Welding Technologies

Transfer of welding technologies from offshore to onshore pipeline construction

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Agenda

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2. Serimax welding expertise & philosophy
3. Pipeline welding challenges
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   b. Corrosion-resistant alloy specific components
   c. Saturnax bug & band external welding system
   d. Fatigue-specific welding processes
   e. Quality control modules
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Introduction to Serimax

Serimax is a full service welding company offering premium integrated welding and fabrication solutions for land and sub-sea projects. We tailor our solutions to our client’s specific project needs, providing the most appropriate technology and specialized personnel who work safely and efficiently, to ensure we meet and exceed client requirements on the world’s most challenging projects.

Since 2010, Serimax is part of the Pipe Projects division within the Vallourec Group.
Introduction to Serimax

800+ people
20,000-strong workforce as part of Vallourec Group

The Serimax skillset spans operational, technical, logistical, R&D, engineering, training, heavy lift and fabrication and all elements of project management. Our experienced personnel include automatic and manual welders, electrical and mechanical technicians, plant and mechanical operators, HSEQS and R&D specialists, logistical teams and support services to support our project needs.
Introduction to Serimax

A BIT OF HISTORY...

1974
SERIMER, BUILT FOR OFFSHORE, DIVISION OF ETPM (STOLT OFFSHORE)

2004
SERIMER BOUGHT OVER BY PRIVATE FUNDS

2006
ACQUISITION OF UMAX

2010
SERIMAX BOUGHT OVER BY VALLOUREC GROUP

TODAY
WELDING SOLUTIONS FOR OFFSHORE, ONSHORE, SPOOLBASE/MULTI-JOINTING & FABRICATION WORLDWIDE

WHO ARE WE?

International welding partner, for offshore and onshore pipelines, as well as subsea and onshore fabrication.

Serimax is regionally organised, with a centralised function for R&D, Supply chain management, and Assets.

800 employees
200,000 welds
23 countries
80 projects
Introduction to Serimax

Our worldwide presence

NORTH AND CENTRAL AMERICA
Houston

NORTH EUROPE
Evanton
Stavanger

EUROPE, MIDDLE EAST, AFRICA & COMMONWEALTH OF INDEPENDENT STATES
Mitry Mory
Villers Cotterêts
Moscow
Saudi Arabia

ASIA PACIFIC
Singapore
Pasir Gudang
Perth

SOUTH AMERICA
Rio de Janeiro

CORPORATE HQ
Villepinte

Vallourec Group
Introduction to Serimax

Vallourec Group organisation
World leader in premium tubular solutions
Introduction to Serimax

Global Solutions – Vallourec Pipe Project Division

A WIDE RANGE OF PIPING & WELDING SOLUTIONS & SERVICES
FOR
ONSHORE AND OFFSHORE APPLICATIONS
Serimax Welding Expertise & Philosophy

FOUR SERVICE LINES:

In-house expertise:
- Proprietary technology
- Skilled operational workforce

Customer focus: delivering customised welding solutions

Robust and versatile solutions across our four service lines
Pipeline Welding Challenges

OFFSHORE

HSSE
HIGH PRODUCTIVITY
HIGH WELD QUALITY
QUALITY CONTROL
OPERATIONAL SUPPORT

ONSHORE

HSSE
SPREAD EFFICIENCY
HIGH WELD QUALITY
QUALITY CONTROL
OPERATIONAL SUPPORT
Applying offshore value-added onshore

Development of solutions to fulfill stringent offshore project requirements

Understanding of onshore market requirements, and evolution of requirements

Adaptation or pure transfer of solutions designed for offshore, to onshore applications

ONSHORE:
Towards an increasingly stringent normative environment.

Towards welding solutions for higher grade pipe materials for such applications as sour gas or Arctic.

Towards higher quality control standards
Alignment & Clamping Equipment

TECHNICAL APPROACH

The powerful pneumatic Internal Line-Up Clamp (ILUC) was designed to ensure optimum pipe alignment, reduced high-low, and therefore, improved weld quality (root pass), for Serimax's offshore projects (even fatigue-sensitive lines such as OOLs).

For onshore projects above 30 inches in diameter, the ILUC was adapted into the MAXILUC with re-rounder capabilities, to help improve pipe geometry, a frequent problem for onshore pipeline construction. This in turn would lead to improved alignment, reduced high-low, and therefore, improved weld quality (root pass).

Landline adaptations include:
- Increased power in clamping for re-rounder function
- Powerful braking system to ensure a complete and safe stop during automatic move-up
- Wifi-operated automatic clamp move-up controls
- High speed moving
**OFFSHORE**

*First outing of the powerful ILUC:*

**Erha Project, Nigeria – Stolt Offshore for ExxonMobil in 2006.**

Welding of offshore offloading lines onboard the Acergy Polaris.

4.5, 6.625, 10.75 and 12-inch in X65 and Inconel. 20 and 22-inch OOL welds in X60.

*First outing of the MAXILUC offshore:*

**Mexilhao, Brazil – Acergy for Petrobras, 2008.**

Welding of 34-inch double-joints, X60.

**ONSHORE**

*First outing:*

**Big Project, USA – Sheehan for ConocoPhilips, 2007**

Scope of work:
50 km x 42 inch (13.2mm to 19mm); X70

**SpieCapag for Yemen LNG, 320km of 38”**

*Current projects:*

**France for GRTGaz, lot E381-1, AHF2 72km of 48” (Nédon – Corbie)**
Corrosion-Resistant Alloys: Specific Equipment Components

TECHNICAL APPROACH

The Roxane system, used in combination with the Serimax ILUC range for welding on corrosion-resistant alloys (CRA), is a modular, controlled and fully-automated gas purge unit.

This gas purge unit enables the regulation of the oxygen content in the welding shielding gas used to perform the weld. The presence of oxygen is responsible for oxydation and therefore, may potentially lead to corrosion.

Controlling the level of O₂ content is therefore an essential part of welding operations, in order to guarantee weld quality.

The Scanvision is used on CRA projects for internal visual inspection (acceptance and recording) purposes.
Technology Transfer

OFFSHORE

First outing of Roxane:


4.5, 6.625, 10.75 and 12-inch in X65 and Inconel. 20 and 22-inch OOL welds in X60.

Recent projects with Roxane:

OSO RE, Nigeria – Subsea 7 for ExxonMobil in 2011.

Welding of X60 & Clad 825/625.

First outing of Scanvision:

Tyrihans, Norway – Acergy for Statoil in 2007.

Internal visual inspection.

Recent projects with Scanvision:


Welding of 8 and 10-inch % Cr PIP.

ONSHORE

First outing and current project for Roxane & Scanvision:

In Salah Gas, Algeria – Bonatti for ISG, 2012.

8.625, 12 & 16-inch (7.9 to 23.8 mm), 13% Cr

Welding corrosion-resistant alloys in a desert environment means that all auxiliary components need to be adapted to hot and humid conditions, to ensure full reliability and robustness of gas purge system and Scanvision electronics. Internal temperature of 80° C, external up to 55° C.
Saturnax Welding System

**TECHNICAL APPROACH**

With its dual-torch system, weld metal deposit is doubled for every run, halving the welding cycle time. Generally used in a 2-bug configuration, four torches per station ensure that welding efficiency is attained without the need for equipment-intensive welding spreads. In particular, the technical capabilities of the Saturnax allow integral welding possibilities with a single station, and using the same welding consumables (wire and gas) from root to cap.

External welding can be performed with or without the use of copper backing shoes, by varying the chosen welding process. The Saturnax has welded in automatic Gas Metal Arc Welding (GMAW), Pulsed-GMAW, Surface Tension Transfer (STT), or Cold Metal Transfer (CMT).
Technology Transfer

OFFSHORE

First outing:

Hidra, Argentina – ETPM for TOTAL in 1988
Welding of 12, 20 and 22-inch, X52 onboard the DLB1601.

Recent project:


Current project:

CLOV, Angola – Subsea 7 for TOTAL onboard Polaris, 2012.

ONSHORE

First outing:

Beaver Lodge, Canada – Bannister for Nova Corp in 1994
Welding of 42-inch, X70.

Past production records achieved on:

Ras Al Zaur to Riyadh Water Line, Saudi Arabia – Mapa-Limak-MNG for SWCC.
Welding of a 72-inch water line in desert conditions. Production record of 103 welds per day with two spreads.

Yemen LNG for SpieCapag.
38-inch of X70, in desert conditions. Production record of 137 welds per day.
The STT Welding Process

TECHNICAL APPROACH

STT combines:
- Reduced energy
- Improved energy control through droplet by droplet control of the welding pool penetration.

The STT process may achieve a smooth root profile of the weld and may be used without a copper backing shoe. This in turn allows higher resistance to fatigue/mechanical constraints thanks to improved geometry STT is therefore a popular welding process for fatigue-sensitive lines offshore.

Onshore, Serimax has actively promoted this technology for pipeline welding where restrictions have been placed on the use of copper backing shoes with external welding systems or internal coating.
Technology Transfer

OFFSHORE

First projects:

Nakika Project, USA – Coflexip Stena Offshore for Shell in 2003.
10.75, 16, 18 and 20-inch welds of P-i-P and SCR (2G position).

10 & 12-inch lines of X52 + Clad 625 or Clad 625/825, in SCR or flowline.

Since Nakika, all SCR welds have been welded in STT.

ONSHORE

First outing:

Welding of 32-inch (10.9-19.3 mm) in X70.

Recent project:

Welding of 70km of 40” and 3km of 48”.
Quality Control

TECHNICAL APPROACH

Compliance with the highest standards for quality control are a significant aspect of developing offshore welding solutions and welding engineering for offshore, due to the environmental constraints of the offshore environment, and the complexity of pipeline integrity management in case of a lack of quality.

Quality control is becoming increasingly stringent onshore, with reports/documentation required more than ever.

Serimax’s in-house developed Quality Control modules (Orwell and new generation Clever Weld), designed for the offshore pipeline welding requirements, have been integrated on Serimax’s welding equipment, and automatically transferred to onshore welding projects.

High-performance offshore-driven QC technology allows top-of-the-range QA/QC reporting in real-time, accessible by wifi.

In-house designed advanced QC software integrated into Serimax equipment also helps reduce the number of personnel on site, leading to improved and simplified QA/QC reporting, while reaping economic and HSE benefits.
Conclusion

• Welding technology, methods, operations and solutions were developed by Serimax to fit the stringent requirements of offshore welding

• As the onshore pipeline construction industry becomes more and more technically challenging, Serimax has adapted and/or transferred technology and solutions designed for offshore to onshore applications

• Standard external-welding equipment solutions (eg. Saturnax) coupled with customisable technical approaches (eg. STT) have enabled success worldwide both offshore and onshore
Fulfilling Pipeline Welding Challenges

**OFFSHORE**
- HSSE
- HIGH PRODUCTIVITY
- HIGH WELD QUALITY
- QUALITY CONTROL
- OPERATIONAL SUPPORT

**ONSHORE**
- HSSE
- SPREAD EFFICIENCY
- HIGH WELD QUALITY
- QUALITY CONTROL
- OPERATIONAL SUPPORT