

CenArk Controls, LLC

"Processes. Controlled."

Case 161115 - Abbreviated

Project: Semi-automatic resistance welding application

Customer: Manufacturer of electrical harness for the automotive industry.

Location: North America

Challenge: The original welding process is unable to meet production demands.

Overview:

The client is the designer and manufacturer of custom cable harnesses for the automotive industry.

Request:

Quote the fabrication of an additional semi-automatic resistance welding machine.

Discovery:

The existing welding system was semi-automatic. The operator loads the prepared product into a pallet. The pallet is loaded into the machine. The machine steps and repeats the welding process to terminate multiple connection between the bulk cable and connector. The existing system used a servo-controlled motion system to position the pallet. The existing system used pneumatics to move the electrodes into position for welding. The travel of the upper and lower electrode was over two inches (2") respectively. The time required to change electrodes was over five (5) minutes. Electrode changes were required three (3) times a shift on each shift, for a total of nine (9) electrode changes per day. The cycle time per weld was 3.2 seconds.

Customer Perceived Issue:

- The current production line was unable to meet production demands, increasing the backlog of orders.
- Customer delivery requirements demanded the immediate increase in the output of the production line.
- The existing system was reliable and qualified for the customers product.
- The operators reported that the existing system was too slow.
- The expected cost of an additional system was \$170,000 with a twelve (12) week delivery

Actual Issue:

- The travel distance for the electrodes to the part was too large, increasing the cycle time.
- The welder control system was operated by time, without a closed loop communication, increasing cycle time.
- The existing servo system providing the pallet motion was undersized, requiring the system to move slowly to avoid an overload condition.
- The electrode change methodology was manual and error prone.
- The actual time required to complete the welding process was 515 milliseconds. The excessive cycle time was due to ineffective motion and cycle timing.



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Solution:

The existing pallet transport servo was upgraded to a high torque linear actuator (IAI RCP2). The electrode cylinders were replaced with precision servo motion (IAI). The existing control system was upgraded to provide real time servo motion control as well as communications with the welder controls. The electrode mounting system was redesigned to provide the ability of presetting the new electrode positions while the machine was still in cycle.

Results:

- Final installation was less than \$50,000.
- The cycle time for each weld was reduced 50%.
- The electrode change time was reduced to 30 seconds.
- The upgrades improved the machine's output to exceed the production requirements.
- The Client's staff did not have to learn another machine.
- The complete change over required four weeks deliver and a two (2) day installation, which occurred over a weekend.
- The Client's backlog was shipped, and the system continues to outperform requirements.



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