Medical Device Component Assembly

Case Study

High Precision, Vision-Guided Assembly Providing High Throughput

The Challenge

When it came time for our customer to increase production capacity for a bedside medical device they were faced with a dilemma. With several existing manufacturing systems already in production it was necessary to maintain a similarity to existing systems in order to ease the transfer of personnel between systems and maintain current procedures. However, the customer also realized that new technologies exist that can provide real improvements to existing processes.

Our customer didn't want to copy outdated technologies nor did they wish to modify existing processes to fit the rigid boundaries of a pre-boxed solution.

Our customer realized that they didn't need a vendor - our customer needed a partner.

The Solution

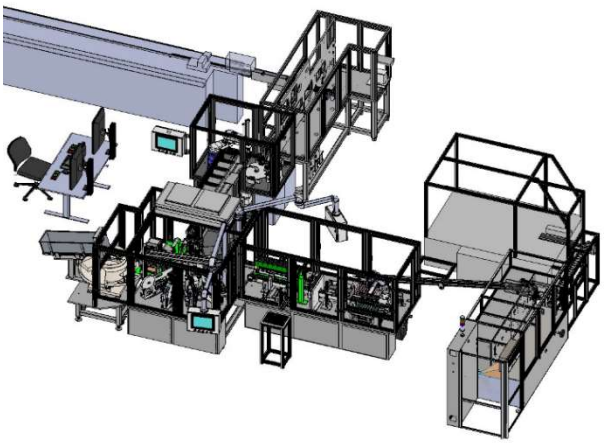
With a reputation for providing quality and ingenuity while developing strong partnerships with customers, Ionic Automation was selected to supply the new production system.

Upon gaining an understanding of the customers' preferences and requirements, Ionic Automation set out to provide improvements to the existing processes while still maintaining many characteristics of the existing systems.

Various component transfer strategies were utilized including robotic, servo pick and place, rotary dials and conveyors to meet the high throughput requirements.

The mixed part transfer strategies allow the solution to provide both the high-speed and high-precision performance necessary to meet the production and quality requirements.

The medical device being produced requires several precise assembly operations. Vision system feedback directs servo-positioned tooling to complete the required positional corrections and provide vision-guided assembly in up to 3 axes.



Assembly tolerances up to 0.05mm are achieved well within the required 1.3s cycle time.

The system includes multiple vision inspection operations that verify the components at multiple stages of the assembly process for various quality features.

The vision inspection operations also provide closed loop data feedback which updates the process parameters and prevents process drift.

One of the challenges presented by the customer was the need to manually verify all components identified as rejected by the vision inspection systems.

Due to the variability of operator availability and the infeasibility of pausing production to allow the operator to verify the inspection, potentially rejected components are not immediately removed from production.

Instead, the software tracks the potentially rejected component through the remaining system operations. Once the operator verifies the status of the component via a remote inspection screen the confirmed rejected components are automatically offloaded.

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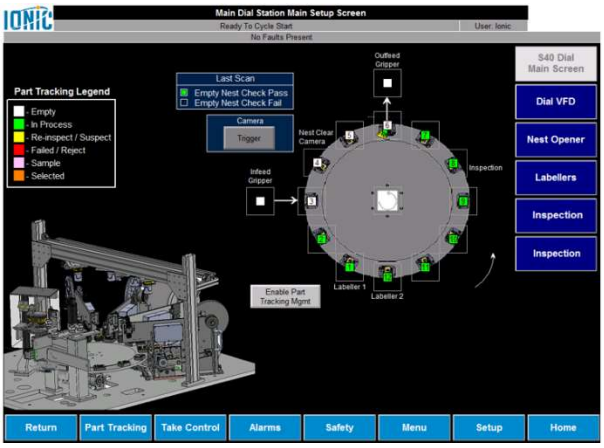

A dedicated rotary indexer, containing non-conductive (PEEK) tooling, is included to transport components through a Corona surface treatment operation.

The system includes a multi-up pressing operation that utilizes a walking-beam transfer assembly to ensure maximum press utilization.

Raw components are provided via bulk feeding, reel feeing and upstream 3rd party equipment.

A packaging station, located downstream from the manufacturing operation, accepts the completed components.

Full handshake and communication interfacing between upstream and downstream 3rd party equipment ensures a smooth flow of components and communication.

A Manufacturing Execution System (MES) is included that provides interaction between the system controller and customer server. The MES system provides individual component build information, process feedback and system performance data to the customer server.

The MES interface is also integral to the recipe programming on the system. The station PLC and MES interface work together to verify selected part types, ensure the provision of the correct raw material and provide part-specific process parameters to applicable assembly and inspection operations.

The Results

The solution provided by Ionic Automation includes many of the advancements available with current technology while maintaining a similarity to the existing customer systems.

The advanced controls platform expands part tracking and MES interfacing with the customer server without requiring specialized customer maintenance or operations staff.

Station throughput was able to exceed quoted estimates without compromising part quality or station performance.

Required assembly tolerances have been met or exceeded and the equipment is meeting or exceeding required performance parameters.

The customer has since reached out to Ionic Automation for the provision of an additional assembly system.

Highlights

- **Vision Guided Assembly – 0.02mm accuracy (X/Y), 0.016mm (skew) – Cpk 1.33**
- **Required Cycle Time – 1.3s**
- **Vision Inspection – included**
- **Part Types - 7**
- **Full Part Data Tracking - included**
- **Customer MES Communication - included**

About Ionic Automation

Founded in 1999, Ionic Automation is an industry leader in the design and manufacturing of complete automation systems and special purpose equipment.

Whatever the project, our goal is to make our clients more profitable through improved productivity, reliability and safety.

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