

# Nuclear Grade Welding Concerns in the Nuclear Renaissance

By: Joe Norris Lead Welding Specialist  
Parsons SWPF

# SCOPE

- Parsons Corporation is contracted with the DOE Savannah River Site to design, build and operate the Salt Waste Processing Facility (SWPF).
- Facility will concentrate radionuclides from stored liquid waste for processing at the Defense Waste Processing Facility (DWPF).
- The SWPF will have approximately 23 miles of stainless steel process piping, much of which is safety significant.
- Requires enhanced weld quality and inspection verification.
- This paper discusses the quality control processes utilized to assure the process piping for the SWPF meets applicable requirements for safety significant systems and components.
- Examples of: weld processes used, different quality of welds, and non-destructive weld inspection results will be demonstrated.

# Welder Certification Testing Programng

- Weld testing meets the requirements of the ASME Section IX and the AWS B2.1 welding codes.
- Adapting testing requirements to supply welders that have the skills to perform small bore piping has been essential.
- Additional testing for entry level welders on small bore piping exceeds the basic code requirement.
- RT rejection rates have dropped from over 20% to approximately 6%.
- Structural and plate welding testing meets requirements of the AWS B2.1 Welding code, which offers more versatility in base metal and filler metal field ranges.
- Testing is monitored by Parsons Welding Specialist to maintain consistency with final product, which is good welders.

# Machine Orbital Welding Program

- Each welder attends 5 days hands on training on the Magnatech Orbital Welding system culminating with the candidate passing a weld test.
- The 433 Magantech welding head is good for 2"NPS through 6"NPS pipe.
- The Redhead Magnatech welding head used with ½" NPS through 1 ½" NPS pipe.
- Operators require 2 more days of training on the Redhead with test on a 1/2"NPS to qualify.
- Parsons Welding Specialist have:
  - Written all welding programs for pipe sizes from ½" - 6"
  - Performed Bends, Tensiles and RT to verify quality of all welding programs.
- Uses a D-head from Magnatech for piping with limited access as the D-Head only requires a 2" spacial envelope.
- Parsons Welding Specialist attended Magnatech Maintenance school allowing minor in-field repairs on equipment.

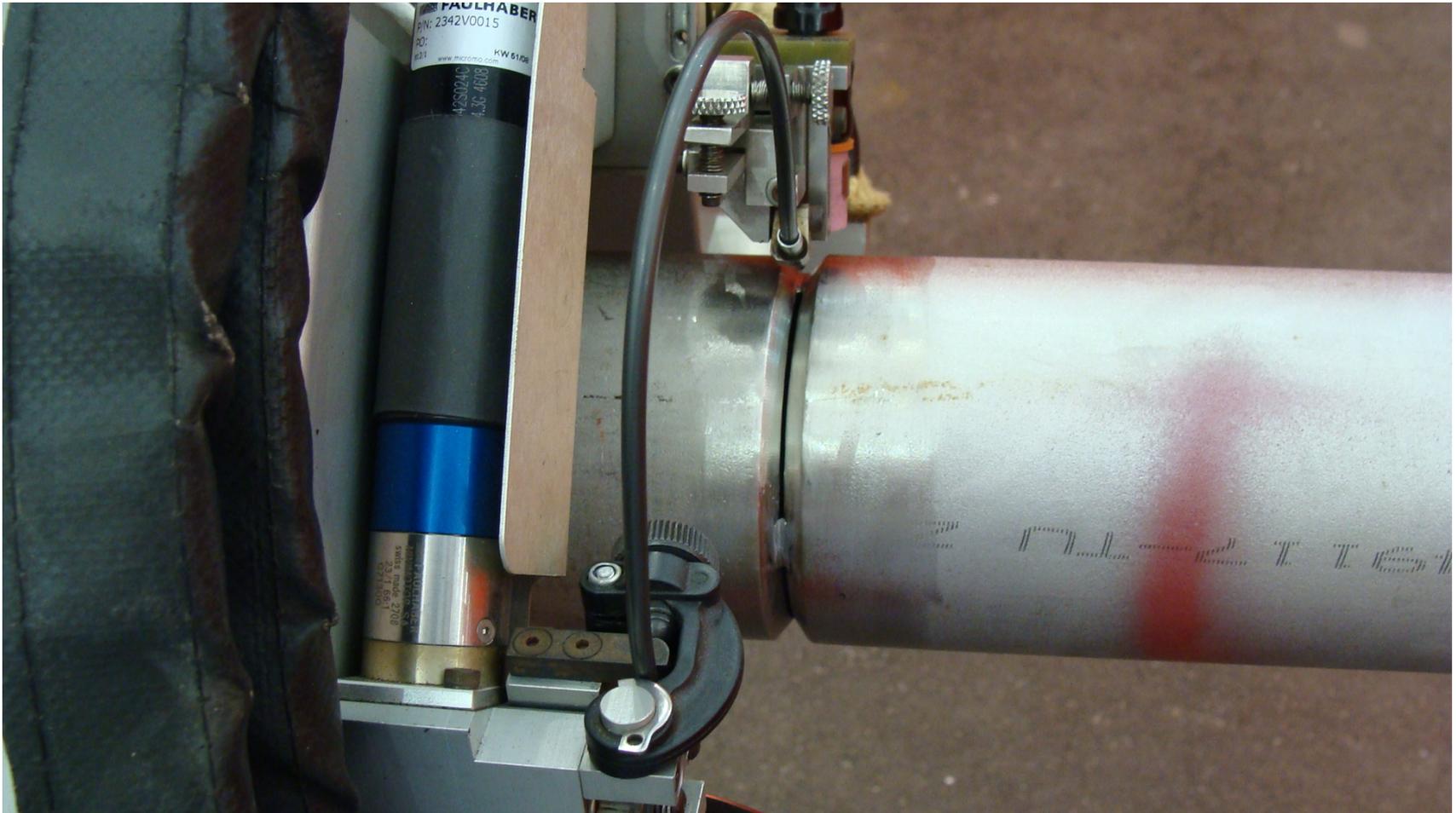
# Autogenous Welding Program

- Each welder attends 3 days training on the autogenous welding system culminating with candidate passing a weld test.
- Autogenous welding requires the deposit of no filler materials and bonds two pieces of square butt pipe.
- Major advantage to autogenous welding is the square butt joint preparation requires very little labor cost to prepare pipe.
- The system is used on pipe from 2"NPS to ¼" NPS and a .154" wall thickness.
- Close attention required because the system can only work on long tangent fittings
- Metal composition critical:
  - Sulfur must be held to over .05% to maintain good weld quality.
  - Copper content effects the joining process.

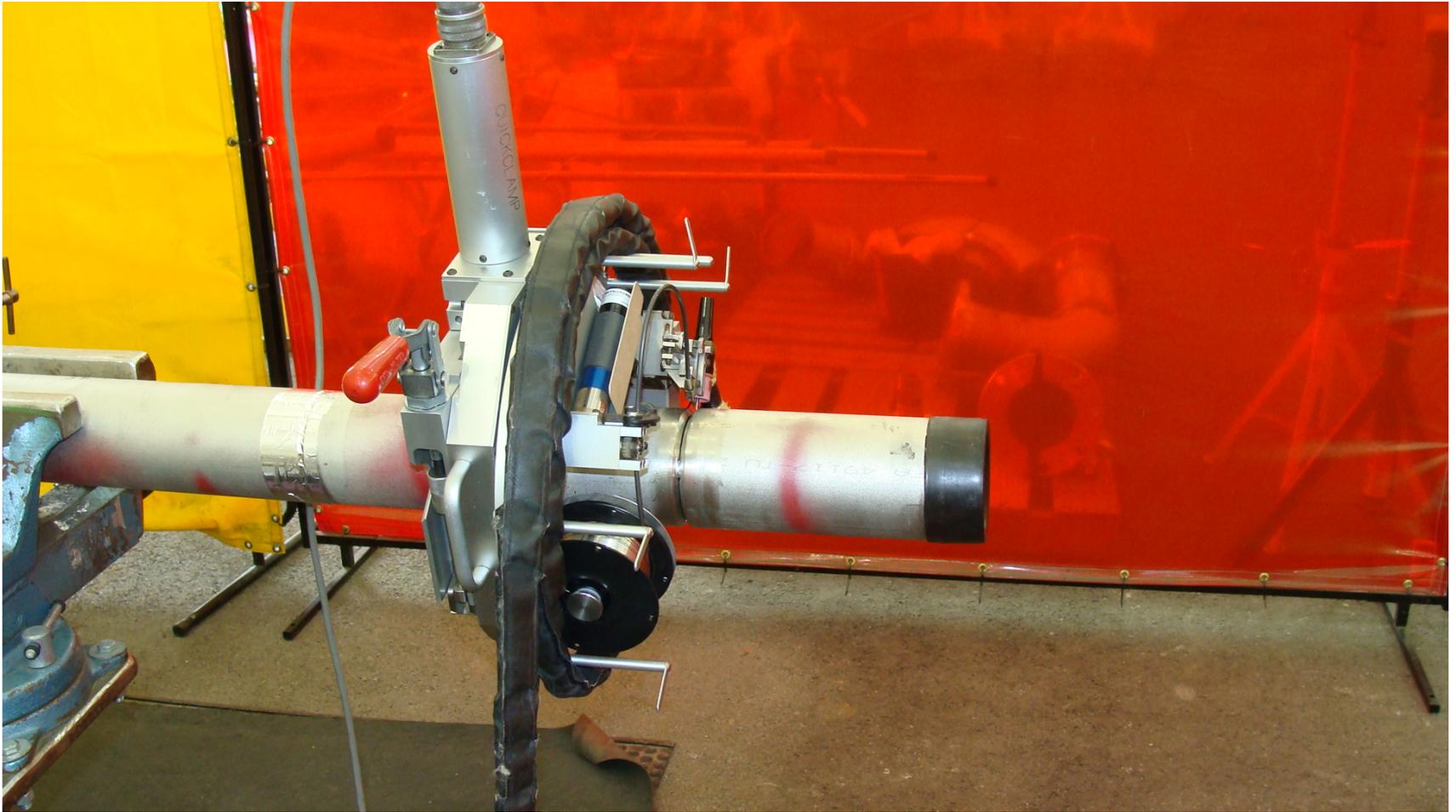
# Summary

- Parsons is having great success in producing high quality welds in the field by:
  - Demanding a highly skilled welder proven through weld testing and training;
  - Supporting field operations with proven Welding Specialists to support craft and proctor all testing and training;
  - Monitoring welder acceptance verses rejection rates to assure levels in the field are held to a high standard. If the rejection rate does not improve then Welders project certification is pulled;
  - Advancing the automated welding of piping to assure the technology is applied correctly and produces welds with a very low rejection rate <1%; and
  - Committing Welding Engineering to Continuous Improvement on all welding processes to assure reduction in weld rejections rates.

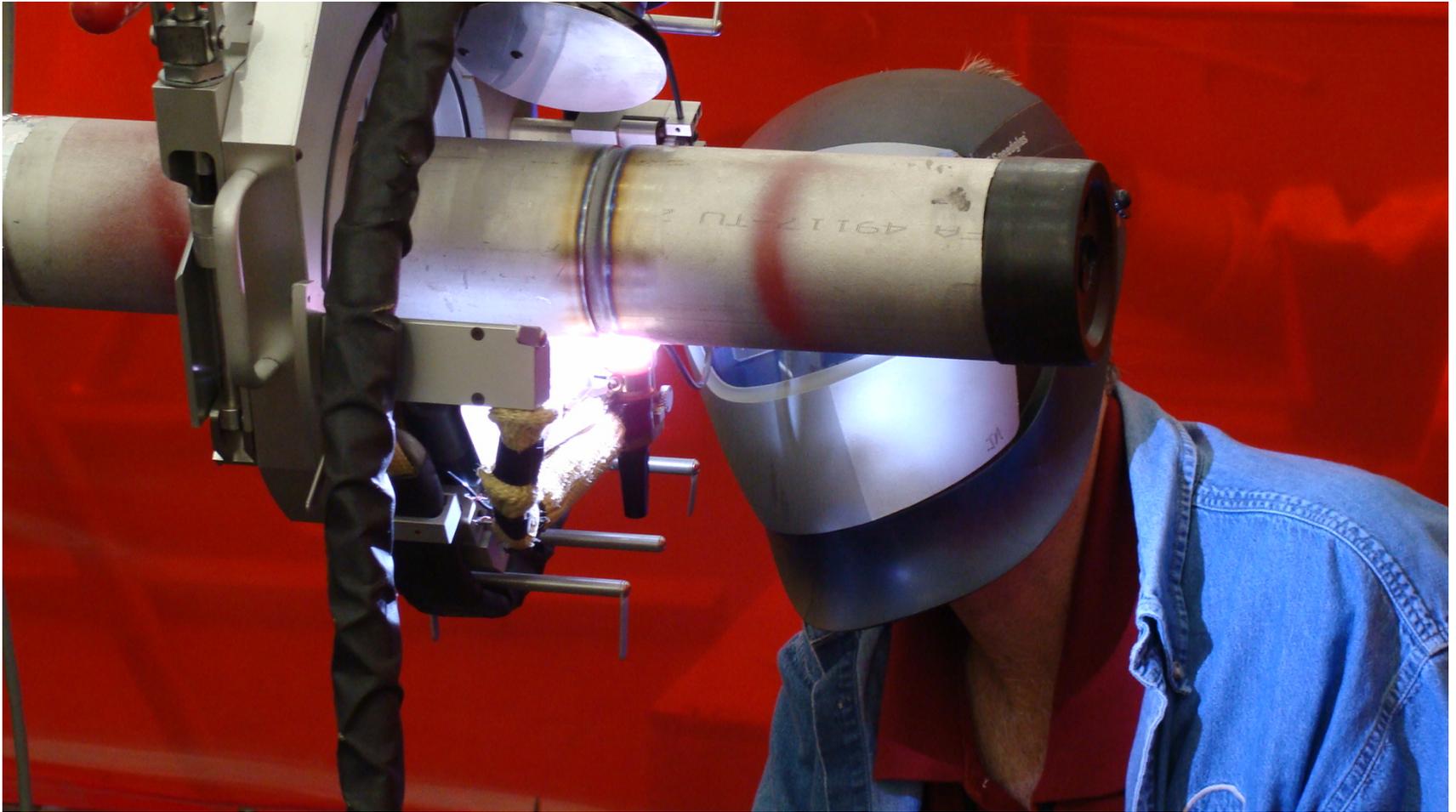
# MAGNATECH 433 HEAD ORBITAL READY FOR ROOT PASS



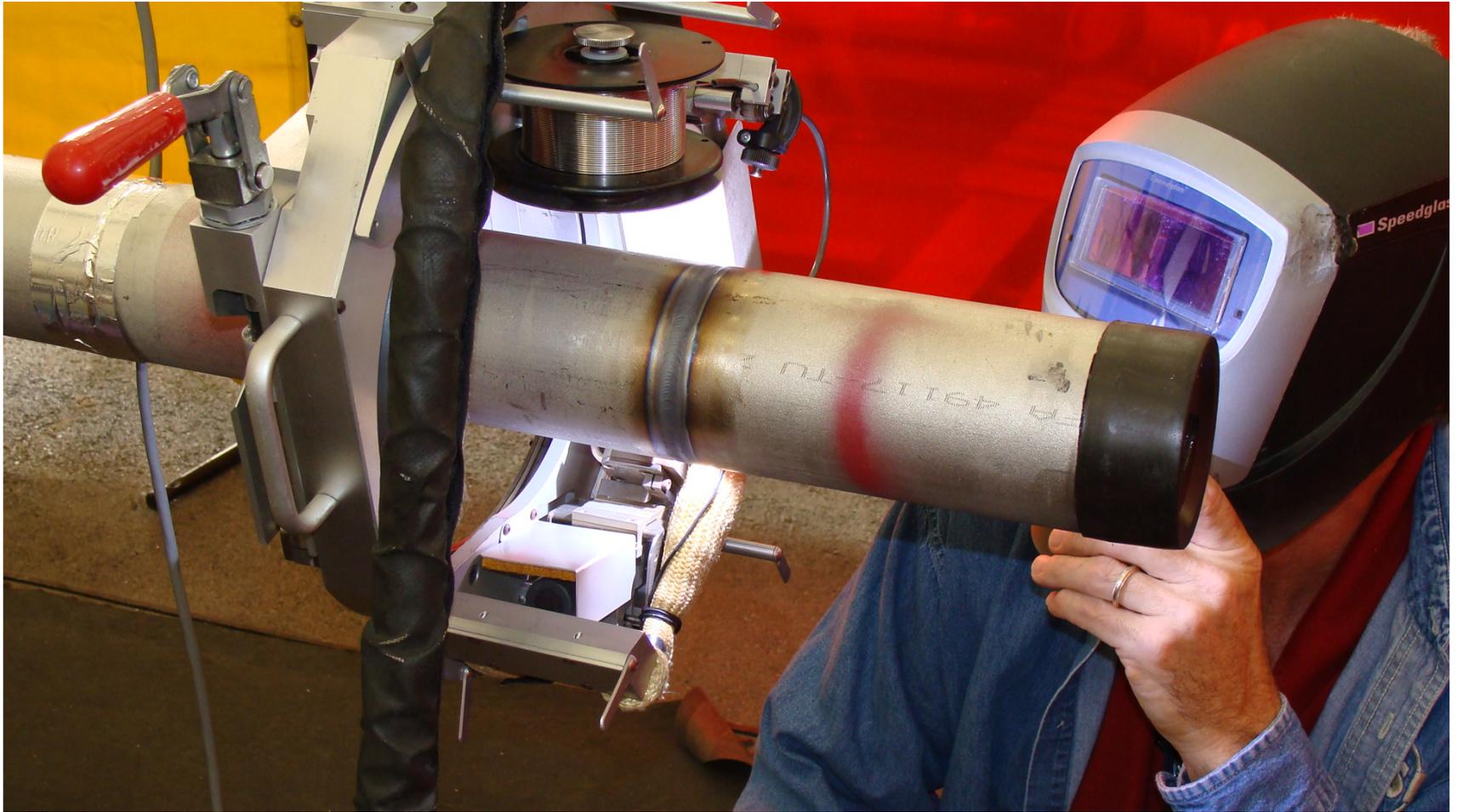
# MAGNATECH 433 ORBITAL WELDING HEAD ROOT PASS



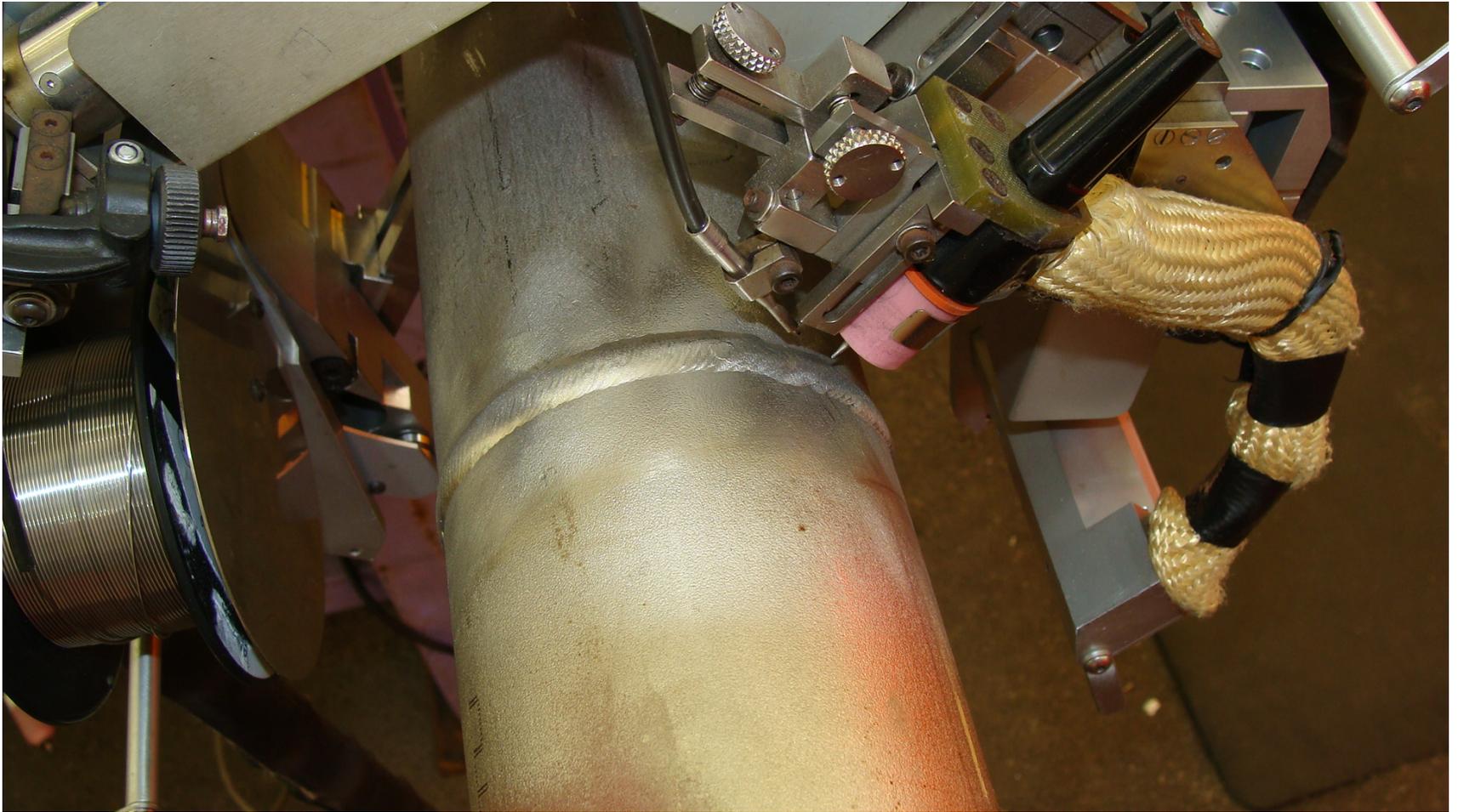
# ORBITAL WELDING HEAD COMPLETION OF ROOT PASS



# ORBITAL HEAD COMPLETION OF SECOND WELD LAYER



# ORBITAL WELD COMPLETION OF THE FINAL PASS



# BETTER VIEW OF COMPLETED ORBITAL WELD

