

ATOS 5 Series

Versatile 3D scanning solution for industrial demands



April 22, 2024



ATOS 5 Series

Versatile 3D scanning solution for industrial demands



ATOS 5
High-speed 3D scanning system



ATOS 5 for Airfoil
Precise scanning of smallest details



ATOS LRX
3D scanning for very large volumes



ATOS 5X
Automated scanning for large volumes

ATOS 5 Series

Benefits



Versatile

Manual or automated setup, shop floor or measuring room

Accelerated measuring times

Fast data delivery due to advanced hardware and software

Effective tool for analysis

All-in-one: measurement, inspection and reporting

Numerous application fields

Broad range of applications from airfoils to mega castings

Robust

Developed for industrial use



ATOS 5 Series

Versatile

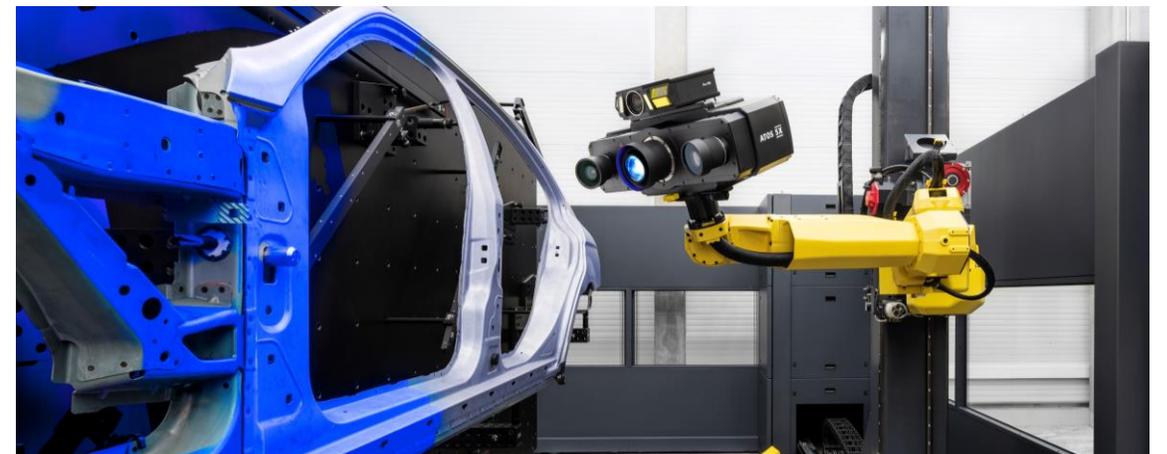


Variable system for individual requirements

Manual, semi-automated or automated setup

Shop floor or measuring room

Growing with customer needs



ATOS 5 Series

Accelerated measuring times



Generation of full-field
3D measuring coordinates

Fast data delivery thanks to
advanced camera technology,
powerful light source and
high-performance software

Maximum speed with large
measuring areas in automated
setup

Faster results and less scrap



ATOS 5 Series

Effective tool for analysis



Powerful combination of hardware and software

Consistent workflow for scanning, inspection and reporting

3D measurement technology software with active parametric concept and customization via Python interface

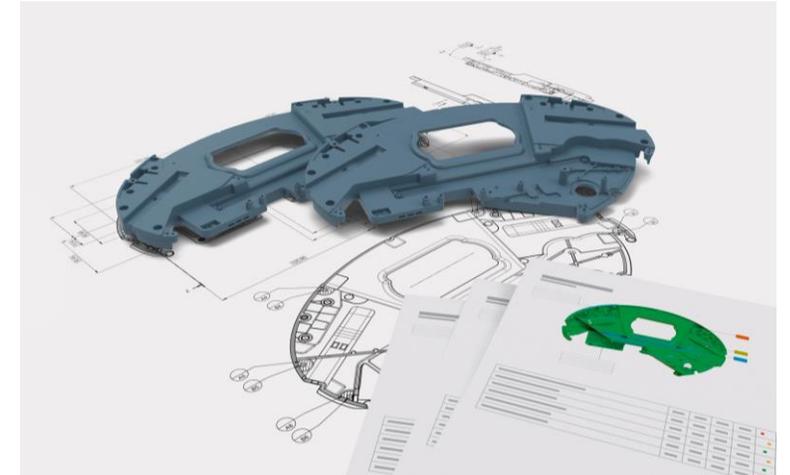
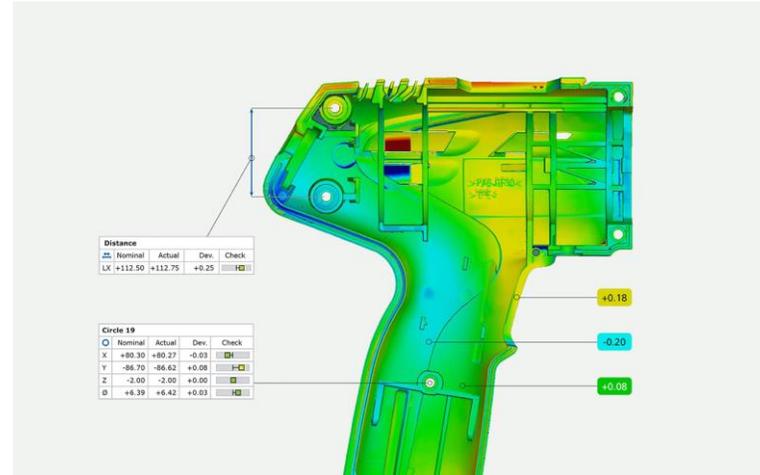
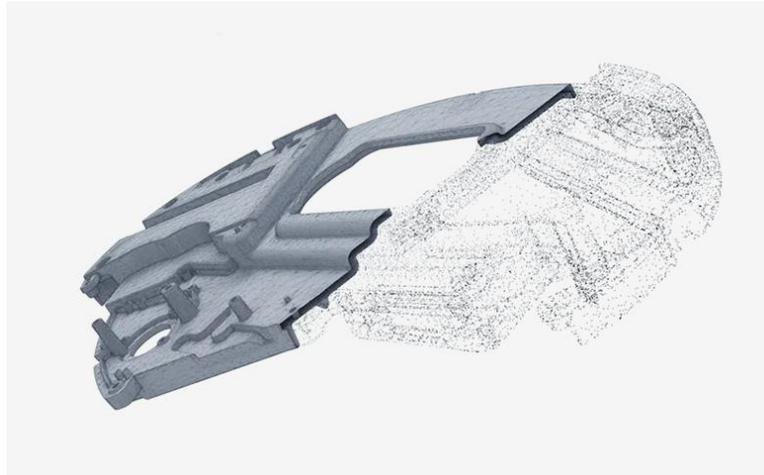
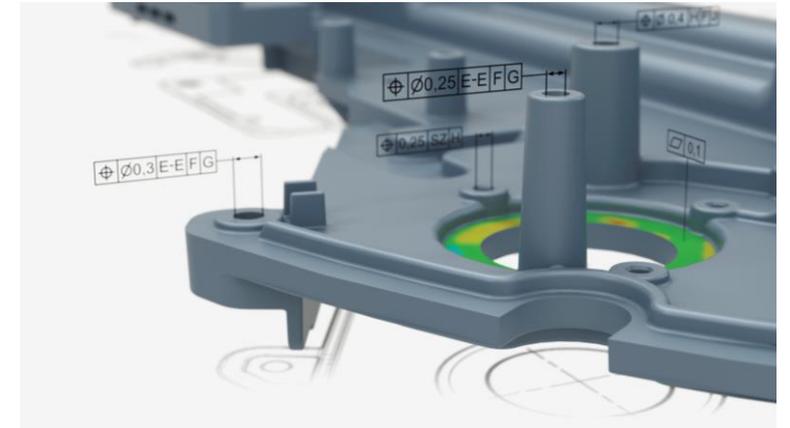
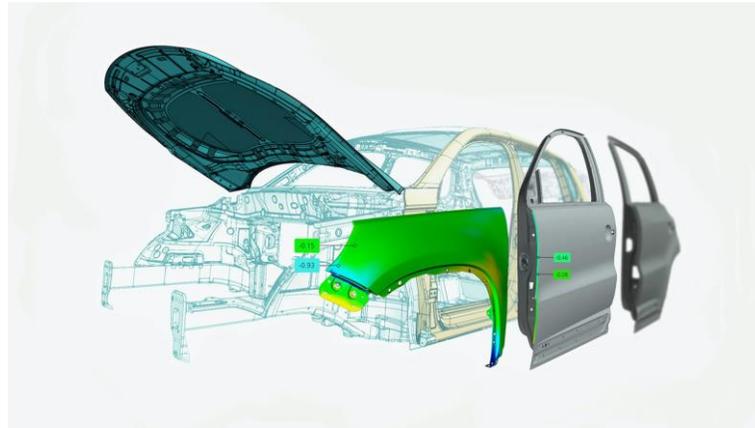
Digital twin for inspection, adaptive manufacturing, simulation and reverse engineering



ZEISS INSPECT Optical 3D Highlights



- Mesh editing
- Nominal-actual comparison
- Geometric dimensioning
- Digital assembly
- Reporting



ATOS 5 Series

Numerous application fields



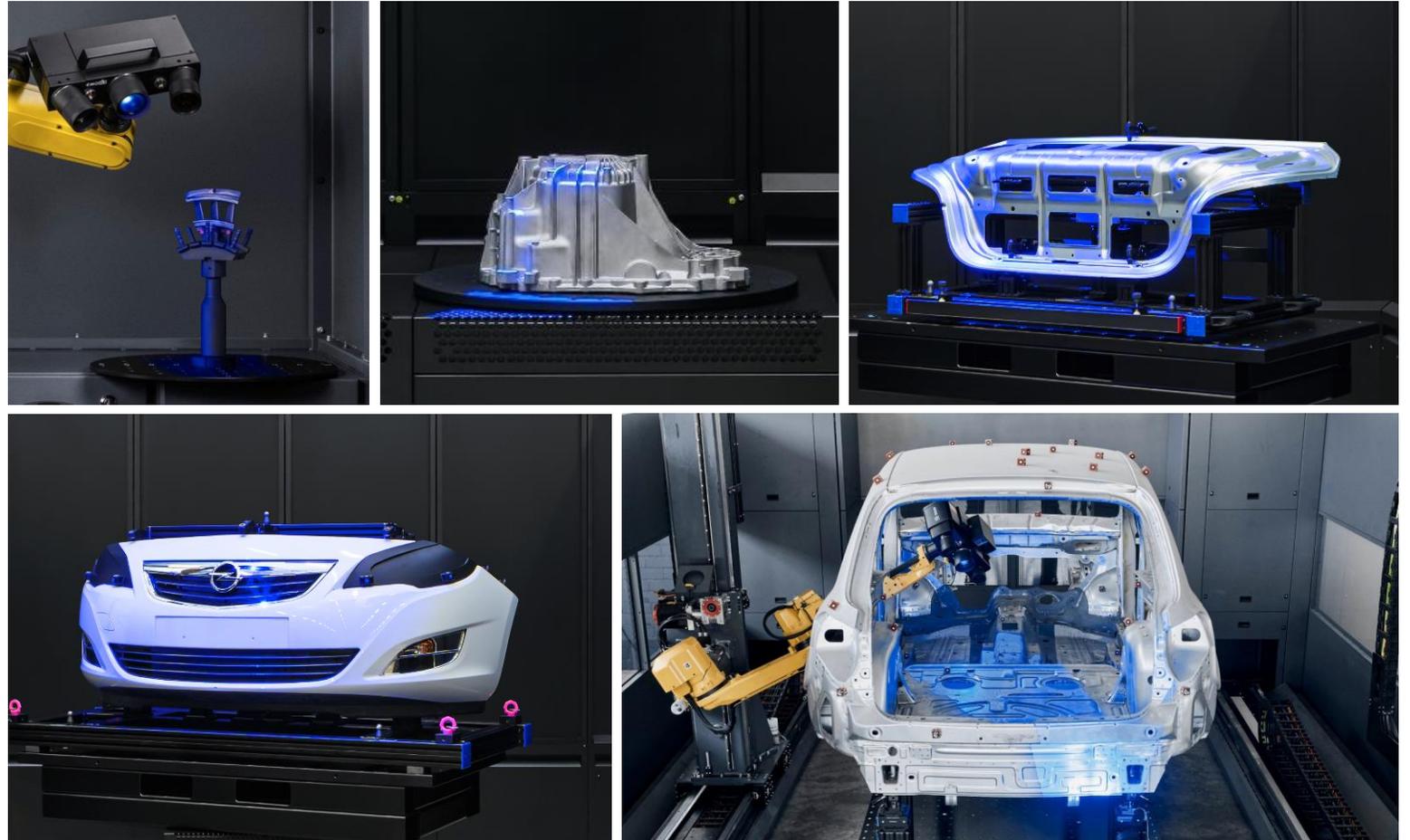
Broad range of applications from
airfoils to mega castings

Quality assurance of sheet metals, tools
and molds, turbine blades, prototypes as
well as injection-molded and cast parts

Automotive, consumer goods and
aerospace industries

Accelerated time-to-market and
maintenance of products

Quality assurance in ongoing production
and fast process optimization



ATOS 5 Series

Robust



Developed for industrial use

Protected optics, encapsulated electronics, dustproof and splashproof housing

Assured measuring data quality thanks to self-monitoring system that identifies changing conditions during operation

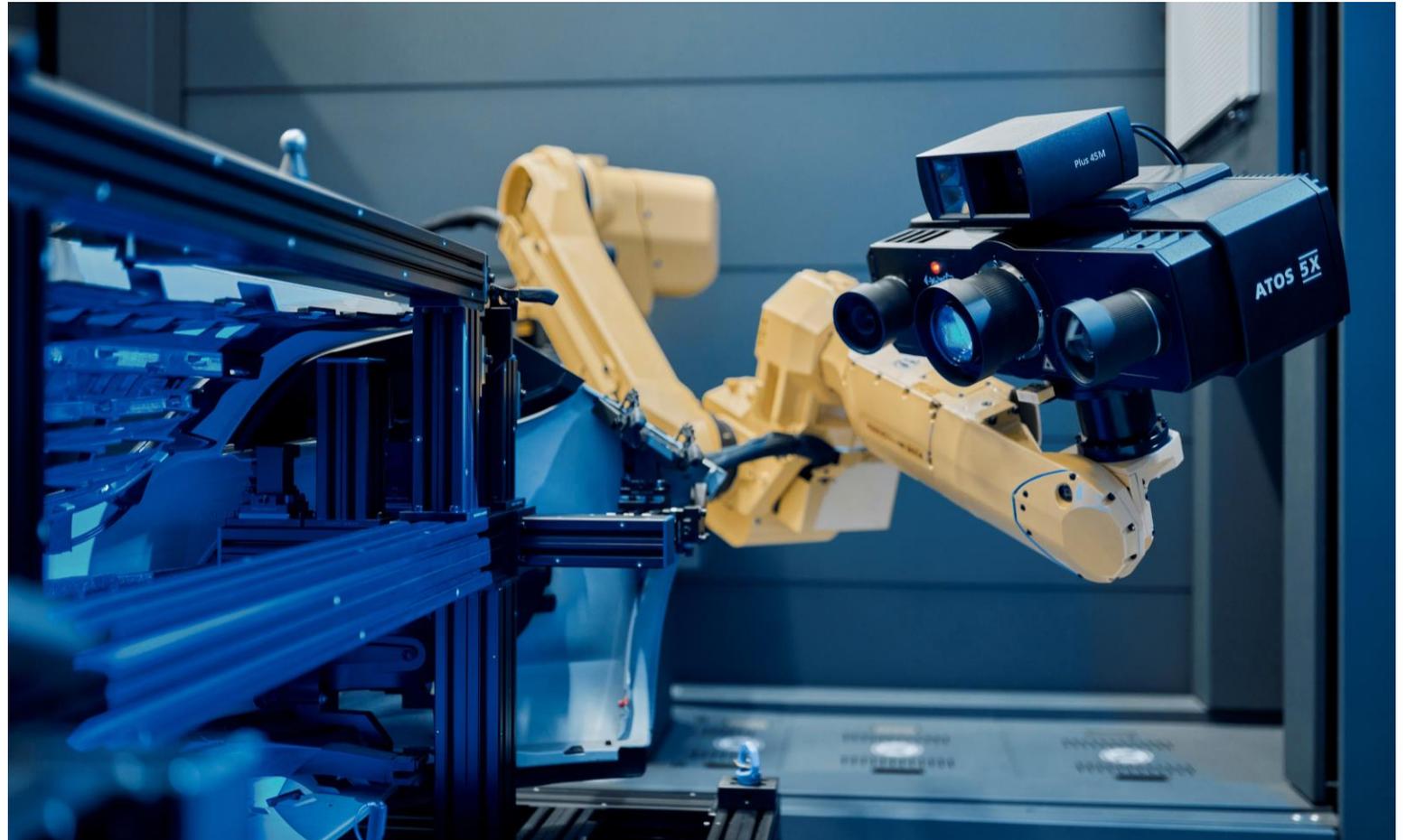
Absolute, accurate and traceable measurement data even under harsh conditions





ATOS Technology

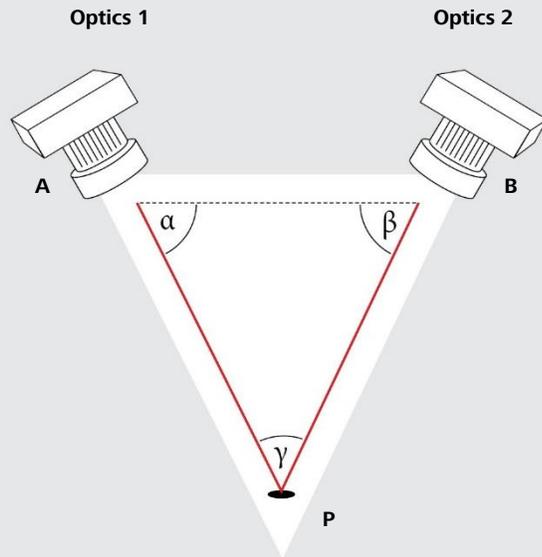
- High-speed fringe projection
 - Fast data processing
 - High data throughput
- Comprehensive quality information in reduced measuring time
- Fast identification of optimal corrective measures
- Cost efficiency



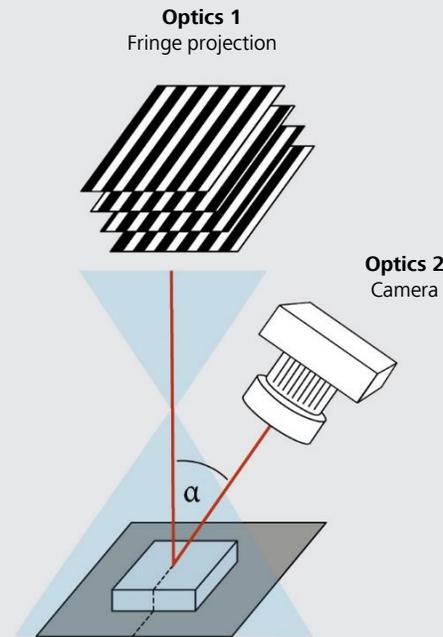
- Triple Scan Principle
 - Blue Light Equalizer
 - Self-monitoring system
-
- Precise, full-field 3D coordinates (geometrical digital twin)
 - Detailed 3D information for comprehensive quality analyses
 - Improved product quality
 - Process safety in industrial applications



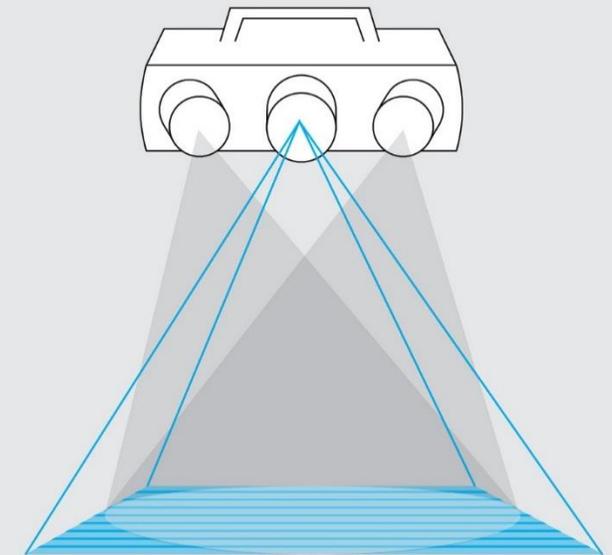
The principle of triangulation combined with the fringe projection technique enables the stereo camera system to capture precise 3D coordinates.



Triangulation principle



Fringe projection technique



Stereo camera system

Triple Scan Principle

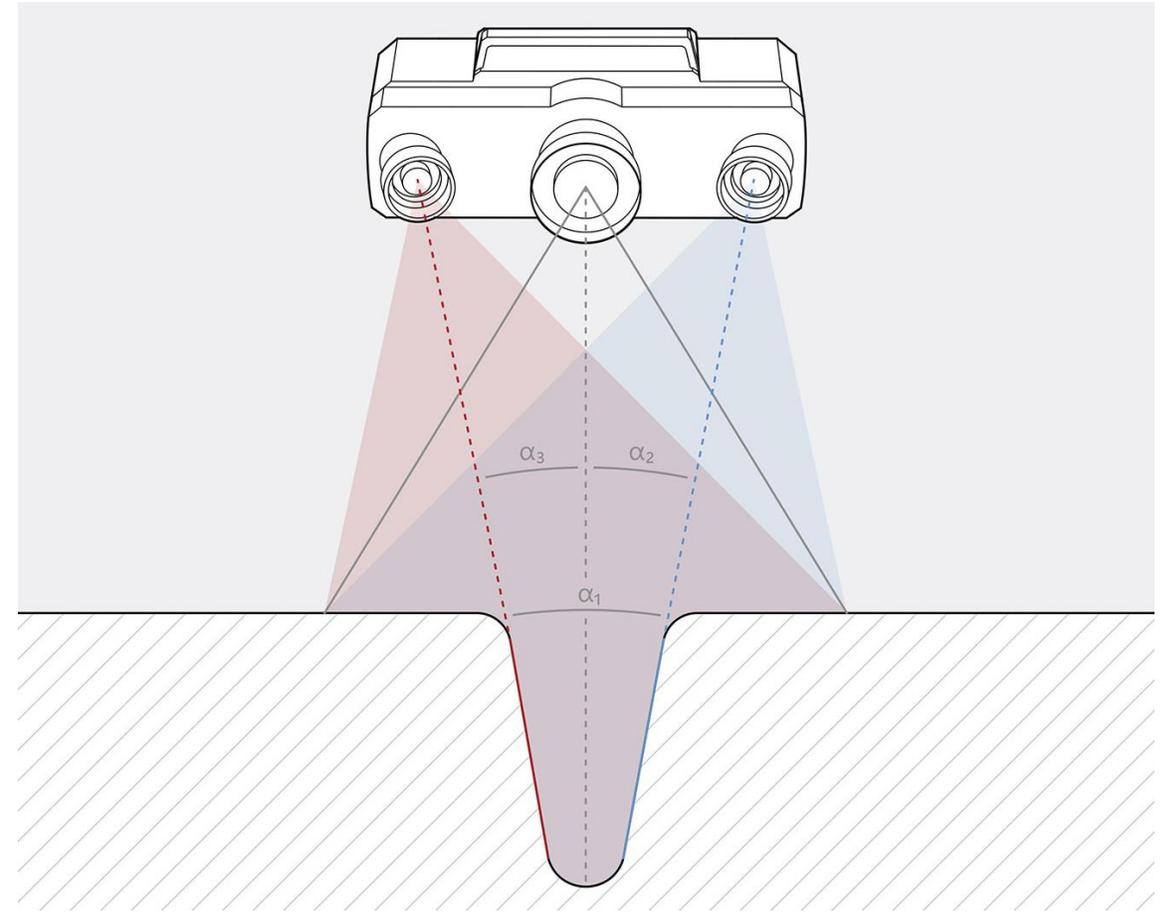


3-in-1 sensor concept

- Right and left camera, each combined with the projector
- Three different views of the object in one measurement

Measuring results

- Reduces the number of individual measurements: faster measurement due to less individual measurements, even in case of complex parts
- Improved measurement of shiny surfaces by avoiding hotspots
- Improved measurement of deep pockets



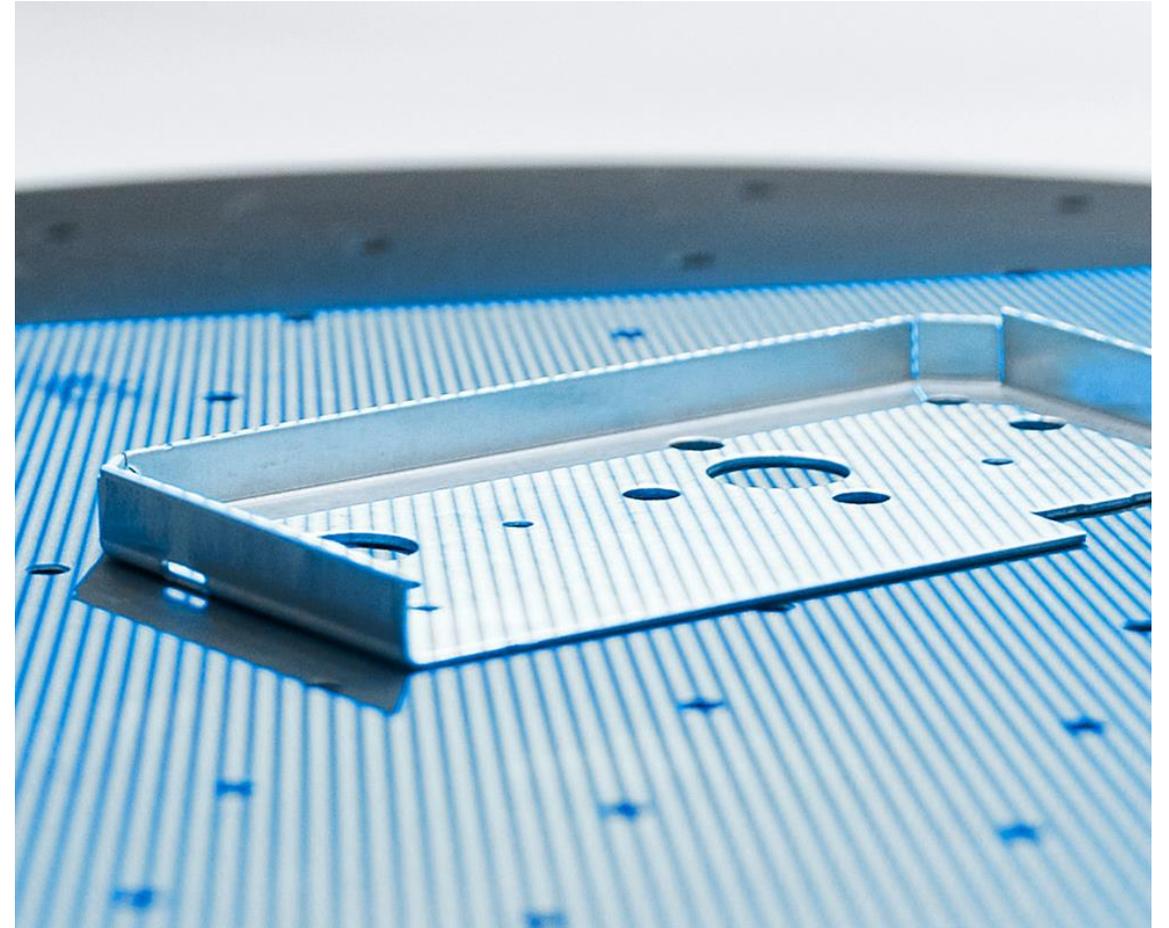
Bright LED light source

Projection of very small fringes per unit area

- High detail resolution
- Precise coverage of complex geometries

Uniform, non-coherent, speckle-free light

- Low noise level
- Precise coverage of complex geometries
- Highest data quality



ATOS 5

High-speed 3D scanning system



ATOS 5

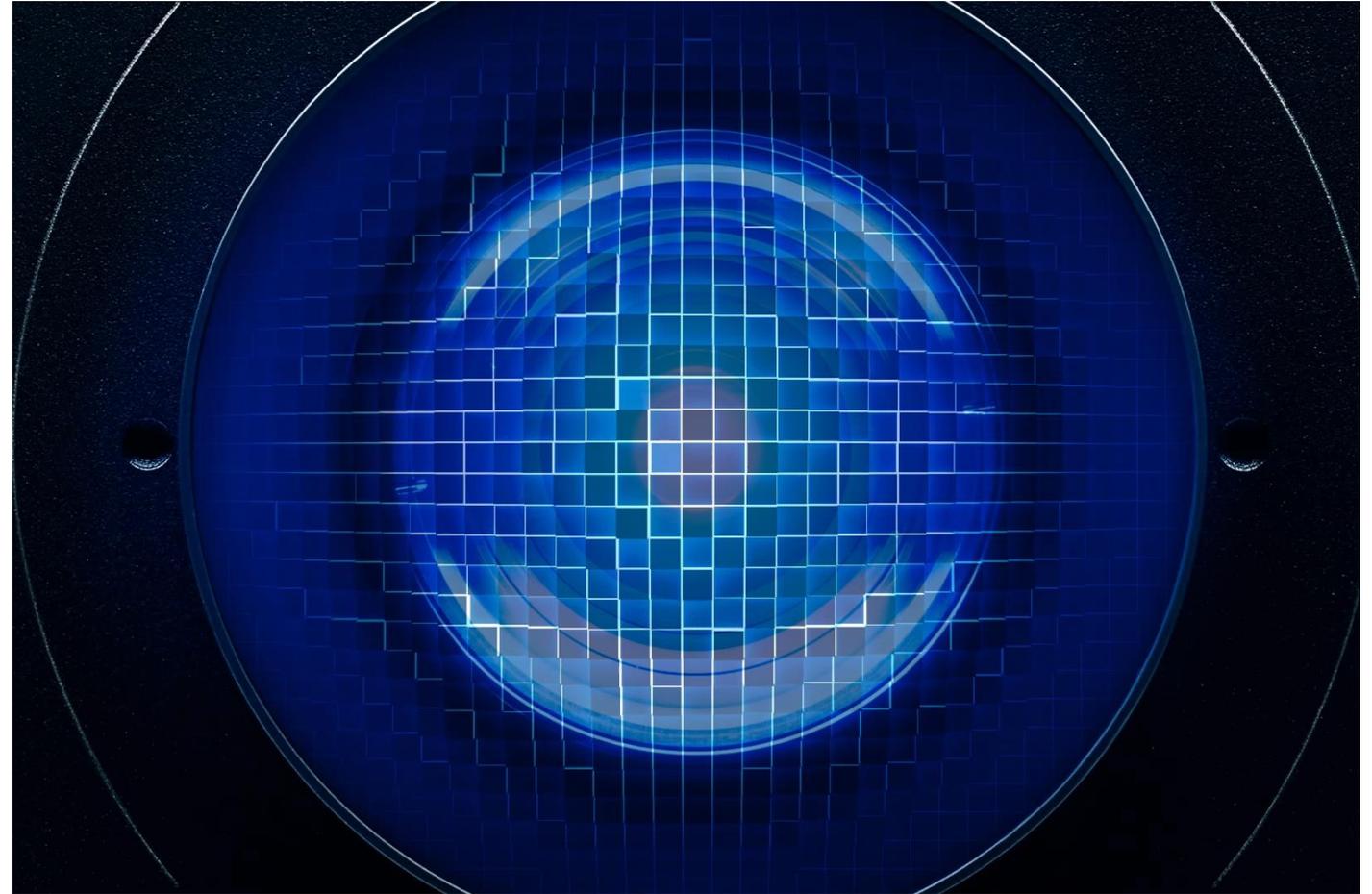
Versatile scanner with highest data quality



High-resolution scanning system for the fast delivery of 3D measuring data in the production environment

ATOS 5 provides full-field 3D coordinates (up to 12 million independent measuring points per scan)

Fast measuring results due to GPU acceleration (processing of individual scans on the graphics card)



ATOS 5

Manual setup



- Manual use with tripod
- Mobile 3D metrology: System goes directly to the part
- Shop floor or measuring room

→ Flexibility

→ Early error detection

→ Fit for industrial use



ATOS 5

Manual setup



- Flexible measuring areas thanks to changeable measuring volumes
- Interchangeable lenses ensure high-precision measurements of medium-sized to big parts
- Changing from the smallest to the largest measuring volume is easy thanks to the fixed camera position



ATOS 5

Accessories: Touch Probe



- Point based measurements of areas that are difficult to access
- Measurements of regular geometries, direct comparison against CAD data
- Fast measurement of single points and online alignment



ATOS 5

Extension with photogrammetry



- Quick and precise measurement of 3D coordinates with the TRITOP optical photogrammetry system
 - For the inspection of very large and often complex components, the portable solution captures reference point fields
 - ATOS 5 uses these reference points to automatically transform the individual measurements
- High accuracy for large and complex objects
- Flexibility
- Mobility



ATOS 5

Application areas



- Casting and forging
- Metal forming
- Plastics
- Additive Manufacturing



ATOS 5

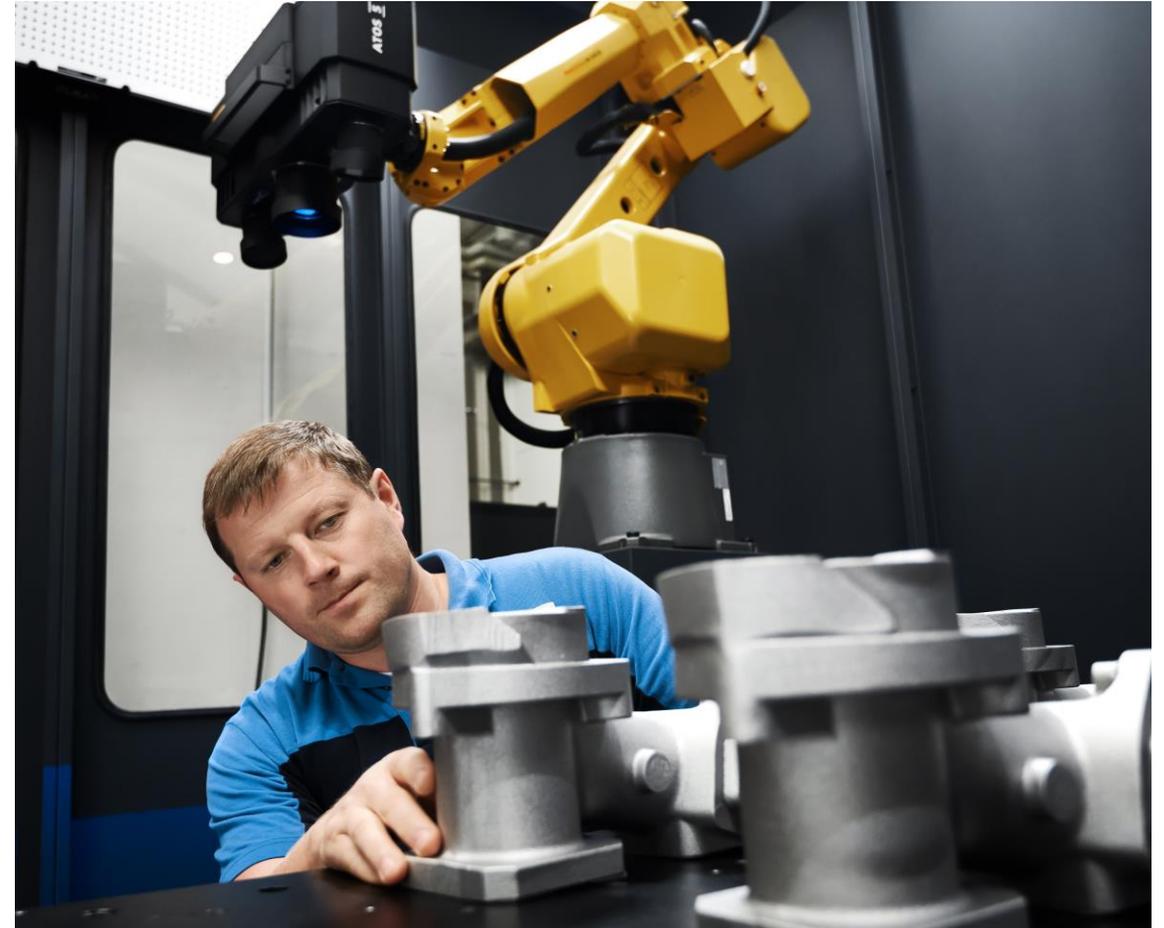
Application areas



Casting and forging

Acceleration of all stages in sand casting, die cast, and investment casting processes

- Targeted correction of tools and patters
- Inspection of fitting for mold halves, cores and sliders
- Acceleration of tool try-out
- First article inspection
- Production control



ATOS 5

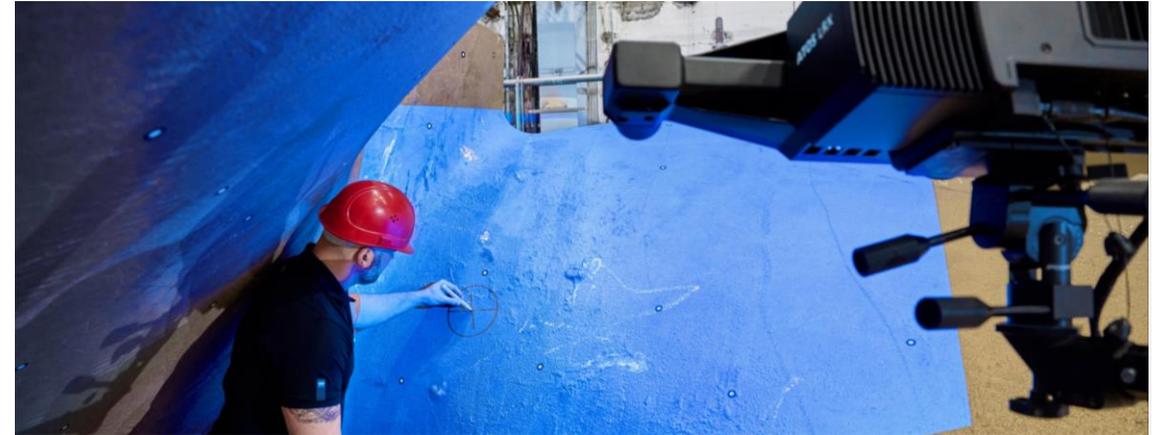
Application areas – Casting and forging



Tracking

ATOS 5 for single-point and multi-point tracking

- Component positioning for CNC machining
- Assembly analysis of molds and tools
- Positioning and assembly of sand cores and sand mold
- Online positioning of a component in the nominal position or in an assembly



Back projection

ATOS 5 projects elements onto real physical components to support machining and/or visualization

- Fast marking of cast blanks
- Projection of isolines and punch marks
- Marking for positioning in a milling machine
- Marking of machining areas

ATOS 5

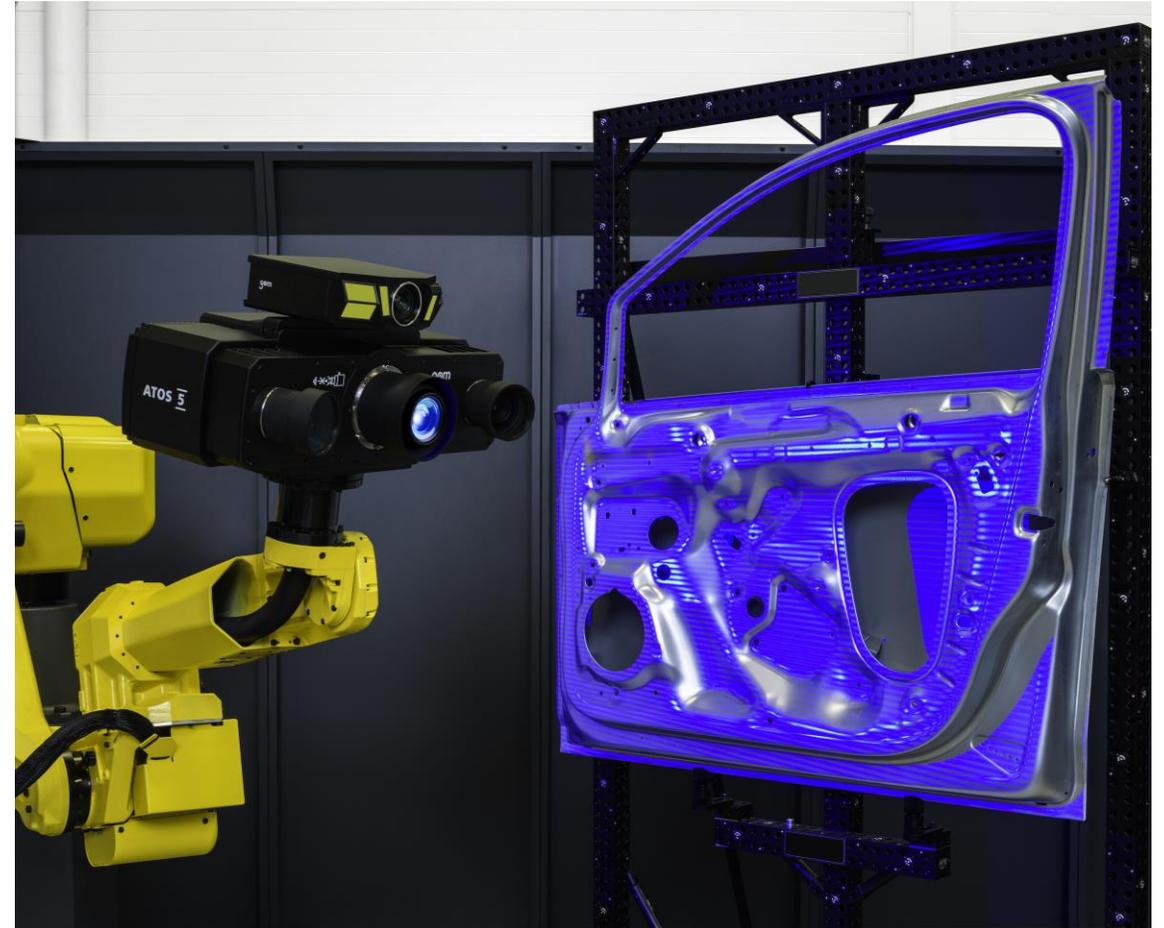
Application areas



Metal forming

Consistent quality assurance in stamping, bending, drawing, pressing and forming process chains

- Tool manufacturing
- Tool try-out and first article inspection
- Maintenance and repair
- Production control and assembly analysis



ATOS 5

Application areas



Plastics

ATOS 5 speeds up all phases of injection molding, blow molding and thermoforming by measuring complete surfaces of prototypes, electrodes, tools and injection-molded parts:

- Tool correction
- First article inspection
- Production control and assembly analysis



ATOS 5

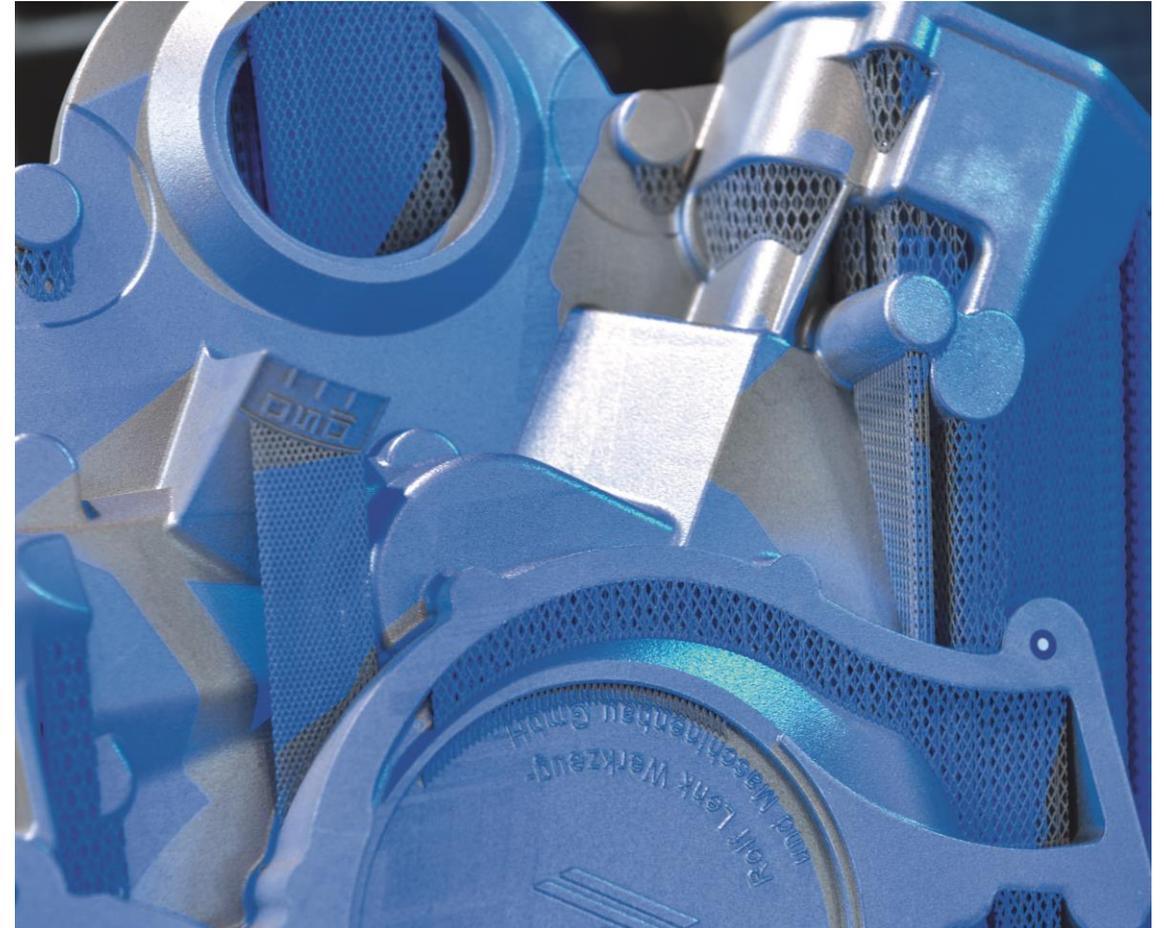
Application areas



Additive manufacturing

ATOS 5 accelerates product development and launch:

- Fast and precise scanning of parts
- Dimensional quality check
- Improving CAD models
- Reverse engineering
- Direct 3D printing



ATOS 5 Series

Upgrade from manual to automated in ScanBox systems



- Automated measurement, inspection and reporting
- Flexibility regarding measuring parts
- Fast measurement and high throughput
- Smart Teach
 - computes the required sensor positions for all inspection characteristics and CAD surfaces
- Easy operation via simplified user interface
- Reliability of measuring results/statistical process control
- Compact measuring system for industrial environments
- All-in-one solution from a single source



ATOS 5 Series

Upgrade from manual to automated in ScanBox systems



ScanBox Series 5

ScanBox Series 6, 7, 8

ATOS 5

Industrial high-speed 3D scanning system
for the precise acquisition of complex geometries

ATOS 5 for Airfoil

Precise scanning of smallest details

ATOS 5X

High-end scanning system for toolmaking,
press and body shops

ATOS 5 Series

ATOS Plus – Automated photogrammetry



Integrated photogrammetry for ScanBox systems

Automatically transforms individual measurements

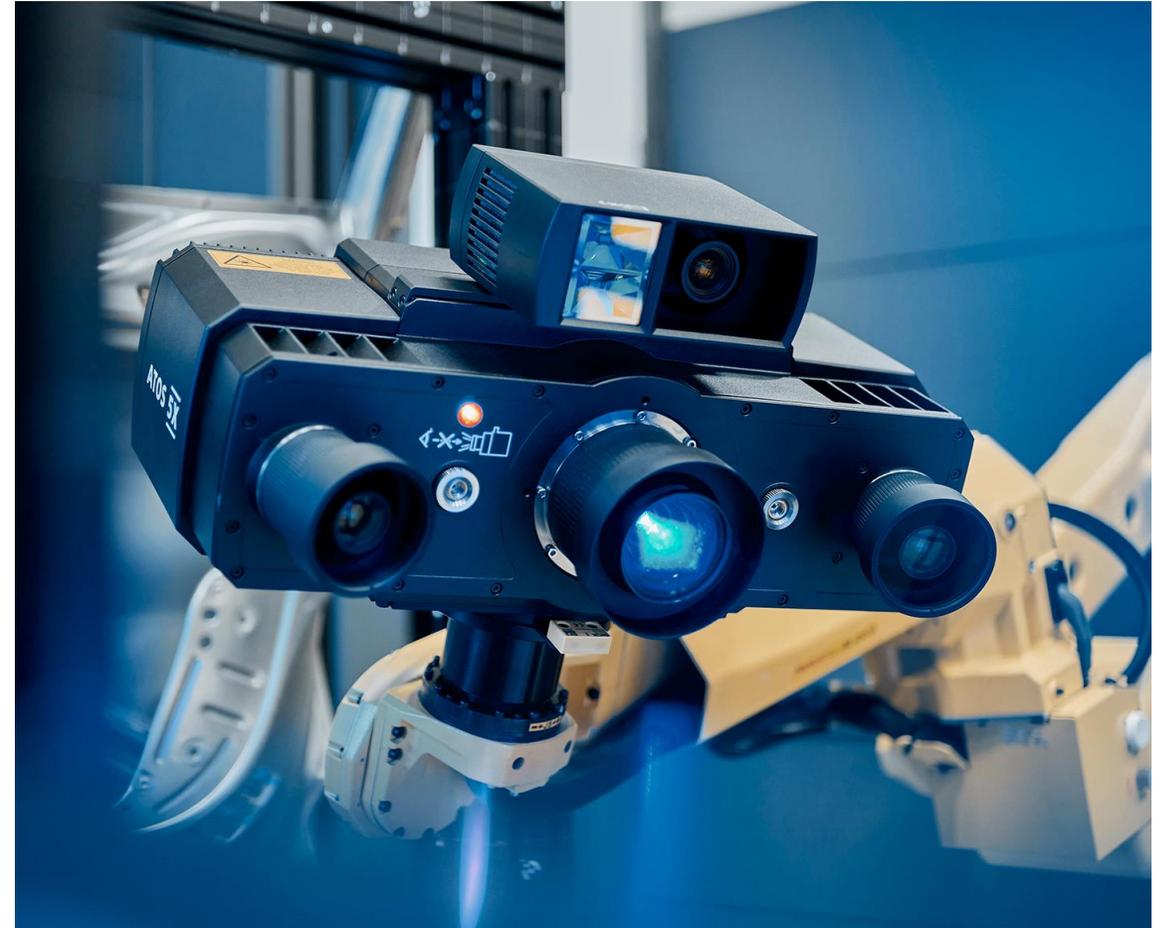
- Transformation errors are not added up
- Regardless of object size and complexity

Highest accuracy

- Global accuracy instead of composite single scans from a local area

Process security

- Automated online monitoring of sensor status
- Traceability of calibration
- Traceability of movements



ATOS 5 for Airfoil

Precise scanning of smallest details



ATOS 5 for Airfoil

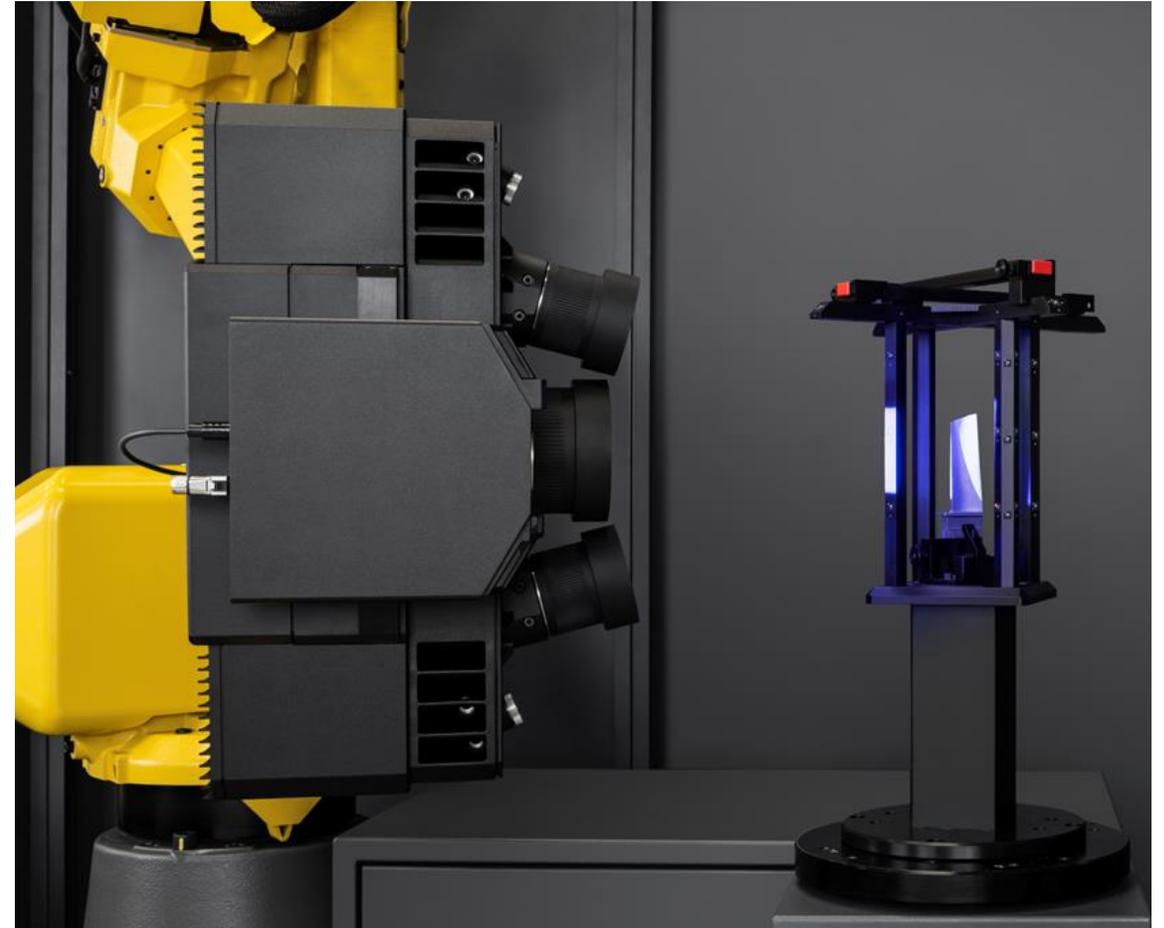
Precise scanning of smallest details



High-speed scanner for small to medium-sized, complex parts of the aerospace and power generation industry

- Fan and turbine blades, blisks, drums and vanes from jet engines or gas turbines
- Propulsion systems (gears etc.)

→ Precise acquisition of smallest details and edge geometries



ATOS 5 for Airfoil

Features



Optimized working distance

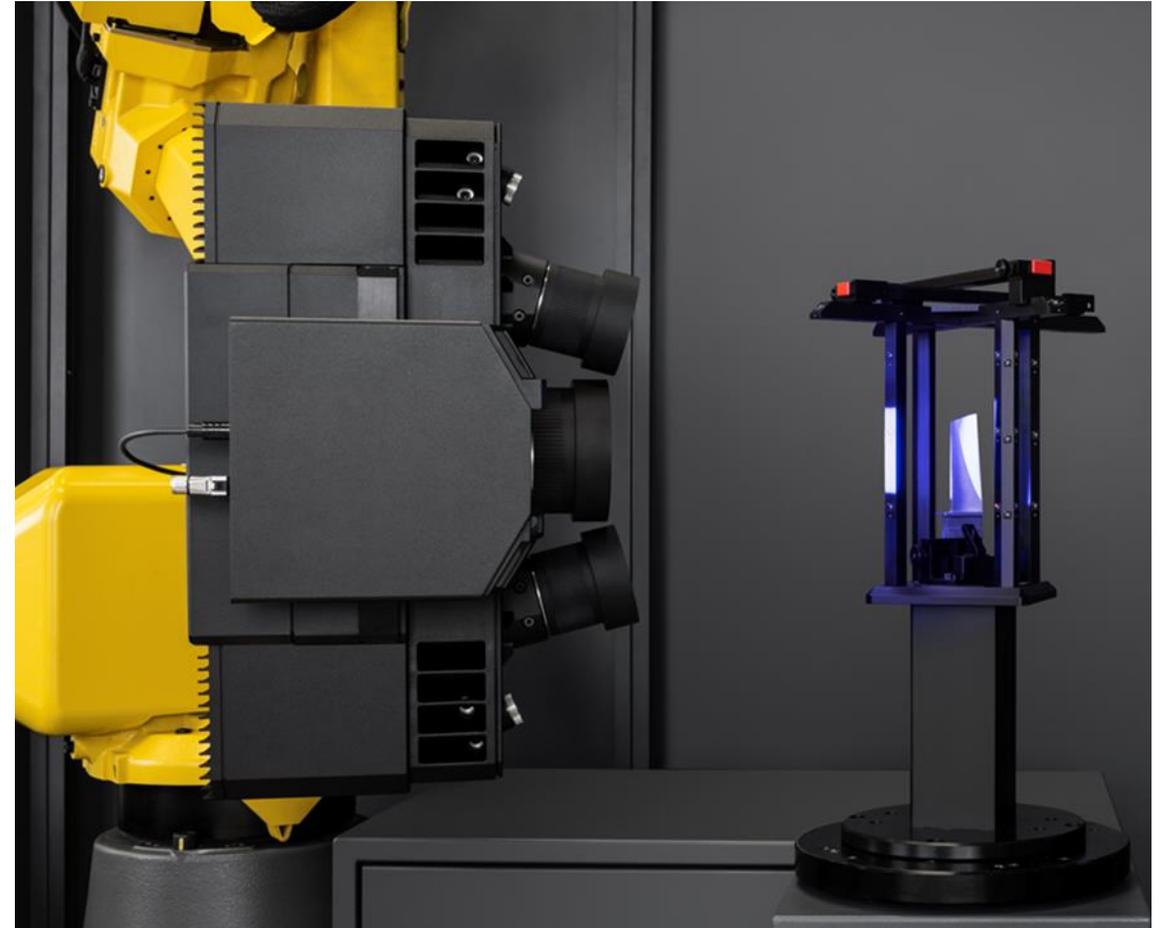
Highest data quality down to the smallest detail

High stability

Automated high-speed scanning

Unique software functionalities

Efficient inspection of airfoil sections



ATOS 5 for Airfoil

Automated inspection in ZEISS ScanBox Series 5



Optical 3D measuring machine for the automated inline dimension analysis during production

ATOS 5 for Airfoil compatible with ScanBox 5110 and ScanBox 5120

- Fast measurement with high repeatability
- High stability (resistant to unwanted movements)



ATOS 5 for Airfoil

Automated inspection in ZEISS ScanBox Series 5

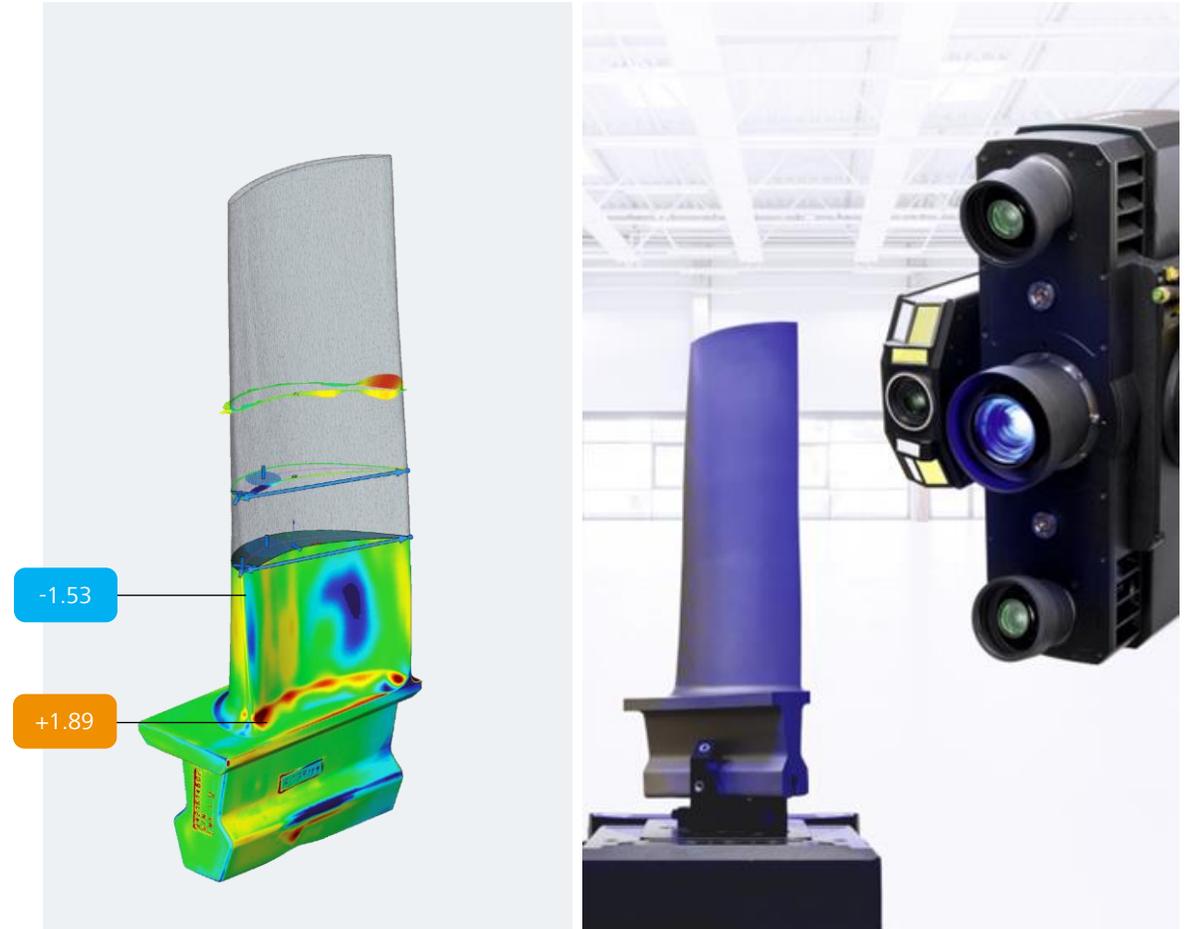


Integrated software ZEISS INSPECT Airfoil for the efficient inspection of airfoil properties

- Max. profile thickness, points on the leading and trailing edge
- Centroid, profile mean line and twist analysis
- Flow inlet and exit angle, profile chord line and stagger angle
- User-defined inspection principles

Quality assurance in production

- Definition of wear control
- Trend analysis and statistical process control (SPC)
- Export of measuring results and reports to internal servers and databases



ATOS 5X

Automated scanning for large volumes



ATOS 5X

Automated scanning for large volumes

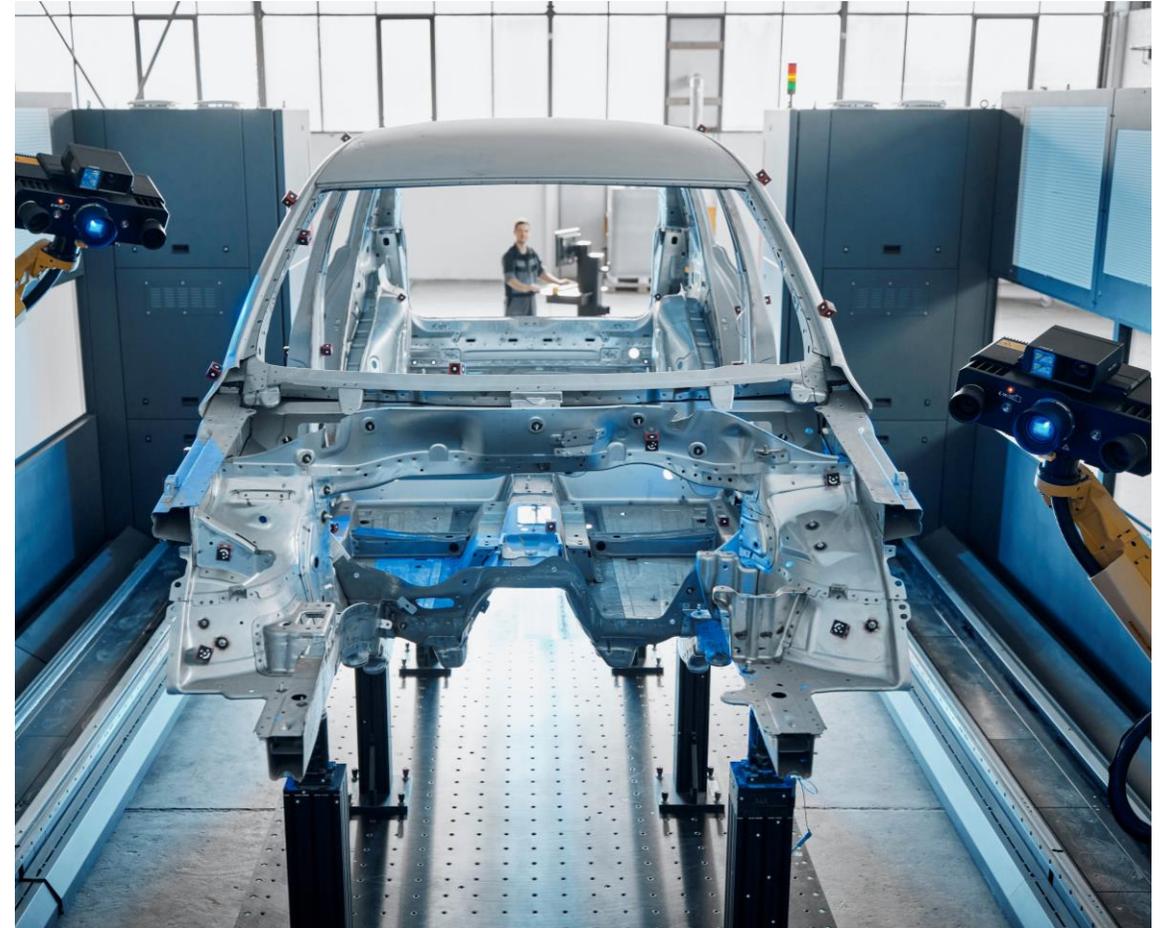


Automated high-end scanning system for

- Toolmaking
- Press shop
- Car body manufacturing

Precise acquisition of large parts

- Large-field 3D scanning for measuring areas of up to 1,000 mm



ATOS 5X

Features



Extremely bright laser light source

Resistant to ambient light conditions

Short exposure times

Even for dark and shiny surfaces

High detail resolution

Low noise level and precise coverage of complex geometries

Robust sensor design

High accuracy in rough environments

Process safety

In industrial applications

Interference-free data transfer

Intelligent sensor communication using fiber optics



ATOS 5X

Ultra-bright light source for high-speed scanning



Integrated Laser Light Compressor

Bundles multiple laser elements into a very bright light source

- Resistant to ambient light influences
- Reduced number of required scans
- Measuring areas of up to 1,000 mm

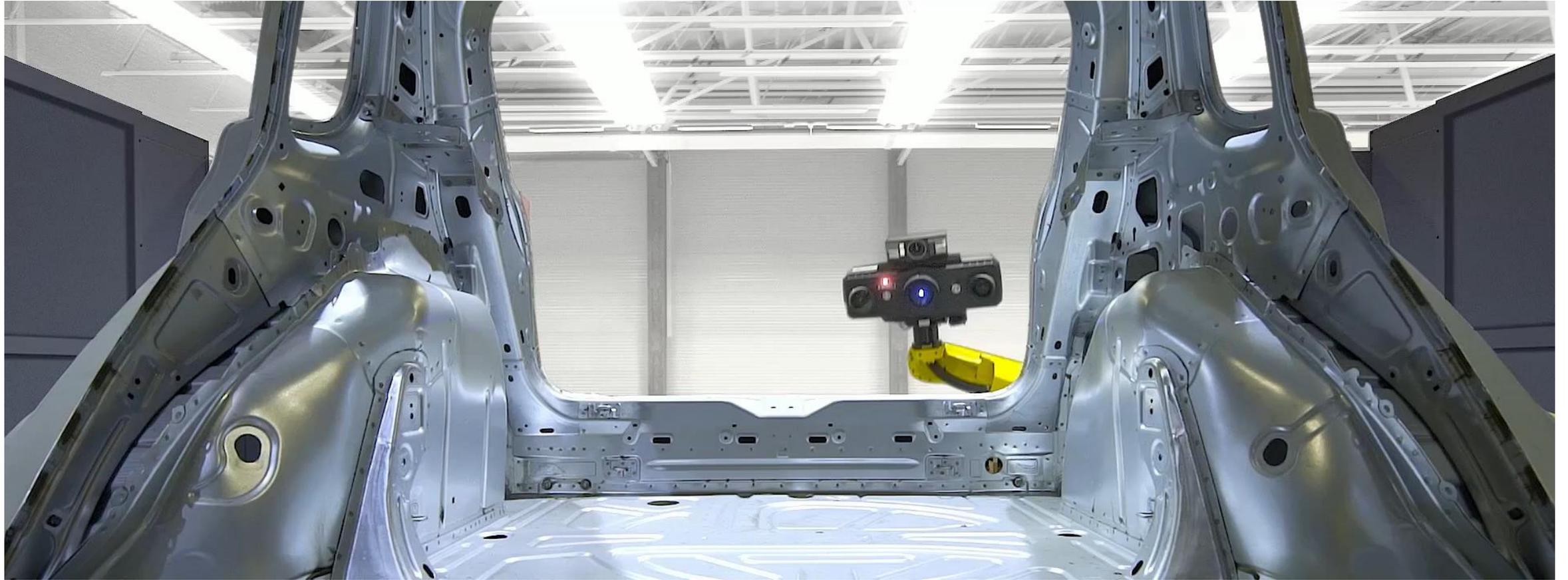
→ Simplified measuring setup

→ Short measuring time



ATOS 5X

Automated scanning for large volumes



ATOS 5X

Automated scanning for large volumes



Optical 3D measuring machine for the automated and production-related dimension analysis

Ideal for measuring large parts such as bodies in white, hang-on parts, marine engines and tools

High-speed scanning

Higher throughput due to up to three working areas

Multi-part fixture allows for measuring all hang-on parts without changing the fixtures

Key applications

- Quality assurance in production
- Full-field acquisition of cast blanks
- Quality control of milling tools
- Tool maintenance
- Analysis in master jig and cubing



ATOS 5X in ScanBox Systems

All-in-one solution for efficient production control



ScanBox Series 6



ScanBox Series 7



ScanBox Series 8

ATOS LRX

3D scanning for very large volumes



ZEISS ATOS LRX

3D scanning for very large volumes



ZEISS ATOS LRX is the specialist for fast scanning of very large surfaces.

Thanks to its powerful light source in combination with the very large measuring area, the sensor delivers precise full-field data in a short time especially for large parts.

ZEISS ATOS LRX captures up to 2×12 million coordinate points with a single scan.



ZEISS ATOS LRX

Next generation laser light source



Extremely bright laser light source

- Generated by advanced integrated Laser Light Compressor
- Resistant to ambient light conditions
- Uniform, non-coherent, speckle-free light over the entire measuring area of 2000 x 1600 mm
- Short exposure times even for dark and shiny surfaces
- High detail resolution with precise coverage of complex geometries
- Accessories:
 - Touch probe for optically inaccessible areas
 - Photogrammetry with TRITOP



ZEISS ATOS LRX

Next generation laser light source



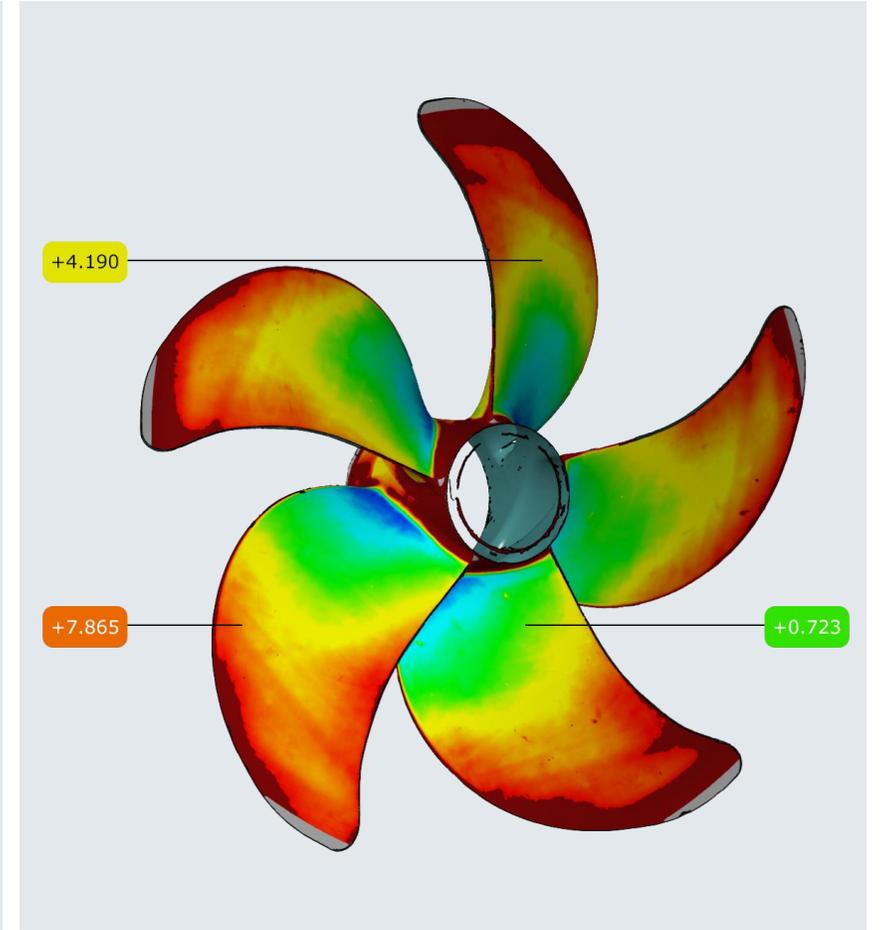
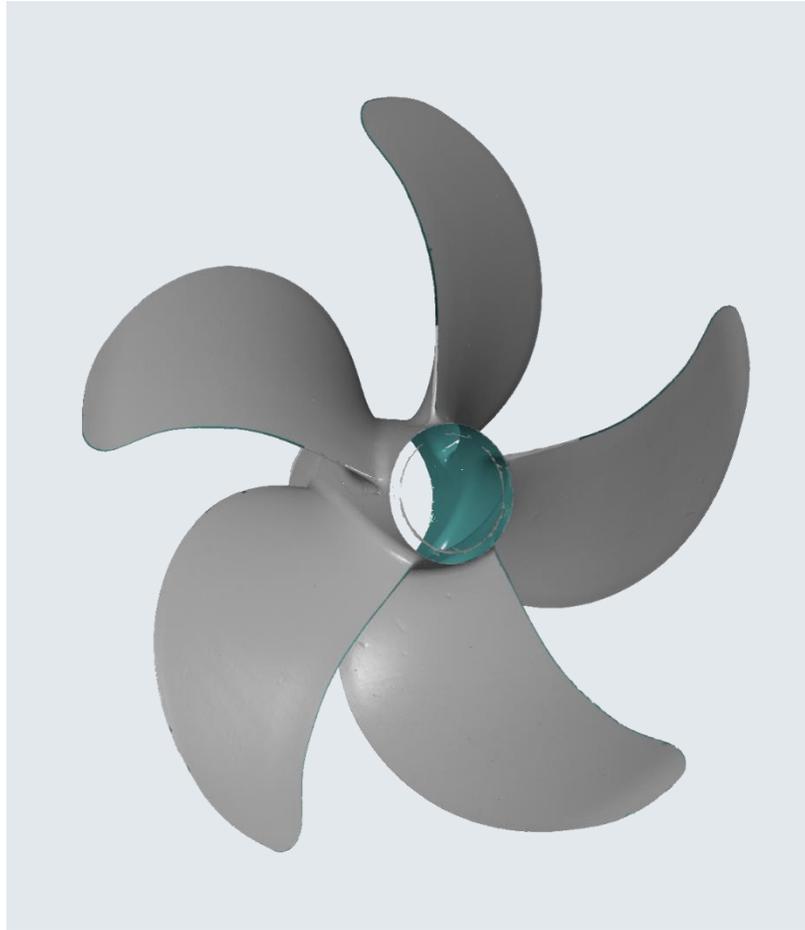
High safety

- Class 2 (no further protective measures)
- Built-in radar sensors automatically turn off the light source if the safety distance is not maintained and if they detect movements in the critical area
- No protective equipment, no laser safety officer necessary
- Interactive operation possible (using reduced projector light for operator convenience)
 - Touch probe
 - Live tracking
 - Backprojection



ZEISS ATOS LRX

Dimensional inspection with ZEISS INSPECT



ZEISS ATOS LRX

Applications



Fast scanning of large surfaces

ZEISS ATOS LRX serves applications for which neither large volume scanners (laser trackers or laser radars) nor the current fringe projection systems are well suited today: The fast measurement of large surfaces.

ZEISS ATOS LRX is a specialist. Applications include:

- Aerospace
- Automotive
- Casting
- Shipbuilding
- Wind power



ZEISS ATOS LRX

Applications



Aerospace

- Structural components like fuselage, wings, wing ribs, tail
- Outside fuselage (rivets and gap/flush lines between panels)
- MRO (e.g. surface defects)



ZEISS ATOS LRX

Applications



Automotive

- Design (e.g. pre-milling of clay models)
- Crash testing



ZEISS ATOS LRX

Applications



Large castings and structures

- Automotive tool making (cast blanks for forming tools, e.g. for side and floor panels, fenders)
- Machine building (e.g. injection molding machines, welded assemblies)



ZEISS ATOS LRX

Applications



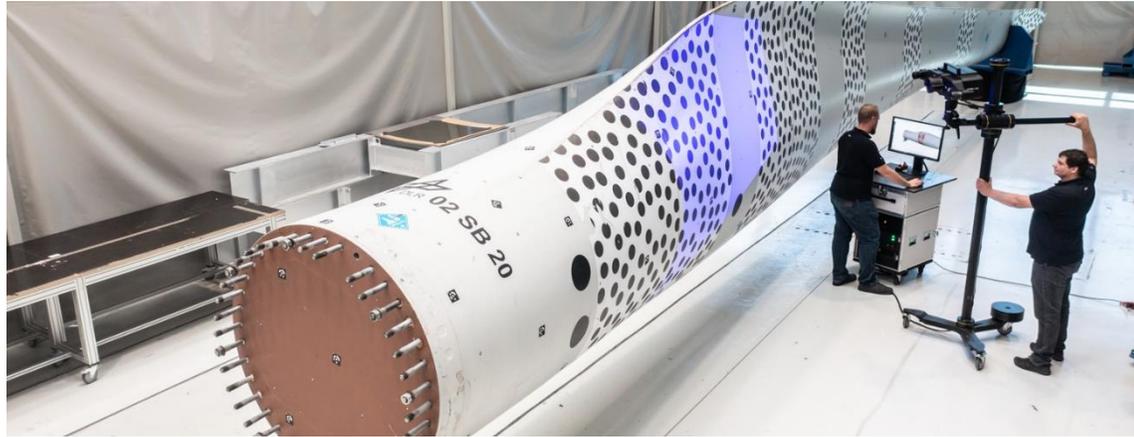
Shipbuilding

- Marine propellers
- MRO



ZEISS ATOS LRX

Applications



Wind power

- Rotor blades and molds
- Wind turbine housings



ZEISS ATOS LRX

Automated Set-up



ZEISS ATOS LRX is compatible with **ScanBox Series 8**. In this way the system can be used as an automated solution.

- ScanBox Series 8 is specially designed for big parts
- Especially used in the automotive industry for quality assurance in car body manufacturing or crash tests

For projects with more specific requirements such as extremely large parts, **individual measuring cells** can be installed.



The German Siempelkamp Gießerei has installed the world's largest non-contact robot measuring cell together with ZEISS, to ensure precise quality of their very large castings.

ATOS 5 Series

Product overview



ATOS 5 for Airfoil

Precise scanning of smallest details

- Optimized, shortened working distance
- Extremely high stability in automated applications



ATOS 5

High-speed 3D scanning system

- Highest data quality in short measuring time
- Precise coverage of complex geometries



ATOS 5X

Automated scanning for large measuring areas

- Laser Light Compressor for extremely bright light
- Large-field 3D scanning for measuring areas up to 1,000 mm



ATOS LRX

3D scanning for very large volumes

- Fast scanning of very large surfaces
- Based on ATOS 5X technology

ZEISS ATOS Series

Technical Data



	ATOS 5X	ATOS 5 (12M)	ATOS 5 (8M)	ATOS 5 for Airfoil	ATOS LRX
Light source	laser	LED	LED	LED	Laser
Laser class	2/3B *	–	–	–	2
Points per scan	12 million	12 million	8 million	12 million	12 million
Weight	approx. 14 kg	approx. 14 kg	approx. 14 kg	approx. 14 kg	approx. 17 kg
Dimensions	approx. 550 mm × 320 mm × 200 mm			approx. 950 mm × 320 mm × 200 mm	
Housing	dustproof, splashproof				
Cable length	fiber optic cable up to 30 m				10 m
Operating system	Windows 10				
Measuring volumes	320, 500, 700, 1000	170, 320, 500, 700, 1000	170, 320, 500, 700, 1000	100, 170, 270, 400	2000
Measuring area [mm²]	320 × 250 – 1000 × 800	170 × 140 – 1000 × 800	170 × 140 – 1000 × 800	100 × 70 – 400 × 300	2000 × 1500
Point distance [mm]	0.08 – 0.25	0.05 – 0.25	0.06 – 0.29	0.03 – 0.1	0.479
Camera angle	27.5°	27.5°	27.5°	27.5°	27°
Working distance [mm]	880	880	880	530	1810

* According to standard IEC 60825-1: In 2014, classified as a Class 2 laser in automated use and as a Class 3B laser in manual use. (safety distance without safety goggles > 700 mm).

ZEISS Industrial Quality Solutions

Customer segments



Automotive, NEV, ICE, car body



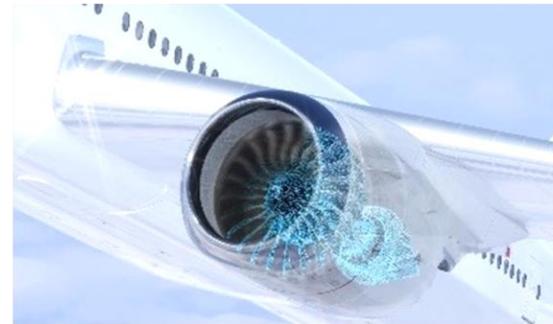
Machine tools, mechanical engineering and heavy machinery



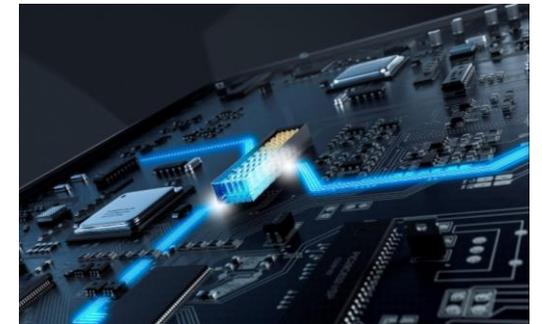
Power and energy



Medical technology



Aerospace and defense

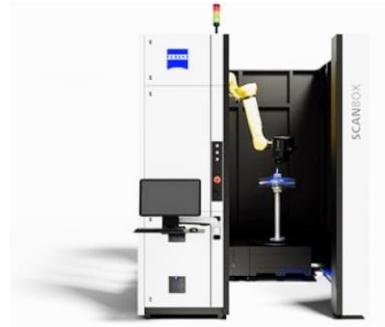


Electronics

ZEISS Quality Suite – Metrology Software



CMMs & optical CMMs



Optical systems



X-ray systems



Industrial microscopy

Automated solutions

Value-adding services

ZEISS Industrial Quality Solutions

Our comprehensive portfolio supports all facets of production



ZEISS Quality Suite



Part size

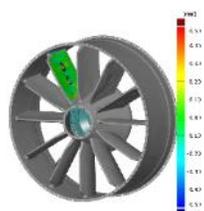
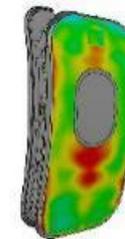
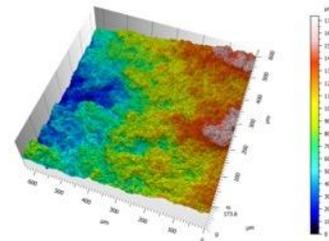
Small

Large

Nanometers

Resolution

Millimeters





Seeing beyond