Industrial Metrology

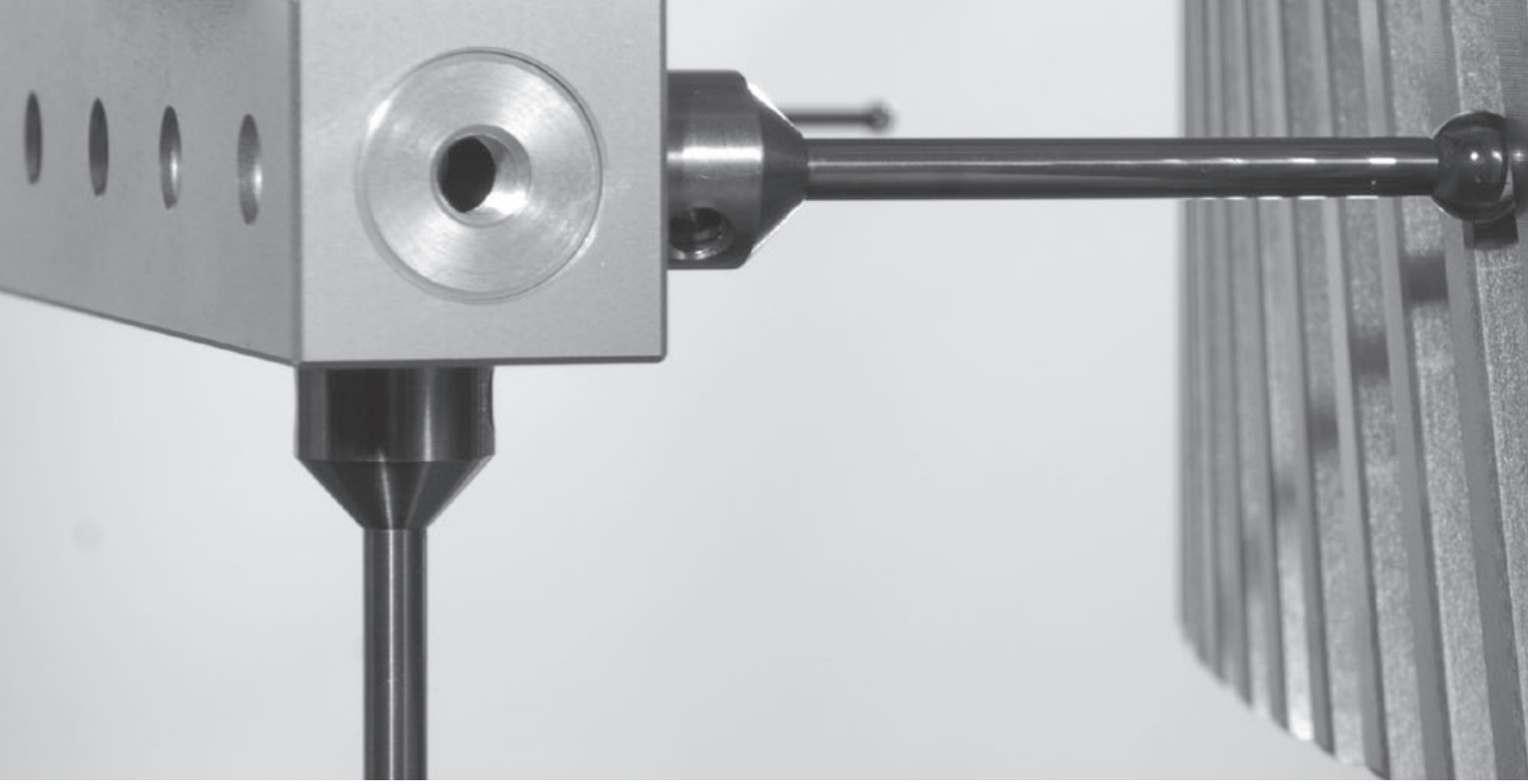
Bridge-type Measuring Machines

ZEISS

Creating more flexibility in production.

ZEISS Bridge-type Measuring Machines

// PRECISION
MADE BY ZEISS



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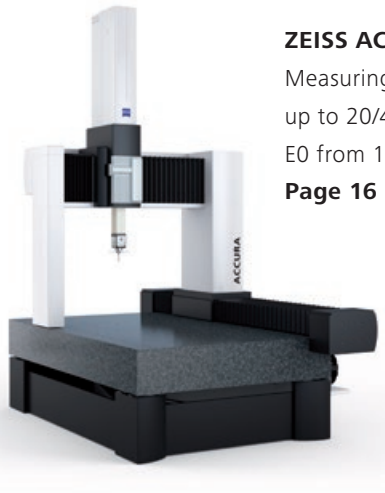

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ZEISS Benefits

A Closer Look

Faster and More Precise Measurements – with Bridge-type Measuring Machines from ZEISS

Industrial measuring technology from ZEISS is a well-balanced system: from the measuring machine, to the sensors and software, all the way up to service. All single components, as well as the entire system are designed to deliver the best possible results as quickly as possible.

Materials and design

Regarding the choice of material and design, bridge-type measuring machines from ZEISS are known for

- their dynamic rigidity
- the low weight of the moving parts
- their insulation against ambient influences

Dynamic rigidity is the key to meeting high precision requirements with the high speeds achieved during scanning operations. Temperature and vibration insulation, as well as protective covers enable installation near production, thus eliminating the time-consuming trip to the measuring lab.

Scanning technology

ZEISS invented contact scanning and is still setting milestones in scanning technology:

- Active scanning to make scanning faster and more precise. Furthermore, unknown contours can be scanned
- navigator technology features automatically optimized scanning speeds, tangential approach, helix scanning and dynamic stylus calibration. Benefit: faster programming, calibration and scanning
- FlyScan allows you to "fly" over interrupted contours – for considerably shorter programming and measuring times

Stylus configurations

The active VAST scanning probes from ZEISS lay the foundation for the use of very long and heavy stylus configurations: styli up to 800 mm with a total weight of up to 600 g. Such long styli make it possible to scan deep features without taking up a lot of time. Moreover, complex stylus configurations with differently arranged styli can be used. Stylus change-outs are avoided; the measuring time for complex parts reduced. Stylus configurations tailored to your application are available from ZEISS Service & Support.

Multisensor system

ZEISS offers an extensive line of sensors that work optimally with the measuring machines and software from ZEISS. The right sensor or sensor system is available for any application and any demand. The multi-application sensor system (mass) enables maximum flexibility. mass enables the highly precise operation of all sensors (sensors with an articulating probe holder or fixed stylus configurations, optical or contact, passive or active) on one measuring machine.

Software

Software from ZEISS stands for efficiency and performance in industrial metrology. ZEISS CALYPSO, ZEISS HOLOS and ZEISS CALIGO allow you to quickly and intuitively complete all your measuring tasks. This software, which harmonizes perfectly with our bridge-type measuring machines, saves time while programming, measuring and analyzing. Additional software products for offline programming, automation, measuring lab management and quality data management ensure that you have powerful tools at your disposal.

Services & solutions

ZEISS is a full provider of industrial measuring technology. We emphasize this with an extensive offering of services available around the globe:

- Maintenance, repairs, spare parts, analysis and relocation
- Software and hardware updates
- Contract programming, contract measurement, computed tomography, planning, calibration and consultation
- Training
- Feeding systems, measuring lab planning, clamping equipment, stylus system equipment, artifacts, computer and network technology

Outstanding scanning technology, CALYPSO reference software and its finely tuned overall design make CONTURA a model of success

ZEISS CONTURA –
The Reference Machine in the Compact Class

CONTURA – the broad platform from ZEISS for flexible, reliable and uncompromising quality assurance. The latest generation is even more precise and offers a large package of optical sensors on top of a larger measuring range. Outstanding scanning technology, ZEISS CALYPSO reference software and a highly tuned overall concept enable ZEISS CONTURA to cement its place as the standard in its class.

Measuring ranges [mm]

Type	X	Y	Z
7/7/6	700	700	600
7/10/6	700	1,000	600
10/12/6	1,000	1,200	600
10/16/6	1,000	1,600	600
9/12/8	900	1,200	800
9/16/8	900	1,600	800
12/18/10	1,200	1,800	1,000
12/24/10	1,200	2,400	1,000

Sensor variations

ZEISS CONTURA comes with a fixed passive sensor, the flexible RDS articulating probe holder or with an active scanning probe. All sensor variations enable scanning. ZEISS navigator technology comes standard with the active version – for smooth measurements without a stop & go.

Robust and precise

Depending on the configuration, ceramic or CARAT guideways are used on ZEISS CONTURA for high rigidity, low thermal expansion and minimal moving weights. Air bearings in all three axes ensure consistent stability even at high travel speeds and acceleration. The floating glass ceramic scales on ZEISS CONTURA are practically expansion-free and therefore do not require any additional temperature sensors or mathematical compensation. They are suitable for the shop floor and are protected against contamination and other influences.

Computer-Aided Accuracy (CAA)

The bridge is subjected to dynamic forces that can affect accuracy, particularly while scanning. ZEISS CONTURA calculates the compensation for such inertia effects. This ensures that the required precision remains intact even at high measuring speeds.

Convenient control

The system is controlled via a user-friendly control panel and does not need a computer. The progressive joystick enables easier and more precise control of all axis movements. The speed can be regulated in CNC mode.

Options

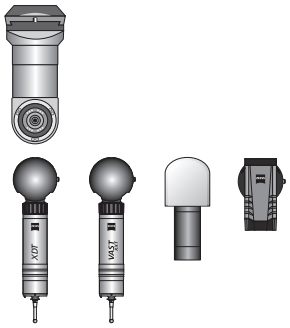
- HTG (High Temperature Gradient) for a larger temperature range (18 – 26 °C) with the same measuring uncertainty. Features temperature sensors for the workpiece and measuring machine. Available for x= 700/1,000 mm
- Integrated sensor rack for maximum reproducibility without recalibration
- QuickChange fast sensor change-out for active probes
- ZEISS AirSaver for up to 60% less consumption of compressed air

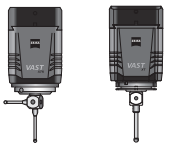
ZEISS CONTURA
Sensor variations

Direct
The direct sensor model is ideal for the measurement of small parts with perpendicular geometries without inclined features. Equipped with the ZEISS VAST XXT scanning sensor, ZEISS CONTURA direct provides a particularly affordable means of entering the world of scanning technology from ZEISS for production and progress inspection of single processing stages. The alternative XDT single-point sensor can be retrofitted on VAST XXT from ZEISS as needed. ZEISS CONTURA direct is available up to a size of 10/16/6.

RDS
Combined with the VAST XXT sensor from ZEISS, the flexible, RDS articulating probe holder enables the scanning of features in all angular positions. With a total of 20,736 positions at 2.5° increments, RDS can reach virtually any spatial angle. This is particularly advantageous for the measurement of complex parts, for which specific stylus configurations have to be created. Calibration times are kept to a minimum thanks to optimal calibration routines. RDS also enables the use of optical sensors from ZEISS on ZEISS CONTURA.

Active
ZEISS CONTURA active comes standard with navigator technology for fast scanning in one smooth run. It can be operated with the VAST XTR gold or VAST XT gold active scanning probes from ZEISS – and is particularly well-suited for the measurement of deep and offset features with high throughput rates. Both sensors use the same receptacle. Existing measuring programs can be used following conversion. The QuickChange fast stylus change-out system is also an option.





Available sensors

Contact	**Contact**	**Contact**
XDT, VAST XXT	XDT, VAST XXT	VAST XTR gold , VAST XT gold
	Optical	
	ViScan, LineScan	

Active sensors allow you to achieve maximum precision and productivity

Measurement accuracy

direct/RDS with VAST XXT

Measuring range X x Y [mm]	length measurement error E0 in µm
700 x 700 – 700 x 1,000	1.7 + L/350
1,000 x 1,200 – 1,000 x 1,600	1.8 + L/350
900 x 1,200 – 900 x 1,600	1.8 + L/350
1,200 x 1,800 – 1,200 x 2,400	2.2 + L/350

active with VAST XTR/XT gold

Measuring range X x Y [mm]	length measurement error E0 in µm
700 x 700 – 700 x 1,000	1.5 + L/350
1,000 x 1,200 – 1,000 x 1,600	1.7 + L/350
900 x 1,200 – 900 x 1,600	1.6 + L/350
1,200 x 1,800 – 1,200 x 2,400	2.1 + L/350

Compact size and maximum precision: ZEISS MICURA offers accuracy of 0.7 + L/400 µm

ZEISS MICURA –
Maximum Precision for Small Parts

ZEISS MICURA sets the standard in the compact class. Despite its small size, ZEISS MICURA makes no compromises when it comes to accuracy. ZEISS MICURA comes standard with the VAST XT gold active scanning sensor from ZEISS and navigator technology. Optionally, the VAST XTR active scanning sensor provides even more flexibility when measuring complex parts.

Measuring ranges [mm]

	X	Y	Z
	500	500	500

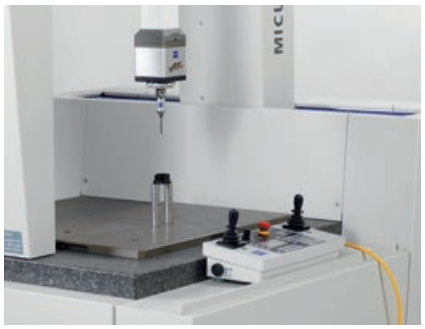
Small and precise
ZEISS MICURA is the solution for new demands in industrial production where parts are becoming increasingly compact and accuracy requirements are rising. Equipped with the VAST XT gold high-end sensor from ZEISS and navigator technology, ZEISS MICURA offers active scanning with measuring accuracy of less than one micrometer. ZEISS MICURA flexes its muscles, in particular, with small, complex parts featuring narrow tolerances. Despite its compact size, this system provides a measuring volume of 500 x 500 x 500 millimeters – and therefore considerably more than comparable instruments.

Precise high-speed scanning
The VAST XT gold sensor from ZEISS enables high-speed scanning featuring up to 200 measuring points per second. As a result, form and location parameters such as roundness and flatness can be precisely captured, in addition to geometric features, in a short time. The sensor can be equipped with extremely small stylus tips. The smallest stylus has a diameter of just 0.3 millimeters.

Automatic measuring speed with VAST navigator from ZEISS
ZEISS MICURA comes standard with VAST navigator technology. It automatically configures the optimal measuring speed with guaranteed accuracy, thus considerably reducing the measuring time. ZEISS MICURA moves somewhat slower in areas that demand more precision. It moves faster with simple contours or when less accuracy is needed. navigator technology also saves time through tangential approach and scanning, helix scanning and fast dynamic stylus calibration.

Computer-Aided Accuracy (CAA)
Measuring errors due to dynamically induced inertia effects are automatically compensated for.

Fast and Easy Measurements – ZEISS MICURA Makes It Happen



Operation and ergonomics

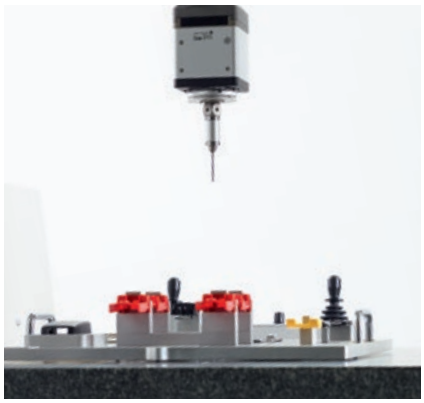
ZEISS MICURA comes with a control panel. One display and two joysticks enable operators to control and program the machine independently of the computer. The system is easy to operate and makes it possible to start measuring even without in-depth experience with measuring machines. The ledge on the front of the granite table allows the control panel and tools to be stored outside the measuring range.

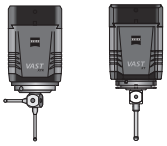
Well thought-out design

- Ceramic guideways and a large bearing base minimize susceptibility to external influences
- ZEISS air bearings on four sides guarantee stability and precision
- ZEISS MICURA also comes with a temperature sensor for the workpiece
- The probing force of the sensor is actively regulated and is very low – ideal for sensitive materials
- Controller technology, software, sensors and additional components are made by ZEISS and are finely tuned to each other

Sample applications

- Converters and adjusting units with highly accurate leads and bearings
- Pistons and shafts with the tightest tolerances
- Artificial hips
- Gear wheels
- Optical lens elements





Measuring accuracy

ZEISS MICURA featuring VAST XTR/XT gold

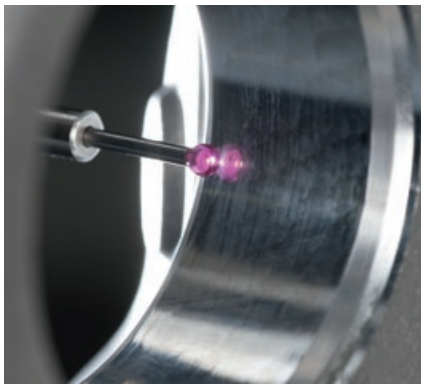
Measuring range X x Y x Z [mm]	length measurement error E0 in µm
500 x 500 x 500	0.7 + L/400

ACCURA adjusts to your needs and can be upgraded without complications

ZEISS ACCURA – the Solution that Grows with You

Are performance and precision your top priorities? With its wide range of configurations, ZEISS ACCURA can be tailored to your needs – and budget. Furthermore, the modular design makes the system futureproof: ZEISS ACCURA can be modified to meet changing requirements on the configuration, sensors and software.

Measuring ranges	
X [mm]	900; 1,200; 1,600; 2,000
Y [mm]	1,200; 1,600; 1,800; 2,400: 3,000; 4,200
Z [mm]	800; 1,000; 1,500



Futureproof
Thanks to its modular design, ZEISS ACCURA is ready to meet the demands of the future. It grows with your requirements on equipment, sensors and software. Pre-wiring for contact and optical sensors, as well as scanning, makes ZEISS ACCURA immediately multisensor capable.

Low weight, high dynamics
Made of steel and aluminum, the ZEISS ACCURA bridge is extremely rigid, yet slim. The aluminum elements are coated with CARAT technology from ZEISS to improve temperature stability and service life. The reduced weight of the moving parts improves the dynamic rigidity of the machine.

Temperature range of 20°C to 26°C
The ZEISS ACCURA bridge is covered with Foam Insulating Technology, a new type of high-performance insulation. The housing covers ensure maximum insulation and minimal thickness. This enables the operator to select a measuring lab temperature between 20°C and 26°C.

Maintenance-friendly design
All housing panels of the bridge can be removed and remounted in only a few steps. This reduces the time needed for maintenance and increases machine availability.

Accuracy into the corners
Every size of the ZEISS ACCURA comes with a maximized measuring range. This guarantees measuring accuracy into the corners.

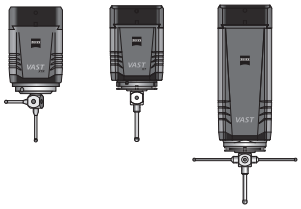
VAST navigator
ZEISS ACCURA comes standard with VAST navigator technology to enable even faster calibration, approach and scanning, as well as improved precision.

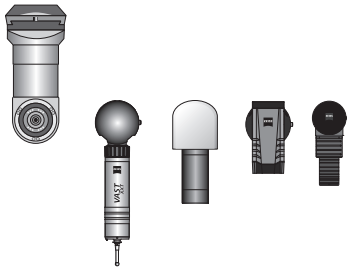
ZEISS ACCURA
Sensors and options

ZEISS ACCURA with VAST active measuring sensors
High-end sensors for contact measurements. You have the choice between the VAST XTR gold, VAST XT gold and VAST gold active measuring sensors from ZEISS. This allows you to use complex stylus configurations to measure deep, offset features with high throughput rates.

ZEISS ACCURA with RDS
The RDS-C articulating probe holder enables the use of the VAST XXT scanning sensor and the ViScan and LineScan optical sensors from ZEISS. The best articulating probe holder in its class (20,736 positions in 2.5 degree increments) makes it possible to access practically all spatial angles via an extremely high number of single positions. This is particularly advantageous for the measurement of complex parts, for which stylus configurations usually have to be created for various spatial directions.

ZEISS ACCURA with multisensor system
The multi application sensor system (mass) from ZEISS allows you to use and quickly change-out all available sensors from ZEISS. This enables you to use both high-speed scanning and optical probing on your ZEISS ACCURA system.





Available sensors

Contact Active	**Contact Active**	**Contact**
VAST XTR gold, VAST XT gold, VAST gold	VAST XXT	VAST XTR gold, VAST XT gold, VAST gold, VAST XXT
	Optical	**Optical**
	ViScan, LineScan, DotScan	ViScan, LineScan, DotScan

Optional High-dynamic Package

The High-dynamic Package turns ZEISS ACCURA into a high-speed measuring machine. It permits travel speed of up to 800 mm/s. Due to the high speed, the measuring area of the machine requires added protection. Laser scanners monitor the protection zone around the machine. If anyone enters the safety zone, ZEISS ACCURA immediately slows down. High-speed measuring operations are automatically restarted once the zone is cleared. This safety technology is included with the High-dynamic Package.

Measuring accuracy

ZEISS ACCURA with VAST XT gold, VAST gold

Measuring range X x Y x Z [mm]	length measurement error E0 in µm
900 x 1,200 – 1,600 x 800	1.2 + L/350
1,200 x 1,800 – 4,200 x 1,000	1.9 + L/300
1,600 x 2,400 – 4,200 x 1,000	2.4 + L/300
1,600 x 2,400 – 4,200 x 1,500	3.2 + L/300
2,000 x 2,400 – 4,200 x 1,500	3.6 + L/300

ZEISS ACCURA with VAST XXT

Measuring range X x Y x Z [mm]	length measurement error E0 in µm
900 x 1,200 – 1,600 x 800	1.6 + L/350
1,200 x 1,800 – 4,200 x 1,000	2.2 + L/300
1,600 x 2,400 – 4,200 x 1,000	3.4 + L/250
1,600 x 2,400 – 4,200 x 1,500	4.2 + L/250
2,000 x 2,400 – 4,200 x 1,500	4.9 + L/200

ZEISS PRISMO stands for maximum measuring accuracy even in rough production environments

ZEISS PRISMO – Ideal for All Measuring Tasks

PRISMO from ZEISS is synonymous around the world for high-speed scanning and maximum accuracy near production. With length measurement error of just 0.5+L/500 millimeters, ZEISS PRISMO ultra is ideal when maximum demands on precision have to be met.

Measuring ranges	
X [mm]	700; 900; 1,200; 1,600
Y [mm]	900; 1,200; 1,500; 1,800; 2,400; 3,000; 4,200
Z [mm]	500; 650; 1,000

Turbo scanning: VAST navigator
ZEISS PRISMO enables high-speed with maximum precision. navigator technology is the logical enhancement to scanning from ZEISS.
It automatically configures the maximum measuring speed during scanning – with guaranteed accuracy. Additional time is saved through tangential approach and scanning, helix scanning and fast dynamic stylus calibration.

Computer-Aided accuracy (CAA)
ZEISS PRISMO uses computer-guided corrections of all dynamic influences on the machine. This optimizes precision during high-speed scanning.

Measuring near production
ZEISS PRISMO is also ready for environments near production, thus eliminating a trip to the measuring lab. All machine parts critical to operations are perfectly matched. This is achieved through the use of in-house developments for all components.

Machine technology
- Bridge made of carbon-fiber compounds and ceramic for minimal weight and high flexural strength
- Temperature-neutral, glass ceramic scales
- All axes with air bearings from ZEISS on four sides. X axis: 8 air bearings; Y axis: 8 air bearings; Z axis: 5 air bearings
- Elastomer vibration damping, as well as covered guideways and scales for use near production
- Workpiece weights up to 5,000 kg

ZEISS PRISMO
Options

RT-AB rotary table
Rotary tables are an ideal addition to coordinate measuring machines – particularly for rotationally symmetric parts such as shafts, bearing rings, gear wheels and housings. The RT-AB sits on air bearings and impresses with its seemingly effortless movements, its fantastic radial and axial runout values, and the dynamism of its direct drive. The RT-AB is available as an integrated or surface mounted system and allows you to configure the maximum speed depending on the load. The CAA-corrected positioning accuracy ensures maximum precision.

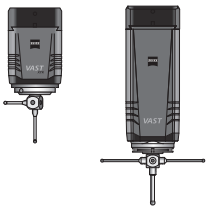
RDS-CAA select
Ensures shorter calibration times for measurements with the RDS articulating probe holder as only a few angular settings require calibration.

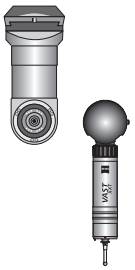
Additional options
- Multisensor rack
- Integration of a rotary table as the 4th axis
- Use of palletizing and loading systems
- Enclosure for operation near production

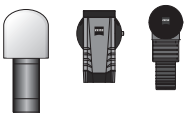
ZEISS PRISMO
multi application sensor system

ZEISS PRISMO comes standard with the multi application sensor system (mass) from ZEISS. mass enables both contact and optical measuring on the same machine. Sensors can be changed out in just a few steps thanks to the common interface for all sensors.

mass
multi application sensor system







Available sensors

Contact, Active	**RDS, Contact, Passive**	**RDS, Optical**
VAST XTR gold, VAST gold	VAST XXT	ViScan, LineScan, DotScan

VAST gold
The VAST gold probe is required for time-saving navigator technology. It turns ZEISS PRISMO into a high-speed scanning machine. The optimized hinges on the probe ensure higher rigidity and enable the use of stylus extensions up to 800 mm.

RDS
With more than 20,000 positions, the RDS articulating probe holder allows the operator to reach virtually all spatial angles. It is therefore ideal for the measurement of complex parts with many different spatial directions. Both contact and optical sensors can be used on the RDS.

ZEISS PRISMO and ZEISS PRISMO ultra

Measuring accuracies

ZEISS PRISMO

With VAST gold at 18 – 22 °C

Measuring range X x Y x Z [mm]	length measurement error E0 in µm
700 x 900 x 500	0.9 + L/350
900 x 1,200 – 2,400 x 650	0.9 + L/350
1,200 x 1,800 – 4,200 x 1,000	1.5 + L/350
1,600 x 2,400 – 4,200 x 1,000	2.0 + L/300

With VAST XXT on RDS at 18 – 22 °C

Measuring range X x Y x Z [mm]	length measurement error E0 in µm
700 x 900 x 500	1.6 + L/350
900 x 1,200 – 2,400 x 650	1.6 + L/350
1,200 x 1,800 – 4,200 x 1,000	2.2 + L/300
1,600 x 2,400 – 4,200 x 1,000	3.2 + L/250

ZEISS PRISMO ultra

ZEISS PRISMO ultra further increases the accuracy of ZEISS PRISMO. This precision is achieved through more ZERODUR scales with a higher resolution, a modified air bearing connection, air damping, extra developed CCA method, stricter matching of all machine parts and other correction procedures. ZEISS PRISMO ultra is therefore ideal for jobs in research, development and quality assurance, as well as for the calibration of gages and test pieces. Thanks to the RT-AB select, the ZEISS PRISMO ultra also works as a form tester.

With VAST gold at 20 – 22 °C

Measuring range X x Y x Z [mm]	length measurement error E0 in µm
700 x 1,000 x 500	0.5 + L/500
900 x 1,300 x 650	0.5 + L/500
1,200 x 1,800 – 2400 x 1,000	from 1.0 + L/500
1,600 x 2,400 – 3,000 x 1,000	from 1.6 + L/400


ZEISS
VAST
XTR

ZEISS XENOS is pioneering in its design, choice of material, drive technology and sensors

ZEISS XENOS – the Reference

ZEISS XENOS is at home wherever maximum precision is demanded – in the measuring labs of research institutes, the aerospace industry and the optical industry. The high-end machine combines precision at the limits of what is technically feasible with a measuring range of nearly one cubic meter. Innovative drive technology and the use of silicon-carbide ceramic also ensure outstanding dynamics.

Measuring ranges [mm]

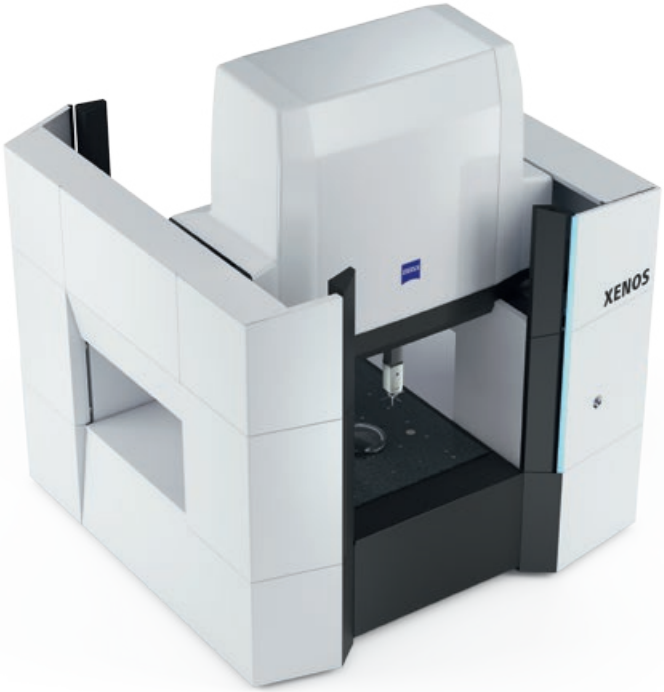
X	Y	Z
900	1,500	700

Innovative mechanical design

ZEISS XENOS impresses with its new mechanical design based on the proven ZEISS CenterMax. Unlike the standard bridge-type design, the Y guideways are on top of the side walls which separate all moving axes from the clamping area. Because only the cross beam moves in the Y direction, there are lower moving masses. This remains constant at all times – a real benefit compared to a moving table. Together, the weight reduction and constantly moving masses enable optimal coordination of the drives regarding acceleration and maximum speed.

Linear drives in all axes

ZEISS XENOS uses linear drives on all axes. The benefits: high speeds, very fast acceleration, high positioning accuracy and shear force-free drives. In conjunction with the high-resolution scales, the use of linear drives on ZEISS XENOS provide very high path adherence and extremely high positioning accuracy below 100 nanometers. For example, the stylus deflection remains more constant, which results in higher accuracy. Another benefit is evident when measuring curved surfaces: the more reliably and accurately a stylus follows the specified path, the more precisely errors can be determined.



The dynamic weight distribution is fully accounted for during synchronization of the linear drives in the Y axis

Virtual central drive

XENOS from ZEISS features two linear drives in the Y direction, which are synchronized via a new technology developed by ZEISS: the central drive. It ensures optimal force distribution of the drives depending on the position of the X axis. This is enabled by the latest generation of controller and algorithm. It is a key element of maximum accuracy and the best possible path adherence throughout the measuring range.

Silicon-carbide ceramic

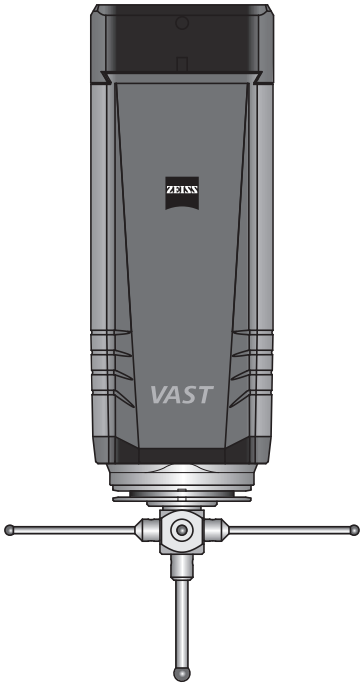
ZEISS XENOS uses an innovative silicon-carbide ceramic for the parts of the machine structure relevant to accuracy. Until now, this material has rarely been used for a comparable part size or accuracy. Compared to the standard aluminum-oxide ceramic, silicon-carbide ceramic exhibits around 50 percent lower thermal expansion, up to 30 percent higher rigidity and 20 percent less weight. Compared to steel, it delivers twice the rigidity at half the weight.


ZEISS
XENOS

Enhanced VAST gold
ZEISS XENOS comes standard with the VAST gold reference probe from ZEISS. During development of ZEISS XENOS, this powerful sensor from ZEISS was further optimized for better accuracy and repeatability. The more rigid connection to the ram on ZEISS XENOS is also new. The VAST gold sensor is designed for styli up to 800 millimeters long and stylus weights up to 500 grams, including asymmetrical stylus configurations.

Optimized air bearings
New air bearings with an even more rigid connection enhance stability and and therefore enable better accuracy.

Improved electronics design
The influence on precision of moving cables on all coordinate measuring machines has been clearly reduced through the improved decoupling and a new electronics concept featuring decentralized modules. New Computer-Aided Accuracy (CAA) acceptance methods and additional CAA corrections are playing an increasingly vital role in achieving maximum accuracy.



ZEISS XENOS measuring accuracy

Measuring range X x Y x Z [mm]	length measurement error E0 in µm
900 x 1,500 x 700	0.29 + L/1,000


ZEISS
VAST

More Accurate Measuring Means More Efficient Production

Not all parts require maximum precision. However, production quality is a must. It enables full utilization of limit deviations, flexible deployment of machines and efficient planning of tool changes.

Data you can rely on

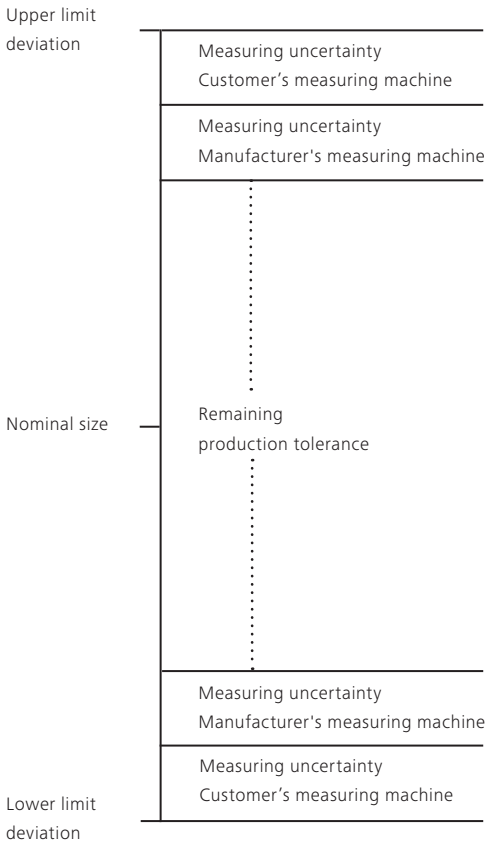
Above all, measuring technology must be reliable. The accuracy information on the data sheet of the measuring machine is little help if it can only be achieved under ideal conditions. It must be ensured at any time and anywhere in the measuring lab. The entire measuring process must provide the same result every time. Bridge-type measuring technology from ZEISS easily satisfies these requirements. You receive a well thought-out system that reliably demonstrates its quality in practical operations.

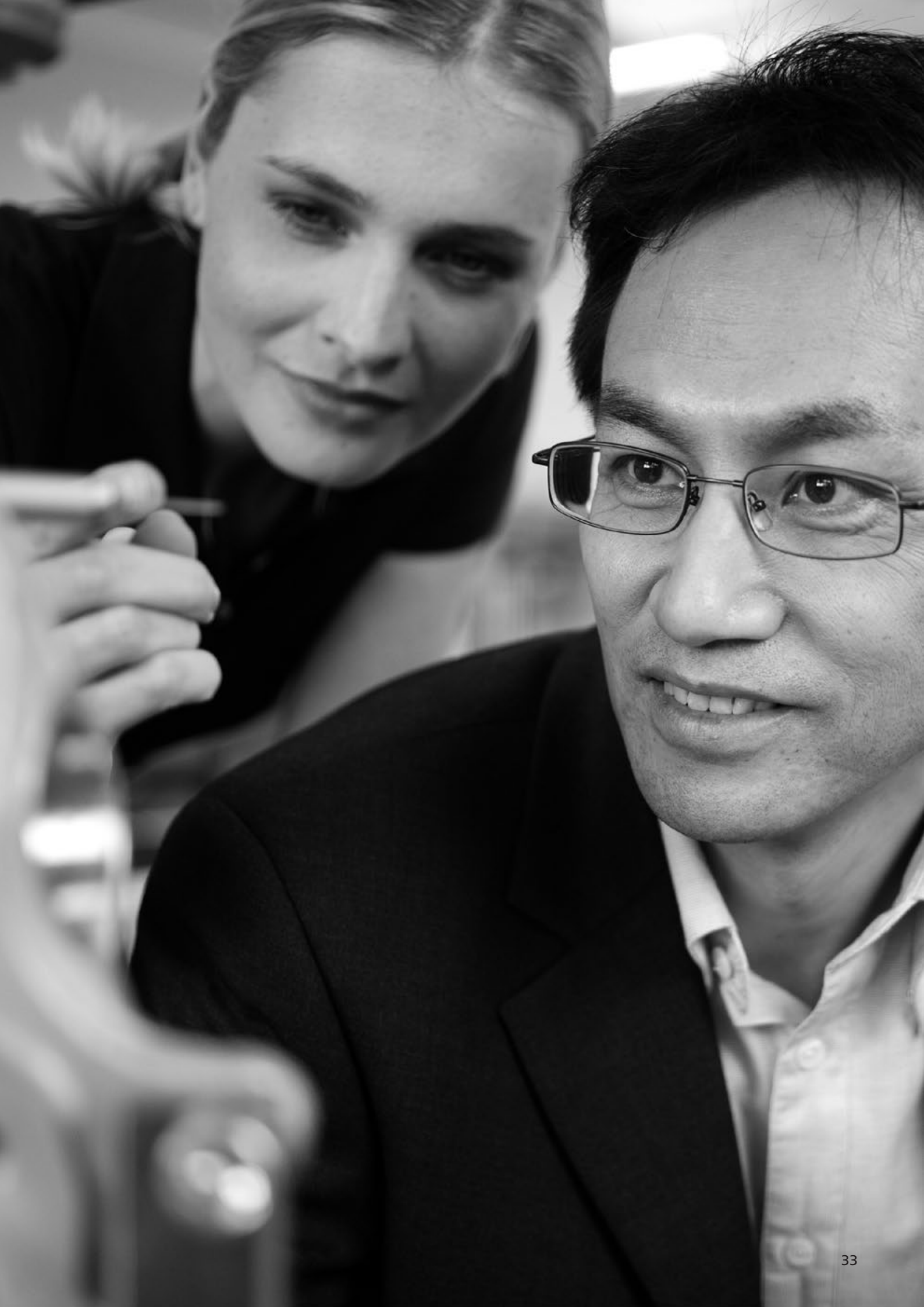
More precision for more flexibility in production

The more accurately you know your actual production quality, the higher the flexibility in production. And vice versa: the more inaccurate your measuring technology, the more accurately you have to manufacture to reliably comply with the specified tolerances.

Document changes

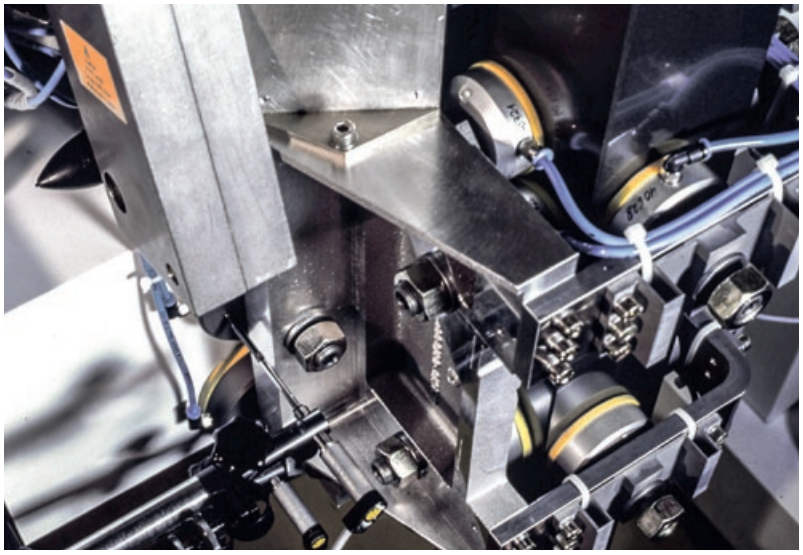
In volume production, changes are continually made to part dimensions, e.g. due to tool wear. Precisely monitoring such processes opens up the possibility of making targeted corrections at an early stage. ZEISS offers measuring machines and the corresponding measuring, analysis and management software to help you identify such trends and to avoid unnecessary rejections. Because all system components are optimized for speed, maximum productivity remains intact.





Designed for Precision

The design quality of a bridge-type measuring machine from ZEISS can be heard and felt: the bridge glides over the finely polished granite table on a bed of air just 6 µm thick. Air consumption is minimal, and does not impact accuracy.



Materials selected for functionality

When designing bridge-type measuring machines, ZEISS relies on a combination of materials selected for functionality and takes advantage of the knowledge and technology of other divisions in the company. While granite is used as a stable base for the table, the moving parts are as light as possible, yet still very rigid. The faster the bridge accelerates and brakes, the more the dynamic forces negatively affect accuracy. Depending on the demands, ZEISS uses materials for the bridge that offer an optimal balance between weight and rigidity, and are unaffected by environmental influences: ceramic, CARAT aluminum and CFK. A new type of high-performance insulation (F.I.Technology) on ZEISS ACCURA helps minimize temperature influences.

In-house air bearings

A key element for highly precise and fast measuring processes is the use of air bearings. For its bridge-type measuring machines, ZEISS utilizes 21 air bearings distributed on three axes. They enable virtually friction and wear-free motion. Emergency operation properties ensure that the granite running surfaces are not damaged if the compressed air supply fails. The quality of a properly configured air bearing can be heard. If the machine whistles or is loud while moving, the air gaps between the bearing and guideway are not properly configured. As a result, the machine uses too much air. Over the long term, this consumption leads to higher operating costs. Furthermore, improper alignment considerably influences the dynamic properties of the machine.

F. I. Technology: a special foam insulation technique on ZEISS ACCURA minimizes temperature influences

Measuring machines from ZEISS are known for the quality of sound during machine travel. They indicate precisely adjusted air bearings, for which the air pressure and gap optimally interact. Because commercial air bearings cannot meet these high demands, ZEISS developed its own highly efficient air bearings.

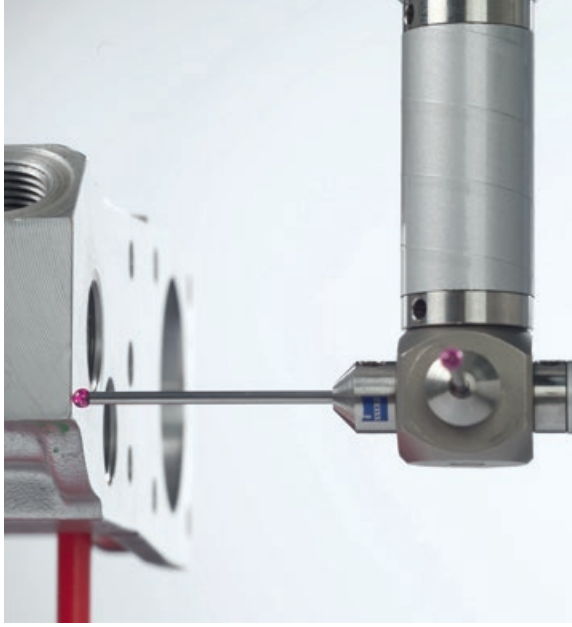
Patented acceptance procedure

The air gap on bridge-type measuring machines from ZEISS is just 6 – 8 µm. The small gap improves the dynamic rigidity and reduces air consumption. In order to meet even the highest demands, ZEISS has developed its own configuration and acceptance testing equipment. Using this equipment, specialists align each bearing, as well as the spatial position of each bearing to the next using measuring sensors and special tools. Simultaneously, they optimally configure the air-gap ratio. The data of each configuration can be easily reproduced. Therefore, when servicing is needed, the bearings can be quickly readjusted. The design and acceptance procedure are also patented.

Glass ceramic scales

ZEISS measuring machines are equipped with glass ceramic scales. Glass ceramic is virtually expansion-free over a wide range of temperatures. By comparison, steel scales exhibit 1000 times higher expansion which makes mathematical corrections or tempering of the compressed air necessary. Not at ZEISS. We can completely do without temperature sensors on the scales. At ZEISS, the temperature on the workpiece, and only the workpiece, is measured. Because temperature expansion on the guideways and bridge cannot be fully eliminated, the scales float on a film of oil. Very few specialists around the world have the expertise and experience to properly mount the scales on the measuring machines: these specialists work for ZEISS.

Scanning Technology from ZEISS



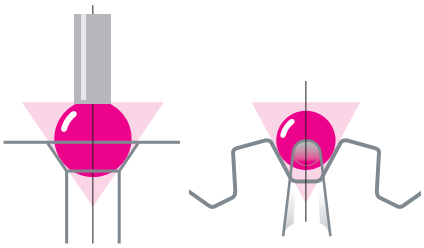
ZEISS introduced the first scanning system more than 30 years ago, a move that revolutionized measuring technology. Since then, we have been continually enhancing our scanning methods. With technologies such as active scanning, VAST navigator and FlyScan, ZEISS demonstrates its position as the innovation leader in coordinate metrology.

Inventor of contact scanning
In 1974, ZEISS used scanning in coordinate metrology in a precision measuring lab for the first time. With the presentation of the VAST probe in 1995, this technology became the new standard in industrial measurements near production. No other manufacturer of coordinate measuring machines has more experience in its application. Around the globe, 75 percent of all installed scanning systems are made by ZEISS.

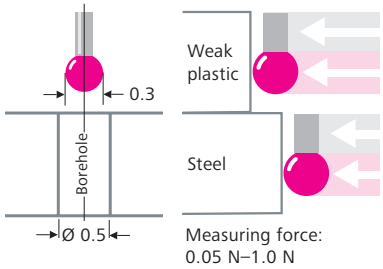
More points – more precision
Unlike single-point scanning with touch-trigger stylus systems, continuously probing the workpiece surface makes it possible to quickly capture a high number of measured points for a characteristic. Numerous scientific studies show a clear connection between the error for a characteristic and the number of measuring points.

Form inspection
Highly accurate scanning enables retroactive processing through filtering, in which form inspections such as roundness, straightness, surface form, cylinder form, cone form, sphere form, etc. can be completed. In many cases, this can eliminate further expensive form inspection, contour and surface measuring machines.

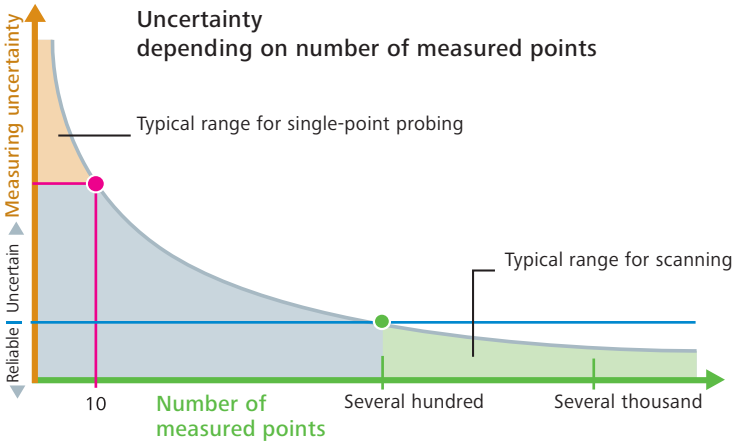
Self-centering
With the DT, VAST XT gold and VAST gold sensors from ZEISS, self-centering enables fast, easy and exact measurements in depressions, gearing, 2D and 3D corners, etc., thus considerably expanding the measuring possibilities. VAST XT gold and VAST gold from ZEISS also allow self centering and scanning of known and unknown geometries and curves.

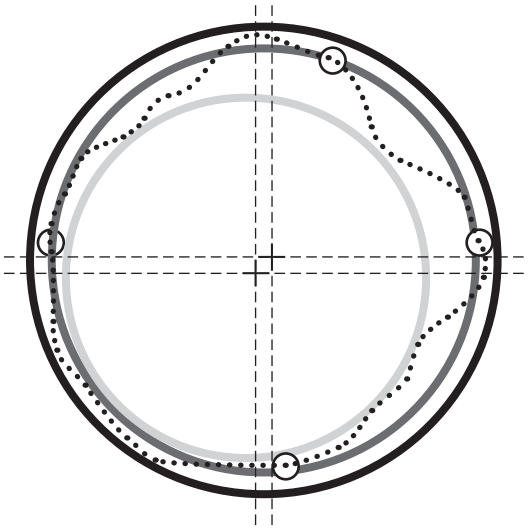


Adjustable measuring force
The adjustable measuring force allows the operator to measure different unstable workpieces made of various materials without the known measuring problems caused by deformation. Furthermore, the measuring force in a part program can be changed depending on the stylus and workpiece stability.



Better reproducibility
The high density of measured points also allows better reproducibility of the measurements. If a workpiece is removed from the equipment and reinserted, it is not necessarily in the





Minimum circumscribed circle determined using scanning values

Compensating circle calculated from 4 single points

Maximum inscribed circle determined using scanning values

Form evaluation

Single point (4-point measuring)

Different center point coordinates for minimum circumscribed/ maximum inscribed circle

same position. A repeat measurement with a single-point sensor can return different values. Thanks to its in-depth measurement, a scanning sensor delivers a differentiated analysis of location and form.

Uniquely ZEISS: active scanning

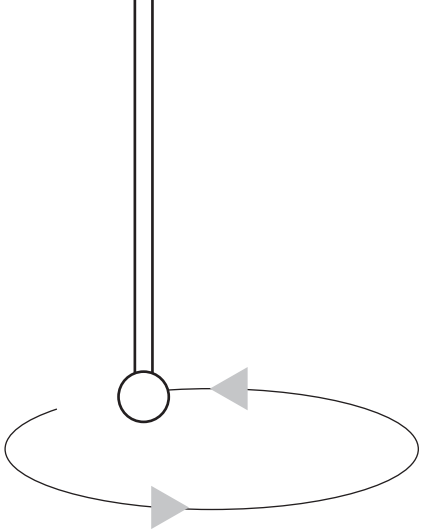
Most scanning systems are passive. Their measuring force is generated by a spring parallelogram. Because the control range of the passive sensors is small, changing forces constantly affect them which leads to relatively strong stylus bending and high probing error. This results in decreasing precision as the dynamics increase. ZEISS, on the other hand, works with active scanning probes – and is the only manufacturer to offer active sensors. The VAST XT gold sensor from ZEISS, for example, continually measures its own probe deflection. A low, constant measuring force is actively applied electronically in the opposite direction. For example, the stylus is moved in the direction in which the bridge is accelerating. Dynamic influences are therefore practically ruled out. The low measuring force remains constant and the measuring results are more precise.

Capture unknown contours

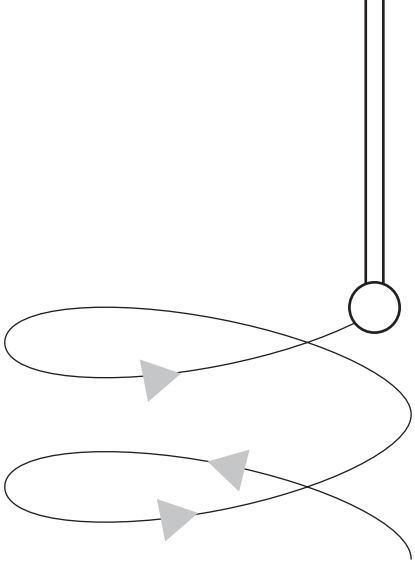
Unlike scanning with passive sensors, active scanning can be used to measure unknown contours. Digitization of the contour before scanning is not necessary. Therefore, active scanning also enables reverse engineering.

Measuring with very small stylus tips

Very small stylus tips are required, e.g. to measure the tooth flanks of an interior borehole. Because these are often on thin shafts, a steady minimal measuring force is needed to keep the shaft from bending. The active VAST sensors are therefore the ideal solution for precision measurements with very small stylus tips.



Traditional scanning

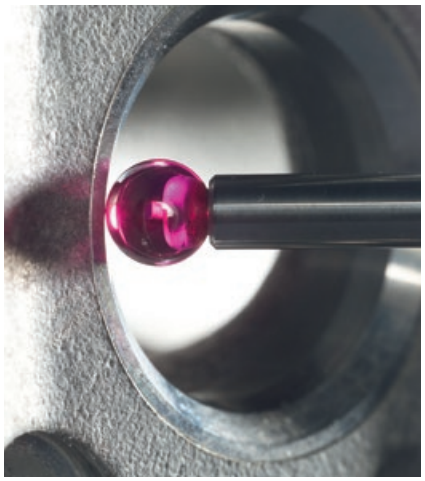


Helix scanning

VAST navigator from ZEISS – the Next Level of Active Scanning

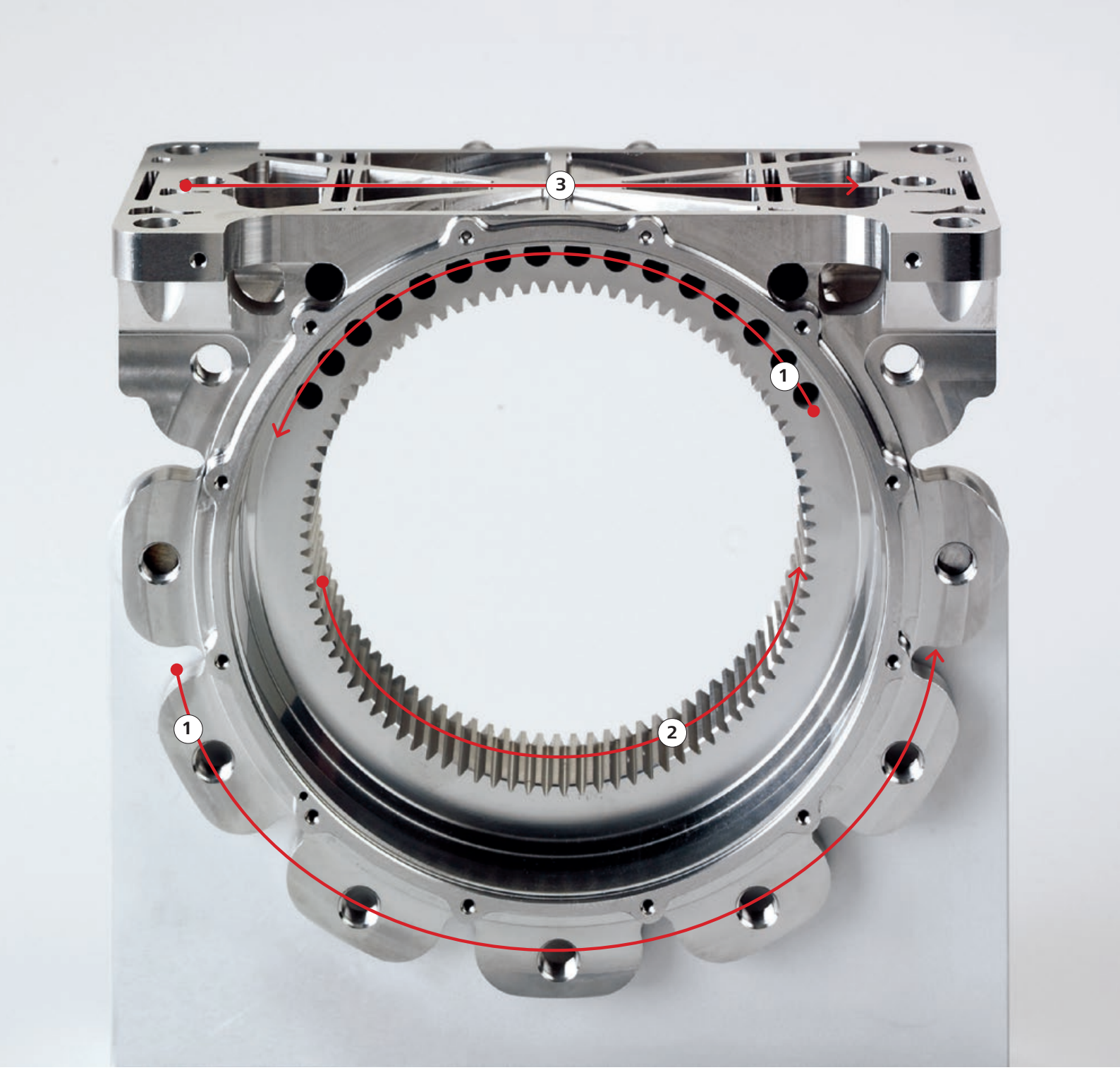
VAST navigator from ZEISS
The VAST navigator technology package from ZEISS fully utilizes the potential of active scanning. A key element of navigator technology is the automatic generation of measuring strategies: depending on the measured part, the system automatically measures at the highest possible speed with which the desired accuracy is guaranteed. The machine accelerates and slows independently.

Tangential approach
A tangential approach ensures continuous motion from the probing path to the probing process without the intermediate stops and maneuvering required by conventional methods. Depending on the job, this can result in time savings of 15 to 65 minutes with a level of quality that corresponds to the measuring error of gauges.



Helix scanning
Thanks to intelligent measuring strategies, VAST navigator technology enables exact measuring results for a cylinder measurement in an unparalleled short time. Unlike standard scanning methods, this process scans the cylinder with a continuous scroll line. This helix scanning delivers precise, optimal and reproducible results in one measuring run.

Easy stylus calibration
The calibration of different styli is amazingly simple with VAST navigator: the measuring machine scans the reference sphere in the fringe ranges: once at 5 mm/s and once at 50 mm/s. This enables dynamic and static influences from the high accuracy to high speed range to be recorded and corrected at the same time. This dynamic stylus calibration is so flexible that it applies to all workpieces. Time-consuming calibration with a number of different gauges is not necessary.



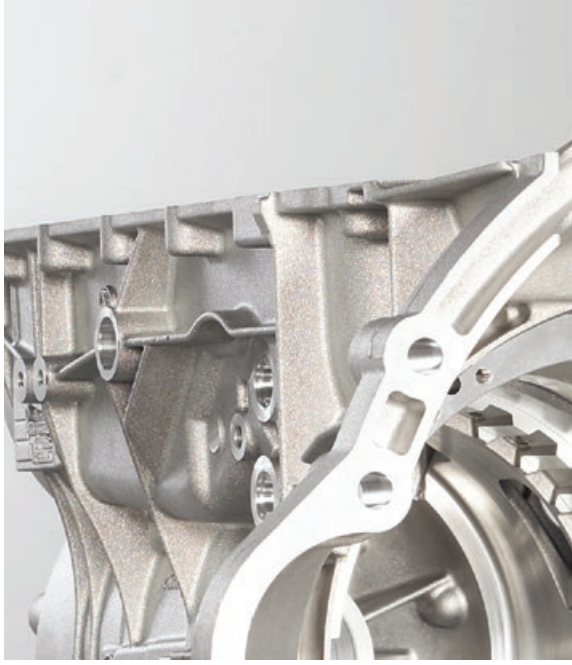
FlyScan – Scanning Interrupted Contours

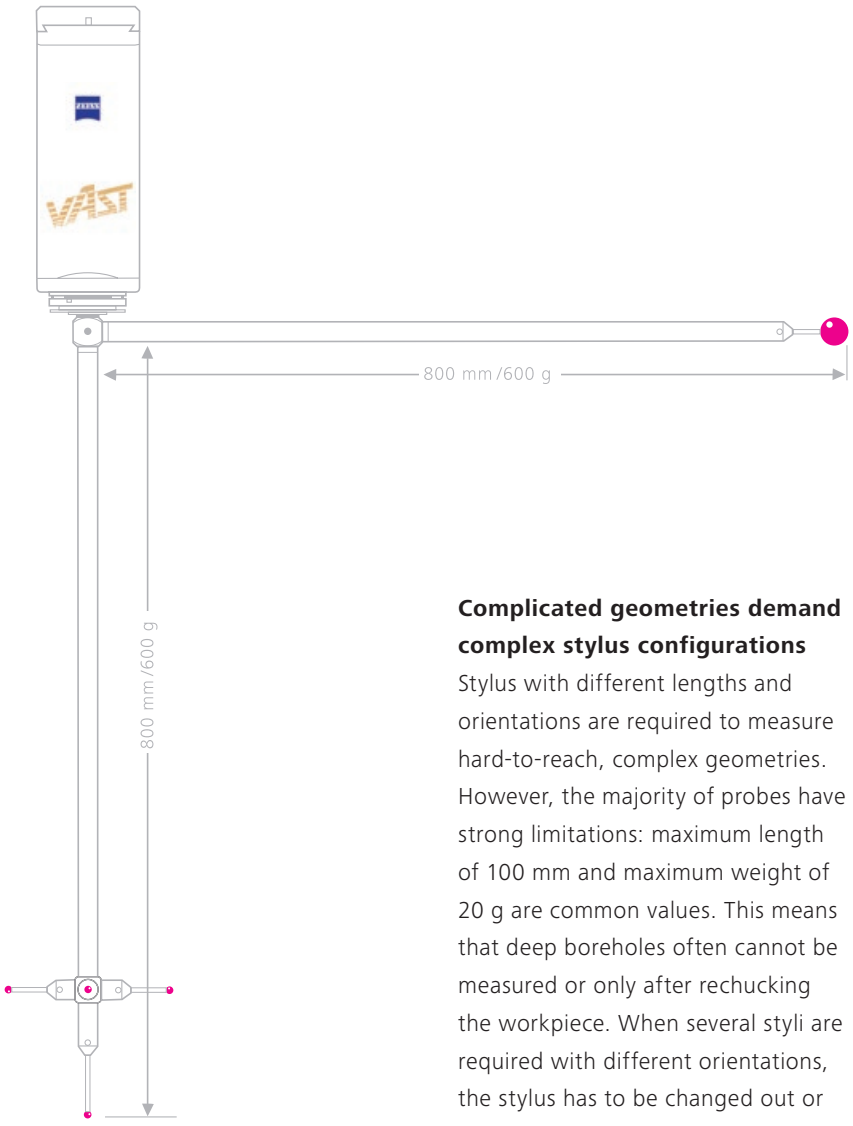
FlyScan range of application
FlyScan reduces the programming and measuring work for many jobs, including:
1) Scanning over boreholes
2) Scanning over a gear wheel
3) Scanning an interrupted plane

Faster results
ZEISS offers the FlyScan option for premium coordinate measuring machines. This development enables you to scan over interrupted contours. In the past, 16 scanning paths were required to measure a flange that has a plane surface interrupted with boreholes. FlyScan only needs a single path. The previous method for this measurement also required elaborate programming. With FlyScan, not only is programming easier, but the measuring time is also considerably reduced – with absolutely reliable results.

Stylus Configurations – Quickly Capture Each Characteristic

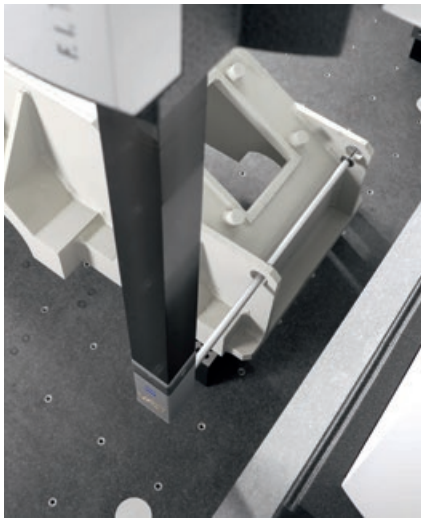
VAST probes from ZEISS accommodate stylus systems up to 800 mm long and weighing up to 600 g. This enables you to reach deep features, and measure without long travel paths and without rechucking the workpiece.





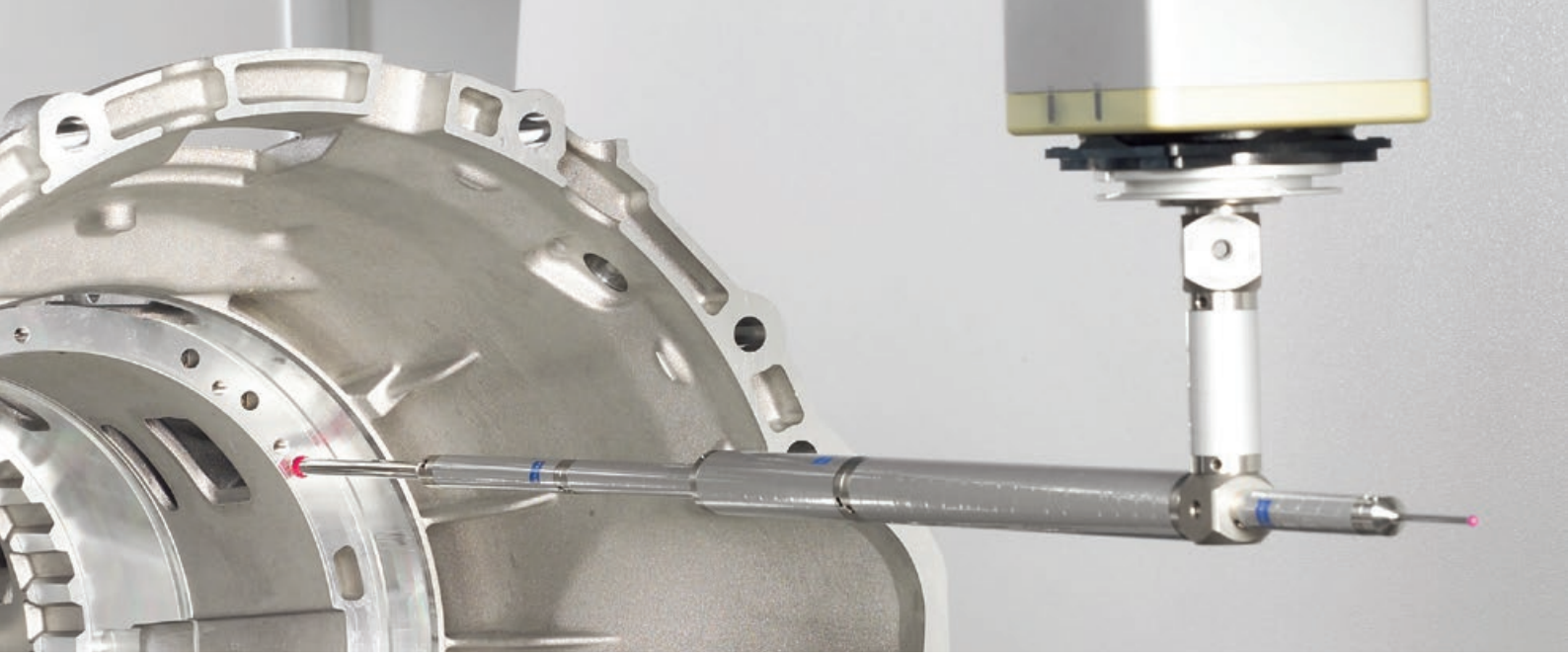
Complicated geometries demand complex stylus configurations

Stylus with different lengths and orientations are required to measure hard-to-reach, complex geometries. However, the majority of probes have strong limitations: maximum length of 100 mm and maximum weight of 20 g are common values. This means that deep boreholes often cannot be measured or only after rechucking the workpiece. When several styli are required with different orientations, the stylus has to be changed out or an articulating system used due to the weight limitation.



More capacity

The VAST gold probe from ZEISS, on the other hand, can accommodate styli up to 800 mm and stylus configurations up to 600 g, even with laterally connected styli. Taring is automatic and the VAST sensors compensate the resulting torque. Many jobs on a complex workpiece can be completed with one stylus configuration. Time-consuming rechucking and stylus change out are reduced to a minimum.



Exact angular setting

An ideal probing strategy requires the stylus to always be perpendicular to the workpiece surface. Articulating systems are one means of realizing different probing orientations. However, as a result of their design, this is not always possible. Articulation influences the accuracy of the measurement and is too rough for high-precision needs. Because every position has to be recalibrated, the use of an articulating probe holder also leads to an unjustifiable waste of time. With the right stylus configuration, the stylus changers from ZEISS offer much higher precision because the perpendicularity to the workpiece surface is guaranteed. On the same workpiece, characteristics with different orientations can be very accurately and efficiently measured without changing the stylus and without recalibration.

Better utilization of the measuring range

Unlike an articulating system, a stylus changer also requires less room in the probing direction. This means that the available measuring space is larger.

Stylus changers

Changing the sensor cannot always be avoided considering the range of measuring tasks. The faster and safer it can be accomplished, the more efficient the measuring machine can work. Stylus changers from ZEISS therefore work with adapter plates that can be simply plugged in – manually or under fully automatic CNC control. Calibration resulting from a change out is not necessary thanks to the high degree of reproducibility.

The moment you can count on reliable results even before measuring.

This is the moment we work for.

// RELIABILITY
MADE BY ZEISS

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