Adding Multiple Processes to Your Arc Welding Robot

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Machine Overview - Crawler
Part Description

- 106,000 LB
- Material – HSLA/quenched and tempered
- 3,160 lb weld wire
- 3 stage build
- In severe service application
Part
Benefits of Automation

• Bring product in house
• Increase velocity and production predictability
• Increase quality of the welded product
Product Design Review

- At the beginning of the product we changed the product design to eliminate most out of position welding
- Opened up many groove welds for better access for GMAW vs. manual FCAW
- Re-design corner joints to enable better weld tie-ins (eliminate clip corners and add radii).
System Overview
Part Sequencing
Processes on the Robot (with high level specifications)

- GMAW – Metal Core
- Air-Fuel Preheat
- Infrared Temperature Sensing
- Needle Descaling
- Automatic Neck Changing
- Adaptive Laser Vision
Description of End Effector

• Picture of the end of robot arm – Include
  • Weld torch
  • ATI tool changer
  • Temp sensor
  • Heat Shield
Tool/Neck Change Combination
Robotic Preheat
Preheat/Temp Sense Combination
Preheat/Welding
Robotic Laser Camera

- Servo Robot SF-D 350 with docking through the tool changer
Needle Scaling
2F over 2G
Weld 2” Fillet/1” Fillet over Bevel/.75” Fillet
Unequal Leg Fillet
Picture of Corner Weld from Small Parts Cell
Weld 3.5” Groove Weld
Challenges

• Upstream plate processing
• The amount of time it takes to get the part up to temperature
• Distortion control/prediction
• Cables management
• Coordinating the handling of errors and logistics of multiple processes
• Managing multi-stage build of the part
Successes

• The welding is excellent
• Adaptive tools handle the part variation
• The software developed to handle the coordination of multiple processes is working well
• Distortion is now controlled and we can adapt for distortion
Questions