ABCO AUTOMATION

CASE STUDY

VISION INSPECTION SYSTEM

FOR A LEADING

SPECIALTY CHEMICALS AND HIGH-PERFORMANCE CARBON MATERIALS MANUFACTURER

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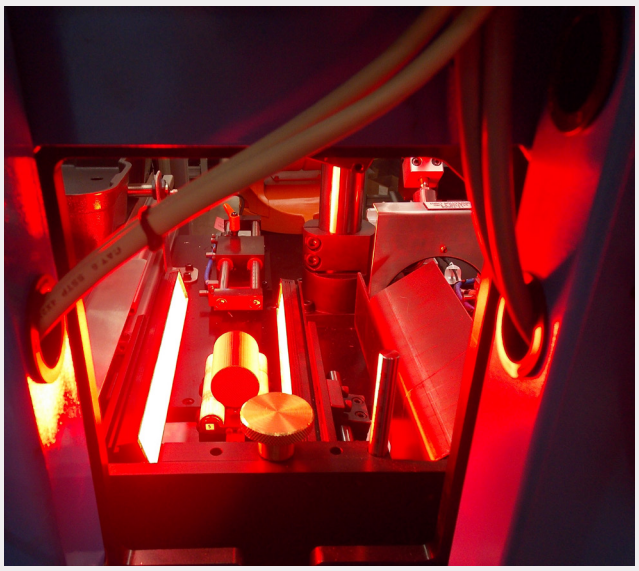
INTRODUCTION

A large southeastern manufacturer produces specialty chemicals and high-performance carbon materials for a variety of applications, including asphalt paving, oil exploration and production, agrochemicals, adhesives, lubricants, printing inks, and automotive systems.

As the frontrunner of EVAP canister manufacturing, the company must constantly deliver a high quality product. To help achieve this, the company's representatives contacted ABCO Automation to design and build a robotic inspection system that could quickly and consistently inspect carbon canisters. This system would discover and reject any defective canisters, eliminating non-conforming product from entering the marketplace and reducing the potential for gasoline-powered vehicles to leak hazardous air pollutants. In addition, with a vision inspection system, the company can realize the following benefits:

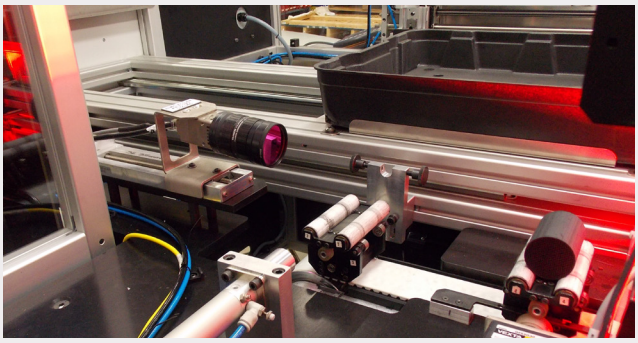
- Increased uptime with consistent workflow—determining a product's pass/fail product status is seamless
- Reduced expenses by cutting operational costs associated with returned goods
- Improved customer service by reducing warranty claims



ABCO VISION EXPERTISE

For over 15 years, ABCO Automation has been a vision systems integrator for some of the world's leading camera manufacturers and vision software developers. Practical experience has enabled ABCO to deliver high performance systems that help manufacturers gain knowledge and empower change. ABCO machine vision systems have helped improve the quality of manufacturing and output by eliminating defects, verifying assembly, and tracking information at all production stages. And, these systems have been used in a wide range of applications from parts orientation and product assembly to large material handling and label inspection.

With a vision system, manufacturers receive a constant stream of information by capturing images of specific manufacturing process functions. From the data gathered, the vision system can make decisions, generally pass/fail, on operations needing an analysis.



ABCO uses a wide range of cameras, lenses, lighting, and software to a create vision system that not only provides a customized solution but offers the best performance for the cost. From a stand-alone, single camera cell to a comprehensive vision inspection and automation system with multiple cameras, an ABCO vision system meets the most challenging needs. And, when asked, a feasibility study can be conducted to prove out the solution before the design build process begins.

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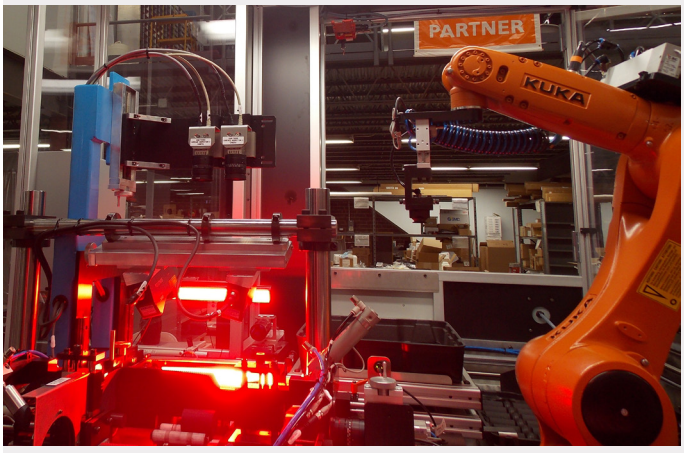
VISION SYSTEM APPROACH

ABCO introduced a semi-automatic process where an operator works in conjunction with a robot, camera, lighting system, software, and transfer mechanisms. ABCO selected Cognex's Vision Pro Software to capture images from six different cameras. To perform the vision tasks, ABCO used several functions within the Vision Pro tool library, including:

- **Measure geometry**—measure distances, angles, and intersections
- **Blob analysis**—measure area, size, shape, and other geometric properties
- **Fixturing**—position tools dynamically based on location tool results

ABCO mounted a camera above a Kuka KR6 900 six-axis robot to view a tray with two canisters and capture the canister's location. After receiving location information, the robot picks up two canisters and places one onto the inspection station rollers; the canister automatically rolls around on its longitudinal axis.



ABCO added two area array cameras above the inspection station to perform a surface inspection, looking for edge chips, skin splits, damage, air bubbles, and pin holes. In addition, a fourth camera views the filter across its length; the software uses the images to determine a "bowed" condition and a length calculation.

In the next vision sequence, the robot picks up the first canister from the rollers and drops the second canister onto the rollers. The robot picks up and presents the first canister's end to a fifth camera for inspection. The camera performs a face inspection, looking at/for the flat side, out of round, face cracks, split cells, distorted webs, rough face, and diameter calculations. The robot moves the canister and presents the other end to the sixth camera. The process repeats for the second canister.

Vision Pro Software processes images, captures data, and provides the robot with pass/fail feedback. The robot places canisters that have passed inspection into their matching part type tray and places canisters that have failed into a matching part type tray.

COMPONENTS

- Infeed tray conveyors for full and empty trays
- Pneumatically actuated tray transfer mechanism for emptied trays and filled trays
- Empty tray chute
- Six-axis Kuka KR6 900 robot with KRC4 compact controller
- Two-up suction cup end effector
- Camera mounted above robot (location)
- Canister rotating tool
- Five area array vision cameras for product inspection
- Five lighting solutions for inspection cameras
- Five manual micrometer slides
- Reject tray station
- Filled tray chute
- Two PCI-bus based frame grabbers
- Two PCs and monitors for vision interface
- Vision Pro Software
- Enclosure with Ethernet processor
- Operator interface with touchscreen in machine-mounted enclosure
- Safety circuits
- Control system

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