ELECTRONICS AND OEM INDUSTRY SOLUTIONS GUIDE

Increase Performance, Improve Quality, and Protect Your Brand

COGNEX

THE GLOBAL LEADER

IN MACHINE VISION AND INDUSTRIAL BARCODE READING

Cognex,® the world's most trusted machine vision and industrial barcode reading company.

With over 3 million systems installed in facilities around the world and over forty years of experience, Cognex is solely focused on industrial machine vision and image-based barcode reading technology. Deployed by the world's top machine builders and original equipment manufacturers (OEMs), Cognex patented vision tools and hardware are suitable for integration into semiconductor and printed circuit board (PCB) machinery and offer custom multi-camera alignment solutions for display manufacturing, module assembly, and finished consumer devices. Today, electronic hardware OEMs use Cognex products to take their equipment performance to the next level.

$811 MILLION
2020 REVENUE

OVER 40
YEARS IN THE BUSINESS

500+
CHANNEL PARTNERS

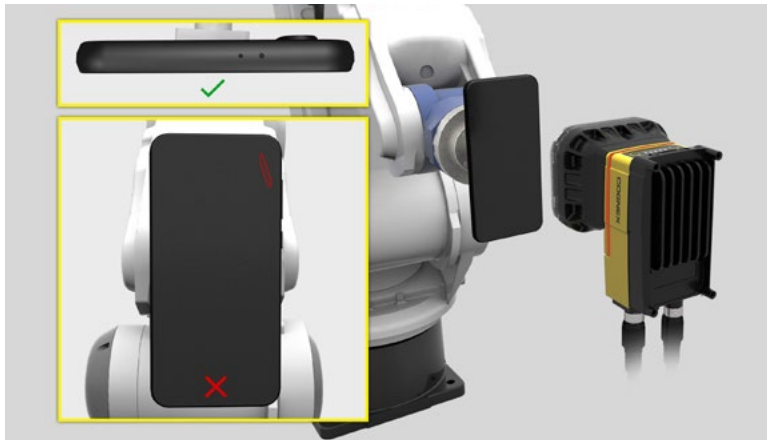
GLOBAL OFFICES IN
20+ COUNTRIES

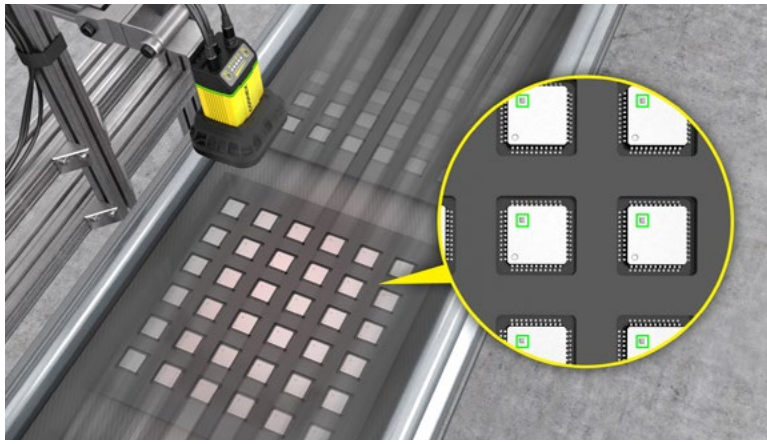
3,000,000+
SYSTEMS SHIPPED

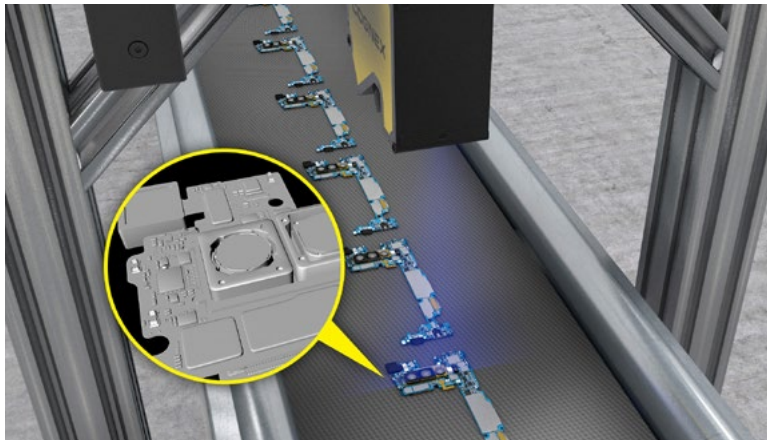
THE RIGHT CHOICE
FOR OEMS AND MACHINE BUILDERS

SOLVING COMPLEX, CUSTOM ELECTRONICS APPLICATIONS WITH INDUSTRY-LEADING MACHINE VISION AND ALIGNMENT TECHNOLOGY

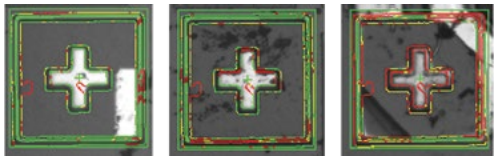
Today, electronic components and devices cannot be manufactured without using machine vision. In fact, machine vision has made it possible to achieve the density in today's integrated circuits and to manufacture them cost-effectively. Electronic manufacturers rely on Cognex machine vision, deep learning, and 3D vision technology to build and inspect semiconductors, printed circuit boards, electronic hardware, and consumer devices.







INDUSTRY-LEADING
VISION & DEEP LEARNING TECHNOLOGY

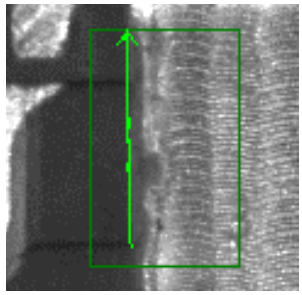


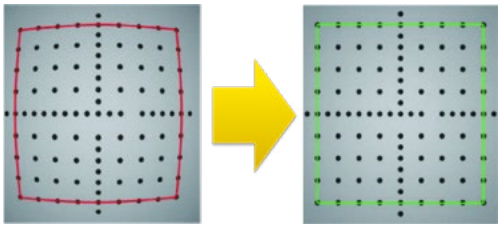
Pattern-Matching Technology

Robust pattern-finding technology accurately and reliably locates wafer patterns, fiducials, flex circuits, button cut-outs, and other features with up to 1/40th pixel accuracy under challenging conditions. PatMax® auto-tune automatically removes the effects of noise and lighting effects. Multi-Model PatMax locates instances of multiple patterns in a single run-time image.

LineMax Line Location Tool

Advanced line finding tool reliably and accurately extracts and locates edge features that make up lines in noisy or low contrast images. Used in applications where patterns or fiducials do not exist, LineMax handles beveled glass and other confusing edges with ease.



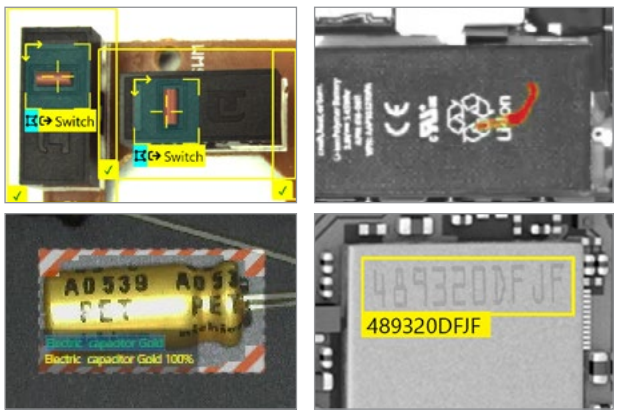


Calibration Technology

Auto-Calibration technology correct lens distortion, perspective, and stage error with high accuracy for unified camera, motion stage, and physical coordinate spaces. Automated set-up assures consistent machine-to-machine performance. Ultra-Calibration technology corrects for non-linear distortions associated with multi-camera applications, enabling one-move alignment during run-time, limiting error, and reducing cycle time.

Cognex Deep Learning

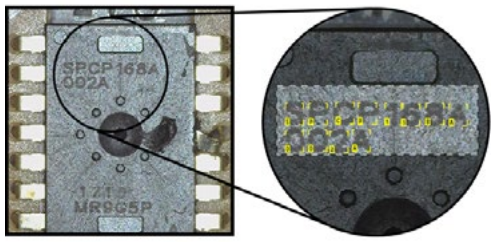
Cognex Deep Learning is the first ready-to-use deep learning software dedicated to industrial image analysis and optimized for complex surface inspection and challenging optical character recognition. Cognex Deep Learning uses neural network analysis to inspect and classify images, outperforming the best quality inspectors.



SEMICONDUCTOR & SURFACE MOUNT TECHNOLOGY (SMT) SOLUTIONS

Cognex Deep Learning OCR

Cognex's deep learning-based OCR & OCV software uses a pre-trained, omni-font library to immediately recognize characters during AOI inspection. The OCR tool can be easily retrained on application-specific fonts and misread characters. This dramatically reduces development time while providing robust, reliable character recognition and verification.



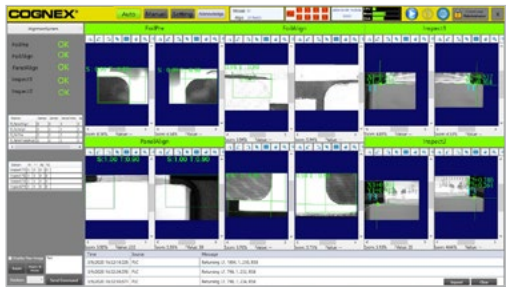
In-Sight 1740 Wafer ID Reader

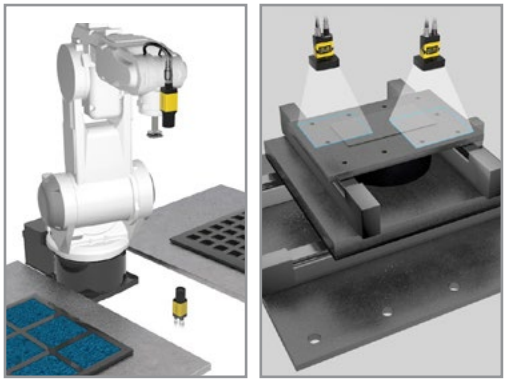
For more than two decades, Cognex wafer readers have set the standard for wafer identification with on-board processing, integrated lighting, and adjustable working distance built into a slim standalone package. Advanced barcode reading algorithms successfully read OCR, T7 Data Matrix, and 1D and 2D codes on hard-to-image wafers. With 12 modes of built-in, software-controlled, bright and dark field illumination, In-Sight® 1740 series readers can image virtually any code including soft marks and ultra-thin coated sapphire substrates.

ELECTRONIC HARDWARE SOLUTIONS

AlignPlus Display Alignment

Cognex AlignPlus® is a turnkey vision solution designed for high precision alignment applications in OLED display manufacturing, touch panel and FPD lamination, bonding, cover glass screen printing, and module assembly. Machine vision tools include patented hand-eye calibration, line finders in challenging conditions such as beveled edges, and pattern-matching vision tools. Engineered as a configurable template, AlignPlus rapidly integrates with a wide assortment of camera and motion stage designs and runs on a Windows-based PC.





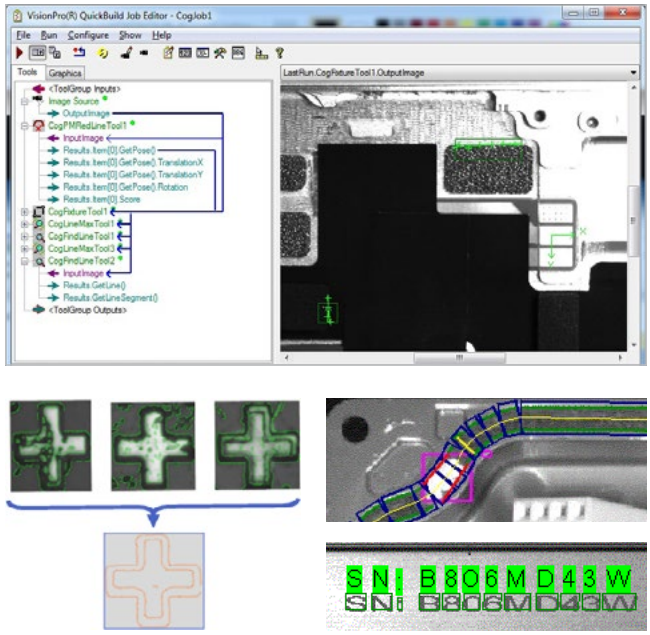
AlignSight Alignment Sensor

The AlignSight alignment sensor is designed specifically to provide vision-guided alignment for motion stage or robot control. The fully self-contained sensor with built-in modular lensing and lighting makes installation simple and quick. Sensor configuration is performed by a simple operator interface without the need for vision programming. Automated motion-vision calibration launches with a click of a button. Offering robust performance, compact design, and simple deployment, the AlignSight sensor is the preferred choice for vision-guided alignment for machines and equipment used in electronics assembly.

MACHINE VISION SOFTWARE AND HARDWARE

VisionPro Software

The leading PC-based vision software is designed to setup and deploy 2D and 3D vision applications with a broad range of industrial cameras and frame grabbers. Extensive .Net class libraries and user controls fully integrate VisionPro® software into OEM and capital equipment machines. A robust library of pattern matching (PatMax), blob, caliper, line location (LineMax), image filtering, OCR (OCRMax™), and OCV vision tools perform a wide range of functions, from geometric object location and inspection to identification, measurement, and alignment, as well as specialized functions specific to semiconductor and electronics applications.



Cognex Industrial Cameras and Frame Grabbers

No matter the software development environment, Cognex Industrial Cameras (CIC) and frame grabbers provide fast, reliable image acquisition designed for easy integration with Cognex VisionPro and CVL software and access to a comprehensive library of tools. GigE Vision® and Camera Link® cameras support standard image sources, including digital, color, monochrome, area scan, line scan, high resolution, multi-channel, and multiplexed acquisition.

MODULAR MACHINE VISION SYSTEMS

In-Sight Vision Systems

In-Sight vision systems are unmatched in their ability to align, guide, measure, inspect, and identify parts within a self-contained form factor. These modular industrial-grade systems include a comprehensive library of advanced vision tools and the resolution and speed for any application. In-Sight Explorer combines the guided step-by-step setup of EasyBuilder with the additional power and flexibility of the spreadsheet for greater control and customization of application data.

3D Machine Vision Systems

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

AUTOMATIC IDENTIFICATION

DataMan Barcode Readers

Powerful barcode decoding software, built-in lighting, and electrostatic-safe packaging make Cognex DataMan® handheld and fixed-mount ID readers ideal for a range of electronics applications. Cognex DataMan products read printed, stamped, and laser-etched barcodes on IC packages, PCBs, housings, and other electronic components.

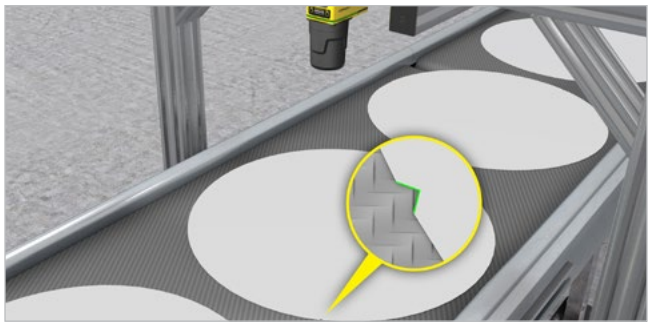
SEMICONDUCTORS

Throughout the process of semiconductor fabrication on a wafer there are numerous inspection and measurement steps to ensure the semiconductor is free from defects and is assembled as designed. From monitoring the diameter of ingots as they are being formed to wafer notch detection or inspecting a die lead frame prior to wire bonding, 2D and 3D machine vision inspection, along with deep learning, is critical during all stages of fabrication.

Wafer Traceability

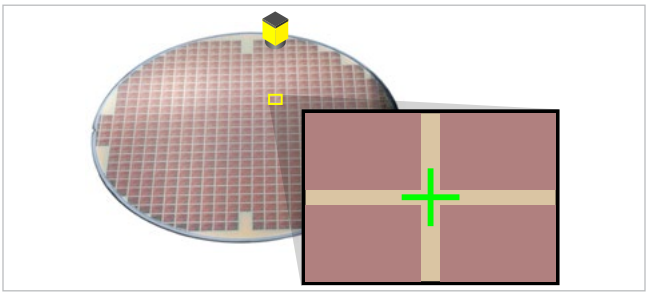
In-Sight 1740 series readers decode difficult-to-read wafer ID marks.

Wafer Notch Detection



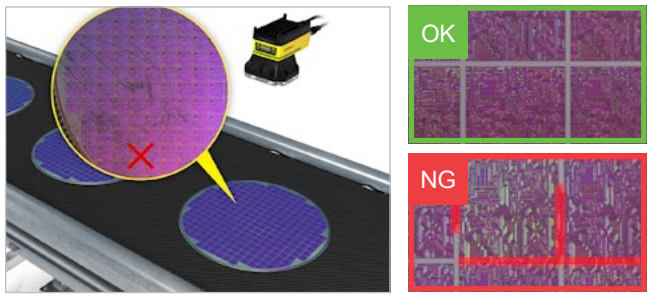
In-Sight vision systems and PatMax accurately identify the wafer's notch and XY position in any orientation.

Wafer and Die Alignment



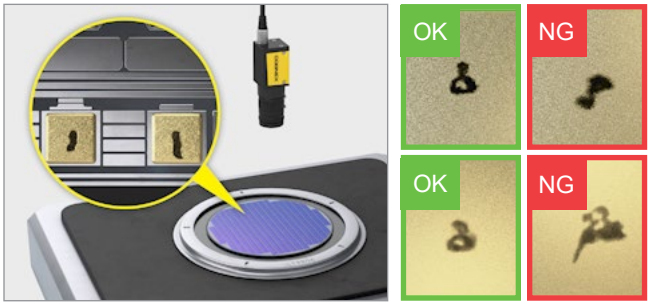
PatMax technology provides robust, accurate, and fast wafer and die pattern location for wafer inspection, probing, mounting, dicing, and testing equipment.

Semiconductor Wafer Defect Inspection



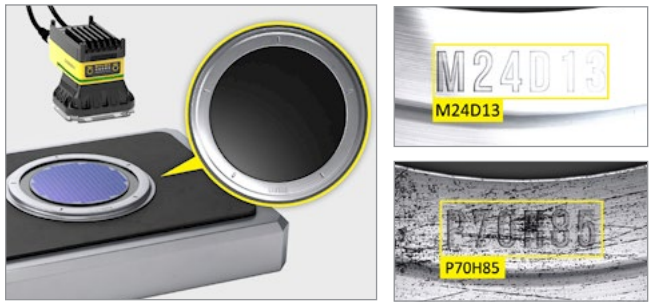
Cognex Deep Learning defect detection tool learns the difference between acceptable and non-acceptable defects on wafer surfaces.

Inspecting and Classifying Probe Marks



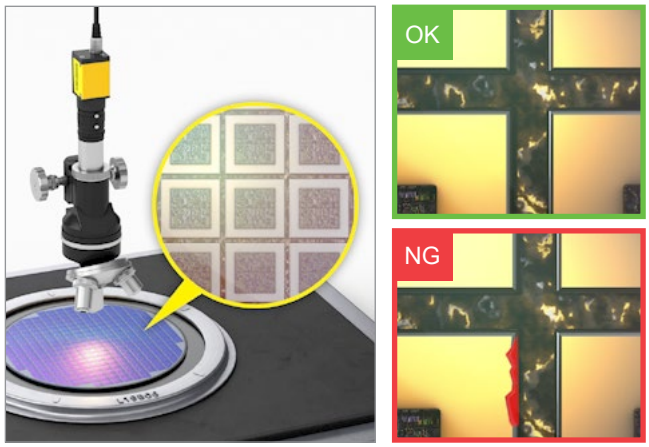
Cognex Deep Learning learns the normal appearance a probe mark and characterizes all features that deviate as defective.

Optical Character Recognition on Wafer Carrier Rings



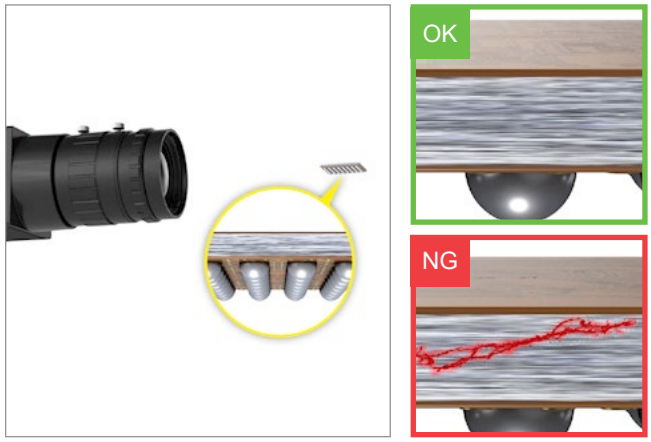
Cognex Deep Learning's OCR capability improves traceability by accurately reading worn and damaged alphanumeric codes on wafer carrier rings.

Detecting Edge Chipping and Burrs After Dicing



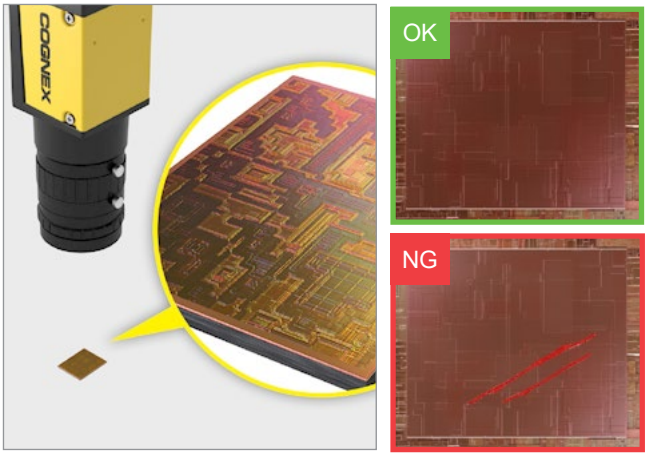
Cognex Deep Learning's defect detection tool learns the difference between normal and excessive chips and burrs that occur during wafer dicing.

Detecting Micro Cracks on Sidewall of WLCSP



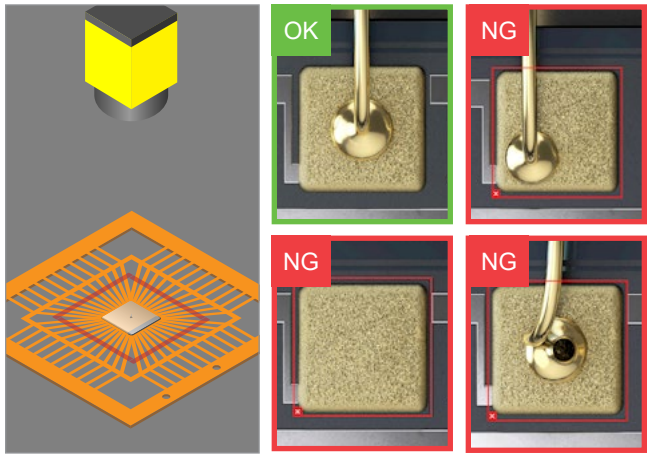
Cognex Deep Learning learns the normal appearance of the sidewall of a WLCSP and characterizes all features that deviate as defective.

Semiconductor Die Surface Inspection



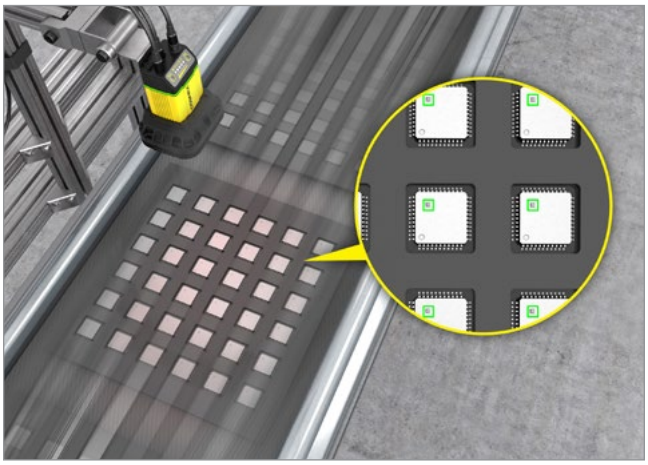
Cognex Deep Learning searches and identifies a wide variety of functional anomalies on the surface of semiconductor dies which affect quality and performance.

Wire Bonds Defect Inspection



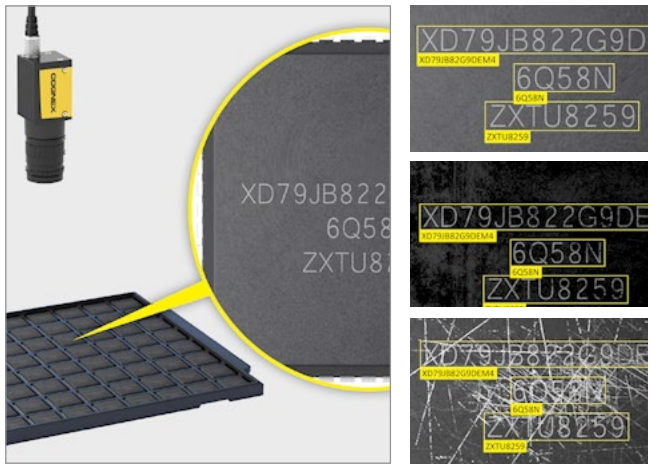
Cognex Deep Learning defect detection tool learns and correctly identifies the wide variety of wire bond welding defects which can affect IC performance.

2D Code Reading on Integrated Circuits



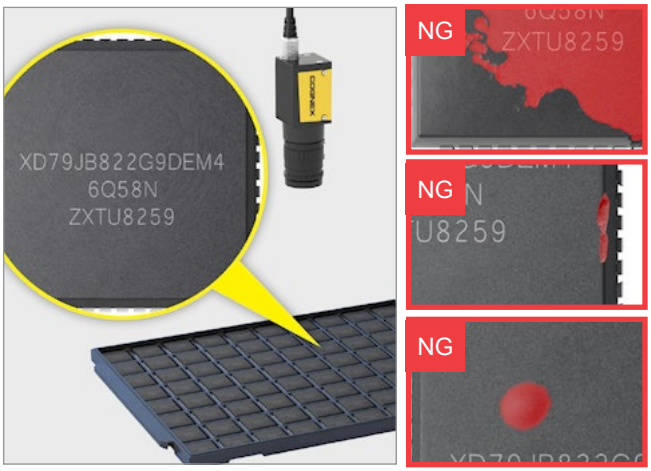
Cognex DataMan image-based barcode readers reliably read 2D codes on integrated circuits enabling traceability.

Optical Character Recognition on Integrated Circuits



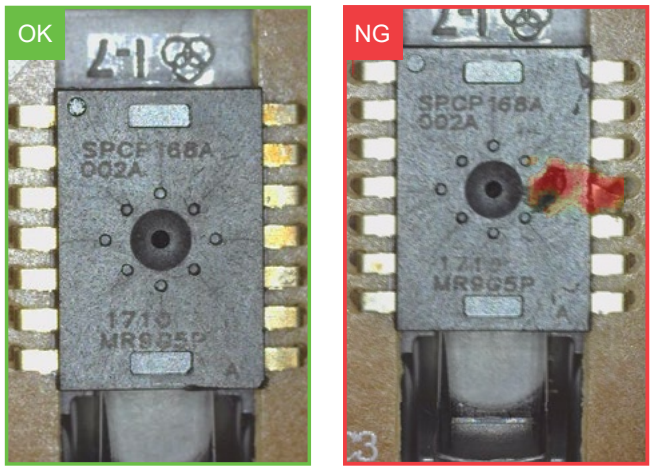
Cognex Deep Learning's OCR capability improves traceability by accurately reading damaged alphanumeric codes in ICs, even on difficult backgrounds.

Detection and Classification of IC Molding Cosmetic Defects



Cognex Deep Learning technology identifies and classifies a wide variety of functional defects, such as cracks or voids on IC molding to help increase IC quality.

Integrated Circuit Lead Cosmetic Inspection

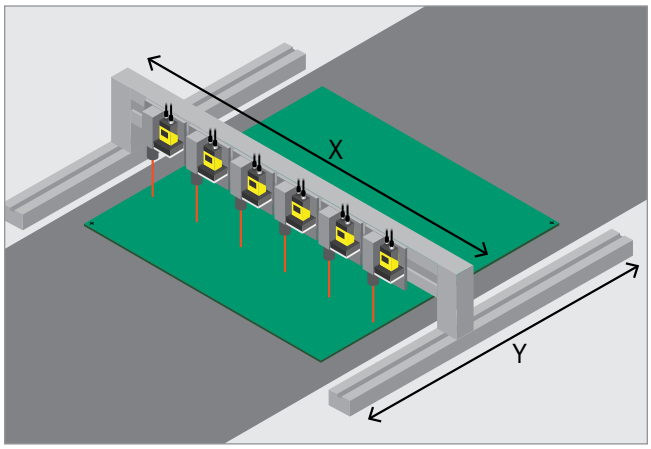


Cognex Deep Learning learns the normal appearance and position of a chip's leads and pins and characterizes all features that deviate as defective.

PCB ASSEMBLY

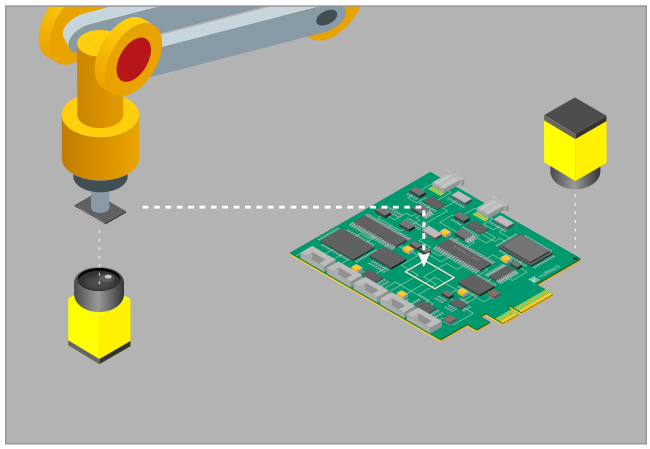
The PCB assembly process features complex alignment, glue bead adhesive or soldering steps, along with ensuring all small component connections are free from defects and properly assembled onto the circuit board. Cognex technology enables manufacturers to ensure PCB parts and components are assembled correctly and function properly.

Laser Drilling and Scribing Alignment



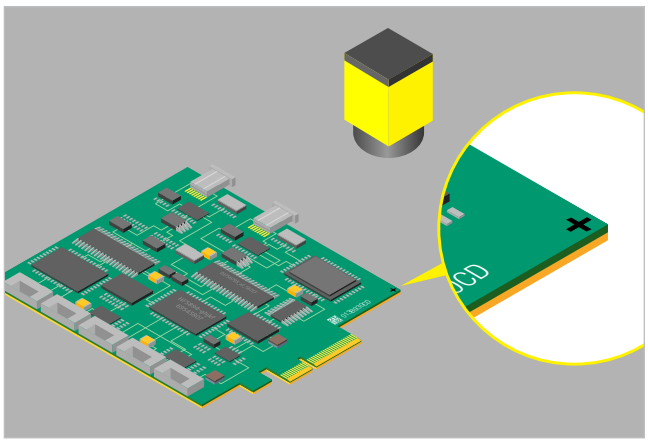
AlignSight sensors perform vision-to-motion control calibration quickly and automatically to ensure precise alignment between the drill and PCB boards.

PCB Component Placement Guide



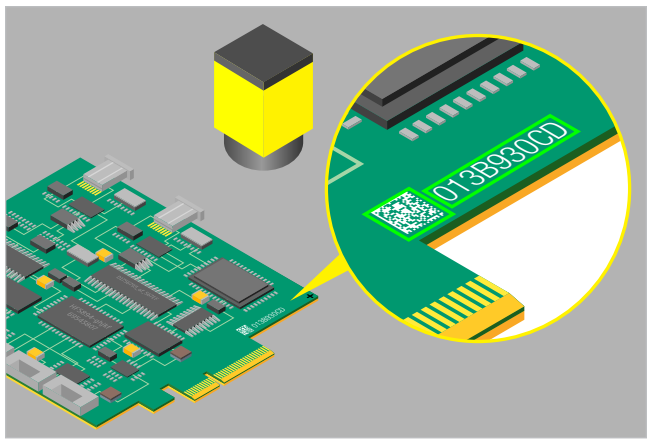
Machine vision solutions guide components, including surface mount devices, onto PCBs.

PCB Fiducial Alignment



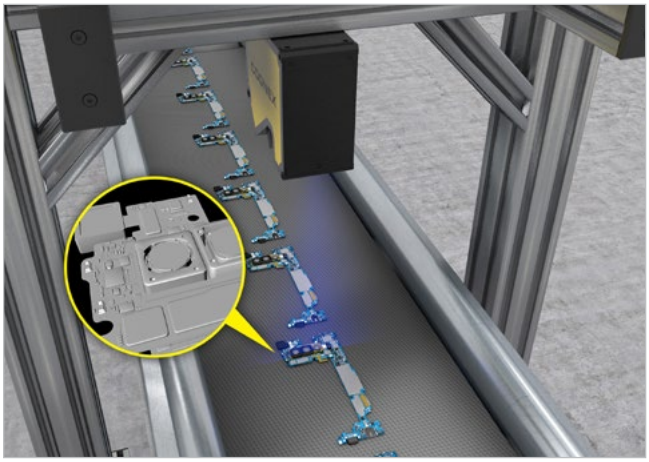
PatMax uses geometric information to locate fiducial marks during screen printing, glue dispensing, mounting, and automated optical inspection.

Board Identification



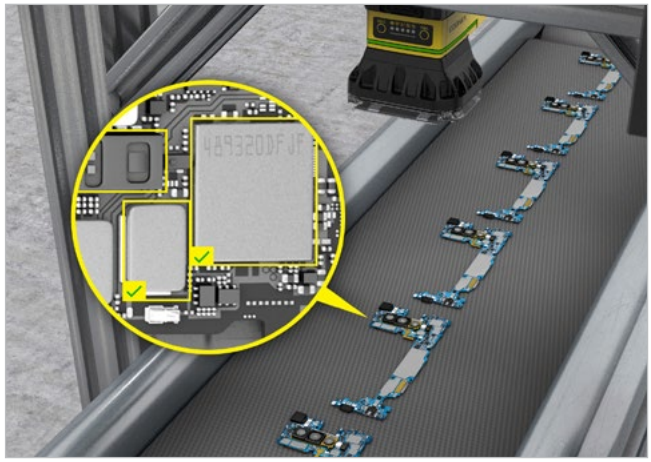
Barcode reading technology identifies serial numbers on board components and reads codes on PCBs for traceability.

PCB Inspection



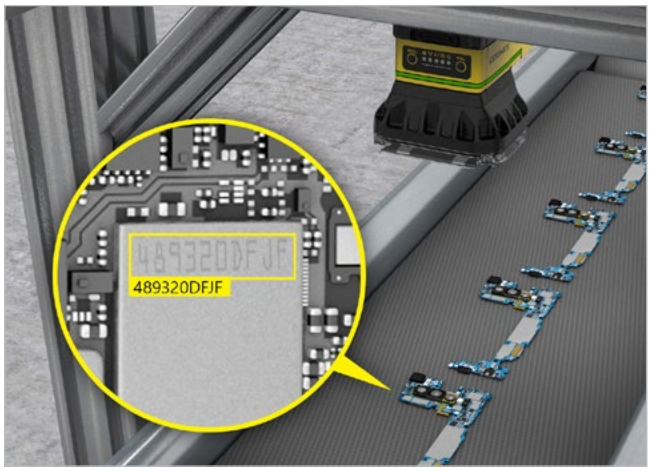
2D and 3D machine vision systems inspect PCBs for the proper number, size, and placement of components.

PCB Assembly Verification



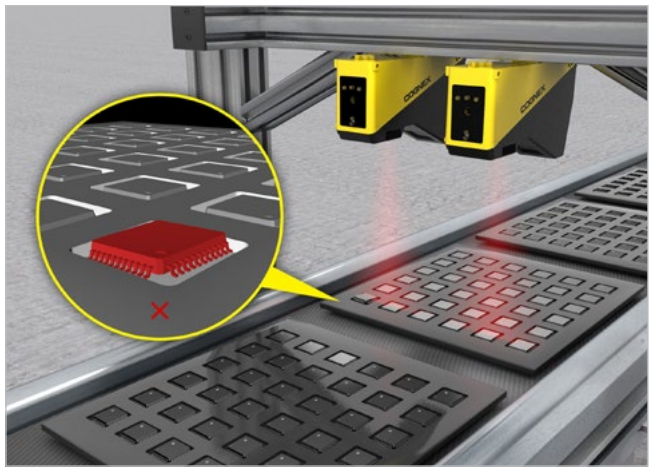
Cognex Deep Learning identifies components based on distinguishing features and learns their correct location on the board.

OCR on Assembled PCB Components



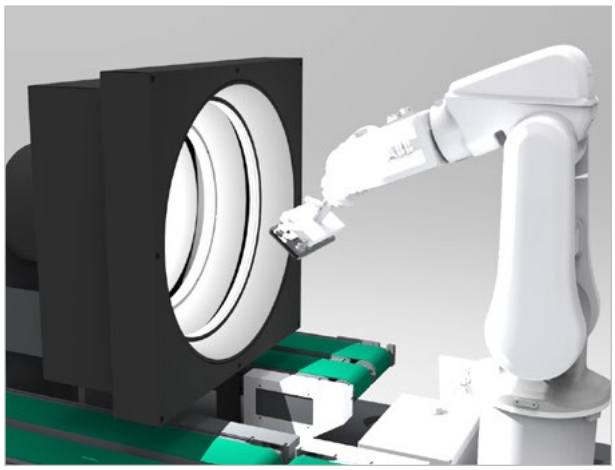
Cognex Deep Learning's OCR tool reads any character text under challenging conditions.

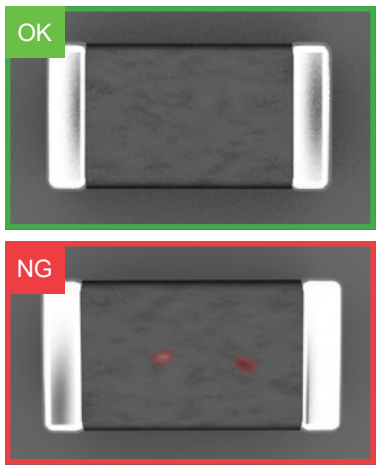
Chip Positioning and Alignment Measurement



3D laser displacement sensors accurately detect the skew of individual chips in a tray.

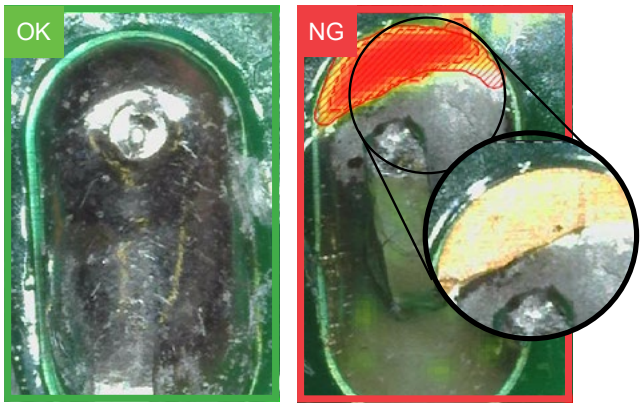
Multi-Layer Ceramic Capacitor Inspection





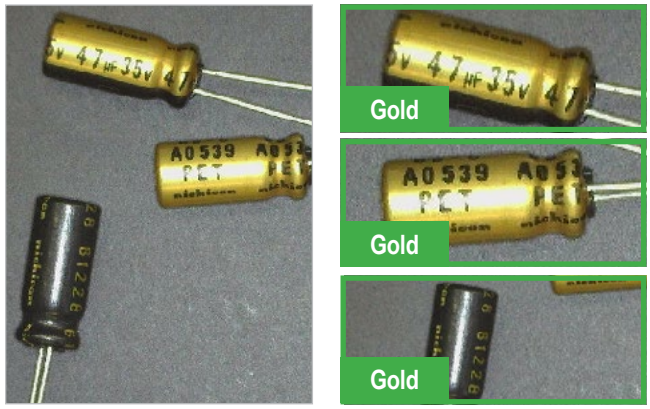
The MLCC cosmetic optical inspection machine leverages customized lighting and deep learning tools to find defects on the capacitor body and terminals.

Capacitor Soldering Inspection



Cognex Deep Learning locates solder resist on a diode despite specular glare and identifies a wide variety of defects such as bridging, peaking, and gapping.

Capacitor Classification

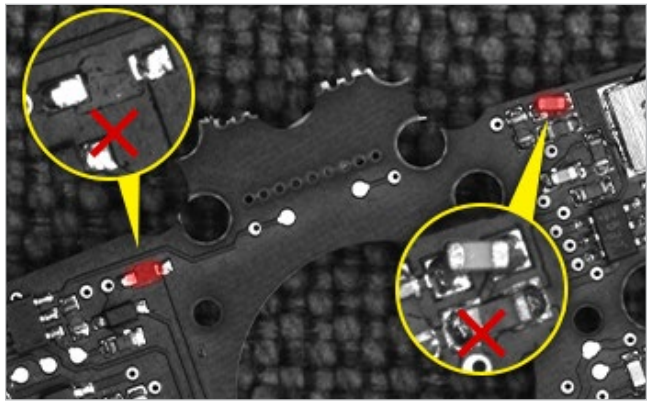


Cognex Deep Learning classifies challenging electrical components, despite confusing variations in pattern even within the same type of capacitor.

Automated Electrical Connector Inspection

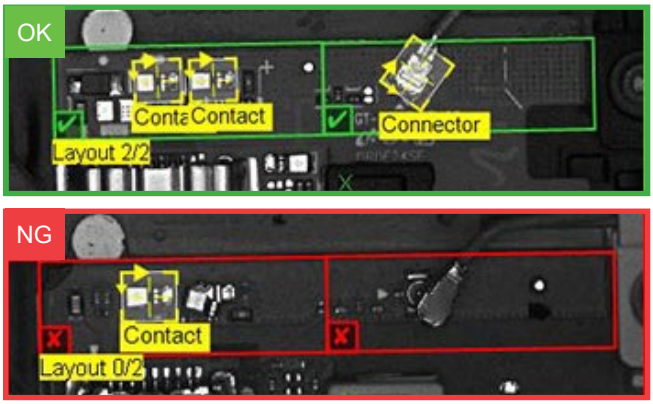
Cognex Deep Learning detects anomalies anywhere on the electrical connector ensuring only acceptable connectors move forward in the assembly process.

LED PCB Defect Detection



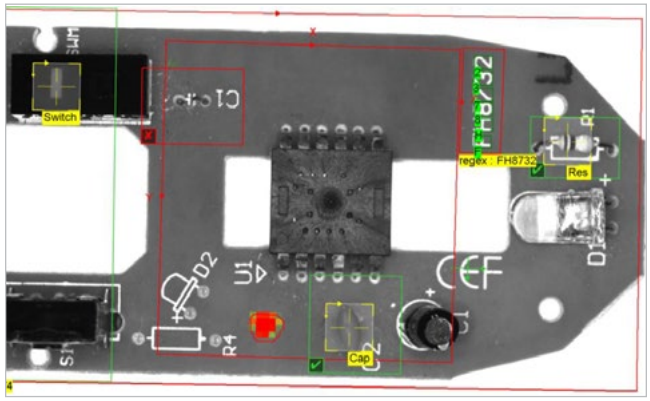
Cognex Deep Learning can reliably learn and detect various anomalies of LEDs and other components on PCBs which improves overall board quality.

PCB Connector Inspection



Cognex Deep Learning quickly locates and identifies flaws in connector seating by learning the difference between acceptable and unacceptable installations.

Mouse PCB Inspection

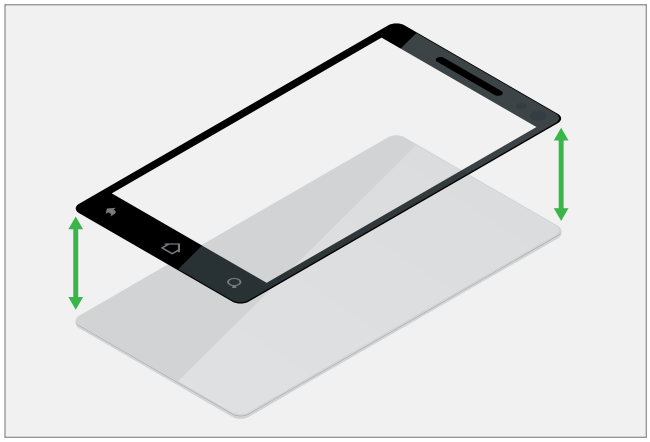


Cognex Deep Learning quickly and reliably solves mouse PCB assembly verification by learning the difference between good and bad PCBs.

ELECTRONICS HARDWARE

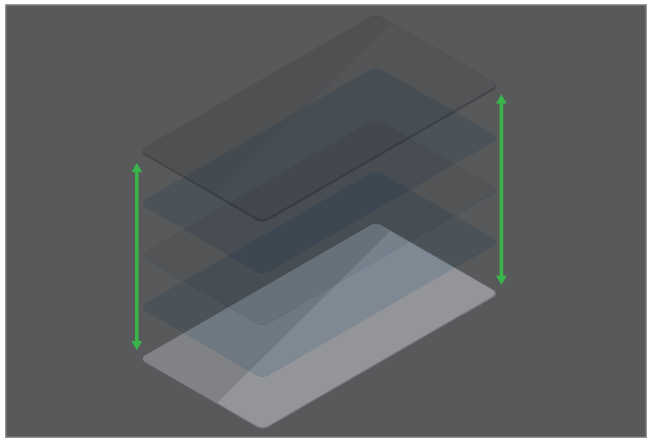
Electronic hardware manufacturers require fast production ramp up with quick product changeover. Cognex helps manufacturers and their equipment suppliers improve manufacturing yields and reduce machine downtime by solving common precision alignment, 2D and 3D inspection and traceability challenges.

Screen Printing Alignment



AlignPlus software quickly and with high precision automatically aligns the glass to the stencil.

Touch Panel Lamination

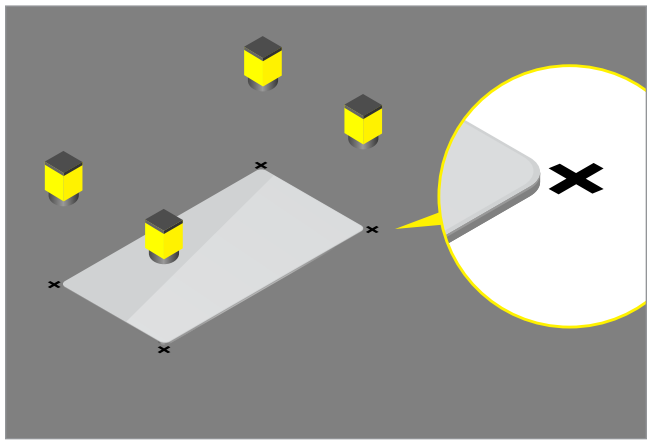


AlignPlus software delivers micron-level alignment of display and touch panel modules.

Cover Glass Assembly

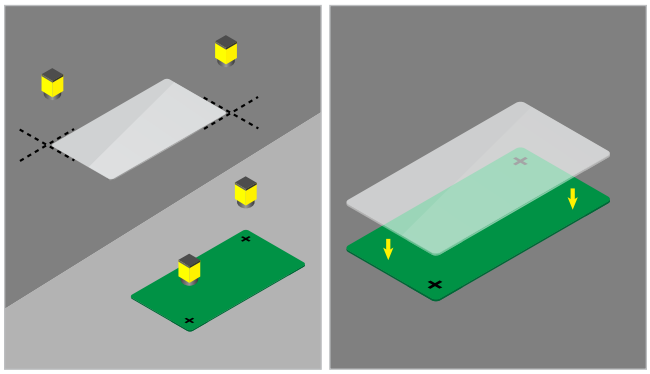
AlignPlus software offers closed loop robot motion guidance for precision assembly of cover glass.

OLED Golden Pose Alignment



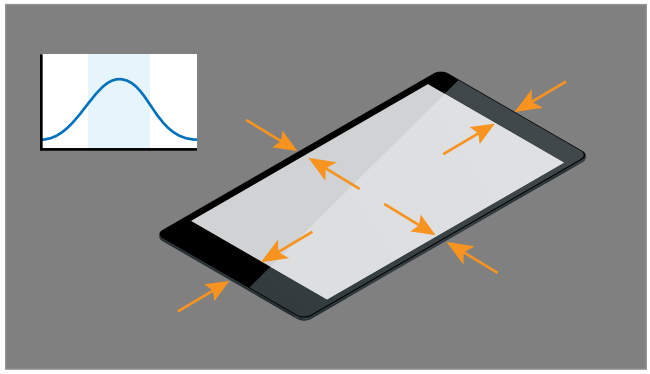
Vision-enabled, golden pose alignment brings parts to a pretrained ideal location.

OLED Display Lamination Alignment



AlignPlus software aligns display components relative to each other using unified multi-camera motion stages.

OLED Gauging

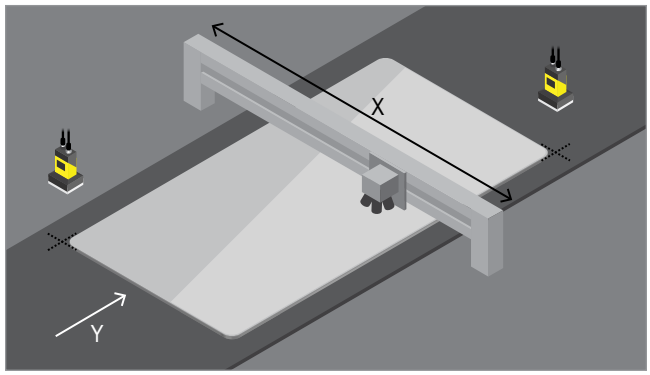


In-Sight systems and AlignPlus software gauge the alignment accuracy of parts based on specific features that do not have to be in the camera's field of view.

Machine Tending with VGR

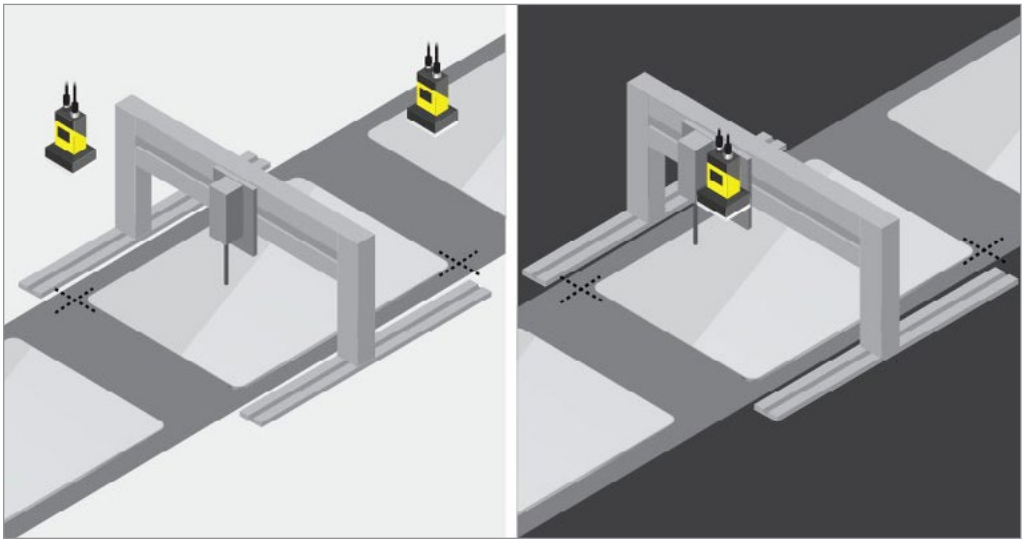
Vision-guided robotics handle complex alignment for standalone machine tending during panel product and lamination.

OLED Display Gauging Alignment



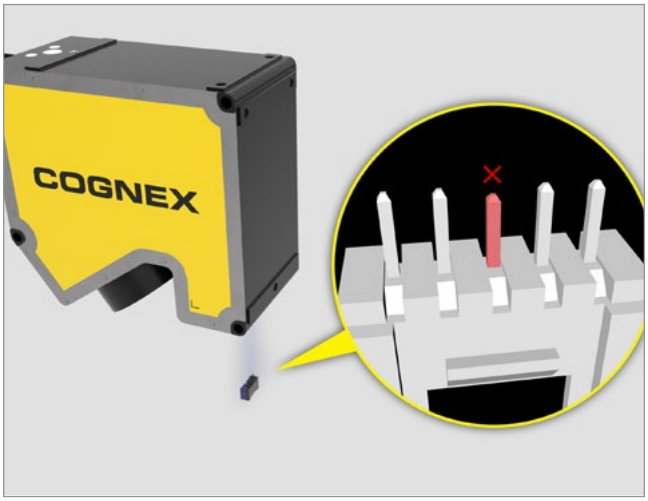
AlignSight sensors and PatMax vision tools locates trained patterns so the gauging robot begins their job on the same location of the OLED display every time.

Glue Bead Dispensing Alignment



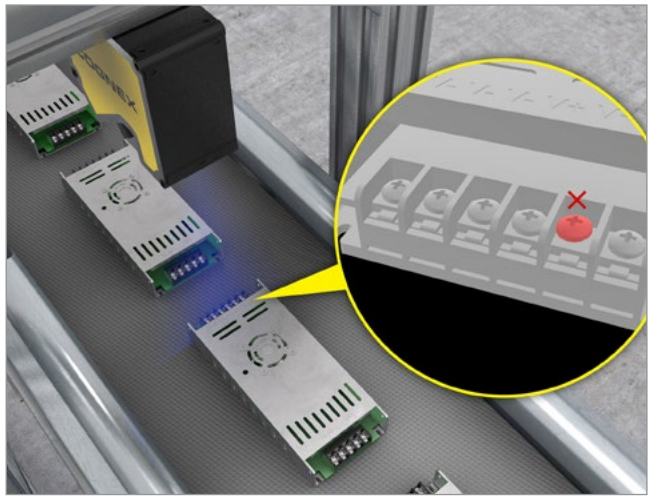
The AlignSight alignment sensor leverages onboard pattern-matching and edge-finding vision technology to align the glue dispenser to a pre-trained starting position repeatedly and with very high accuracy.

Connector Pin Inspection



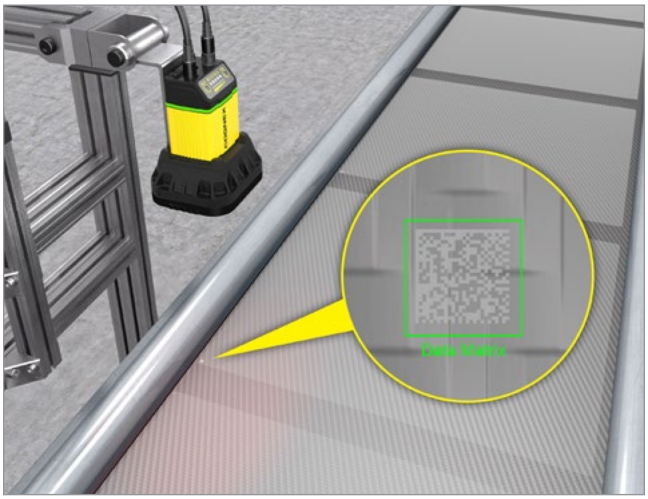
3D laser displacement sensor inspects connector pins to ensure they are manufactured to strict tolerances to optimize product quality.

Screw Assembly Height Measurement



3D laser displacement sensors determines with high precision whether the height of the screw is outside the accepted range.

2D Codes on Glass Substrate



DataMan fixed-mount readers with high dynamic range (HDR) technology increases image contrast to maximize read rates on glass substrate.

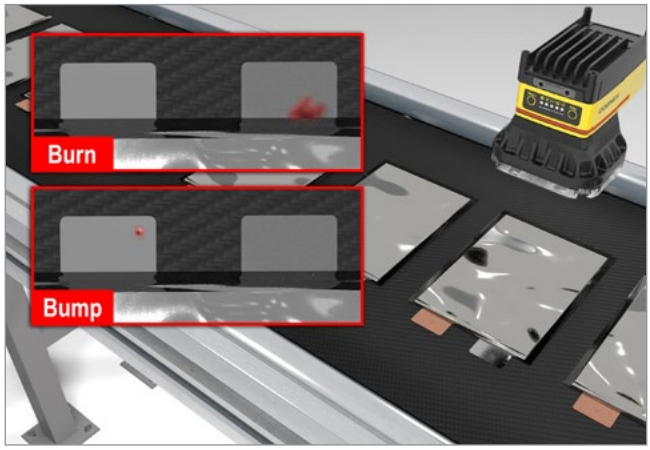
2D Codes on Smartphone Components

DataMan fixed-mount barcode readers easily and reliably read 2D codes on small components thanks to fast read rates and powerful decoding algorithms such as PowerGrid technology.

Battery Sealing Pin Welding Inspection

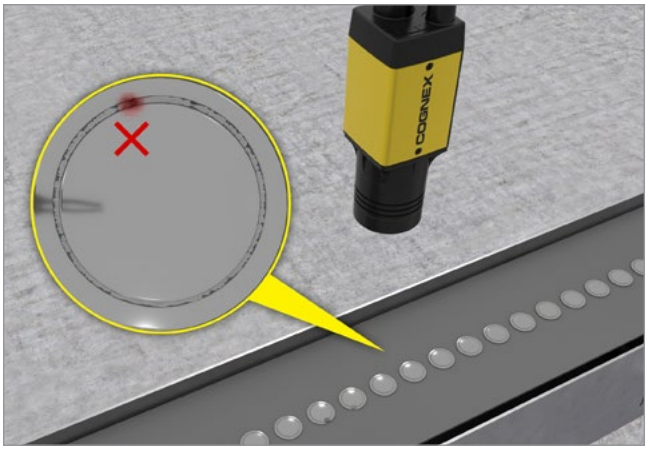
Cognex Deep Learning combined with a 3D laser displacement sensor inspects for weld defects and that the sealing pin is placed correctly.

Battery Tab Defect Check



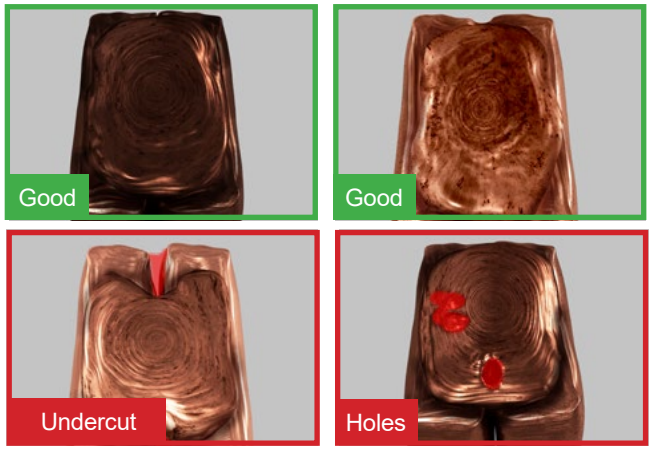
Cognex Deep Learning's defect detection tool flags any battery tabs or solders that are outside the acceptable range.

Button Battery Inspection



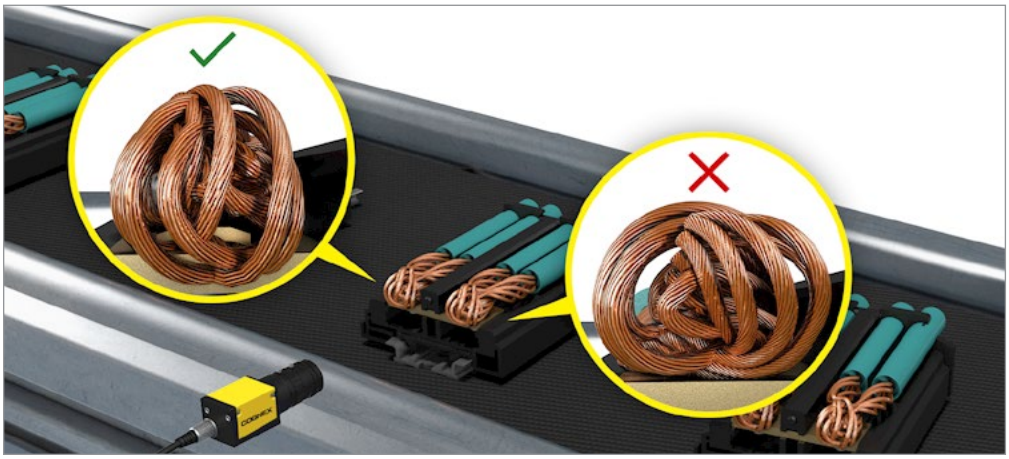
Cognex Deep Learning's defect detection tool finds functional defects while minimizing false positive from purely cosmetic defects.

Spot Weld Inspection



Cognex Deep Learning's defect detection and classification tools finds all unacceptable defects and categorizes them for upstream process control.

Braided Wire Connection Inspection

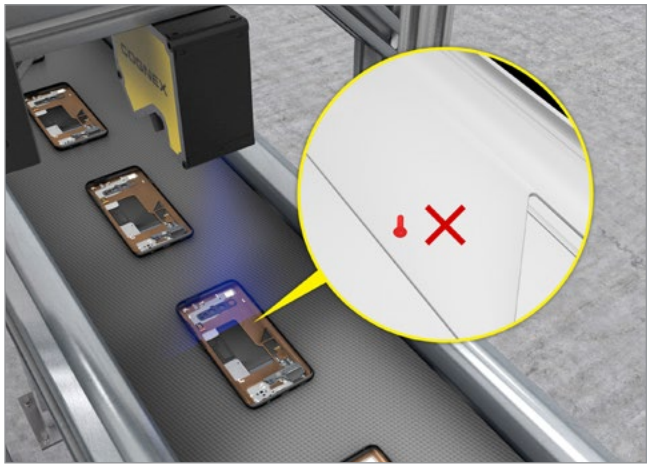


Cognex Deep Learning's defect detection tool easily finds unacceptable functional defects on complex braided wire connections so only acceptable connections are passed forward in the process.

CONSUMER DEVICES

Consumer devices must be manufactured for the highest quality. That means they must be assembled properly and free from cosmetic defects such as scratches, dents, or other deformities. Cognex technology enables consumer device manufacturers to assemble and properly inspect these devices throughout every phase of production.

Pre-Assembly Insertion Check

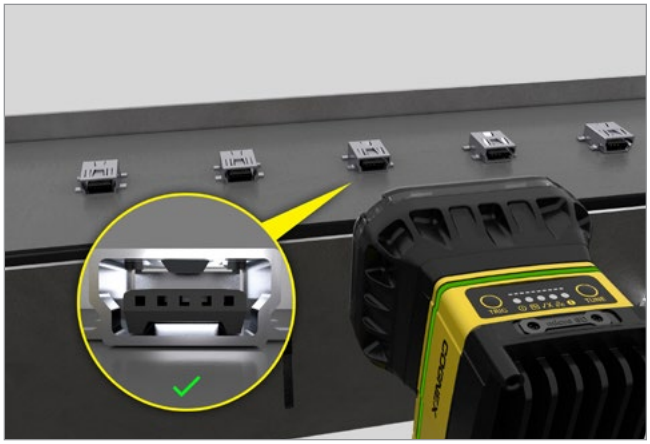


3D systems ensure the module mounting area is free of potential obstructions.

Battery Module Cosmetic Inspection

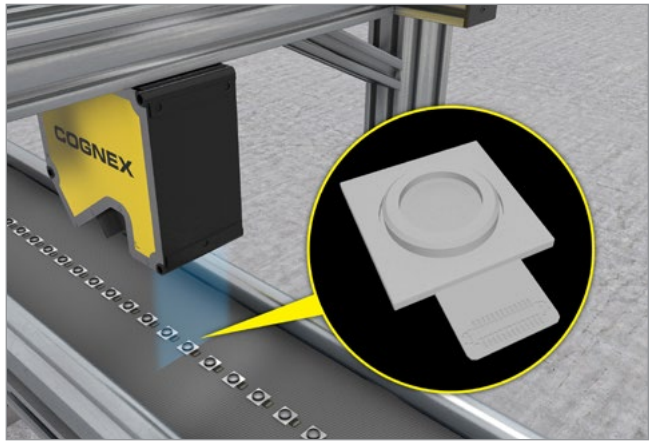
Cognex Deep Learning checks the integrity of batteries and differentiates between cosmetic and functional anomalies.

USB Connector Inspection



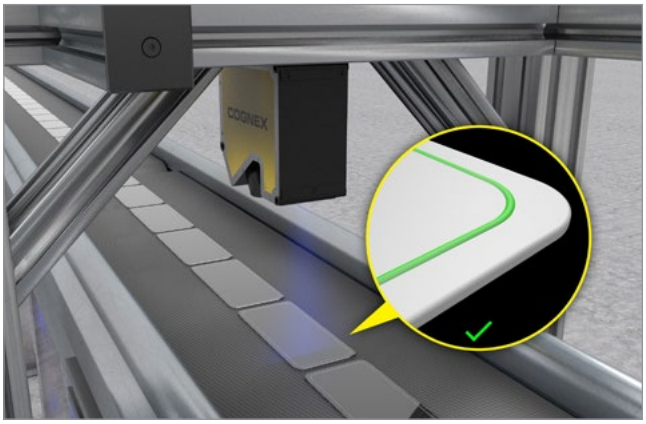
Cognex Deep Learning's defect detection tool identifies both cosmetic defects and functional defects that cause quality issues.

Smartphone Camera Height Measurement



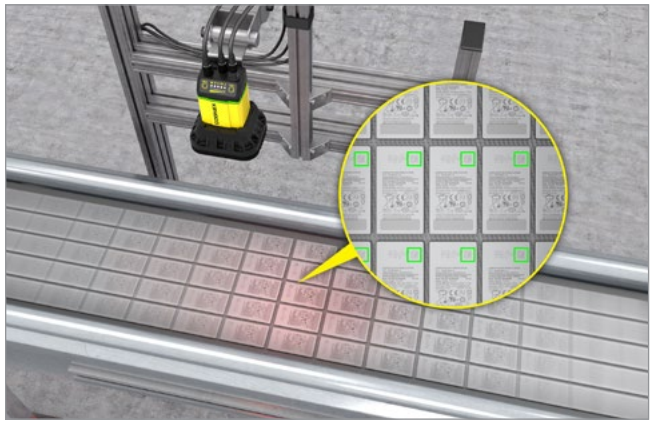
3D laser displacement sensor gauges the height dimensions for a complex, transparent camera assembly.

Glue Bead Inspection on Smartphone



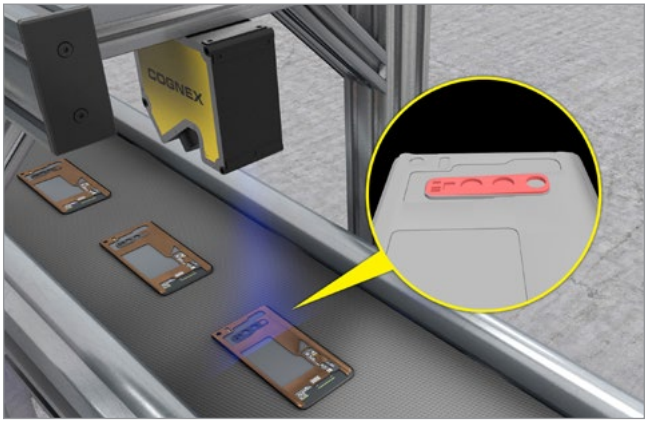
3D laser displacement sensors assess glue adhesion volume dimensions and position on the part.

2D Codes on Battery Cells



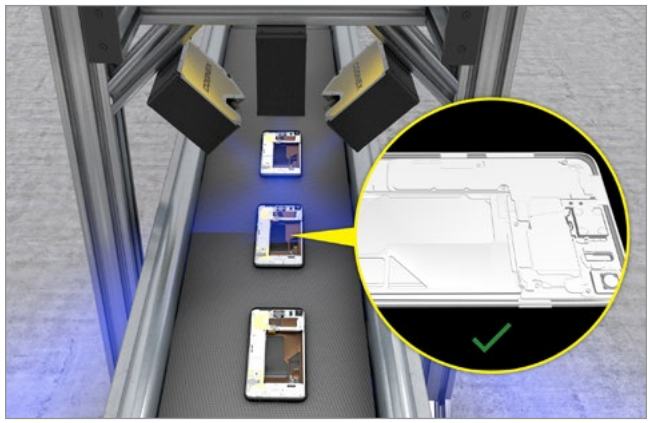
DataMan barcode readers decipher multiple direct part mark codes on high-speed production lines.

Smartphone Housing Flatness Inspection



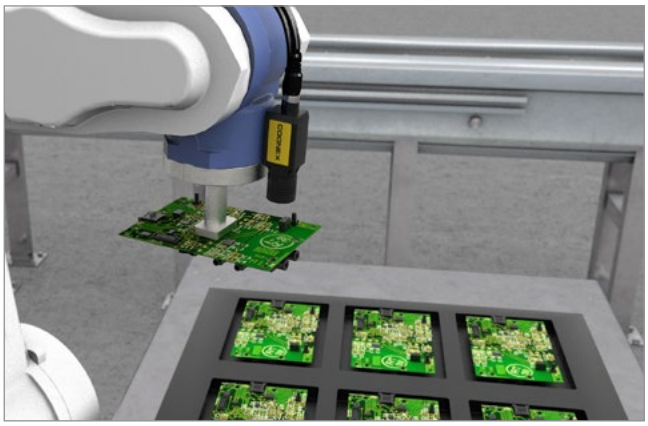
3D laser displacement sensors gauge the height and detect the smallest dents to micron-level accuracy.

Post-Assembly Verification



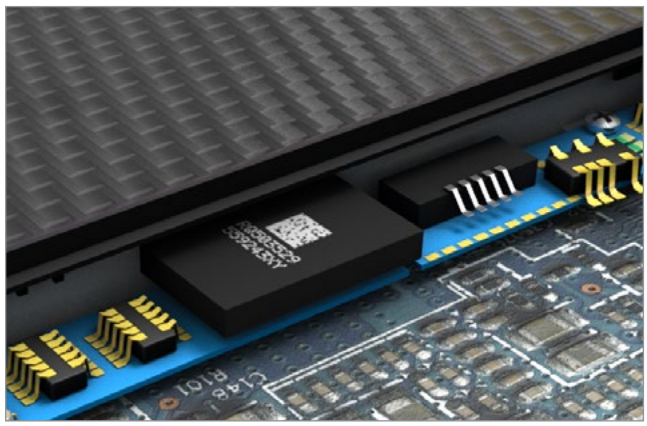
2D and 3D vision systems verify that components are properly installed and meet quality parameters.

Precision Robot Guidance



Machine vision enables precision robot guidance for error-free assemblies.

Serial Number and Barcode Reading



Cognex serial number and barcode reading solutions help manufacturers track thousands of small parts during the final assembly process and aid in process control.

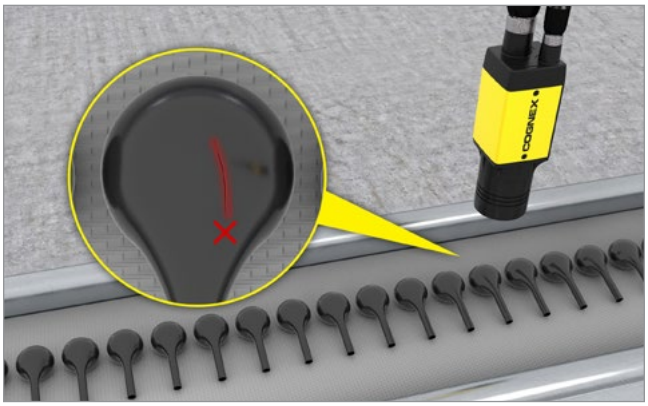
Mobile Device Speaker Mesh Inspection

Cognex Deep Learning's defect detection tool identifies contamination or cosmetic defects anywhere on the part.

Camera Module Surface Inspection

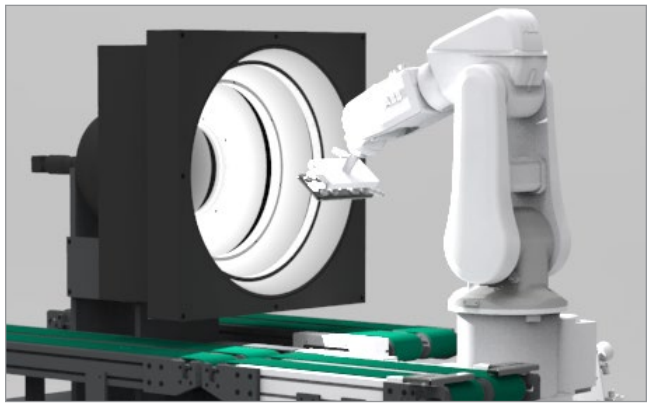
Cognex Deep Learning's defect detection tool finds foreign materials, scratches, dust, or other unwanted abnormalities anywhere on the camera lens.

Cosmetic Housing Inspection



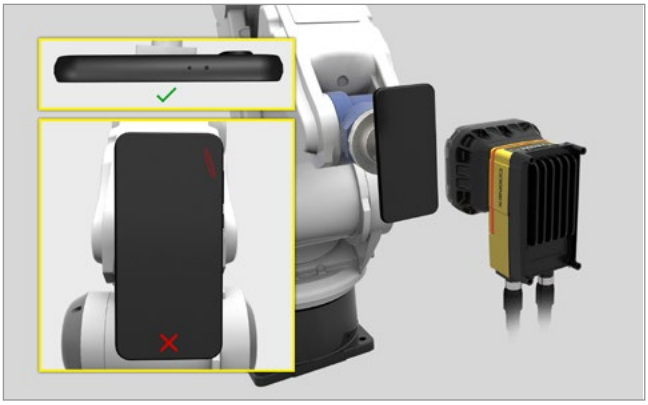
Cognex Deep Learning searches for specific defects like scratches on the housing of earbuds while tolerating unimportant anomalies and variations.

Multi-surface Inspection and Classification



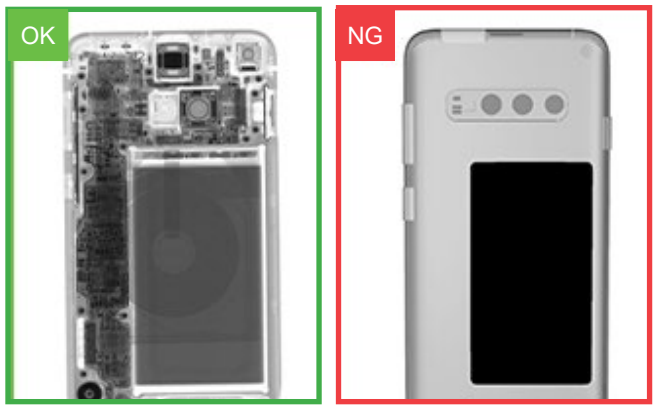
Available in Asia only, Cognex's Cosmetic Optical Inspection (COI) system identifies and classifies defects simultaneously on multiple surfaces under ideal lighting conditions.

Cosmetic Defect Analysis



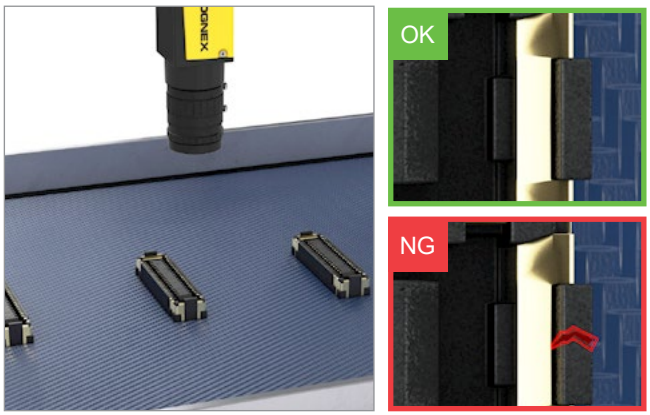
Cognex Deep Learning's defect detection tool finds a wide range of unacceptable product defects, including dents, scratches, and discolorations.

Automated Counterfeit Detection



Cognex Deep Learning's part location tool easily learns to identify the presence or absence of known phone parts which helps confirm authenticity.

BTB Connector Inspection

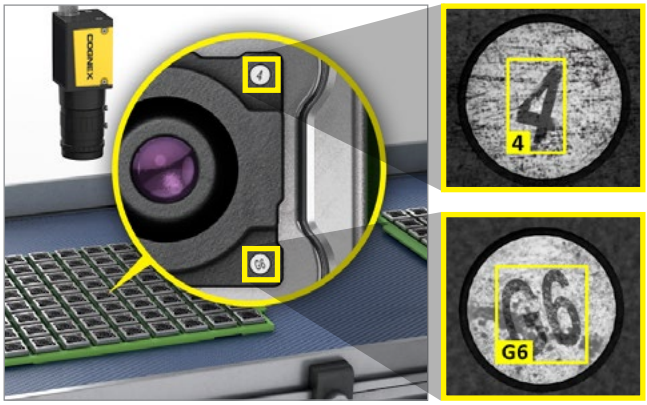


Cognex Deep Learning's defect detection tool identifies both cosmetic defects and functional defects on BTB connectors that cause quality issues.

Liquid Injected Molding (LIM) Rubber Seal Inspection

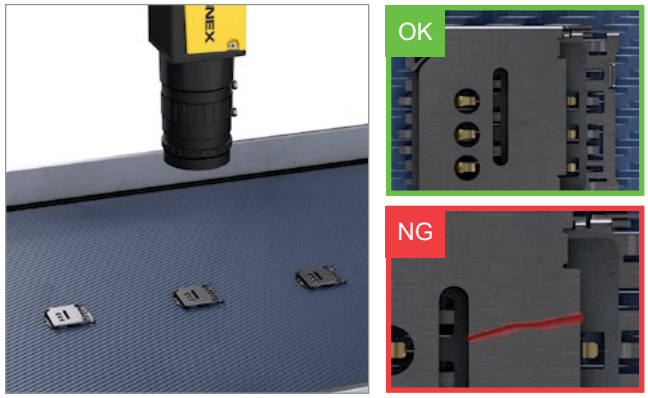
Cognex Deep Learning learns the variable defects like rips, weak spots and missing glue marks associated with LIM rubber seals used in smartphones.

Optical Character Recognition of Lens Holder Modules



Cognex Deep Learning's OCR capability accurately reads damaged alphanumeric codes used to orient camera lenses of various diameters into multi-size lens holders.

SIM Card Connector Inspection

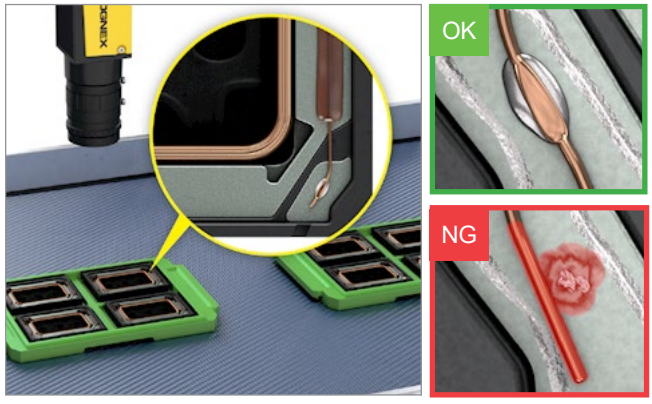


Cognex Deep Learning's defect detection tool learns the difference between cosmetic and functional defects on SIM card connectors.

Smartphone Speaker Diaphragm Inspection

Cognex Deep Learning defect detection tool learns the difference among the wide range of cosmetic and functional adhesion anomalies on smartphone speaker diaphragms.

Voice Coil Spot Welding Inspection



Cognex Deep Learning checks the integrity of batteries and Cognex Deep Learning searches for and detects a wide variety of functional defects of smartphone voice coil spot welds.

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