

Appendix H: 3D scanning systems

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The following table lists 3D scanning and digitizing (CMM, touch probe, and other) systems from around the world. This table is exclusive to the readers of *Wohlers Report 2016* and is not published elsewhere. All company information and product specification data is subject to change. Please refer to the company websites for additional information. The company websites were live as of February 2016.

The following abbreviations are used in the table.

acc	accuracy	h	height	obj	object
acq	acquisition	horiz	horizontal	pos	position
approx	approximately	in	inch(es)	pts	points
CMM	coordinate measuring machine	lp	line pairs	pts/s	points per second
config	configuration	lp/mm	line pairs per mm (image sharpness)	res	resolution
CT	computed tomography	m	meter	rot	rotation(al)
D	depth	max	maximum	s, sec	second(s)
DOF	depth of field	meas	measure, measuring	sec/scan	seconds/scan
DOV	depth of view	min	minimum or minutes (speed column)	SO	stand-off distance
dia	diameter	min/scan	minutes/scan	std	standard
diag	diagonal	mm	millimeter	TOF	time of flight
dist	distance	MP	megapixel	uncal	uncalibrated
dpi	dots per inch (resolution)	ms	millisecond (1/1000 second)	µm	micron, micrometer (10 ⁻⁶ m)
ext	extended	msec	millisecond (1/1000 second)	vert	vertical
feat	feature	mult	multiple	vol	volume
ft	feet	n/a	not applicable, not available	w/	with
FOV	field of view	nom	nominal	W	width
fps	frames per second				

Company	Product	Technology	Work volume	Accuracy ¹	Speed
3D Digital Corp. Danbury, Connecticut 3ddigitalcorp.com	Optix 500H Optix 500L Optix 500M Optix 500S EScan 2.0	laser line triangulation	350-550 mm DOF, 15° FOV 300-900 mm DOF, 30° FOV 300-650 mm DOF, 30° FOV 100-200 mm DOF, 30° FOV 300-650 mm DOF, 40° FOV	± 50-75 µm ± 50-125 µm ± 50-75 µm ± 12-18 µm ± 30-70 µm	not specified not specified not specified not specified not specified
3D Systems Rock Hill, South Carolina 3dsystems.com	Sense Capture Capture Mini	IR structured light structured light	3 m x 3 m x 3 m 192 mm x 120 mm 88 mm x 68 mm	1 mm 0.060 mm 0.034 mm	30 fps 0.3 sec 0.3 sec
3Shape Copenhagen, Denmark 3shape.com	D500 Q700 Q800	laser line triangulation	80 mm dia x 80 mm height	20 µm 16 µm 16 µm	—
Automated Precision, Inc. Rockville, Maryland apisensor.com	Radian RapidScan	tracker structured light	—	better than ± 0.5 ppm not specified	—
Artec Palo Alto, California artec3d.com	Artec Eva Artec Spider Artec Space Spider	structured light triangulation	0.4-1 m 0.2-1 m 0.2-1 m	0.1 mm 0.05 mm 0.05 mm	2,000,000 pts/s 2,000,000 pts/s 2,000,000 pts/s
Breuckmann from AICON Meersburg, Germany breuckmann.com aicon3d.com	stereoSCAN/ smartSCAN	miniaturized projection technique (structured light triangulation)	75-1,100 mm 30 – 1,500 mm	min depth res 2 µm	<1 s/frame <1 s/frame

Company	Product	Technology	Work volume	Accuracy ¹	Speed
Creaform 3D Levis, Quebec, Canada creaform3d.com	METRAscan HANDYIscan GO!Scan	self-positioning laser triangulation	70 – 210 mm 225 – 250 mm 380 – 380 mm	± 0.08 mm to 0.03 mm to 0.10 mm	36,000 pts/s 480,000 pts/s 550,000 pts/s
DataPixel Bilbao, Spain datapixel.com	OptiScan 1015L OptiScan 1040L OptiScan 2080L	laser line scanner laser line scanner laser line scanner	SO 100 mm, DOV 10 mm, FOV 15 mm SO 100 mm, DOV 40 mm, FOV 40 mm SO 200 mm, DOV 4060 mm, FOV 80 mm	± 0.006 mm ± 0.010 mm ± 0.050 mm	60,000 pts/s 60,000 pts/s 60,000 pts/s
Faro Technologies Lake Mary, Florida faro.com	Gage FaroArm (Edge) ScanArm Laser Tracker Focus3D Scanner Cobalt Imager Freestyle	touch probe / gage 6-, 7-axis articulated arms 7-axis arm with laser scanner, ultra-precise laser beam, TOF phase-shift structured light IR structured light	1200 mm sphere varies based on scan arm varies based on scan arm horiz ± 270, vert +75 to -50, max range 110 m dia 120-330 m range (varies based on model) 500 x 350 x 300 mm FOV 8.1m3 / 286 ft3	0.010/500-0.020/500 mm 0.0005 in 2σ: 50 μm to 0.015 mm at 2 m ± 2 mm at 10 m and 25 m 0.225 mm resolution <1.5mm	varies varies 19,200 pts/s angular velocity 180°/s 976.00 pts/s 5M pts/image up to 88,000 pts/s
Fuel3D Greenville, North Carolina fuel-3d.com	Scanify	photometric stereo imaging and stereophotogrammetry	35 cm diagonal	Not specified	0.1 sec per scan
Geodetic Systems Melbourne, Florida geodetic.com	V-STARs S, M, D, N Pro-Spot	photogrammetry light projection	varies	to 5 μm + 5 μm per m	n/a
GOM Braunschweig, Germany gom.com	ATOS Compact Scan ATOS Core ATOS II Triple Scan ATOS ScanBox	structured white light (fringe)	40 x 30 – 1200 x 900 mm 500 x 380 mm 170 x 130 – 810 x 610 mm	not specified	2 x 5 MP/frame 5 MP/frame 2 x 16 MP/frame
GoMeasure3D Amherst, Virginia gomeasure3d.com	eMicroScribe	articulating arm	0.5-1.0 m	—	n/a
Hexagon Metrology Cobham, Surrey, Great Britain hexagonmetrology.com	ROMER Absolute Arm Cognitens WLS Leica Laser Tracker Leica T-Scan	articulating arm w/laser scanner structured light triangulation laser ranger laser ranger and triangulation	5-15 ft measuring range (varies by model) 500 x 500 x 230 mm 80 m range (depending on model) 30 m	± 0.079-0.214 mm n/a to 25 μm to 50 μm for <8.5 m (2σ)	n/a n/a up to 3,000 pts/s 14,400 pts/s
Intel Santa Clara, California intel.com	RealSense F200 & R200	IR structured light	varies by use	not specified	not specified
Kreon Technologies Limoges, France kreon3d.com	Zephyr II Aquilon Solano	laser line scanner	varies by implementation	10 μm 5 μm 25 μm	up to 250,000 pts/s up to 1,000,000 pts/s 50,000 pts/s
Laser Design Minneapolis, Minnesota laserdesign.com	SLP Laser Scanner	laser line	varies by implementation	varies by implementation	225,000 pts/s
Metronic Systems Snoqualmie, Washington metronicsys.com	G2 Laser Scanner	laser scanner	varies by model	± 0.001 in	n/a
Nextec Tirat Hacarmel, Israel nextec-wiz.com	WizProbe	confocal laser probe	400 x 650 x 500 mm	14 μm (2 σ)	50 pts/s
NextEngine Santa Monica, California nextengine.com	Ultra HD	multi-stripe laser triangulation	130 x 97 mm (macro mode at 400 dpi) 343 x 257 mm (wide mode at 150 dpi)	± 0.005 in (macro mode) ± 0.015 in (wide mode)	50,000 processed pts/s

Company	Product	Technology	Work volume	Accuracy ¹	Speed
Nikon Metrology Leuven, Belgium nikonmetrology.com	XC65D LC15DX LC60Dx MV350 Model Maker Kscan MMDx	laser line scanner (cross) laser line scanner laser line scanner laser radar arm-mounted laser scanner handheld scanner	150 x 150 mm FOV 18 x 18 mm FOV 60 x 60 mm FOV 1-50 m range varies on arm length	15 µm (1 σ) 8 µm (1 σ) 9 µm (1 σ) 24 µm at 2m 12-34 µm	19,200 pts/s 19,200 pts/s 75,000 pts/s 150,000 pts/s 30,000 pts/s
Northern Digital Inc. Waterloo, Ontario, Canada ndigital.com	Pro CMM with ScanTRAK	optically tracked laser line	1.5 to 7.5 m FOV	up to 20 µm	up to 458,400 pts/s
North Star Imaging, Inc. Rogers, Minnesota 4nsi.com	X25 X50 X5000 X6000 X7000	x-ray scanner	6 in dia x 9 in h 8 in d x 12 in h 32 in d x 48 in h 32 in d x 48 in h 60 in d x 60 in h	0.5 µm 1 µm 500 nm n/a n/a	n/a n/a n/a n/a n/a
Nub3d Barcelona, Spain nub3d.com	SIDIO Neo SIDIO XR	structured white light structured white light	120-550 x 80-390 x 60-240 mm ³ 340-550 x 220-350 x 200-200 mm ³	0.075-0.375 mm 0.075-.25 mm	>1 sec <0.5 sec
Occipital Boulder, Colorado occipital.com	Structure	IR structured light	varies by use	not specified	not specified
Optimet Jerusalem, Israel optimet.com	ConoLine ConoScan Smart ConoProbe	conoscopic holography (line) conoscopic holography (line) conoscopic holography (point)	45 mm DOF 160 x 150 x 100 mm 1.8-120 mm range	2-25 µm 1-15 µm 1-60 µm	18,000 pts/s 50 mm/s 3,000 pts/s
Perceptron Plymouth, Michigan perceptron.com	Scanworks Contour Probe v5 Smart3D	laser line scanner laser line scanner	varies on arm length 12 x 12 in	24 µm, 2 σ n/a	458,400 pts/s n/a
Phase Vision Leicestershire, UK phasevision.com	Quartz Scanner 800 DBE Quartz Scanner 1200 DBE	structured light	50-1500 mm 500-2000 mm	50 µm 50 µm	—
phoenix x-ray (GE) Wunstorf, Germany microfocus-x-ray.com	v tome x M	x-ray computed tomography (CT)	600 mm high x 500 mm dia		n/a
Polhemus Inc. Colchester, Vermont polhemus.com	FastScan II Patriot	laser scan with magnetic tracking electromagnetic tracking	up to 50 cm 30-42 cm in range (up to 60)	1 mm 0.1 in RMS	50 lines/s 60 updates/s
Scantech Ringsted, Denmark scantech.dk	CNC Mounted Tabletop Portable SL Handheld	laser line scanner laser line scanner structured white light structured white light	400 x 600 x 400 mm 400 x 600 x 400 mm 900 x 700 mm variable	± 0.1 mm ± 0.1 mm down to +/- 0.05mm varies by use	n/a n/a 8 seconds/frame up to 15 fps
Shapegrabber Ottawa, Ontario, Canada shapegrabber.com	Ai300, Ai600 Ai310, Ai810 LM600, 800, 1250, 1750	laser line scanner systems	300 or 600 x 150 x 150 mm 300 or 800 x 1250 x 150 mm 600 x 175 x 190 mm to 1750 x 750 x 900 mm	0.04 mm 0.04 mm 0.04 mm	18,000-100,000 pts/s 18,000-100,000 pts/s 18,000-100,000 pts/s
Shining3D Hangzhou, China shining3d.com	OpticScan OptimScan EinScan Pro and S FreeScan X3	structured light	100 x 75, 200-150, 400-300 mm ² 100 x 75, 200-150, 400-300 mm ² 200 x 200 x 200 mm 230 x 250 mm	0.007-0.25 mm 0.005-0.15 mm <0.1 mm 0.03 mm max	<2 sec <2 sec <3 min 240,000 pts/s
Solutionix Seoul, Korea solutionix.com	Rexcan CS2+ Rexcan 4 Rexcan CS+ Rexcan DS3	phase-shifting optical triangulation	400 x 500 diag mm max 55 x 1545 diag mm 100, 200, or 400 diag mm, selectable 320 x 320 x 370 mm	not specified 0.03-0.71 mm resolution not specified not specified	6 MP 5 MP 5 MP 5 MP

Company	Product	Technology	Work volume	Accuracy ¹	Speed
Steinbichler Optotechnik Neubeuern, Germany steinbichler.com	COMET6 COMETL3D T-SCAN CS & LV	white light triangulation white light triangulation position-tracked laser scanner	81 x 54 x 40 to 1235 x 823 x 600 mm ³ 100 x 75 x 140 to 400 x 300 x 250 mm ³ up to 35 m ³	16-252 µm resolution 60-250 µm resolution 0.075 mm	1.2 sec/scan 1.5 sec/scan 210,000 pts/s
Surphaser Seattle, Washington surphaser.com	50HSX 100HSX 105HSX	phase-shift laser	1-130 m range, 360° H x 270° V 1-120 m range, 360° H x 270° V 1-110 m range, 360° H x 270° V	<0.7 mm @ 15 m <0.35 mm @ 5 m <0.7 mm @ 15 m	up to 1,000,000 pts/s up to 1,000,000 pts/s up to 1,000,000 pts/s
LMI Technologies Delta, BC, Canada lmi3d.com	HDI 100 series HDI Advance, R1x or R3x MikroCAD, lite, premium, plus	white light triangulation white light triangulation structured light	87 x 68 to 190 x 175 mm 165, 310, 455 diag mm; 200, 400, 600 diag mm 1.6 x 1.2 to 140.105 mm	0.08-0.18 mm resolution 0.06-0.118 mm resolution as low as 0.07 µm resolution	0.3 sec 0.88 or 1.3 sec 26 to 283 sec
Vialux Chemnitz, Germany vialux.de	zSnapper (in three configurations: portable, multiple, oem scanner)	structured light triangulation	350 mm FOV	not specified	300,000 or 80,000 (x,y,z) coordinates per single sensor scan; scan time: 0.022 s
Wenzel Greding, Germany wenzel.com	MobileScan3D	laser line scanner	200-3000 mm (spherical)	0.01-0.25 mm	74,400 pts/s
Wolf & Beck (Zeiss) Wangen, Germany wolfbeck.com	WBRetro MAN WBRetro CNC	laser line scanner (CMM retrofit)	55-250 mm range max 55 mm	50-200 µm	250,000 pts/s 250,000 pts/s
YXLON International X-Ray Hamburg, Germany yxlon.com	Y.CT Precision Y.CT Compact	fan beam CT	450 mm x 750 mm 450 mm x 750 mm	<254 µm slice pitch <254 µm slice pitch	15 s/slice 15 s/slice
Zeiss Optotechnik Neurbeuern, Germany optotechnik.zeiss.com	Comet 6 Comet L3D 2 T-Scan CS & LV	light projection light projection optical-tracked laser scanner	86 x 64 x 40 to 1235 x 823 x 600 mm 45 x 38 x 30 to 481 x 404 x 250 mm up to 3700 x 2600 mm	16-252 µm resolution 18-196 µm resolution 0.075 mm	1.2 sec/scan 1.0 sec/scan 210,000 pts/s

Table created by Michael Raphael and Sara Ebright in cooperation with Wohlers Associates, Inc.

Footnote:

1 Accuracy as reported by vendor in technical specifications. Vendors that publish only repeatability or resolution are identified. For more information, contact the vendor directly.