Abstract

Johanson Technology, a capacitor and microelectronic part manufacturer, located in Camarillo, CA has forecasted a 50% increase in demand for single layer capacitors for the year 2011. Johanson chose to hire an intern to design and implement a robotic pick and place system to meet this demand. A complete automated system composed of a Stäubli RS20 robotic arm, CS8C-M Controller, and Electrosort Bowl Feeder needed to be integrated into an environment where no system currently existed. A bill of materials and parts list indicated that the entire system would be a fixed cost of $50,104. This proved to be the superior choice over the alternatives of hiring an outside consultant to design the system for $115,051 or hiring an additional employee to hand pick and place the parts for nearly $24,000 annually. Programs were written in VAL3, Stäubli's own programming language, for the RS20 to pick and place parts in a grid formation onto Waffle, Gel, and Ring Packs. A custom tool composed of manufactured and purchased parts was made at Johanson Technology and held by the RS20 arm to handle the single layer capacitors. Performance of the system's placement accuracy was analyzed by measuring correct placements on Waffle, Gel, and Ring Packs. Waffle Packs received a placement accuracy of 99.21%, missing around 10-20 parts out of 2,400. Gel Packs received 99.71% accuracy, and Ring Packs failed to place parts consistently within their 2-3^{o} rotation tolerance so their accuracy of placement could not be measured. The robotic pick and place system places single layer capacitors into Waffle, Gel, and Ring Packs at two to three times the speed of a human operator. At this rate, Johanson Technology will be able to meet their demand.