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Course Name

Bow-Tie Analysis: The Modern, Fast and Easy to Use Risk Analysis Methodology

Sector Name

Oil, Gas and Chemical

Document Type

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Bow-Tie Analysis: The Modern, Fast and Easy to Use Risk Analysis Methodology

Course Introduction

The concept of cause-consequence analysis is a combination of the inductive and deductive reasoning of logic diagrams (e.g., event-tree analysis or fault-tree analysis). The method has been used to identify the basic causes and consequences of potential accidents. Likewise, bow-tie diagramming provides a pictorial representation of the risk assessment process that, during the last decade, has become increasingly popular, especially in the sector of oil and gas offshore exploration and production sector. Because of their unparalleled advantages in demonstrating that major hazards are identified and controlled, bow-tie diagrams are widely used in Europe and Australia to support safety reports and health, safety, and environment (HSE) cases for drilling and greenfield major hazard facility onshore projects. Other applications have been reported for healthcare, nuclear, transport, and organizational culture.

Incorporating management system techniques

The bowtie method of analysis is a qualitative analysis incorporating management system techniques. The bowtie has become popular as a structured method to assess risk where a quantitative approach is not possible or desirable. The success of the diagram is that it is

simple and easy for the non-specialist to understand. The idea is a simple one of combining the cause (fault tree) and the consequence (event tree). When the fault tree is drawn on the left-hand side and the event tree is drawn on the right-hand side with the hazard drawn as a "knot" in the middle, the diagram looks a bit like a bowtie, as shown.

The five days, basic and advanced, Bow-Tie Analysis Training Course is specially designed to demonstrate the risk-based approach in the Oil & Gas Industry Projects and will explore how the bow-tie model would fit in the risk management process for upstream, Midstream and downstream projects and facilities, and it shares a representative Bow-Tie case study application in making engineering controls operational.

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Target Audience

✓ Process design
✓ Unit Operator
✓ Environmental
✓ Process safety engineer
✓ Gasoline blender engineer
✓ Lab supervisor
✓ Supply chain engineer
✓ Distillates analyst
✓ Models engineer
✓ Chemical Operator
✓ Chemical Plant Operator
✓ Chemical Process Technician
✓ Control Room Supervisor
✓ Gas Plant Process Operator
✓ Gas Production Operator
✓ Gas Terminal Operations and Storage
✓ Gathering Pipeline engineer
✓ Oil Terminal / Storage engineer
✓ Pipeline Maintenance / Equipment / Compliance / Repair
✓ Pipeline Testing / Technician / Supervisor / Safety

- ✓ Plant Equipment Operator
- ✓ Plant Operations Technician
- ✓ Plant Shutdown
- ✓ Plant Supervisor
- ✓ Power Distribution
- ✓ Power Plant Manager
- ✓ Process Supervisor
- ✓ Refinery Operations Technician / Manager
- ✓ Terminal Operator / Manager
- ✓ Utilities Operator

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Learning Objectives

- ✓ Preventing major incidents by managing barriers: Understanding the causes of major incidents using Bow-Tie models of risk management
- ✓ Assuring plant performance: Safety critical elements and performance standards, Process safety performance indicators, Verification schemes.
- ✓ Assuring people performance: Safety-critical roles & competencies, Human factors.
- ✓ Assuring process performance: Process safety management framework, Audit, and management review.
- ✓ Reducing risk to ALARP: Risk assessment process, as low as Reasonably Practicable concept, Leadership, and culture.

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Course Outline

✓ 01 Day One

Trends in global risk management standardization

- ✓ Approaches to Risk Assessment
- ✓ Qualitative (Q), in which frequency and severity are determined purely qualitatively.
- ✓ Semi-quantitative (SQ), in which frequency and severity are approximately quantified within ranges.
- ✓ Quantified risk assessment (QRA), in which full quantification occurs

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Course Outline

✓ 02 Day Two

Guidance on the choice of risk assessment approach

- ✓ Starting point for the risk assessment approach
- ✓ Risk assessment as a function of risk level and complexity
- ✓ What is hazard?
- ✓ Sources of risk assessment uncertainty
- ✓ Risk management process
- ✓ Identify
- ✓ Evaluate
- ✓ Analyze
- ✓ Manage

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Course Outline

✓ 03 Day Three

Intolerability of risks

- ✓ Risk estimation and ranking of risks
- ✓ Which risks have to be managed?
- ✓ Cost-benefit analysis (CBA)
- ✓ Bowtie Definitions and Nomenclature
- ✓ Why Bow-Ties?
- ✓ Bow-tie terminology
- ✓ The bowtie process
- ✓ The Hazard(top) and the Event to be prevented
- ✓ The Threats that could cause the event to occur
- ✓ The Consequences of the event occurring with the assessed risk
- ✓ The Barrier Controls prevent the event from occurring
- ✓ The Recovery Controls to mitigate against the consequences
- ✓ The items that will cause a Control to fail
- ✓ The Barriers to the Threats to the Controls
- ✓ Bow-Tie Analysis Reporting

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Course Outline

✓ 04 Day Four

The Principles of the Bowtie Methodology

- ✓ Benefits of the Bowtie technique
- ✓ Constructing Bowtie Models
- ✓ Bow-tie diagram(s)
- ✓ Where do bow-tie diagrams fit with Oil & Gas industry projects
- ✓ How can bow-tie diagrams contribute
- ✓ Data and information collection for Bow-Tie Analysis?
- ✓ Understand risk control systems, tools, and equipment
- ✓ Combined control effectiveness
- ✓ Management of controls using Bow-Tie Analysis
- ✓ Categories are controlled by type
- ✓ Categories are controlled by effect
- ✓ Categories are controlled by code
- ✓ Cost of controls
- ✓ Tasks of control
- ✓ Responsible Parties

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Course Outline

✓ 05 Day Five

Performance standards and procedures

- ✓ Key performance indicators calculation using bow-tie analysis
- ✓ Relationship of risk assessment with Safety Management System and Bow–Tie Analysis
- ✓ How do we know if we have enough controls
- ✓ Determining that risk has been reduced alarp
- ✓ Lessons learned
- ✓ Review Checklist for Bow-Tie analysis
- ✓ Computer Tools for Bow-Tie Analysis
- ✓ Case Studies I, II, III, Onshore, Up-stream, Mid-stream and Down-stream
- ✓ Case Studies I, II, III, Offshore Up-stream, Mid-stream

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Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
April 5, 2027	April 9, 2027	5 days	4250.00 $	UAE , Dubai
June 22, 2026	June 26, 2026	5 days	4950.00 $	England , London
Sept. 27, 2026	Oct. 1, 2026	5 days	4250.00 $	Bahrain , Manama
Jan. 4, 2027	Jan. 8, 2027	5 days	4250.00 $	UAE , Dubai

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