sandwich panel transport system including a track system, drive computer and safety technology. The automatic loading system guarantees for the fast, repeatable and precise positioning of car bodies in the optical 3D measuring machine. Alternatively, the parts can also be transported to the respective rotation table working area by transport cart, pallet truck, crane or forklift truck.



## Automated scanning in duplex operation

The two 8-axis kinematics allow for a smooth full-field measurement of particularly large assemblies. The double robot mode ensures the synchronous, coordinated use of two robots in the measuring cell. In this process, a joint data set of measurements is created, as the double robot mode is carried out in a shared coordinate system. Depending on individual requirements, the two robots of ScanBox Series 8 are also able to measure two different parts independently from each other.





## Expandability

ScanBox Series 8 can be extended by one or two rotation table working areas. This upgrade opportunity makes it possible to respond quickly and flexibly to production changes and make adjustments to increase the throughput.



## Technical Data

	<b>ScanBox 8160</b>	<b>ScanBox 8260</b>	<b>ScanBox 8360</b>
Dimensions	5750 × 10150 × 3900 mm	9750 × 10150 × 3900 mm	13750 × 10150 × 3900 mm
Max. part size	<b>6000 × 2500 mm</b>	<b>6000 × 2500 mm, rotation table up to Ø 3000 mm</b>	<b>6000 × 2500 mm, rotation table up to Ø 3000 mm</b>
Max. part weight	<b>unlimited</b>	<b>unlimited, rotation table up to 2000 kg</b>	<b>unlimited, rotation table up to 2000 kg</b>
Opening width	3050 mm	3050 mm, rotation table 3400 mm	3050 mm, rotation table 3400 mm
Sensor compatibility	ATOS 5, ATOS 5X	ATOS 5, ATOS 5X	ATOS 5, ATOS 5X

All-in-One Software

# Detailed Analysis of 3D Data

Scanning, inspection and reporting with a single source: Each ScanBox system comes with the Inspect Pro 3D inspection software. The software is part of the ZEISS Quality Suite and manages the control of the ScanBox systems. You can import CAD data, create polygon meshes from point clouds and execute 3D inspections.

## Certified inspection software

The measuring accuracy of the ZEISS software has been tested and certified by the German National Metrology Institute (Physikalisch-Technische Bundesanstalt, PTB) and the National Institute of Standards and Technology (NIST). By comparing obtained results with reference results, the software has been put in the category of lowest measurement deviations (Class 1).

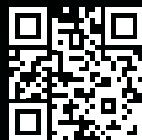
## Parametric inspection

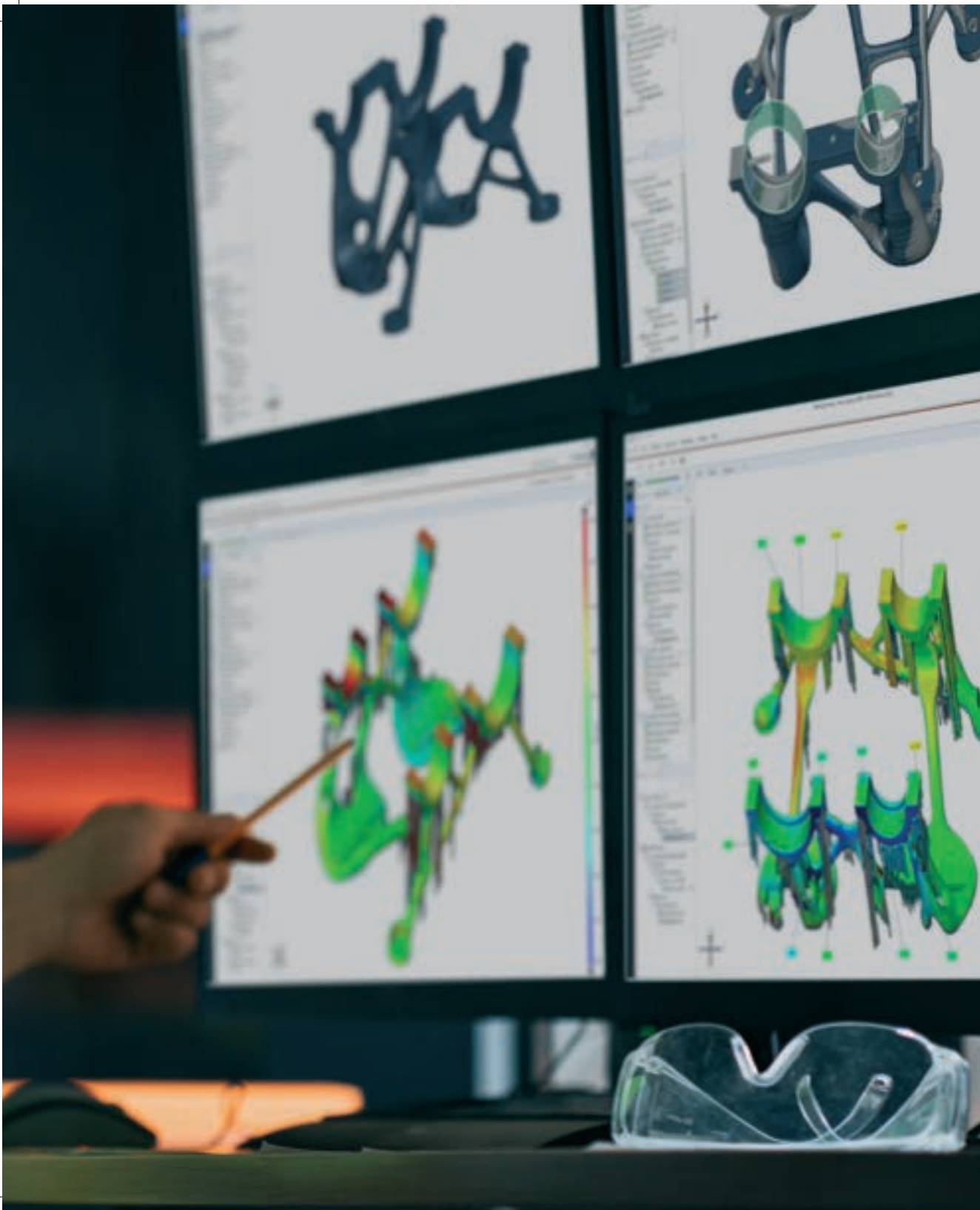
The parameter-based design of the software allows every step of a process to be traced, repeated and edited. Trend analyses, statistical process control (SPC) and deformation analyses can be performed with one piece of software. In addition, it is also easy to perform serial inspections in a project and to determine statistical analysis values.

## Free trial version

Get to know the numerous benefits of Inspect Pro – free and without any contractual obligations for 14 days.

Start now: [zeiss.ly/kq2w](https://zeiss.ly/kq2w)





### **Numerous CAD formats**

Native CAD formats, such as CATIA, NX, SOLIDWORKS and Pro/E, can be imported into the software at any time.

### **Teaching by doing**

Thanks to continuous buffering, the desired inspection steps can be transferred to subsequent parts without any programming effort.

### **Digital assembly**

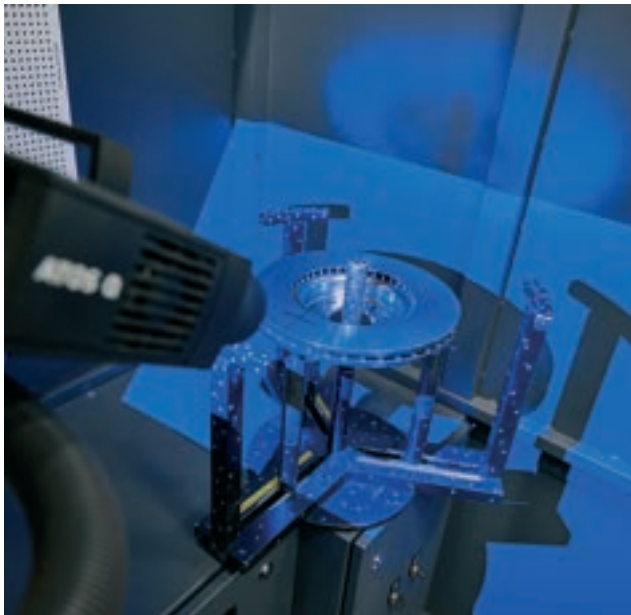
Digital assembly allows for the alignment of parts to one another and an analysis of whether they fit accurately, regardless of where the parts were manufactured.

### **Customization**

A command recorder saves all executed operations as a Python script, which can then be repeatedly applied or adjusted for additional measurements.

The software supports the measuring and inspection process with detailed analysis and reporting functions. The results are displayed in a simple and clear manner.

# Customer Testimonials



“ScanBox enables us to digitize a complete part in little or no time and create GD&Ts as well as sections or false-color comparisons afterwards in order to determine various drawing dimensions.”

**Marcel Nickel**

Buderus Guss



“Compared to our previous manual system, the production-integrated 3D measuring machine helps us to increase our throughput and delivers quick and precise results about the accuracy of the parts, especially for series production.”

**Florian Topp**

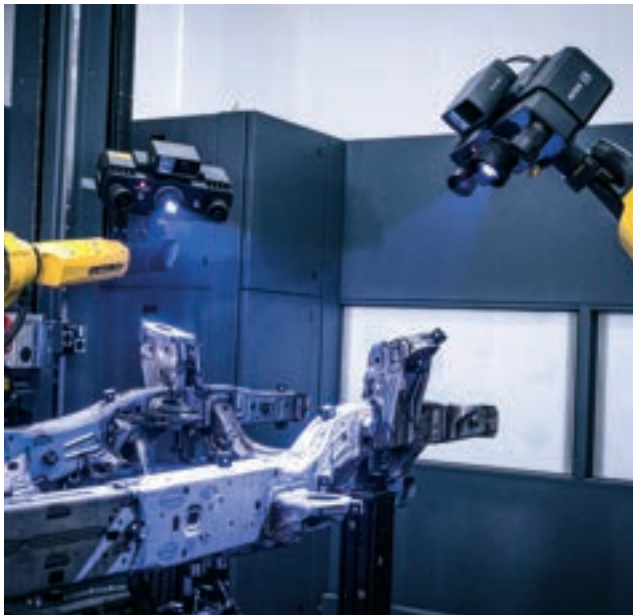
Metallgießerei Wilhelm Funke GmbH & Co. KG



“Our parts are highly complex. However, ScanBox makes it very easy and efficient to measure them according to individual requests.”

**Michael Kray**

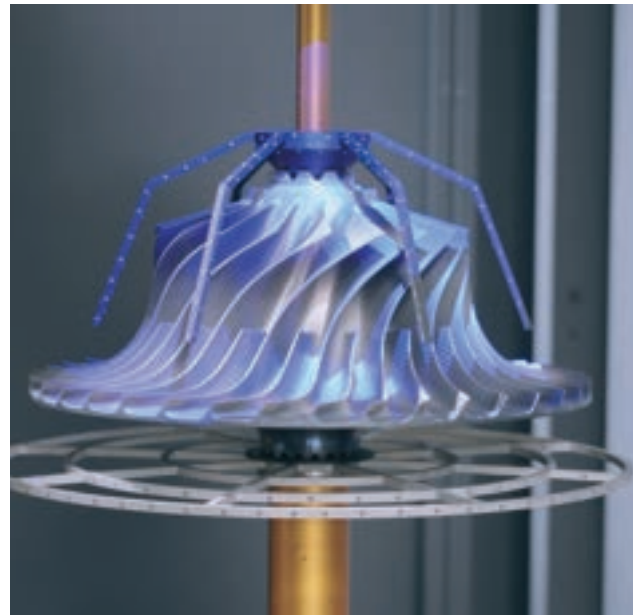
LINDE + WIEMANN SE & Co. KG



“ScanBox helps us to make sure that sheet metal parts are within tolerance by 99,997 % according to the Six Sigma principle and can be used in construction.”

**Jan Groenewald**

Ford Motor Company South Africa



“Cost efficiency is more important than ever. Every dollar counts, which is why we invest in technology that helps us to reduce costs for our customers.”

**Leon Boersma**

EPCOR B.V.



“The full-field measuring results ensure a faster first article inspection and goal-oriented tool correction, resulting in reduced production lead times.”

**Andreas Spilker**

Coko-Werk GmbH & Co. KG

A man in a dark blue shirt is operating a ZEISS ATOS 5X industrial metrology machine. The machine is a large, complex piece of equipment with a yellow robotic arm and a black camera head. The man is looking intently at the machine, which is positioned in a factory or industrial setting. The background is dark and out of focus, highlighting the machine and the operator.

# ZEISS Industrial Quality Solutions

Your holistic technology partner

ZEISS Industrial Quality Solutions is a leading manufacturer of multidimensional metrology solutions. These include coordinate measuring machines, optical and multi-sensor systems, microscopy systems for industrial quality assurance as well as metrology software for the automotive, aircraft, mechanical engineering, plastics and medical technology industries. Innovative technologies such as 3D X-ray metrology for quality assurance complete the portfolio.

In addition, ZEISS Industrial Quality Solutions offers a broad global spectrum of customer services with ZEISS Quality Excellence Centers close to its customers. The company is headquartered in Oberkochen. Production and development sites outside Germany are located in Minneapolis in the USA, Shanghai, China and Bangalore, India.

ZEISS Industrial Quality Solutions is part of the Industrial Quality & Research segment.

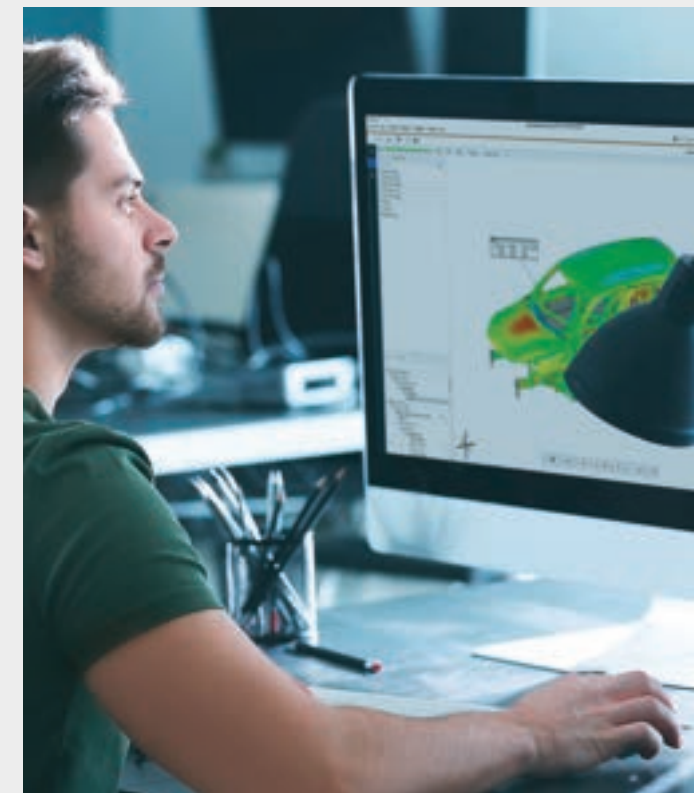
Numerous services and training courses support you in your daily use of 3D measurement technology. Training courses and webinars help you to extend your knowledge about using the software and get to know more application fields for the measuring systems.

At conferences and application-based workshops, webinars and digital demos, ZEISS directly shares process and measurement technology know-how. In addition, support and services on a contractual basis are offered for all 3D measuring systems.

## Training

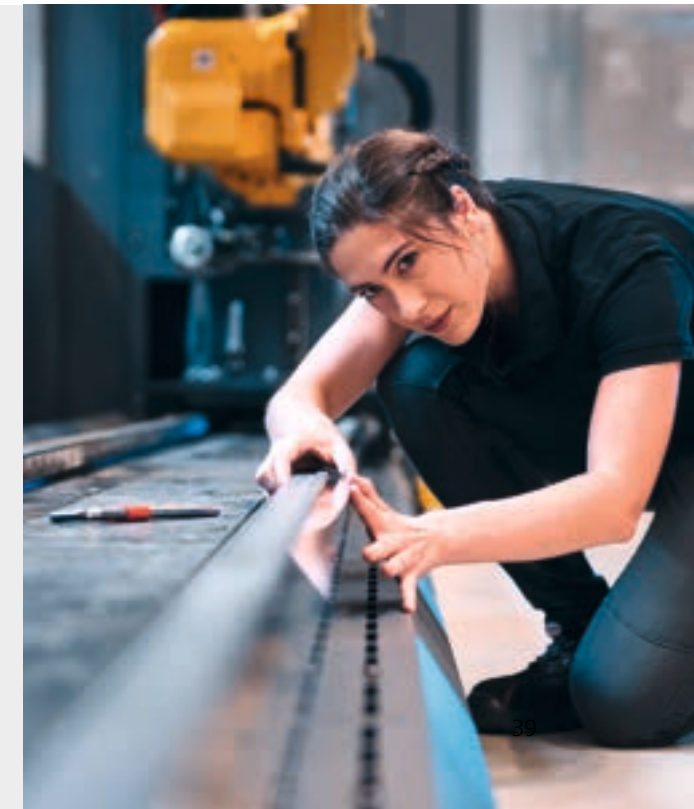
ZEISS training centers offer training and eLearning courses for all levels of expertise. The training courses follow an internationally standardized concept and are implemented by our certified partners in the corresponding national language.

In addition to on-line training courses and scheduled courses in our training centers, customer-specific training courses on site are also available on request.



## Support and Service

ZEISS provides support and services to assist you quickly and reliably if required. These are based on the following three pillars: Remote Assistance, Services and Contract Plans.



**Carl Zeiss GOM Metrology GmbH**

Schmitzstraße 2  
38122 Braunschweig  
Germany

Phone: +49 531 39029-0  
info.optical.metrology@zeiss.com  
www.zeiss.com/optical-metrology