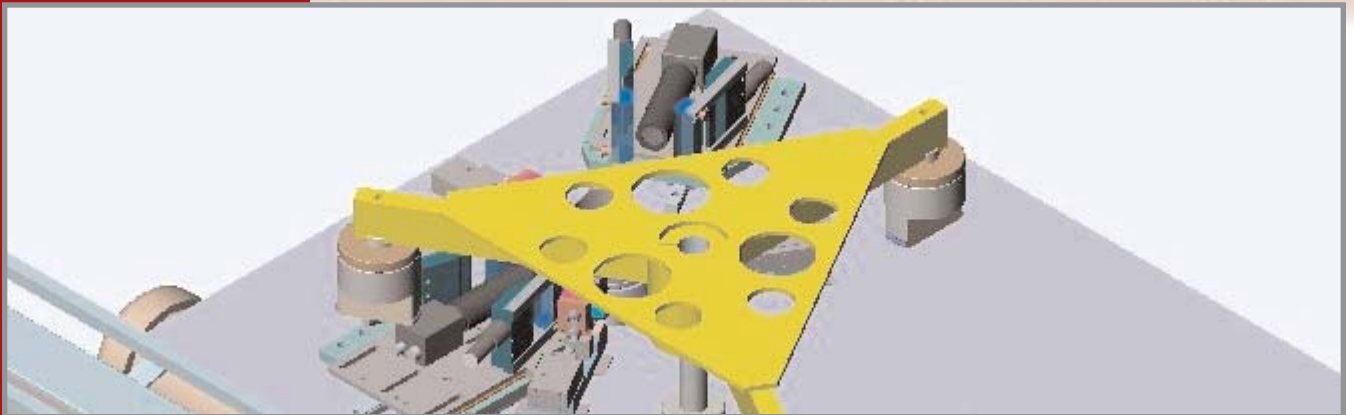


# Application Report

Automated Piston Assembly Inspection



## The Application

The Automated Vision Piston Assembly Inspection System has been designed to inspect piston heads for a number of characteristics such as ring defects, stamping, skirt coating, and presence/absence of component parts. This system provides a complete integrated solution in the form of a proprietary Vision System, the Control System, and Material Handling Automation.

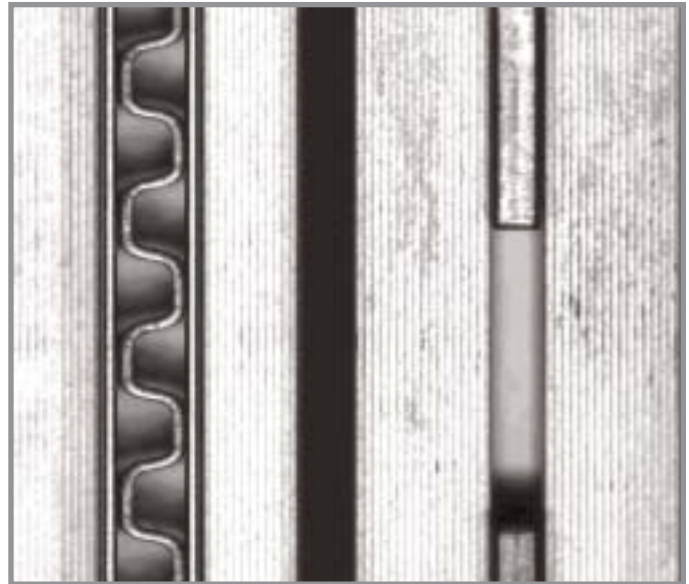
In this particular application, the Automated Vision system had to be capable of meeting certain criteria. The inspection cycle for each piston head was 3.1 seconds. Each piston was transported on an input conveyor, and after inspection had to be automatically sorted and transported based on inspection results. The Vision system had to store the inspection data and share the data across a network. In addition, the floor space for the hardware was limited to 40 inches x 60 inches.

The Automated Piston Assembly System had to have the capability to inspect for:

- head stamping and stamping location
- presence of and location of of compression rings
- presence and orientation of expander ring
- presence and location of anodizing
- presence and location of skirt coating
- broken or missing parts of compression rings

## Expander Ring Rails

## Compression Ring



## Solution

Automated Vision provided the stand-alone hardware configuration to accept multiple cameras allowing the system to simultaneously inspect different attributes of the piston. The IDAS Vision System processes and displays the results of the multiple camera inspection.

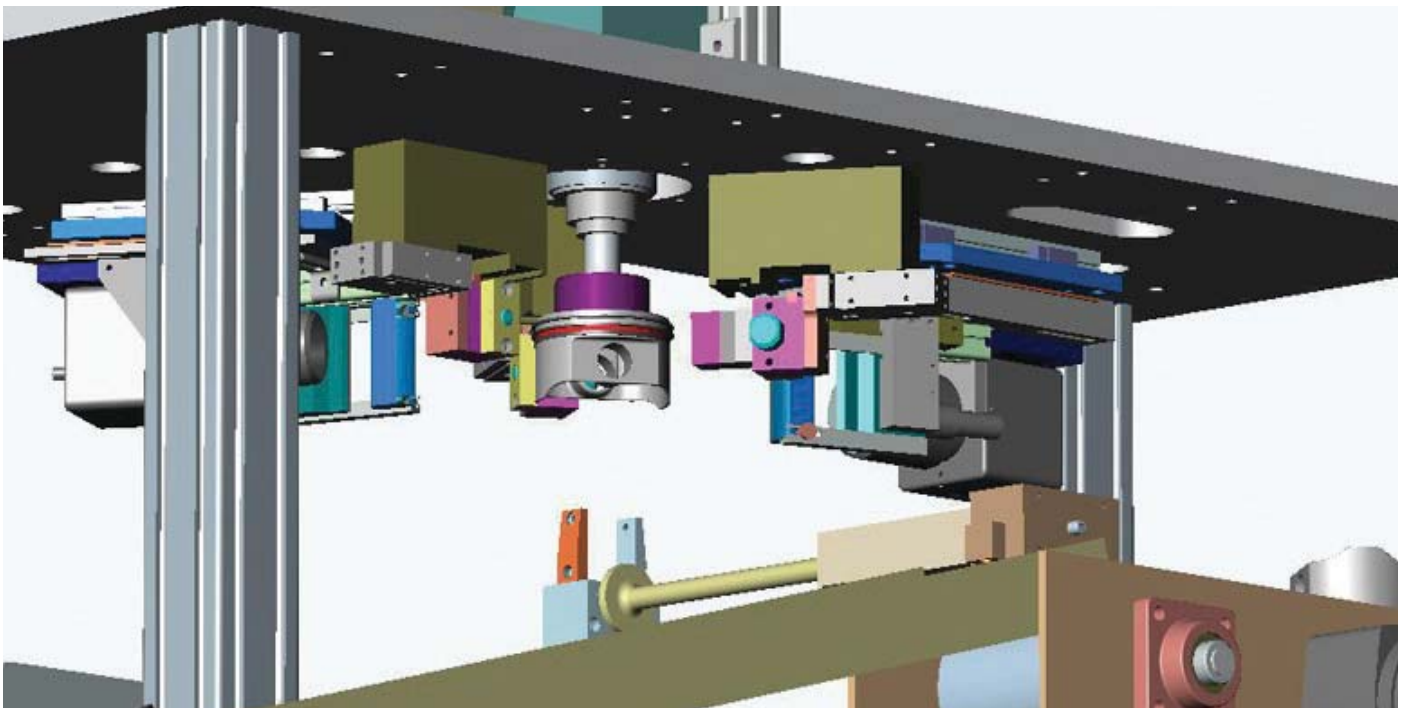


Diagram of typical inspection components



The Controller provides the timing sequence for the inspection, sorting and handling of the pistons.

One CCD camera provides the IDAS Vision System with the image used to determine the presence and absence of compression rings, and whether they are in the proper location. This CCD camera also provides data to determine the presence and orientation of the expander ring and the rail rings.

A second CCD camera provides the image used to determine the presence or absence of anodizing and the presence and condition of the skirt coating.

Finally, a CCD camera is positioned to collect data allowing the IDAS Vision System to determine head stamping presence and location. The IDAS Vision System is also able to determine whether there are foundry and machining defects per ARL standards. Once the individual inspection is completed, the Accept pistons are placed back onto the conveyor, and the Reject pistons are placed on a reject conveyor.

Before installation the system was cycled and debugged off-line to ensure proper operation immediately upon site installation.

### **Part Presentation**

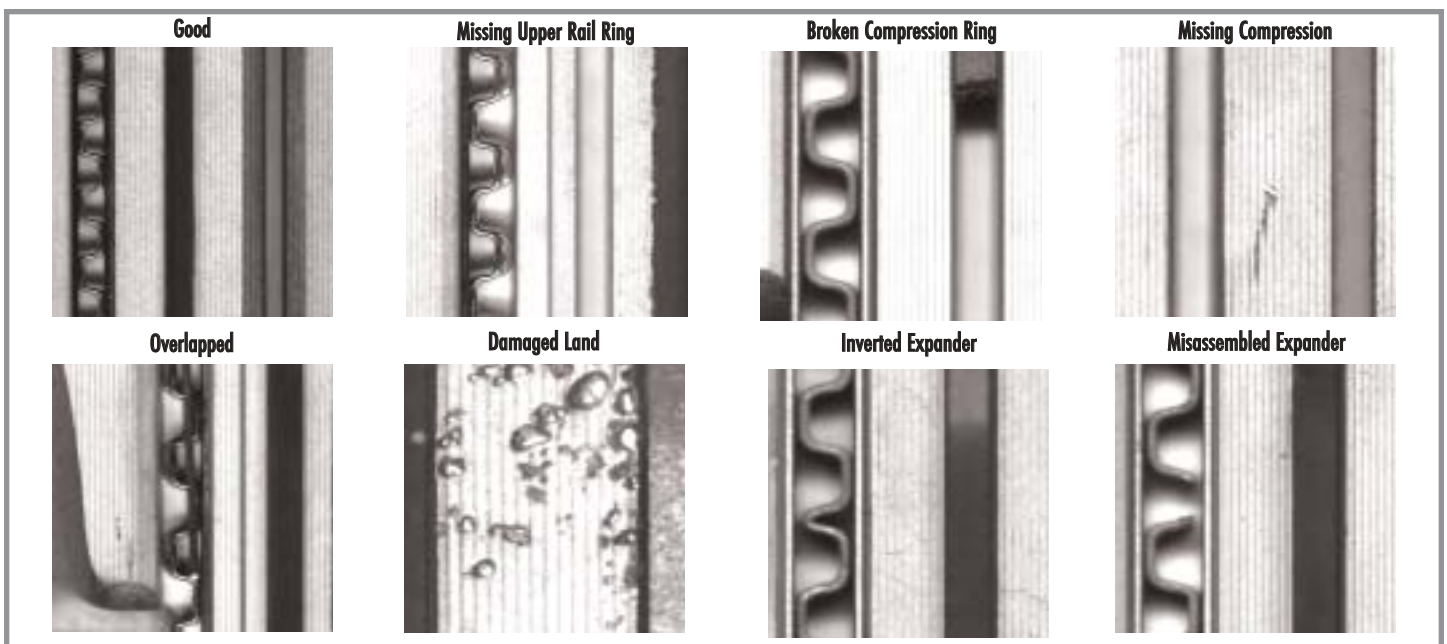
Automated Vision provides a total integrated process including lighting, optics, and product positioning for optimum product imaging. The controller provides all signals and timing necessary to handle the piston parts throughout the entire inspection process.

### **Image Acquisition**

We applied our vast experience in high speed image acquisition and configured the detection resolution necessary for the application

When the IDAS Vision System detects a piston that does not pass all inspection criteria, it places the piston on a reject conveyor, and proceeds to the next component.

All inspection data can be stored and shared on the network.



Types of irregularities automatically determined by IDAS Vision System

## Typical System

Automated Vision developed the optimum system configuration for the piston assembly inspection application.

## Vision System

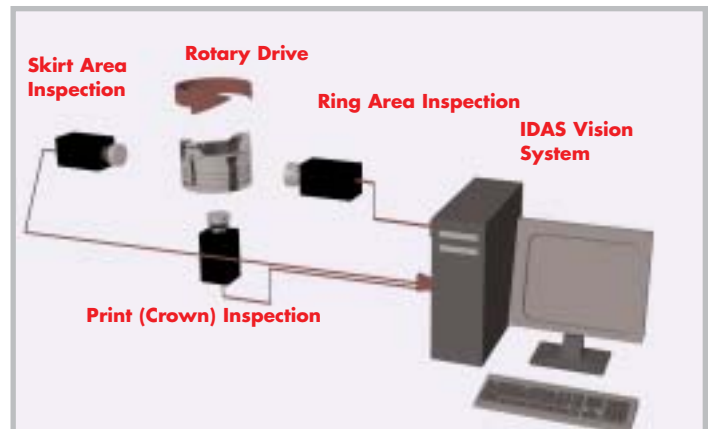
- Vision Processor
- High resolution linescan CCD cameras
- Area scan CCD camera
- Piston inspection software
- Windows NT Operating System
- User interface
- Measurement Algorithms

### Control System

- A/B SLC500 or MicroLogix PLC package
- PV550 operator interface
- Servo and/or AC,DC drives as required
- Electrical enclosure

## Piston Handling Automation

- Stand-alone inspection base and supports
- FlexLinkXM - integrated In/Out pallet stops
- 3-position piston transfer cam-indexer with profile grippers
- Piston centering assemblies
- Precision mounts for three fixed CCD cameras and applicable lighting
- Station #1 Precision driven vacuum chuck
- Static fixture
- FlexLink XM - integrated Reject pallet



Automated Vision is a leader in providing total vision system design and implementation. We specialize in the development of all aspects of speed critical systems providing you with turnkey solutions to your machine vision applications.

- image analysis
- material handling
- part presentation
- data handling
- Statistical Process Control
- installation and training
- Automatic e-mail alerts
- Remote support

By providing you with a completely integrated solution, Automated Vision ensures that all aspects of your machine vision application perform seamlessly in your environment without the requirement of additional resources.

A comprehensive library of image processing algorithms shortens the time from application definition to vision solution, putting your system on-line in the shortest possible time.

The Imaging Development and Application System (IDAS) is designed on the familiar and dependable Windows operating environment.

Automated Vision is your most effective approach for the necessary knowledge and experience to total integrated vision application solutions for quality manufacturing in:

- Automotive
- Electronics
- Industrial
- Paper
- Pharmaceutical
- Medical.

