



Yaskawa Motoman Case Study: Arc Welding and Material Handling

OVERVIEW

A manufacturer of forklifts experienced a rapid increase in sales growth, and needed to increase its throughput and part quality to meet the demand. The company was looking for ways to reduce its overall production costs, while increasing its production volume. Its existing process required the parts be manually welded in several orientations and moved to various stations. An overhead crane was being used to move and/or rotate the parts between operations, which proved to be inefficient as well as posing potential safety concerns. Additionally, the multiple stations required a large amount of floorspace.

CHALLENGES

- Design a solution that will automatically configure and changeover for each final assembly based on manufacturer's daily production schedule
- Integrate efficient and safe handling of various sized heavy weldments
- Design a solution that will minimize floorspace requirements
- Produce consistent welds to improve part quality

PROJECT RESULTS

- The multi-robot solution reduced cycle time and increased efficiency while maintaining the high standard of weld quality required. A weldment can now be completed every 30 minutes, a significant reduction from the time- and labor-intensive manual process.

SOLUTION

Yaskawa Motoman developed a custom solution that included:

- Two track-mounted HP600D material handling robots. The versatile HP600D offers a 600-kg payload capacity and a large work envelope to accommodate a wide range of big, heavy parts. It is ideal for "jigless" applications, where the robot positions the part for processing by another robot. Each HP600D is equipped with a custom servo-controlled gripper that automatically varies the clamping pressure and location for each part.
- Six Motoman® MA1900 extended reach arc welding robots. Its streamlined design allows the robots to be placed close together. These robots are ideally suited for use in workcells with larger workpieces that require access to parts in tight spots.
- A custom HMI with bar code scanner, a pneumatic lift assist, a custom adjustable infeed servo shuttle and an outfeed conveyor.

HIGHLIGHTS

The eight-robot, high robot density workcell combined all of the previous manual welding and material handling operations into one synchronized robotic operation.

Based on a bar code scan of the production schedule, the workcell adjusts its programs and the infeed servo shuttle adjusts to accommodate the proper length and width of the specific pre-tacked weldments.

Three different sized weldments, welded in sequence, are required for the final assembly. The cell automatically changes over for each.

The two servo track-mounted HP600D robots operate in sync to move the weldment through the various operations in the cell. These robots act as a part positioner, rotating the part as needed for welding. Due to the offset center of gravity of the weldment, a lift assist is utilized on the end-of-arm tooling of one HP600D.

The MA1900 robots utilize AccuFast™, a non-contact seam finding sensor, to scan and locate the weld joints prior to welding. Once the welds are completed, the HP600D robots place the part on an outfeed conveyor resulting in a flow-through operation.

- The flow-through system simplified the handling operations and addressed the safety issues of the previous manual operation.
- The jigless operation allowed optimal weld positions ensuring the highest weld quality possible.
- Due to the high-density robot placement and jigless operation, the amount of floorspace required was reduced significantly compared to a traditional robot/positioner approach.
- The infeed servo shuttle was able to accommodate various sizes of weldments.

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