



ELECTRONIC MFG. SERVICES (EMS)

Scalable Automation a Path to Turnkey Success

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The world of custom automation used in electronics and other industries is a game of which direction to proceed — user-operated benchtop stations, or full turnkey systems. By creating a scalable automation strategy from the beginning, equipment reuse, risk reduction, and incremental implementation can be realized. By approaching an automation strategy in an incremental way, benefits such as the opportunity to prove risky or untested processes before “going all in” on a full turnkey system, a reduction in initial capital outlay at the beginning of a program, and the quick launch of critical processes for production are gained.

An Application in Scalability

The fast-paced electronics manufacturing environment shows no mercy to custom processes. Even though there is no off-the-shelf equipment available, production timelines and process performance goals must be met. In one particular application, Demco Automation was tasked with providing, in the end, multiple automated assembly cells. However, through significant planning with the customer, Demco started with critical semi-automatic stations first and then reused them in the automated cells.

The telecom firm was challenged with meeting production demand for a small transformer assembly. Each system was required to process ten different product styles within the product family.

Demco Automation partnered with the customer to develop a low-risk scalable automation strategy. All processes were previously being performed with manual labor.

The key reasons for automating this production process were to increase capacity, quality, and production. In order to meet the objectives of the overall plan, Demco developed an incremental approach with the end result being multiple automated dial assembly machines.

The major project goals were: to plan for multi-phase automation implementation to begin automating in weeks; to move from manual operations to multiple dial assembly machines while reusing the capital from the semi-automatic benchtop phase of the project; to develop high-impact processes first to improve quality, yield and throughput; to reduce operator ergonomic challenges found within manual assembly; and to reduce end-of-line defects by improving processes and eliminating operator inconsistencies.

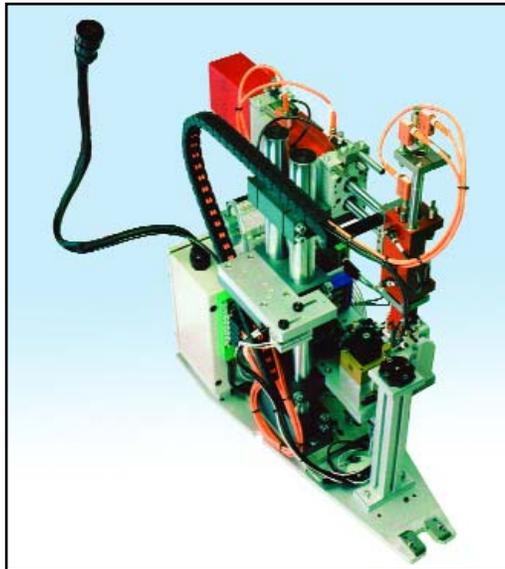
Processes included such tasks as ultraviolet (UV) gluing and curing, electrical testing, label application, clip attach, and core assembly.

Implementation

In order to understand the current assembly process and the nuances of production that the operators were experiencing, Demco Automation and

the customer identified several key steps in the process that were causing particular pain during operation. Demco's patented Wedge® Modular Assembly Platform was used as a baseline for creating a scalable and modular approach to the custom assembly process.

The application of modular equipment provided an avenue to recycle the benchtop units into the final, fully-automated configuration. Not only was the modular approach able to reuse



Phase 1 — single benchtop station.

equipment and increase the ROI, but it also allowed for the equipment to be upgraded quickly in the field without extensive retrofits and rework on the customer's production floor. To install the stations into the base machine, the control harness is plugged in and the baseplate is connected with a docking mechanism and one shoulder bolt.

Semiautomatic Benchtop Units

In the initial phase, process stations were used as semiautomatic benchtop units. The goal was to first identify processes that were the most difficult during production. For example, UV adhesive and curing were incorporated into a two semi-automatic stations manually loaded by one operator. Rather than inconsistent manually deposited adhesive by the operator, the new benchtop station immediately eliminated process variability with the added benefit of a shorter cycle time for the adhesive dispense sequence.

The label application process was a quick upgrade from attaching pressure-sensitive labels by hand to a repeatable and centered product label. In this instance, an off-the-shelf label applicator was selected and designed directly into the benchtop phase with the intention of being inserted into the automated dial assembly machine in the turnkey system. In other words, the same label applicator was used in both the manual and automated processes.

This approach enabled the customer to purchase only one label applicator for all phases of the project for a sizable reduction in capital budget.

Another benefit to starting with a benchtop unit is that it may make workers more comfortable with complex assembly tasks.

In this project, outsourced stampings were being received from an off-shore location with significant non-conforming parts. The inventory being shipped to the customer would take weeks to arrive.

Good parts within these shipments

had to be used in order to keep production moving until the supplier implemented corrective actions. If the stamped component was assembled in a fully-automated system with unacceptable quantities of defective parts, the station would jam, create a fault and significant downtime until the fault or jam was cleared.

Conversely, in a benchtop situation,

be applied in various industries and manufacturing processes, even in custom applications, by using basic design principles.

Custom tooling, standardizing mounting arrangements, and planning for potential changes in the production process all help to reach the goal of a scalable, modular, and flexible automation plan.



Phase 2 — plug stations into system for automated assembly.

the operator can clear jams quickly since they are interacting directly with the mechanism every cycle to keep producing good assemblies.

From Manual to Full Automation

While benchtop production continued at the customer's facility in semi-automatic mode, dial base machines were being constructed at Demco's production facility to create the complete system for full automation. The dial machine base chassis, additional process stations, and offloaders were built, shipped and installed directly on the customer's production floor for a lower-risk, customized assembly process launch.

By implementing the stations as a benchtop unit first, improvements to the operator processes were realized in a relatively short time period. In addition, part conformance issues were addressed before a fully-automated process was introduced. The customer worked in parallel with its suppliers to bring the non-conforming components within specification.

Scalable automation strategies can

By reusing elements of equipment, whether it be an entire station, or simple tooling, everything counts toward a better ROI.

Incremental implementation is a great method to reduce risk within a complex production process. This allows processes to be refined and proven before full automation is used, mass customization can be accommodated by adding process variations as required, the capacity can be tailored to specific production requirements, and only takes incremental capital investment.

Before starting a custom automation project, be sure to do the homework and plan obsolescence out of the strategy. Use the principles of modularity, scalability and flexibility to create a reconfigurable automation system for the production process. In the end, it can extend budget dollars and increase the longevity of equipment in a competitive global marketplace.

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