Solving the Welder Shortage with Robotic Technology

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Some Facts to Consider

- AWS (American Welding Society)
  - In February 2007, AWS reported a shortage of more than 200,000 skilled welders by 2010
  - Updated in 2016 to an estimated shortage of 372,000 welders by 2026
- Indeed *(job search engine)*
  - 8,907 welder positions posted as of March 2017 in the USA
- Weld schools across the country have a wait list and are expanding their facilities

US Manufacturers

- 2016 feedback from my travels
  - “We can’t find qualified welders”
  - “When we do, they are hard to keep”
  - “Today, we have a 50% no show in our weld shop”
  - “Finding welders that produce quality welds is next to impossible”

- The impact this brings
  - Lost business
  - Longer deliveries
  - Reduced product quality

Benefit of the “Welder”

- Built-in adaptive control
  - Change travel speed as needed
  - Vary the stick out (GMAW) as needed
  - Adjust torch and travel angles as needed
  - Adjust the amps/volts as needed
- Multi-process capable
  - GMAW
  - GTAW
  - PAC
  - SMAW

Case Study: Oil Filter Recyclers (Onken)

- Located in Easton, Illinois
- Manufacturer of steel tanks for used motor and cooking oil
- Challenged with the welder shortage issue

Their Goals

- Increase production rate
- Improve weld quality
- Reduce demand for manual welding
- Evaluate the pros/cons of robotic welding

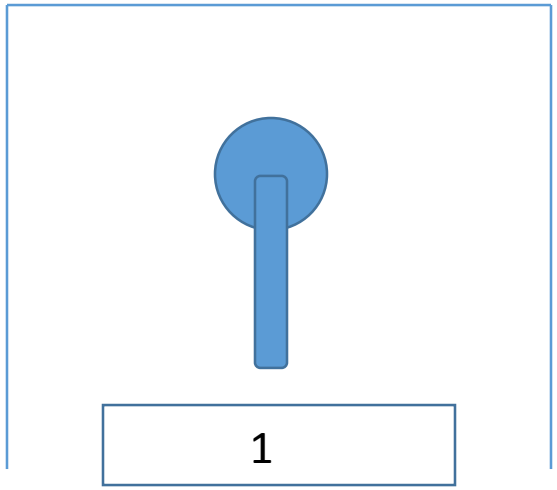
Robotic Welding Facts: True or False

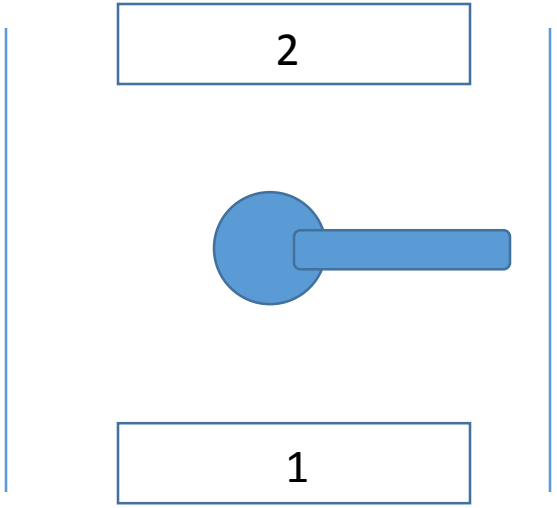
- The robot will be welding faster than my manual welders
- Robotic welding technology will allow the robot to change critical welding parameters to accommodate changes in the weld joint during welding
- The production efficiency of a robot welder is approximately 4.5 times that of a manual welder
- The best person to program a welding robot is your best welder

Team Approach to the Robotic Cell Design

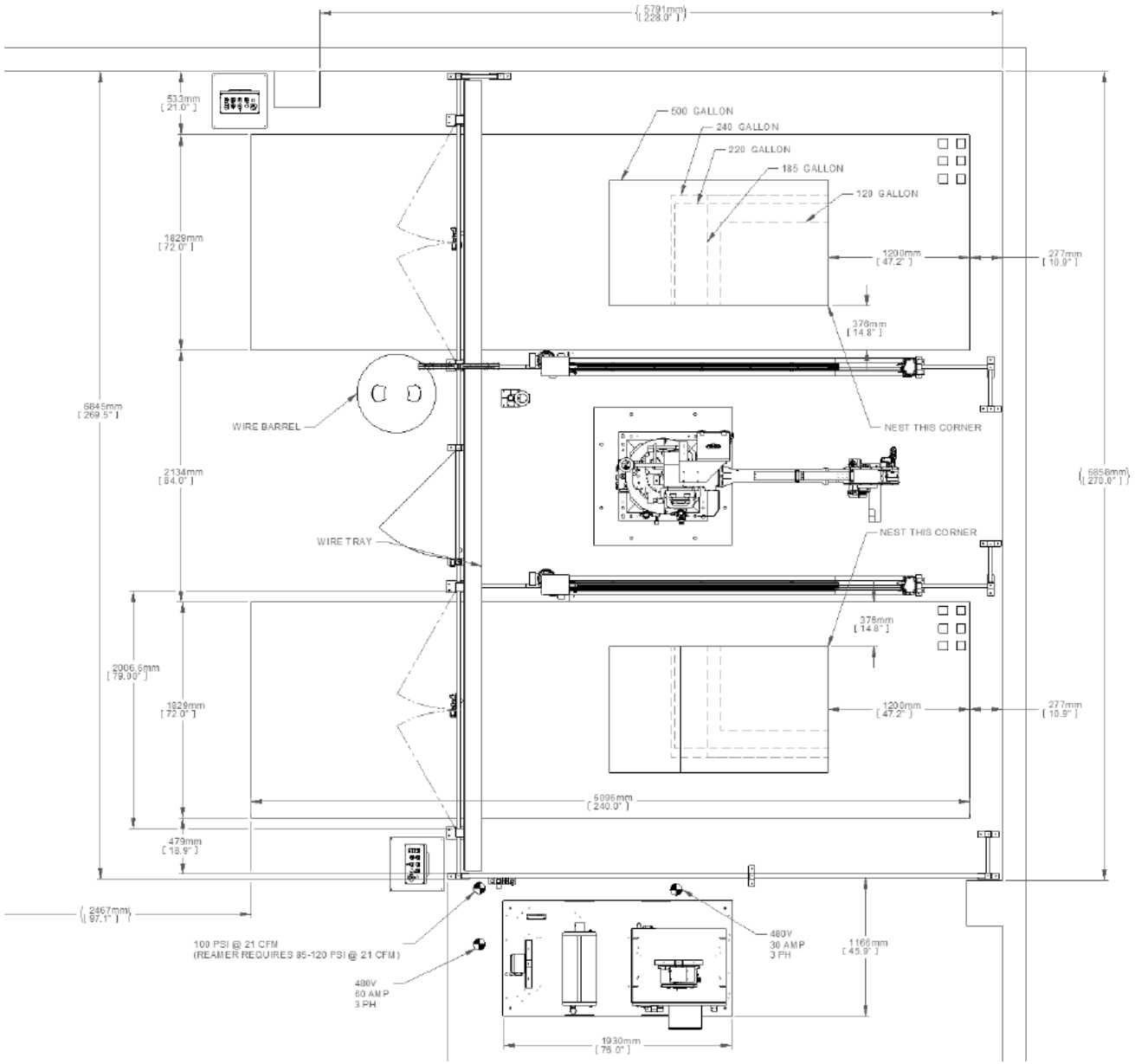
- Oil Filter Recyclers and Yaskawa Motoman formed a team to address the critical needs
  - Part tolerances reviewed
  - Weld joint fit up evaluated (*looking for a “no gap” condition*)
  - Robotic cycle times calculated
  - Operator load and unload time estimated
  - Based on the cycle time and load/unload time, a single robot cell with two stations was needed to meet the production rate

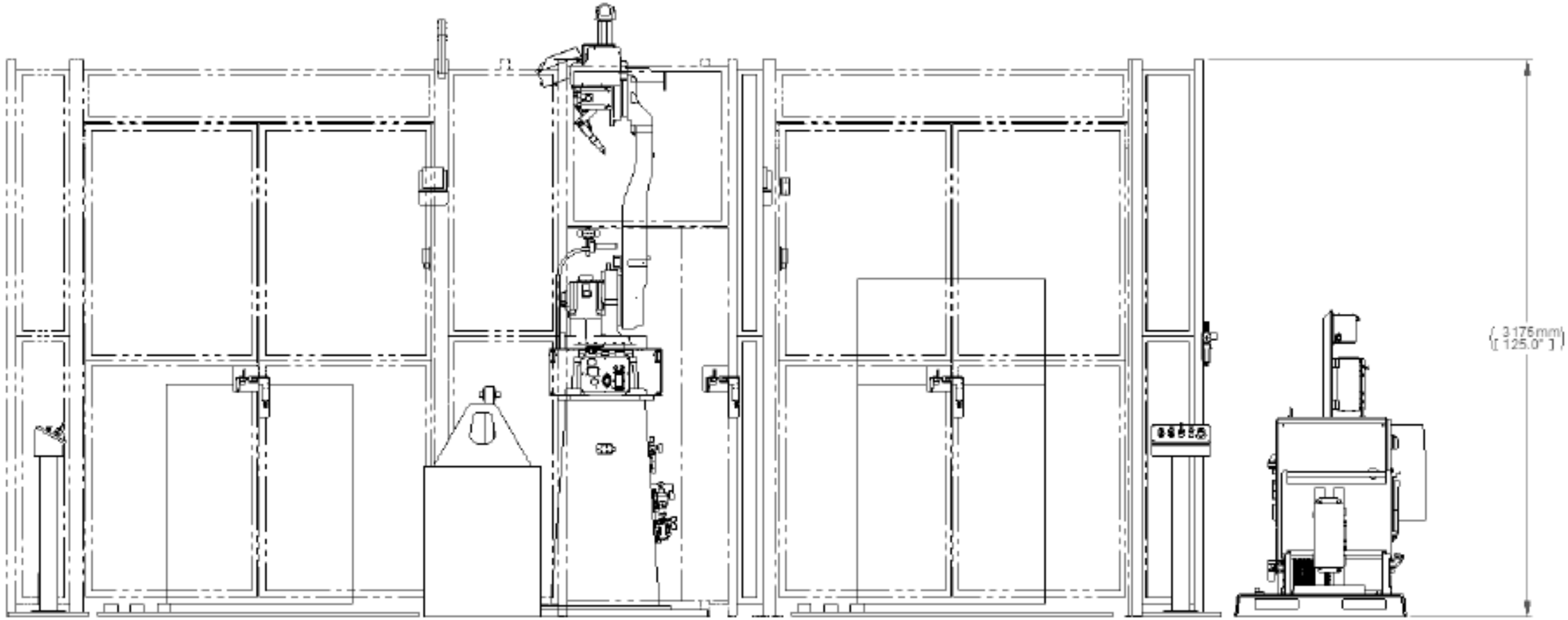
Single Station vs. Dual Station Cell





The Solution for Onken

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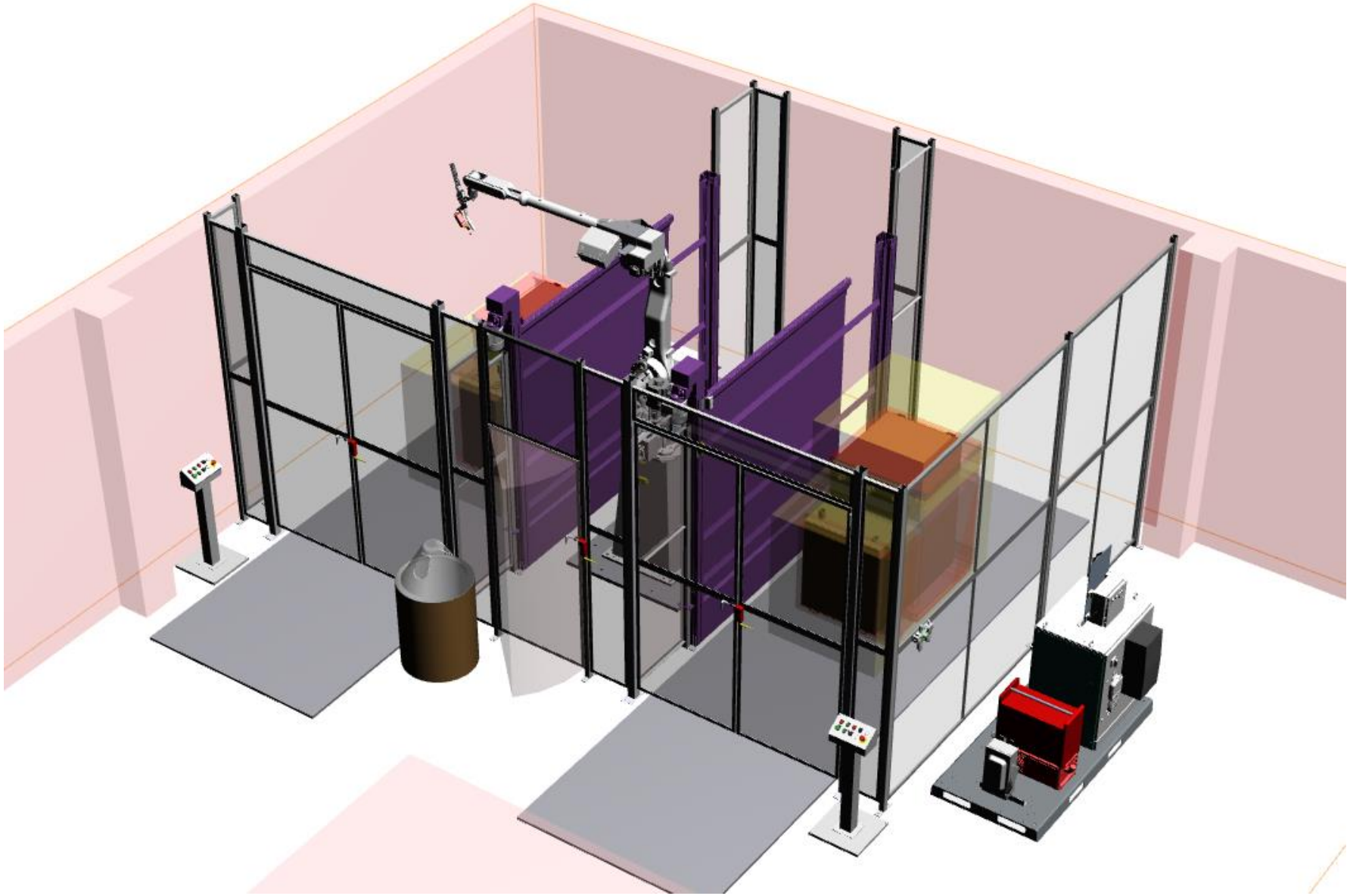
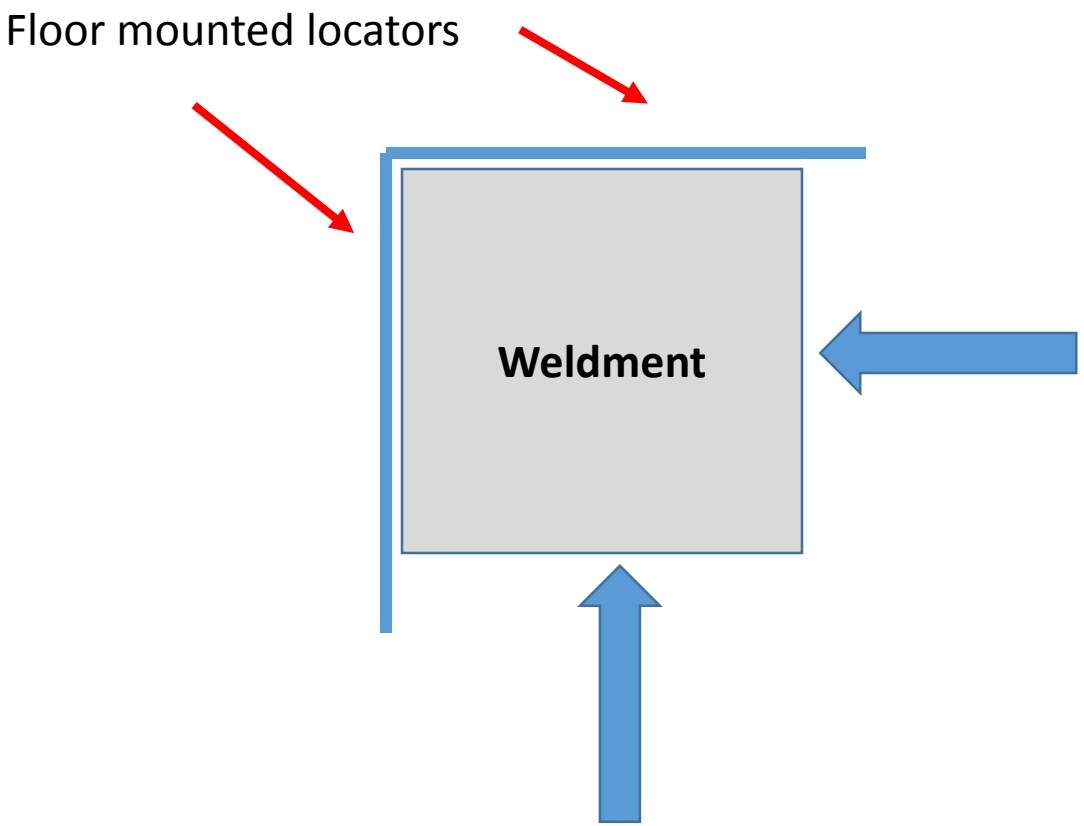



FLASHFOLD
YASKAWA
FLASHFOLD


VPE1
LINCOLN
ILMG

The Welding Challenge

- Weld joint repeatability – how good does it need to be to produce quality welds?
  - Rule of thumb for GMAW: +/- one half of the wire diameter



The Welding Challenge

- Weld joint stability
  - What is the weld joint doing during welding?

Robotic Welding Technology to Address These Concerns

- Weld joint repeatability:
  - Touch sensing *(weld wire)*
  - Laser finding *(Servo Robot)*

- Weld joint stability:
  - Thru arc tracking (weaving – current sensing)
  - Laser tracking *(Servo Robot)*

Pre-tack Changes for Robotic Welding

Thank You for Attending

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