

Advanced Bowtie Analysis for Risk Management

Course general description:

The **Advanced Bowtie Analysis for Risk Management** course is designed to provide professionals with advanced knowledge and skills in applying the Bowtie methodology for risk management in high-risk industries such as oil & gas, chemicals, manufacturing, aviation, and healthcare. The Bowtie method is an effective tool to visualize, assess, and manage risks, helping organizations identify critical threats, hazards, and consequences, and establish control measures. This course focuses on advanced techniques for building Bowtie models, analyzing risks, and implementing practical solutions for risk control and mitigation.

Audience:

This course is intended for professionals working in risk management, process safety, operations, and safety leadership roles, including:

- Risk Managers
- Safety Managers
- Process Safety Engineers
- HSE Managers
- Engineers and Technicians in high-risk industries
- Operations and Maintenance Leaders
- Safety Consultants
- Project Managers in safety-critical industries

Course objectives:

By the end of this course, participants will:

- Understand the advanced principles and applications of the **Bowtie risk analysis methodology**.
- Be able to develop and implement Bowtie models for complex risk scenarios, identifying threats, controls, and consequences.
- Use Bowtie diagrams to improve decision-making in risk assessment and management.
- Develop a deeper understanding of how barriers and controls are used to prevent and mitigate risks.
- Apply Bowtie analysis for continuous improvement in safety and risk management.
- Develop actionable strategies to improve organizational risk culture using Bowtie-based insights.
- Understand how to integrate Bowtie risk analysis with other risk management systems, such as HAZOP, FMEA, and Layer of Protection Analysis (LOPA).
- Enhance communication and training regarding risk control using Bowtie models for team alignment and decision-making.

Course duration:

5 days

Course location:

Cairo-Dubai-Istanbul

Course contents:

Day 1: Introduction to Advanced Risk Management and Bowtie Analysis

- Pretest
- Overview of Risk Management Methodologies
 - Risk Assessment and Mitigation Frameworks

- Bowtie Analysis: A Visual Risk Management Tool
- Understanding the Basic Structure of Bowtie Diagrams
 - Key Concepts: Hazards, Threats, Consequences, Barriers, and Controls
 - How Bowtie Diagrams Visualize Risk Scenarios
 - Comparison of Bowtie with Other Risk Management Techniques (e.g., HAZOP, FMEA)
- Case Studies: Real-world Bowtie Applications

Day 2: Building Bowtie Models

- Advanced Techniques in Bowtie Diagram Development
 - Step-by-Step Process for Constructing a Bowtie Diagram
 - Identifying and Categorizing Hazards, Threats, and Consequences
 - Mapping Controls: Primary and Secondary Barriers
 - Analyzing Failure Modes and Risk Escalation
- Interactive Session: Hands-on Practice with Basic Bowtie Modeling Tools
- Identifying Weaknesses in Existing Risk Controls
 - Bowtie Analysis for Barrier Integrity and Validation

Day 3: Risk Assessment and Quantification Using Bowtie

- Risk Quantification Methods in Bowtie Analysis
 - Qualitative vs. Quantitative Approaches in Bowtie Analysis
 - Integrating Probability and Consequences to Assess Risk Levels
 - Risk Matrix: Determining Acceptability
- Advanced Risk Scenarios and Bowtie Analysis
 - Hazardous Scenarios in High-Risk Industries (Oil & Gas, Chemicals, Nuclear)
 - Bowtie for Crisis Management and Business Continuity
- Risk Control and Mitigation: From Identification to Action

Day 4: Integrating Bowtie Analysis with Organizational Safety Systems

- Incorporating Bowtie into Process Safety Management (PSM)
 - Risk-based Decision Making with Bowtie Diagrams
 - Integrating Bowtie Analysis with LOPA and HAZOP
- Bowtie for Safety Culture and Risk Communication
 - Improving Risk Communication with Stakeholders Using Bowtie Models
 - Training and Engaging Employees with Bowtie Diagrams
 - Creating Organizational Alignment Around Safety and Risk Management
- Interactive Workshop: Real-life Bowtie Model Integration

Day 5: Advanced Applications and Practical Implementation

- Advanced Applications of Bowtie Analysis
 - Bowtie for Emergency Response and Incident Investigation
 - Using Bowtie for Continuous Risk Monitoring and Assessment
 - Post-Incident Analysis with Bowtie Models
- **Final Project: Group Exercise to Develop a Complete Bowtie Risk Model for a Complex Scenario**
 - **Scenario: Design and Present a Bowtie Model for a High-Risk Process or Operation**
- Course Wrap-Up: Review, Q&A, and Certification

Methodology:

- 50% lectures & concepts
- 10% Videos
- 10% Case studies
- 10% Exercises
- 10% Discussions
- 10% Software (if applicable or examples)

Assessment and Certification:

- Knowledge Assessment: Through case study analysis and group exercises.
- Final Project: Completion of a Bowtie model for a real-world scenario.
- Certificate: Participants will receive a course completion certificate upon successfully finishing the course, which demonstrates proficiency in Advanced Bowtie Analysis for Risk Management.

Course code: (THSE002)