COGNEX

3D-L4000 WITH VISIONPRO

3D laser displacement sensor with PC-based development environment

The 3D-L4000 with VisionPro® 3D laser displacement sensor optimizes product quality by providing high-speed, high-resolution three-dimensional inspections of your products. Using advanced image formation, it generates detailed topographical renderings of parts under inspection from which you can measure 3D features including length, width, height, tilt, and volume relative to any surface. It also simplifies challenging OCR and presence/absence applications by creating contrast from height changes, independent of color.

Designed to operate in the toughest factory environments, the 3D-L4000 with VisionPro offers a compact form factor that easily fits into any production line. With industry-proven vision software and a powerful 3D toolset, it solves a range of inspection, identification, measurement, and alignment tasks.

Key Features

Complete 2D and 3D machine vision solution

- Meet specific application needs with an extensive range of sensor options and the ability to combine 3D and 2D cameras
- Connect up to four 3D displacement sensors for centralized management
- Quickly deploy applications with intuitive software
- Deploy reliable automation in harsh environments with IP65 housing

Full factory calibration for easy setup

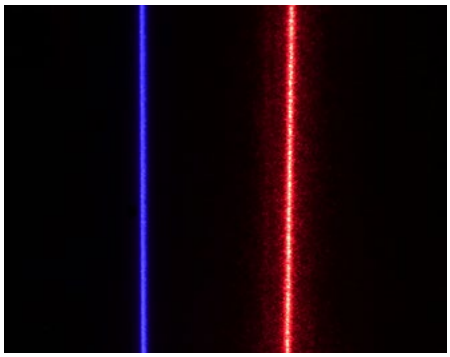
- Generate measurements in real-world units
- Achieve micron-level accuracy
- Prevent misalignment and motion errors
- Establish consistency across production lines
- Achieve higher resolution and accommodate wider fields of view
- Simplify multi-head analysis with 3D image stitching

Contrast independent inspection

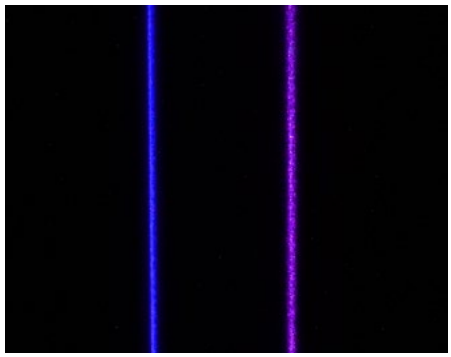
- Detect objects on challenging backgrounds, including reflective surfaces and dark parts against dark surfaces
- Generate intensity data of different regions concurrently
- Enhance texture of 3D visualizations for more accurate inspections
- Solve a wide range of vision tasks with height, volume, plane-fitting, and tilt tools

Optimize image formation in real-world settings

The 3D-L4000 with VisionPro includes patented, speckle-free blue laser optics that enable the system to capture higher quality images than traditional laser displacement sensors. This type of laser optics minimizes speckle and glare, common problems for 3D laser systems.



Blue speckle-free laser line (left) and red laser with speckle line (right)

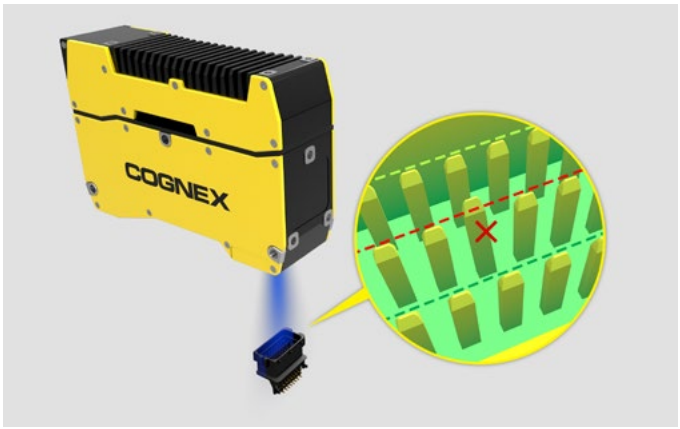


Blue speckle-free laser line (left) and blue laser line with speckle (right)

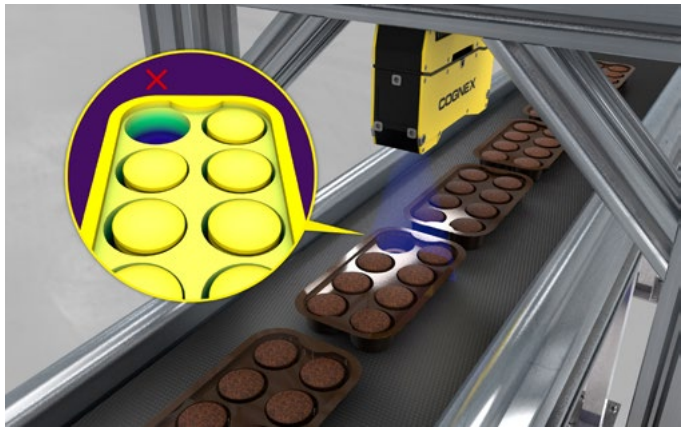
Expedite factory integration with advanced calibration

The factory-calibrated 3D-L4000 with VisionPro provides results in real-world units of measurement with micron-level accuracy, streamlining application configuration and delivering more precise inspections.

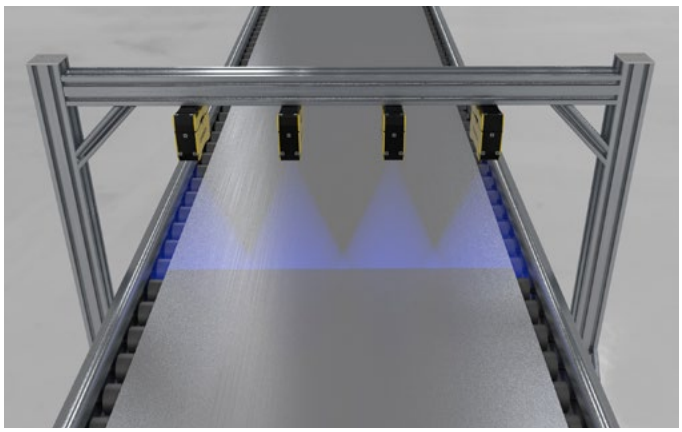
Innovative field calibration technology maintains accuracy, even with relaxed mechanical configurations, and makes it simple to correct mounting and motion errors. Field calibration also enables simultaneous use of multiple sensors across wide production lines to generate single high-resolution 3D images.



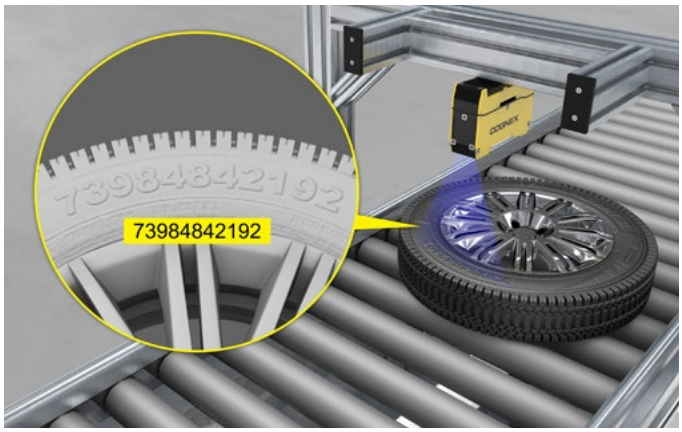
Measure heights and tilts of components to assess misalignment



Detect missing objects in packages by measuring height



Combine multiple sensors to inspect wide production lines



Read embossed or raised characters

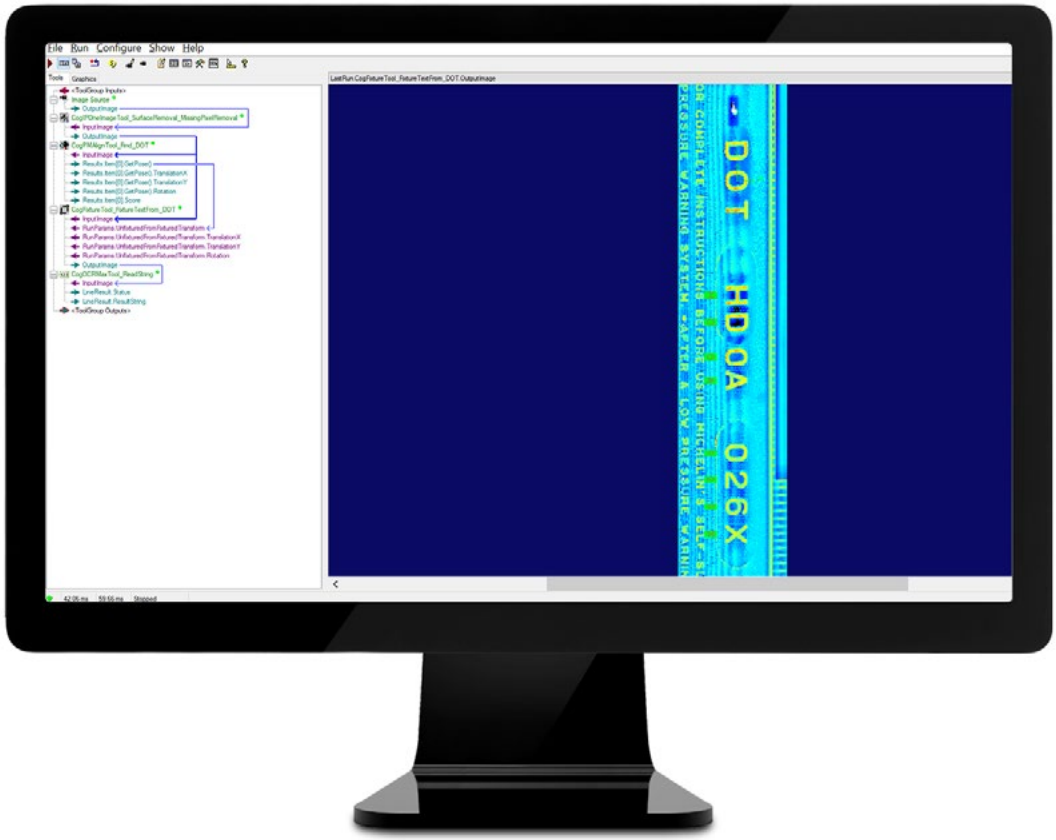
Simplify application development without losing functionality

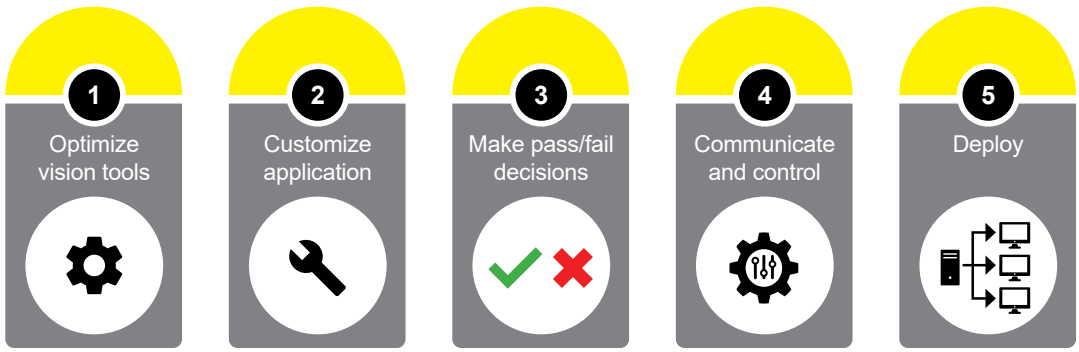
The 3D-L4000 with VisionPro uses a PC-based development environment to quickly configure jobs through extensive tool prototyping and an intuitive interface. The easy-to-use QuickBuild™ graphical development interface allows users to visually define and tune their application. Modular tool blocks allow developers to create and reuse components, further simplifying setup and shortening cycle times. VisionPro also offers advanced scripting and .NET C# programming options for additional flexibility in building custom applications.

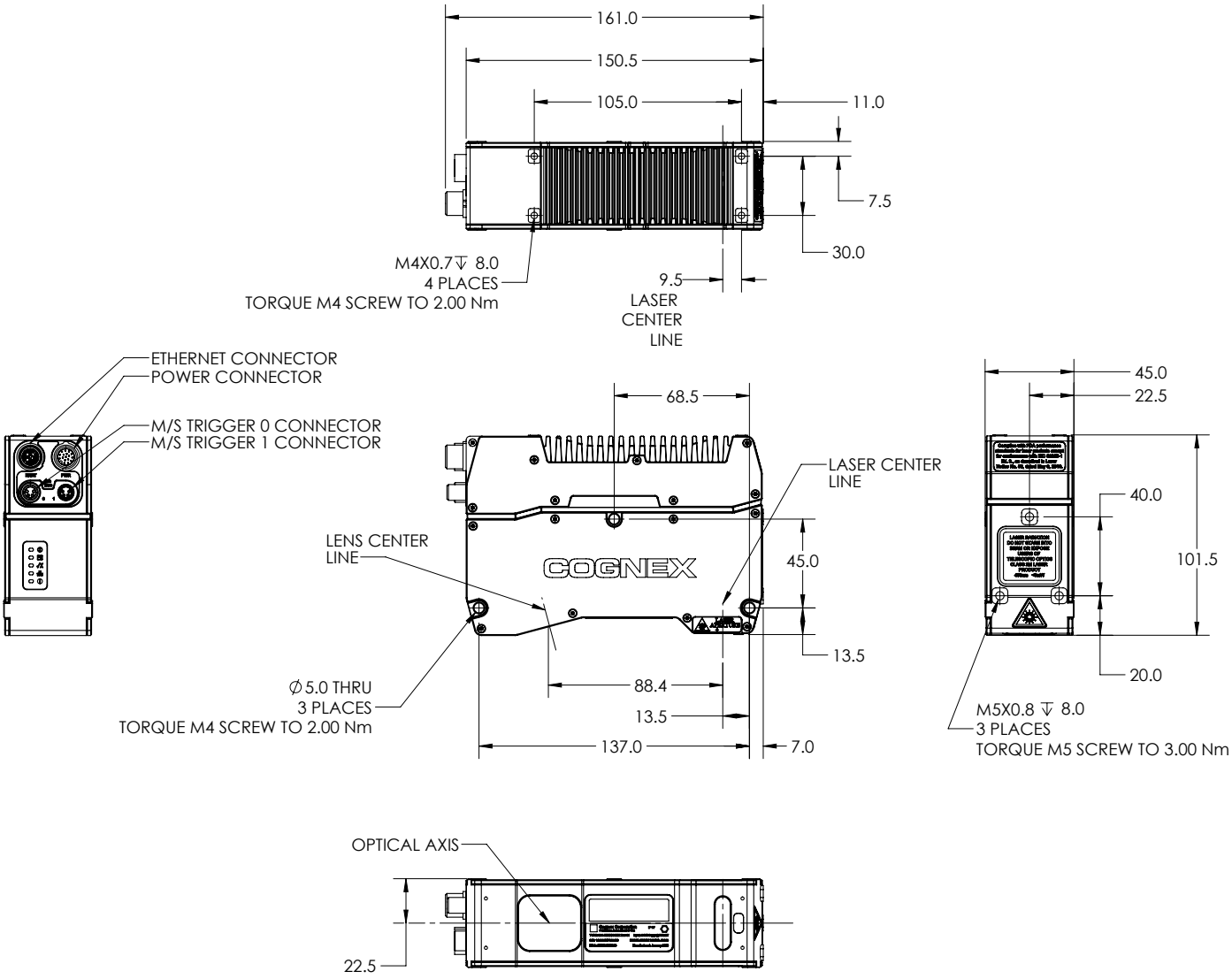
Software compatibility

- VisionPro 9.9 SR1
- Cognex Designer 4.4.3

VisionPro QuickBuild workflow for setting up jobs

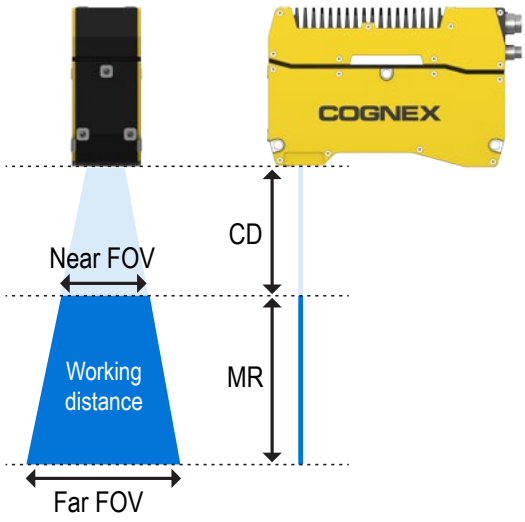






Working distance for 3D-L4000 with VisionPro

WORKING DISTANCE				
	VP 3D-L4033	VP 3D-L4050	VP 3D-L4100	VP 3D-L4300
Clearance distance (CD)	93 mm	92 mm	130 mm	180 mm
Near field of view	33 mm	55 mm	75 mm	95 mm
Far field of view	39 mm	90 mm	180 mm	460 mm
Measurement range (MR)	44 mm	106 mm	235 mm	745 mm



SPECIFICATIONS

			VP 3D-L4033		VP 3D-L4050		VP 3D-L4100		VP 3D-L4300	
			1K	2K	1K	2K	1K	2K	1K	2K
Measurement range	Clearance distance		93.00 mm		92.00 mm		130.00 mm		180.00 mm	
	Z-axis (height)	Measurement range	44.00 mm		106.00 mm		235.00 mm		745.00 mm	
	X-axis (width)	Near field of view	33.00 mm		55.00 mm		75.00 mm		95.00 mm	
		Middle field of view	36.00 mm		72.50 mm		127.50 mm		277.50 mm	
		Far field of view	39.00 mm		90.00 mm		180.00 mm		460.00 mm	
Laser (light source)	Wavelength		450 nm							
	Laser class		2M							
	Output power		45 mW							
Spot size (middle field of view)			72 µm		110 µm		181 µm		240 µm	
Sensor	Data points/profile		960 points[1]	1920 points	960 points[1]	1920 points	960 points[1]	1920 points	960 points[1]	1920 points
	X resolution	Top	34.4 µm	17.2 µm	57.3 µm	28.6 µm	78.1 µm	39.1 µm	99.0 µm	49.5 µm
		Bottom	40.6 µm	20.3 µm	93.8 µm	46.9 µm	187.5 µm	93.8 µm	479.2 µm	239.6 µm
	Z resolution	Top	1.7 µm		2.5 µm		4.4 µm		6.9 µm	
		Bottom	2.7 µm		6.9 µm		25.9 µm		147.5 µm	
	Z repeatability[2]	Top	0.5 µm		0.5 µm		1 µm		2 µm	
		Bottom	0.5 µm		0.5 µm		1 µm		2 µm	
	Z linearity[3]		0.06% of full scale (F.S.)		0.06% of full scale (F.S.)		0.04% of full scale (F.S.)		0.05% of full scale (F.S.)	
	Temperature characteristics		0.01% of F.S./°C[4]							
Environmental resistance	Housing protection		IP65							
	Operation temperature[5]		0–45 °C (32–113 °F)							
	Storage temperature		-20–70 °C (-4–158 °F)							
	Maximum humidity		<80% (no condensation)							
	Vibration		10 to 57 Hz, double amplitude 1.5 mm X,Y,Z, 3 hours in each direction							
	Shock		15G/6 msec							
Scan rate			Up to 4 kHz (after windowing down the sensor) ([6]Up to 6 kHz)							
Housing material			Aluminum							
Weight			0.94 kg							
Dimensions			150.5 mm x 101 mm x 45 mm							
Power supply requirements			24 VDC +/- 10%, 750 mA minimum							
Inputs			Trigger, differential/single ended encoder, laser interlock							
Trigger			Input voltage limits: Trig+ - Trig - = -24 VDC to +24 VDC Input ON: >10 VDC (>6 mA) Input OFF: <2 VDC (<1.5 mA)							
Encoder specifications			Differential: A+/B+: 5–24V (1.0 MHz max) A-/B-: Inverted (A+/B+) Single ended: A+/B+: 12–24V (1.0 MHz max) A-/B-: VDC = ½ (A+/B+)							
Interface			Gigabit Ethernet interface Integrated link and traffic LEDs Standard M12-8 X-coded female connector							
Software compatibility			VisionPro 9.9 SR1 and Designer 4.4.3							
Vision tools			3D Pattern Finder, Height, Tilt, Plane-fitting, Volume and Cross-section, PatMax®, IDMax®, and OCRMax™							

1 Only available when binning is enabled in the camera settings.

2 Z repeatability is measured an average of 100 times over a pointcloud using a 4x4 mm area, at the middle of the measurement range.

3 Z linearity is the maximum deviation of 250 position measurements on the measurement range, where a measurement is the average of 2 profiles using the standard Cognex target.

4 From the standard ambient temperature 21 °C (70 °F).

5 Mounted to a 400 mm aluminum bar along the camera's fins (parallel to the camera) on top of the vision system.

6 When binning is enabled and the FOV is windowed down.

COGNEX

Companies around the world rely on Cognex vision and barcode reading solutions to optimize quality, drive down costs and control traceability.

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