COGNEX

MACHINE VISION

Systems ▪ Sensors ▪ Software

OPTIMIZE QUALITY, MINIMIZE WASTE, MAXIMIZE THROUGHPUT

Tens of thousands of applications worldwide inspect billions of products each day, many products that simply could not be manufactured without machine vision technology. Whether verifying the fill levels of soda bottles traveling on a conveyor, reading oil-stained codes on automotive parts or positioning touch screens on smartphones to micron-level accuracy, machine vision technology performs highly-detailed tasks on high-speed production lines.

Cognex's comprehensive line of sensors and 2D and 3D systems all use machine vision technology to perform inspections but are engineered for different tasks.

Vision Sensors

2D Vision

3D Vision

	Vision Sensors	2D Vision	3D Vision
Presence/Absence	✓	✓	✓
Defect Detection	✓	✓	✓
Assembly Verification	✓	✓	✓
Gauge/Measure	✓	✓	✓
Cosmetic Inspection		✓	✓
Guide/Align		✓	✓
OCR/OCV	✓	✓	
Code Reading		✓	

INDUSTRY-LEADING VISION TECHNOLOGY

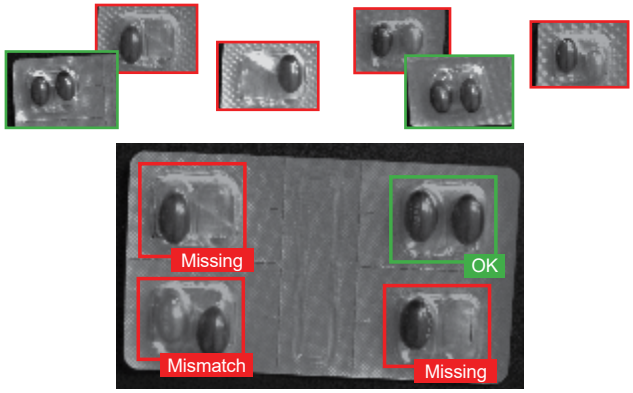
Cognex machine vision provides the power and flexibility to solve your most challenging manufacturing applications. Whether for inspection or robotic guidance, you can choose from a robust library of AI- or rule-based technologies that include classification, defect detection, feature location, optical character recognition (OCR), measurement, and more capabilities.

Cognex AI

Cognex AI learns to spot patterns and anomalies from example images. It solves tasks that are too complicated and time-consuming to program with rule-based algorithms, while providing a consistency and speed that aren't possible with manual inspection.

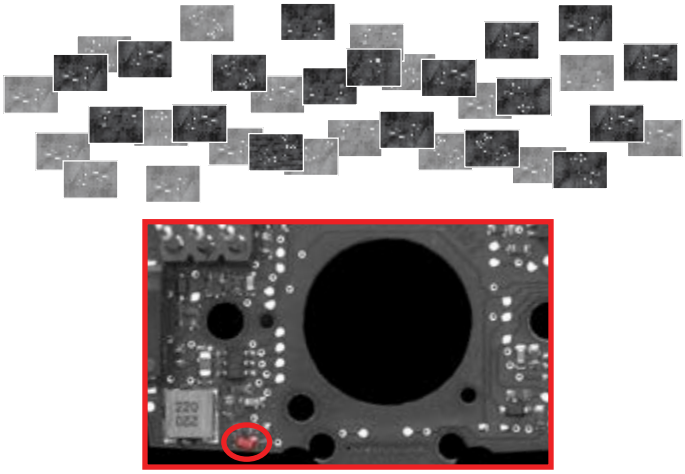
Edge learning: Deploy in minutes

Edge learning is a subset of AI in which processing takes place on-device, or “at the edge,” using a pre-trained set of algorithms. The technology is simple to setup, requiring smaller image sets and shorter training and validation periods than traditional deep learning-based solutions.



Deep learning: Analyze fine details

Capable of processing large, detailed image sets, deep learning is designed to automate complex or highly customized applications. The technology enables users to analyze vast image sets quickly and efficiently, while differentiating between acceptable and unacceptable anomalies, to deliver accurate results.



Rule-based technologies

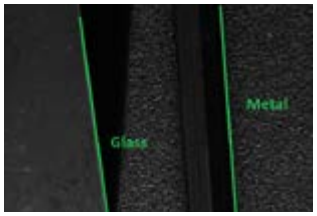
Cognex rule-based algorithms solve diverse applications from guiding assembly to automating inspections to expediting production and distribution. Designed for specialized tasks with consistency and low variation, these patented technologies are used in virtually all industry sectors to expedite and improve manufacturing.

Object location

Find geometric patterns on parts under inspection

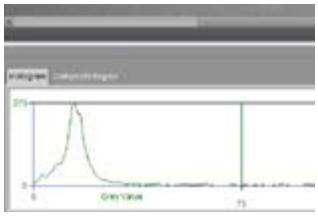
Bead inspection

Run high-precision inspections on beads and edges



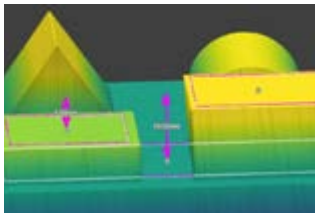
Edge inspection

Locate edges, features, and measure width



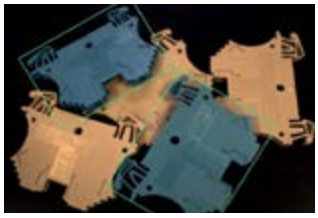
Histogram and image processing

Measure thresholds and prepare images for analysis



Measurement tools

Establish reliable feature-based parameters and thresholds



Color tools

Run color-based analysis for a range of applications

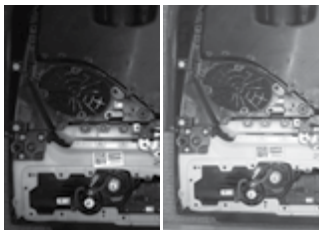
Identification

Ensure high read rates for 1D and 2D barcodes

Optical character recognition

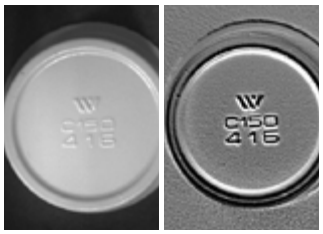
Automate character reading and decipher text

Advanced imaging technologies



HDR+

Delivers high-contrast images for multi-point inspections of parts with varying depths of field and lighting conditions.



SurfaceFX

Isolates features and defects that are recessed or embossed on parts such as chips, wrinkles, punctures, stamped text, and codes.

2D VISION SYSTEMS

Cognex In-Sight® 2D vision systems are unmatched in their ability to inspect, identify, and align parts. These self-contained, industrial-grade vision systems combine a library of advanced vision tools with high-speed image acquisition and processing. A wide range of models, including line scan and color systems, meet most price and performance requirements.

In-Sight 3800 Series

Designed for high-speed applications, In-Sight 3800 delivers a fully integrated solution for manufacturing automation. Beyond speed, this powerful system is embedded with the latest vision technologies and offers high flexibility and high resolution, allowing users to maximize throughput, scale their solution, and run more accurate inspections.

TOOL SET

ViDi EL

RESOLUTION

Up to 5MP

FEATURES

Monochrome/ Color

Autofocus

IP67

HDR+

In-Sight 2800 Series

The In-Sight 2800 vision system combines edge learning technology with traditional rule-based vision to solve a range of error-proofing tasks. From presence/absence detection to sortation and character reading applications, this fully integrated vision system offers an easy-to-use solution for automating inspections.

TOOL SET

ViDi EL

RESOLUTION

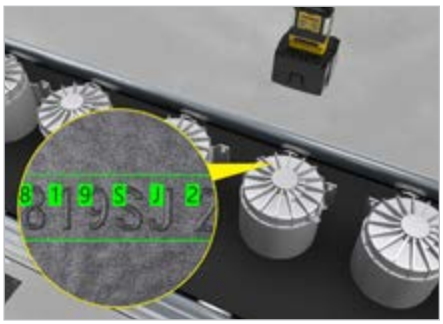
Up to 2MP

FEATURES

Monochrome/ Color

Autofocus

IP67



In-Sight D900 Series

The In-Sight D900 vision system leverages advanced AI-based tools to solve challenging OCR, assembly verification, and defect detection tasks. Processing takes place on-device, which eliminates the need for a PC, simplifying application deployment.

TOOL SET

DL

ViDi EL

RESOLUTION

Up to 5MP

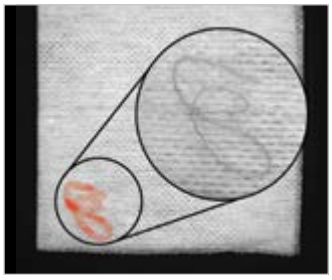
FEATURES

Monochrome/ Color

Additional Storage

Autofocus

IP67



In-Sight 9000 Series

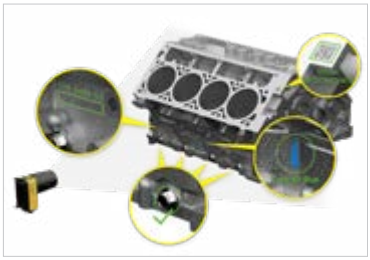
Rugged, ultra-high-resolution standalone vision system solves high-accuracy part location, measurement, and inspection applications. Line scan and area scan image acquisition options are available for imaging large, continuously moving or stationary objects.

TOOL SET | RESOLUTION

Area Scan: **Up to 12MP**
Line Scan: **Up to 32MP**

FEATURES

Monochrome/ Color | IP67 | Additional Storage



In-Sight 8000 Series

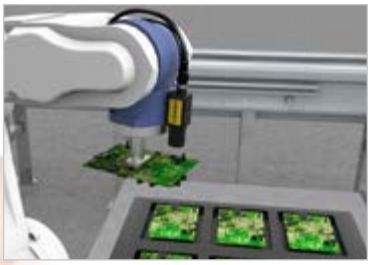
Ultra-compact standalone vision system delivers industry-leading performance in the micro form factor of a typical GigE vision camera.

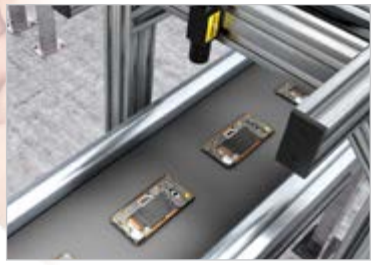
TOOL SET | RESOLUTION

Up to 5MP

FEATURES

Monochrome/ Color | Micro | PoE | HDR+





In-Sight 7000 Series

Combines modular integrated lighting with powerful vision tools in a compact footprint to deliver fast, accurate inspections on space-constrained production lines.

TOOL SET | RESOLUTION

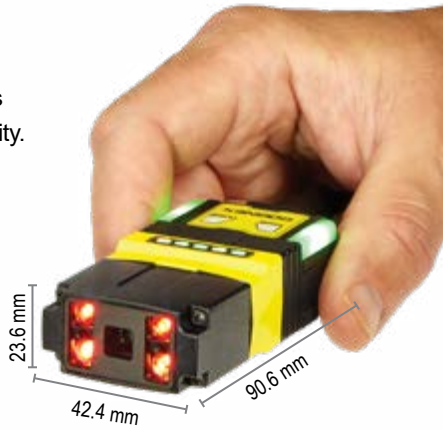
Up to 5MP

FEATURES

Monochrome/ Color | IP67 | HDR+ | | Autofocus

VISION SENSORS

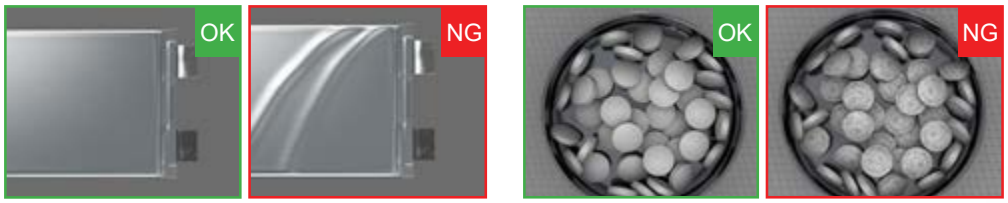
Vision sensors perform simple pass/fail applications that help ensure products manufactured on an automated production line are error-free and meet specified quality standards. Cognex vision sensors provide reliable inspections thanks to powerful vision tools, integrated lighting, and hardware modularity.



In-Sight SnAPP Series

In-Sight SnAPP vision sensors bring the power of automation to everyone. Using pre-trained AI, these sensors solve a range of inspection tasks in minutes, with no experience needed. Designed for ultimate simplicity, they offer a fast- and easy-to-deploy solution for automating common quality control activities.

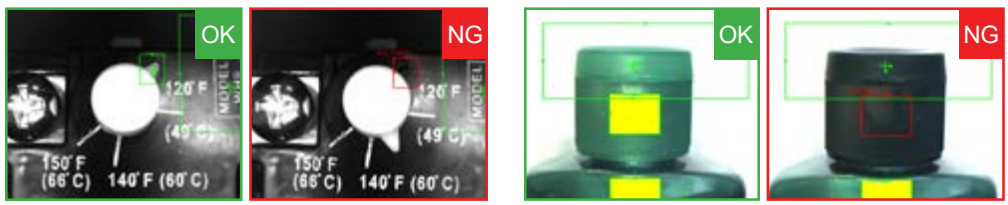
TOOL SET	RESOLUTION	FEATURES
ViDi EL	Up to 1.6 MP	Monochrome/ Color, Autofocus, IP67, PoE



In-Sight 2000 Series

Leveraging rule-based vision tools, In-Sight 2000 vision sensors solve error-proofing tasks with consistent or predictable anomalies. They offer robust programming options, giving intermediate users more control in application development while providing the flexibility to adapt to any production line.

TOOL SET	RESOLUTION	FEATURES
	Up to 1.2 MP	Monochrome/ Color, Autofocus, IP65, PoE

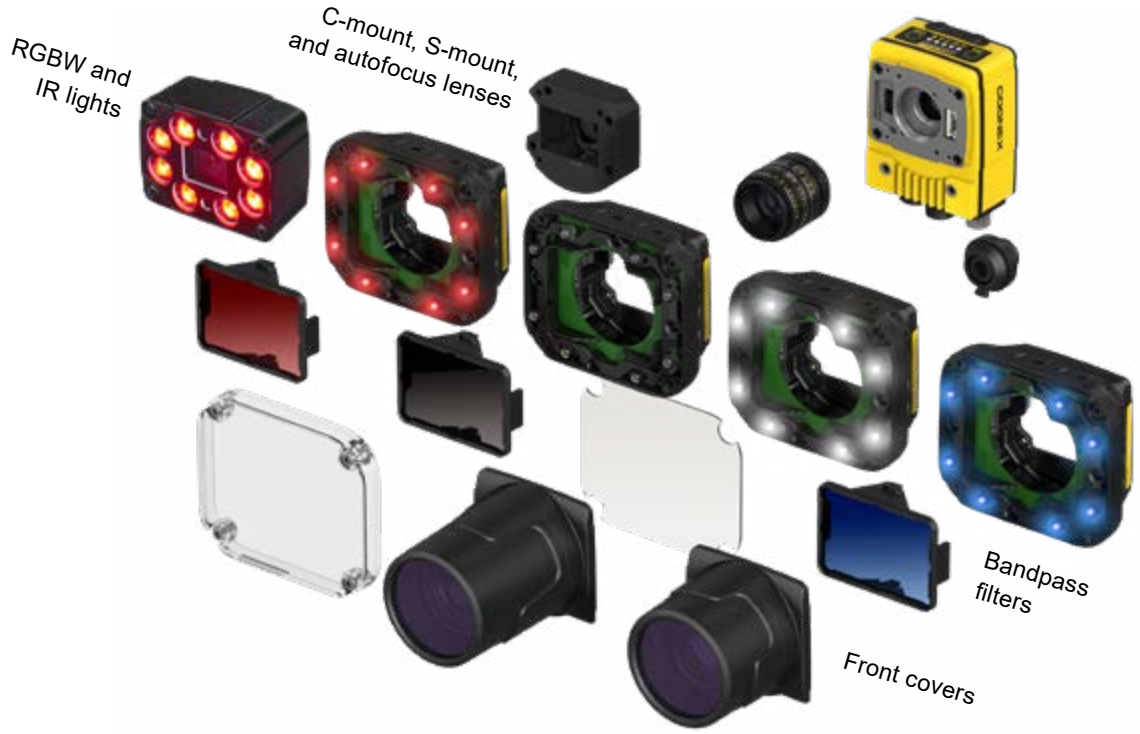


POWERFUL AND FLEXIBLE
IMAGING TECHNOLOGY

Modular, scalable architecture for current and future needs

When it comes to factory automation, one size rarely fits all. That's why many In-Sight products provide users with the flexibility to customize the system for their specific application and easily adjust as needs change.

Field-changeable, user-configurable options



Get better inspection results with the right imaging accessories

Multi-colored **LED lights** minimize the need for expensive external lighting and enhance specific features or text.

Polarizers reduce glare or hot spots and enhance contrast so objects can be recognized.

Color filters create contrast to lighten or darken features of the object.

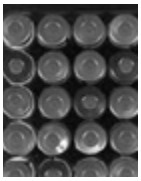

Ambient light

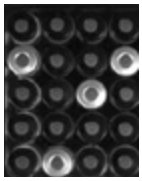
Monochrome with blue light


No filter


With linear polarizer

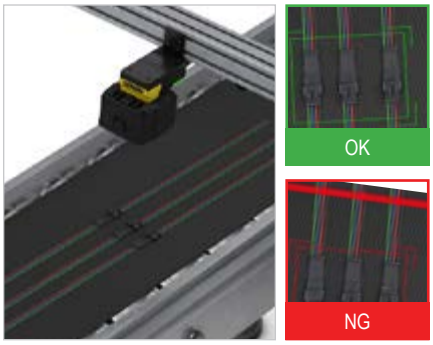

Original color

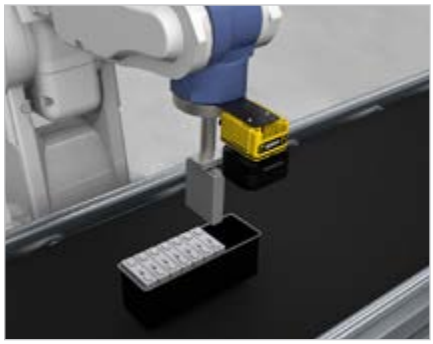

No filter


Blue Bandpass Filter

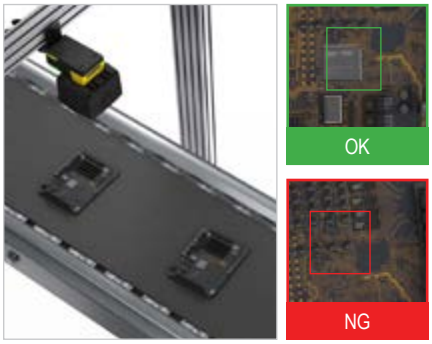
2D VISION APPLICATIONS

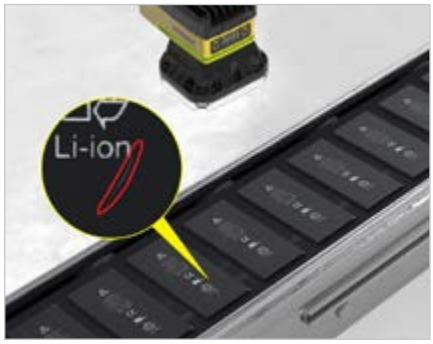
Automotive



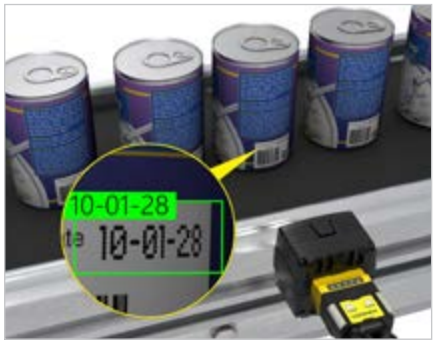


Electronics

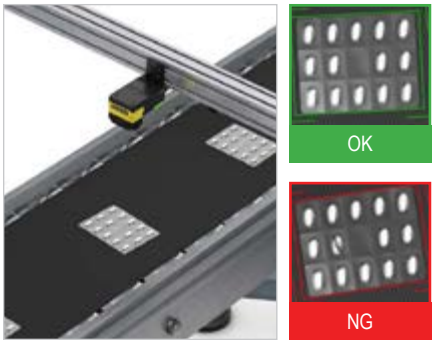




Food & Beverage



Pharmaceutical and Medical



2D VISION SPECIFICATIONS

	SnAPP Series	2000 Series	2800 Series	3800 Series	7000 Series	8000 Series	9000 Series	D900 Series
Image								
Imager Type	Monochrome/ color area scan	Monochrome/ color area scan	Monochrome/ color area scan	Monochrome/ color area scan	Monochrome/ color area scan	Monochrome/ color area scan	Monochrome/ color area scan, Monochrome line scan	Monochrome/ color area scan
Resolution	Up to 1.6MP (1440 x 1080)	Up to 1.2MP (1280 x 960)	Up to 2MP (1920 x 1080)	Up to 5MP (2448 x 2048)	Up to 5MP (2448 x 2048)	Up to 5MP (2448 x 2048)	12MP (4096 x 3000), 32MP (2048 x up to 16,384 lines) for line scan	Up to 5MP (2592 x 1944)
Acquisition Speed (Max)	45 fps	75 fps	45 fps	Up to 200 fps	Up to 217 fps	Up to 217 fps	Up to 14 fps, 66K lines per second for line scan	Up to 51 fps
Options								
Lenses	S-mount, Autofocus	S-Mount, Autofocus	S-Mount, Autofocus	C-Mount, Autofocus	C-Mount, S-Mount, Autofocus	C-Mount	C-Mount	C-Mount, S-Mount, Autofocus
Lighting	Integrated	Integrated	Integrated	Integrated, External light via light control connector	Integrated, External light via light control connector	N/A	External light via light control connector (area scan only)	Integrated, External lights via light control connector
Networking								
Speed	Gigabit Ethernet (10/100/1000 Mbps)							
General Protocols	SFTP	TCP/IP, UDP, FTP, Telnet, RS-232C	TCP/IP, FTP	TCP/IP, FTP	TCP/IP, UDP, FTP, SFTP, Telnet, SMTP			TCP/IP, FTP
Industrial Protocols	Ethernet/IP, PROFINET	OPC UA, EtherNet/IP with AOP, PROFINET Class B, iQSS, Modbus TCP, SLMP/SLMP Scanner, CC-Link IE Field Basic	PROFINET, EtherNet/IP, SLMP, OPC/UA	PROFINET, EtherNet/IP, SLMP, OPC/UA	OPC UA, EtherNet/IP with AOP, PROFINET Class B, iQSS, Modbus TCP, SLMP/SLMP Scanner, CC-Link IE Field Basic, IEEE 1588 (CIP Sync)	OPC UA, EtherNet/IP with AOP, PROFINET Class B, iQSS, Modbus TCP, SLMP/SLMP Scanner, CC-Link IE Field Basic	OPC UA, EtherNet/IP with AOP, PROFINET Class B, iQSS, Modbus TCP, SLMP/SLMP Scanner, CC-Link IE Field Basic, IEEE 1588 (CIP Sync)	Ethernet/IP with AOP, Profinet Class A, Profinet Class B
I/O								
Trigger input	1	1	1	1	1	1	1	1
General purpose input	1	1	1	1	1		1	1
General purpose output	4	4	2	2	2	2	2	2
Bi-Directional			2	2	2		2 (area scan only)	2
Encoder							2 (line scan only)	
Expansion I/O		CIO-1400			CIO-1400, CIO-Micro	CIO-Micro	CIO-1400, CIO-Micro	
Serial		RS-232C			RS-232C	RS-232C	RS-232C	

	SnAPP Series	2000 Series	2800 Series	3800 Series	7000 Series	8000 Series	9000 Series	D900 Series
Mechanical								
Length	In-line: 90.6 mm (3.6 in), Right-angle: 78.5 mm (3.1 in)	In-line: 92 mm (3.61 in), Right-angle: 61 mm (2.42 in)	In-line: Up to 110 mm (4.3 in), Right-angle: Up to 68 mm (2.7 in)	Up to 117 mm (4.6 in)	90.1 mm (3.54 in)	75.5 mm (2.97 in)	121.0 mm (4.77 in)	121.0 mm (4.77 in)
Width	In-line: 42.4 mm (1.7 in), Right-angle: 42.4 mm (1.7 in)	60 mm (2.38 in)	Up to 69 mm (2.7 in)	Up to 104 mm (4.1 in)	60.5 mm (2.38 in)	35 mm (1.38 in)	60.5 mm (2.38 in)	60.5 mm (2.38 in)
Depth	In-line: 23.6 (0.9 in), Right-angle: 37.8 mm (1.5 in)	52 mm (2.05 in)	Up to 104 mm (4.1 in)	Up to 181 mm (7.1 in)	Up to 2MP: 35.7 mm (1.41 in), 5MP: 49.4 mm (1.94 in)	32 mm (1.26 in)	53.4 mm (2.10 in)	53.4 mm (2.10 in)
Protection	IP67	IP65	IP67	IP67	IP67	IP40	IP67	IP67
Vision Tools								
Cognex AI	✓		✓	✓				✓
Pattern Matching		✓	✓	✓	✓ Available PatMax and PatMax RedLine			
Blob		✓		✓	✓	✓	✓	✓
Edge		✓	✓	✓	✓	✓	✓	✓
Measurement		✓	✓	✓	✓	✓	✓	✓
1D/2D Code Reading			✓ IDMax®, PowerGrid®, Hotbars®	✓ IDMax, PowerGrid, Hotbars	✓ IDMax, PowerGrid, Hotbars	✓ IDMax, PowerGrid, Hotbars	✓ IDMax, PowerGrid, Hotbars	✓ IDMax
OCR		✓	✓	✓	✓	✓	✓	✓
Flaw Detection					✓	✓	✓	✓
Color Verification		✓			✓	✓	✓	✓
Color Identification					✓	✓	✓	✓
Histogram			✓	✓	✓	✓	✓	✓
Brightness		✓	✓	✓	✓	✓	✓	✓
Pixel Counting		✓	✓	✓	✓	✓	✓	✓
Contrast		✓	✓	✓	✓	✓	✓	✓
Image Filters		✓	✓	✓	✓	✓	✓	✓

3D VISION SYSTEMS

Whether performing a single profile measurement or scanning an entire surface, Cognex has the most powerful and robust 3D vision tools. Manufacturers in all industries trust Cognex technology to deliver high accuracy surface measurements that go beyond the capabilities of 2D vision technology.

In-Sight 3D-L4000 Series

A unique vision system combining 3D laser displacement technology with a high-performance smart camera. It allows factory engineers to quickly, accurately, and cost effectively solve a wide variety of inspections thanks to a comprehensive suite of true 3D vision tools, easy setup, and speckle-free blue laser optics.

TOOL SET

3D RESOLUTION

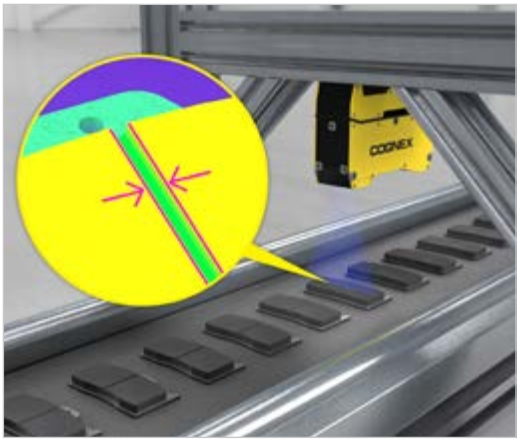
2000 points

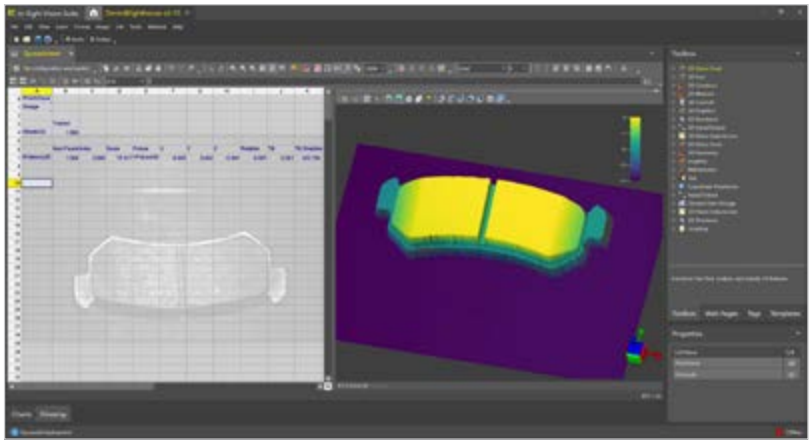
FEATURES

ESD-Safe

Factory Calibrated

IP65





3D-A5000 Series

State-of-the-art area scan camera captures high-resolution 3D point cloud images in less time than alternative methods. Using unique 3D imaging technology, it solves challenging assembly verification, in-line metrology, and robotic guidance applications.

TOOL SET

3D RESOLUTION

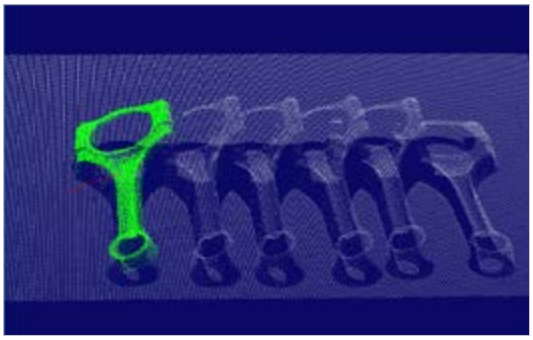
1.5 million points

FEATURES

LightBurst

Factory Calibrated

IP65



3D-L4000 with VisionPro

Powerful laser displacement sensor with PC-based development environment performs fast, accurate 3D inspections, measurements, and OCR character reading. Equipped with industry-leading 3D vision tools and delivers results in real-world units.

TOOL SET

3D RESOLUTION

960–1920 points

FEATURES

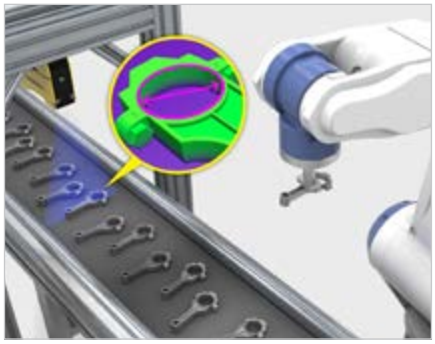
Factory Calibrated

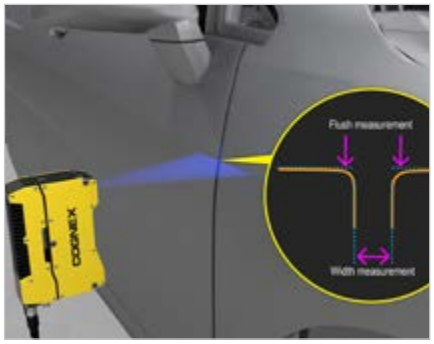
ESD-Safe

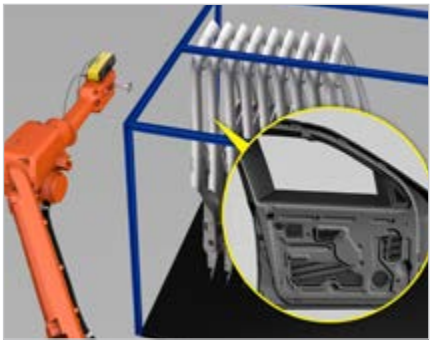
IP65

3D VISION APPLICATIONS

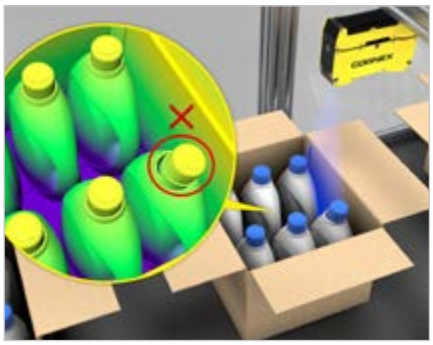
Automotive

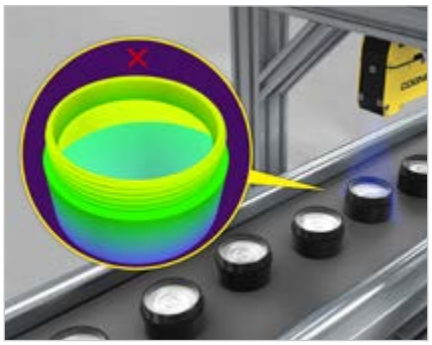


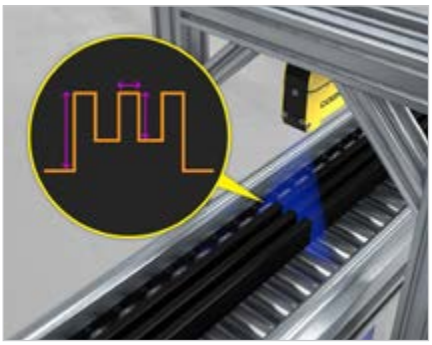




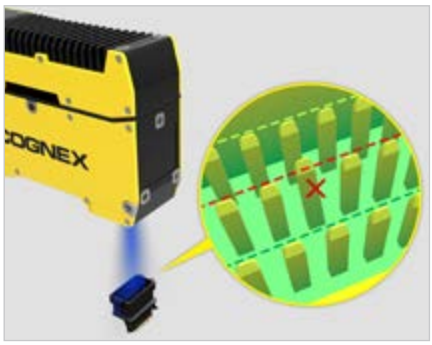
Consumer Packaged Goods

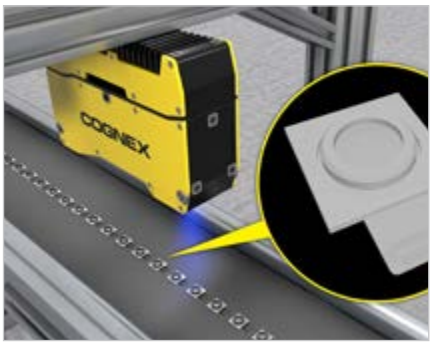


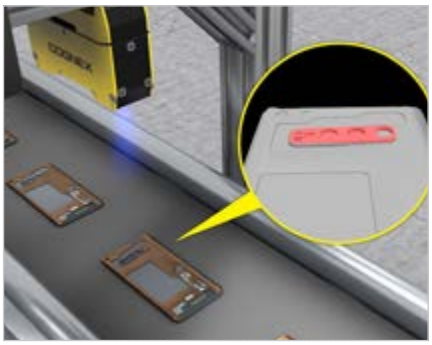




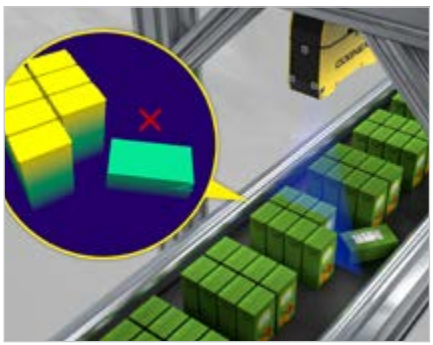
Electronics

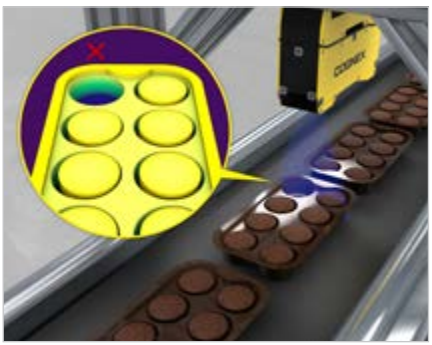


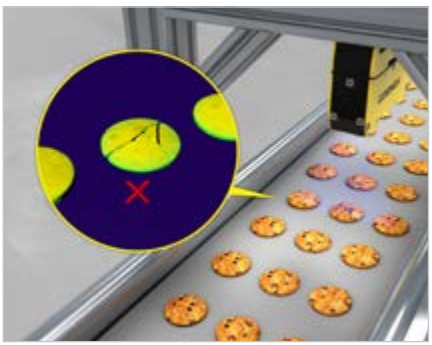




Food & Beverage







3D VISION SYSTEMS SPECIFICATIONS

In-Sight 3D-L4000 Series

	IS3D-L4050	IS3D-L4100	IS3D-L4300
3D Technology	Displacement Sensor		
Clearance Distance (CD)	92.00 mm (3.6 in)	130.00 mm (5.1 in)	180.00 mm (7.1 in)
Measurement Range (MR)	106.00 mm (4.2 in)	235.00 mm (9.3 in)	745.00 mm (29.3 in)
Near FOV	55.00 mm (2.2 in)	75.00 mm (3.0 in)	95.00 mm (3.7 in)
Far FOV	90.00 mm (3.5 in)	180.00 mm (7.1 in)	460.00 mm (18.1 in)
Resolution X	28.6–46.9 µm	39.1–93.8 µm	49.5–239.6 µm
Resolution Z	2.5–6.9 µm	4.4–25.9 µm	6.9–147.5 µm
Acquisition Rate	Up to 4 kHz (after windowing down the sensor) ([1]Up to 6 kHz)		
Protection	IP65		
Software	In-Sight Vision Suite		

3D-A5000 Series

	3D-A5120	3D-A5060	3D-A5030	3D-A5005
3D Technology	3D LightBurst Technology™ Area Scan			
Clearance Distance (CD)	1000.0 mm (39.4 in)	1400.0 mm (55.1 in)	1465.0 mm (57.7 in)	299.3 mm (11.8 in)
Measurement Range (MR)	1000.0 mm (39.4 in)	400.0 mm (15.7 in)	80.0 mm (3.1 in)	12.0 mm (0.5 in)
Near FOV	900 x 675 mm (35.4 x 26.6 in)	520 x 390 mm (20.1 x 15.4 in)	280 x 210 mm (11.0 x 8.3 in)	60 x 44 mm (2.4 x 1.7 in)
Far FOV	1760 x 1320 mm (69.3 x 52 in)	645 x 490 mm (25.4 x 19.3 in)	285 x 216 mm (11.2 x 8.5 in)	65 x 46 mm (2.6 x 1.8 in)
Resolution X	626–1223 µm	361–454 µm	195–200 µm	42–44 µm
Resolution Z	414–1656 µm	338–690 µm	178–213 µm	7–8 µm
Acquisition Time	200 msec			
Protection	IP65			
Software	VisionPro & Cognex Designer			

3D-L4000 with VisionPro

	VP 3D-L4033	VP 3D-L4050	VP 3D-L4100	VP 3D-L4300
3D Technology	Displacement Sensor			
Clearance Distance (CD)	93.00 mm (3.7 in)	92.00 mm (3.6 in)	130.00 mm (5.1 in)	180.00 mm (7.1 in)
Measurement Range (MR)	44.00 mm (1.7 in)	106.00 mm (4.2 in)	235.00 mm (9.3 in)	745.00 mm (29.3 in)
Near FOV	33.00 mm (1.3 in)	55.00 mm (2.2 in)	75.00 mm (3.0 in)	95.00 mm (3.7 in)
Far FOV	39.00 mm (1.5 in)	90.00 mm (3.5 in)	180.00 mm (7.1 in)	460.00 mm (18.1 in)
Resolution X	17.2–20.3 µm	28.6–46.9 µm	39.1–93.8 µm	49.5–239.6 µm
Resolution Z	1.7–2.7 µm	2.5–6.9 µm	4.4–25.9 µm	6.9–147.5 µm
Acquisition Rate	Up to 4 kHz (after windowing down the sensor) ([1]Up to 6 kHz)			
Protection	IP65			
Software	VisionPro & Cognex Designer™			

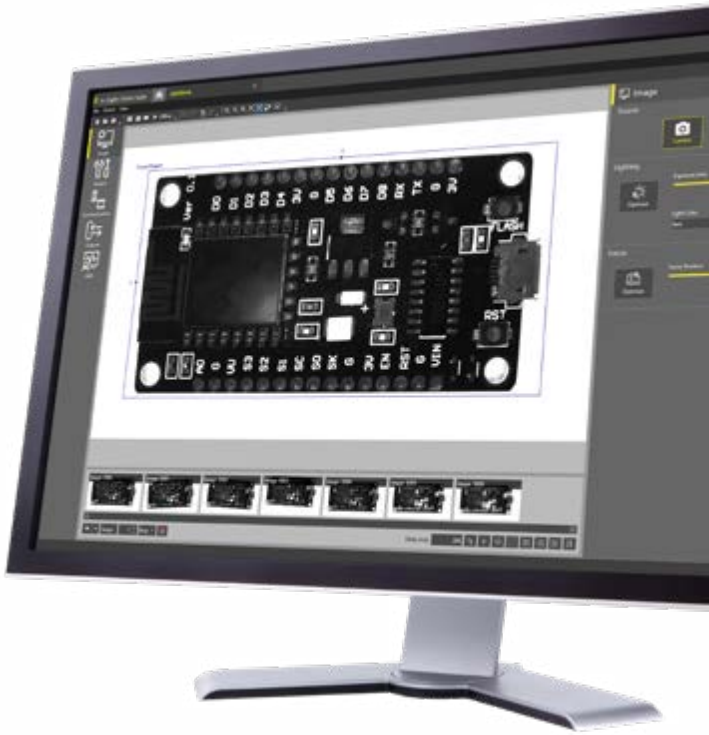
[1] When binning is enabled and the FOV is windowed down.

VISION SOFTWARE

Cognex vision software provides the power and flexibility to solve your most challenging applications. Available in several formats, choose between programmatic or graphical user interfaces to meet your development needs and gain access to the industry's most robust vision tool libraries.

In-Sight Vision Suite

In-Sight Vision Suite software is common across all In-Sight products and offers flexible development options. It includes two programming environments — EasyBuilder® and spreadsheet — designed for different types of tasks, which allows you to seamlessly scale your solution as your application needs change.



EasyBuilder

With its point-and-click programming, the EasyBuilder interface is ideal for setting up simple or common jobs. The intuitive process guides developers step-by-step through setup — from image capture to the final result.

Spreadsheet

The spreadsheet interface is ideal for building advanced or customized applications. Robust in design, this development environment provides users with the ability to make critical adjustments to job parameters, without the need for programming.

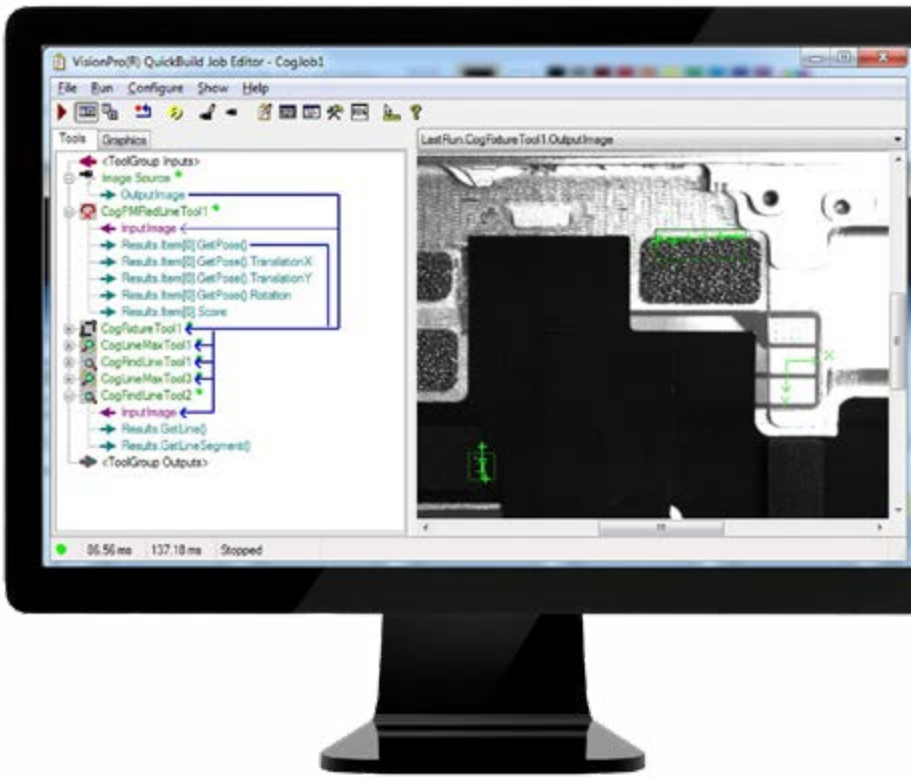
Runtime visualization for real-time device management

VisionView Web is a web-based, human-machine interface (HMI) and display panel for monitoring and controlling In-Sight vision systems, directly on the factory floor. From the HMI, users can view inspection results, configure applications, and modify setup parameters.

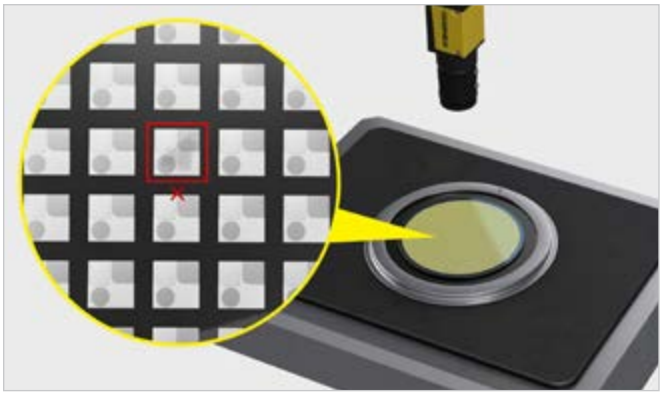
VisionPro

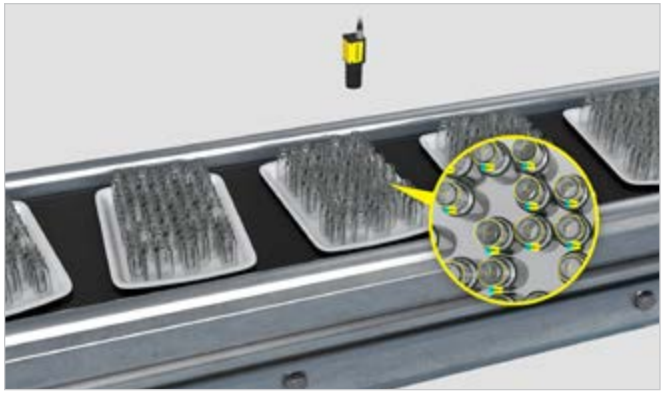
VisionPro® is a PC-based software that combines best-in-class vision technologies in a graphical programming environment. Powerful enough to solve the most challenging vision tasks, it enables rapid deployment of highly-customizable applications, from geometric object location and inspection to identification, measurement, and alignment. With a future-oriented design that includes rule-based tools and AI capabilities, this flexible software supports both current and future vision needs.

TOOL SET



Extensive library of AI- and rule-based tools tackle your toughest vision challenges





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Cognex vision systems and barcode readers help customers improve product quality and operational performance by eliminating defects, verifying assembly, and tracking information at every stage of the production process. Using data captured by Cognex vision systems and barcode readers, companies can monitor, update, and change production plans in real-time across global supply chains.

Smarter automation using Cognex products means fewer errors, which equates to lower costs and higher customer satisfaction. And Cognex is constantly applying new techniques, like artificial intelligence, to enable companies to evolve their automation strategy to meet today's and tomorrow's needs.

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