

# 3D MACHINE VISION APPLICATIONS GUIDE

Advanced 3D technology for high-accuracy measurements and inspections

**COGNEX**



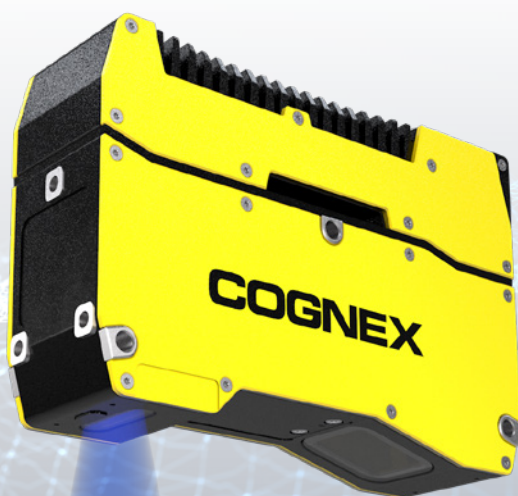
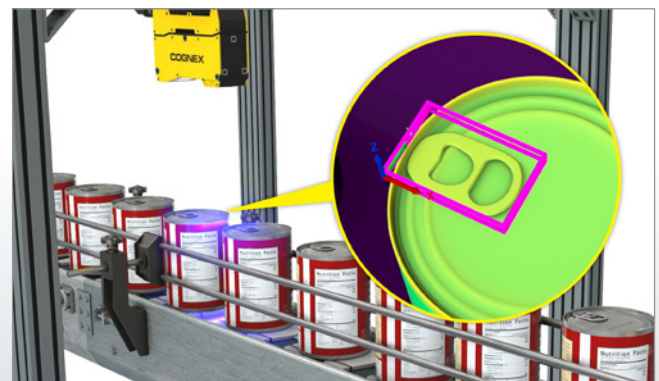
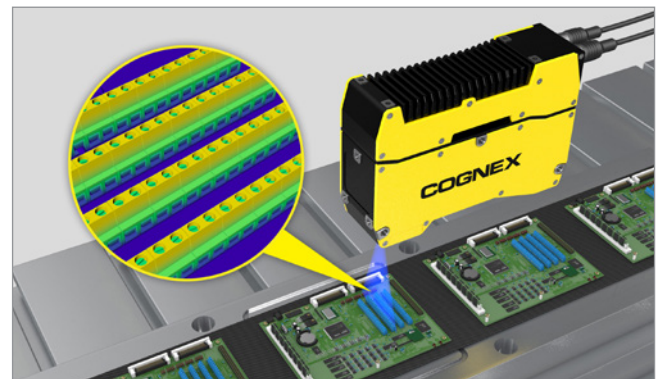
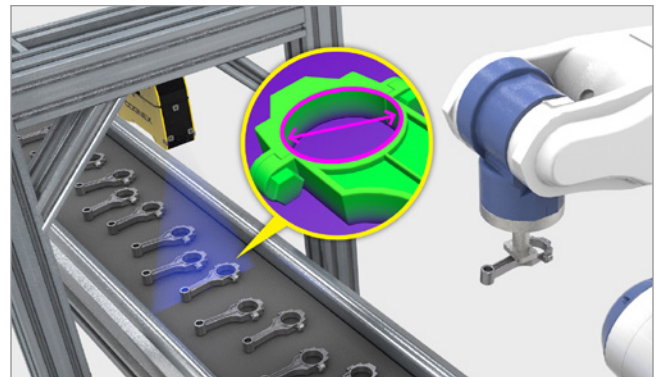
# AI-POWERED 3D MACHINE VISION FOR FASTER DEPLOYMENT, HIGHER EASE OF USE, AND MORE RELIABLE AUTOMATION

A 3D machine vision system is an optical device used in industrial automation to capture and process three-dimensional images of objects or scenes. Adding an extra dimension to image analysis, manufacturers can automate applications once considered too challenging for traditional automation, while gaining all the benefits and features of 2D machine vision.

3D vision systems are ideal for solving tasks that require high precision including:

- Inspection and quality control
- Gauging and measurement
- Robotic guidance
- Object recognition and location
- Logistics and warehouse automation

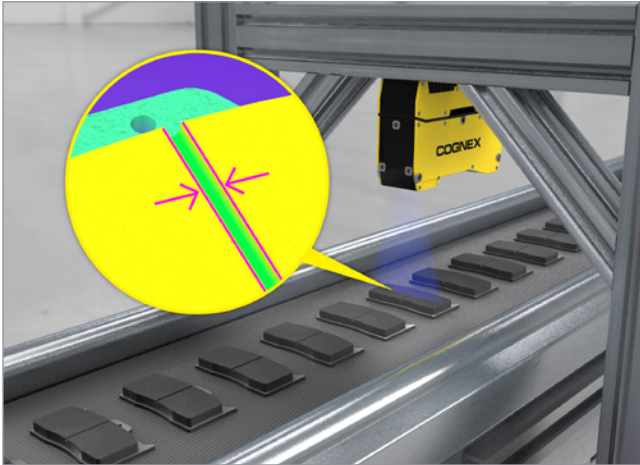
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# AUTOMOTIVE

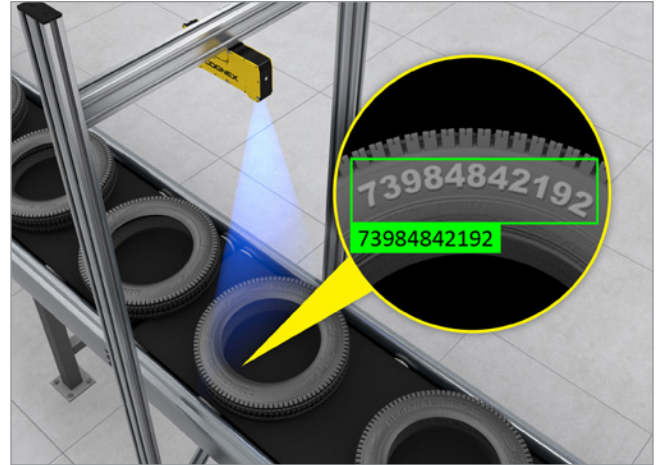
From assembly to final inspection, nearly every component within a gas-powered, hybrid, or electric vehicle is manufactured with machine vision technology. Cognex 3D machine vision systems enable automotive part manufacturers and vehicle assembly plants to achieve exceptional quality and safety, and meet their production goals.

## Brake Pad Inspection



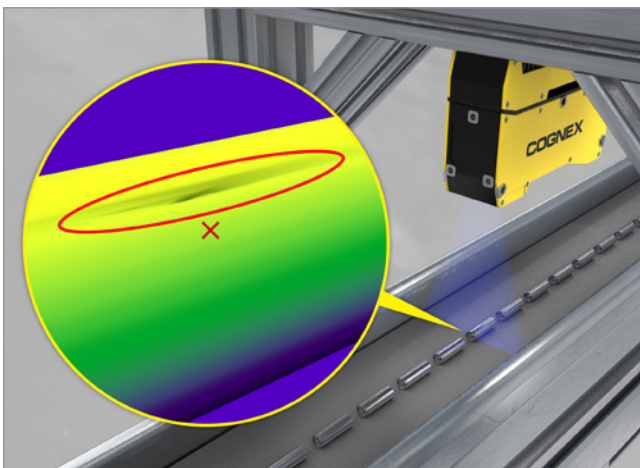
Measure the width of the gap and inspect the beveled edges in a brake pad.

## Tire Identification



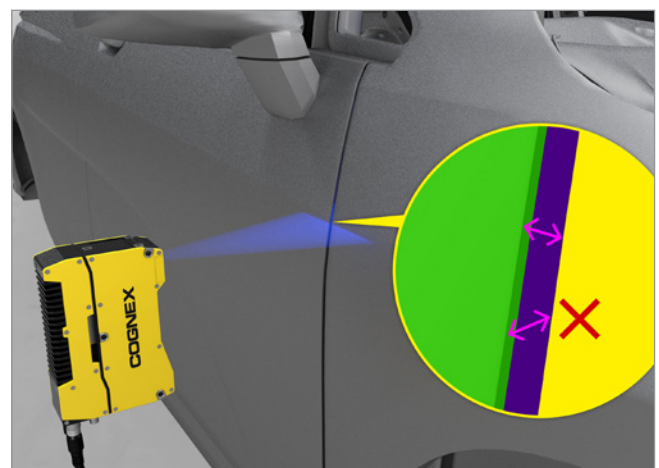
Read text on low-contrast surfaces for part tracking and traceability purposes

## Electric Vehicle Battery Inspection



Detect dents, scratches, and other defects on the surface of an electric vehicle (EV) battery.

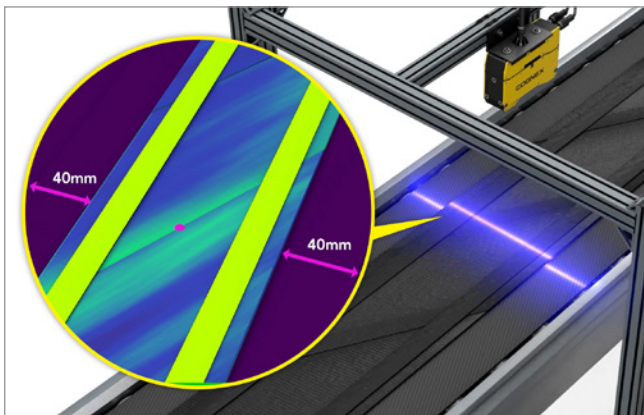
## Flush and Gap Inspection



Measure the gap between a car door and the body to ensure proper alignment.

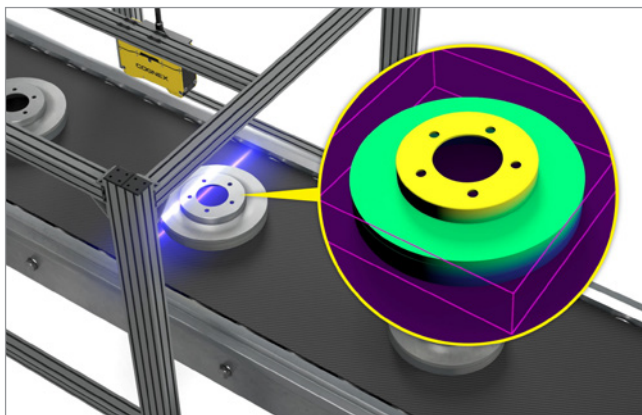


## Extruded Rubber Splice Detection



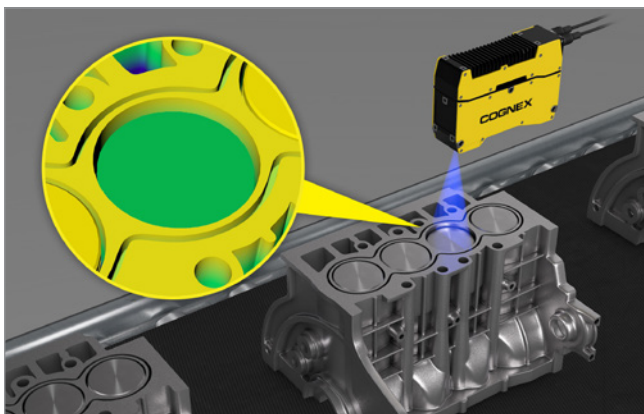
Locate the edge and verify straightness of spliced rubber for tires.

## Automotive Casting Inspection



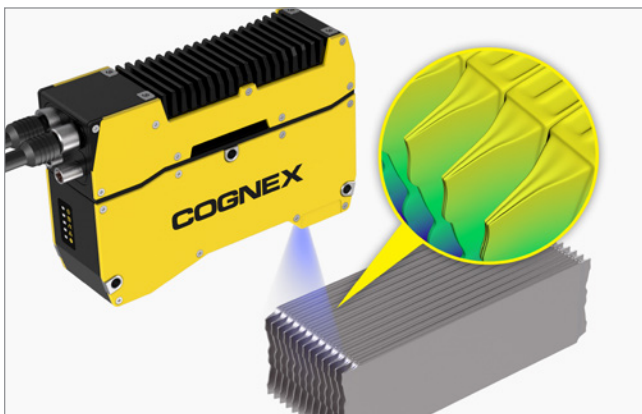
Inspect automotive part volumes for flashing, short shots, and other defects.

## Engine Component Matching



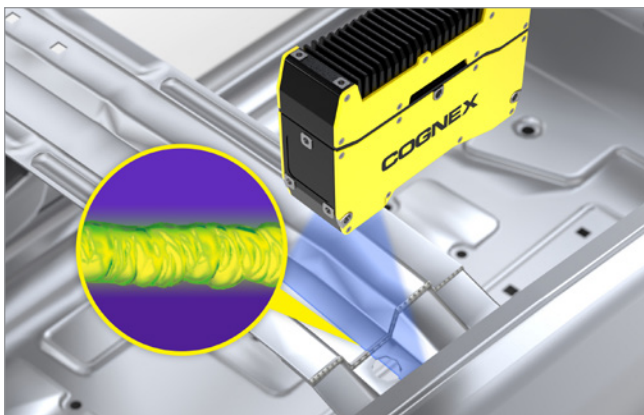
Gauge whether pistons are seated properly in a cylinder block.

## Cell Stacking Height Measurement



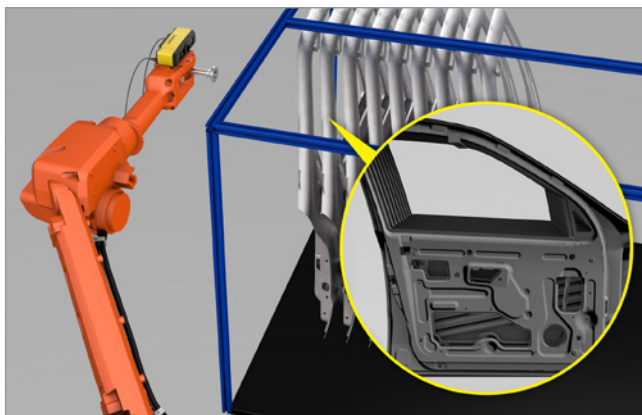
Measure the height of cells stacked inside a battery module to verify uniformity.

## Weld Seam Inspection



Inspect weld seams to ensure they are complete and defect-free.

## Racking and Deracking Identification

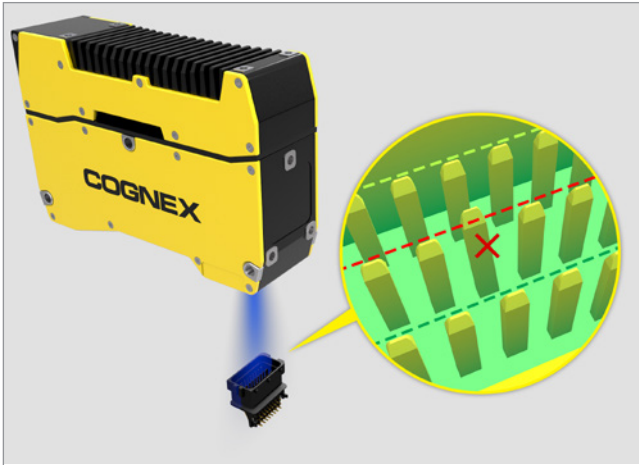


Guide robots to move stamped parts from the line to a rack for inspection and identification.

# ELECTRONICS

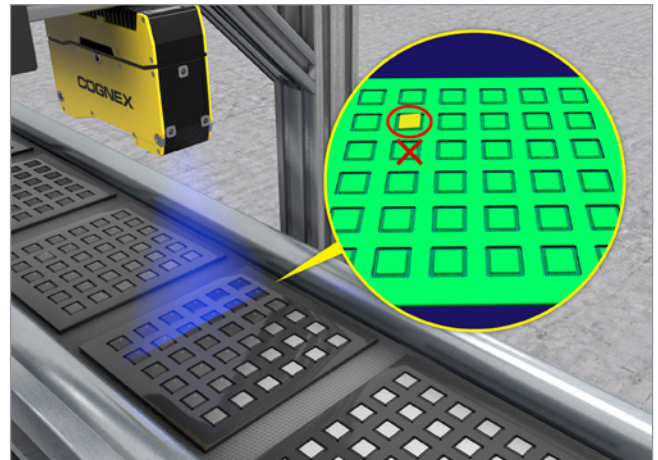
Cognex 3D vision systems solve the toughest applications for electronic materials, semiconductors, components, integrated circuit (IC) packaging, and finished electronic equipment. Driven by powerful vision technology, these solutions eliminate defects, verify assembly, and track and capture information during the production lifecycle to achieve maximum quality, high yields, and traceability.

## Connector Pin Height Inspection



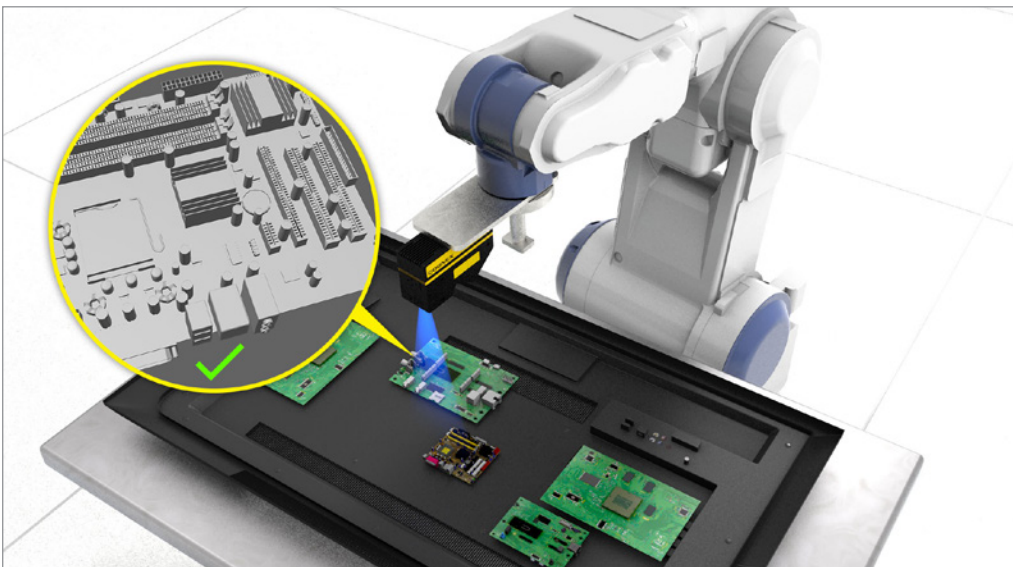
Verify the correct number of pins and ensure the pins are correctly positioned on the connector.

## Carrier Flatness Inspection



Determine if chips are correctly seated inside the carrier tray by measuring position and flatness.

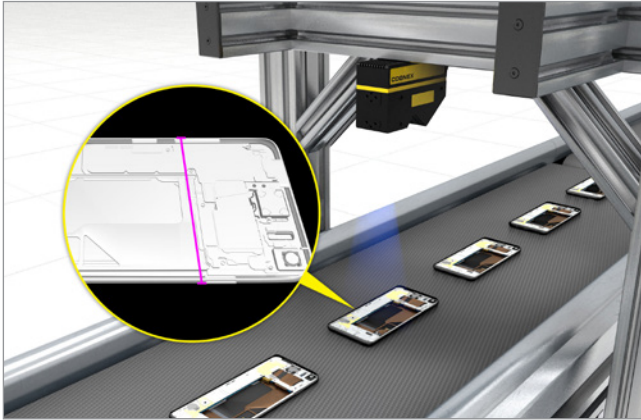
## Printed circuit board (PCB) Inspection



Inspect PCBs for the proper number, size, and placement of components.

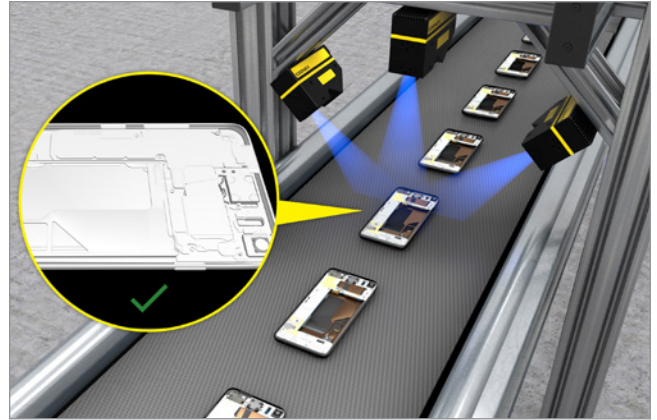


## Pre-Assembly Check



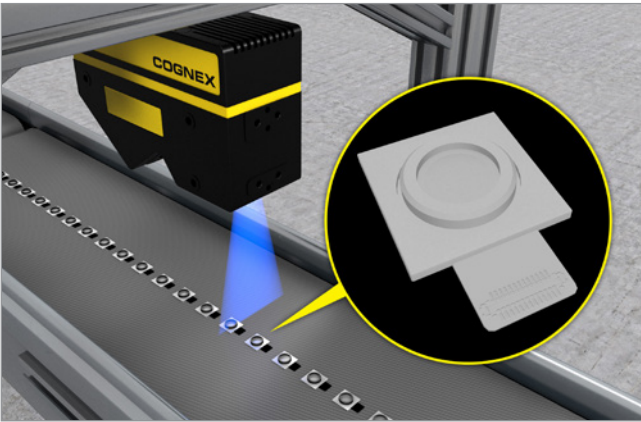
Measure gaps to ensure correct alignment.

## Post-Assembly Verification



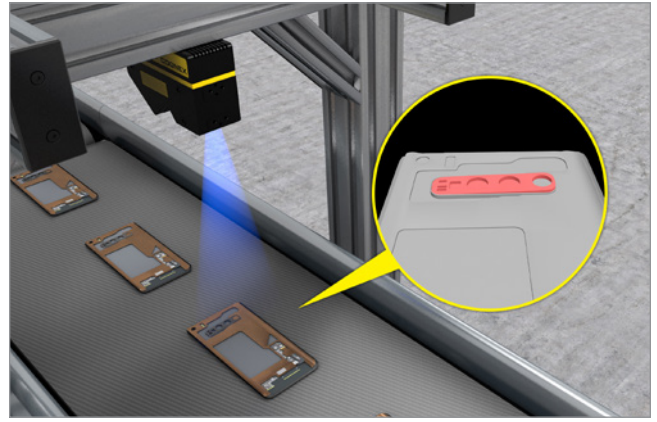
Verify that components are properly installed and meet quality parameters.

## Smartphone Camera Height Measurement



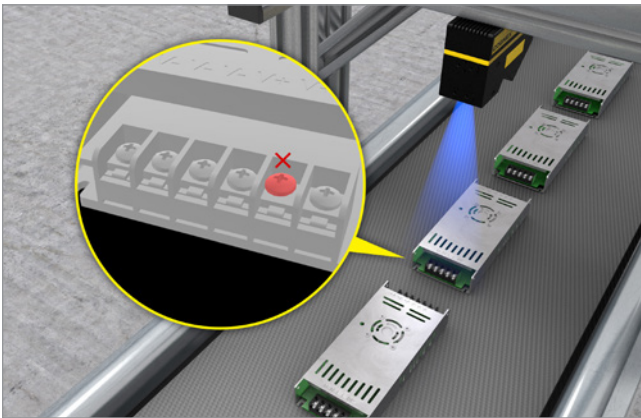
Gauge the height of complex and transparent camera assemblies.

## Smartphone Housing Flatness Inspection



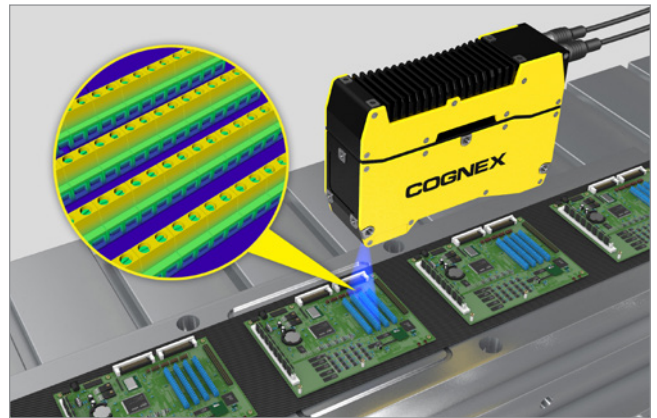
Measure the height of housing and detect small defects, down to micron-level accuracy.

## Screw Assembly Height Measurement



Determine whether the height of the screw is within the acceptable range.

## Terminal Height Measurement

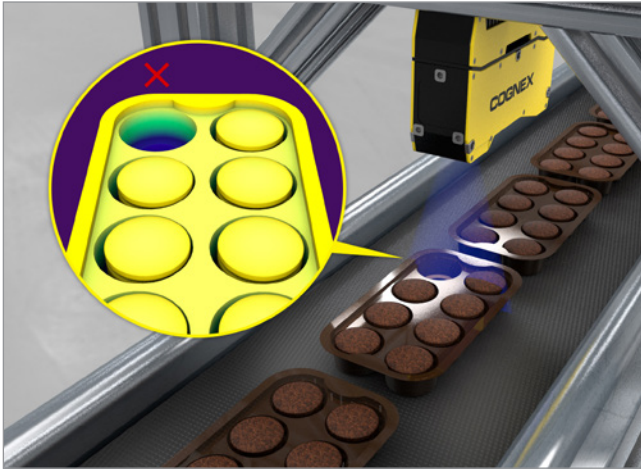


Confirm height of terminals in PCBs.

# FOOD AND BEVERAGE

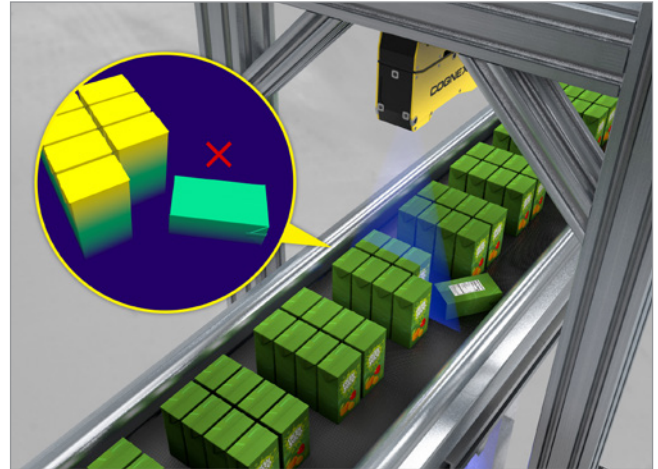
Successful food and beverage manufacturers embrace machine vision solutions to minimize downtime and consistently deliver safe, high-quality products. With a wide selection of 3D machine vision systems, Cognex helps these manufacturers automate some of the most challenging inspection and verification applications.

## Packaging Inspection



Detect the presence/absence of items in a package to ensure completeness.

## Item Location



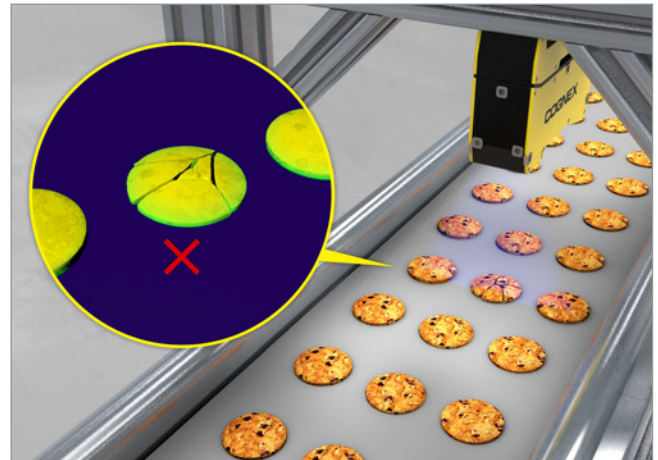
Verify full assembly of multi-packs by detecting the orientation of products.

## Cap Inspection



Ensure bottles are properly sealed by checking the height and angle of the bottle cap.

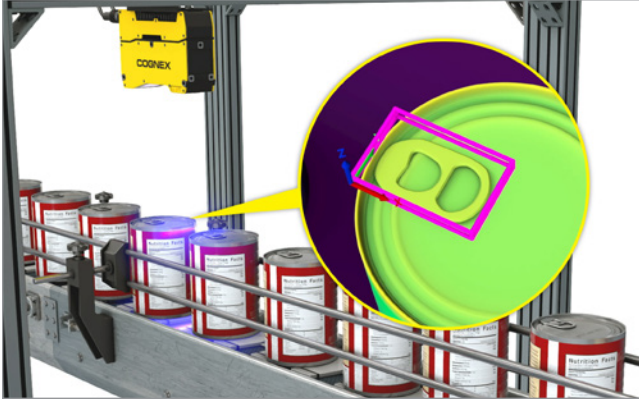
## Cookie Defect Detection



Check the uniformity of cookies and inspect for defects by measuring length, width, and height.

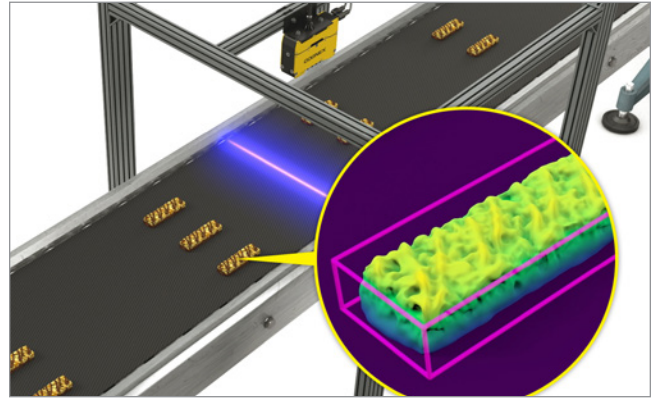


## Aluminum Can Inspection



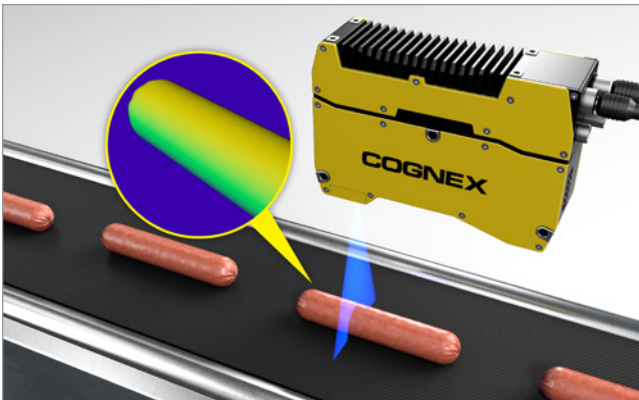
Check for dents, missing tabs, lifted tabs, and other defects.

## Cereal Bar Inspection



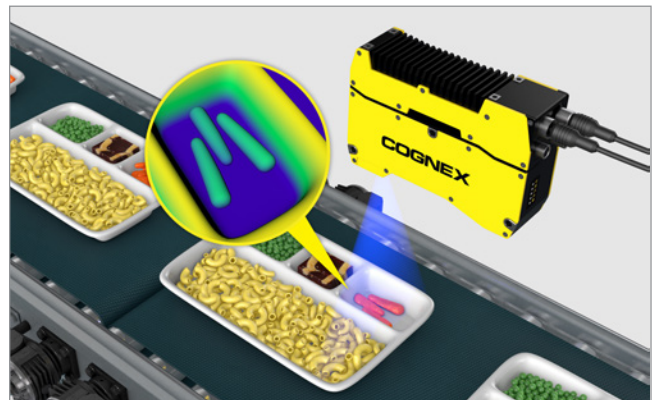
Ensure proper volume, detect defects, and validate flatness.

## Food Uniformity Inspection



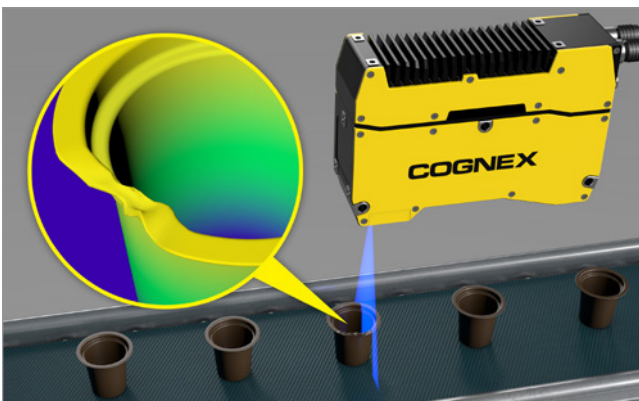
Measure height, length and width and calculate volume to detect variations in food uniformity.

## Food Portioning Inspection



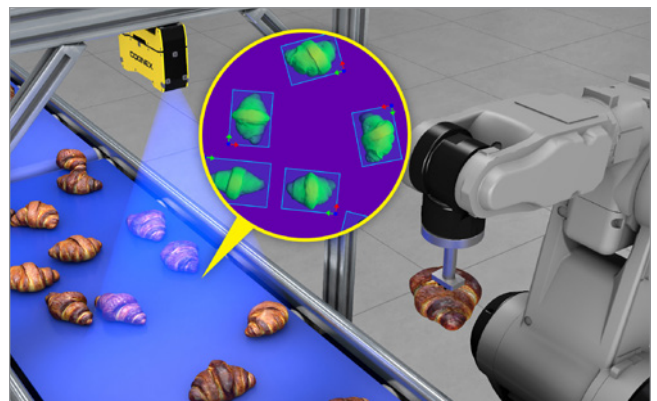
Measure portions in kitted meals.

## Injection Molded Cup Inspection



Inspect injection molded cups and verify proper dimensioning.

## Food location and inspection



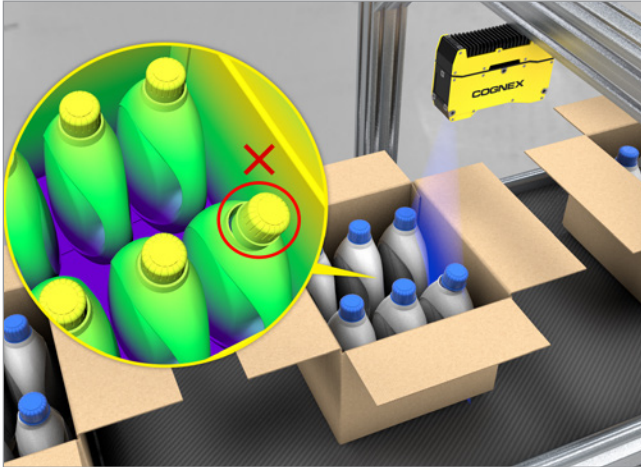
Locate products in variable positions and inspect them for defects.



# CONSUMER PRODUCTS

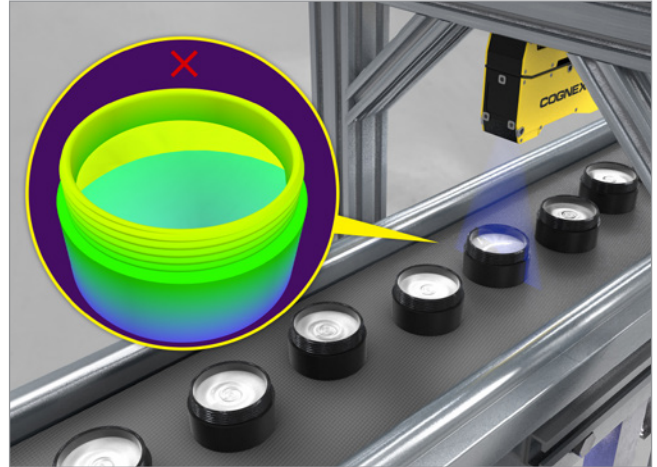
Cognex is uniquely positioned to deliver the highest level of performance in product safety, product quality, and productivity improvements for consumer packaged goods (CPG) manufacturers. Our 3D machine vision solutions for every application help these manufacturers maximize gross margin and customer satisfaction by improving product quality.

## Cap Inspection



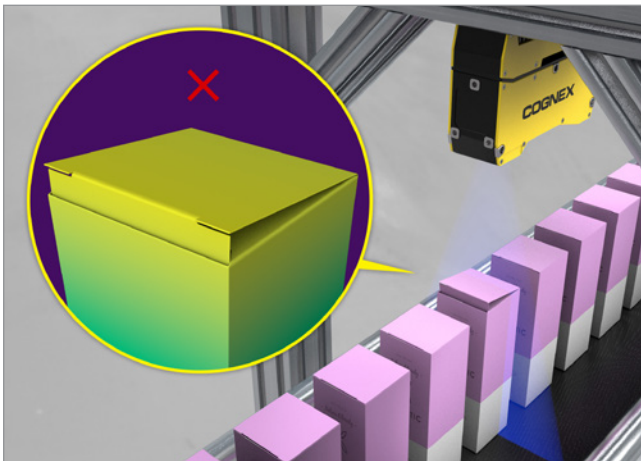
Check the presence and position of the cap by measuring the height and tilt.

## Fill Level Inspection



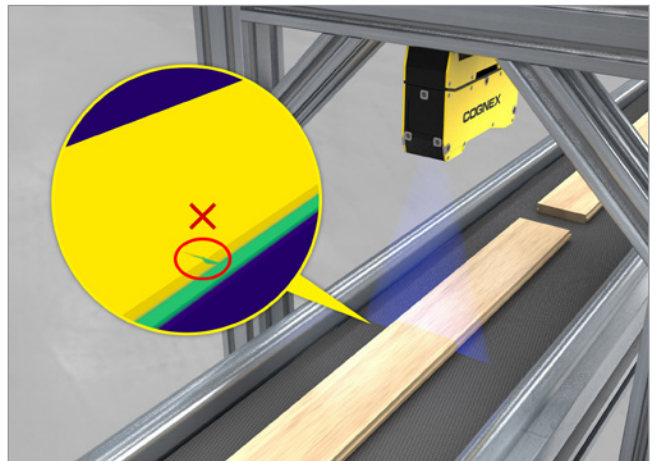
Inspect the height and volume of contents to ensure the correct amount of product is in each container.

## Packaging Quality Inspection



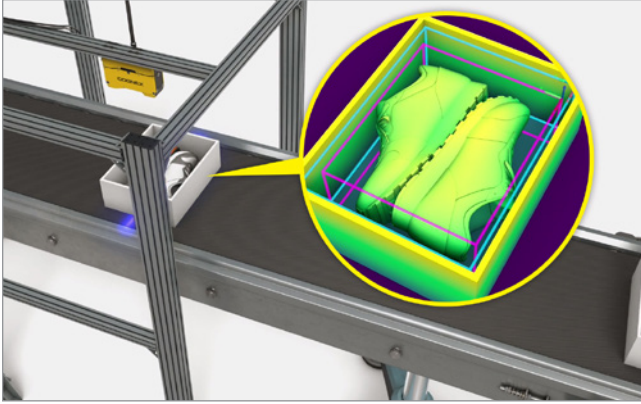
Verify boxes are intact and sealed while inspecting for potential quality issues such as crushed corners, tears, or open flaps.

## Flooring Inspection



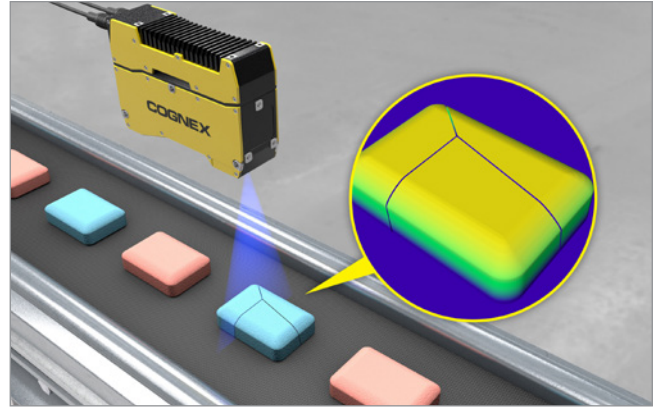
Inspect floorboards for surface defects including gouges, bowing, splits, and knotholes.

## Shoe Detection and Inspection



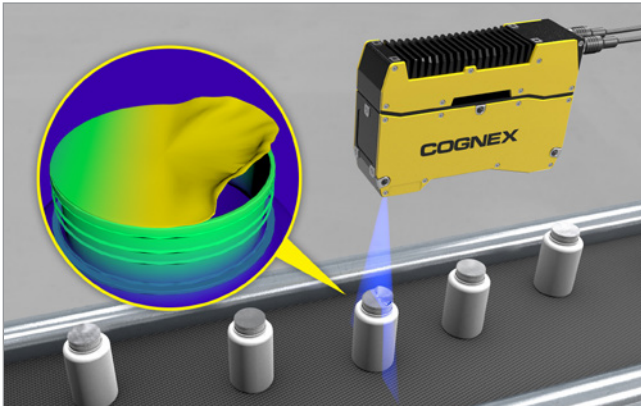
Detect presence/absence of shoes in a box and ensure proper pairing by measuring the volume.

## Soap Bar Inspection



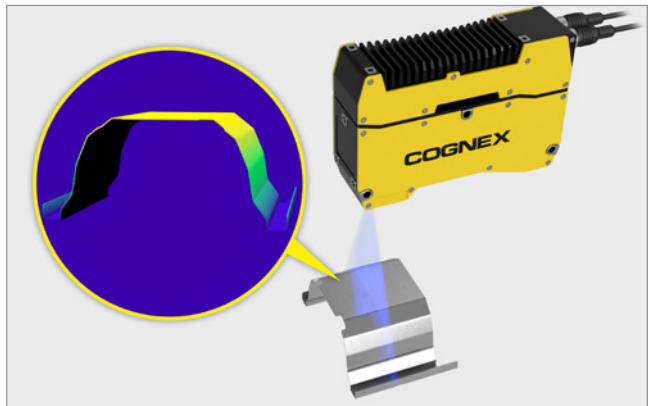
Inspect bars of soap for damage and confirm dimensions prior to packaging.

## Tamper and Safety Seal Inspection



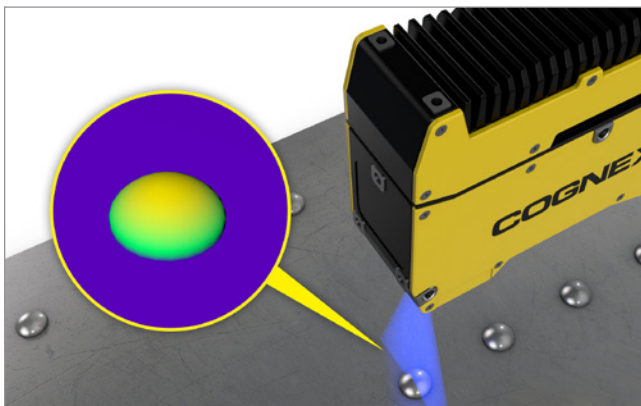
Perform final quality checks and verify integrity of seals.

## Angled Sheet Metal Inspection



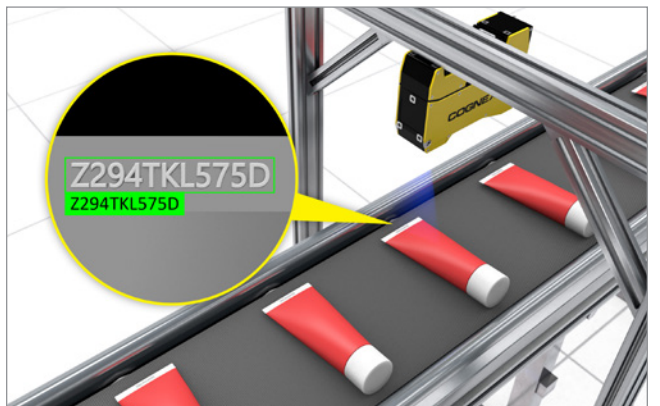
Measure curvature and edges of angled sheet metal to ensure proper dimensioning.

## Rivet Inspection



Confirm height of rivets and detect defects prior to sending sheet metal to the next stage of manufacturing.

## Imprinted text reading



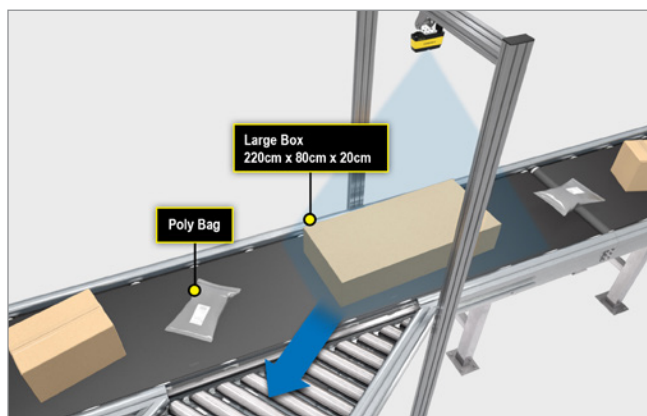
Read lot codes, even with minimal contrast.



# LOGISTICS

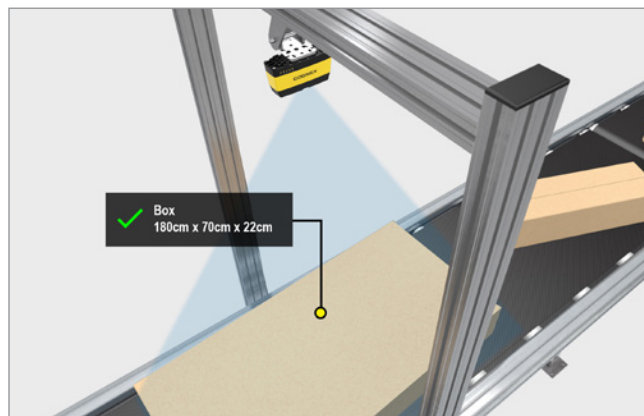
Cognex 3D machine vision solutions deliver high accuracy and robust performance which helps improve traceability, increase throughput, and reduce costs for distribution, fulfillment, and parcel processing operations. These solutions also provide rich real-time performance data and trending insights that further optimize logistics automation.

## Inbound Product Categorization



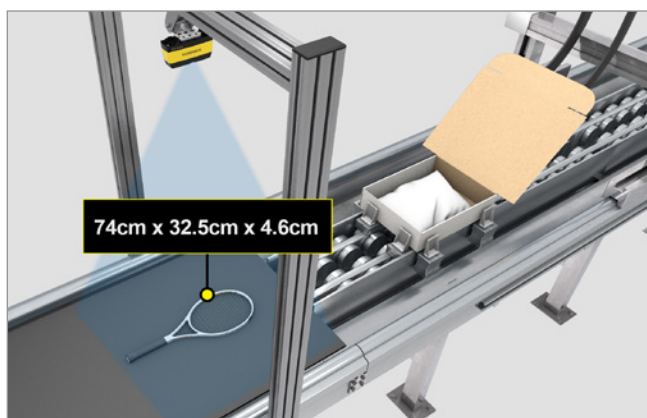
Capture parcel and package dimensions, categorize incoming freight, and provide item data for proper storage.

## Manifest Verification



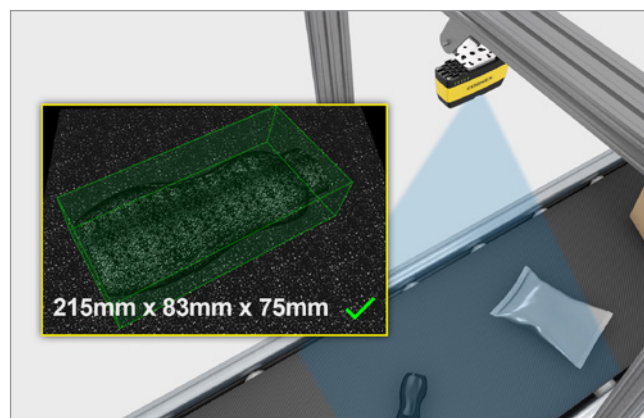
Capture volumetric and dimensional information of incoming products to improve traceability and verify what is listed on the manifest.

## Packaging Optimization



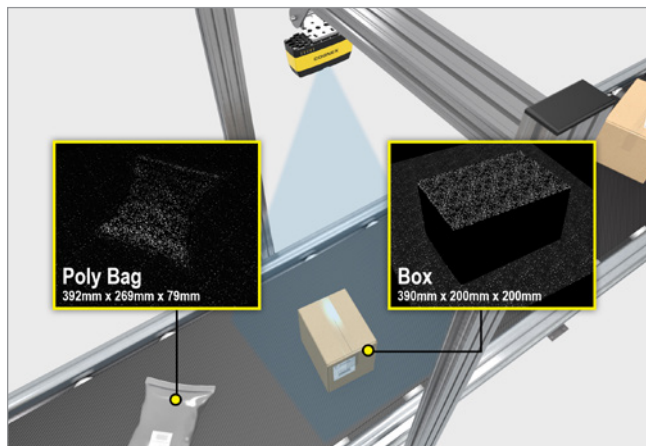
Automate volumetric measurement of picked products to reduce manual handling and measurement time, and lower overall shipping costs.

## Item Verification



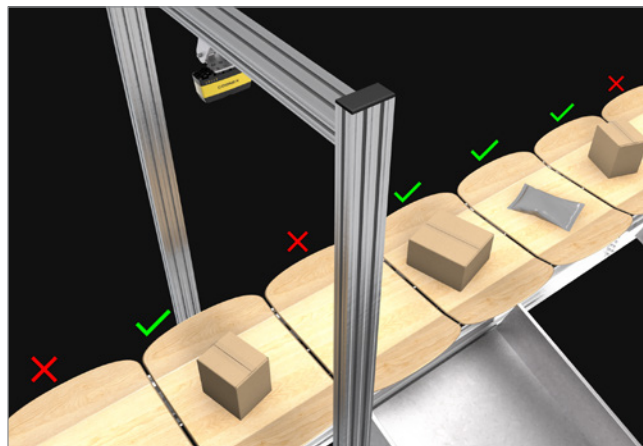
Capture volume and dimensioning data of picked items to increase order accuracy, improve inventory management, and reduce return costs.

## Categorizing Pre-Shipment Packages



Categorize products to ensure proper handling and reduce damage to packages.

## Item Detection



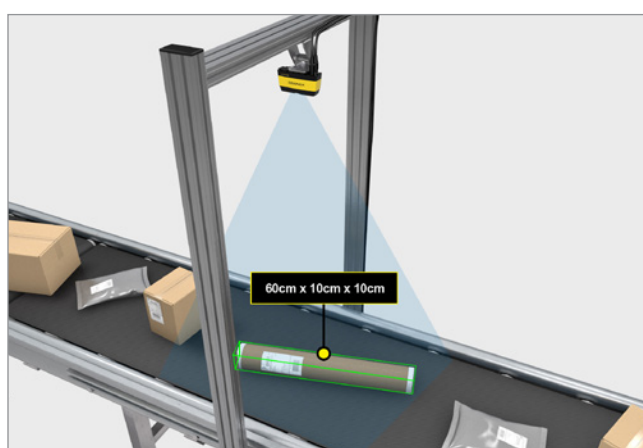
Identify products among dirt, dust, and foreign objects on the sorting belt, and monitor error codes.

## Estimating Shipping Costs



Capture and report dimensional and volumetric information, so operators can select the optimal packaging and more accurately estimate shipping costs.

## Truck Load Optimization



Collect dimensional and volumetric information for outgoing freight, allowing outbound handlers to pack their trucks efficiently to optimize transportation costs.



# The Global Leader

## in Machine Vision and Barcode Reading

For over 40 years, Cognex has helped the world's most innovative companies make their manufacturing and distribution faster, smarter, and more efficient.

Cognex machine vision solutions combine hardware and software to capture and analyze visual information. The company's wide range of solutions automates manufacturing and distribution tasks for customers worldwide, improving efficiency and quality in applications like inspecting, identifying, locating, and measuring components, products, and packaging. Cognex products incorporate advanced technologies including artificial intelligence to simplify implementation, increase accuracy, and deliver a faster ROI.



**>40 years** in business

**\$830M+** 2023 revenue

**>60%** revenue from EU & Asia

**25K+** global customers

**400+** channel partners

**500+** global customer support resources

**17%** of revenue into R&D

**>1,100** technology patents

**>8 years** developing AI for industrial machine vision

# BUILD YOUR VISION

## Vision Systems

Automate inspection tasks, from defect detection to assembly verification and text reading, with easy to deploy vision systems.

[www.cognex.com/machine-vision](http://www.cognex.com/machine-vision)



## Barcode Readers

Track and trace, from the floor to dock door, with powerful readers and verifiers designed to handle any code type.

[www.cognex.com/barcodereaders](http://www.cognex.com/barcodereaders)



## Industry Solutions

Solve applications across a wide range of industries with flexible and reliable machine vision and barcode reading solutions.

[www.cognex.com/solutions](http://www.cognex.com/solutions)



# COGNEX

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

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