SUBSEA PIPELINE ENGINEERING

2 – 6 December 2013  Course extended to 5 days!
Kuala Lumpur, Malaysia – 5th Run in Asia!

Expert Faculty:

Dr. Andrew Palmer
Dr. Roger King

Authors of Subsea Pipeline Engineering, Books

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"Excellent course, I was very impressed with the knowledge and professionalism of the speakers. I would definitely recommend this course to others." Ed Hernandez, Shell Global Solutions (US), Inc.

"Very informative. There was a great deal to take in, and the overall coverage of the subject matter was excellent." Mark Garden, Worley International Inc.

Previous participants include:
Baker Hughes, BJ Services Malaysia, Block B Pipeline Operating Co, Brunei Shell Petroleum, Carigali-Pt tep Operating Company, J P Kenny, Kangean Energy Indonesia, Murphy Oil Corp, Murphy Sarawak Oil Co.,Oman Oil Company E & P, Petronas Carigali, PT Perusahaan Gas Negara (persero), Pt. Supraco Indonesia, Sarawak Shell, Shell India Markets, Tebodin Middle East, Wasco Coatings, WoodGroup – CCC and many others

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Course Objectives

Subsea pipelines are the arteries of the offshore industry, and around the world more than 18,000km are in service. Part of almost every project, they often form a large component of project cost. This course will provide a complete and up-to-date overview of the area of Subsea Pipeline Engineering, taking delegates through the pre-design phase, design, construction, installation, operation and maintenance.

It will give a complete picture of the work of design engineers and pipeline construction companies, using actual case studies from around the world to highlight the topics discussed. While the course requires no previous experience, this is not a superficial overview. The lecturers bring to the course a long experience of industry projects, in many parts of the world and under varied conditions. The technology is far from being static, and the trainers will discuss new developments and ideas for the future.

Who Should Attend

Engineers from oil & gas companies, construction companies, pipe and service suppliers and regulatory authorities, who are newly qualified, have recently moved into pipeline engineering or hold broad responsibilities that include pipelines.

Course Documentation

Participants receive a sturdy ring binder containing more than 700 pages of text and illustrations supporting the lectures and providing an invaluable reference source after the course.

In addition, each participant will receive a copy of the newly published 650pp. reference book *Subsea Pipeline Engineering* by Andrew Palmer and Roger King, worth over US$ 170 per copy.

About your Experts

**Dr. Palmer** has been engaged with pipelines since 1970. His background is in civil engineering and applied mechanics. He was initially at Cambridge University, then at R.J. Brown and Associates, then founder and director of Andrew Palmer and Associates, a company of consulting engineers involved in pipeline projects in every continent, latter as Research Professor of Petroleum at Cambridge University, as a Visiting Professor at Harvard University, and now as Keppel Chair Professor in the Centre for Offshore Research and Engineering at the National University of Singapore. He has written three books and more than 180 research papers. He has an extensive consulting practice, and is in demand as an expert witness.

**Dr. King** has been engaged with pipelines since 1969. He is a chemical engineer and now specialises in oilfield corrosion, cathodic protection and materials selection and retains particular expertise in microbiological corrosion. He was a founder of CAPCIS (Corrosion and Protection Industrial Services), a consulting and research centre within the University of Manchester Institute of Science and Technology. He too has an extensive consulting and expert witness practice.

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5-Day Course Syllabus

- **Overview – Marine Pipeline System Configuration (Palmer)**
  Introduction to design sequence and its interaction with the different topics covered in the course. Film on construction and connection of an offshore pipeline.

- **Route Selection (Palmer)**

- **Shore Approaches (Palmer)**

- **Marine Pipeline Construction (Palmer)**

- **Hydraulics and Flow Assurance (Palmer)**
  Single-phase flow, oil and gas; calculation of pressure drop and effect on optimal line size; influence of compressibility, temperature change and profile, two phase flow; flow regimes, correlations, profile effects, terrain-induced slugging, slugging in risers. Surge. Hydrates and wax.

- **Introduction to Design Exercise (Palmer/King)**

- **Design exercise phase 1**

- **Presentations of conclusions of design exercise phase 1**

- **Materials Selection (King)**

- **Increasing Corrosion Resistance (King)**

- **Flexible Pipe (King)**

- **Pipeline Structural Analysis (Palmer)**
  Internal pressure, code requirements. External pressure; bending; bending buckling; collapse and buckle propagation; denting and gouging; allowable strain design; impact damage.

- **Pipeline Materials for Sour Service (King)**
  Pipeline steels for sour service: sulfide stress cracking and HIC. Appropriate specification of pipe material.

- **Design for Stability (Palmer)**

- **Internal Corrosion and Its Prevention (King)**

- **Project History: Design and Installation of the Mardi Gras Transportation System**

- **External Corrosion and Its Prevention (King)**
  Coating for submarine pipelines: enamels, FBE, triple coats, extruded coatings and elastomers. Inspection of coating integrity. Concrete weight coatings. Field Joints and infills.
- **Cathodic Protection (King)**
  Conjoint protection by coating and CP. Mechanism of CP. Design of sacrificial anode CP systems. Thermal effects on CP performance. Interactions between CP systems.

- **Microbiological Corrosion (King)**

- **Internal Inspection and Corrosion Monitoring (Palmer/King)**

- **Marine Environment (Palmer)**

- **Design Exercise Phase 2 (Palmer/King)**

- **Presentation of conclusions of design exercise**

- **How Safe Are Pipelines?**
  Introduction to risk-based design and the corresponding background to the safety factors.

- **Mishaps, Risk and Repair (Palmer)**

Project History: Shell’s Experience with Hurricanes Ivan, Katrina and Rita - Response and Lessons Learned

- **Upheaval and Lateral Buckling (Palmer)**

- **Insulation (Palmer)**

- **Trenching and Burial (Palmer)**

- **Welding (King)**

- **Span Assessment and Correction (Palmer)**
  Description of span occurrence and possible systems. Analysis; vortex-excited oscillation, overstress, hooking. Span monitoring and correction.

- **Design Codes (Palmer)**

- **Decommissioning (Palmer)**

- **Current and Future Developments (Palmer/King)**

- **Presentation of Course Certificates**
Kuala Lumpur, Malaysia

Subsea Pipeline Engineering
2 - 6 December 2013

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