4800 Series
Automatic Optical Inspection System

Automatic Optical Inspection Systems (AOI) offering extended inspection and process monitoring to the electronic manufacturing industry

- Detection of reversed and incorrect components
- Detection of solder shorts and blow holes
- Detection of bent or missing connector pins
- Detection of mechanical devices
- Allows for acceptable component variations in manufacturing
- Search, blob, caliper, position, OCR and Laser height tools available
- Up to 12 camera positions
- Color camera option available
- Networked repair and off-line programming stations
- In-line and off-line handling versions
- Manual and In-line versions available
- Easy to programme using a point and click user interface

Introduction

The 4800 series of Automatic Optical Inspection (AOI) systems are designed to complement IFR's series of electrical test systems to offer the user even more choice in terms of test strategy and process monitoring.

The AOI systems are available in four versions, the 4805, 4810, 4820 and 4830. Each variant of the range is targeted at a different manufacturing requirement and inspection problem from small batch production to high volume. The use of AOI machines complements the traditional electrical inspection process and extends confidence in the build quality to cover areas such as: connector type and color, bent or missing connector pins, color of LEDs, heatsinks, nuts, bolts, screws, labels and other mechanical parameters.

4805

The 4805 is an in-line fixed camera position unit with up to 12 cameras. This system is mainly used in low and medium volume applications.

4810

The 4810 is a manually loaded X-Y system with up to 12 cameras above, below and on the sides of the unit under test. This is a very flexible system which allows for board sizes up to 0.6 m square and it is a simple task to change product types.

4820

The 4820 is a fully automatic in-line version with up to 12 cameras above, below, and at angles to the test subject.

4830

The 4830 is a distributed system which is intended for factory floor use in many areas of industry. Up to 12 cameras with one controller are distributed in the production line for any type of inspection.

System Overview

The 4800 series control executive integrates industry standard vision libraries from Cognex. The operator and programmer interfaces have been designed to make the operation of the 4800 series as simple but as powerful as possible.

The 4800 series can accept input from CAD data if available. However an important distinction is that (unlike many other vision systems), CAD information is not essential in order to generate the test programe. The benefit is the 4800 can test for any object and is not restricted to objects in the CAD data. Also components such as conventional capacitors which can have acceptable differences in color, markings and angle of placement can be tested using the 4800 series multi-accept cryteria to allow for such differences.
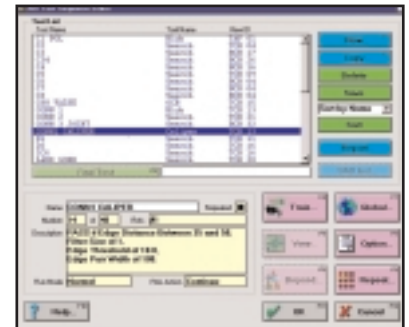
Programming Interface

A full SQL database for Pass/Fail data collection is standard on the 4800 series. Bar-code readers, off-line programming and repair stations as well as a full SPC package are available as options.

The 4800 series is quickly proving to be an industry leader due to its high speed, reliability, robust performance, ease of programming and use, coupled with an extremely competitive price. All the 4800 series users so far have reported outstanding results and are now generating and supporting their own vision test

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programmes.

The 4800 series operator interface is very simple to use and no previous vision or software experience is required. It is totally 'point and click' based with the only text input being the name and value of the component you wish to test. Password control allows different levels of operation from testing only at the operator level, to programme generation at the supervisor level.

Each 4800 series is fully commissioned on the customers site and can include maintenance, operator and programmer training.

Vision Inspection Tools:

The 4800 AOI series provides vision test tools which are used by the programmer in order to generate a test sequence for each board type.

The Search Tool

The Search tool is used to match a 'Gold model' to the test image inside the Search Area. A result percentage match is returned and tested against the test limited for a pass or fail output. It can be used for detection of missing, misplaced, reversed, incorrect and wrong color of components.

The Blob Tool

The Blob tool is used via a simple interface to test for various errors including shorts, missing or bent sockets and pins, labels and reversed components.

The Caliper Tool

The Caliper tool is a gauge, it is used to measure distances between and across objects. It can also be used for component height measurements (if side cameras are used) and for detecting bent connector pins.

Position Tool

The position tool returns the X - Y co-ordinates. Its main use is to detect component placement error or slew and to ensure labels or mechanical components are located in the correct place.

OCR

The OCR tool (Optical Character Recognition) is available on the 4800 series as an option. This tool is used for 'true' character recognition when testing for correct labels and component types.

Laser Height

The Laser Height option is used to accurately measure the height of components and items such as connectors, washers, nuts, bolts, etc.

Specification (Example 4820)

General

Dimensions including conveyer
2065 mm wide, 1460 mm deep, 1700 mm high.

Footprint excluding conveyer
1480 mm wide, 1460 mm deep, 1700 mm high.

Weight
1,200 kg

Power requirements
Single Phase 220-240 Vac @ 16 A

Operating temperature
5 to 35ºC

Storage temperature
-20 to 60ºC

Operating humidity
RH 75% or less.

Storage humidity
RH 75% or less.

MTBF (measured)
>2000 hours.

Maximum UUT size
480 mm long x 320 mm wide.

CE Marked

PC Configuration

450 MHz Pentium III, 256 MB Ram, 800 x 600 resolution
graphics card with 65,536 colors, 10 GB hard drive.
x32 CD ROM, Windows 95.

Hardware Features

Service
Easy access electronics service tray. Easy to remove interlocked front panel with viewing window. Removable rear panel.

Status
4 position light tower indicating machine status

Viewing
1050 mm x 525 mm removable window.

Cooling
3 mains operated fans.

Safety
3 emergency stop buttons, front panel interlock, hardware and software motion limit switches, 4 RCD trips.

Other
Modem, Network card, Light pen, Parallel printer port, Zip drive, CDROM, 19" color monitor, monitor and keyboard support arm.

Cameras
Monochrome 2/3" CCD chip, 760 x 576 pixels.

Lens type
50 mm lockable, C mount, F1:1.8

Area of PCB acquired per move
25 mm x 20 mm x No. vertical of cameras.

Resolution
33 µm per pixel.

Number off
Up to 12, 8 as standard.

Image memory size (high res)
440 kb per image. Image memory size (low res) 110 kb per image.

CONVEYOR

Conveyor type
3 stage, left to right feed, front rail fixed. SMEMA International Standard 1.2

Positioning
Automatic board stop and alignment system. Control PLC and PC logic.

Safety
Fully interlocked and emergency stop buttons.

Load/unload time
<4 seconds

UUT requirements
5 mm clearance on two parallel under side slides.

MOTION

Motion type
X-Y linear.

Speed
2 m/second maximum, 0.5 m/second as supplied.

Control
BAi controller/amplifier via PC serial ports.

Positioning accuracy
2 µm repeatable per stage, <20 µm in X-Y configuration.

Ramp rates
Programmable, factory set to suit camera load.

Safety
Hardware and Software limit switches plus emergency stop buttons.

Software

Standard vision tools
Search, Blob, Caliper, Position, Fiducial realignment and Prompt.

Optional vision tools
OCR, Laser height.

Calibration
Calibration hardware and software supplied.

Databases
SQL test and machine fault databases, Calibration manager, Event view logger.

Operation
Test executive, Test executive editor, Option scheme editor, Step and repeat editor, Global parameter editor.

Utilities
File backup, PC Anywhere.

System Performance

Fault detection capabilities
Component absence, Solder excess, Solder lack of, Solder short, Solder ball, Solder dry/non wetted, Lifted leg, Tombstone, Blow hole, Reversed component, Placement error, Mechanical component damage, Raised components, Incorrect part, Component Slew, Component value (OCR), Component height (Laser), Incorrect Color of component (Color camera required).

Speed by area
50 mm x 20 mm x number of parallel cameras per second.

Speed by test
1-40 tests per second, typically 10-20 per second.

OPTIONS
Additional monochrome cameras
Networked quickfind Repair Station (excluding PC)
Networked Programming Station (excluding PC)
SPC Tool
OCR Tool
Laser height measurement upgrade
I-Base[4] information management system

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