Weld inspection in the firing line

Richard Brown, Engineering Manager
Introduction.

- Oil and gas sector still faces challenging times
- Supply chain placed under huge strain
- Barrel price nearing US$60/bbl in 2017
- Green shoots of recovery starting to appear
- Projects starting to emerge

So what is OMS doing about this?
Innovation.
Creating technology to meet sector demands

Collaboration.
Partnering with organisations to exploit strengths

Flexiblity.
Offer agile, versatile and tailored services
Focus on innovation.

How can innovation play a role in such challenging market conditions? By providing the route to discovering previously unidentified cost-efficiencies that enable projects to become viable in the short term and profitable in the long term.

Weld inspection, specifically in the firing line is one area where pipeline operators can benefit from new technology.
Inline weld inspection.
In spoolbases and on pipe-laying vessels

Currently, weld inspection services are required to determine if a weld meets specification and to identify potential defects in order to ensure integrity over the pipelines lifetime.

Current methods include:

- Automated Ultrasonic Testing (AUT)
- Radiography Testing (RT)
- Internal laser and camera inspection (OMS)
OMS inspection process.

See
Visual inspection

Measure
Laser inspection

Verify
Analysis
Why inspect?

Achieving a consistently high quality of welded joint is crucial to subsea pipeline construction. The internal laser and camera inspection of a pipe joint will help to:

- Ensure specifications are met
- Reduce time taken for cut-outs and weld repairs
- Minimise unnecessary downtime
- Assure asset lifespan
- Prevent pipeline failure
Weld inspection considerations.

- Inspection can occur at a spoolbase, or offshore, in both the horizontal (S-Lay) and vertical (J-Lay) orientations.

- Stringent welding specifications, e.g. for CRA, may specify camera and laser profilometry.

- For offshore welding, early inspection is essential, i.e., immediately after the root and hot pass.
Where does laser profilometry fit into an inspection strategy?

For CRA lined pipe projects, 100% inspection of the root pass is mandatory:

- The boundary between the CRA liner and the pipe wall interferes with the Ultrasonic technique when inspecting zone C.
- As a result, Radiography is used to assess the root and hot pass (zone C) before the fill passes are added.
- Both these techniques have difficulty accurately quantifying excess root penetration or concavity, this is where laser profilometry is the most applicable technology.
Weld features.
Detected and quantified by laser

- Re-entrant angle
- Root concavity
- Lack of penetration
- Linear misalignment (HiLo)
- Concavity / suckback
- Undercut
- Root penetration
- Cracking
- Incomplete fusion
Wire inclusion  
Lack of penetration  
Burn through  
Concavity  
Burn through  
Poor purge
Introducing Auga™
Technology innovation: Auga™
Can be used on a Lay Barge or a Spoolbase firing line
Auga™ overview.
Real time verification in the firing line

• Attaches to the rear of the Internal Line-Up Clamp (ILUC) and performs a complete 360° scan of the root pass in under 20 seconds

• Adjusts scan head position for different pipe lengths
Seamless integration.

- Auga weld inspection takes place in parallel with fill passes, thereby staying off the critical time path
- Works in conjunction with WeldAnalysis software
- Records detailed weld geometry and an accurate 3D topographic map of the weld
- An Excel report is automatically generated highlighting weld attributes
Real time weld verification in the firing line.
Introducing WeldAnalysis software
WeldAnalysis overview.

• Supporting Auga is a new version of OMS’ proprietary WeldAnalysis software.

• This unique, powerful software processes data from weld inspection tools, highlighting specific features. This allows the operator to quickly analyse and pass the weld.
WeldAnalysis interface.
The Auga served the purpose very well ... exactly the tool required ... it will be recommended for future work!

Terry Breaux, Technology Manager, McDermott
We have worked for all the major owners operators, installation companies and welding contractors.

Acergy / Acute / Allseas / Apache / BP / Bayou / Bredero Shaw / Butting
Ceona / Chevron / Cladtek / CRC Evans / Doosan / EBK / Edgen Murray
Ersai / ExxonMobil / FMC / Globestar / GMC / GRT gaz / Heerema / Hess
HHI / Isleburn / Kencana / JP Kenny / Larsen Toubro / Marathon Oil
Marubeni Itochu / McDermott / Murphy / Nippon Steel / Oceaneering
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Subsea Structures / Sumitomo / Tata Steel / Technip / Tecnicas Reunidas
Total / TWI / V&M / Vision Survey / Wellspun / Williams / Woodside
Benefits of OMS weld inspection.

- Useful during welding trials to optimize welding parameters
- Check root weld and geometry before further passes
- Reduction in cut-outs
- Rapid real-time full reporting with documentation
- Fewer defects at the AUT stage
- Improve overall productivity and efficiency
- OMS supplies CSWIP qualified operators
Thank you for your time.
Please don’t hesitate to ask further questions.