

**GENERAL DYNAMICS**



03/23/07

# Hybrid Pipe Welding System at NASSCO

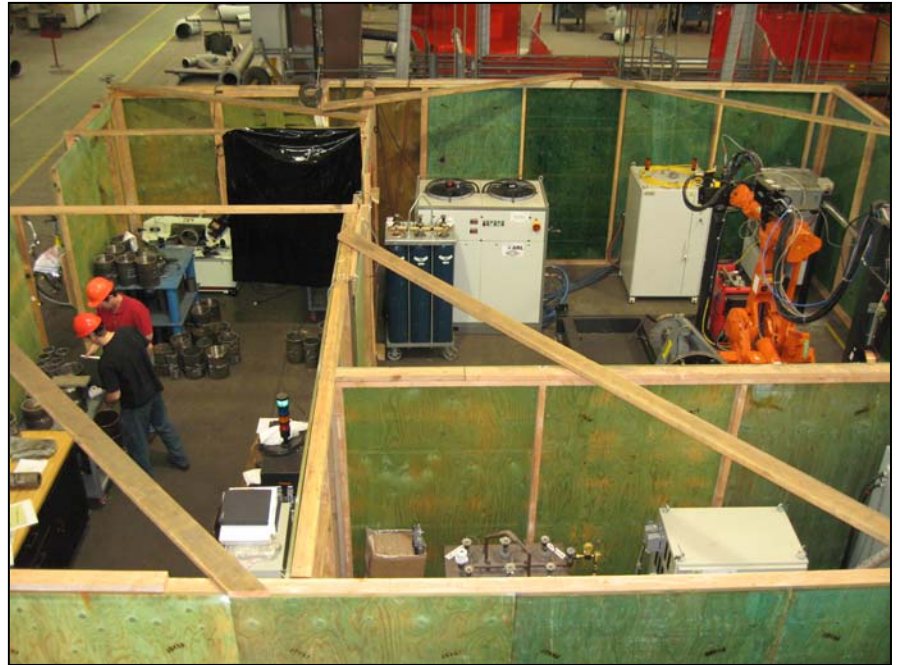
**PREPARED BY:**

**Juan Avalos  
Randy Doerksen  
Assistant Welding Engineer**

**APPROVED BY:**

**Michael J. Sullivan  
Chief Welding Engineer**

WELD ENGINEERING



## Aerial Views of the System Installed In GD NASSCO Pipe Shop.

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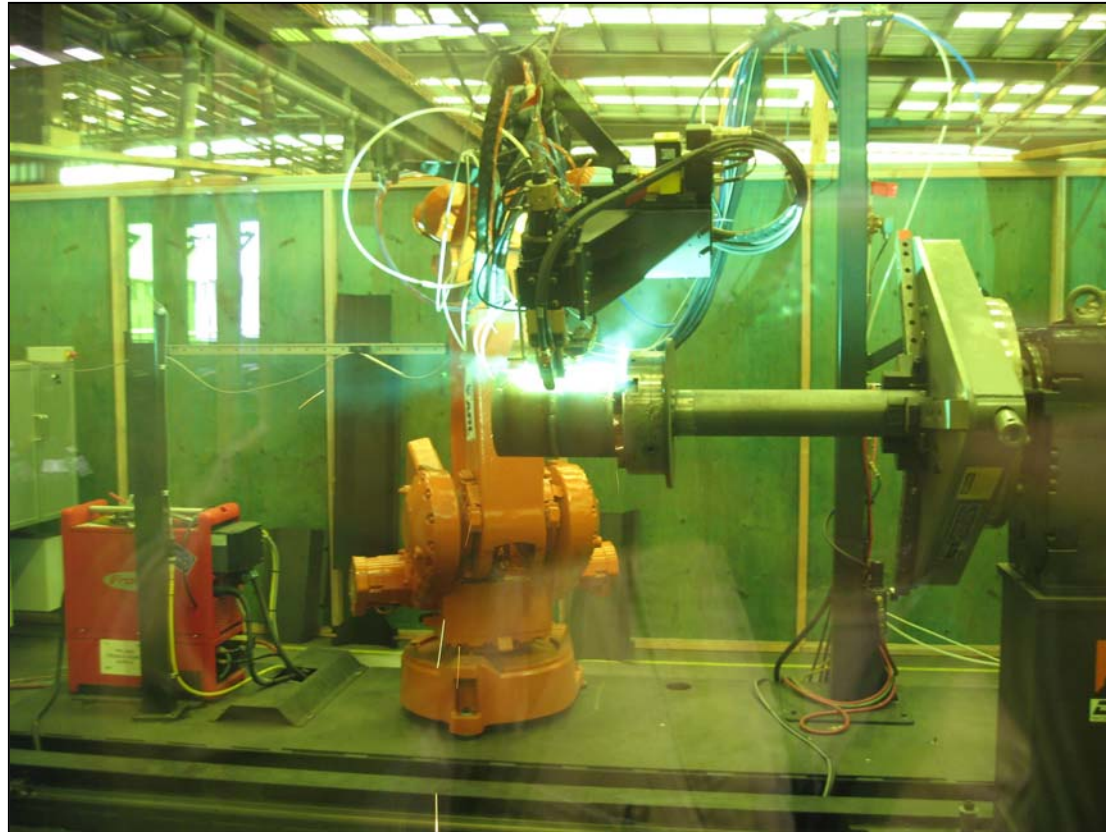


Operator teaches welding position

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## Robot Welding

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GENERAL DYNAMICS / NASSCO  
2798 Harbor Drive  
San Diego CA 92186-5278  
(619) 544-3599 / Fax (619) 544-7516

## PROCEDURE QUALIFICATION RECORD (PQR) NP-11A1.1

Laser-GMA Hybrid  
Base Material: CFe Pipe  
Filler Material:

THIS IS TO CERTIFY THAT THE PROCEDURE, AS LISTED ABOVE, HAS BEEN SATISFACTORILY QUALIFIED IN ACCORDANCE WITH THE REQUIREMENTS OF ABS 2006 RULES, AND THE SIGNATURES BELOW INDICATE APPROVAL OF THIS PROCEDURE.

PREPARED BY:  DATE: MARCH 22, '07  
Randy E Doerksen  
Assistant Welding Engineer

APPROVED BY: /s/ Michael J Sullivan DATE: MARCH 22, 2007  
Manager of Accuracy Control and Chief Welding Engineer

APPROVED BY:  DATE: MARCH 23 2007  
Don Haydock  
ABS, Engineer Materials Department

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Procedure Qualification Record No. NP-11A1.1 Revision No. --- Date 21, March 2007

FACE BENDS



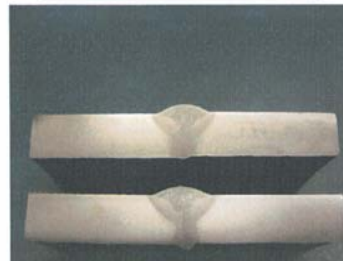
ROOT BENDS



TRANSVERSE TENSILES (2)



WELD MACRO-ETCH





Tacked



Welded

Small production test was run with these  
10 pipe samples took 69 minutes.