



A large, semi-transparent black rectangular box covers the central portion of the background image. Inside this box, the text "WE SEE WHAT OTHERS CAN'T" is displayed in a large, white, sans-serif font. Below this, the words "MACHINE VISION, AI, ROBOTICS, & LOGISTICS" are written in a smaller, white, sans-serif font.

**WE SEE WHAT
OTHERS CAN'T**

MACHINE VISION, AI, ROBOTICS, & LOGISTICS

CONTENTS

About Us	3
Services Offered	4
Partners and Suppliers	5
Vision+	5
Technical Competence	6
VisionVault	7
Automated Cylinder Drop Test	8
Deep Learning Inspection	9
Vision Inspection of Large Paper Rolls	11
Automotive Engine Head 3D Inspection	12
Thermal Seal Inspection System	13
3D Complex Geometric Surface Blemish Inspection Machine	14
Rivet Inspection	15
Surface Grading Inspection for Siding Boards	16
Defect Detection for Dog Treats	18
Logistics Solutions	19
Hyperspectral Imaging Solutions for Pharma	20
Hyperspectral Imaging Solutions for Food Industry	21
Golf Ball Sortation Machine	22
3D Bead Inspection	23
Thermal Inspection Solutions	24
Automated Temperature Tunnel Scan	25
Pick N Place Vision Guided Robotics	27
3D Inspection of Welds on Automotive Steering Motors	28
EBC Pump Filter Inspection	29
Medical Device Bag Measurement and Verification	30
Final Assembly Transmission Inspection	31
Automotive Wheel Lug Dimension Verification System	32
High-Speed Tool Bit Inspection System	33
SideWinder Label Inspection	34
Container Inspection	35
Cylindrical Bushing Internal Coating Verification and Dimensional Analysis System	36
Tire Guardian Series	37
Round Disk Surface Inspection	38
Copper Fitting Inspection Station	39
Metal Web Inspection	40
Ink Jet Labeler Machine	41
Web Registration Inspection System	42
Manual Line Scan Station	43
High Speed Syringe Vision Inspection System	44
Snow Blower Inspection	45
Glass Jar Foreign Material Detection System	46
The Raptor: 2D and 3D Precision Measuring System	47
Bullseye Rapid Tube & Lumen Inspection System	48
Anode/Cathode Pick and Place Calendering Machine	49
Anaconda Tube Inspection System	50
Medical Device Inhaler Incremental Counter Verification	51
Contact Integro	52

ABOUT US

Integro Technologies is a turnkey, machine vision and system integration company. Integro Technologies designs and develops custom machine vision inspection solutions utilizing a range of components including high resolution cameras, optical and illumination systems, material handling, robotics, and 3D vision system applications for automated quality control checks, 3D surface inspection, defect detection, classification, gauging, batch sorting, VGR, ID, optical character recognition, and more.

Who We Are

Since its founding in 2001, Integro Technologies has cultivated strategic partnerships with recognized machine vision suppliers, and they continuously provide superior solutions for the most challenging applications.

Over 1000 clients worldwide rely on Integro's expertise to solve the most demanding vision applications on time and within budget. Application engineers work one-on-one with clients to determine their objectives and system requirements.

Through a strategic project development process, Integro's team ensures the proper vision platform selection to match a company's vision application and systems integration needs, while avoiding the common costly pitfalls related to such projects.

Industries Served

Integro Technologies serves a wide range of manufacturing industries including, but not limited to:

- Aerospace
- Automotive
- Consumer Products
- Electronics
- Food & Beverage
- ID Solutions
- Military
- Packaging
- Pharma & Medical
- Plastics
- Semiconductors
- Special Imaging



SERVICES OFFERED

Integro Technologies provides the following machine vision integration consulting and field engineering services for end-users, system integrators, and machine builders.

Vision Integration with Consulting Services

- Turnkey machine vision system design, development, and installation
- Artificial Intelligence and Deep Learning Solutions
- Robotic system integration with 3D & 2D vision systems
- Logistics Solutions
- Customized OEM solutions
- Optimization of existing optical systems for inspection
- Technology review of machine vision systems for upgrades and retrofits
- Integro VisionVault User Traceability and Data Archiving Package for Business Intelligence



Field Engineering Services

Integro Technologies has one of the most dedicated field service workforces in the machine vision industry. Whether companies require system start-up, equipment servicing, emergency response, turnkey solutions, or in-house staff support, Integro Technologies will meet those needs.

- Support of Domestic and International Accounts
- On-Line Remote Support Services
- On-Premise Field Engineering
- 911 Vision Rescue for faulty machine vision integration systems
- Training for machine vision technology applications
- Communication troubleshooting to other devices
- Robotic system integration with vision systems
- Support to improve hardware/software performance
- Remote diagnostics



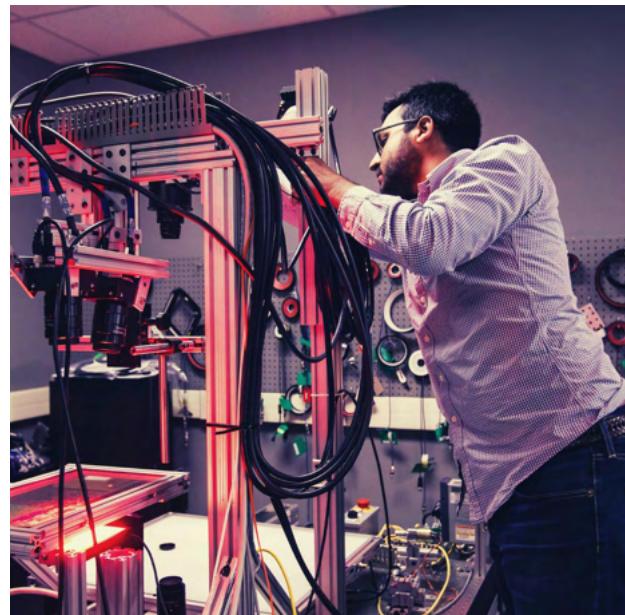
PARTNERS AND SUPPLIERS



WE ARE VISION+

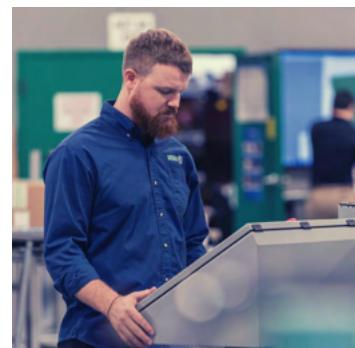
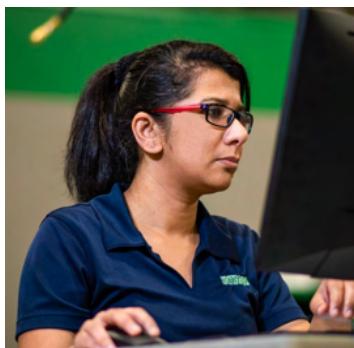
Integro Technologies develops engineering solutions utilizing machine vision technologies surrounded by supporting technology to provide turnkey solutions.

- Robotics
- Motion
- PLC
- HMI
- Visualization
- Analytics: Power BI & Industry 4.0
- Laser
- Material Handling
- Complex Image Formation Systems
- Light Assembly
- Mechanical & Electrical Design
- Global Solution Provider



TECHNICAL COMPETENCE

Integro Technologies serves a wide range of industries to solve some of the most difficult problems in manufacturing inspection. Many of Integro's projects are protected by non-disclosure agreements, and therefore, this document does not provide the full scope of Integro's capabilities. Contact Integro Technologies directly to learn more about specific applications. The following are just a few examples of our solutions.



VisionVault

Integro Technologies offers the VisionVault® Package, allowing for effective and efficient user-traceability and data archiving capabilities on the Cognex In-Sight Platform.

Today, all Cognex In-Sight systems have an independent set of usernames and passwords per device that have to be setup and managed. The greater the number of deployed cameras, the greater the probability of a lost password or restricting access unintentionally. These types of event result in lost production and increased maintenance and administrative costs.

By implementing VisionVault, all usernames and passwords are centralized to Microsoft ActiveDirectory for Administration, thereby minimizing potential security risks to a company's vision systems. Users can access read only production data via an Internet browser from any user terminal with sufficient rights to execute queries on the central VisionVault database. Users can enter username and password using traditional methods or use existing company RFID badge scanners at each VisionVault-AD access point to authenticate.

Features:

- FDA: CFR 21 Part 11 compliant database
- User-Authentication through Microsoft Active Directory
- Preconfigured & Customizable SQL Reports
- Industry-Standard Network Architecture
- Streamlined Validation Procedures
- Microsoft .NET Compliant- SQL 2012
- Supported Systems: MS Windows 7, MS Server +2008, and Microsoft SQL +2012
- Supported Browsers: Microsoft Internet Explorer (+v8.0), Google Chrome (+v17), Microsoft Edge, and Firefox
- Cognex In-sight Explorer 4.9.3+
- Integrates with VisionView 900



Automated Cylinder Drop Test

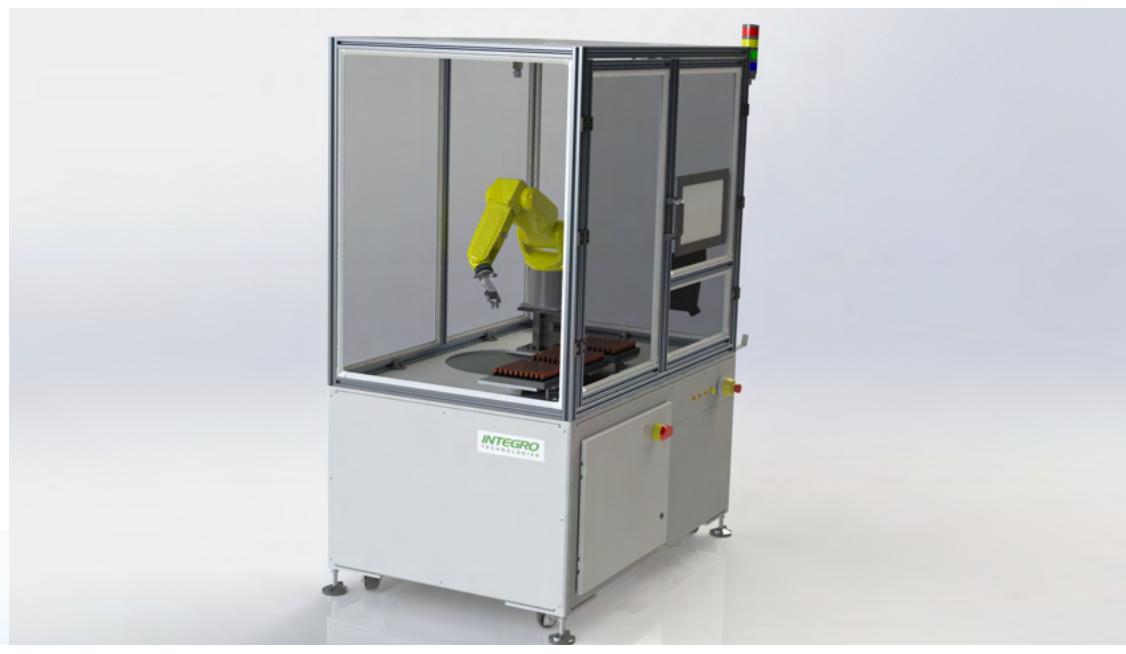
This system automates a formerly manual drop test performed on cylinders using a vision-guided 6-axis robot (Fanuc LR Mate).

Features:

- Vision guidance for locating, picking, and placing batteries
- Electromagnets to pull cylinders away from edges of impact surface for proper pick
- Custom hardened concrete impact surface to meet ANSI standards for cylinder drop tests
- User-friendly interface to specify type of cylinder, cylinder quantity, and desired drop sequence
- Stand-alone cell consisting of welded steel frame and interlock extrusion safety guarding
- Custom gripper finger design to pick up both two cylindrical objects in vertical and horizontal positions

Benefits:

- System can perform tests for up to 300 cylinders at a time without human intervention
- Precise 1 meter height drop to meet ANSI standards
- Mobile system that can be moved throughout test facility and only requires 120 VAC power source to function (no pneumatics)
- Tray change takes less than 1 minute



Deep Learning Label Inspection System

This application is an automated machine vision inspection for printed labels to eliminate human inspection, improve quality, and production efficiency. The system performs automated Deep Learning based OCR/OCV, 1D/2D code reading and Print Quality Inspection (PQI). Operator can train labels of varying sizes and printed text/graphics to generate their own recipe through an easy-to-use training User Interface

Features:

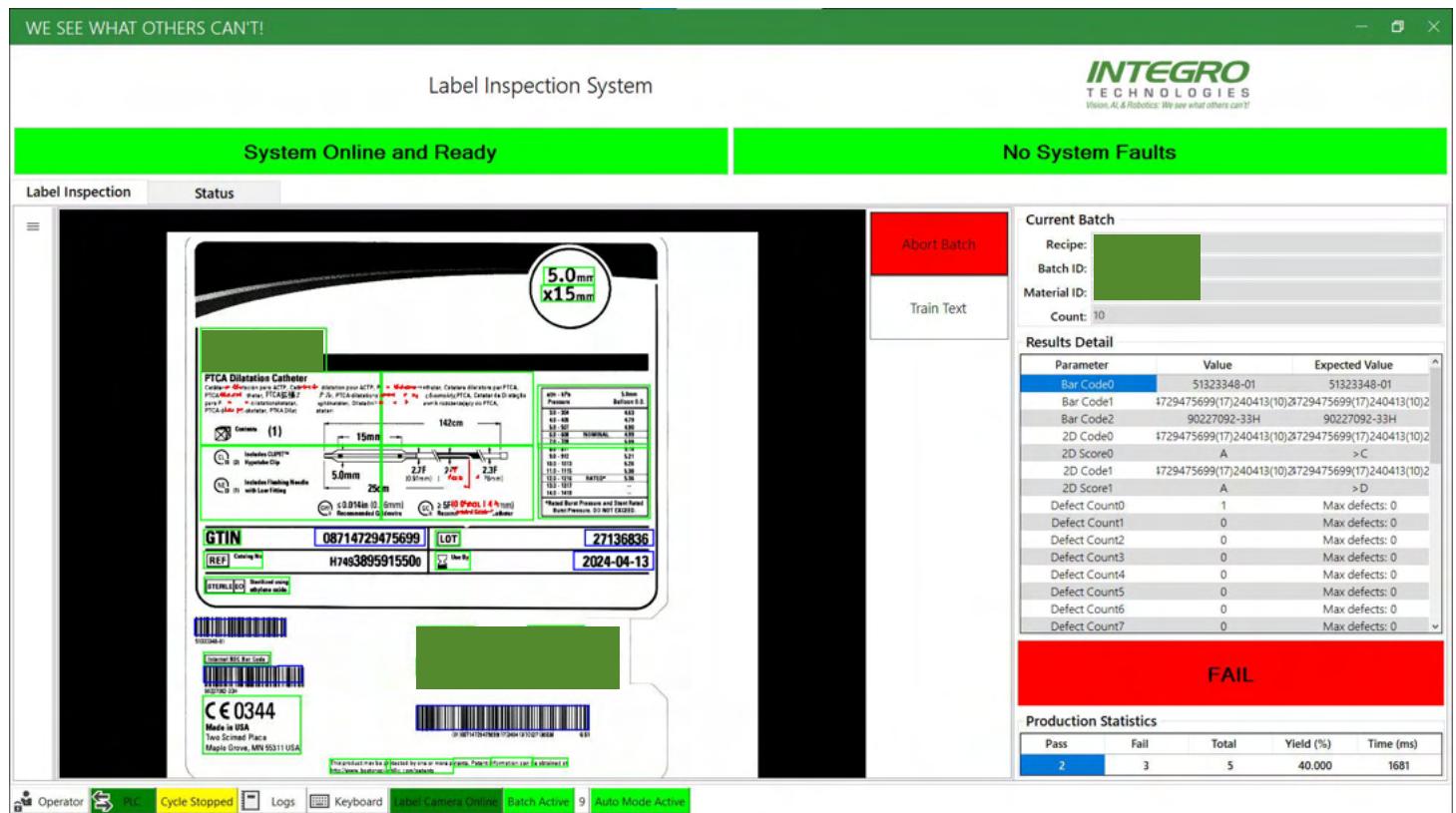
- The system utilizes high resolution linescan imaging to inspect pharmaceutical labels with high accuracy.
- System implements a Deep Neural Network (DNN) to perform OCR on text as small as 5pt in size. The OCR/OCV is agnostic to font size/style, character spacing, character size within the same string. There is no need to train any characters, making the system extremely easy to use.
- System reads and grades designated code 1D and 2D symbology at various regions on the labels.
- Detects blemishes in print (text and graphics) in designated areas of the label where the defect is present.
- The system uses PDF print files for each label as the “first article” template for that label. The PDF file is used as a golden template to define the regions of interest for various inspections to be performed on the label: OCR/V, blemish etc.). A recipe (set of label specific parameters for each label type, or label configuration) is trained based on the PDF and loaded up before running the roll.
- The system fully handles the roll printing and inspection. Blank label stock is loaded on, good, printed labels are dispensed, and rejected labels are rolled into the take-up roll.



Deep Learning Label Inspection System (continued)

Benefits:

- High accuracy, thorough inspection of all printed graphics and critical text on the label. Deep learning based, highly accurate OCR/OCV on text with varied font types and sizes requiring no prior training. Blemish detection and ID and 2D code reading. This allows the customer to make sure that the correct labels are being dispensed and applied on critical medical devices.
- All the inspection data is saved in a database which the customer can mine to track down defects.
- System can be used to track existing process, analyze inspection data, and make calculated decisions to improve existing process.

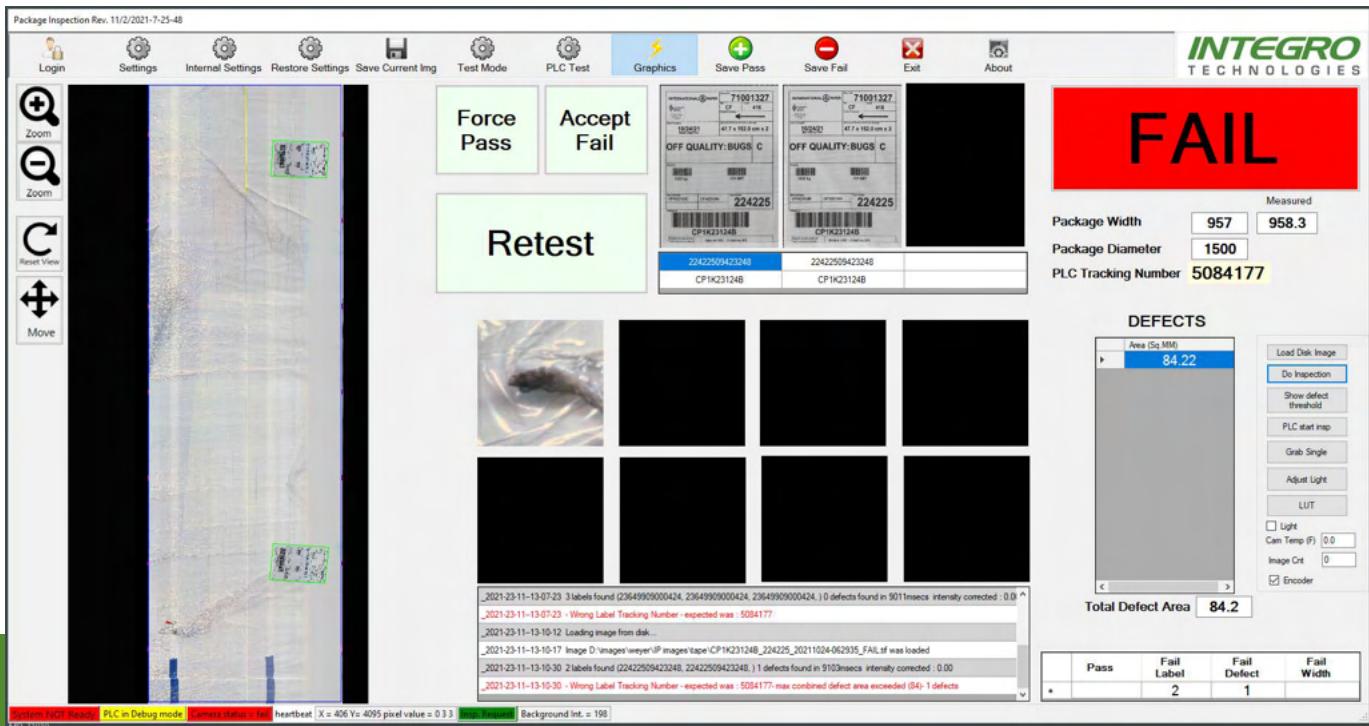


Vision Inspection of Large Paper Rolls

The vision system is designed to locate paper labels attached to the paper rolls and use OCR to acquire the tracking number printed on the label. Additionally, defects are located (typically small debris in the range of 2-3 mm) and reported to the operator.

Features:

- High precision 16K linescan camera acquires images from the outer surface of large paper roll packages.
- Image processing locates labels and defects, then reports this information to the customer's PLC.
- This application could be used on any web inspection system and cycle time is 7 seconds to acquire an image and 4 seconds to process.
- Processing time image size of 750 Mbytes.
- System uses high density, high speed linescan camera to acquire very large images.
- System auto-adjusts for variation in the product to produce a uniform image for analysis.
- OCR can be used on many variations of background materials.
- The system inspects large paper rolls (approx. 5 ft in diameter and 6 ft wide).



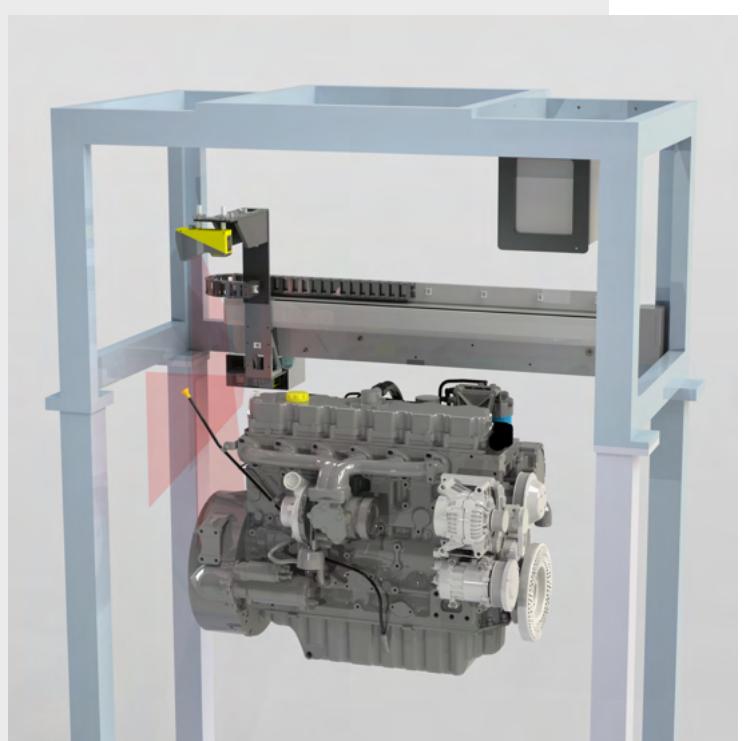
Automotive Engine Head 3D Inspection

This system utilizes two Cognex DS (displacement sensor camera) 3D units in conjunction with a Yamaha single axis linear servo. The Yamaha linear servo carries the two DS units across the scanning plane. The inspection system images the upper assembled head of the engine block at different angles to verify items such as valve positioning, rocker arm set screw height, and various presence/absence inspections.

Application inspects for debris in specific portions of the engine head, presence/absence of the Push Tube, Rocker Arms, Cross Foot, Set Screws and Jake Brake if applicable. The application also measures the height of the set screws and determines if they are within a specified tolerance. This type of application setup could be used to inspect anything that requires inspection at 90° angles from each other. Parts per minute rate of this application is dependent on the customer line speed rather than the capability of the inspection system. The inspection system is capable of approximately 4 parts per minute at the current inspection settings where the customer line rate is 1 part per 2-5 minutes on average.

Features:

- This system replaced an existing, non-functioning inspection cell.
- All results of inspection are recorded to a SQL database along with engine type, seal number, assembly verification, and pallet ID for tracking and reporting purposes.
- This application requires no user interaction. Engine type data is handed to the application from the PLC.
- This allows the application to automatically update the inspection criteria with each new part that enters the inspection cell.



Thermal Seal Inspection System

This application implements a Medium Wave Infrared Camera (MWIR) to check the integrity of foil and plastic lift and peel seals on bottles containing a liquid nutritional product. The system is capable of inspecting seals of varying diameters, and detecting a wide range of failure modes such as cuts, loose caps, upside-down seals, overheated seals, underheated seals, missing seals, down bottles, and more. Once a defect is detected, the system automatically rejects the bottle.

Apart from detecting and reject defects, the customer has been able to use the data from failed images to derive process insights and improve it. This has allowed the customer to cut down on their failures and improve their yield.

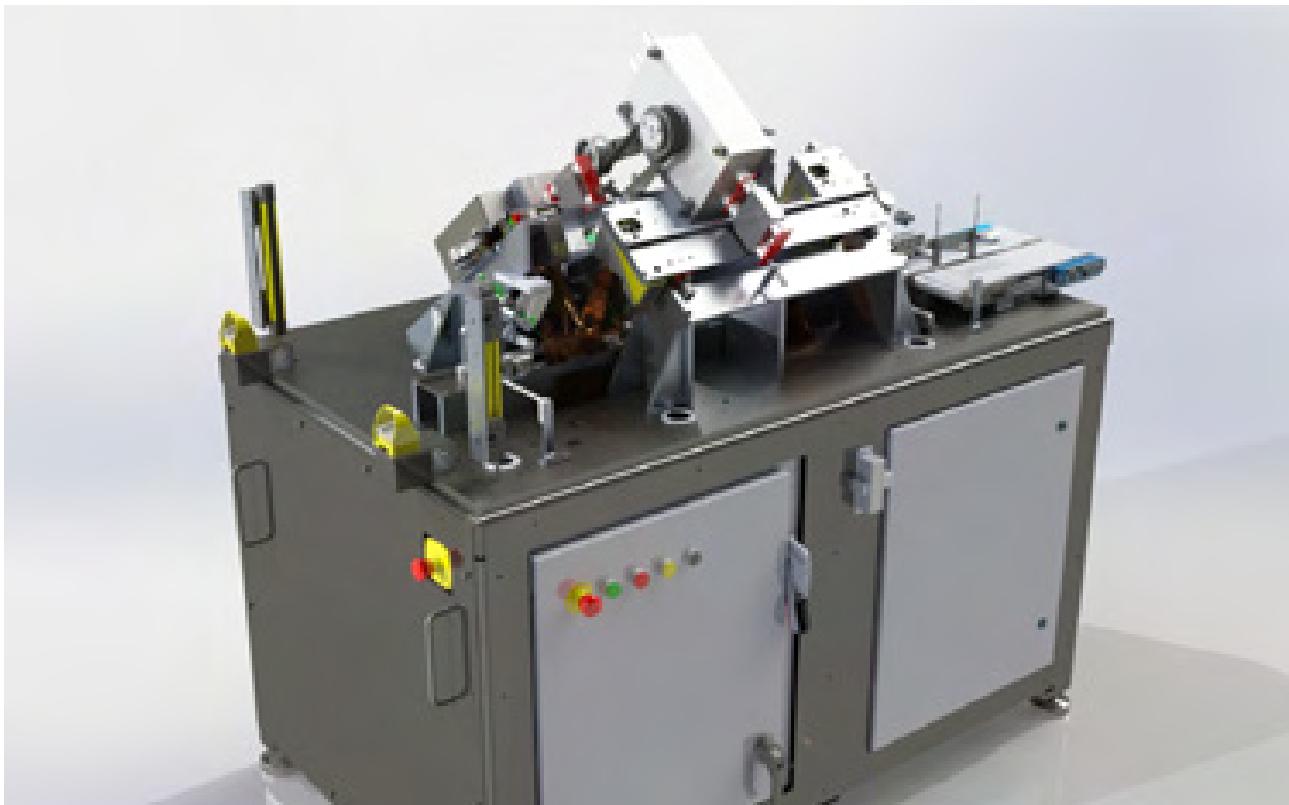


Features:

- The system uses a high thermal resolution FLIR MWIR thermal camera for imaging the seals immediately after they have been sealed using an inline inductive sealer.
- 3 different bottle sizes (16oz to 128oz), and 2 different seal types (foil and plastic lift and peel) can be inspected with this system.
- System implements a large Deep Neural Network (DNN) trained on production images to catch highly stochastic defects (created by loose caps). The DNN demonstrates a detection accuracy > 99% for product running in production.
- The DNN is complemented by advanced traditional computer vision algorithms to perform the defect detection tasks (Hybrid System), leveraging the strengths of both approaches to achieve superior accuracy.
- The system features pneumatic reject mechanisms and tracks parts as they travel through the system.
- The system inspects 120 bottles per minute at a typical conveyor speed of 85 ft/min.

3D Complex Geometric Surface Blemish Inspection Machine

This system contains a nine-axis camera driven walking beam with flipping mechanism for smooth 3D laser profile image acquisition and formation of all flat, crescent shaped surfaces at 30ppm.



Features:

- Four (4) Laser Profilers imaging all surfaces of flat crescent shaped parts with complex machined geometric features
- Innovative flattening algorithm for geometric data normalization to detect minute cracks, chips, waves, and chatter (unground surfaces) in the metallic components' part surface
- First of its kind inspection solution for electronic component manufacturer to eliminate 300% manual inspection of individual components
- Designed to be manually loaded or fully automated with robotics pick-n-place and part stacking systems

Rivet Inspection

This system inspects rivets, springs, flange tabs, and other parts on a torque converter clutch (TCC) assembly. The TCC is inspected on both surfaces with a cycle time of 12 seconds.

Features:

- Performs 3D metrology on surfaces of a TCC
- Average standard deviation of measured features is 0.005 mm, ensuring high repeatability
- Performs inspections of up to 17 failure modes across 6 types of TCC assemblies
- Extensive result database for storing measured data for future IoT implementation.

Benefits:

- Replaces expensive and difficult to maintain rivet checking machines implementing LVDTs which only checks for rivet heights as opposed to 16 additional checks performed by Integro's machine.
- Change over time is 3s versus 30 mins to 60 mins for existing machines.

The screenshot displays the Integro Rivet Inspection software interface. At the top, there are navigation buttons: User Login, Add User, Add Recipe, Manual Mode, Servo Ctrl, Online, Faults, and Exit. Below these are status indicators for six stations: Station 7 (orange), Station 6 (orange), Station 5 (orange), Station 4 (orange), Station 3 (green), Station 2 (green), and Station 1 (green). A "Save Images" checkbox is also present.

The main interface includes several sections:

- TOP INSPECTION IMAGE** and **BOTTOM INSPECTION IMAGE**: Displays visual inspection results for the top and bottom surfaces of the TCC assembly.
- Results Pass**: Shows the overall inspection status as "Pass".
- Select Clutch To Run**: A dropdown menu set to "GU1".
- ReInspect**, **Cycle Stop**, and **Reset Fault/Ack Reject**: Control buttons.
- System Running**: Status indicator.
- No Faults Detected**: Confirmation message.
- ARC SPRING RESULTS** and **COIL SPRING RESULTS**: Tables showing inspection data for arc and coil springs. The tables include columns for Pitch, Y Diameter, Cap1Present, Cap2Present, Mean Diameter, Spring Is Complete, and various presence and tab-related metrics.
- TOP RIVET RESULTS** and **BOTTOM RIVET RESULTS**: Tables showing inspection data for rivets. The tables include columns for Top Rivet, X Diameter, Y Diameter, Volume, Height, and various dimension and presence metrics.
- TOP INSPECTION RESULTS** and **BOTTOM INSPECTION RESULTS**: Summary tables showing overall inspection statistics for rivet height, volume, and outer diameter.
- Total Inspected**: 50
- Total Passes**: 50
- Total Failures**: 0
- Yield**: 100.00%
- RESET STATISTICS**: A button to reset the inspection statistics.

Surface Grading Inspection for Siding Boards

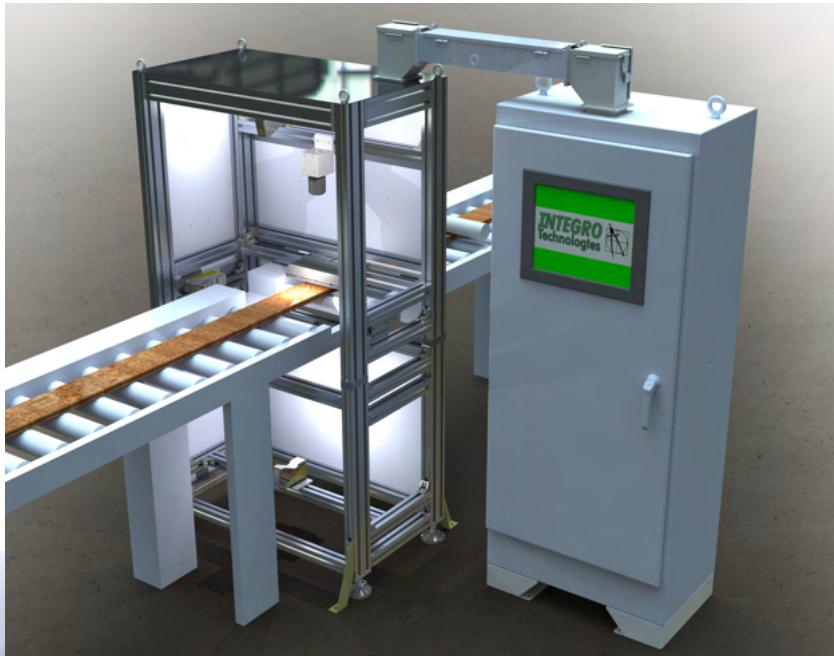
The purpose of this application is to eliminate human inspection and provide real time grading for siding boards. The vision system is integrated in the manufacturing outfeed conveyor line and automatically downgrades the boards based on the vision inspection results. The inspection solutions are tailored to meet the quality standards provided by the customer.

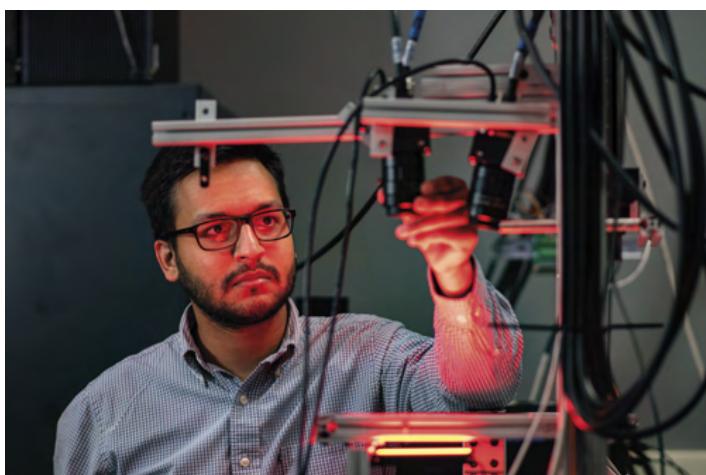
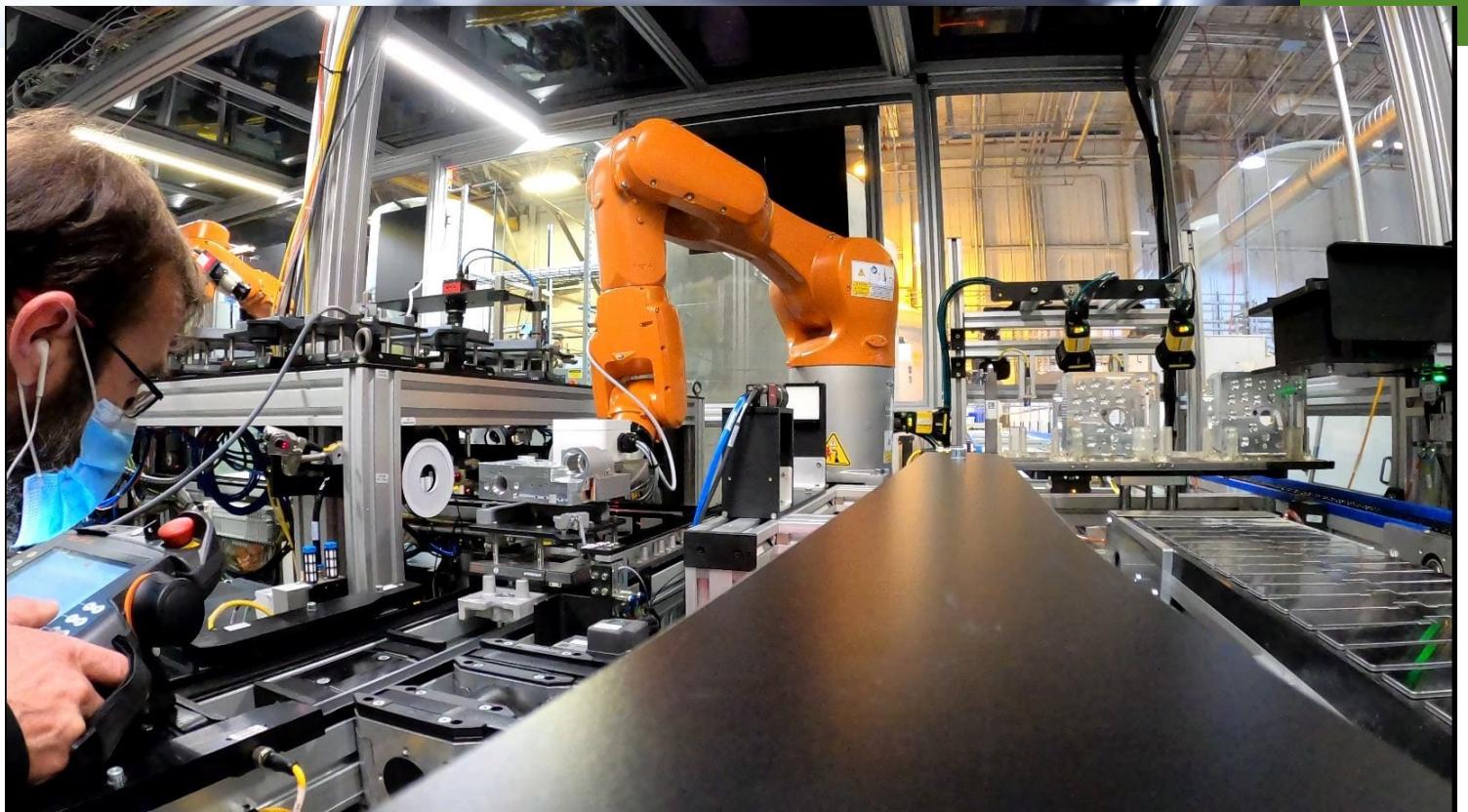
Features:

- System utilizes a High Resolution 3 Chip Color camera to inspect wide range of surface defects that have varying colors.
- Automatically detects surface defects like carbon spots, bark resin, heavy primer, missing primer, flake on face, etc.
- Inspects boards of different length ranging from 6 ft to 12 ft.
- Inspects boards with different groove patterns and color
- Stores defect information for all panels in a SQL Database

Benefits:

- Highly accurate and repeatable inspection that removes human subjectivity in the grading process.
- Detects defects that are as small as 3 mm X 3 mm
- Inspects boards in real time running at the rate of 300 ft/min
- Historical results are stored which can be used to plot trends to get more insight on the existing process and make improvements.





Defect Detection for Dog Treats

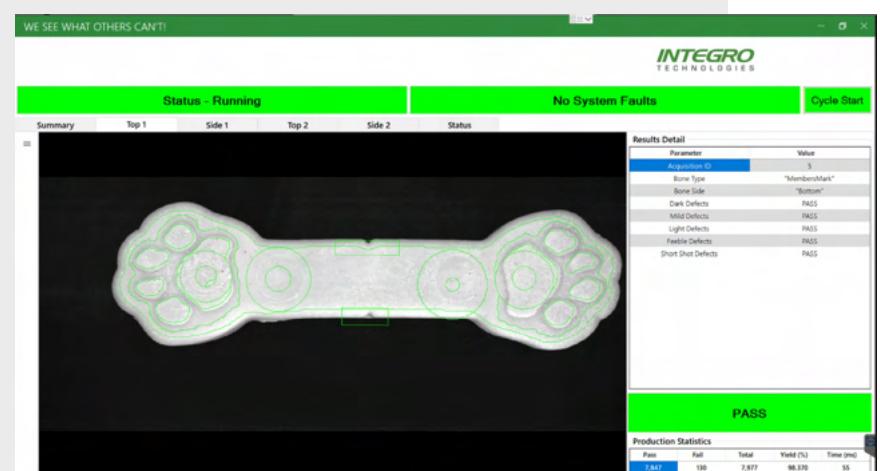
The purpose of this application is to automate the quality inspection of dog treats and dynamically sort between two types of dog treats at a very high speed. This is a stand-alone system with a buffer area to load bulk parts, infeed conveyor system to route the dog treats through the inspection station, reject bins to collect defective treats, outfeed conveyors to route the sorted "good" dog treats to be collected in their respective bins.

Features:

- High speed application inspecting 200 dog treats per minute.
- System utilizes two (2) inspection stations with four (4) high resolution monochrome area scan cameras to capture all sides of the dog treats.
- The first inspection station inspects top and one side of the dog treat, and the treats are flipped before reaching the second inspection station which inspects the bottom and other side of the dog treat.
- Automatically detects defects such as pin cut, short shot, molding defects, debris, cracks, knit lines etc.
- Dynamically sorts between two (2) types and drops it in their respective bins.
- Counts the parts present in the box using the accurate weight information from the scale prior to packaging.
- Automatically blows the defective parts to the reject bins.

Benefits:

- Replaces manual manipulation and visual inspection process eliminating human error
- High speed application running at 200 parts /min
- Detects defects as small as 0.5 mm X 0.5mm and removes human subjectivity issue in the quality inspection process
- Dynamic sorting and part counting feature which helps in packaging efficiently



Logistics Solutions

As logistics industries continue to grow, the pressure to meet customer demands and performance metrics is greater than ever. Successful companies are scaling and optimizing operations while minimizing manual work and equipment downtime.

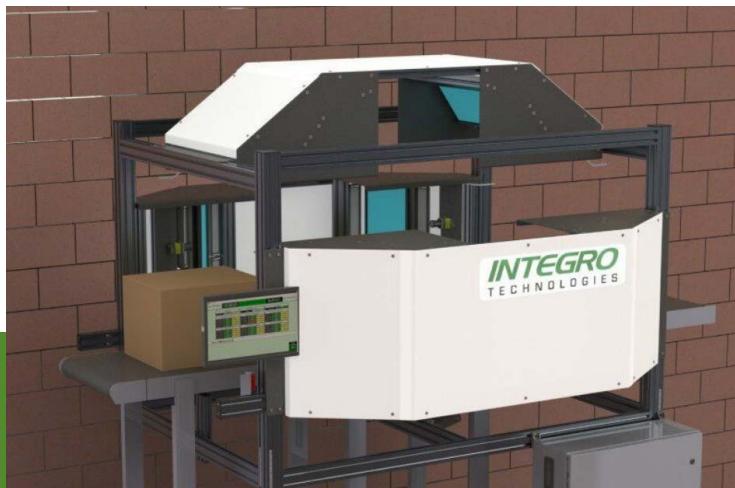
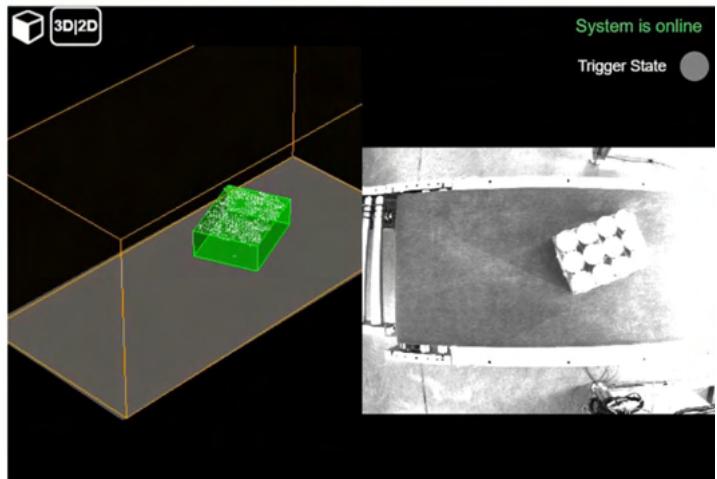
Machine vision logistics solutions are increasingly critical to:

- Higher read rate performance
- Increased speed and throughput
- Improved accuracy and efficiency
- Lower maintenance costs
- Preventing or correcting label and shipping errors

Leading retailers use barcode readers to quickly scan and track goods through their distribution centers. Image-based barcode readers help ecommerce fulfillment centers scan and sort goods quickly and reliably.

Integro's Logistics Solutions include:

- Automated Sorting
- Dimensioning
- Pallet Scanning
- Pick and Pack Sorting
- Print and Apply
- Warehousing
- Inbound Sorting
- Outbound Sorting



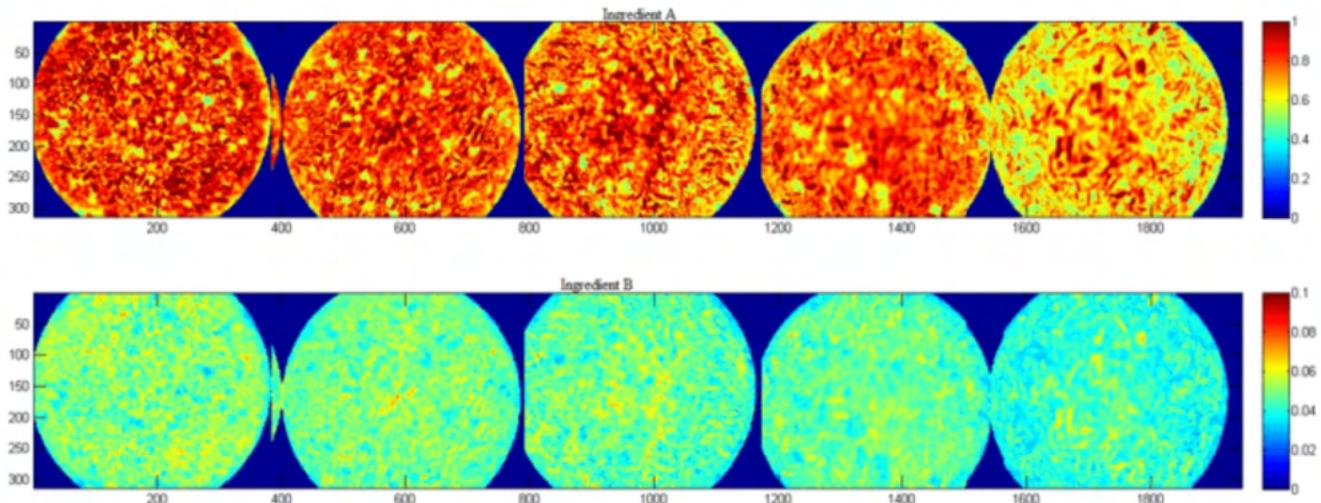
Hyperspectral Imaging Solutions for Pharma

Quality assurance of pharmaceutical products chemical composition with 100% inspection accuracy can be achieved with spectral cameras. Inspection is based on identification of products' active ingredients. Products with correct appears but with wrong active ingredient or concentration can be identified in real time.

Get control over pharmaceutical products: perform chemical composition analysis during production process, measure presence, amount and distribution of active pharmaceutical ingredient (API), avoid mix-ups and improve the product quality and safety.

Integro's solution provides:

- High frame rate – meets industry requirements
- Accurate – offers a high spectral resolution
- Thorough – image everything, not just a small sample or one point
- Small – flexible installation location

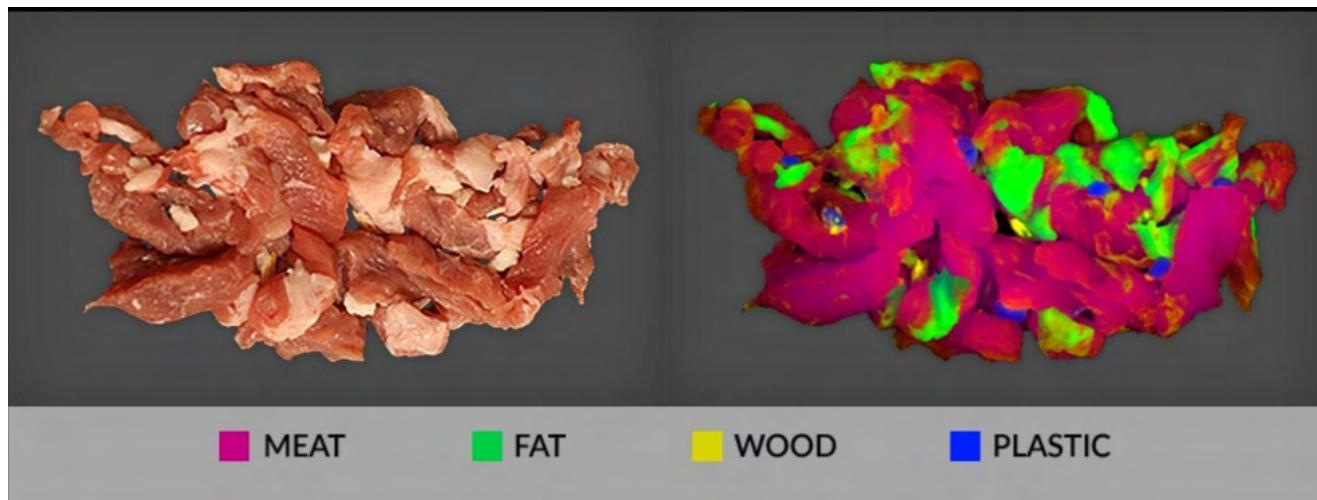


Hyperspectral Imaging Solutions for Food Industry

Integro Technologies has partnered with Specim Spectral Imaging . The Specim FX series cameras mounted on Integro Technologies' automated machinery can sort food faster with less waste and cost. The SpecimOne can sort bruised, blemished, overripe, moldy, discolored, and improper chemical quality food products with little waste.

Specim FX cameras meet all the key industrial requirements in on-line inspection and sorting:

- Their line scan rate is high enough for required spatial resolutions with process line speeds of several meters per second.
- Cost is affordable for sensible return-on-investment in industrial processes.
- They are robust and compact for industrial installations and require minimal maintenance.
- Easy to accept and adapt by machine vision integrators.
- The cameras are directly compatible with the most advanced real-time hyperspectral analysis solutions.
- They have a fully configurable multiple region of interest (MROI) property making it possible to replace a range of fixed-filter instruments with a single camera.



Golf Ball Sortation Machine

Intego Technologies has extensive experience in the application of deep learning for classification. For this project, deep learning was used in conjunction with discrete analysis tools to optimize system reliability and performance for logo classification for a variety of golf balls brands for sortation and inspection.

Several test cases were developed and executed in-house to identify the performance of a deep learning system in this context.



Product variations tested include:

- Brands / Logos
- Ball Conditions
- Ball Colors

3D Bead Inspection

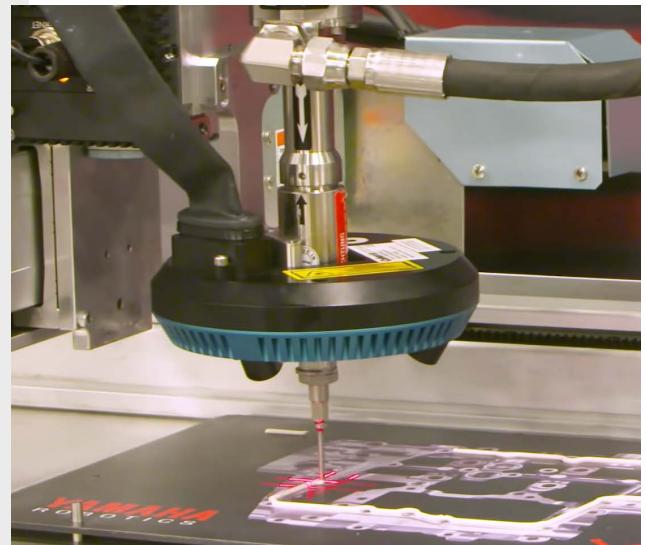
Integro Technologies partnered with Yamaha Robotics and the Coherix Predator 3D product to combine a servo controlled bead dispensing system and integrated a real time 3D monitoring of the bead condition and position.

Integro offers this as a customized turnkey solution for your process to inspect 100% of your bead application. This solution eliminates manual, periodic bead inspection and provides a fully automated solution.

This technology and technique can also be applied outside the automotive industry with any adhesive or sealant application process.

Features:

- Smart continuous 100% bead tracking and measurement
- 3D bead visualization, analysis and reporting
- Easy setup with flexible zone based criteria
- Intuitive for users
- Compact, light-weight robust sensor head
- Simple to retrofit to existing dispensing systems
- Configurable for robot and pedestal mounting
- Coherix Core Software Platform and Embedded i-Cite software
- Coherix SHARK Multi Imager Architecture
- Gigabit Ethernet and USB 3.0 interface options



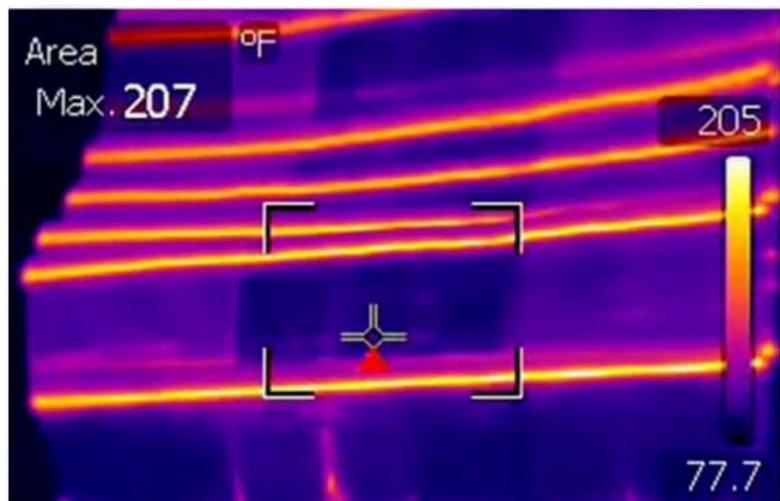
Thermal Inspection Solutions

Thermal Imaging is applied to inspect and verify any process utilizing heat or cooling transfer. A common application of this thermal imaging technique is inductive heat sealing used in a variety of industries.

Integro has partnered with a number thermal imaging technologies suppliers to allow the proper selection of the imager for the application, accounting for image quality, time decay, repeatability, environment conditions, calibration, and return on investment.

Applications Examples:

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Automated Temperature Scan Tunnel

Integro Technologies has designed and developed an easy, one-stop, no contact solution to detecting a person's temperature to keep team members and visitors safe from the effects of COVID-19. While this solution can not treat or diagnosis COVID-19, this thermal fever scanning is one form of defense against the spread of human transmissible viruses.

Integro's solution utilizes detection tools to obtain accurate body temperature measurement to the right and left of the dorsal bridge of the nose following CDC-endorsed best practices for detecting a highly accurate body temperature in a very minimally invasive way. This solution is identifies facial location either with or without a mask.

Screening officials monitoring the system can still maintain good social distancing by operating the system from a safe distance away from the individual being scanned.

Fever Detection can be completed at a rate of one person every 2.5-3.0 seconds with people walking through the machine from start to end at social distancing standards.

On-site detection of potential health risks is crucial to a successful return to normal activities, but data monitoring will be equally helpful for long-term success as the COVID-19 virus persists.

The Integro solution provides immediate direct user and administrator feedback, data archiving of obtained information, and wireless network connectivity. RFID data options are available as well.

Automatically detect elevated temperatures in employees, contractors and visitors entering your facility and help prevent viruses from infecting your workforce.



Automated Temperature Scan Tunnel (continued)

Integro's solution includes:

- Temperature measurement via thermal (IR) camera
- Measurement accuracy to +/- 0.5C with blackbody reference
- Absolute or relative (population based) measurements
- Automatic face and hot spot (inner canthus) detection
- Complies with social distance standards of six feet or 2 meters
- No operator intervention necessary
- Visual GO/STOP outputs
- Measurement logging of results and images
- Rate of one person every 3.5 seconds with people walking through the machine from start to end at social distancing standards, or approximately 17 to 20 people per minute (up to 1200 people per hour).



Pick N Place Vision Guided Robotics

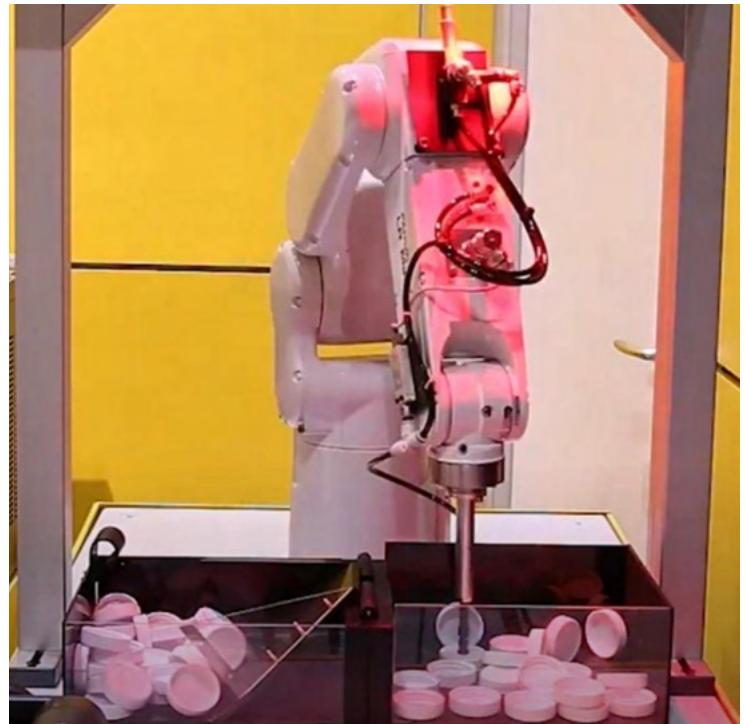
Vision-guided robotics (VGR) technology is increasing production while reducing costs in industries across the board. Exciting new developments in technologies such as 3D machine vision and deep learning have opened the door to flexible automation to accelerate production and ease the ergonomic burden on the human production team. More often than not, modern production lines have certain processes which are infamous among the line team members.

These jobs involve intense pick and place procedures which require excessive lifting, bending, and twisting, all tediously repetitive and at high production speeds.

Integro's solutions combines industrial grade smart cameras with advanced pattern location processing which allows robots to identify and select products based on their distinct size, shape, and design regardless of their orientation when the part is presented. Faster processing speeds keep the robot ahead of the identification process.

This opens the door to a variety of VGR applications including:

- conveyor loading and unloading
- handling of nested parts from trays or boxes
- placement, assembly, verification and packaging
- bin picking of random parts
- palletizing and depalletizing
- racking and de-racking

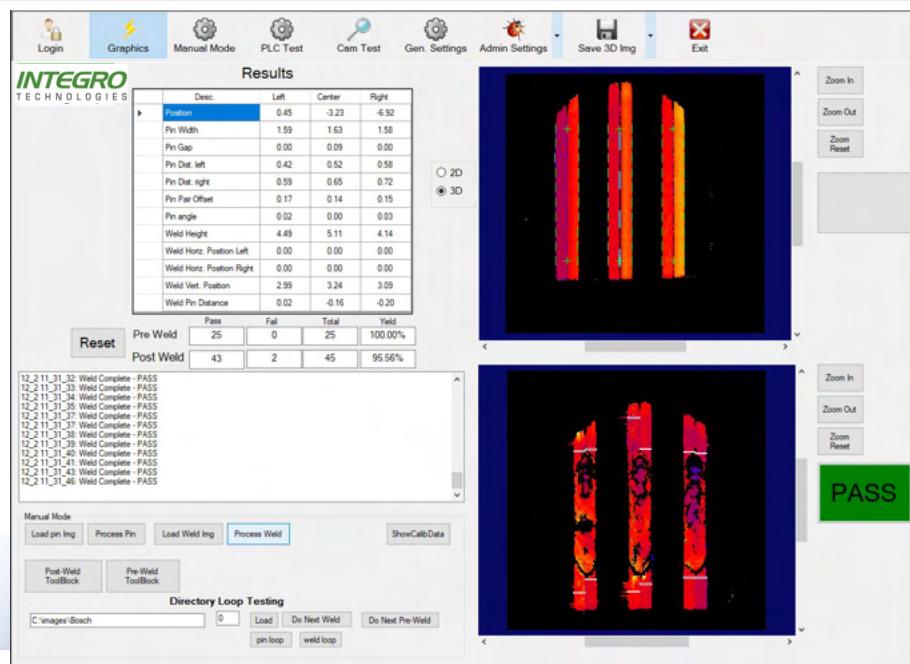


3D Inspection of Welds on Automotive Steering Motors

Automated 3D inspection system inspects electrical contacts prior to a laser welding operation to confirm correct position and other dimensional data. After the contacts are welded, the system again inspects to assure the welds are acceptable.

Features:

- Use of high precision 3D scanner technology
- Advanced image processing techniques to evaluate weld topography
- A high precision 3D sensor provides micro level topography information of electrical contact pins.
- Image processing software evaluations the contacts and provides detailed positional data to a laser welder which then welds the contacts.
- The inspection system provides weld size and positional information to the customer's PLC for dispositioning.
- The system inspects motor electrical contacts both pre and post weld. Similar systems could be used for quality assurance in many weld operations where 2D systems might fail due to incorrect evaluation of welds (due to particle contamination, etc.).
- Cycle time is approximately 30 seconds per motor, but the inspection system requires only 2 seconds to scan and perform image processing. The remaining time is part handling by the customer's system.
- This solution can be used for a variety of automotive component inspection applications.

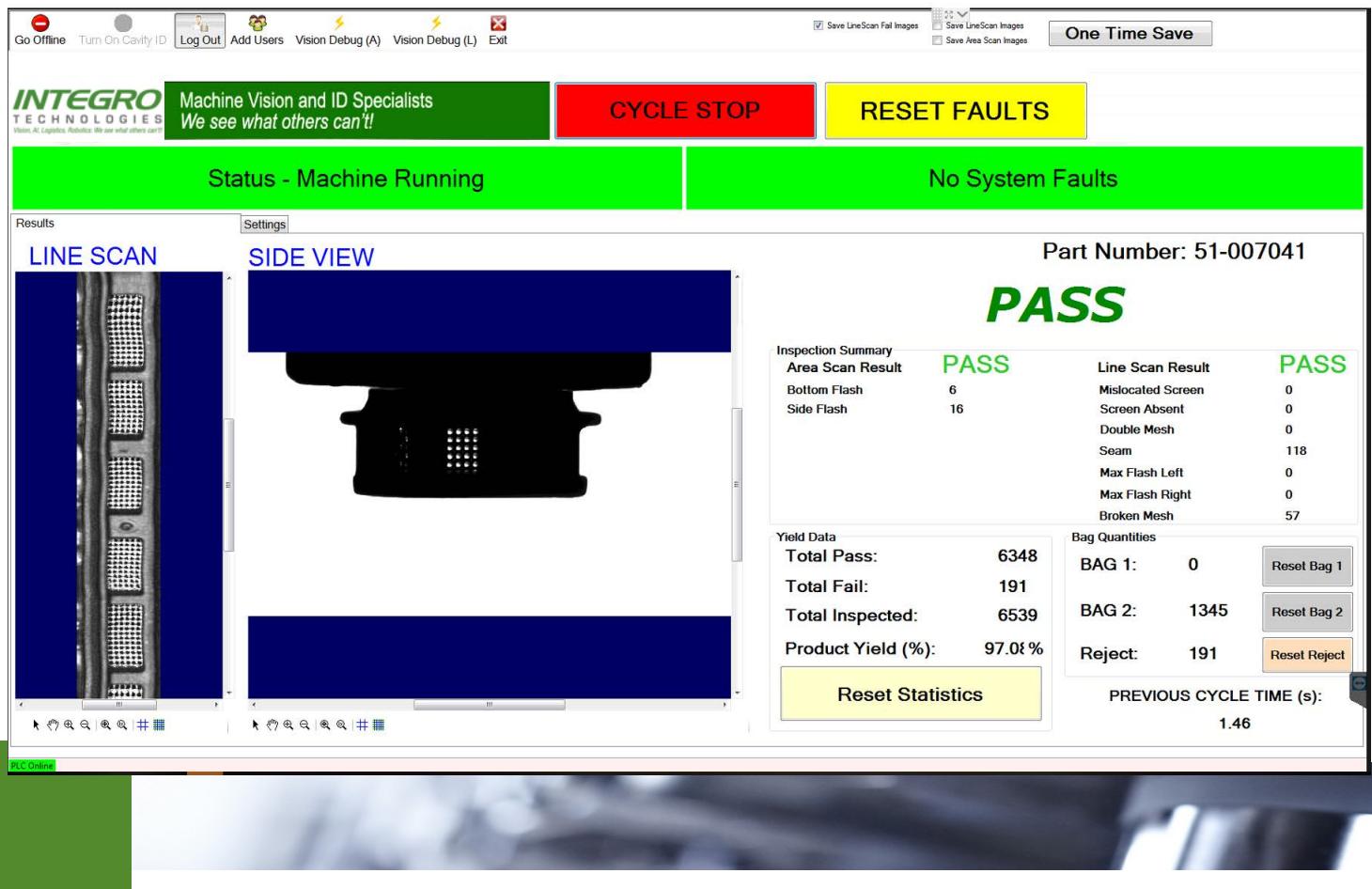


EBC Pump Filter Inspection

The function and purpose of this application is to detect multiple features in an automotive filter for failures. This machine uses a SCARA robot for part handling and uses a line scan and an area scan camera to perform inspections within 1.2 seconds for each part. The part required 100% profile inspection; 61 area scan images are grabbed and inspected in 0.6 seconds in parallel with the line scan image.

Features:

- Application detects mesh failure modes such as holes, misalignment, flash, double mesh and presence absence.
- Machine detects flash around the part to 0.15 mm and performs acquisition and inspection of 61 images in parallel within 1.2 seconds.
- This solution is a high-speed inspection with a multi-threaded application with 2D metrology and performs 100% inspection efficiently.
- Small mm/pixel value ensures highly accurate and repeatable measurements.



Medical Device Bag Measurement and Verification

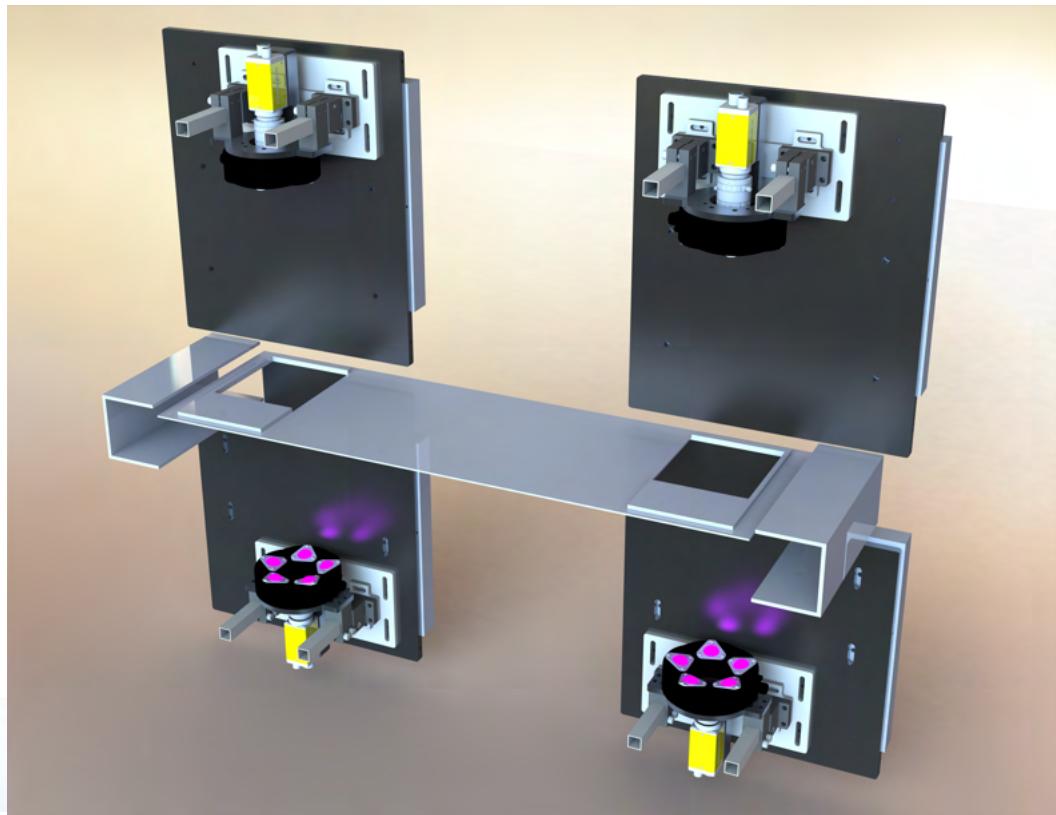
The purpose of this application is to inspect medical bags in web form within the final stations of the assembly process.

Features:

- Two (2) different assembly lines, two (2) stations per line, two (2) cameras per station, eight (8) total cameras
- The two (2) cameras at each station were required to share measurement data to verify the measurements were correct relative to each camera pair.
- High output UV light sources were utilized to eliminate background noise and enhance features of interest to be inspected.

Benefits:

- Replaced an outdated system that inspected a limited number of product features.
- The new system measures and performs an increased number of inspection tasks while improving and increasing user functionality and ease of use.
- System utilizes a single NIST calibration target to calibrate each camera relative to each other for data coordination and offset measurements.

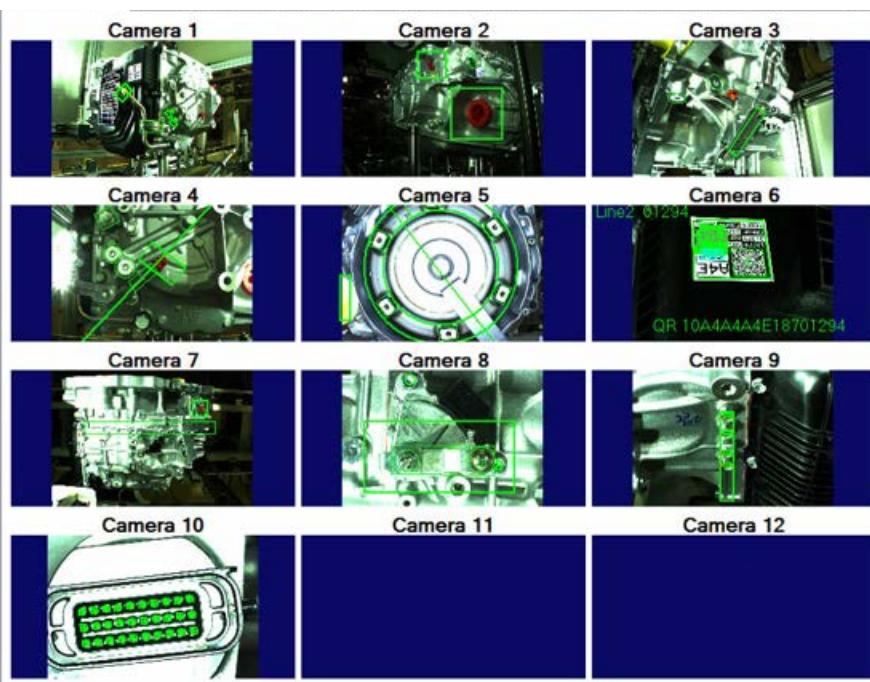


Final Assembly Transmission Inspection

The station inspects and verifies the presence or absence of 47 discrete components/objects per transmission assembly. The system executes the inspection in <3 second (including acquisition cycle).

Features:

- Serialized transmissions are delivered to the inspection station on a conveyor and are inspected using nine (9) independent cameras.
- The serialized code for each transmission is read from the pallet RFID tag.
- All processed image data is assigned to the serialized transmission assembly via a database and the image stored to the central server for archiving.
- The inspection tasks include, but are not limited to, color caps, oil pan plug, connector presence, cable harness routing, bolt/clip presence, QR Codes, etc.
- Creates a mosaic of nine (9) images into a single image for storage and display purposes.
- Production line rate is 45 seconds/part.
- The multiple camera inspection technique can be applied to visually inspect and archive any sized object.
- A similar version of this Integro system has been applied to inspect engines.
- Multiple camera technique is preferred over multipoint robotic systems due to operator and user training requirements.



Automotive Wheel Lug Dimension Verification System

The wheel lug inspection system by Integro Technologies uses 3D-Laser profiling technology to evaluate key measures of refurbished rims that indicate overall rim stability while driving.

Once wheels are loaded into the system, two cameras create 3D height maps of the top and bottom of the lug regions.

Once scanning is complete, customized software locates the serialized wheel 1D/2D barcode, two air stems, backplate planarity, lug hole surface flaws, and other critical dimensional measurements. All measurement data is stored and associated to each individual wheel's serialized barcode number in a database. Finally, the wheels are sorted according to the measurements' tolerances by a robotic cell further down the production line.



High-Speed Tool Bit Inspection System

The Integro high-speed tool bit inspection system processes one part every two seconds. Customer part trays, of multiple configurations, are delivered to the robotic cell through a conveyor system. The trays are stopped on the conveyor, and a high-resolution camera is utilized to locate each part in the tray and provide trajectory information to the first ceiling mounted Yamaha Robotics (YRG) SCARA system.

The robot immediately picks up an individual tool bit and delivers it to an optical-grade glass gauging platform center. The first robot then returns to pick the next part from the incoming tray position. Once the robot clears the inspection area, the part is imaged and inspected using a 21MP telecentric optical system with a collimated illumination source to yield a top down view of the tool bit. The top down view is a high-resolution silhouetted view of the tool bit for gauging and maximum material defect perimeter detection.

The inspection result and part position is communicated to the secondary YRG Ceiling mounted SCARA robot. The secondary YRG SCARA robot will pick up the part and present the first cutting face to a lateral ultra high-resolution telecentric image formation system to gauge and perform perimeter inspection.

The robot quill is then rotated 180 degrees at high speed to inspection the second cutting face of the given tool bit. If all inspections pass the imposed criteria, the part will be loaded into an good exit tray. If the part fails, it will be loaded to a reject tray for further human scrutiny.

The primary and secondary robots are synchronized to eliminate the potential for collision while optimizing kinematic robotic cell performance.



SideWinder Label Inspection

The SideWinder Label Inspection System is designed to perform 100% verification of printed text and graphics at high speeds. The base package provides the ultimate in label rewind technology and surpasses the competition in every performance category.

This base system may be upgraded with any of the other SideWinder product configurations. The SideWinder offers a variety of inspection groups that may be applied in any combination with a default of 10 vision tools per given inspection group. The system has been developed with proven Cognex vision technology.



Features:

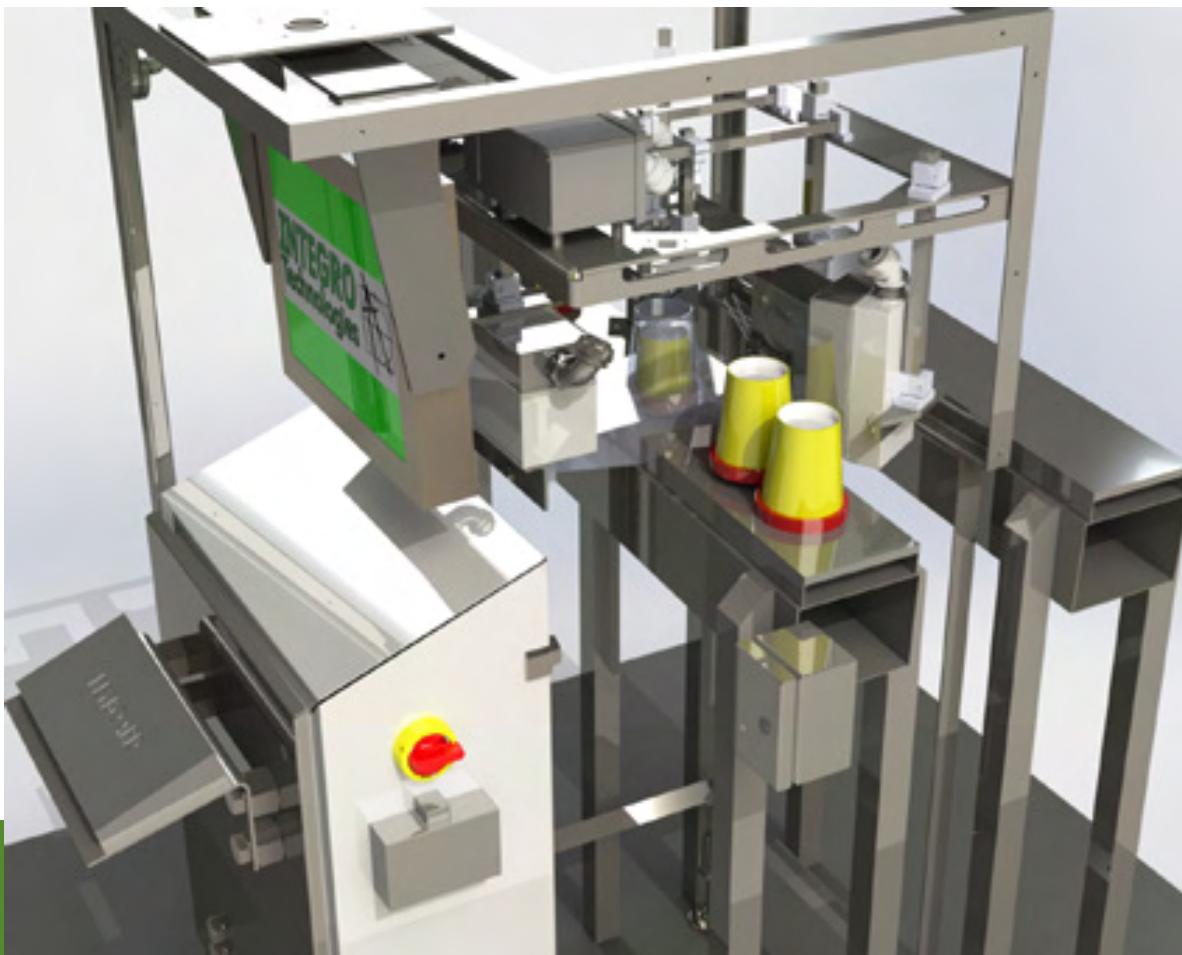
- Automatic web reversal upon detection of failed inspection
- Sets the point for removal by operator
- Uniform rewind of label reels
- Self-tensioning system in forward and reverse
- Automatic and manual operation modes
- Accurate label counting and tracking
- Splice detection and tracking
- Air cores capable of gripping plastic and paper
- Small dimensions (42" X 40")
- Optical Character Verification (OCV)
- Recognizes multiple ID codes: 1D Barcode, Data Matrix (2D Barcode), PDF417 Symbology
- Print Quality Inspection (PQI)
- Optical Character Recognition (OCR)The system can inspect text printed with virtually any printing technology and black or white text on various colored backgrounds. The web width may range from 12.7mm (0.5") to 178mm (7.0"). Label length can range from 12.7mm (0.5") to 406.4mm (16.0")

Container Inspection

This application by Integro Technologies is a 360° inspection of ice cream containers. Customer specification was requested for correct lid on packaging to ensure allergen safety.

Features:

- Inspection of lid to determine if absent, present and correct lid for that type of ice cream
- Recipe driven system that is managed by the end-user
- User management system allows them to add people to the system using their RFID badges
- Up to 400 parts per minute
- Inspection metrics stored in SQL server database
- Fault data stored in SQL server database
- User Login and Logout stored in SQL server database



Cylindrical Bushing Internal Coating Verification and Dimensional Analysis System

This high speed (300ppm) backlight singulation, material handling, rejection tracking and verification system was designed for bulk feeding and orientation of 50 different size parts numbers with three (3) machine vision cameras.

Features:

- Parts vary in height, outer diameter, flange size, coating type, and color
- Automatic system adjustment via linear servos, VFD, and camera inspection programs based on operator selected part number via user interface
- Part changeover takes less than 30 seconds from inspection configuration manager
- Two inspection bins for various defect mode separation/sorting downstream of the three inspection points with data association and applying a modified virtual motion axis tracking system



Tire Guardian Series

The patented Tire Guardian® Series allows the automotive industry to use the most reliable and cost-effective methods to comply with US DOT and other regulatory bodies worldwide.

The Tire Guardian Series is a combination of two different machine vision applications that can be used individually, or in sequence, to assure tire assembly quality from the most common non-compliance issues.

Within 15 seconds, a laser light is projected across the sidewall surface of a rotating automobile tire, and a profile sensor digitizes the circumferential band that contains the DOT Code, Mold Code, E-Mark Code, and other molded-in features.

The outputs are formatted into a video signal, which are transformed onto a computer screen. The digitized tire data is then analyzed by the Tire Guardian, processed, accepted/rejected, and stored for each tire assembly.

Features:

- Patented Technology
- Verifies Rim/Tire Arrangement
- Inspects for Tire Deformities
- 15 Second Cycle Times
- OCR & OCV DOT Data, Speed Rating, Direction, Manufacturer, and Size



Round Disk Surface Inspection

This round disk surface inspection is an ideal vision system for 360 degree part inspection. This vision solution was custom designed to reduce the takt time required for part inspection. Each part is presented to a rotary stand by use of a 2-axis robot.

Once placed onto the rotary stand, each round disk is inspected 360 degrees in 3D form and can be utilized to inspect for an array of items including manufacturing defects and part specific registration marking.

Features include 3D measurement with accuracy of 0.004mm, 100% full part handling, full part inspection, high-speed capabilities and is compact in size.



Copper Fitting Inspection System

This customizable inspection machine offers full verification of part geometry and validation of O-ring placement and seating. Press-fit copper fittings are growing in market share for their ease of installation.

From residential to industrial, these fittings are becoming common-place and offer peace of mind upon proper installation with lifetime guarantees.

Our inspection cell ensures that each part matches the configuration specified by the operator as well as ensuring that each press-fit O-ring has been properly placed inside of the press-fit bead.

Features:

- 100% full part handling
- Full part inspection
- High-accuracy and customizable to client needs
- On-site and remote support



Metal Web Inspection

This application inspects six-inch webs of aluminum bonded to steel. A strip of metal is bonded, sanded, and coiled into a roll. The web, held tautly between rollers, passes through an Integro inspection station.

High resolution, line scan cameras inspect the material top and bottom, lit by low angle lighting.

Burrs, dents, scratches, discoloration, foreign material, paint, oil stains, and splices can be detected, triggering an alarm and/or marking the material.

Features:

- High-resolution images of a web
- Images displayed on large monitor for operators to keep track of the process
- Storage of fault images for possible process improvement
- 45 feet per minute



Ink Jet Labeler Machine

The system enables the end-user to print text or a label on a full tray of parts at high speed, while also providing a detailed inspection of the print quality on the part. The ink jet printing process consumed 30 minutes of process time. This solution allows the process to be completed in 30 seconds with a higher level of precision.

Features:

- User interface includes statistical data display of inspection results with part images and pass/fail criteria which allows for modification of tolerances.
- Power roller conveyors progress the trays through the system without damaging them.
- Cartesian robot (x, y, and z axis) allows the ink jet print head and camera to be at the correct locations with different part height range.



Web Registration Inspection System

This vision system inspects a number of different web width and print characteristics, perforations, or patterns to be located and offsets calculated. An operator interface has been designed to provide an easy to use pattern-training wizard to handle new part numbers or SKUs as they are added to the manufacturing process.

Features:

- Linescan
- Web Registration
- Perforation Detection
- Perforation Registration
- Registration Mark Feedback

Benefits:

- Replaces low accuracy photo-eye sensors that are easily confused with changing patterns/back-grounds.
- The system provides high accuracy feedback as to the location of the registration/perforation marks for automatic adjustments.



Manual Line Scan Station

The purpose of this application is to identify damaged product during or after the manufacturing process, prior to delivery to customers to prevent product recalls and product damage (for example: oil leaks).

This application inspects transfer case seals for damage or tears. It could be easily repurposed to inspect any large circular parts that need to be inspected on multiple surfaces. This is an operator-driven inspection cell, but automation can be easily implemented with the addition of a two-axis robot.

This machine was designed to utilize two (2) Cognex 3DS topography vision systems to inspect for flashing, debris, surface damage, or other miscellaneous defect types on an O-ring seal used in most transmission transfer cases. If no failure is detected, the machine uses vision guidance to orient the part in front of a Keyence laser marker which applies the Julian date that the part was manufactured. This operator driven system uses two (2) Yamaha servos, Safety Light Curtains, rotary servo, and laser marker.

Features:

- User interface that depicts product damage that cannot be seen by the human eye
- Statistical data storage for analysis of manufacturing process
- Automated laser safety door for faster cycle times and less operator interaction



High Speed Syringe Vision Inspection System

This high-speed syringe vision inspection system is a six (6) Cognex In-Sight camera solution inspecting for cracks in the barrel of a syringe. This solution would be applicable for fill-level inspection as well as plastic contamination.

Features:

- VisionVault capable
- MS Active Directory Authentication
- In-feed screw to meter the spacing of the syringes
- 300 parts per minute
- High speed rejection with reject verification sensor and machine stop
- Stainless steel construction
- StrongArm® HMI with 360° access

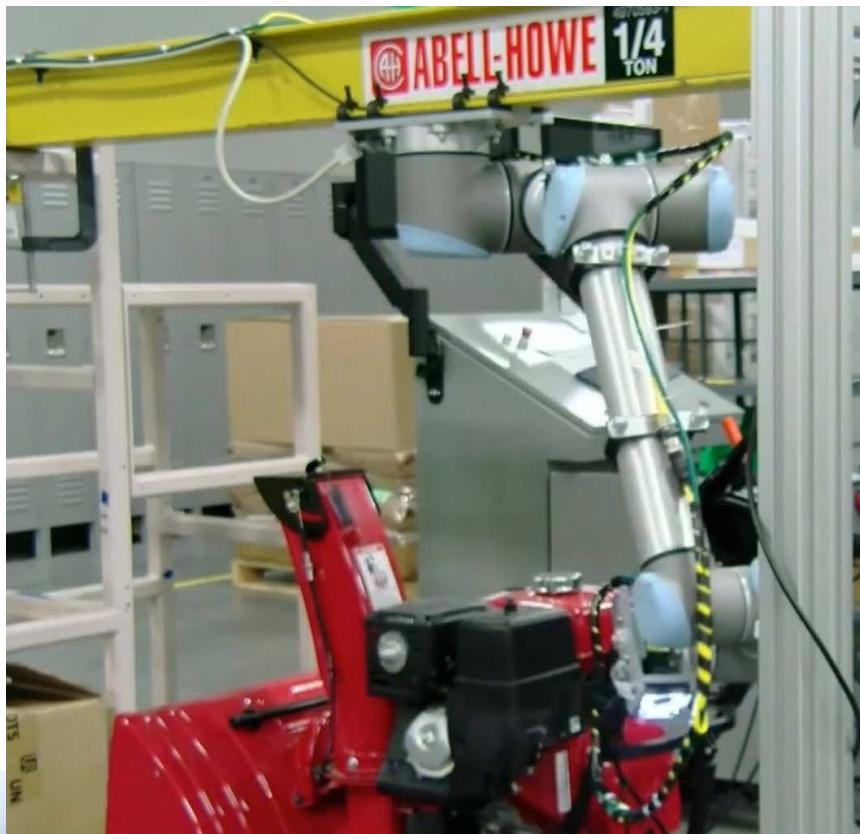


Snow Blower Inspection

This application inspects snow blowers for a Fortune 500 manufacturer. A Cognex In-Sight camera is on the end of a Universal Robots cobot. The robot moves the camera around the snow blower into different positions in order to inspect all of the decals and logos on the blower.

Features:

- UR-10 robot to move camera in different positions and Cognex In-Sight camera takes images from 14 different positions.
- Robot positions and camera job recipes are modifiable to run a large number of product types.
- Eliminating the need for multiple cameras to inspect product on a moving production line.
- Able to add recipes to run multiple product types.
- Performs inspections with 1 camera that would normally require many more.

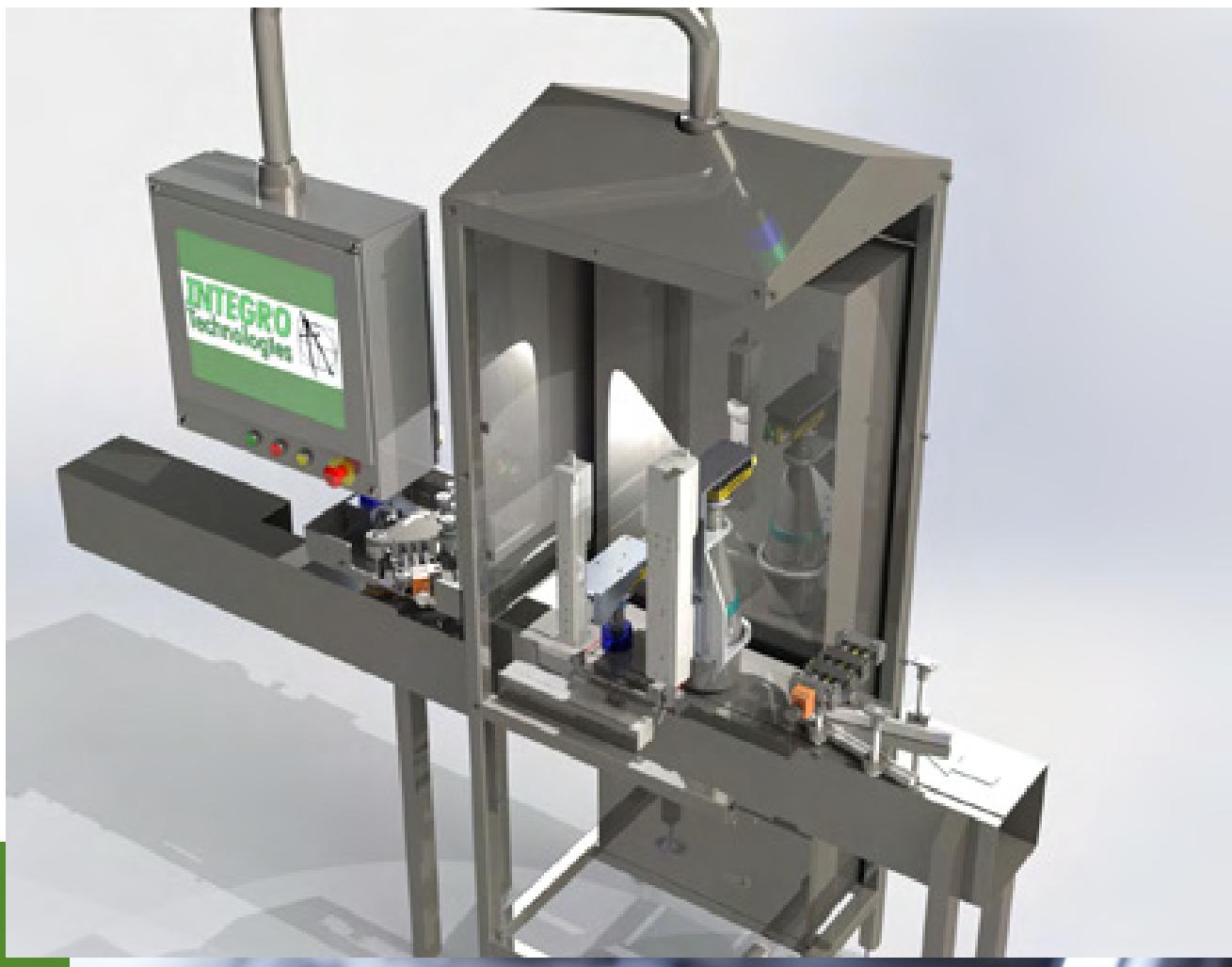


Glass Jar Foreign Material Detection System

The system evaluates a glass jar with a 360 degree view for small cracks in the rim, cracks running along the side wall, cracks in the bottom, and foreign material such as cardboard and glass shards at 120ppm.

Features:

- Foreign material and glass shard optical detection.
- Automatic camera and image formation adjustments via linear servos for various part configurations via a single user interface.
- The camera positions, as well as the trigger sensors, are servo controlled to deal with differing diameters. They move automatically by an intuitive recipe selection. Recipes are very easily added, modified, and implemented.
- System has a custom stainless steel structure and backlit conveyor solution for installation into an existing or new production line.



The Raptor: 2D and 3D Precision Measuring System

Utilizing a combination of software, optics, and ultra-high resolution image formation technology, the Raptor is a single solution for precision 2D and 3D measuring. Materials can be measured from a wide variety of industries including Aerospace, Automotive, Military, Medical, Plastics, and Electronics. The Raptor is designed with exceptional optical capabilities in a single system for efficiency, accuracy, and cost-effectiveness.

Features:

- Gauging accuracy of 0.01mm
- 100% automatic inspection
- Inline capable
- Single target calibration procedure
- Database archiving for analysis
- Stand alone inspection station



Bullseye Rapid Tube & Lumen Inspection System

The Bullseye Rapid Tube & Lumen Inspection System is designed to measure the outer diameter (OD), inner diameter (ID), wall thickness, concentricity & ovality, and other key parameters to pre-determined performance specifications. The system can inspect clear, colored and opaque tubing, and includes a rotary table that can be used to measure multiple product configurations.

The Bullseye Inspection System provides easy to use inspection software coupled with a variety of inspection options that may be applied to meet or exceed the client's visual inspection requirements. The system is capable of a point to point accuracy of <0.0005 inch, and can interface with SPC/SQL packages to track defects and key performance indicators.

Features:

- Automated product configuration via carousel
- 15 carousel product guides 0.030 thru 1.50 inch diameter
- Graphical representation of key product metrics
- Interfaces available for SPC/SQL packages
- Designed to meet Clean Room requirements
- Ultra high accuracy image resolution
- Image storage of failed product for QA review
- Customizable HMI based on customer requirements



Anode/Cathode Pick and Place Calendering Machine

At a production rate of 40 parts per minute, the machine can pick and place a full cassette of 600 parts in 15 minutes. Once the machine is loaded, the machine does not require operator intervention. The user interface includes statistical data of inspection results with corresponding part images and pass/fail criteria.

Features:

- The machine can be manually loaded with a number of cassettes, to minimize operator interaction.
- The machine utilizes two high-speed Yamaha Robotics YP series (X & Z axes) to pick-n-place cathode/anodes from the new part cassette and places them on the calendar system.
- The second Yamaha Robotics YK system pick-n-places the parts from the calendar back into the cassette system.
- Two elevator system utilizing linear servos optimize performance by minimizing the vertical travel of the robot system by incrementally raising the cassette stack per machine cycle with Keyence displacement sensor feedback.
- All cassette are tracked using RFID system.
- Venturi vacuum conveyor system allows for complete control while the part is on the end of the arm of the robot.



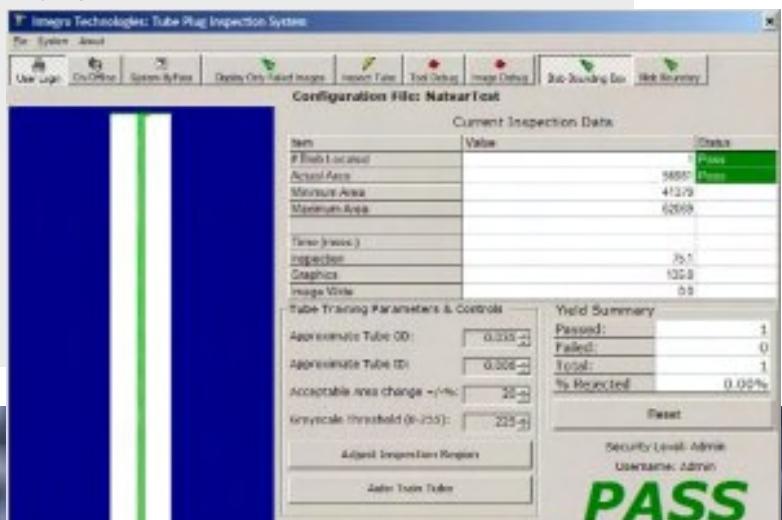
Anaconda Tube Inspection System

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Features:

Sample Industries:

- Medical Tubing
 - Industrial Cable/Wire
 - Rubber Tubing
 - Extrusion Processes
 - Web Processes

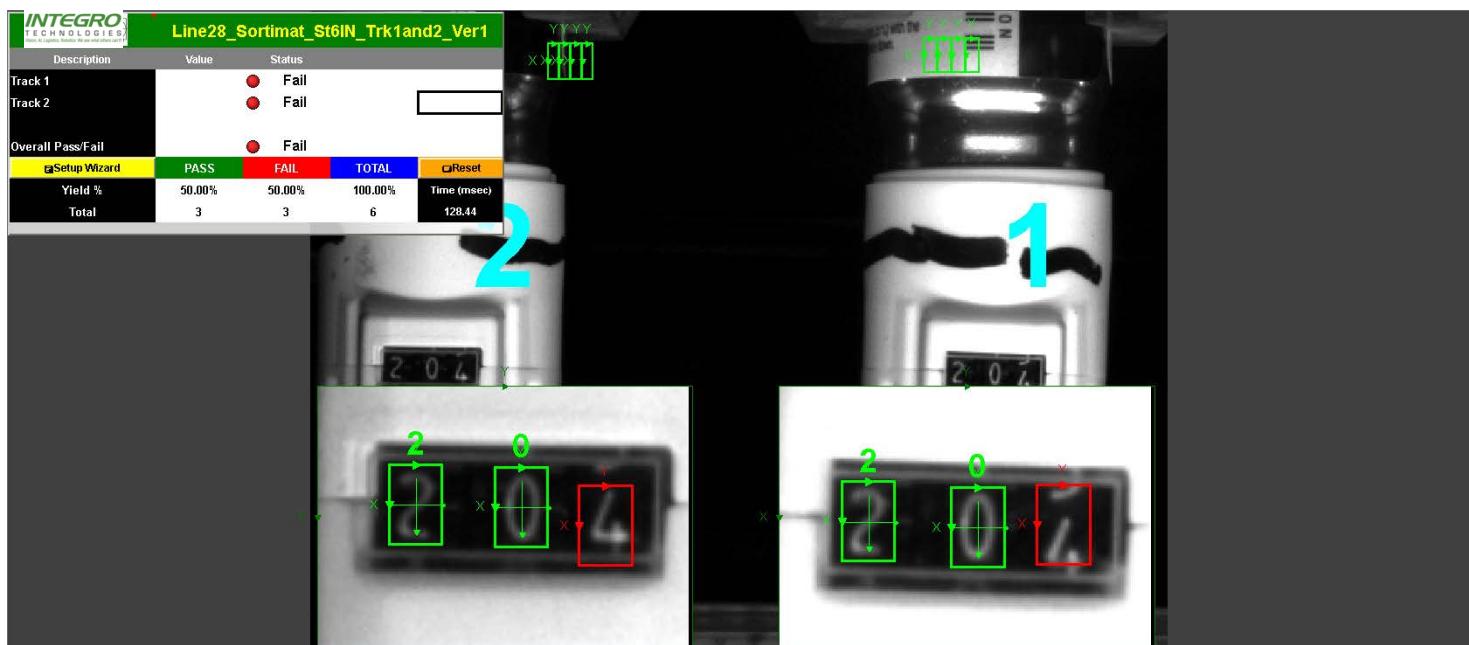


Medical Device Inhaler Incremental Counter Verification

The purpose of this application is to verify that the correct three digits are present and aligned on the incremental counter on a medical inhaling device and to authenticate assembly completion. The incremental counter digits represent the number of device dosages that remain within the medical device.

Features:

- Multiple inspections methods are deployed within a single program.
- Custom lighting solution permits the incremental counter digits to be visualized through a molded plastic window within the device.
- System was integrated into an OEM rotary machine control system that assembles the medical device, tracks, and rejects the product at designated stations.
- The solution reduces the risk of a potential recall due to assembly verification of counter digits and active system actuation.





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