

# THE A TO Z OF NATURAL GAS PIPELINE

## Introduction

The course is specially developed for operators, engineers, technical services personnel, planners and business development personnel involved with natural gas transportation. The course has been conducted for major companies including Kvaerner (Philippines), Petronas (Malaysia).



## Course Content

No.	TOPIC	DESCRIPTION
1.	<b>Fundamentals and basics of natural gas</b>	What is Natural Gas, Gas fields and reserves, Natural gas composition and utilization, Macro-system – Gas production to gas utilization, Physical and hazardous properties of natural gas
2.	<b>Flow properties, Pipe Sizing and Specifications</b>	<ul style="list-style-type: none"> <li>• Fluid Dynamics Principles</li> <li>• Friction factor and properties affecting it.</li> <li>• Water and condensate formation in pipeline</li> <li>• Hydrate formation and prevention</li> <li>• Two phase flow characteristics</li> <li>• Computer model of flow dynamics and pressure drop</li> <li>• Wall thickness of pipe</li> <li>• Line pipe specification</li> <li>• Pipeline cost break-up</li> <li>• List of standards</li> </ul>
3.	<b>Cross Country Pipeline Hardware</b>	<ul style="list-style-type: none"> <li>• Long distance pipeline configuration and flow diagram</li> <li>• Gas Compression system</li> <li>• Valves, fittings and accessories</li> <li>• What is hydrate?</li> <li>• Hydrate formation in pipeline</li> <li>• How to control hydrate formation</li> </ul>
4.	<b>Pipeline Construction</b>	<ul style="list-style-type: none"> <li>• Stages in Pipeline Construction</li> <li>• Route Survey</li> <li>• Right of Way (ROW)</li> <li>• Site Preparation</li> <li>• Stringing of Pipes</li> <li>• Inspection</li> <li>• Coating</li> <li>• Laying of Pipes</li> <li>• Testing</li> <li>• Mechanical Completion</li> </ul>
5.	<b>Typical Gas Pipeline Terminal Facility</b>	<ul style="list-style-type: none"> <li>• Pig Receiver and Launcher</li> <li>• Filter</li> <li>• Pressure Reducing Station</li> <li>• Metering</li> <li>• Gas Heater</li> <li>• Corrosion Control</li> <li>• Flare and venting</li> <li>• Control and SCADA</li> </ul>
6.	<b>Pigging Operation</b>	<ul style="list-style-type: none"> <li>• What is Pig and Pigging?</li> <li>• Objective of Pigging</li> <li>• Types of Pigs and their application</li> <li>• Selection of Pig</li> <li>• Pig Launcher, Pig Receiver</li> <li>• Selection of Pig</li> <li>• Pig Tracing</li> <li>• Intelligent Pigs and their application</li> </ul>
7.	<b>SCADA System</b>	<ul style="list-style-type: none"> <li>• What is SCADA?</li> <li>• Objectives</li> <li>• Architecture</li> <li>• Hardware aspects</li> <li>• Software aspects</li> <li>• Typical Pipeline SCADA</li> <li>• Features and benefits of Pipeline SCADA</li> </ul>

No.	TOPIC	DESCRIPTION
8.	Health, Safety and Environment	<b>(A) Handling of Natural Gas</b> <ul style="list-style-type: none"> <li>Hazardous properties of natural gas</li> <li>Flammability and Toxicity</li> <li>Safety aspects for H<sub>2</sub>S handling</li> </ul>
		<ul style="list-style-type: none"> <li>Safe Handling of Gases</li> <li>Factors affecting safety and the integrity of the pipeline</li> <li>Real life accident cases and their analysis</li> </ul>
		<b>(B) Prevention by Ensuring Pipeline Integrity</b> <ul style="list-style-type: none"> <li>Safe Systems</li> <li>Monitoring</li> <li>Protection from Corrosion</li> <li>Inspection and Maintenance</li> </ul>
		<ul style="list-style-type: none"> <li>Patrolling and Surveillance of ROW</li> <li>Quiz and group exercise</li> </ul>
9.	Corrosion and Corrosion Control	<ul style="list-style-type: none"> <li>Principles of corrosion</li> <li>Internal and External corrosion</li> <li>Corrosion due to H<sub>2</sub>S and CO<sub>2</sub></li> <li>External corrosion principles</li> <li>Control of internal and external corrosion</li> </ul>
		<ul style="list-style-type: none"> <li>Cathodic protection <ul style="list-style-type: none"> <li>Types</li> <li>Basic parameters</li> <li>Selection guidelines</li> </ul> </li> <li>Corrosion monitoring</li> </ul>
10.	Maintenance	<ul style="list-style-type: none"> <li>Inspection of pipeline before commissioning</li> <li>Periodic inspection</li> <li>Patrolling of ROW</li> <li>Routine inspection during operation</li> <li>Corrosion monitoring</li> <li>Detection of dent, buckle</li> <li>Leak detection</li> </ul>
		<ul style="list-style-type: none"> <li>Corrosion monitoring using gauging pigs and/or intelligent pigs</li> <li>Maintenance of Cathodic Protection</li> <li>Valves and safety devices inspection</li> <li>Remedial measure.</li> <li>Line repair.</li> </ul>

### Methodology of presentation

- Microsoft Power Point with colorful slides packed with information.
- Highly interactive with total involvement of the participants.
- Interesting and Interactive Quiz Sessions, group tasks for better assimilation.