Field Welding of Titanium
Steps to Success
Overview

• Not HOW YOU WELD but HOW to ensure completion of a SUCCESSFUL PROJECT.

• You have the RFQ, now what do you do?
  – Information in the RFQ
  – Questions to be answered
  – Qualifications necessary to perform on-site work

• Keys to Success.

• On site welding example.
Define the Scope

- New Equipment or Used Equipment – MSDS
- Location of Chemical Plant -- contractor or safety license
- Welding required – Material system, Code, Elevated or Ground level
- Responsibility for Drawings and Prioritizing of work
- Scheduling and Timing of work
- Fixed Cost or Time & Material
Review of the Job and Bidding

- Pre-Bid meeting and walkthrough – customer & fabricator
- Field weld locations and number of welds identified
- Quality Control procedures / Material Management
- Safety certifications required
- Customer support required – general contractor
- Special requirements identified – facial hair, drug testing, safety training, union or non-union plant, etc.
Fabricator Selection and Coordination of Job Details.

- Fabricator Expertize, Welder Experience & Overall Capabilities
- OSHA Logs / EMR reports may be required
- Delineation of responsibilities
  - Safe Work Environment and Clear Access to work area
    - Scaffolding, platforms, plant safety equipment
    - Shielding from inclement weather / wind / rain / etc.
  - Appropriate Utilities – 110 electric, water, compressed air, 480V power
  - Rigging, lifting and moving of materials/equipment
Safety Requirements

• Local, state & federal safety requirements
  – Safety Certifications by government organizations?

• Chemical plant safety requirements
  – Training by company safety reps?
  – Safety training by Outside Organizations?
  – Time & Travel involved?
  – How many welders/ helpers to train?
  – Other fabricator personnel required – training required?
    • Supervisor / Safety rep / hole watch / fire watch?
Equipment Necessary

• Welding Machines, Gases & Weld Wire
• Consumables (Grinding, Cutting, Sanding, etc.)
• Hand tools (Die Grinders, Sanders, Saws, etc.)
• Personal Protective Equipment
• Field Trailer
• Transportation and Hotels
Selection of Field Fabricator

- Key Factors in Selection:
  - Experience working with Titanium
  - Field Fabrication Experience
    - With complicated jobs / unusual requirements
    - Check references
    - Safety Record
  - Engineering understanding of Requirements
  - Pre-award meeting to review details
  - Overall Cost (Price plus intangibles) to complete job
Titanium Clad Autoclave
Contaminated Weld
Contaminated weld area
Crack found by Dye Penetrant
Grinding of weld
Crack in junction weld after grinding
Final Excavated area
Welding with trailing shield

Chuck Young, Business Development Manager
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Overhead/out of position welding
Conclusion

• Steps to Success
  – Understand the entire project scope
  – Pre-bid meeting and walkthrough
  – Details, details, details
  – Safety requirements & training
  – Quality and on-time completion
  – **Lowest Price is not always least Total Cost.**
Thank you for your attention.

Chuck Young
Tricor Metals
chuck@tricormetals.com
330-264-3299  x 2500