



JBBS

J. RAY McDERMOTT BUG & BAND WELDING SYSTEM

Overview

The J. Ray McDermott (JRM) Automatic Bug and Band Welding System (JBBS) is a state-of-the-art system incorporating the latest developments in pipeline welding technology. This system supplements the JRM Automatic Welding System (JAWS) which is used on larger diameter and longer pipelines. Together these systems provide capabilities to produce high quality welds at excellent rates of production strengthening JRM's place as a world leader in the installation of offshore pipelines.

The JBBS is an updated version of the Vermaat Technics Veraweld system. The original design utilized a single torch on each "bug". Vermaat, with input from JRM welding engineers, developed the dual torch version of the equipment increasing productivity with four torches welding simultaneously at each welding station.

JBBS Features

- Two dual torch bugs per station
- Automatic control of all welding parameters
- Programmable parameters can be changed as a function of radial location
- Exceptional mechanical properties
- Reduced lack of side wall fusion (pulsed mode)
- All welding done externally
- High production rates
- Repeatable, high quality welds
- Production flexibility; each station can complete an entire weld (programmed)

Welding Processes

The JBBS equipment typically operates in the Pulsed Gas Metal Arc Welding (GMAW-P) process. JRM, a leader in the use of Pulsed Mig for S-Lay offshore welding, has used the process in production since 1996. The JBBS equipment also operates in the conventional Short Circuit Gas Metal Arc Welding (GMAW-SC) process.

With a minor conversion, the equipment can also utilize the Gas Tungsten Arc Welding (GTAW) process.

Research & Development

JBBS development and support is centered at the Automatic Welding Facility in Morgan City, Louisiana. JBBS equipment is assembled, tested



and refurbished at this location. Welding procedure development as well as procedure and welder qualifications can be completed at this facility. A similar facility in Batam, Indonesia supports Eastern Hemisphere projects.

JBBS Project History

The JBBS equipment was first used by JRM in 1998. The first project was completed with single torch equipment operating in the GMAW-SC mode of transfer. The single torch equipment was replaced in 1999 with dual torch units using the GMAW-P process.

On May 26, 2000, the system laid 386 joints of 14" pipe in a single day on the Conoco West Natuna project in Indonesia. In 2001, the system was used on the EPMI Larut project in Malaysia. Production on the 12 in. x .437 in. pipeline peaked at 442 joints on May 12, 2001.

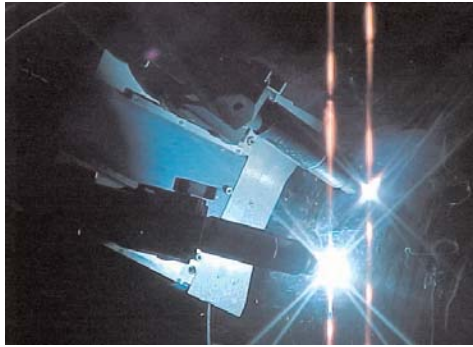
In early 2001, the JBBS equipment was adapted for J-Lay use on JRM's DB50 pipelay barge. The equipment was used to install deepwater Pipe-in-Pipe (PIP) pipelines on the Shell Serrano-Oregano and Crosby projects in water depths up to 4,400 ft. This application included installation of three critical Steel Catenary Risers (SCRs) including two Pipe-in-Pipe SCRs on Serrano-Oregano.

Welds made with JBBS equipment have met the requirements of API 1104 section 6, API 1104 Appendix A and DNV Rules. Non-destructive testing of JBBS welding includes radiography, manual ultrasonic testing (UT) and automated ultrasonic testing (AUT).

JBBS



Welding in 2G Position for J-Lay



Dual Torch Welding, GMAW-P Process



JBBS on Derrick / Lay Barge, DB16

AUTOMATIC WELDING JBBS SYSTEM HISTORY

INSTALL. DATE	PROJECT	PIPE SIZE	LINE LENGTH (Miles)
Sept. 98	Elf Maharaja Lela	18" x .500" - .750"	50.68
Apr. 99	IOC (India) Pipelines	24" x .437"	24.15
Apr. 00	Conoco West Natuna	22" x .508"	32.09
May 00	Conoco West Natuna	14" x .374"	30.60
Jun. 00	Conoco West Natuna	16" x .374"	7.18
Jul. 00	Shell Conger Pipelines	8.625" x 1.137" - 1.25"	9.67
Aug. 00	Shell Brutus Pipelines	20" x .562 - .812"	47.02
Sep. 00	Shell Brutus SCRs	18" x .750"	3.00
Apr. 01	EPMI Satellite Pipelines	18" x .563"	28.07
May 01	EPMI Larut Pipelines	12" x .437"	63.12
May 01	EPMI Satellite Pipelines	12" x .563"	8.70
Mar. 01	Shell Serrano-Oregano	6" in 10" Pipe-in-Pipe	14.54
May 02	Shell Crosby	8" in 12" Pipe-in-Pipe	20.18
May 02	Phillips Bayu Undan (CRA)	18" x .750"	4.77
Apr. 02	El Paso VK Gathering	12" x .500" to .688"	35.88
May 02	Murphy Medusa	12" x .500" & .688"	21.08
Aug. 02	BP Aspen	7" x .890" & 1.06"	32.61
Aug. 02	EPMI Palas-Guntong	24" x .752" & 1.063"	13.67
Sep. 02	EPMI Bintang (CRA)	18" x .535" & .661"	4.00
Sep. 02	EPMI Bintang (CRA)	16" x .500" & .598"	2.40
Nov. 02	Total Peciko	24" x 1.00" & 1.25"	18.03
Dec. 02	Total Carina	24" x .591" & .681"	50.94
Dec. 02	Total Aires	18" x .409" & .543"	14.97
Apr. 03	Conoco Belanak (CRA)	16" x .743"	4.85
May 03	Conoco Belanak	24" x .540"	59.00
May 03	AIOC (Azerbaijan) FFD	30" x .811" & .965"	115.55
Aug. 03	AIOC (Azerbaijan) FFD	28" x .689" & .890"	115.91
		TOTAL:	832.66