An Integration Solution for Automatic Optical Inspection Machines

Introduction:

As devices are becoming more sophisticated and customers are demanding higher quality, manpower inspection in production lines is hard to do well. Automatic Optical Inspection (AOI) is the key to success in today's production environment to detect faults sooner and more precisely while meeting the increased need for 100% inspection. Since AOI machines are an essential tool and are widely used in many industries, including semiconductor, PCB, TFT-LCD, automobile, food processing and packaging etc. in recent years, manufacturers are seeking more effective efficient means of implementing their AOI system. Compared with bulky and space-consuming desktop computers to control equipment, Advantech provides a cost-effective AOI solution to integrate a Human Machine Interface (HMI) with visual inspection applications enabling users to not only simplify their detection configuration but also reduce the implementation costs.

System Requirements:

AOI evaluates the quality of manufactured products with the help of visual information and uses a two-part machine: first a PC-based system performs the defect inspection and then a PLC-based system controls the operation of industrial equipment and processes. Industrial PCs (IPC) are often used as the main control device but these have some shortcomings such as

oversized computer cases which take up too much space and require a large cooling fan. Our client planned to use a compact IPC to improve the old system, and requested that the new computer had was powerful enough to seamlessly execute programs and tasks; have enough I/O interfaces for future updates and extensions and include a touchscreen for improved operation and maintenance control. The solution also needed to offer a better way to display the inspection results and HMI information on the same screen to minimize staff's operating time and improve production efficiency.

System Description:

Advantech's proposed solution included a space-saving automation computer, an industrial projected capacitive touch screen monitor and HMI runtime software with easy-to-use features. The fanless palm size UNO-2483P is less than half the dimensions of a current IPC and its solid rugged design enables it to be protected from dust. With Intel's 4th generation Core processor and plenty of memory, the UNO-2483P has faster performance especially for image intensive tasks. Providing a variety of I/O interfaces is another feature to conveniently connect diverse devices especially using the Power over Ethernet (PoE) port which can power devices directly without the need for a power supply. Unlike a traditional IPC which only has two PoE ports, this palm-sized computer supports 4-port PoE power up to 15.4W for each port allowing users to easily expand their AOI system at no additional cost.

Featuring a wide-screen 16:9 aspect ratio, the FPM-7151W flat panel monitor   provides a much larger screen area than 4:3 ratios, and its multi-touch capabilities allows system designers to develop useful and practical control functions. Its touchscreen replaced a keyboard and mouse to streamline the system and make it easier to operate. The WebOP Designer and Panel Express software are easy to use integrated development tools for operator panels which save development time and labor costs. WebOP Designer supports more than 400 communication drivers and users can effortlessly exchange data via simple communication settings (taking only a few minutes), and record the inspection data to generate EXCEL reports. There is no need to install two monitors for the visual inspection system and the HMI system, because Panel

Express can be used to connect media between both systems (Ethernet Modbus TCP/IP) to display all the information on the same screen, thus fully integrating AOI applications with peripherals to facilitate daily use and maintenance tasks.

Project Implementation:

Product	Description
UNO-2483P	Intel® Core™ i7/Celeron Regular-Size Automation Computer w/ 4 x PoE, 4 x GbE, HDMI/VGA
FPM-7151W	15.6" Industrial Monitor with Projected Capacitive Touchscreen, Direct-VGA/DVI or VGA/HDMI ports
WebOP Designer	HMI Development Software
Panel Express	HMI Runtime Software

System Diagram:
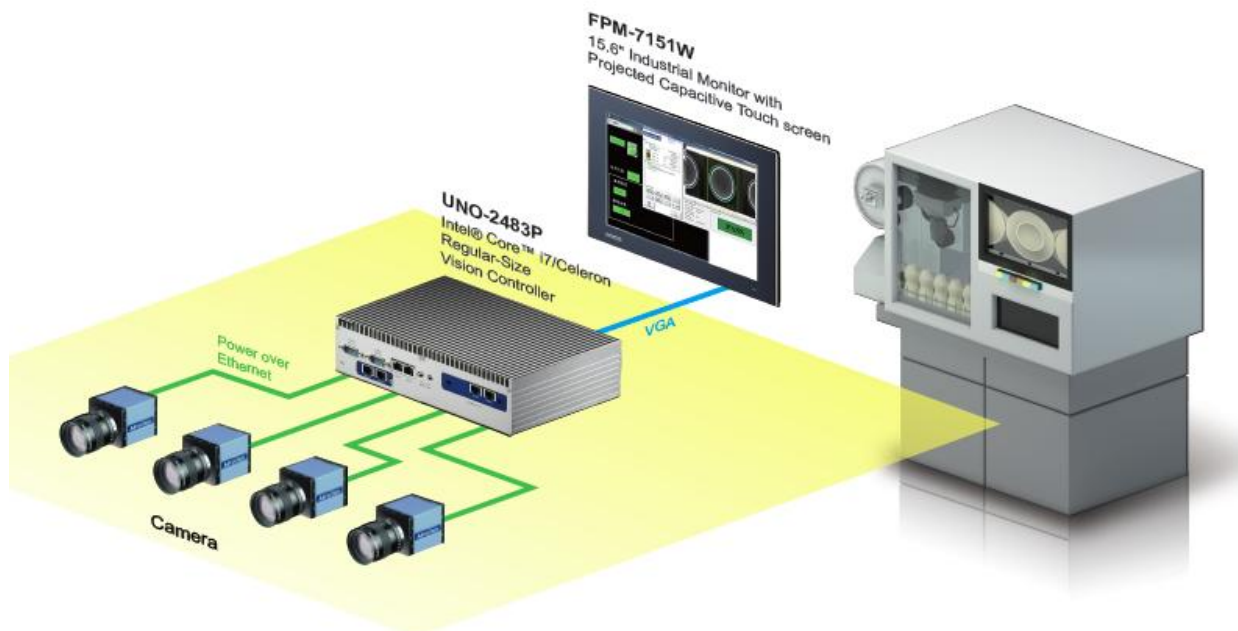
Conclusion:

In order to ensure the quality of the manufacturing process, AOI is necessary equipment. However, a number of manufacturers may be hesitant to use it or put off upgrading their old system because of the time consuming and labor intensive process. Advantech's integrated solution is able to bring great benefits to users such as using one screen to replace two-monitor configuration as well as providing compact hardware to save space, simple setting with an intuitive user interface to accelerate development time and cost, a wealth of software/hardware resources for future expansion, thereby speeding up users' AOI system implementation to boost manufacturing productivity.