

Appendix F: 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 2018* 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 January 2018.

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)	pt(s)	point(s)
CMM	coordinate measuring machine	lp	line pairs	pts/s	points per second
config	configuration	IR	infrared	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	typ	typical
dpi	dots per inch (resolution)	MPE	maximum permissible error	uncal	uncalibrated
ext	extended	ms	millisecond (1/1000 second)	µm	micron, micrometer (10 ⁻⁶ m)
feat	feature	msec	millisecond (1/1000 second)	vert	vertical
ft	feet	mult	multiple	vol	volume
FOV	field of view	n/a	not applicable, not available	w/	with
fps	frames per second	nom	nominal	W	width

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 2 Capture Capture Mini	IR-structured light structured light	2 m x 2 m x 2 m 190 mm x 175 mm 88 mm x 87 mm	1 mm 0.060 mm 0.034 mm	30 fps 0.3 sec 0.3 sec
Automated Precision, Inc. Rockville, Maryland apisensor.com	Radian RapidScan	laser ranger structured light	—	better than ± 0.5 ppm not specified	—
Artec Palo Alto, California artec3d.com	Artec Eva Artec Space Spider Artec Leo	structured light triangulation	0.4-1 m 0.2-1 m 0.35-1.2 m	0.1 mm 0.05 mm 0.1 mm	2,000,000 pts/s 2,000,000 pts/s 4,000,000 pts/s
Creafom 3D Lévis, Québec, Canada creafom3d.com	METRAscan HANDYscan 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

Company	Product	Technology	Work volume	Accuracy ¹	Speed
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 (Quantum) ScanArm Laser Tracker Focus3D Scanner Cobalt Imager Freestyle	touch probe/gauge 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 arm varies based on scan arm horiz ± 270, vert +75 to -50, max range 110 m dia 120-350 m range (varies based on model) 500 x 350 x 300 mm FOV 8m ³ /286 ft ³	0.010/500-0.020/500 mm 0.013 mm 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
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 to 1200 x 900 mm 500 x 380 mm 170 x 130 to 810 x 610 mm	not specified	2 x 5 MP/frame 5 MP/frame 2 x 16 MP/frame
Hexagon Manufacturing Intelligence, Cobham, Surrey, Great Britain hexagonmi.com	ROMER Absolute Arm WLS Leica Laser Tracker Leica T-Scan AICON StereoScan neo AICON PrimeScan AICON SmartScan	articulating arm w/laser scanner structured light triangulation laser ranger laser ranger and triangulation miniaturized projection technique (structured light triangulation)	5-15 ft measuring range (varies by model) 500 x 500 x 230 mm 80 m range (depending on model) 30 m 75-1100 mm 50-800 mm 60-1550 mm	± 0.079-0.214 mm n/a to 25 μm to 50 μm for <8.5 m (2σ) min 12 μm pt spacing 28 MP 5 & 8 MP	n/a n/a >1 s/frame up to 3,000 pts/s 14,400 pts/s <1 s/frame <1 s/frame <1 s/frame
HP Palo Alto, California hp.com	HP 3D Scanner HP Sprout Pro G2 HP Z Scanner	structured light IR-structured light IR-structured light	60-500 mm 500 x 500 mm 500 x 500 mm	up to 0.05 mm to 1 mm to 1 mm	2.3 million pts in 2 sec 30 fps 30 fps
Kreon Technologies Limoges, France kreon3d.com	Ace Baces Zephyr II Aquilon Solano	articulating arm articulating arm laser line scanner	2 m to 4.5 m length (varies by model) 2.6 m to 4.6 m length (varies by model) varies by implementation	to 0.026 mm to 0.052 mm 10 μm 5 μm 25 μm	n/a n/a 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 CyberGage 360	laser line structured light	varies by implementation 200 mm x 100 mm cylinder	varies by implementation to 7 μm	225,000 pts/s < 3 min/cycle (typ)
LMI Technologies Delta, BC, Canada lmi3d.com	HDI	white light triangulation	87 x 68 to 190 x 175 mm	0.08-0.18 mm resolution	0.3 sec
Metronic Systems Snoqualmie, Washington metronicsys.com	G2 Laser Scanner	laser scanner	varies by model	± 0.025 mm	n/a
Nextec Tirat Hacarmel, Israel nextec-wiz.com	WizProbe	confocal laser probe	varies by implementation	6.5 μm MPE	to 40 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)	± 0.127 mm (macro mode) ± 0.381 mm (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	1.5-7.5 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	152 mm dia x 229 mm h 203 mm dia x 305 mm h 813 mm dia x 1219 mm h 813 mm dia x 1219 mm h 1524 mm dia x 1524 mm h	0.5 µm 1 µm 500 nm n/a n/a	n/a n/a n/a n/a n/a
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
Polhemus Inc. Colchester, Vermont polhemus.com	FastScan II	laser scan with magnetic tracking	up to 500 mm	1 mm	50 lines/s
Polyga Vancouver, CA polyga.com	HDI Advance	white light triangulation	165-600 mm	to 60 µm	5.2 MP in 1.2 s
Revware Raleigh, North Carolina revware.com	MicroScribe Skiron Laser	articulating arm laser line stripe	up to 1676 mm 75 mm	up to 0.051 mm up to 0.002	n/a up to 45,000 pts/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 Ai210, 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	OptimScan-3M, -5M EinScan Pro and Pro+ FreeScan X3, X5, X7	structured light	100 x 75, 200-150, 400-300 mm ² 200 x 200 x 200 mm 230 x 250 mm	0.005-015 mm <0.1 mm 0.03 mm max	<2 sec <3 min 240,000 pts/s
Solutionix Seoul, Korea solutionix.com	C500D500	phase-shifting optical triangulation	90 x 500 mm 120 mm	to 0.028 mm to 0.056 mm	5 MP 2 MP
Surphaser Seattle, Washington surphaser.com	Model 10 100HSX Model 400 75USR	phase-shift laser	1-110 m range, 360° H x 270° V 1-50 m range, 360° H x 270° V 1-300 m range, 360° H x 270° V 0.25-2.5 m range, 360° H x 270° V	<0.12 mm @ 15 m <0.07 mm @ 5 m <0.2 mm @ 30 m <0.025 mm @ 0.3-2 m	up to 1,000,000 pts/s up to 1,000,000 pts/s up to 832,000 pts/s
Trimble Sunnyvale, California trimble.com	TX6 TX8	time-of-flight	1-80 m range, 360° H x 317° V 1-120 m range, 360° H x 317° V	<2 mm from 2 m to 80 m <1 mm from 2 m to 120 m	up to 500,000 pts/s up to 1,000,000 pts/s
Vialux Chemnitz, Germany vialux.de	zSnapper (in three configurations: portable, multiple, OEM scanner)	structured light triangulation	350 mm FOV	300,000 or 80,000 (xyz) coordinates per single sensor scan	scan time: 0.022 s

Company	Product	Technology	Work volume	Accuracy ¹	Speed
Wenzel Greiding, Germany wenzelamerica.com	exaCT	computed tomography	100-250 mm dia x 300 h	20-100 µm pixel size	1.5-4 M pixels/scan
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.