TECHNICAL
EDUCATION
ACADEMY

School of Engineering

COURSE PROGRAMME

000127

MECH004 - Pipeline Hydraulics and Multiphase Flow

Pipelines play a vital role in our economy.



Learn from the Best in the Business!

Course overview

Intermediate level

Why take this course

Pipelines play a vital role in our economy. Out of sight and usually out of mind, they bring us, daily, the liquid heating and motor fuels on which we depend. They draw little public attention until they malfunction and release their contents into the environment. Pipeline operators have a duty to preserve public safety and the environment.

Responsible employees of a pipeline operator have a duty to thoroughly understand and rigorously adhere to principles of safe pipeline design and operation in order to keep the products flowing and to minimize the chances that any product will ever be released unintentionally into the environment.

Who it is for and how it helps

This course is designed for surface facilities production engineer, surface facilities design engineer, operation engineer, pipeline designers, pipeline contractors, pipeline operators.

What you will learn

- Explain basic elements of pipeline design, construction and maintenance
- Apply principles of safe pipeline design and operation
- List factors influencing the energy requirement for transporting oil through pipelines
- Explain methods for process optimization
- Oil transportation and gathering systems
- Use elementary nodal analysis
- Apply practical chemical and mechanical options for transporting oils
- Appreciate scaling issues
- Explain physics of sand settling and engineering implications
- Appropriate fluid mechanics and the physics of pipeline hydraulics
- Use pressure loss calculation methods
- List thermal methods
- Apply methods suitable for multiphase flow calculations

Curriculum

Modules 01–04

01 Fundamentals of fluid mechanics friction losses in single-phase flow

- 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.
- Calculation of friction loss through fittings: resistance coefficient & equivalent straight pipe length.
- Case of compressible fluids (gas) - Main empirical equations.

02 Multi-phase flow in Oil & Gas production

- Incentives and stakes.
- Definition of multi-phase flow.
- Main terminology.
- Basic understanding of different modeling approaches.
- Historical methods to study steady-state two-phase flow.
- Example of multi-phase dynamic flow simulator.
- Future with multi-phase flow modeling.

03 Flow assurance

- Main flow assurance issues.
- Flow stability: Flow pattern (horizontal and vertical) - Slugging.
- Erosion constraints, Wax, Hydrates.
- Heat transfer: main heat transfer phenomenon, OHTC, cold spot issue.
- Fluid modeling.
- Phase envelope, hydrate dissociation curve, emulsion, viscosity.

04 Well gas streams

- Natural gas field development: “Dry” scheme versus “Wet” scheme
- Main flow assurance issues (hydrates, TLC, surge liquid volume handling).
- “Wet” scheme simulations.
- Operating envelope.
- Geometry impacts.

Curriculum

Modules 04–06 · Module 04 — continued

- Example of slugcatcher design.

05 Crude oil field development:

- Deep water constraints.
- Typical field preservation.
- Classical loops versus alternative development architectures.
- Subsea processing.

06 Crude oil stream:

- Severe slugging.
- Hydrodynamic slug flow. Slug-catcher design.
- Thermal constraints during production/transient (cool down).

Joining the programme

Contact the Academy and quote course code 000127 to confirm dates, delivery format, prices and enrolment terms.

Training for your team

Tell us your business goals, the roles and number of participants, and your preferred dates and location. This will help us discuss the right training option.

Preparing for the programme

The published programme does not specify any prerequisites. Contact us before enrolling to confirm how to prepare.

Discuss your training needs

mail@tecedu.org
www.tecedu.academy

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