ELECTRICAL AND INSTRUMENTATION (E & I) ENGINEERING
FOR OIL AND GAS FACILITIES

WHAT YOU WILL GAIN:

- Skills and competencies in E & I oil and gas engineering
- Knowledge of the latest technologies in E & I oil and gas engineering
- Key techniques in operating your facility to the highest level of safety and in protecting the environment
- Decades of real experience distilled into the course presentations and materials
- Guidance from real E & I oil and gas experts in the field
- Hands-on, practical knowledge from the extensive experience of instructors, rather than the theoretical information from books and colleges
- Networking contacts in the oil and gas industry

WHO SHOULD ATTEND:

This course would be ideal for you if you are seeking expertise in the oil and gas business and are an:

- Instrument and process control technician or technologist
- Instrument fitter
- Chemical and mechanical engineer
- Electrical engineer
- Instrument and control systems engineer
- Fire and gas engineer
- Experienced electrician
- A recent graduate electrical, instrumentation or mechanical engineer

Even if you are highly experienced you will find this a great way to become familiar with the oil and gas technology as quickly as possible.

The Workshop

This valuable oil and gas course has five threads in the E & I areas running through it:

1. Electrical engineering
2. Instrumentation and control engineering
3. General oil and gas engineering (onshore and offshore)
4. Subsea instrumentation and control
5. Floating Production, Storage and Offloading (FPSO) facilities

1. Oil and Gas Electrical Engineering – Design, Installation, Commissioning and Maintenance

Electrical power systems within the oil, gas, petrochemical and offshore industries have significantly different engineering characteristics to a typical power utility plant and associated consumers of electricity. This course provides an excellent balance between basic applicable mathematical theory and practical know-how which is so essential in applying this immediately to your work. Solid practical know-how is provided in the electrical systems equipment used in off-shore production platforms, on-shore separation and production plants, drilling rigs, pipelines, refineries and even general petrochemical plants. You will gain confidence in basic design, selection, and operation of the typical electrical equipment used in these areas. Numerous practical rule-of-thumb examples are given to enable you to make quick estimates and assessments whilst engaged in your work.

2. Oil and Gas Instrumentation and Control Engineering – Design, Installation, Commissioning and Maintenance

Instrumentation and Control Engineering is the most diversified and challenging area in the oil and gas industry. It covers a whole gamut of engineering such as:

Instrumentation Engineering - You will learn about design documentation and specification, field measurement devices, control elements, condition and machine monitoring, fieldbus, actuators, control valves, severe service valves, solenoids, hydraulics, testing and calibration, wireless instrumentation, instrument fittings/ monoflanges/manifolds/tubing and accessories, "on line" process analysers and sample systems, pressure relief valves, choke valves and associated "real world" applications.

Control System Engineering –This extremely interesting area covers Programmable Logic Controllers (PLCs) , Supervisory Control and Data Acquisition (SCADA), Distributed Control Systems (DCS), control system tuning, basics of advanced process control, control applications, compressor surge control, pneumatic controllers, programmable automation controllers, process control security, OPC and smart plant concepts.

Safety Instrumented Systems – SIS is a very important part of any oil and gas plant in that these systems provide the most important safety layer necessary to protect a facility. You will learn about Safety Integrity Levels (SIL), the importance of maintaining SIS Instrumentation, safety logic, Burner Management Systems (BMS), emergency shutdown systems and their certification, shutdown and blowdown valves, SIS standards, fire and gas detection and protection systems and devices along with combined safety systems.

In addition you will get some insight into High Integrity Pipeline Protection Systems (HIPPS).

3. General Oil and Gas Engineering

This covers critical aspects which are applicable across all disciplines associated with oil and gas engineering including;

- Corrosion
- Health, Safety and Environment,
- Basics of Oil and Gas Process Plant

You will then work through a project such as a three-phase inlet separator, its components, design, operation, control and instrumentation and maintenance. You will gain a strong introduction to Front End Engineering Design (FEED) with coverage of flow diagrams, P&IDs, control system philosophy, safety instrumented system logic, specification, cost estimates and design approval. You will then be exposed to final design activities including authorisation for expenditure, specifications, power systems, wiring and connection diagrams, logic diagrams and bill of materials. Finally, the construction, installation and commissioning phase will be covered with an emphasis on factory acceptance testing (FAT), commissioning, start up and maintenance.

4. Subsea Control Systems Engineering

Subsea manifolds are commonly utilised in offshore applications, these are either tied back to platforms or piped onshore. These have instrumentation and control systems that are specifically designed for deepwater use. You will learn about the basic concepts and how these systems are monitored, controlled and maintained.

5. Floating Production, Storage and Offloading (FPSO) Facilities

Floating production, storage and offloading facilities receive crude oil and gas from deepwater wells and store it until the crude oil can be pumped into other vessels for transport to shore. The electrical and instrumentation systems relevant to FPSOs and FLNG will be examined during this course.

The Program

INTRODUCTION – SETTING THE SCENE IN OIL AND GAS E & I ENGINEERING

- Fundamentals of electrical engineering
- Fundamentals of instrumentation, measurement and process control engineering

ELECTRICAL ENGINEERING IN OIL AND GAS

- Electrical drawings, documentation and schematics
- Transformers
- Troubleshooting, maintenance and protection of AC electrical motors
- Power distribution
- Power system protection and co-ordination (incl. fault calculations/stability and protective relays)

ELECTRICAL ENGINEERING IN OIL AND GAS (cont.)

- Switchgear and distribution systems
- Cables and wires – maintenance and installation practice
- Variable (or adjustable) Speed Drives (VSDs) for instrumentation and control systems
- Electrical safety
- Earthing/grounding, power system harmonics and power quality – onshore/offshore
- Lightning and surge protection
- Uninterruptible Power Supplies (UPSs), batteries and battery chargers
- Emergency power supplies

ELECTRICAL ENGINEERING IN OIL AND GAS (cont.)

- Electrical equipment in hazardous areas
- Electrical applications to an oil and gas platform and site

INSTRUMENTATION AND CONTROL

- General instrumentation standards in oil and gas
- Best practice in process, electrical and instrumentation drawings and documentation
- Process instrumentation
- Calibration, installation and maintenance of instruments

INSTRUMENTATION AND CONTROL (cont.)

- Process control basics
- Control valves sizing, selection and maintenance (incl. pressure relief valves)
- Programmable Logic Controllers
- SCADA systems
- Distributed control systems
- Industrial data communications (incl. Fieldbus and industrial Ethernet)
- Safety instrumentation and emergency shutdown systems for oil and gas (IEC 61511 and IEC 61508) – basic introduction

INSTRUMENTATION AND CONTROL (cont.)

- Wellhead and flowline control – control systems
- Emergency wellhead blowout controls

SPECIALISED APPLICATIONS IN OIL AND GAS E & I

- Power generation
- Cathodic protection
- Compressor control (incl. surge control)
- Drilling control systems and instrumentation
- Subsea instrumentation and control systems
- Pig launcher/receiver systems
- Critical flare knock out drum controls and instrumentation
- Flare flame front generator and ignition monitoring system
- Distributed control systems