

E-655

▲ Who should attend?

Graduate Engineers, whose activity is related to the design, construction and/or operation of Oil & Gas production facilities.

▲ Duration

5 days

▲ Dates & Location

Sept. 28 - Oct. 02, 2009
Rueil-Malmaison (Paris)

▲ Registration

Fees: € 2,060

Contact:

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▲ Course Coordinator

Franck BEIJER

Ref. OFF / HYDRGB

PIPELINE HYDRAULICS AND MULTIPHASE FLOW

OBJECTIVES

To provide knowledge of the phenomena relative to pipeline hydraulics, as well as main methods for friction loss calculation and flow simulation.

On completion of the course, participants:

- are able to calculate/estimate the friction losses in a pipeline and fittings for a single phase flow,
- know the flow patterns for multiphase flow and the main parameters that influence them,
- know the hydrodynamic phenomena relative to multi-phase flow for gas dominated or oil dominated systems,
- are sensitive to flow assurance issues, relative to flow in a pipeline,
- have a first experience in pipeline simulation.

COURSE CONTENT

FRICITION LOSSES FOR SINGLE PHASE FLOW

2 days

Total energy of a fluid – **Bernoulli law**

Real fluid flow: Viscosity, Friction coefficient

Flow regimes: Laminar and Turbulent (eddy) flows – **Reynolds number**

Calculation of **friction loss through pipes**

Moody chart

AFTP charts (Lefevre)

Calculation of **friction loss through fittings**

Method 1: **Resistance Coefficient**

Method 2: **Equivalent Straight Pipe Length**

Case of **compressible fluids** (gas) – Main empirical equations (Weymouth, Panhandle A, Panhandle B...)

Several exercises

MULTIPHASE FLOW IN OIL & GAS PRODUCTION

0.50 day

Incentives

Definitions

Flow patterns or flow regimes / Slugging phenomena

Fluid physico-chemistry related issues / Flow Assurance

TWO-PHASE FLOW MODELING / SIMULATION

0.50 day

Historical methods to study steady-state two-phase flow

Modeling two-phase flow

Simulation software

GAS DOMINATED SYSTEMS

0.75 day

Field development schemes: “**dry**” **scheme** versus “**wet**” **scheme** – Incidence on hydrate formation and corrosion issues

Multiphase pipeline design criteria

Slug catcher design - Examples

OIL DOMINATED SYSTEMS

0.50 day

Hydrodynamic slug flow – Examples

Severe slugging – Examples

FLOW ASSURANCE ISSUES (FOCUS ON DEEP OFFSHORE)

0.75 day

Wax management

Hydrate management

Examples

Classical subsea loop versus alternative development architectures