The Right Choice for Automotive Applications

Cognex vision technology helps companies improve their manufacturing quality and performance by eliminating defects, verifying assembly, and tracking and capturing information at every stage of production to ensure the entire process is completed correctly. Smarter automation using Cognex vision means fewer production errors, which equates to lower manufacturing costs and higher customer satisfaction.

Cognex is the world’s most trusted vision company. With 700,000+ systems installed in factories around the world, and over thirty years of experience solely in vision technology, we have the experience and application knowledge to ensure that our systems will do exactly the job you need, every time.

Cognex products are used by many of the world’s top automotive manufacturers, suppliers, and machine builders to ensure that the products that are being delivered match the stringent quality requirements of the automotive industry.

Global Leader, Local Expertise, Worldwide Reach

Standardizing inspection and ID solutions across all production lines reduces the total cost of ownership for any enterprise, but it also requires a supplier that’s able to deliver and support large scale deployments that require systems at multiple locations. As the undisputed global leader in vision-based inspection and identification systems, Cognex offers greater security for manufacturers and equipment suppliers striving to comply with rapidly approaching regulatory deadlines and has the capacity and resources available to support even the largest enterprise–wide inspection and barcode deployments across multiple production lines.

Every day leading automotive manufacturers and suppliers rely on Cognex sales engineers and 450+ partners located around the world to provide assistance wherever and whenever needed.
The Cognex Product Family

Vision Systems
Rugged systems provide easy-to-use interface for configuring applications in a fully integrated package. In-Sight vision systems are ideal for inspection, text verification, and track and trace. A wide range of models, including line scan and color systems, meet all price and performance requirements.

Vision Software
A library of powerful vision tools allows complete flexibility in choice of cameras, frame grabbers, and other peripherals. VisionPro® software combines the power and adaptability of advanced programming with the simplicity of a graphical programming environment.

Vision Sensors
Easy, affordable sensors replace photoelectric sensors for more reliable inspection and part detection. Checker® vision sensors succeed where traditional sensors fail, and allow multiple inspections with a single device. The Checker 3G offers configuration with no need for a PC.

Fixed-Mount Industrial ID Readers
DataMan® readers offer the smallest size and highest performance in direct part mark and high-speed code reading applications. Reading everything from simple barcodes, the most challenging 2D codes, DataMan readers are equipped with autofocus and ethernet capability for ease of networking to factory platforms.

Handheld Industrial ID Readers
DataMan offers the widest range of industrial handheld readers in the industry. Innovative lighting, image acquisition, and code reading capabilities provide the most reliable reading of virtually any code on any surface.

Code Verifiers
Handheld and fixed-mount DataMan verifiers are easy-to-use, reliable, and enable accurate evaluation of code quality to ensure the highest read rates through production and the supply chain.
Cognex Connect
Connecting Cognex systems into virtually every automation system

Cognex products link to a wider range of factory automation equipment than any other range of products. Whether you connect directly to a PLC (Programmable Logic Controller) or robot controller or manage multiple systems remotely from a networked PC or HMI (Human Machine Interface), Cognex Connect™ assures a seamless reliable communications link between Cognex products and all of your equipment on the factory floor.

This table summarizes just some of the communication capabilities with Cognex Connect:

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<td>Pre-configured drivers and ASCII string commands</td>
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<tr>
<td>ABB, Denso, FANUC, Kuka, Mitsubishi, Motoman &amp; Staubli</td>
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If you need to integrate inspection images, quality data, and interactive controls into your own operator interface, Cognex Connect gives you an array of visualization options:

- **In-Sight Display Control** embeds an In-Sight image and CustomView display in your .NET or ActiveX compatible custom application, or a PC-based HMI/SCADA system from Rockwell, WonderWare, Citect and others.
- **In-Sight and Checker** allow you upload data to your HMI displays, SPC (Statistical Process Control) systems, plant supervisory systems, and even Microsoft Excel to monitor operations and record statistical data.
- **Checker, DataMan and In-Sight** all offer SDKs (Software Development Kit) to allow systems integrators to create a custom user interface for managing your systems, tailored to your exact requirements.
AUTOMOTIVE INDUSTRY APPLICATIONS

### BODY

**Steel frame | Inspection**

**APPLICATION**

Inspect each part for the location, presence, or absence of the nut. If the nut is not present, trigger a cylinder to eject the part into a reject bin.

**SYSTEM**

Checker

**RESULT**

Checker’s integrated lighting, optics, camera, processor, and input/output (I/O) in an industrial IP67 housing have provided continuous 100% effective inspection.

**Customer:** “Besides the low cost, we liked the fact that Checker is so easy to use. We ran through a demo on their website and in just a couple of minutes programmed Checker to inspect a sample part.” Ice Industries

### BODY

**Side panels | Guidance**

**APPLICATION**

Guide the robot for spot welding and guide the first and second robots to perform an optical spot weld inspection. The number and location accuracy of the spot welds are inspected.

**SYSTEM**

VisionPro 3D

**RESULT**

VisionPro 3D uses industry-leading alignment tools, such as PatMax, SearchMax™, and PatFlex find multiple 2D features on the part’s surface. VisionPro 3D combines them to determine the precise three dimensional position and orientation of the object.

**Customer:** KWD Automobiltechnik
CHASSIS
Tires | Inspection

**APPLICATION**
Inspect the tires on the manufacturing line and measure any distortion with complete reliability at a facility with a rate of 28,000 tires per day.

**SYSTEM**
In-Sight

**RESULT**
In-Sight has a full range of tools available and the environment is very intuitive and easy to use. There is no need for a PC, which simplifies the connections and reduces maintenance.

Customer: “The In-Sight which we have chosen has a full range of tools available. The environment is very intuitive, it can be configured by a few clicks of the mouse and there is no need for a PC, which simplifies the connections and reduces maintenance. These systems can take measurements very reliably, which is essential for our application.” Continental

CHASSIS
Brake Pads | Inspection

**APPLICATION**
Provide zero defect detection of brake pads by detecting mixed materials, incorrectly sized or incorrectly loaded products, and products which missed a step in the production process by measuring the overall dimensions of brake pads, identifying surface patterns and labeling, and distinguishing the characteristics of the pads.

**SYSTEM**
In-Sight

**RESULT**
Federal-Mogul chose the Cognex system because it is not possible to achieve quick and effective production by using manual inspection. The In-Sight vision system provided simplicity and flexibility, strong stability, reliability of the images recorded, and non-contact online rapid detection.

Customer: Federal Mogul
AUTOMOTIVE INDUSTRY APPLICATIONS

CHASSIS
Wheel Fasteners | Inspection

**APPLICATION**
Inspect fasteners that consist of either two parts—a nut and a stainless steel cap—or three parts—a nut, cap and washer—that are assembled on an index machine that processes two parts simultaneously at a speed of 31 cycles per minute.

**SYSTEM**
Checker

**RESULT**
Checker provides high resolution and a wide field of view and can inspect parts at speeds up to 6000 parts per minute.

**Customer:** “We selected Cognex Checker vision sensors because they are very easy to program and operate. The Cognex Checker inspection engine is far more powerful than a traditional sensor because it is capable of understanding what a good part should look like and can compare as many different features as are needed to make the pass or fail decision with certainty.” Maclean Vehicle Systems (MVS)

CHASSIS
Electric Valve Parts | Inspection

**APPLICATION**
100% inspection of nearly twenty-four multi-spindle lathes that produce 120,000 parts each day, representing an annual production of 35 to 40 million parts.

**SYSTEM**
In-Sight

**RESULT**
In-Sight’s fast, powerful algorithms were able to keep pace with this fast production facility. The rate of faulty parts delivered to customers dropped rapidly after installing In-Sight.

**Customer:** “We were concerned that these systems would slow down production rates. We have noted with satisfaction that the implementation of these industrial vision solutions do not have a negative effect on production” Meister France
**CHASSIS**

**Tires & Wheels | Inspection**

Customer: Nissan

**APPLICATION**

Locate the radial force variation (RFV) spots on the tire and wheel, and then transmit the angle between the two spots back to the machine’s main control system.

**SYSTEM**

In-Sight

**RESULT**

The spots the camera had to detect were of different colors, the wheels could be one of three sizes (14, 15, or 16 inch rims), and the tires could be of any profile. Despite all the different combinations, In-Sight’s powerful algorithms were able to provide accurate information on each wheel and tire.

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**CHASSIS**

**Automated Lug Nut Fastening | Guidance**

Customer: “As far as we know, this is the first time this application has been successfully automated with the use of machine vision.” Radix Controls

**APPLICATION**

Provide robotic guidance for running down and torquing the lug nuts that hold the wheel to the hub.

**SYSTEM**

In-Sight

**RESULT**

The vision application relies on Cognex’s unique PatMax pattern matching technology to quickly locate the wheel in the image. PatMax can be programmed to recognize any pattern simply by highlighting the pattern in an image taken by the camera.
### Automotive Industry Applications

#### Climate
**Cooling Modules | Inspection**

**Application**

Provide inspection of cooling modules that are built on five different assembly lines, each line building more than 50 different variants.

**System**

In-Sight

**Result**

In-Sight is mounted on a robot that moves into position to capture the 30+ images in less than 45 seconds, completely inspecting the module. The In-Sight vision system can be modified to inspect for future design changes easily with a few hours of programming time.

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**Customer:** “A single Cognex In-Sight met the requirements of this application by accurately inspecting 30+ very different features in many different locations in less than 45 seconds. Plant wide we are using this camera for more than 90 different inspections.” The Piston Group

#### Components
**Screws | Inspection**

**Application**

Ensure 100% accuracy on sorting speciality components made at 400 ppm. The screws can vary in length from 40mm to 60mm.

**System**

In-Sight

**Result**

The robust software and speed of the In-Sight cameras allows for a series of thread measurements to be performed at speeds of 30-40 milliseconds per part, offering an outstanding speed/accuracy ratio.

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**Customer:** “The In-Sight 5100 cameras from Cognex have given us the read accuracy LISI demanded whilst maintaining an outstanding throughput rate. Using the Cognex products has also demonstrated that not only has the unit price of the cameras been more cost-effective than alternative systems, but they have allowed us greater flexibility when tailoring our machines to each individual customer.” LISI Automotive
**AUTOMOTIVE INDUSTRY APPLICATIONS**

**ELECTRONICS**  
**Batteries | Inspection**

**APPLICATION**  
Accurate final inspection of up to 3,000 absorbent glass mat (AGM) car batteries per day.

**SYSTEM**  
VisionPro

**RESULT**  
VisionPro’s high-performance tools that were intelligent enough to ignore non-critical changes in appearance and focus on the critical characteristics that are decisive for the acceptance of its products. This project provided Banner with quick cost savings with 100% inspection and zero error tolerance.

**Customer:** Banner GmbH

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**ELECTRONICS**  
**Cable Assemblies | Inspection**

**APPLICATION**  
Ensure accuracy of cable assemblies, including positioning, color, and presence/absence of parts.

**SYSTEM**  
In-Sight

**RESULT**  
 Twelve Cognex standard and color vision systems provide total inspection of the final cable assemblies. All the cameras are linked together and provide live image feedback on what is being inspected.

**Customer:** Komax
Customer: “This vision system provides accurate and reliable readings, essential for our production lines. The system will better support new product introduction as it is more flexible than before. Based on this improved flexibility it is predicted that there will be a significant reduction in changeover time during future new product introduction.” Nissan

**APPLICATION**

The existing mechanical centralizer could not cope with the new glass sizes for two of its key vehicles. It was imperative that the new vision system would not only provide accurate information for the two new models, but also that it would adapt easily to future product developments.

**SYSTEM**

In-Sight

**RESULT**

The In-Sight PatMax technology for locating parts or features provided the maximum vision results. The exact coordinates measured are X, Y and the angle of the glass on the vision part of the cell (front to back, side to side and twist) to ensure exact location for the robots.

**APPLICATION**

Reduce excessive scrap and rework costs due to inconsistent placement of vehicle door carriages for transport down the assembly line. Standard photoelectric sensors were unable to reliably check position of the carriages on the frames due to variations in frame location plus the long sensing distance required (> 2ft).

**SYSTEM**

Checker

**RESULT**

Checker’s part finding, contrast, and brightness tools provide consistent and reliable readings even when position of the carriage frame varies. Scrap and rework costs were reduced and line throughput increased by reliably identifying misaligned carriages.
**AUTOMOTIVE INDUSTRY APPLICATIONS**

### EXTERIORS
**ID-plates | Traceability**

*Customer:* “After about one year on the production line, we can say, that we have not only met our specifications, we have clearly exceeded them in the positive sense of the word. Our reading reliability and the availability have proven themselves to be important contributions to a smooth and efficient process.”

Ford/AIT

**APPLICATION**

By reading an OCR code, every car body must be unmistakably assigned to the respective vehicle order and to its corresponding individual accessories to avoid manufacturing or process errors with a reliability of 99.9% or greater.

**SYSTEM**

VisionPro

**RESULT**

The OCR tool in VisionPro uses PatMax as a base. PatMax can also handle very high resolutions down to the sub-pixel range, and the sure and safe determination of angles on objects down to 0.02 degrees. 100% reliability was reached.

### INTERIORS
**Instrument Clusters | Inspection**

*Customer:* “Using the new Cognex In-Sight Micro vision system with its compact size and high performance, has ensured our customer can build their parts safe in the knowledge that there will be no product defects due to appliqué clipping.”

Visteon

**APPLICATION**

Inspect pointer alignment for the speedometer, tachometer, fuel, and temperature gauges on each instrument panel and each appliqué must be clipped into position with pinpoint precision; vibration from the car could make the appliqué move, resulting in the incorrect speed and revolutions being shown.

**SYSTEM**

In-Sight

**RESULT**

The small system size (30x 30x 60mm) allowed the system to be fit into the tight working space that was available and the high performance was able to provide complete inspection for the 24x7 production schedule and part production that is in excess of 2000 parts per day.
AUTOMOTIVE INDUSTRY APPLICATIONS

INTERIORS
Seat components | Inspection

Customer: “Employing a reliable international vision supplier like Cognex offers benefits which have a long-term impact on the entire group and its international production network.” Keiper GmbH & Co Group

APPLICATION
Twenty different types of components had to be identified and inspected individually with 100% reliability on each production line. The components vary in color and aspect.

SYSTEM
In-Sight

RESULT
The In-Sight high resolution system, along with the powerful software tool, PatMax, ensured accurate inspection, even with the variability in components.

COMPONENTS
Robotic Guidance | Guidance

Customer: Theilinger Automation & Papiertechnik

APPLICATION
Guide a pick and place robot that feeds small parts, such as punched flanges, and also check the quality of the parts, their orientation, and their positioning.

SYSTEM
In-Sight

RESULT
The In-Sight communicates continuously with the robot program, which means that no additional PLC (programmable logic controller) is needed. The In-Sight is reliable and easy for operators to use with no need for programming skills and with minimal effort.
POWERTRAIN

Electro-Hydraulic Automatic Transmission Control Module | Inspection

APPLICATION
Reliable inspection of the module that is easily scalable so output can be expanded rapidly and new products could be introduced efficiently in the future.

SYSTEM
In-Sight

RESULT
In-Sight’s powerful software tools helped increase the quality, guarantee the supply of quality products, and greatly improve customer satisfaction.

Customer: Continental Automotive Systems (Tianjin) Co., Ltd.

POWERTRAIN

Engine Block | Traceability

APPLICATION
Read an OCR code that is created in casting based on ten different characters and identify the engine blocks from the foundry through to the final machining stage.

SYSTEM
VisionPro

RESULT
Even with variations in the engines position, VisionPro registers the serial numbers quickly and reliably providing fast, error-free traceability.

Customer: FritzWinter
**POWERTRAIN**

Sealing Rings  |  Inspection

**APPLICATION**
Inspect the surface of the sealing rings for scratches and contamination and provide a dimensional check measuring the inside and outside diameter of the parts.

**SYSTEM**
VisionPro

**RESULT**
Powerful VisionPro tools ensured flawless surfaces in the range of thousandths of a millimeter—and at a breathtaking speed.

*Customer: Hänggi GmbH*

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**POWERTRAIN**

Transmission assembly  |  Inspection

**APPLICATION**
Inspect the transmission assembly with a target of a zero defect rate.

**SYSTEM**
VisionPro & In-Sight

**RESULT**
In-Sight, with IP67 and IP68 ratings, provided fast, durable inspection and VisionPro was to four 5 megapixel cameras providing part inspection to a 0.6mm tolerance.

*Customer: “The In-Sight vision system provided outstanding performance based on a powerful algorithm and has made it possible to check all cameras on the assembly line and save and manage images at a main server through an Ethernet network.” HANWHA TechM*
**POWERTRAIN**  
*Engine parts | Inspection*

**APPLICATION**
Inspect connecting rods for characteristics such as thickness, length, and width dimensions, symmetry deviations, concentricities, and displacement.

**SYSTEM**
In-Sight

**RESULT**
In-Sight 100% error detection in the first test step. In-Sight’s robust injection-molded aluminium and stainless steel housing renders it impervious to high vibration loads and tight M12 connections protect it from dust.

*Customer: IMR Gesellschaft*

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**POWERTRAIN**  
*Pump seals | Inspection*

**APPLICATION**
Provide a reliable and confirmed quality control solution for the inspection of pump seals during production.

**SYSTEM**
In-Sight

**RESULT**
In-Sight takes 24 snapshots of each fully rotating piece in only 2 seconds to verify the external profile of the seal in a complete 360° inspection.

*Customer: Meccanotecnia Umbra*
**POWERTRAIN**

**Oil Cap Assembly | Part Orientation**

*Customer:* “The small size, built-in lighting, variable working distance, ladder logic and free-running capability make these devices very simple to install. There was no need to wire them to a PLC, no need to install and wire trigger sensors, and the four-step set up makes Checker by far the easiest vision sensor that I’ve ever used.”  

Miniature Precision Components Inc. (MPC)

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**APPLICATION**

Provide tight control of o-ring and cap orientation so the oil cap will function as intended. The cap must also be in the right orientation prior to pad printing in order to meet quality requirements.

**SYSTEM**

Checker

**RESULT**

Checker’s unique sensor tools detects a part by locating a feature on the part, not just an edge. Checker achieved zero-defect rates in the manufacturing process and lowered scrap costs.

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**POWERTRAIN**

**Solenoid stators | Inspection**

*Customer:* “The vision system’s relatively low cost was easy to justify since we are penalized $2,000 for any defect. The vision system has operated for six months and in this time it has never passed a bad part nor failed a good part.”  

Pontiac Coil

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**APPLICATION**

Inspect two different types of fasteners—pins and star head screws—that are used on the two different types of stators inspected on this line. Also ensure additional feature inspection.

**SYSTEM**

In-Sight

**RESULT**

After six months, In-Sight never passed a bad part nor failed a good part. In-Sight easy programmability allowed for easy modification to the program to compensate for design or process changes.
AUTOMOTIVE INDUSTRY APPLICATIONS

**POWERTRAIN**
Transmission control module | Inspection

*APPLICATION*
Perform 100% inspection of a transmission control module (TCM) to verify the mechanical integrity of the unit.

*SYSTEM*
In-Sight

*RESULT*
The powerful vision tools in In-Sight provided perfect quality to date, while also delivering substantial labor savings and part traceability for the company.

**Customer:** “The ability to use a single vision system to meet all of the requirements of the application saved time and money because we were able to work in a single programming environment and with a single interface throughout the project.” Universal Instruments

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**POWERTRAIN**
Transmissions | Traceability

*APPLICATION*
Provide exact OCR detection of the inscription surface's position on the transmission. Eight different transmission types are being marked and inspected in three shifts.

*SYSTEM*
In-Sight

*RESULT*
Robust vision tools on In-Sight provide reliable OCR inspection. In-Sight also offers Ethernet interface so the vision system can be managed, monitored, and controlled at each stage of production from anywhere within the factory network.

**Customer:** ZF Getriebe
BODY
Metal Stamping | Traceability

APPLICATION
Read a 2-D Data Matrix on metal stamped components and track and confirm the correct parts included in lot shipments.

SYSTEM
DataMan

RESULT
The industrial strength of the DataMan handheld readers are able to robustly read challenging DPM dot peen codes even with distortions.

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CHASSIS
Brake Housing | Traceability

APPLICATION
Read a 2-D Dot Peen code on automotive brake housing assemblies during final assembly.

SYSTEM
DataMan

RESULT
DataMan is able to read challenging codes where appearance changes because of mark quality, reflections, or material surface variations.
CHASSIS
Chassis | Traceability

APPLICATION
Read four 1-D barcodes on a label and make decisions based on the strings.

SYSTEM
DataMan

RESULT
DataMan software algorithms offers reliable, fast 1-D code reading and can read multiple codes simultaneously. DataMan offers Ethernet providing quick triggering for decisions.

CHASSIS
Brakes | Traceability

APPLICATION
Read 1-D barcodes on labels for part traceability and replace existing laser scanner technology.

SYSTEM
DataMan

RESULT
DataMan’s read rates outperform that of laser scanners, with the ability to read codes that are scratched or damage. DataMan also allowed for a larger working distance from the label than the laser scanner could accomplish.
ELECTRONICS
PCB Legend Identifier | Traceability

APPLICATION
Read a small 6mm 2-D laser etched Data Matrix code on the border or legend of each PCB.

SYSTEM
DataMan

RESULT
DataMan offers the flexibility to read small or large codes in a variety of locations on different surface types.

ELECTRONICS
Heat Sink | Traceability

APPLICATION
Read a QR code on the side of a heat sink (part of the electronics on the alternator) that is a black on aluminum code.

SYSTEM
DataMan

RESULT
The powerful DataMan software algorithms are able to compensate for different reading surfaces. DataMan also offers real-time viewing of how the system is performing.
**AUTOMOTIVE INDUSTRY APPLICATIONS**

### EXTERIORS
**Plastic Bumpers | Traceability**

**APPLICATION**
Read moulded 2-D Data Matrix codes on plastic.

**SYSTEM**
DataMan

**RESULT**
DataMan 8500 is able to create contrast between the code and the background with unique UltraLight settings. IDMax algorithms are able to decode the low contrast code molded into the plastic.

**Customer:** Innovative Automation Inc

### POWERTRAIN
**Actuator | Traceability**

**APPLICATION**
Read a 2-D Data Matrix code on the plastic housing of the part that is read at each assembly and test operation.

**SYSTEM**
DataMan

**RESULT**
DataMan reliably read the 2-D Data Matrix codes at high rates of speed and easily integrated into the factory floor.
Customer: “There are a number of vision companies but we always recommend Cognex vision systems because they have the best technology for reading 2D Data Matrix codes.” Wegner Motorsports/NASCAR

**APPLICATION**

Grade a 2-D Data Matrix code, then read the codes on each of the major parts in the new motor. The marks need to be positioned in very specific, often difficult-to-mark locations on the parts, so they can be inspected easily before and after the race to prevent the use of illegal parts that would increase the power of the engine.

**SYSTEM**

In-Sight/DataMan

**RESULT**

In-Sight, built into the marking system, reliably grades the 2-D Data Matrix code mark. DataMan wireless handheld scanners read the codes on site which show which part has gone into which kit which makes it possible later to trace its history if necessary.

**POWERTRAIN**

**Engine | Traceability**

**APPLICATION**

Read different sized 2-D codes—from 3mil up to 10mil—on shiny curved surfaces with one unit.

**SYSTEM**

DataMan

**RESULT**

DataMan handheld readers provide excellent read rates with flexible UltraLight illumination that can overcome surface or lighting issues.