

Genesis Case Study #: J6941 – J6945
Application: Robotic MIG Welding
Market Segment: Industrial
Product: Long Wall Coal Mining Equipment
Cycletime: 10 Min – 16 Hours



Summary

Genesis Systems Group was asked to provide a robotic welding solution for the production of large mining equipment components that are used in Long Wall coal mining. All the components are presented to the robot as pre-tacked assemblies, and most required one or more cycle interrupts to add plates and other piece parts.

Project Challenges

- The customer had no technical experience with robotic programming
- The size and weight of the parts (up to 50,000 LB)
- The pre-tacked parts needed to be located and tacked repeatable for the robot system.
- A pre-heat process and inter-pass temperature 250 deg.F to 450 deg.F during the welding.
- The amount of man-hours for part programming exceeded the calendar time to get the systems into production.
- The robot path will need to adjust in real-time to adapt to part dimensions that change due to weld distortion.

Genesis Solution

- Multiple robotic workcells consisting of Genesis Modular System components and Fanuc robots
 - Two-station, two-robot workcell with a 12 m servo track with two carriages
 - (2) Single-station, two robot workcells each with a drop center positioner (15,000 LB capacity)
 - (2) Single-station, single robot workcells each with servo positioners
- Genesis implemented a comprehensive training program for the customer. Training for basic and advance programming was conducted at Genesis for lead project personnel. A training robot was installed at onsite for a period of 6 months.
- Genesis provided 7 weeks of on-site engineering support after the run-offs were completed.

- The robot, equipped with an ATI tool changer, was programmed to pick up a pre-heat torch fueled by propane and oxygen interfaced with an igniter. A temperature sensor, mounted on the robot arm was used to automatically sense the inter-pass temperature of the part, and the robot would heat the part as needed.
- Genesis performed reach analyses on the various component parts and worked with the customer to set the location of spreader bars, tack locations and weld sequences. The team worked very closely on determining datum points based on previous experience in the manual operation and Genesis 3-D reach analysis.
- Genesis used Fanuc Weld-Pro software for offline programming the component parts in a concurrent Engineering effort to minimize the overall project timeline and to simulate the robot programs with the process tooling.. A video of was made of the robot programs and reviewed by Genesis and the customer to assist in determining the proper weld sequence to minimize weld distortion.