Imaging Diagnostics
Total vision solutions

Exerra Case Study: USB a superior choice for Industrial Applications

Imaging Diagnostics offers reliable and durable vision systems based on USB 2.0 technology. These systems are capable of withstanding intense industrial conditions, to ensure high work flow, efficient throughput and cost effectiveness.

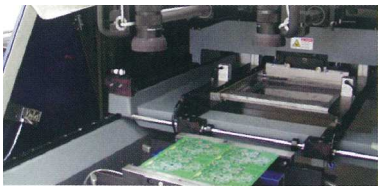
Background: Printed Circuit Boards

Printed Circuit Boards are used in virtually every electronic device today, from cellular phones and personal computers to industrial and medical machinery. A 60 billion dollar market, Printed Circuit Boards or PCB are commonly designed using surface mount technology.

Surface-mount technology (SMT) is a method for constructing electronic circuits in which the components are mounted directly onto the surface of PCBs using soldering paste. The soldering paste deposition utilizes a screen printing process with a stainless steel or nickel stencil. Precise alignment and amount of solder paste is necessary for functioning circuit boards.

Problem: Maintaining High Performance in Harsh Industrial Conditions

Solder inspection is one of the most complicated machine-vision tasks primarily due to reflections from metal, the nature of the solder flow, and possible solder flux that may be present on the part. Further, Solder inspections require high magnification of the solder joints in order to determine functionality and acceptability.



Processing conditions in a stencil and screen printer are similar to any other harsh industrial manufacturing environment. High temperatures and exposure to soldering paste can impair camera functions.

Exerra, a developer and manufacturer of off-line stencil and screen printers, required a vision system for their off line stencil printer the eP25 that could accurately verify the presence and orientation of a particular surface mount component. At the same time, reliably check the quality of the solder connecting the surface mount component to the circuit board under difficult industrial conditions.

Imaging Diagnostics creates the optimal vision solution

Imaging diagnostics provided a series of cameras for Exerra's eP25 off-line stencil and screen printers designed to address the complex issues involved in soldering identification and verification.

USB camera solution for the eP25

Uniplane alignment system

The Uniplane alignment system features a 1.3 MP USB2.0 camera mounted on a precision servo controlled bridge located above the stencil. A self learning system, the uniplane alignment system provides fast and accurate configuration, by capturing fiducal mark images in the printing position. Any shape on the PCB or stencil can be used as a fiducial position, and the number of fiducials can be chosen to increase alignment accuracy. The USB2.0 cameras accurately capture these minute images and feed the data to the robust image processing algorithm to achieve high PCB alignment of +/- 12 microns.

2D&DTM

The 2D&DTM is based on a proprietary image processing generator that enables 100% inspection of 100% of assemblies - without compromising on throughput. During each inspection cycle, a 1.3 MP USB2.0 camera rapidly scans the PCB and acquires a set of color images at a resolution of 8 microns. The images are then compared to reference images and manipulated to determine acceptability. A one-click utility enables fast threshold setting. Use of a color camera enables the system to analyze solder color differentiation, which is not possible with most existing monochrome camera based solutions.

Imaging Diagnostics integrated USB2.0 cameras in a friendly and intuitive interface enabling users to define the entire PCB or as many "areas of interest" as desired. Each area of interest is presented as an icon on a graphical representation of the PCB, and can be magnified for close-up verification. Each type of defect is displayed on the screen in a unique color, making it easy to identify various types of problems, if identified. The frequency and level of inspection is user-defined and can be executed after every printing and stencil cleaning cycle. The inspection system generates both statistical and graphical reports, featuring automated alerts when measurements exceed defined tolerances.

Stencil Inspection

The Stencil Inspection features a 1.3 MP USB2.0 camera that inspects an automated stencil aperture to ensure that apertures are free of clogged paste. As in the printing inspection, the user can define whether to inspect the entire stencil or only selected areas of interest (for example, fine-pitch components). The results of the stencil inspection can be set to trigger automatic or manual stencil cleaning.

Summary: USB best choice for Intense Industrial Applications

Imaging Diagnostics supplied Exerra eP25 with reliable and durable vision systems that withstand industrial conditions to ensure high work flow, efficient throughput and cost effectiveness. With the complete vision system the eP25 was able to exceed current standards of quality control and improved positioning. System integration was simple and fast due to the inherent ease of use of USB2.0 cameras and the straightforward SDK package standard to all Camelot cameras. The Camelot vision system improved the eP25 printer's overall capabilities and ease of use while decreasing development time and cost, for a successful industrial machine.

***Image Diagnostics**, a BDR group company and Analog Devices partner, is a vendor of USB/DSP cameras at affordable prices. Visit WWW.Imagine2d.com to find out how ID can save you money while improving your machine vision application.*