HEXAGON

Product brochure

Structured light and photogrammetry inspection solutions

High-accuracy, high-speed optical 3D measurement technology

HEXAGON

Advanced camera-based 3D measurement

Measurement systems based on high-speed photography are intrinsically fast in terms of data collection, offering large fields of view that can capture entire part profiles in fractions of a second. Whether this is turned into 3D model data with the referencing of physical targets or projected light patterns, there are few faster ways of inspecting surfaces and features.

Hexagon's range of photogrammetry and structured light scanning systems build on this intrinsic speed with complex processing algorithms that turn images into data in an instant.

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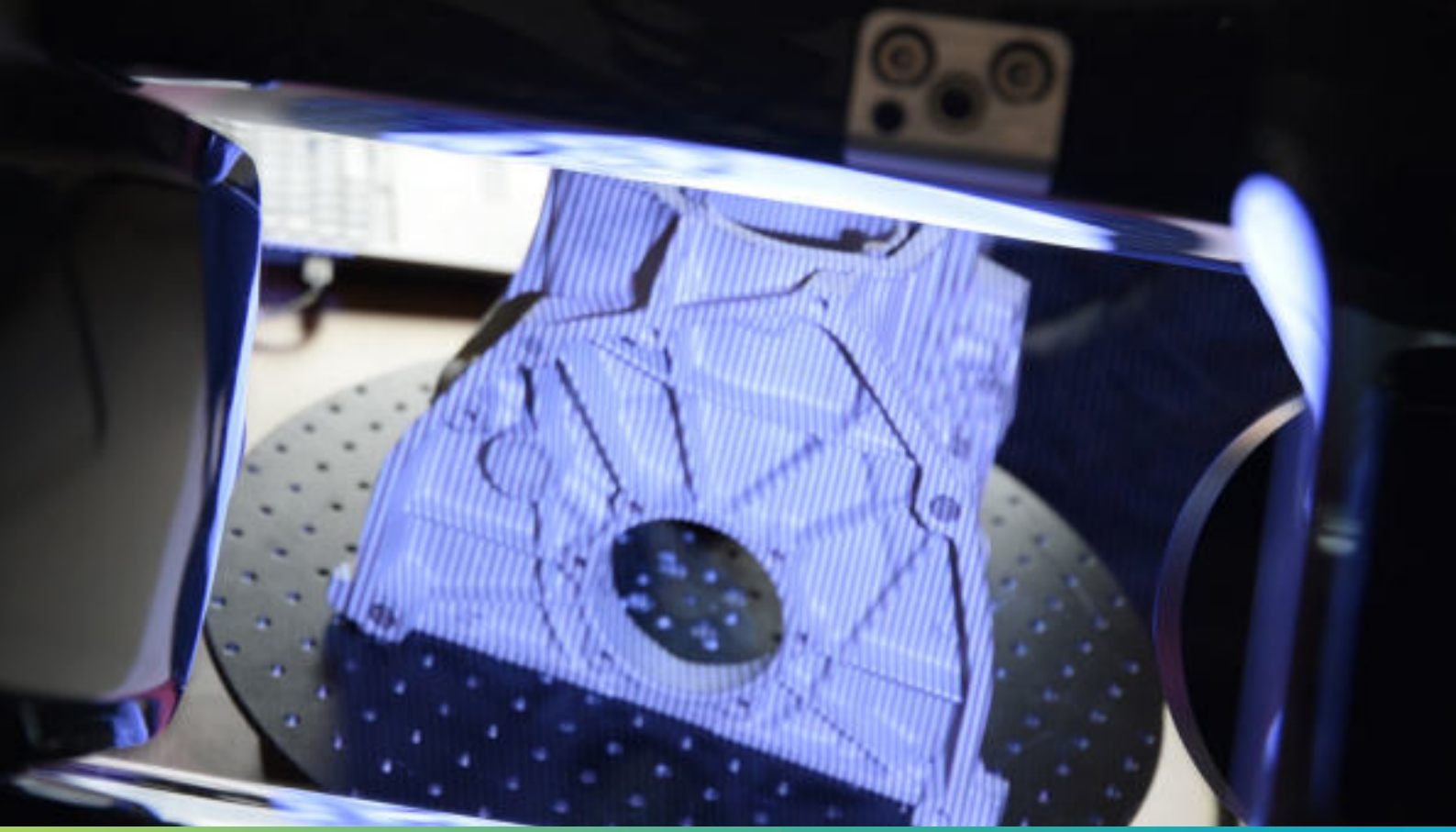


Structured light scanners

Structured light scanning is a well-established and highly reliable technology for three-dimensional surface acquisition. Even complex surface geometries are captured swiftly and at a high level of resolution and accuracy with this advanced non-contact optical 3D scanning technique.

Owing to their exceptional mechanical and thermal stability, Hexagon's range of structured light scanner systems can be employed across a multifaceted array of applications. Extremely sturdy by design, these two-camera systems are renowned for their extraordinary combination of ruggedness and precision, allowing them to meet the challenges of modern metrology from the most sterile quality room to the dustiest shop floor.

Hexagon structured light scanning technology works with the dedicated OptoCat software platform, designed to quickly transform high-quality measurement information into precise digital mesh data, as well as directly within third-party metrology software through plug-ins based on the SLS SDK.

Introduction to structured light

How structured light scanning works

Structured light scanning – sometimes referred to as white light scanning, blue light scanning or simply optical 3D scanning – is a method of measuring objects by using high-definition cameras to capture light patterns projected onto a surface and analysing the shape of the captured projection.

Signalising

A special projector casts a specifically designed type of light pattern onto the measurement object. Hexagon's structured light scanning technology uses a cutting edge type of fringe projection pattern, designed to deliver the most accurate possible scans.

Capturing

Each structured light scanner is equipped with two digital camera units that capture this projection at predefined viewing angles. The entire measuring process takes between a few seconds and several minutes and is completed as soon as images from all sides of the object have been captured.

Calculating

The resulting images are then analysed based on the principle of spatial image triangulation and used to derive highly accurate dimensional information about the measurement surface.

Individual scans of different sides of the measurement object are then aligned by geometry or with the aid of targets placed around the object before measurement. Subsequently, all individual scans are merged to a single triangle mesh.

Reporting

Measurement results are subsequently collated into detailed reporting within the metrology software package being used, whether that be a dedicated platform from Hexagon or a third-party inspection software accessible through a dedicated plugin.

Key advantages

- Short scanning times through fast digital projection
- Smart Phase Projection for scanning of glossy and dark surfaces without pre-treatment
- Smart Data Capture technology allows for fast acquisition and variable resolution
- Colour back-projection of measurement results
- Quick and easy exchange of measurement fields
- Maximum degree of feature accuracy through high-resolution camera sensors
- High-stability scanning
- Ready for automated robotic inspection thanks to rigid design and double carbon frame
- Accessories such as turntable and turn-tilt units allow for semi-automated scanning
- Handheld probe option
- Combinable with photogrammetry systems

StereoScan neo

The benchmark in structured light scanning

As Hexagon's flagship structured light scanner, the StereoScan neo combines superior resolution and accuracy with an arsenal of innovative features that fundamentally improve the scanning experience.

The StereoScan neo is an incredibly versatile optical 3D scanning system. Innovative Smart Data Capture technology allows the system to acquire data at extremely high speed without compromising data quality while also allowing for variable resolution as required by the application at hand.

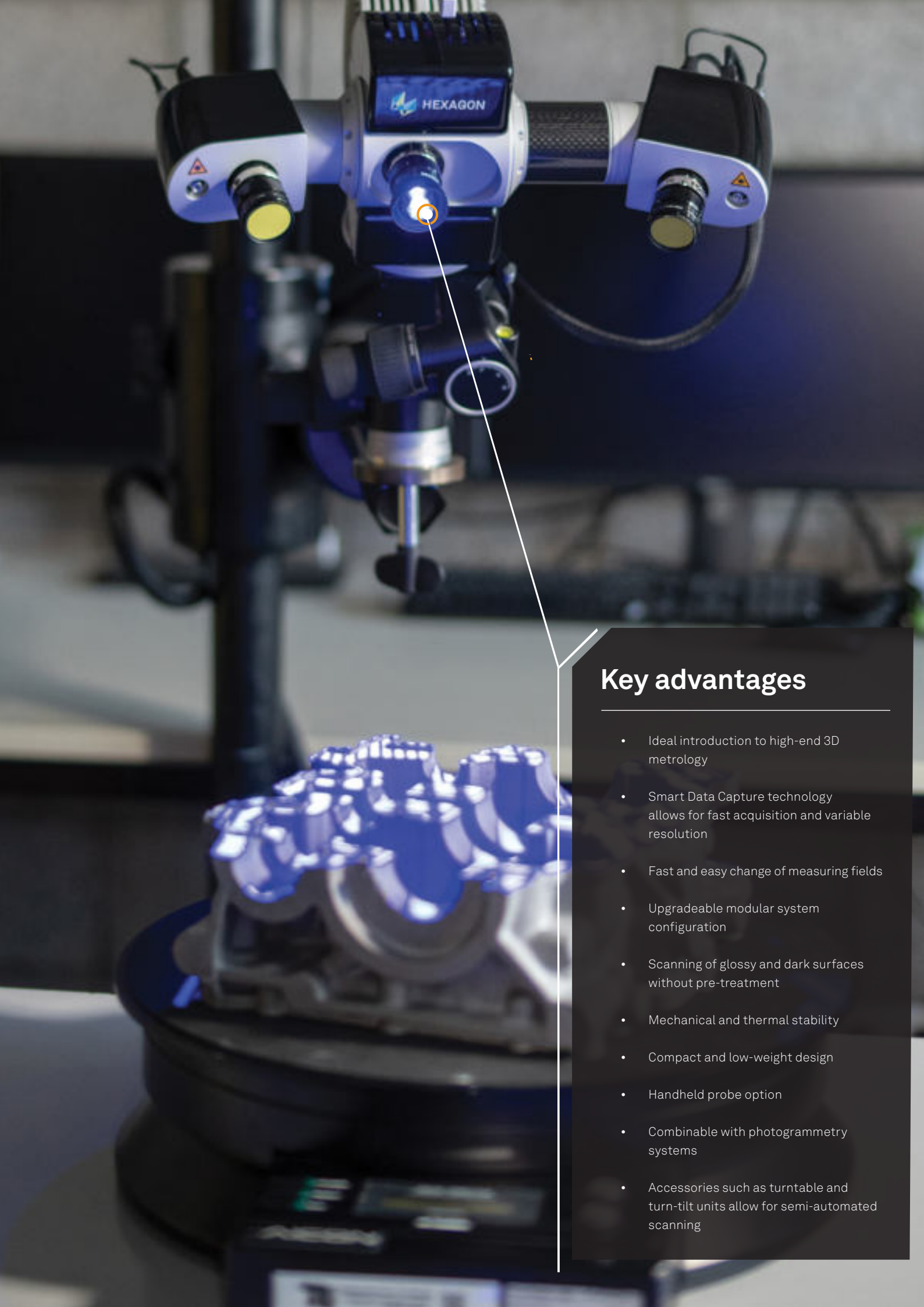
Equipped with an advanced digital projector that utilises ground-breaking projection patterning and full-colour back projection, the StereoScan neo is one of the most advanced structured light scanners ever produced. With data acquisition powered by twin 16.8-megapixel digital cameras, and measurement fields ranging from 75 to 1000 millimetres that can be quickly and easily changed by the user as necessary, the StereoScan neo is simply the most versatile and powerful structured light scanner on the market.

Smart Phase Projection

Hexagon's Smart Phase Projection technology employs a cutting-edge type of fringe projection pattern designed to yield the highest quality data even when facing the most challenging measurement surfaces. This technology represents a pioneering departure from classical fringe projection techniques that means the StereoScan neo truly excels when faced with glossy and dark surfaces with no need for pre-treatment

Variable Light Projection

The StereoScan neo's innovative Variable Light Projection (VLP) technology is an adaptive full-colour projection technique that allows the scanner to go further than just projecting the patterns necessary for the scanning process. With VLP, the generated measurement results can be instantly projected back onto the measurement surface, allowing for the easy colour-coded visualisation of deviations from CAD right on the part being measured.



Key advantages

- Ideal introduction to high-end 3D metrology
- Smart Data Capture technology allows for fast acquisition and variable resolution
- Fast and easy change of measuring fields
- Upgradeable modular system configuration
- Scanning of glossy and dark surfaces without pre-treatment
- Mechanical and thermal stability
- Compact and low-weight design
- Handheld probe option
- Combinable with photogrammetry systems
- Accessories such as turntable and turn-tilt units allow for semi-automated scanning

SmartScan

Powerful and compact 3D scanning

Discover high-speed data acquisition at extremely high levels of detail with the non-contact 3D optical scanning technology of the SmartScan. Objects are digitised within seconds, irrespective of their size and complexity, and are directly available as high-precision 3D data in numerous standard formats for further processing.

With a compact design and low weight it's a fully mobile system, ready to go to work in the most challenging workshop conditions. Thanks to a high-tech carbon-fibre structural design, the SmartScan maintains extremely stable and reliable performance even under the pressure of temperature fluctuations.

Available in a variety of system configurations, and fully upgradeable thanks to its modular architecture, the SmartScan is the ideal choice for effective and affordable measurement performance across a range of applications and industries. Choose between the standard twin 5-megapixel camera version and the high-end twin 12-megapixel camera arrangement.

Smart Data Capture

The Smart Data Capture technology developed for all Hexagon structured light scanners powers data acquisition at extremely high speeds while maintaining high data quality. It also allows for the varying of measurement resolution as required by the demands of the specific application.

DPA photogrammetry

By working in combination with a high-end photogrammetry system, the SmartScan can be used to digitise considerably larger parts down to the smallest details with high accuracy maintained throughout a larger measuring volume.

Key advantages

- Ideal introduction to 3D metrology
- Smart Data Capture technology allows for fast acquisition and variable resolution
- Compact and low-weight design
- Short working distance ideal for applications in narrow environments
- Various fixed configurations for diverse range of measuring tasks
- High-resolution sensor technology for maximum detail
- Scanning of glossy and dark surfaces without pre-treatment
- Handheld probe option
- Combinable with photogrammetry systems
- Accessories such as turntable and turn-tilt units allow for semi-automated scanning

PrimeScan

Scanning made simple

An attractive entry-level solution for the precise 3D digitisation of industrial components, the PrimeScan stands on a foundation of innovative fringe projection technology that allows it to deliver high luminous power and excellent projection quality.

Thanks to a compactly designed unit with a base area the size of an A4 sheet of paper and a total system weight of less than four kilograms, the PrimeScan is ready to go anywhere that high-resolution measurement is needed. Combined with a short working distance, its small form factor makes the PrimeScan perfect for scanning in special application areas, such as on a desktop or in difficult to access parts of the shop floor.

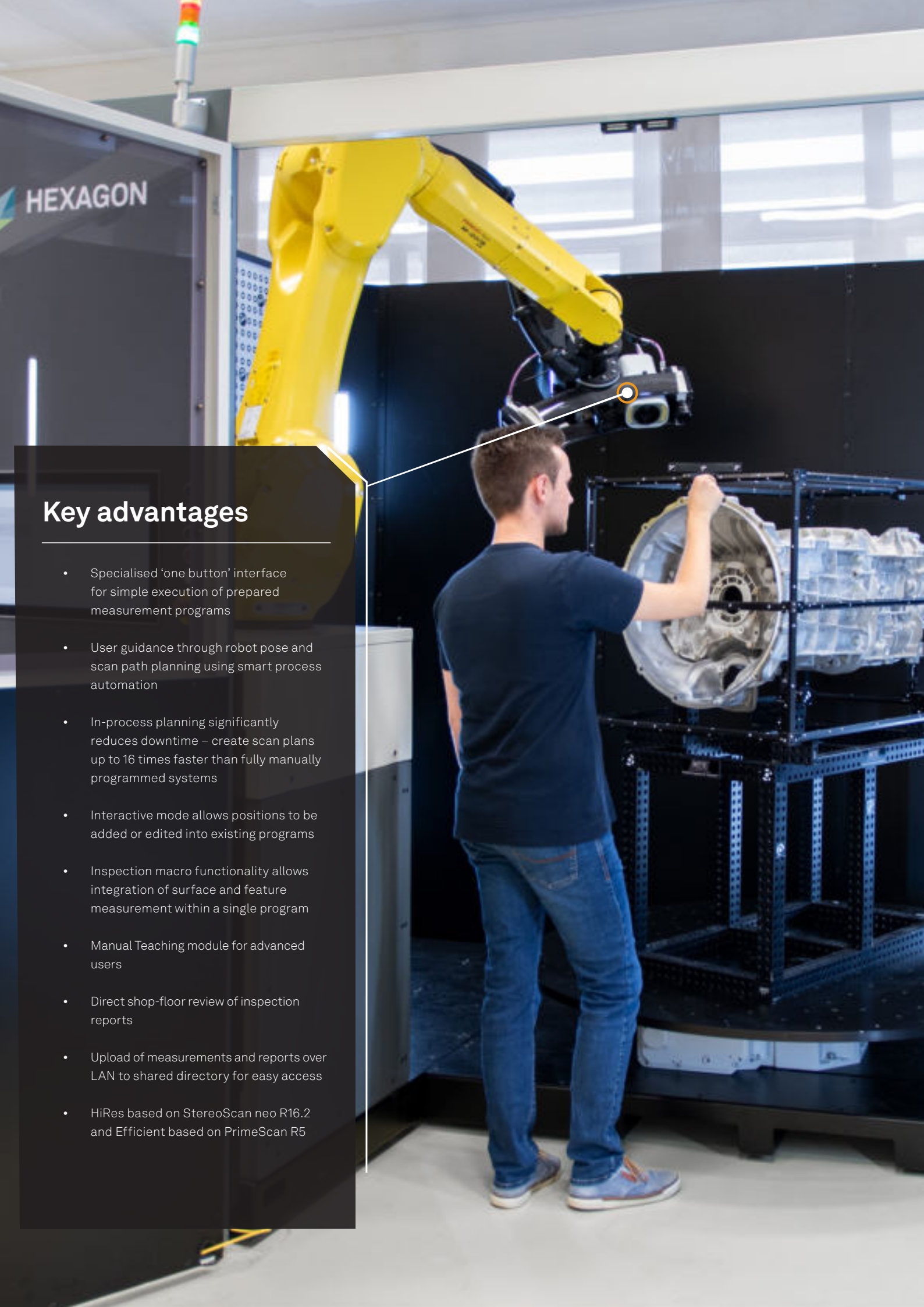
The scanning of glossy and dark surfaces without pre-treatment is aided by the PrimeScan's powerful projector, while the initial positioning of the measurement object is simplified by the scanner's integrated laser pointers. Selected robots and accessories enable both automated measurement and easy data acquisition within both smaller and larger volumes.

Smart Data Capture

The Smart Data Capture technology developed for all Hexagon structured light scanners powers data acquisition at extremely high speeds while maintaining high data quality. It also allows for the varying of measurement resolution as required by the demands of the specific application.

Configuration options

Depending on the required resolution and precision, different camera resolutions and measuring fields are available for the PrimeScan. Eight fixed configurations are available, allowing users to select the perfect tool for their particular measurement task.



Key advantages

- Specialised ‘one button’ interface for simple execution of prepared measurement programs
- User guidance through robot pose and scan path planning using smart process automation
- In-process planning significantly reduces downtime – create scan plans up to 16 times faster than fully manually programmed systems
- Interactive mode allows positions to be added or edited into existing programs
- Inspection macro functionality allows integration of surface and feature measurement within a single program
- Manual Teaching module for advanced users
- Direct shop-floor review of inspection reports
- Upload of measurements and reports over LAN to shared directory for easy access
- HiRes based on StereoScan neo R16.2 and Efficient based on PrimeScan R5

PartInspect

Advanced automation made simple

Pairing a premium structured light scanner with a powerful robot arm for automated inspection offline, near-line or at-line, PartInspect offers straight-forward measurement cells that simplify and accelerate repetitive inspection tasks. A unique combination of automated scan planning and manual fine tuning delivers unmatched flexibility to the user, supported by an easy-to-use kiosk interface that allows for simple cell control right on the shop floor.

With PartInspect, project planning and execution requires no expert knowledge of robot teaching, allowing for simple automation that can be operated with minimal training. This all adds up to a range of high-end automated measurement systems that move vital inspection processes into the world of smart manufacturing with the minimum of expertise and effort.

OfflineProgramming

The PartInspect OfflineProgramming software tool allows for a wide range of measurement preparation functionality within an easy-to-learn user interface. The system takes the complexities of robot teaching out of the hands of the shop-floor user while also assisting advanced users through an intelligent guidance process.

ScanControl

On the shop floor, measurement is controlled through a touchscreen kiosk interface powered by the PartInspect ScanControl software. This allows the user to select and launch predefined measurement programs and means the standard user need never interact with the robot teach panel.

For advanced users, the Manual Teaching module within ScanControl allows for direct alterations to predefined measurement plans, making it easy to fine tune programs to ensure accurate and complete measurement at the first pass.

PartInspect configurations

Advanced automation made simple

PartInspect is available in two turnkey cell configurations, with each built on a different model from Hexagon's range of structured light scanners. Each cell is equipped with a touchscreen kiosk interface and a range of climate control sensors as standard.

PartInspect L HiRes

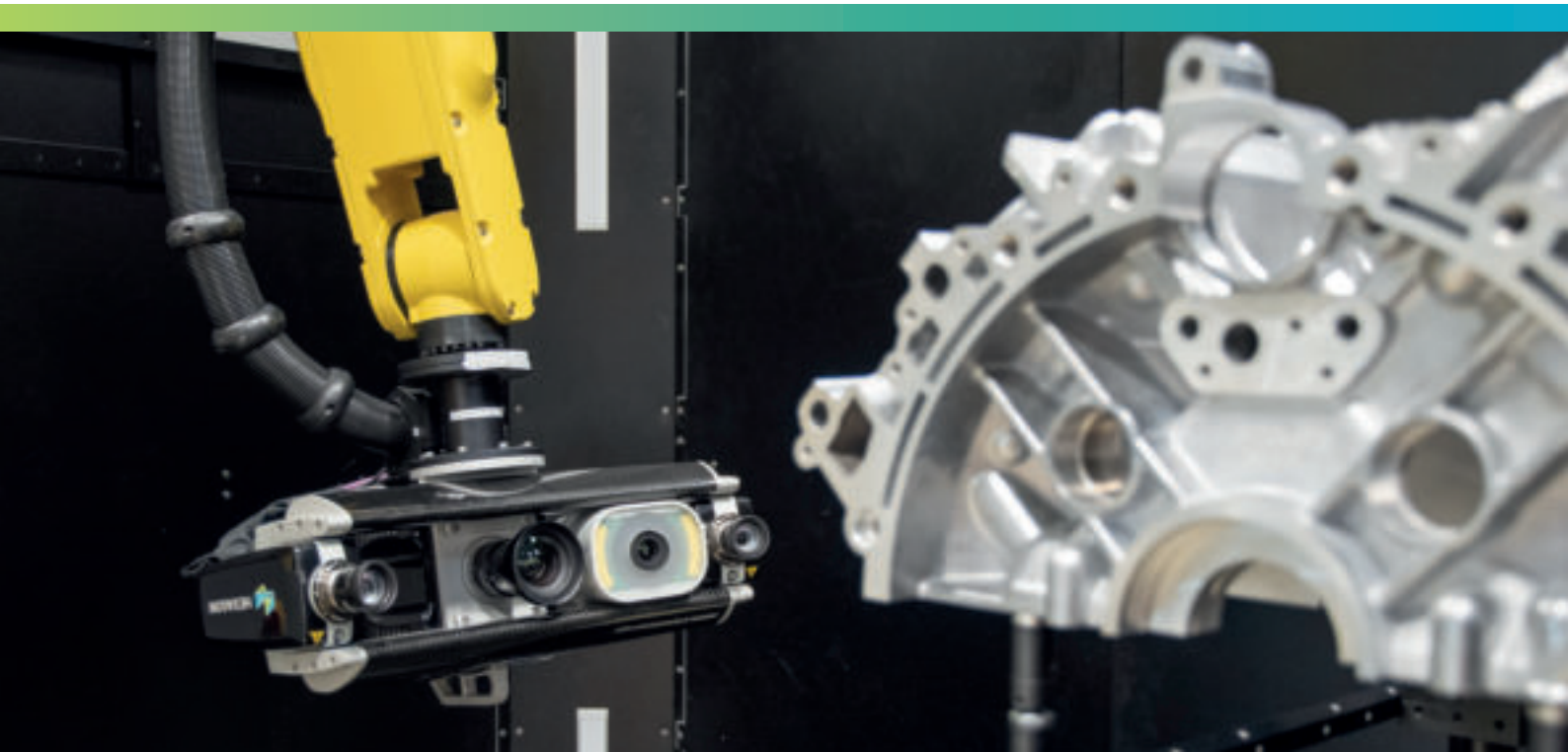
The flagship PartInspect turnkey cell is the PartInspect L HiRes, powered by the high-resolution sensor and digital projection technology of the StereoScan neo R16.2. The system has three field-of-view options, which can be selected as needed by the user, allowing for measurement of small-to-large parts with a single system. With X,Y resolution to within just 55 microns and scan accuracy to within 10 microns, the HiRes system is the pinnacle of automated structured light scanning solutions.

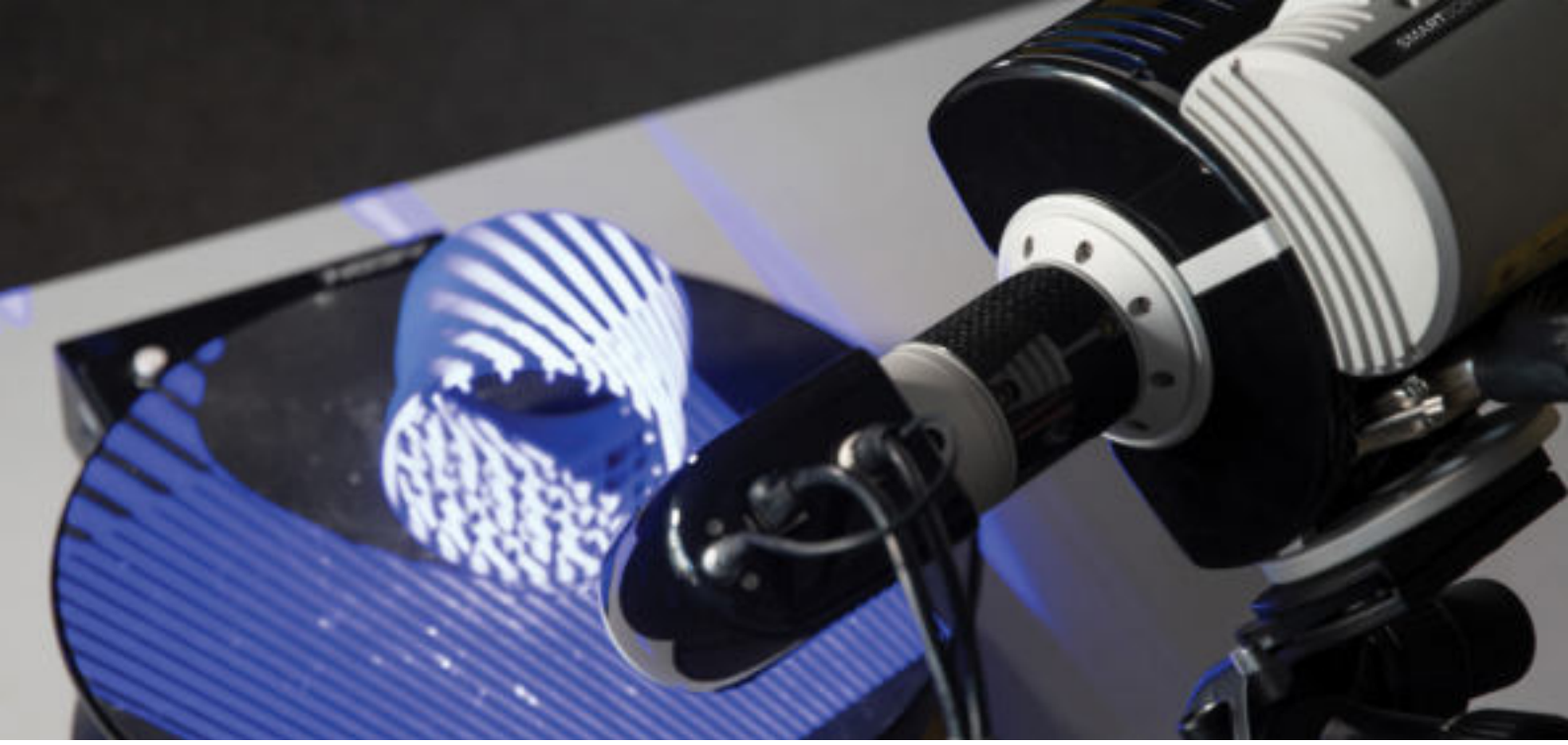
PartInspect L Efficient

PartInspect L Efficient is equipped with the economically priced sensor technology of the PrimeScan and comes with all necessary software features for automated 3D measurement of object surfaces at a high accuracy level of to within just 20 microns. The system is available with a choice of two field-of-view options for measuring small or large parts.

PartInspect custom

The Manual Teaching module within the PartInspect ScanControl software allows advanced users with specific automation needs to configure a custom PartInspect setup. By working with an experienced integrator, users can define an automated structured light inspection system tailored to their exact requirements.





Simple automation

Turntables and turn-tilt units for complete measurement productivity

An alternative to complex robot-based automation solutions can be achieved through the combination of structured light scanning technology with turntable or turn-tilt units. These productivity enhancing accessories allow a scanner to access every side of the measurement object without repositioning – all relevant areas of the object can be captured while minimising the number of single exposures.

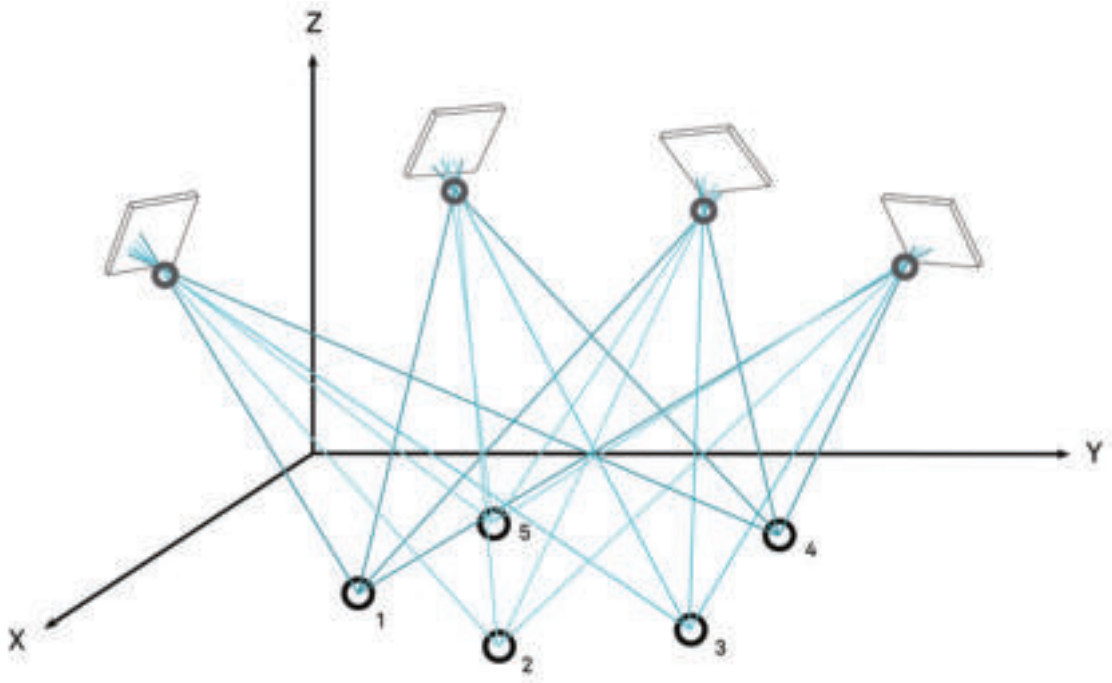
- Semi-automated, highly precise inspection and digitisation of small-to-medium sized components.
- Highly repeatable accuracy enables a usefully reproducible process.
- Cost-effective and flexible alternative to a robot automation system.
- Portable system with minimal training requirements.
- Significant reduction in maintenance costs compared to full automation systems.

The DPA Series

When it comes to shop-floor measurement processes, it's important to have a simple process that's as immune as possible to user error and the hazards of an industrial environment.

That's why the DPA Series photogrammetry systems have been designed to deliver user-friendly measurement and processing in every situation. Relying on just a single handheld camera unit backed by a dedicated software platform, DPA Series systems are among the most portable measurement systems in the world, without compromising on metrology-grade accuracy delivered at productivity-enhancing speed.

DPA Series systems are available in three configurations that allow the user to tailor their experience to the needs of their applications. Each system runs on the same advanced DPA Pilot software platform – the foundation of the leading measurement functionality of the DPA Series.



DPA Industrial

DPA Professional

DPA Entry

Introduction to photogrammetry

How digital photogrammetric analysis works

The DPA Series systems are portable 3D measuring tools that use a high-resolution digital camera for data collection. They are based on the principles of digital photogrammetric analysis. Measurement with a photogrammetric system involves the following four key steps.

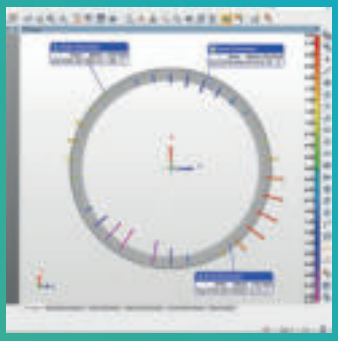
A fully automatic workflow

Signalising

Capturing

Calculating

Reporting



Signalising

To measure a part, it is first signalised with a selection of targets. Coverage of hidden points or features such as holes and edges is ensured with the use of appropriate target adaptors.

Capturing

The part is then photographed from several directions, with the targets in view and overlapping between shots.

Calculating

The images produced are processed either simultaneously with data collection (online processing) or after data collection (offline processing) through a dedicated photogrammetry software tool like DPA Pilot. The software automatically calculates the 3D coordinates of all targeted points.

The calculation is based on the principle of spatial image triangulation and is fully automated. With software that employs an integrated simultaneous calibration procedure, the highest levels of accuracy can be achieved onsite during the measurement process.

Reporting

In addition to 3D coordinates, quality photogrammetry software such as DPA Pilot can provide statistical analysis of the results with specific accuracy information about each coordinate. This allows for instant evaluation of the quality of the measurement. DPA Pilot is also very deeply integrated into the best inspection software packages and allows complete automations of calculation steps and advanced analyses.

Key advantages

- High-end industrial sensor – 50.6 megapixels
- Accuracy to within 10 microns
- Ruggedised housing for strong protection
- Laser pattern projects field-of-view for easy targeting
- Built-in high-speed WiFi connectivity
- Long-life battery – more than 5000 shots
- Remote-control functionality
- Simplified control schema minimises operating errors during measuring tasks
- Full range of measurement targets, adapters and scale bars
- Modern, easy to use interface to major metrology software packages

DPA Industrial

High-end photogrammetry designed for the shop floor

DPA Industrial is our top-of-the-line photogrammetry system. It is built on the inclusion of a specially ruggedised digital camera unit – the C1 Camera. Whether on the shop floor or in the yard, DPA Industrial is the perfect measurement solution for fast and easy measurement.

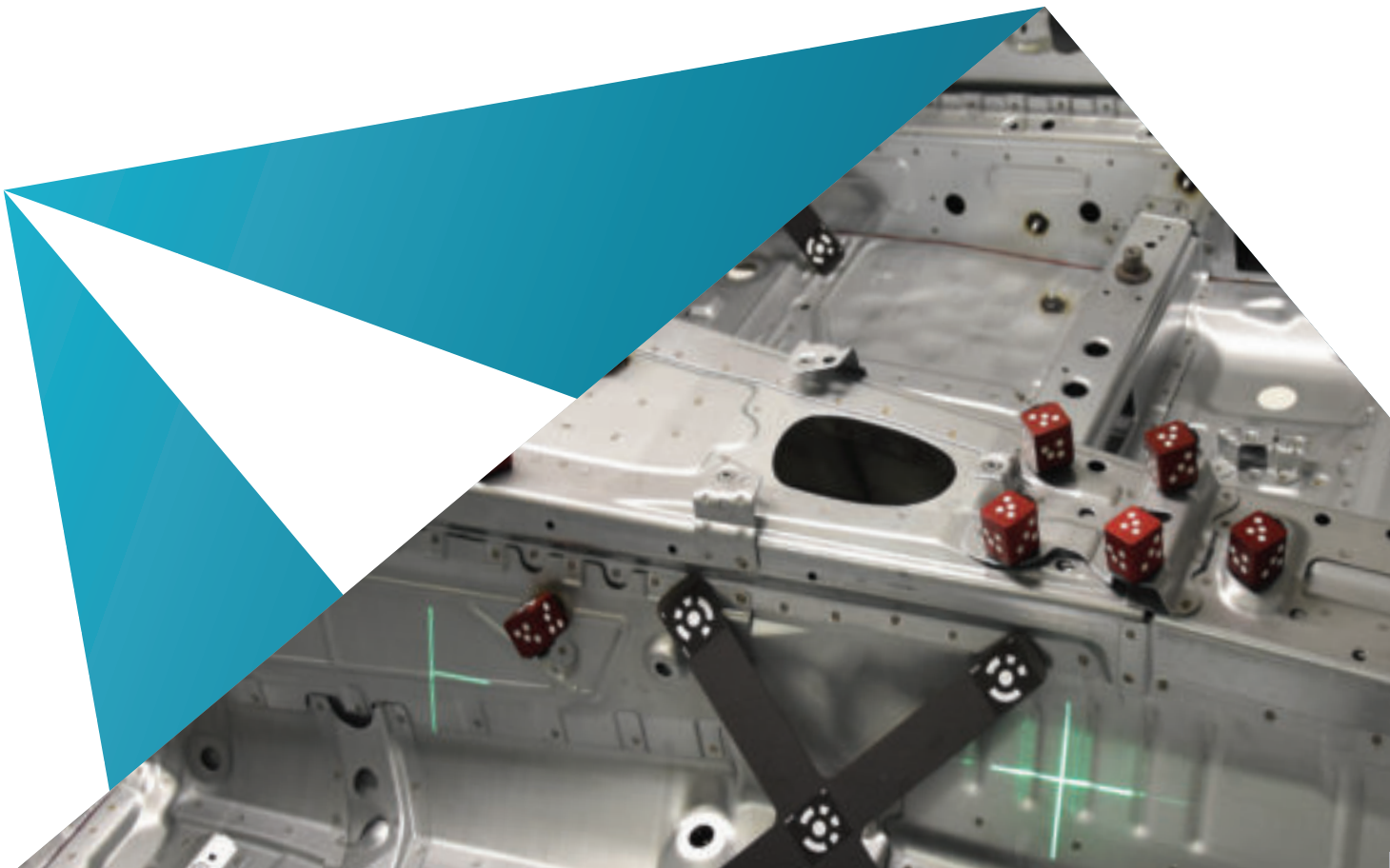
The entire process is simplified by reducing user interaction to defining field of view and image capture, with all settings and processing handled behind the scenes, powered by the DPA Pilot software platform. When measurement is brought out of the quality room, special tools that minimise the potential for compromised results are called for. DPA Industrial and the C1 Camera deliver exactly that – high-end industrial metrology with simple handling.

Rugged protection

The C1 Camera is contained within a protective IP51-rated casing that makes it ideal for use in the challenging environments within which metrology tools are increasingly being applied and where photogrammetry excels as a measurement solution.

Simple operation

The unique simplified control schema of the C1 Camera unit is designed to minimise operating errors during measuring tasks. With no need for complex settings adjustment in the field during the measurement process, photogrammetry becomes an easy point-and-shoot exercise requiring minimal training.



DPA Professional

The standard for high-end photogrammetry

DPA Professional is a high-end photogrammetry system designed for expert metrologists with a strong knowledge of photogrammetric techniques and the ability to take complete control of every aspect of measurement.

Designed to allow specialist users to work with DPA Pilot to achieve best-in-class measurement results, DPA Professional is the ideal solution for experienced high-level operators measuring within clean and safe environments.

- High-end sensor – 30.3 megapixels
- Accuracy to within 10 microns
- Full control of all camera settings directly in the hands of the end-user
- Optional remote-control functionality
- Optional high-speed WiFi connectivity
- Extended range of measurement targets, adapters and scale bars
- Modern, easy-to-use interface to major metrology software packages

DPA Entry

Entry-level photogrammetry

DPA Entry is available to users working in the sort of challenging industrial environments where a standard digital camera represents a more practical investment.

Built on the same DPA Pilot software platform, DPA Entry can deliver excellent measurement results to users well-trained in directing the functionalities of the camera unit.

- Mid-range sensor unit
- Accuracy to within 15 microns
- Full control of all camera settings directly in the hands of the end-user
- Basic range of measurement targets and scale bars
- Modern, easy-to-use interface to major metrology software packages

Key advantages

- High resolution 8-megapixel cameras for highest accuracy across the entire measurement volume
- Highly stable carbon frame with integrated vibration damper for mounting the cameras in vertical or horizontal setup
- Customisable measuring volume due to flexible number of cameras
- Supplies any number of measuring points and object information at the same time (3D and 6DoF)
- Multiple simultaneous point and adaptor measurements time allows monitoring of complex assembly processes
- Vertical or horizonzal setup allows for unobstructed views and a flexible use of space
- Compatible with the wireless handheld MI.Probe for measuring of areas out of sight of the cameras
- Targets allow repeated inspections without interrupting processes for realignments
- Solution-based adaptors for custom-made applications help to speed up adjustment and inspection tasks
- Applicable for measurements under challenging and harsh environmental conditions directly within production areas

3D Arena

Custom dynamic automated photogrammetry systems

The 3D Arena is a flexible multi-camera photogrammetry measurement concept that allows an unprecedented level of freedom to users, both in terms of designing their measuring area and in terms of capturing location data,

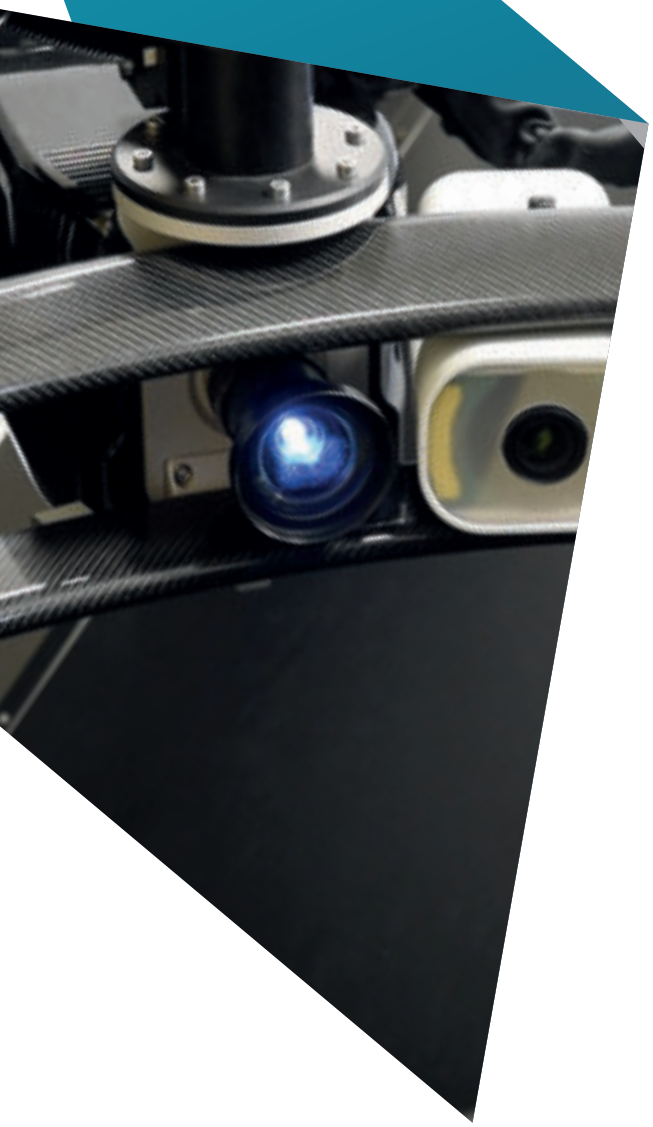
A constellation of high-definition cameras supported by a high-stability carbon frame captures a constant live feed of a signalised measurement object. Every measurement is automatically transformed into the object coordinate system, and the 3D Arena always knows where the object as well as work tools and testing devices are located within the coordinate space.

Flexible scale

A 3D Arena installation is inherently customisable, with no theoretical limit to the number of cameras integrated within the system. A typical 16-camera system can be ceiling mounted, allowing inspection and alignment over a space of 6 by 8 metres, or a 4-camera system could be vertically mounted on a one-square-metre frame to dynamic alignment of a single component.

Application versatility

An installed 3D Arena system is massively versatile, offering probing measurement, tool tracking, both 3D and 6DoF positioning and alignment and deformation tracking. The system's live dynamic referencing capability allows users to forgo the rigid fixation of the measuring object by allowing for the measurement of objects in motion without any loss of accuracy.



Automated photogrammetry integration

Part of the DPA Series of photogrammetry technology, DPA Online is an add-on photogrammetry module for PartInspect L cells. A high-resolution camera is mounted on or beneath the scanner and used to generate a reference frame to control global alignment precision on large and/or complex parts.

- Strengthens measurement geometry and ensures a standardised level of accuracy
- Guarantees accuracy to within 50 microns throughout the entire cell measurement volume
- Aimed at difficult to measure parts, such as flat, thin or very large objects
- Photogrammetry is fully integrated into the workflow of PartInspect measurement projects
- Includes robot programs customised for photogrammetry for each PartInspect L configuration
- Available for all PartInspect L configurations at time of initial installation or as a later upgrade

Photogrammetry meets structured light

Combining leading structured light scanning and photogrammetry technology is an unrivalled way to achieve high-accuracy 3D digitisation results on large measurement objects.

The measuring volume captured in a single scan by a Hexagon structured light scanner ranges from a few millimetres to about one metre across. By combining this technology with a photogrammetry system from the DPA Series, considerably larger freeform areas can also be captured at the highest level of detail. This add-on technology combination provides more reliable and much more precise global coordinates in the component's coordinate system, allowing for accurate measurement across a greater volume.

- Targets are used to signalise reference points on the object
- A digital camera takes photos from a variety of directions and angles
- From this data, a point cloud that can be used as a reference system is created
- Single surface scans are made by a structured light scanner
- The scan data is then matched into the reference system

Photogrammetry meets portable measuring arm

Combining photogrammetry technology with a portable measuring arm equipped with a 3D laser scanner makes it possible for the arm and scanner to cover larger measurement areas without losing measurement accuracy.

The measuring volume captured in a single scan by a Hexagon Absolute Arm has a maximum diameter of 4.5 metres. The addition of a photogrammetry system allows for a greater area to be covered by repositioning the arm through a series of station changes, with the photogrammetry system acting as a global referencing system that ties together the multiple coordinate systems delivered by the arm.

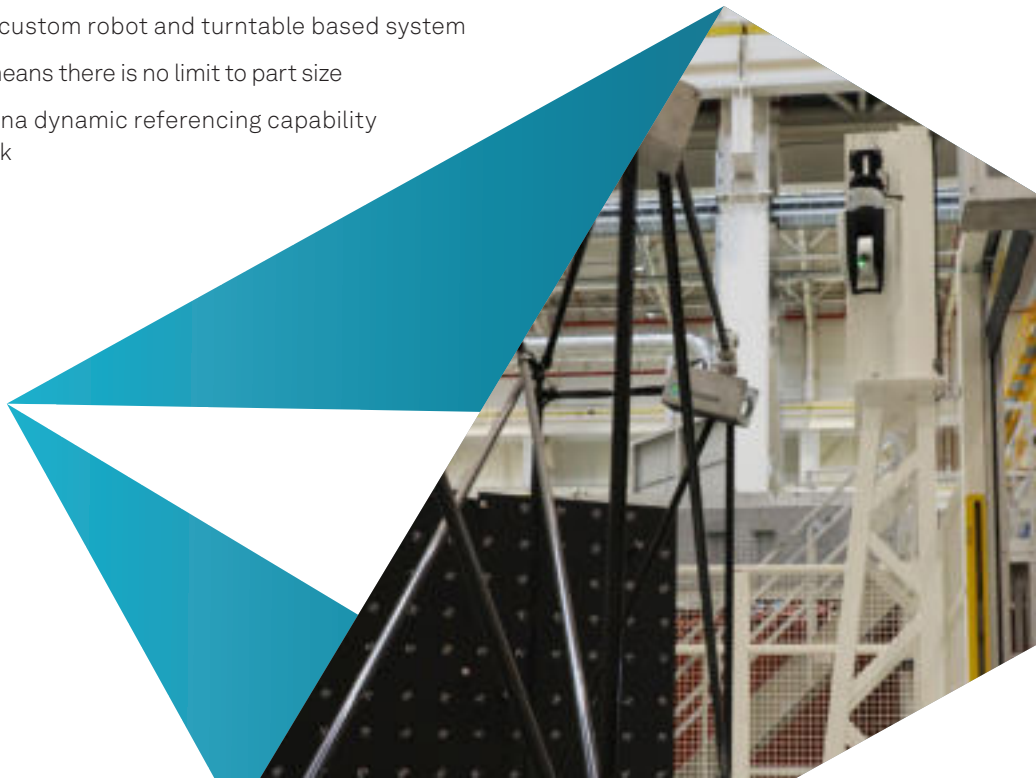
- Targets that can be measured by both an Absolute Arm and a DPA Series camera are used to signalise reference points on the object
- A digital camera from DPA Series takes photos from a variety of directions and angles
- From this data, a point cloud that can be used as a reference system is created
- Areas of the measurement object are scanned by an arm-mounted 3D laser scanner
- The scan data is then matched automatically into the reference

Photogrammetry meets laser tracker

The highly customisable nature of a 3D Arena allows it to be used in conjunction with laser trackers within large integrated measurement and alignment systems, such as might be used in wind energy construction and assembly.

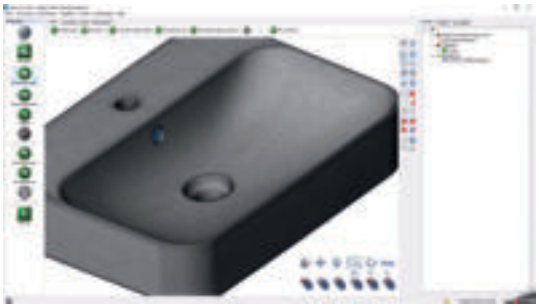
This sort of metrology-assisted assembly system has the potential to deliver large productivity gains when used in combination with a specially designed automation and control system.

- Fixed wide-angle laser tracker targets can be used to introduce a coordinate system within which the photogrammetry results can be referenced
- Calibration is automatable using a custom robot and turntable based system
- Flexibility of the 3D Arena concept means there is no limit to part size
- Live results provided by the 3D Arena dynamic referencing capability is ideal for assembly alignment task



OptoCat software

A dedicated scanning software solution



From 3D scanner calibration and data capture through to post-processing and evaluating measurement data, OptoCat is all the software needed for three-dimensional surface measurement. Featuring a diverse range of metrology functions, the innovative OptoCat modular software package allows users to develop a personally configured setup best suited to the needs of their specific measurement task.

Within the software, individual scans are automatically aligned and merged, with or without photogrammetric targets. The program uses intelligent algorithms to evaluate the geometric features of the scanned object, so there is no longer any need to align the individual scans to each other manually.

Built-in OptoCat functions make it easier to post-process captured 3D data, including functions such as flattening, compressing and optimising meshes, texturing, and data export. In addition to performing its own inspection, the program has the option to link directly to a variety of leading third-party metrology software platforms for an optimised, interactive and/or automatic evaluation. Measurement results can be compared directly or to imported CAD data. The software offers various functions for data analysis, edge extraction and other post-processing steps. Scan data can also be exported into a variety of formats for further processing.

OptoCat modules

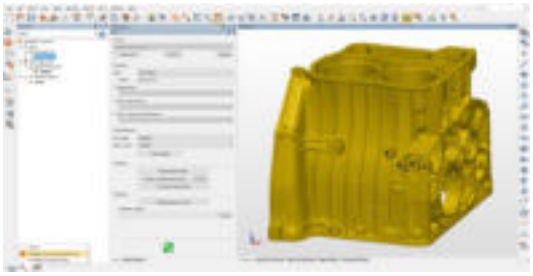
Standard modules	
Calibration	Calibration of the scanner using a certified reference.
Contour Matching	Alignment of the individual scans via object geometry.
Target Matching	Alignment of the individual scans via target, with or without photogrammetry.
Semi-Automatic Scanning	With a turntable or a turn-tilt unit.
Data Processing	Hole filling, compressing, filtering.
Basic Inspection Functionalities	Basic functions for data analysis and data comparison. Various alignment strategies: automatic and manual pre-alignment; shape alignment using Best-Fit; Best-Fit via reference points; 3-2-1; plane-line-point.
Add-on modules	
Ext. Ref. Matching (DPA add-on)	Photogrammetry for precise recognition of targets and for alignment with predefined reference point clouds.
MI.Probing	For tactile measurements with the MI.Probe mini, supplied with MI.Probe accessories.
CAD Data Import	Importing of various CAD formats: STEP, IGES, Catia V4, V5, V6.
Back Projection	Colour back projection of test results and information onto the measurement object with StereoScan neo.
Texture Mapping	Capturing and transfer of the texture (colour and pattern) of an object to its scanned 3D data.

Other functions

- Data import: STL, PLY, CTR, IGES | IGS, STEP | STP, PRT, MODEL, VDA, OBJ, ASCII | ASC, SDF
- Data export: STL, PLY, CTR, OBJ, ASCII | ASC, SDF
- Inspection functions, scalable false colour depiction for data comparison, fitting and comparison with various basic shapes (e.g. plane, cylinder, sphere)
- Construction: multi-cuts, distances, angles
- Various user levels available
- Interface with PC-DMIS, Inspire, REcreate, PolyWorks® and Geomagic Control X for automatic inspection
- Interface with VISI Reverse and Geomagic Design X for reverse engineering

SLS plug-ins

Deep third-party integration



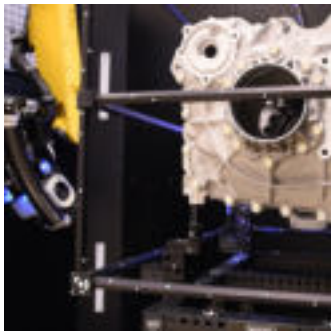
Our structured light scanner software development kit (SDK) was developed to allow for the deep integration of key functionalities of Hexagon's range of structured light scanners within the leading third-party metrology software platforms on the market.

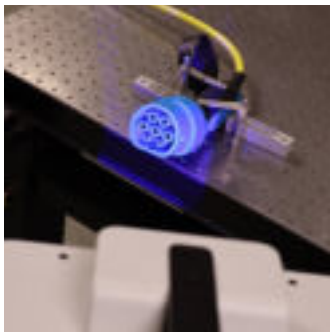
The first result of the publication of this SDK is the SLS-PW Plug-in, an add-on for PolyWorks developed in cooperation with publisher Innovmetric. Equivalent plug-ins have subsequentlybeen developed for Geomagic ControlX and Geomagic DesignX.

These plug-ins let users streamline their scanning and inspection workflow into a single software environment, with clear productivity benefits. The increased efficiency of a single platform workflow will reduce inspection times by eliminating the need to export and import measurement data between separate programs, as well as by minimising training needs.

Applications

Hexagon photogrammetry and structured light systems are suited for a wide range of applications



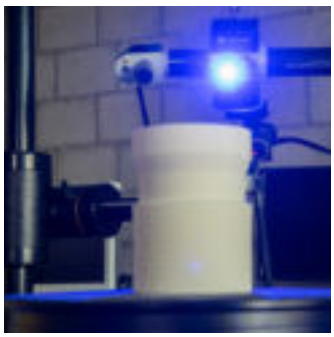


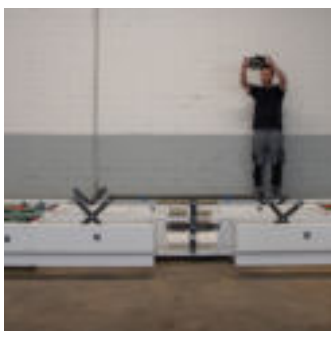
Quality control

Reverse engineering

Roundness inspection

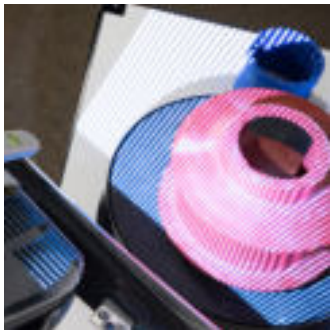
Deformation analysis

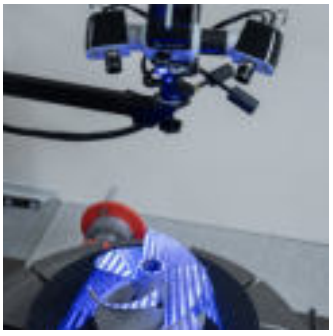


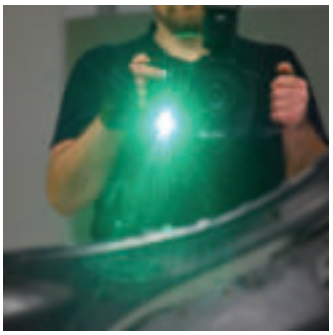


Sheet-metal inspection

Fixture inspection





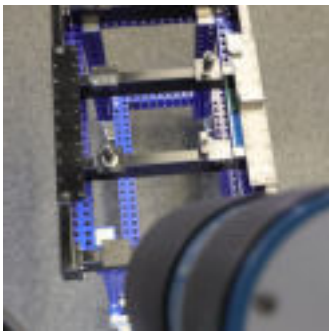


Tolerance analysis

Machine part measurement

CAD comparison

Part alignement

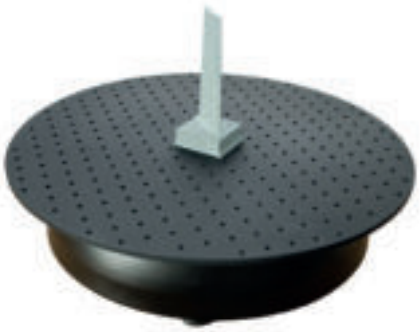


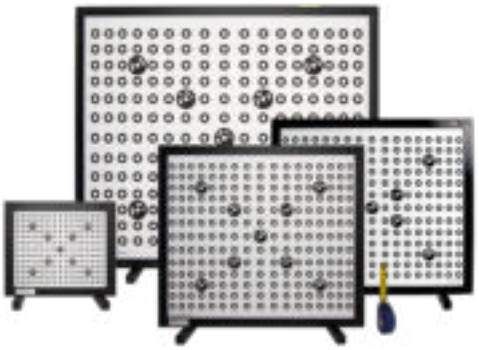
Referencing for other measurement systems

Accessories

Making the most of photogrammetry and structured light systems

- TurnTable
- TurnTilt Unit
- Scan Station 3D
- ScanTable
- Stands
- Tripods
- Fixture set
- Targets
- Scale bars
- Scale crosses
- Igloos
- Adaptor cubes
- Angle adaptors
- Transportation cases





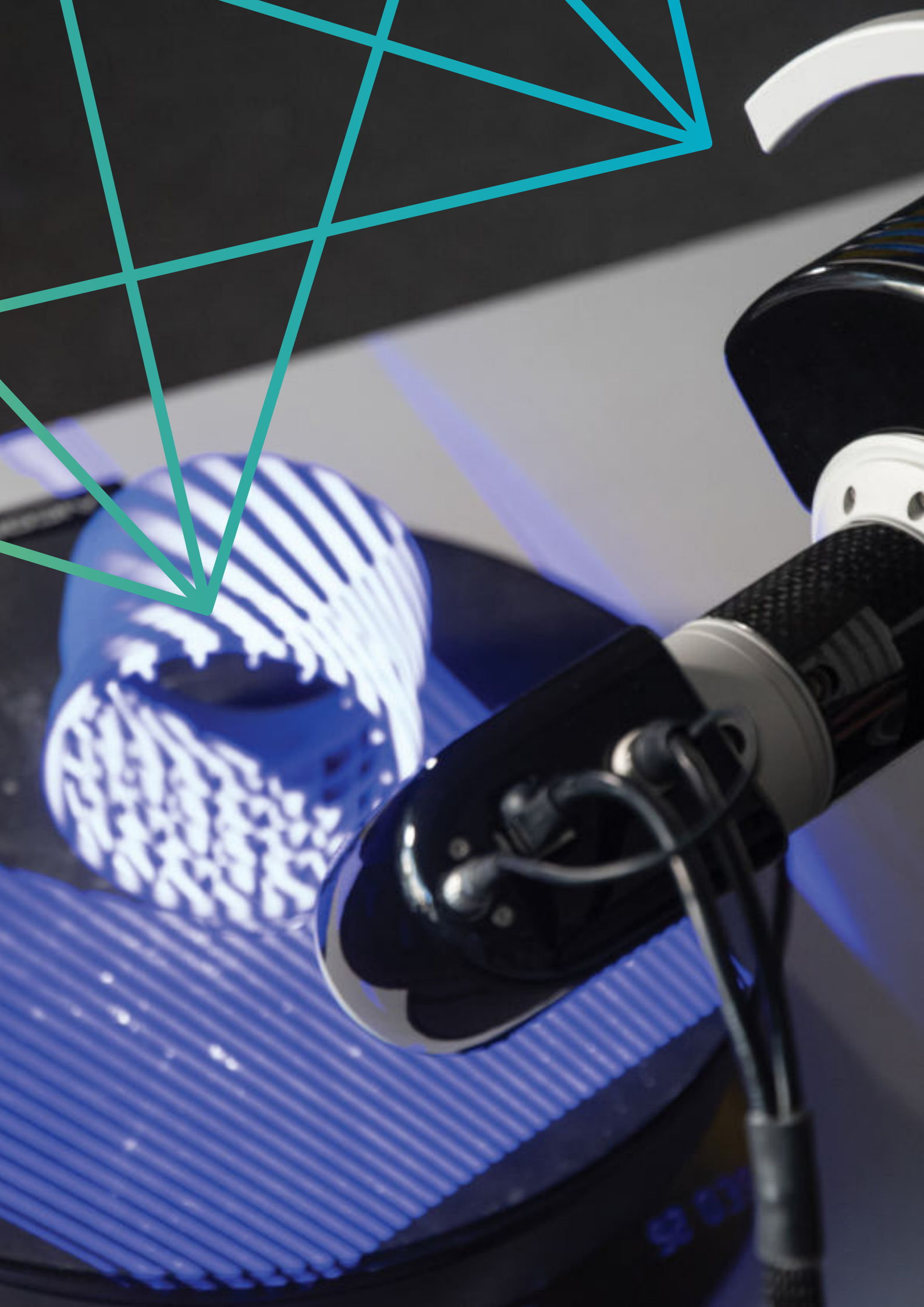
Driven by a truly end-to-end approach to innovation, Hexagon's wide range of accessories for Phogrammetry and Structured Light products reaches from added functionality to improved productivity while covering every need in between.

Hexagon's Manufacturing Intelligence online shop offers a streamlined search, order and delivery service for a wide range of accessories and spare parts in many countries worldwide.

Whether you're buying single items or in bulk, shop.hexagonmi.com takes the time and stress out of securing the measuring equipment you need.

Please direct any questions about Hexagon products or accessories to an authorised local sales representative to receive guidance and assistance in making an appropriate purchasing decision.

Visit our shop



Accuracy

Defining accuracy

Having a reliable basis for the stated accuracy of our structured light scanning systems is vital. That's why we measure every scanner against our defined Scanner Acceptance Test. Based on VDI/VDE Guideline 2634 Part 3, this Scanner Acceptance Test uses four clear quality parameters to ensure users have full confidence in the accuracy of their Hexagon structured light scanner.

Sphere spacing error [SD]

Global quality parameter. Deviation from distance of fitted spheres to calibrated distance.

Length measuring error [E]

Global quality parameter. The deviation of the nearest points along the centre axis.

Probing error form [PF]

Local quality parameter. Deviation from the surface to a fitted sphere.

Probing error size [PS]

Local quality parameter. Deviation from the fitted sphere radius to the calibrated radius.

DAkkS accreditation

Hexagon photogrammetry solutions are produced and accredited in a DAkkS-certified calibration laboratory according to DIN EN ISO/IEC 17025:2018. This allows the DPA Series products to be delivered with a DAkkS certificate upon request. DAkkS accreditation means that calibration methods, services and system accuracy are confirmed by an trusted independent institution.

Technical specifications

Scanner configurations

	StereoScan neo R16.2	SmartScan R5	SmartScan R12	PrimeScan R5	PrimeScan R8
Camera sensor	Monochrome, CMOS, 4/3”	Monochrome CMOS, 2/3”	Monochrome CMOS, 1.1”	Monochrome, CMOS 2/3”	Monochrome, CCD 1”
Camera resolution	16.8 MP 5472 x 3084	5.1 MP 2464 x 2056	12.4 MP 4112 x 3008	5.0 MP 2448 x 2048	8.0 MP 3264 x 2448
Projection unit	Digital projector	Miniaturised projection technique			
Light source	3 x 100 W high-power LEDs (red + green + blue)	100 W high-power LED (blue)			
Min. measuring time	1 s				
Operating temperature	0 to 50 °C ambient (without condensation)				
Sensor weight	12 kg*	4 kg		3.8 kg	
Power supply	Internal, AC 110/230 V, 50-60 Hz, 600 W	External, AC 110/230 V, 50-60 Hz, 150 W			
Control unit	Integrated, USB 3.0	External, USB 2.0		Integrated, USB 3.0	
Operating system	Windows 10, 64 Bit				
Probing	Compatible with MI.Probe mini				

*Weight may vary depending on the measuring fields.

Measurement specifications

StereoScan neo R16.2

R16.2 models

Outer camera position	Triangulation angle: 30° Base length: 450 mm Working distance: 840 mm			
Field of view [1]	L – 350 mm	L – 500 mm	L – 850 mm	L – 1000 mm
Field of view size [2]	295 x 165 mm	445 x 255 mm	730 x 440 mm	890 x 545 mm
Measuring depth [3]	175 mm	250 mm	420 mm	500 mm
X, Y resolution [4]	55 µm	83 µm	143 µm	180 µm
Sphere spacing error	10 µm	16 µm	30 µm	32 µm
Length measuring error	20 µm	28 µm	60 µm	64 µm
Probing error size	6 µm	12 µm	16 µm	18 µm
Probing error form	7 µm	12 µm	16 µm	18 µm

Inner camera position	Triangulation angle: 30° Base length: 150 mm Working distance: 350 mm		
Field of view [1]	S – 75 mm	S – 125 mm	S – 200 mm
Field of view size [2]	70 x 40 mm	105 x 60 mm	170 x 110 mm
Measuring depth [3]	36 mm	54 mm	100 mm
X, Y resolution [4]	12 µm	19µm	33 µm
Sphere spacing error	5 µm	7 µm	8 µm
Length measuring error	10 µm	15 µm	18 µm
Probing error size	6 µm	7 µm	6 µm
Probing error form	5 µm	6 µm	7 µm

All StereoScan neo and SmartScan fields of view (FOV) can be realised by using the same fundamental components, i.e. the system base, cameras and projection unit, through a simple change of the objectives (and of the CRP base, if necessary). In order to simplify the setup and calibration of the standard measuring ranges, they will only be provided with an individually prepared and tested set of lenses for each FOV. The lenses are delivered with a predefined factory setting for the aperture and focal depth, which are optimised for the corresponding FOV and do not need to be altered by the user.

Measurement specifications

SmartScan

R5 models

	Triangulation angle: 27° Base length: 470 mm Working distance: 1000 mm			
Field of view [1]	M – 125 mm	M – 200 mm	M – 500 mm	M – 850 mm
Field of view size [2]	105 x 85 mm	160 x 130 mm	380 x 310 mm	650 x 565 mm
Measuring depth [3]	66 mm	100 mm	244 mm	420 mm
X, Y resolution [4]	43 µm	64 µm	153 µm	266 µm
Sphere spacing error	10 µm	11 µm	22 µm	44 µm
Length measuring error	20 µm	22 µm	44 µm	88 µm
Probing error size	7 µm	9 µm	11 µm	22 µm
Probing error form	7 µm	8 µm	11 µm	22 µm

	Triangulation angle: 30° Base length: 240 mm Working distance: 370 mm		Triangulation angle: 20° Base length: 470 mm Working distance: 1500 mm	
Field of view [1]	S – 60 mm	S – 125 mm	L – 750 mm	L – 1550 mm
Field of view size [2]	50 x 40 mm	100 x 80 mm	560 x 470 mm	1200 x 750 mm
Measuring depth [3]	30 mm	60 mm	360 mm	750 mm
X, Y resolution [4]	20 µm	40 µm	230 µm	485 µm
Sphere spacing error	5 µm	7 µm	61 µm	220 µm
Length measuring error	10 µm	14 µm	122 µm	440 µm
Probing error size	6 µm	7 µm	31 µm	110 µm
Probing error form	5 µm	7 µm	31 µm	110 µm

R12 models

	Triangulation angle: 27° Base length: 470 mm Working distance: 1000 mm			
Field of view [1]	M – 350 mm	M – 450 mm	M – 750 mm	M – 1000 mm
Field of view size [2]	285 x 205 mm	380 x 275 mm	590 x 435 mm	825 x 630 mm
Measuring depth [3]	180 mm	240 mm	370 mm	500 mm
X, Y resolution [4]	69 µm	92 µm	143 µm	201 µm
Sphere spacing error	16 µm	20 µm	30 µm	44 µm
Length measuring error	36 µm	40 µm	60 µm	88 µm
Probing error size	9 µm	10 µm	15 µm	22 µm
Probing error form	9 µm	10 µm	15 µm	22 µm

	Triangulation angle: 29° Base length: 260 mm Working distance: 500 mm			
Field of view [1]	SL – 90 mm	SL – 200 mm	SL – 300 mm	SL – 500 mm
Field of view size [2]	70 x 55 mm	145 x 105 mm	240 x 160 mm	420 x 325 mm
Measuring depth [3]	44 mm	90 mm	144 mm	250 mm
X, Y resolution [4]	17 µm	35 µm	57 µm	102 µm
Sphere spacing error	6 µm	9 µm	12 µm	21 µm
Length measuring error	15 µm	18 µm	24 µm	42 µm
Probing error size	6 µm	6 µm	8 µm	15 µm
Probing error form	6 µm	6 µm	8 µm	15 µm

[1] Designation of the scanner bases (S, SL, M, L,) and the diagonal in the centre of the measuring volume.
[2] Lateral expansion (X x Y) in the centre of the measuring volume.
[3] Depth of the measuring volume (Z).
[4] The values for the lateral resolution have been calculated theoretically (ratio of the size of the FOV and number of pixels of the camera chip).

Measurement specifications

PrimeScan

R5 models

	Short working distance Triangulation angle: 26° Working distance: 370 mm				Long working distance Triangulation angle: 18° Working distance: 540 mm
Field of view	50 mm	125 mm	200 mm	400 mm	700 mm
Field of view size [1]	40 x 30 mm	100 x 80 mm	150 x 125 mm	300 x 275 mm	500 x 450 mm
Measuring depth [2]	24 mm	64 mm	100 mm	200 mm	350 mm
X, Y resolution [3]	16 µm	40 µm	63 µm	125 µm	208 µm
Sphere spacing error	4 µm	7 µm	12 µm	20 µm	56 µm
Length measuring error	10 µm	16 µm	24 µm	40 µm	112 µm
Probing error size	6 µm	6 µm	6 µm	10 µm	28 µm
Probing error form	4 µm	6 µm	7 µm	10 µm	28 µm

R8 models

	Short working distance Triangulation angle: 26° Working distance: 370 mm		Long working distance Triangulation angle: 18° Working distance: 540 mm
Field of view	100 mm	450 mm	650 mm
Field of view size [1]	80 x 60 mm	350 x 290 mm	500 x 400 mm
Measuring depth [2]	50 mm	222 mm	320 mm
X, Y resolution [3]	27 µm	109 µm	155 µm
Sphere spacing error	6 µm	25 µm	52 µm
Length measuring error	14 µm	50 µm	104 µm
Probing error size	8 µm	13 µm	26 µm
Probing error form	6 µm	13 µm	26 µm

All PrimeScan fields of view (FOV) are an integral part of the system: their configuration cannot be changed. Each field of view is delivered as a separate device.

[1] Lateral expansion (X x Y) in the centre of the measuring volume.
[2] Depth of the measuring volume (Z).
[3] The values for the lateral resolution have been calculated theoretically (ratio of the size of the FOV and number of pixels of the camera chip).

Specifications DPA Series

Hardware configurations

Accuracy specifications

	DPA Industrial	DPA Professional	DPA Entry
Length measurement accuracy | MPE[1]	15 µm + 15 µm * $Length_{diagonal}$ [m]	15 µm + 15 µm * $Length_{diagonal}$ [m]	25 µm + 25 µm * $Length_{diagonal}$ [m]
Point-based measurement accuracy	2 µm + 5 µm/m (RMS) 3 µm + 7 µm/m (3 sigma)	2 µm + 5 µm/m (RMS) 3 µm + 7 µm/m (3 sigma)	4 µm + 6 µm/m (RMS) 5 µm + 9 µm/m (3 sigma)

[1] MPE (Maximum Permissible Error) of length measurement error, based on VDI/VDE 2634 part 1: defined as maximum permissible deviation of a measured length, which is located between two measuring points, signalised with photogrammetric targets, in the entire measuring volume of the measuring object, regardless of the position and orientation.

Software specifications

	DPA Industrial	DPA Professional	DPA Entry
Photogrammetric processing	DPA/DPA Pilot	DPA/DPA Pilot	DPA/DPA Pilot
Control software interfaces for post-processing and reporting	AICON 3D Studio, PolyWorks, SpatialAnalyzer, Metrolog X4		
Automatic on-the-job calibration	Yes	Yes	Yes
Online calculation	Yes	Optional	Not supported
Deformation analysis	Yes	Optional	Optional
Adaptor correction	Yes	Optional	Optional
Feature measurement	Yes	Optional	Optional

Technical specifications

Camera specifications

	DPA Industrial	DPA Professional	DPA Entry
Sensor unit	C1 Camera	Canon EOS R	Canon EOS 6D
Lens	28 mm AICON metric wide-angle lens	28 mm AICON metric wide-angle lens	28 mm standard wide-angle lens
Camera resolution	50.6 MP (8688 x 5792)	30.3 MP (6720 x 4480)	20.2 MP (5472 x 3648)
Field of view (FoV)	65 x 46°	65 x 46°	65 x 46°
Illumination	White-light flash	White-light flash	White-light flash
Speed	Up to 5 images per second	Up to 8 images per second	Up to 4 images per second
Viewfinder	Laser pattern, laser safety class 1M Diopter	Diopter	Diopter
Wireless data transfer	Integrated WiFi 802.11n/ 2.4 GHz/WPA2/PSK	Optional	Not supported
Power supply	System internal Li-ion battery (more than 5000 shots)	Li-ion battery	Li-ion battery

Interface and connectivity

	DPA Industrial	DPA Professional	DPA Entry
Processing unit	High-end notebook	High-end notebook	Notebook
Operating system	Microsoft Windows 11 approved, Windows 10 and Windows 7	Microsoft Windows 11 approved, Windows 10 and Windows 7	Microsoft Windows 11 approved, Windows 10 and Windows 7
Connectivity	WiFi, ethernet via RJ45 connector, removable SD card	Removable storage device (SD or CF card), USB cable; WiFi optional	Removable storage device (SD or CF card), USB cable
Control modes	Manual trigger Remote-control trigger	Manual trigger Remote-control trigger	Manual trigger

Geometric specifications

	DPA Industrial	DPA Professional	DPA Entry
Dimensions	300 x 100 x 170 mm	215 x 120 x 140 mm	245 x 110 x 150 mm
External dimensions, transportation box	570 x 460 x 265 mm	520 x 430 x 250 mm	870 x 230 x 170 mm
Sensor weight	2.8 kg	1.7 kg	1.4 kg
Weight, transportation box (including system)	Approx. 14.5 kg	Approx. 12 kg	Approx. 7.7 kg
Storage	Robust case with trolley	Robust case with trolley	Robust case

Technical regulations

	DPA Industrial	DPA Professional	DPA Entry
Operating temperature	5 to 45°C recommended	5 to 45°C recommended	5 to 45°C recommended
IP protection class	IP51	Not specified	Not specified
Conformity	CE, RoHS	CE, RoHS	CE, RoHS
Calibration and certification	DAkkS certificate for the complete measuring system including scale bars and sensor DAkkS calibrated scale bars, 2 x 1430 mm VDI 2634 page 1 certified system	DAkkS certificate for the complete measuring system including scale bars and sensor DAkkS calibrated scale bars, 1 x 1430 mm, 1 x 830 mm VDI 2634 page 1 certified system	DAkkS certificate for the complete measuring system including scale bars and sensor Factory-calibrated scale cross 800 Opt. VDI 2634 page 1 certified system

PartInspect L specifications

PartInspect L cell specifications

Maximum part height	1500 mm
Maximum part diameter	1500 mm
Maximum part load on turntable	2000 kg
Industrial robot Max. payload Reach	25 kg 1853 mm
Voltage range (different regions)	400 Y/230 V AC (+/-5%), 16 A 50/60 Hz or US/C 480 Y/277 V AC, 120 V AC 60 Hz
Input power	5 kVA
Average power consumption	1.5 kW
Housing dimensions	W 3050 x D 2480 x H 2500 mm
Maximum door opening width	1670 mm
Cell weight	2500 kg
Required ceiling height	3500 mm
Required floor load capacity	400 kg/m²

PartInspect L configuration specifications

	PartInspect L HiRes StereoScan neo R16.2	**PartInspect L Efficient** PrimeScan R5
Field of view	FOV L-350/500/850	FOV 400/700
Camera sensor	Monochrome, CMOS 4/3”	Monochrome, CMOS 2/3”
Camera resolution	16.8 MP 5472 x 3084	5 MP 2448 x 2048
Projection unit	Digital projector	Miniaturised projection technique
Light source	3 x 100 W high-power LEDs (red + green + blue)	100 W high-power LED (blue)
Minimum measuring time	1 s	
Sensor weight	12 kg [1]	3.8 kg
Power supply	Internal, AC 110/230 V, 50-60 Hz, 600 W	External, AC 110/230 V, 50-60 Hz, 50 W
Control unit	Integrated, USB 3.0	
Operating system	Windows 10, 64 Bit	

DPA Online accuracy

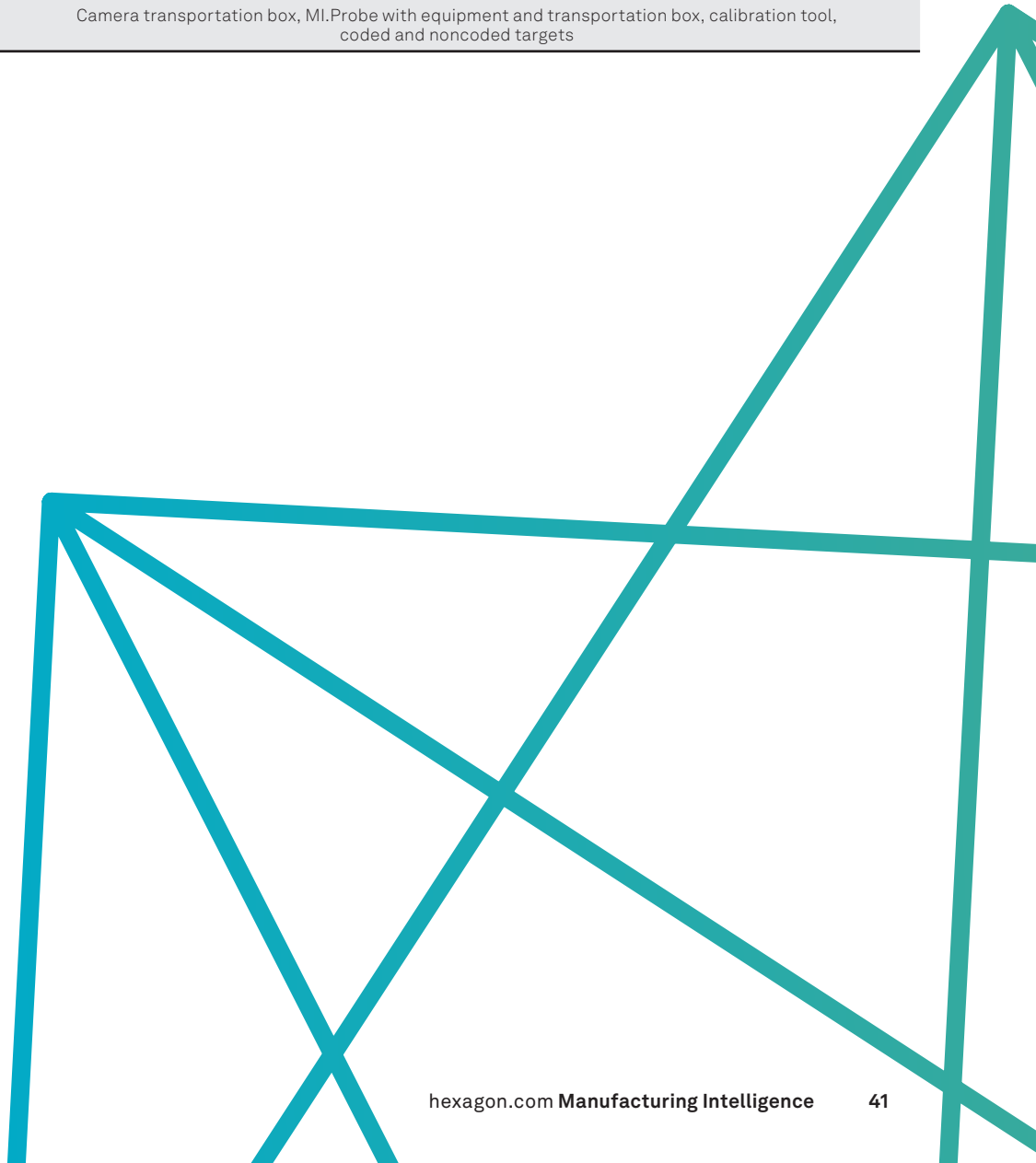
Length measurement accuracy	MPE[2] 20 µm + 20 µm/m (diagonal length of measurement volume)

[1] Weight may vary depending on the measuring fields.
[2] Maximum Permissible Error of length measurement accuracy, based on VDI/VDE 2634 part 1: defined as maximum permissible deviation of a measured length, which is located between two measuring points, signalised with photogrammetric targets, in the entire measuring volume of PartInspect L, regardless of position and orientation.

Specifications 3D Arena

Hardware specifications

	3D Arena
Sensor resolution	8 MP XR cameras
Protection class	IP65
Illumination	Internal infrared illumination, independent from environmental lighting, operator is not disturbed by visible flashing
Operating temperature	5 to 45°C room temperature (without condensation)
Operating humidity	10-90%
Camera frame size	Depends on selected package
Camera array weight	Depends on selected package (<25 kg for 4-camera setup)
MI.Probe weight	850 g (without extension)
Control unit	Syncbox for up to 4 XR cameras, external synchronisation, power supply 90-240 V (quantity depending on selected package)
Processing unit	High-end notebook (industrial PC possible) with Microsoft® Windows® 10 (64 Bit)
Accessories	Camera transportation box, MI.Probe with equipment and transportation box, calibration tool, coded and noncoded targets



Service and support

World-class products to rely on

Drawing on decades of research and development experience, photogrammetry and structured light technology from Hexagon's Manufacturing Intelligence division is built on a long history of outperforming technological innovation. Deriving quality from experience to drive productivity is what keeps Hexagon in front and able to deliver first-class solutions for industries around the world.

Along with the assurance of five years of serviceability, owners of Hexagon photogrammetry and structured light technology systems benefit from a minimum 12-month factory warranty as standard – our guarantee that our technology will always meet the needs of our users.

World-class support delivered locally

The international presence of Hexagon guarantees comprehensive aftersales support and services across the globe. With the largest dedicated service team of any metrology equipment manufacturer and an emphasis on locally delivered solutions, Hexagon is unmatched from service, repair, certification and calibration through operator training and software maintenance and upgrades.

● Customer and demo centre ○ Production facility

World-class service made simple

Hexagon offers a wide range of support services extending well beyond the point of purchase. Delivered by experienced and skilled engineers at ISO-certified laboratories, local Hexagon Precision Centres or even on-site to minimise downtime, our after-sales portfolio is the most complete on the market.

- Maintenance and warranty plans that ensure equipment availability.
- Trouble-free usage and minimal downtime.
- Preferred hotline access at no additional cost.
- Access to professional advice whenever needed.

Customer Care Packages

Owners of the Hexagon structured light scanning and photogrammetry products featured in this brochure also have the opportunity to invest in a Customer Care Package designed to ensure equipment remains in top condition and can be relied on for accurate measurement results throughout a lifetime of use.

Customer Care Packages include a selection of the following benefits, depending on the tier chosen.

	Platinum	Gold	Silver	Bronze
Planned annual service	✓	✓	✓	✓
Customer hardware support	✓	✓	✓	
Software support and software updates	✓	✓	✓	
Annual maintenance and recertification	✓	✓		
Remote connected assistance	✓	✓		
Repair parts and labour	✓			
Customised local benefits	✓	✓	✓	✓

For complete details of the benefits of each level of Customer Care Package, please contact a local Hexagon representative.

Hexagon is a global leader in digital reality solutions, combining sensor, software and autonomous technologies. We are putting data to work to boost efficiency, productivity, quality and safety across industrial, manufacturing, infrastructure, public sector, and mobility applications.

Our technologies are shaping production and people-related ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon's Manufacturing Intelligence division provides solutions that use data from design and engineering, production and metrology to make manufacturing smarter.

Learn more about Hexagon (Nasdaq Stockholm: HEXA B) at hexagon.com and follow us @HexagonAB.

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