Subsea Springboard

Focus on Reducing Operational Costs

17th November 2016
Agenda:

08:00 Introduction and Welcome
Trish Banks and Gordon Drummond

08:05 Lowering the Cost of Hydraulic Subsea Intervention – Paul Armitage, Managing Director, Secc Oil & Gas

08:20 Toolchanger: Is it a Game-Changer? – David Currie, Head of Subsea Tooling, J2 Subsea

08:35 Procurement by Fear, Uncertainty and Doubt – Matt Blair, Subsea Engineering Director, Systems Engineering and Assessment

08:50 Retrofit CP Monitoring to Reduce Inspection Frequency – Andy Smeardon, Managing Director, Aquatech Group

09:05 Knowing the Unknown: Discovery Computer Tomography Scans – Lee Robins, Head of Subsea Services, Tracerco

09:20 J- Tube & Riser Inspection: Prevent Pull-in Delays – Mat Meredith, Technical Director, AISUS Offshore

09:35 Minimising Risk – Maximising Value – Chris Tierney, Managing Director, SETS
Subsea UK Springboard - Focusing on Reducing Operational Costs 17-11-16

Lowering the Cost of Subsea Intervention Operations

Using Proven Emergency Quick Disconnect (and reconnectable) Technology

Secc Oil and Gas

Paul Armitage – Managing Director
pa@secc-oilandgas.com http://secc-oilandgas.com/
Well Intervention Excellence Network – OWI-2014

Activity Levels & Success Rate (2010-2012)

- Intervention intensity decreases as we move to more expensive environments
- Risk averse culture in subsea well interventions despite high technical success rate (and reasonable unit costs)
- Lowest contribution to production in subsea wells
Need for genuine innovation in assisting clients – deep understanding of the issues that affect client well population, fit-for-purpose operations and reduction in unnecessary rates/equipment
Intervention Methodologies

- Riserless or Rigless Production
- Hydraulic Well Intervention
- Riserless Well Intervention

Deepwater Intervention Forum (DIF), 9th-11th August 2016
Hot Make Hot Break

Pressure balanced full bore EQD capable of being re-connected subsea.
DNV qualified.
Designed and manufactured in accordance with API 6A 17D, API 6A & 17D PSL 3 and PSL3G and future API 17G and 17G2.
9:00 AM – 10:30 AM

Session V: Hydraulic Intervention

To define areas of efficiency in all aspects of intervention through innovation, technology and proven best practice solution.

Session Chair: Daniel Vela / Director Business Development, Oceaneering Service

Session Chair: Ronnie Northcutt / Wellbore Recovery Sales Manager, Baker Hughes Inc.

Will Mack, P.E. / Facilities Engineer, Brownfield Projects, BHP Billiton Petroleum

Topic: Shenzi Water Injection Well Remediation - A Proposal

Phillip Rice / Chemical Engineer, OneSubsea

Topic: Subsea Modular Injection System

Andrea Sbordone / Technical Sales Manager, FMC Technologies

Topic: Flowline Hydrate Remediation - An Innovative System and its First Operation

Bin Xie / Project Engineer, Oceaneering

Topic: Development of a Rigless Pumping Intervention System
Secc – Our Vision:
To lead through innovation and ground-breaking connector technology

<table>
<thead>
<tr>
<th>The Safety Case</th>
<th>The Commercial Case</th>
<th>Aftermarket Service and Spares</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Improve the safety levels of subsea and topside interventions and fluid transfer operations</td>
<td>• Enhance operational flexibility</td>
<td>• Full Supply of Spares for all Products.</td>
</tr>
<tr>
<td>• Remove the need for guillotine type mechanisms</td>
<td>• Reduce the impact of vessel availability</td>
<td>• Storage and Servicing of Connectors.</td>
</tr>
<tr>
<td>• Provide protection to personnel, vessels, subsea infrastructures, and other material assets</td>
<td>• Lower the cost of operations and improve cost effectiveness</td>
<td>• Full Yearly Maintenance of Connectors by Qualified SECC Service Engineer on site at your location.</td>
</tr>
<tr>
<td>• Eliminates the risk of fluid loss during disconnection, and therefore are an environmental safeguard</td>
<td>• Reduce deferred oil revenues</td>
<td>• Full Support at FAT &amp; SIT tests.</td>
</tr>
<tr>
<td>• Enable reliable and quick connection and controlled or emergency disconnection at full working pressure</td>
<td>• Contribute to increased production</td>
<td>• Offshore Operational Support.</td>
</tr>
<tr>
<td></td>
<td>• Enable operations to increase oil recovery, revenues, and profitability</td>
<td>• Full 5 Year Maintenance Option.</td>
</tr>
</tbody>
</table>
SECC – Current Client List
The Subsea Tooling Specialists

Subsea UK “Focus on reducing operational costs”
J2 Subsea 4 Port Tool Changer
Tool Changer
What is the Tool Changer?

- Quad port subsea hot stab
- Rated to 5000m depth
- Zero Leakage (on 345 bar) / No spill
- Safety - Emergency Disconnect, mechanical override release, dead-sub
- Developed in partnership with Walther Precision Couplings
What do you get?

- Greatly improve the way ROV tooling is utilised subsea
- Allows ROV to connect with tooling seabed with zero-leak
- Offer significant time savings and cost savings for operators
- Safety by using Locking Mechanism under operational pressure
- 250kg Lifting Capacity
Tool Changer Operation – 3D Animation
Range of tools

The Subsea Tooling Specialists
Tool Changer fitted on Wellhead removal tool
How can Toolchanger reduce operational costs?

- Save time when ROV’s have to be recovered to surface
- Save possibility of damage bringing ROV’s through splash zone and on deck
- Save any costs of clean up / penalties for leak or spills
- Allow ROVs to have many more tools subsea than can be fitted to ROV
- Reduce operational costs by allowing ROVs work longer subsea and doing more

The Subsea Tooling Specialists
Tool Changer = ROV Game Changer?
Reducing Operational Costs

“No one ever got fired for buying an ______”
or
“Procurement by Fear Uncertainty and Doubt”

Matt Blair
Subsea Engineering Director
NSRI November 2016
What SEA does in Subsea Engineering
Why are we where we are?

- In the 1980s subsea technology didn’t exist, and the industry turned to the defence industry for solutions

- The technologies go back to Ferranti and Marconi amongst other

- Excellent companies producing excellent ground-breaking technology

- This is 2016 and the market and technology have moved on

- Role of the SME

- It has taken the oil price crash to reveal the inefficiencies and behaviours that have been allowed to develop in our industry
“No one ever got fired for buying an ……….”

What is Fear Uncertainty Doubt

FUD is used to spread questionable information about less well known products, threats over warranty and support

Why is this used

To discourage decision-makers from choosing those products over its own

What is the result

Companies will buy equipment that they know to be technically inferior because upper management is more likely to recognise the brand, or engineers are tied by supply chain agreements

In this industry you often couldn’t / cant go elsewhere

We know when “Acme” have been doing a campaign in town
The Slide you didn't see

- Monopoly mentality – OEMs and key suppliers
  - After-market support is unresponsive and very expensive
    - Weeks or months to get a quote
    - Months longer to get a delivery date
    - They are too busy delivering the $multimillion project to Brazil
    - They want to sell you the next model, not support the one you have
    - FUD
  - If their kit is permanently installed on the seabed it is easier to replace compatible equipment – i.e. theirs
    - If you are replacing everything, replace with non-proprietary
Supply Chain

- Two of the majors can't/won't deal with us directly
- "You are too small" - I was told this at a supply chain event in 2015
- FPAL - damned if you do/damned if you don't?
- vs
- ISO 9001, 14001, 18001
- Who is driving the commercial decisions and why
- Contracting models – contract for availability
- Second sourcing
- The “Kwik Fit” model
- Frame agreements
Electro-hydraulic stab plates
Polyethylene Moulding

- Used for hull penetrators on nuclear submarines
- Our first EDB product
- 40 /292
- Renewables experience
Subsea Distribution Unit
Subsea Electronics Module / Control Module

Applications

- Brown field
- Small pools
- Replace technology unsupported by original supplier
- Battery / Renewable power
- Pre-abandonment monitoring
- Workover tooling
- Full SCM developed and now testing
SEA in the Market

- Sir Ian Wood 24th Feb 2014

- J+S 22nd Dec 2011

4. The new Regulator will set its own priorities but from my Review I believe these should be:

- Working with Industry to significantly improve production performance and increase reservoir recovery;
- Encouraging and working with Industry to tackle the spiralling increases in exploration, development, production and decommissioning costs;
- Encouraging and facilitating both better deployment of current technology, and the development of new technology. There is an urgent need for Industry to focus in depth on the five or six most critical technology challenges.

- We understand your operational needs
- We are responsive
- We have a solid engineering background
- We work to open standards whenever possible
- We already provide all the other asset support services that you need
- We will set up a frame agreement to simplify contracting and to fix rates
- The current model isn’t working – we are offering a new model
- You have an alternative
Retrofit CP Monitoring to Reduce Inspection Frequency

SUBSEA SPRINGBOARD
Focusing on Reducing Operational Costs

Andy Smerdon – MD, Aquatec Group
17 November 2016

www.aquatecgroup.com
The Challenges

AGING OFFSHORE STRUCTURES

• 5-25 year life extensions
• Sacrificial CP depleted
• Impressed current CP systems damaged or failing
• New infrastructure can rapidly drain CP
• Regulators require reinstatement of protection

INSPECTION DIFFICULTIES

• Reliable and consistent data needed to inform decisions
• Subjective & vague GVI: “anode 90% depleted”
• CP surveys:
  – Erratic time series
  – Inconsistent physical locations
  – In optimum conditions
Solutions

CP MONITORING TOOLBOX

• Fixed Point Monitoring
  – Year-round, identical location in all sea conditions
  – CP Potentials
  – Actual Anode Currents

• Through-Water Communication
  – Acoustic for multiple locations
  – Optical for data retrieval
Case Study

- UK North Sea platform
- 40 years old
- Requirement for 15 year life extension
- Multiple SACP sleds selected as optimum method
- Regular updates of cathodic protection potentials and sled anode current
- All data logged subsea for rapid ROV retrieval
Case Study

- 22x SACP Anode Skids
- All fitted with Current Monitors
- 14x CP Potential Monitors
- 4x Data Loggers & Optical Comms
Case Study

- Potential Monitoring
- Current Monitoring
- Sacrificial Anode CP
- Data logging

Acoustic Receiver

Sacrificial Anode Skid + Current Monitor + Data Logger

Potential Monitor 1 of 14

Collect real-time data

Retrieve logged data

Transmitting CP data acoustically

Return Current

Sense Potential Drop
Alternative Applications

• Up to 64 monitored potentials or currents on large structures…
• or just one or two on a remote tieback
• Can also use for closed loop Impressed Current control
• Data retrieval by vessel of opportunity e.g. Supply vessel = low cost
Summary

• Retrofit CP monitoring solution for aging offshore platforms, pipelines, and tiebacks
• Can be pre-installed on retrofit sleds for as little as zero extra ship time
• Provides consistent time series on demand
• Acoustic data retrieval by vessel of opportunity
• Can recoup costs by saving just one inspection campaign over lifetime
Thank you

Q & A
Tracerco Discovery™
Knowing the unknown, and mitigating uncertainty in pipeline inspection

Using Subsea CT Scanning for real time pipeline visualisation

Subsea UK Springboard Event
17 November 2016
Addressing Two Key Issues

“It is believed that up to 40% of the world oil and gas pipelines are deemed to be unpiggable.”


There are no reliable subsea detection tools to accurately detect and characterise hydrate, wax, scale and asphaltene blockages.
Tracerco Discovery™

- Based upon medical Computed Tomography (CT) principles

- Now, for the first time, CT technology has been taken subsea for the inspection of any type of flowlines
  - allowing visualisation of pipeline integrity and contents
Tracerco Discovery™
Real-time data transmission
Unpiggable Pipeline Integrity
Coated Line Integrity

No cost or risk of coating removal, Ovality of pipeline under coating, Condition of coating and rebar.

Save as much as 35% on the total cost of life extension inspection projects by scanning through coatings.
Coating Integrity

Void within asphalt/mastic field joint coating extends over full length of field joint
No evidence of associated external corrosion (yet)
Pipe-in-pipe integrity

Outer pipe wall thickness, Inner pipe wall thickness, Inner pipe concentricity, Annulus integrity
Pipe Bundles

Outer carrier wall thickness, Wall thickness and contents of each inner pipe, Deposition build-up
Piggyback/unusual inspections

Inspection of main export line for lifetime extension purposes. NO coating removal AND NO uncoupling of piggy back gas lift line.

Knowing the Unknown – water lay-down was detected in sections of the gas lift line.
Flexible Pipe – SWA damage
Flexible Pipe – Carcass Blow-out
Flow Assurance Applications

Multiphase Flow – Static and Flowing Images

Static – Water/Oil/Gas

Flowing Conditions
Flow Assurance Applications

Asphaltene Blockages

A high percentage of remediation campaigns are ineffectual due to lack of accurate information; wasting millions of dollars and losing months of production time.
Flow Assurance Applications

Scale and Hydrate Blockages

Knowing the amount and type of deposition prior to cleaning allows you to plan an effective and efficient cleaning campaign, reduces operational downtime, and minimises lost production.
Tracerco Discovery™
Knowing the unknown, and mitigating uncertainty in pipeline inspection

Using Subsea CT Scanning for real time pipeline visualisation

Subsea UK Springboard Event
17 November 2016
J-TUBE AND RISER INSPECTION
‘PREVENT PULL-IN DELAYS’

17th November 2016

Mat Meredith, Technical Director
OVERVIEW

• INTRODUCTION
• POTENTIAL PULL-IN DELAYS
• J-TUBE & RISER INSPECTION CHALLENGES
• PREVENTING PULL-IN DELAYS
• SUMMARY
AISUS Offshore – Automated Inspection Solutions & Underwater Services

- Remotely deployed **visual** and **ultrasonic** inspection solutions.
- A **specialist** in the inspection of caissons, risers, J-tubes, I-tubes and conductors.
- Completed >100 inspection projects with **zero accidents** or incidents.
INTRODUCTION - J-TUBE & RISER UTILISATION

• Many spare Risers/J-Tubes on existing Platforms
• Ideal conduit for flexibles, umbilicals, cables etc. for tie-backs, power, communications
• Can be used for process purposes (new risers)
• Often no inspection data since installation (30+ years ago in some cases)
POTENTIAL PULL-IN DELAYS

- Drawings don’t match as-built status
- Debris/foreign objects present
- Hang up of pulling head on damaged/deteriorated pipe
- Unexpected bends or kinks
- Difficulty running along horizontal sections
J-TUBE/RISER INSPECTION CHALLENGES

- Length & Depth – 200m or more
- Access from platform
- What’s inside?
- What is the actual ID?
- How much of it is left?
J-TUBE/RISER INSPECTION CHALLENGES

• Length & Depth – 200m or more
  – Long horizontal sections

• Access from platform
  – Often inaccessible
J-TUBE/RISER INSPECTION CHALLENGES

• What’s Inside?
J-TUBE/RISER INSPECTION CHALLENGES

• What’s the ID?
J-TUBE/RISER INSPECTION CHALLENGES

How much of it is left?
• Platform based operations
• Upfront Inspection & Cleaning
• Diameter proving
• Thickness measurement
• Messenger line installation
PREVENTING DELAYS – HP WATER JET CLEANING

- Removes just about anything!
- Deployed from topside
- More effective than brush pigs
- Flushes debris out of open tubes
- Debris collection options
  - Rotating and fixed cleaning heads available

Title: Subsea UK Springboard Presentation
Presenter: Mat Meredith, AISUS Offshore
PREVENTING PULL-IN DELAYS – INSPECTION

- Identification of defects/foreign objects
- Weld condition
- Pipe Alignment
- Surface condition
- Lightweight equipment
- 200m Height of Lift Hoists
EXAMPLE VISUAL INSPECTION DATA

37.50m

1.6m Section
280 still images

39.10m
PREVENTING DELAYS – DIAMETER PROVING
PREVENTING DELAYS – MEASUREMENT

- UT Inspection
- Thickness measurement
- Diameter measurement

![Diagram showing UT probe and measurement process]

KNOWN

MEASURED

UT PROBE
PREVENTING DELAYS – MESSENGER LINE INSTALLATION
Summary

• Unforeseen conditions in J-Tubes/Risers cause delays
• Delays are bad
• Moving away from the unknown allows for contingency/solutions to be developed
• AISUS can help
To arrange a demonstration or to discuss our capabilities further please get in touch:

Mat.Meredith@aisus-offshore.com – Technical Director

Andrew.Mitchell@aisus-offshore.com – Business Development Manager

Stuart.Lawson@aisus-offshore.com – Managing Director
MINIMISING RISK - MAXIMISING VALUE WITHIN SUBSEA SPEND

www.setsltd.com
I KEEP six honest serving-men
(They taught me all I knew);
Their names are What and Why and When
And How and Where and Who.
I send them over land and sea,
I send them east and west;
But after they have worked for me,
I give them all a rest

Kipling
Who?

Experienced subsea project management and engineering company.

SETS philosophy: harvest project management expertise to minimise risk and maximise value for projects.

Developed project processes to ensure efficient and cost-effective delivery.
SETS divides the process of directing and controlling a project from start to finish into 5 Steps:

1. Conception and initiation
2. Definition and planning
3. Launch or execution
4. Performance and control
5. Project close
Why?

Why does project execution go wrong?
All projects have risks.
If potential risk is not identified project delivery will be compromised.

Source: GT Fairways, 2011
How?

Concept & Initiation
• Examine project idea to determine benefits to the client.
• Decision making team will identify if project can realistically be completed

Definition & Planning
• A project plan, outlining the work.
• Initial team shall:
  • prioritise project
  • calculate a budget and schedule
  • determine resources
  • Undertake a project risk assessment

Launch or Execution
• Resources' tasks are distributed
• Form teams and brief on responsibilities
• Risks and actions are tracked

Performance and Control
• Compare project status and progress to the actual plan, as work performed
• Manager may need to adjust schedules or do what is necessary to keep the project on track

Project Close
• After project tasks are completed and the client has approved the outcome, an evaluation is necessary to highlight project success and/or learn from project history.
When?

Engage SETS as early as possible:

Spending a little more time and money early in the project is a prudent approach to reducing overall project costs in execution.

See dashed project expense arrow.
Where?

Geographically, SETS undertake work internationally.

Physically, SETS are subsea focused, from splash zone to wellhead.

Organisationally, SETS interacts across disciplines and levels.
Case Studies
FSO Refurbishment

Problem: aging Mediterranean FSO with serious integrity issues was sole export route for late life field.

Two field partners with diametrically opposed opinions on issue.

Initial in-country operator solution was remove, repair and replace regardless of cost, time and field economics.

SETS appointed by out-of-country partner to review project.
SETT Solution

Step 1, Review project to date, challenge lack of engineering and unrealistic CTR estimates

Step 2, Engage partners, research options, build option CTRs. Partners chose preferred option – eventually.

Step 3, Assemble team, prepare & execute chosen option

Step 4, Manage in-country offshore operations

Step 5, Close out project
$15.6M - In-country Operator original FSO dry-dock cost estimate (unrisked)

$43 - 84M - SETS cost re-estimate dry-dock range; high risk and too late for 2015 scope completion

Option chosen:
• Disconnect FSO before winter and store
• Provide temporary export tanker ASAP
• Review other export options against costs of FSO dry dock

$9.0M - Eventual cost outcome
North Sea Conductors

Problem: aging NS platform with numerous conductor integrity issues.

Conductor integrity vital to platform viability.

Well economics would not support traditional (diving) off-the-shelf solutions.

SETS proposed solution was a merger of rope access deployment with subsea tooling.

Solution required tooling innovation.
SETS Solution

STEP 1, Evaluated project with client.

STEP 2, Convened RA, understood asset economics, undertook market research, proposed solution. Scope remained uncertain.

STEP 3, Executed scopes:
• Conductor inspections
• Repairs & tooling engineered and manufactured
• SITs & training undertaken.

STEP 4, Actively managed & supervised offshore operations

STEP 5, completed initial scope on time & within budget.
Outcome

£1.2M to £3.9M per conductor repair cost estimate range for diver solution

£8.4M to £27.3M x 7 conductor repair cost estimate range for diver solution

£2.5M SETS solution cost outcome:
- Initial conductor inspections
- Repair design and manufacture
- Tooling design and manufacture
- SITs and training
- Offshore operations; resulted in 7 repairs installed
Problem: numerous conductors with integrity issues at El-12 m require repair within asset economic constraints

Divers: operationally possible, expensive, WOW, no off-the-shelf solutions

ROV (vessel or platform): operational limitations, less expensive than divers, WOW, no off-the-shelf solutions

Remote: operationally possible, cost effective, WOW, no off-the-shelf solutions
SETS Solution

SETS proposed solution was a merger of rope access deployment with subsea tooling

Solution required tooling innovation

Conceived RA installation aids

Designed & built:
- Cleaning & laser metrology tool
- Repair installation tool
- Contingency pushdown tool

SIT & training undertaken
**Outcome**

Installation aid enabled consistent, repeatable rigging points for operational efficiency.

Cleaning and laser tool enabled conductor and connector cleaning and metrology to decide repair type.

Repair installation tool enabled repair deployment and fitting.

Contingency pushdown tool to push repairs into place if necessary.
Newmachar Business Centre,
Kingseat Business Park,
Newmacher, Aberdeen AB21 0UE

Tel: +44 (0)1651 863640
Email: info@setsltd.com

www.setsltd.com
Championing the UK Subsea Sector across the World

For more information please contact:

+44(0)845 505 3535
admin@subseauk.com

Or visit

www.subseauk.com