

Component Placement: Robots Are Faster and Cheaper

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Component placement, commonly referred to as “pick-and-place,” has been performed in one form or another since the dawn of the assembly line. Whether it is done by hand or by a fully integrated assembly robot commonly depends on volume. With the current downturn in the economy, we see many manufacturing companies reducing manufacturing costs by “leaning out.” They are looking for ways to decrease production costs and increase profits. The electronics industry is no different, and robotics offers a very effective way to accomplish this goal.

SCARA robot is highly versatile and cost-effective.



Common problems in electronics assembly today are bottlenecks, low productivity, long production times, human error, and worker's compensation claims due to repetitive motion injuries. Nearly every assembly facility in nearly every industry has pick-and-place applications that can be easily converted into fully automatic, cost-effective operations. The return on investment will be noticed the first time that the line is started. The decreased production cost and low error rate will increase profitability from day one.

Automation is not necessarily expensive, and in-line automation or automated cells can be very cost-effective.

Many companies have the common misconception that automation will cost hundreds of thousands of dollars, but this is not the case. In-line automation or automated cells can be very cost-effective. The key is to identify a need and secure the proper equipment to fill that need. Pick-and-place applications are an excellent place to look for automation solutions. Let's face it, there are simply some jobs that robots cannot do. However, why waste valuable manpower on repetitive jobs?

There are many reasons to automate: increased accuracy, decreased human error, increased up time, increased production speed, and of course,

decreasing costs. Pick-and-place applications can often be fully automated with a minimal investment and will allow workers to be moved to a more “value added” position within a company. Robots can be mounted directly in-line on any assembly line or conveyor, taking up minimal space.

There are several types of robots available. Janome Industrial Equipment produces desktop, or Cartesian styles, as well as SCARA articulating arm robots. Typically, SCARA robots are used for in-line automation because of their flexibility. Our SCARA robot has an 880mm range of motion and an accuracy of 0.01mm. The SCARA comes standard in three axis with a fourth theta or rotational axis available. Janome's user-friendly control allows for four-axis simultaneous control. In addition, a built-in sequencer and I/O port (25 inputs and 24 outputs) allows the SCARA to control a variety of external equipment such as conveyor motors or lead cutters.

Because robots do not have the ability to think or learn, a presenter is often custom made and sold with the robot as a turnkey package.

There are several things to remember when considering robotic automation. For one thing, robots do not have the ability to think or learn. It will only do what it is told to do. Therefore, component position is critical in automating. The components must be presented to the robot in such a way that they are in the exact same position and orientation every time. Because of this, a presenter is often custom made and sold with the robot as a turnkey package. Oftentimes, we can present components in the way they are received. The SCARA can pick components directly off a reel or tape.

It is also important to consider the grippers, or “fingers” of the robot. These grippers are oftentimes application-specific and are custom made to fit any particular component precisely. Typically, robots are manufactured with no grippers of any kind so that they can be custom fit to any application. Both air actuated and motor driven grippers are available. It is important to know the maximum force that can be exerted on a particular component prior to picking your grippers to ensure the gripper will be designed so that it does not harm the component.

Presenting the Circuit Board

Presentation of the circuit board is also critical. As with positioning of the components, the robot will go to the exact same position every time. Therefore, the board must be in the same position each time. A common addition to an automation package is a vision system. Our SCARA can communicate with a CCD camera controller to receive positional offset information. The camera is used to look for specific programmed fiduciary marks and will send offset data to the SCARA accordingly. This will allow for flexibility in board placement in a conveyor setup. The SCARA can interpret linear and angular offsets and a height sensor can be integrated as well.

Once an automation package is put together and installed, setups are a breeze.

With Janome's conversational control and seven-line back-lit LCD display, programming the SCARA takes only a matter of minutes. The SCARA has the ability to store 100 programs or 6,000 points within the robot itself. Programming can consist of point-to-point movements or continuous path. The SCARA has the ability to interpolate arc movements as well as activate outputs on the fly. Different programs can be called up on the robot itself or via the I/O port. Windows™-based programming software is available as an option.

The flexibility of the SCARA robot means that it will serve well for years to come. The SCARA can be easily converted to other applications even long after your present application has gone. Janome's SCARA robot uses encoders for positional accuracy and is available for a variety of applications such as: pick-and-place, soldering, vision inspection, laser inspection, and screw fastening to name a few. Janome has developed application-specific operational software, which provides pre-programmed operations such as screw fastening and soldering conditions.

The SCARA also is equipped with a built in PLC function that can operate independently of the standard I/O. This function allows for multitasking operations within a single cell. The PLC function allows for 100-line logic programs. The SCARA is also equipped with two COM ports that can be used to interface with the windows-based programming software. The COM ports also have the ability to send and receive commands in raw ASCII code.

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