WENZEL®
ScanTec

The Mobile CNC Measurement and 3D Scanning System

WENZEL ScanTec MobileScan3D

MobileScan3D

What is it and how does it work?

MobileScan3D is a truly mobile CNC laser scanning solution allowing fully automatic reverse engineering and part inspection verification to occur. Its portability and rapid setup provides a unique opportunity to scan on location without the tedious and time consuming effort required by the current portable arm scanning solutions.

MobileScan3D from Wenzel ScanTec represents a productivity breakthrough for the reverse engineering sector. In addition, since the system offers full CNC automatic scanning, the accuracy of the acquired dataset is significantly enhanced over the same data acquired using portable arm systems and provides automatically structured and ordered data minimizing subsequent data "cleanup" and processing time.

'Blu-Scan' blue laser scanning sensor has been implemented into Mobile Scan3D. The new 'Blu-Scan' sensor projects a much finer line than the previous generation

The Mobile CNC Measurement and 3D Scanning System

MobileScan3D comprises of a 2 axis CNC swivel head providing B and C rotational axes; the scanning sensor is mounted to the swivel head using a "quick-change" adaptor minimizing changeover times between the three available sensors. Sensor variants have a measuring range of 100, 400 and 1000mm and a respective average laser line length of 43, 185 and 270mm. Scanning accuracy down to 10 microns can be achieved with the system. The density of scanned lines can be controlled by programming the velocity of the B and C axes of the swivel head. Integral thermal sensors, with environmental control, ensure scanned data-set accuracy; the sensor body is manufactured from carbon fiber eliminating any thermal growth due to heat generated from the laser source. The sensor outer-casing is independently mounted allowing isolation from the sensor optics and electronics eliminating the potential for calibration errors caused by rough system handling during transit.

100mm sensor for accurate scanning and measurement

400mm and 1000mm sensor for large depth of field applications

Light weight mobile and portable tripod for fast setup and scanning

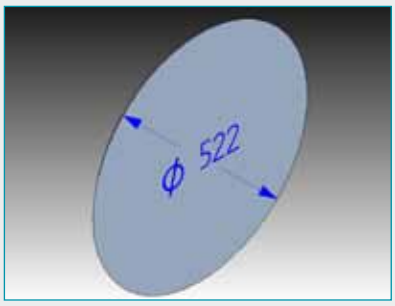
The sensors are interchangeable and can be switched in a few minutes without the need to recalibrate the system.
The sensor ranges are 100mm, 400mm and 1000mm, with respective accuracies of +/- 0.01mm, +/- 0.05mm and +/- 0.15mm.

The addition of a rotary table (optional), provides 3 axis of CNC motion and enhances the system for fast part scanning. Just define your scan path and then let the CNC rotary table rotate by angular increment; this dramatically decreases the scanning time for a large array of parts.

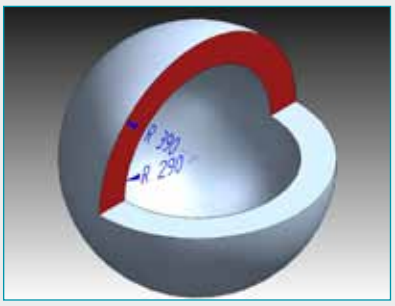
of red laser sensors. It has also a higher resolution and is much more tolerant to surface textures. The distinct advantages over red laser technology are more power, constant laser line thickness through the measurement area and less speckle due its shorter wavelength which also provides much improved focus and a thinner projection line. To the end user all of the above means higher data collection rates, higher resolution data and more accurate processed images."

Measuring Ranges

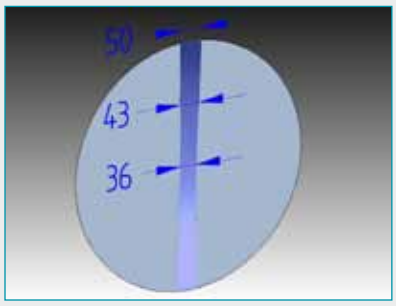
100mm Sensor



Diameter 522mm

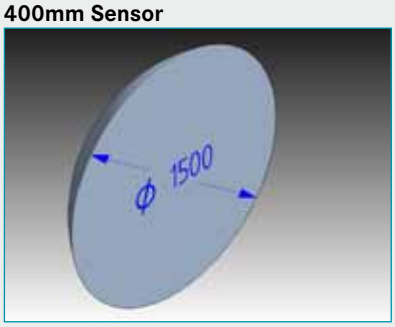


Radial Measurement Area 290-390mm



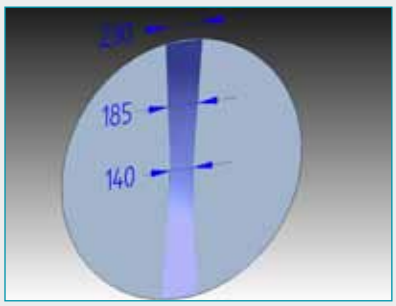
Laser Line Length 36-50mm

400mm Sensor



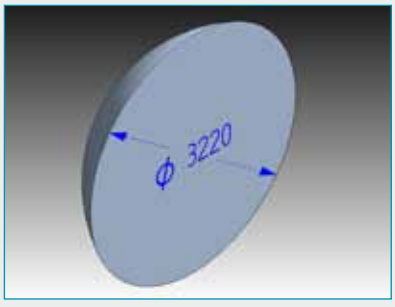
Diameter 1500mm

Radial Measurement Area 500-900mm



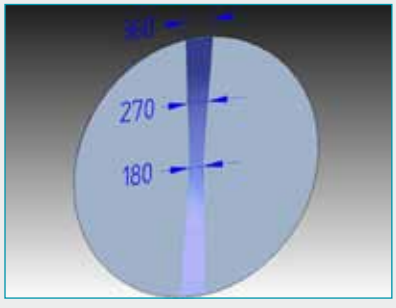
Laser Line Length 140-230mm

1000mm Sensor



Diameter 3220mm

Radial Measurement Area 800-1800mm

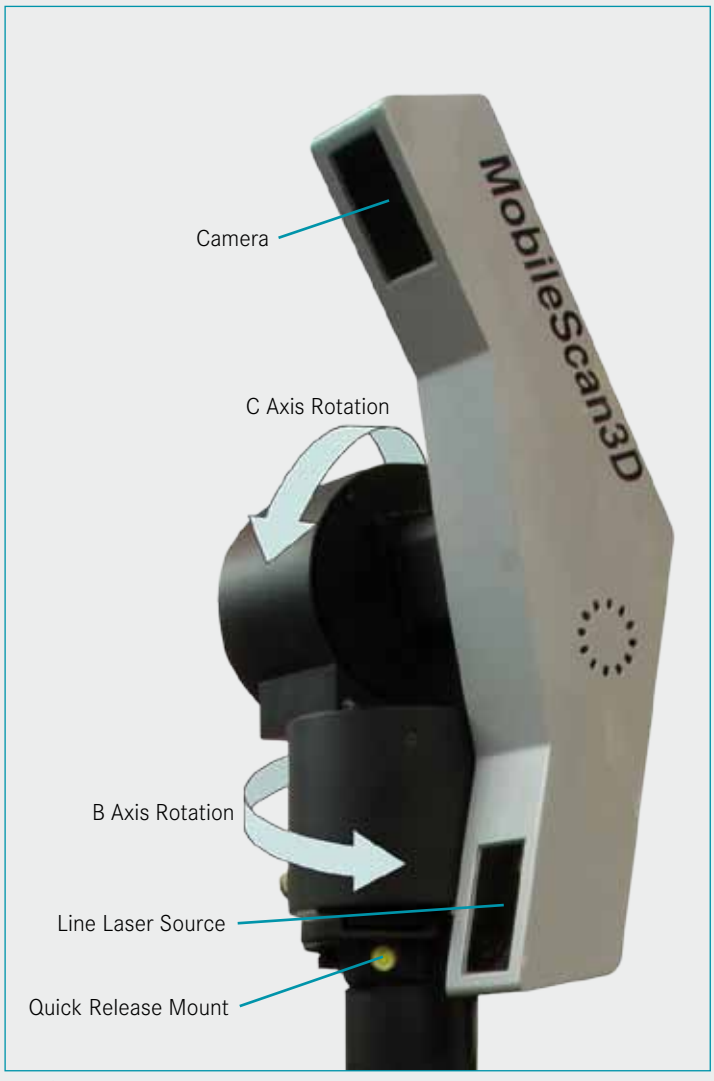


Laser Line Length 180-360mm

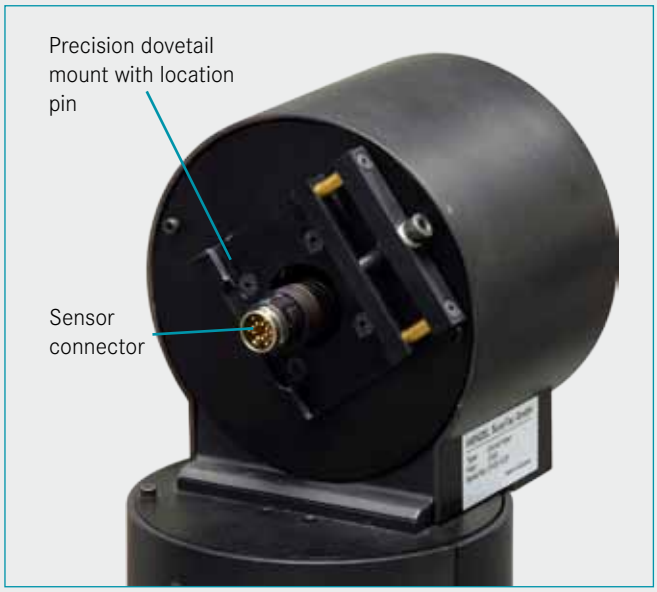
MobileScan3D

The Components

The 400mm and 1000mm sensors have the same size and physical appearance. The precision components are built on a separate carbon fibre substrate which eliminates small knocks impacting on the sensors accuracy. The components, which comprise of line laser source and camera, are all housed in protective lightweight outer case which has a built in fan and temperature sensors to maintain a stable and constant temperature within. The size and width of the sensor enables a good triangulation which in turn also provides a very large depth of field. This eliminates the need to maintain a set distance to the component being scanned, which is often a problem for most manual hand held scanner systems.



400/1000mm sensor



2 Axis full CNC factory calibrated wrist

100mm sensor

360 Degrees of precision CNC motion

MobileScan3D comprises the 2 axis CNC swivel head housed in the main body which has precision rotary encoders and very precise positioning motors. Standard “Quick Click” precision tripod mount enables fast and easy mounting of the swivel head. Each of the 3 scanning sensors are attached in a few seconds. To scan simply initialize the homing sequence and the system is ready to commence data collection. Each sensor is software configurable for two point spacing densities, 512 or 1024 points per line. The accuracies for each sensor are stated on the next page.

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MobileScan3D Sensor Technical Data (all units in mm)

Sensor 100mm	Points/ Line	Line Length			Point Spacing per Line			Accuracy	Offset Distance
		Start	Mid	End	Start	Mid	End		
100 High Speed	512	36	43	50	0.070	0.084	0.100	0.02	290
100 High Mix	512	36	43	50	0.070	0.084	0.100	0.01	290
100 High Res	1024	36	43	50	0.035	0.042	0.049	0.01	290

Sensor 400mm	Points/ Line	Line Length			Point Spacing per Line			Accuracy	Offset Distance
		Start	Mid	End	Start	Mid	End		
400 High Speed	512	140	185	230	0.273	0.361	0.449	0.10	570
400 High Mix	512	140	185	230	0.273	0.361	0.449	0.05	570
400 High Res	1024	140	185	230	0.136	0.180	0.224	0.05	570

Sensor 1000mm	Points/ Line	Line Length			Point Spacing per Line			Accuracy	Offset Distance
		Start	Mid	End	Start	Mid	End		
1000 High Speed	512	180	270	360	0.351	0.527	0.703	0.30	800
1000 High Mix	512	180	270	360	0.351	0.527	0.703	0.15	800
1000 High Res	1024	180	270	360	0.175	0.263	0.351	0.15	800

Speed - High Speed = 100 lines/sec	Speed - High Mix = 50 lines/sec	Speed - High Res = 25 lines/sec

Mains	Commercial AC 85 V to 240 V, 50 to 60 Hz
Interface	USB 2.0, FireWire (IEEE 1394)
Operating Temperature	10-50°C, built in temperature sensor
Laser Line Sensor	Class 3R
Line Resolution	512 or 1024 points/line
Measurement speed	from 25 to 100 lines/second
Swivel Axis (B+C)	360° continuous (each axis)
Max. Speed	360°/sec

Rotary Table

Rotation	360° continuous
Accuracy	0.002°
Max. Speed	360°/sec
Max. Weight	75 kg

MobileScan3D

Typical Applications

The strengths of MobileScan3D are revealed by specific applications. The depth of potential applications are too numerous and varied; a few examples of specific applications are shown to highlight its advantages.

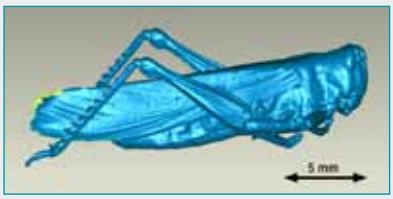
MobileScan3D can be used for numerous applications; here the rotary table is being used to rotate the part and perform a complete scan pass which provides all scans in the same coordinate system. Since the whole system is fully CNC, it ensures that the results are accurate and repeatable; acquired scanned data from competitive manual systems is operator dependent. Not so with MobileScan3D.

Typical setup for 100mm sensor

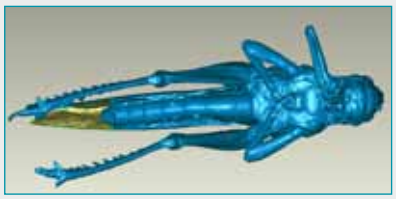
100mm Sensor

Parts scanned with 100mm sensor at high resolution.

100mm sensor



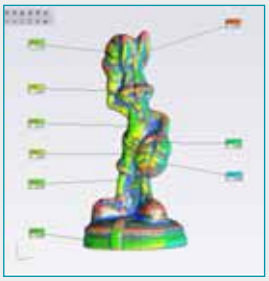
Grasshopper 20mm long



Scanned in natural form, no coating!

Raw scanned data

Contour map data

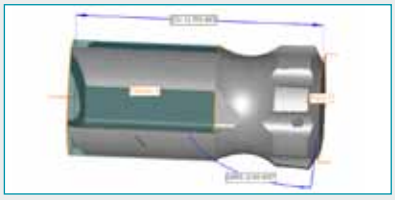


Comparison data

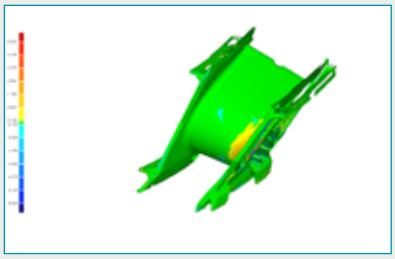
400mm Sensor

Typical of parts that need to be replicated and at time of original manufacturing no CAD existed.

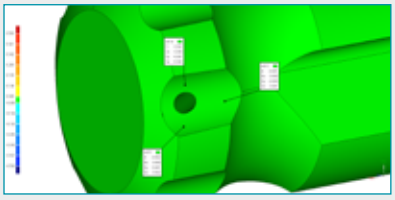
400mm and 1000mm sensor



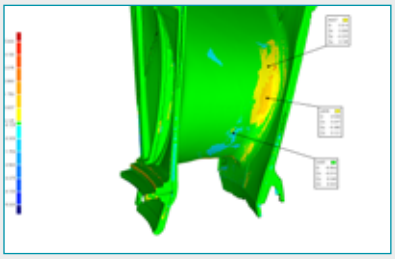
Mining industry drill bit reverse engineered by scanning



Scanned NGV using verification colour mapping comparing the actual scanned data back to the nominal CAD data



Extracted surface point data



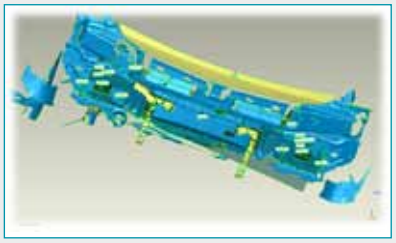
Actual/Nominal point comparison

1000mm Sensor

Each MobileScan3D sensor has an incredible depth of field. In this application the 1000mm sensor was used. The acquired data is not easily obtainable with arm based scanners due to accessibility issues based upon their need to get close to the surface being scanned in order to get good data.

MobileScan3D sensor has no issue accessing awkward under body features

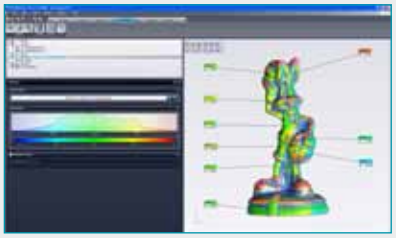
Scan data - Bumper On



Scan data - Bumper Off

Software

MobileScan3D is supplied as standard with our own PointMaster V5 Foundation Scanning Module. Additional application modules can be added at a future point for reverse engineering or verification of scan data against nominal CAD data.
In addition Geomagic Software is supported and fully integrated as a “Plug In” module. No post processing is necessary. Compatibility to other major point cloud software‘s can be evaluated upon request.



PointMaster V5 User Interface

At a glance

MobileScan3D – The most important advantages

- Large measurement volume
- Useable on sloped terrain
- Pneumatic counterbalance system for precise sensor positioning in Z direction
- Aluminium tripod for lightness and durability
- Full CNC operation provides enhanced accurate dataset
- Quick and easy setup in less than 8 minutes
- No attachment of targets to part required
- Impressive depth of field means no need to maintain critical distance to component surface
- Wide angular range means there is no need to be perpendicular to surface to get good accurate data
- Quick sensor changing system enables a small to large measurement volume without need to re-calibrate
- One person transport due to innovative system packaging
- Structured and ordered scanned data set
- Battery pack available for remote locations

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