Training Title

Enhanced Emergency Shutdown System Operations and Safety Management

Training Duration

5 days

Training Venue and Dates

ML072	Enhanced Emergency Shutdown System Operations and Safety Management	5	01-05 July 2024	$5,500	Dubai, UAE

In any 4 or 5-star hotel. The exact venue will be intimated once finalized.

Training Fees

$5,500 per participant for Public Training. Fees Includes Course Materials/Handouts, Tea/Coffee, refreshments, & Lunch.

Training Certificate

Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.

TRAINING DESCRIPTION

In the process industries, Process Safety Management (PSM) embodies the whole of measures and activities to achieve an acceptable safe operating process installation. This includes the control of the safety-related business processes. Obviously, it needs to be known how these business processes can be controlled. Therefore, it needs to be established which aspects or parameters influence these processes and can subsequently be used to control them. This implies that measurement and analysis of the parameter values should result in the necessary information in order to take appropriate control actions. An essential question that needed to be answered was which parameters are most relevant to be controlled. To answer this question, the PSM involved business processes which were divided into the elementary safety-related activities. For each of these activities, the most relevant parameters that influence the performance of the involved activity were established based on the key performance indicator as used in the field of reliability information management. This resulted in the development of the Safety-related Activity Management or SAM model. In order to control the performance of the involved activity the values of these parameters must be measured and controlled.

TRAINING OBJECTIVE

By the end of the course, participants will be able to:

- At the end of this course, participants will demonstrate their understanding of:
- Emergency systems such as; Shutdown (ESD), Blowdown Valves (BDV) and Depressurizing
- How to recognize a situation which requires an ESD
- Informing operations personnel to activate ESD
- Personally activating ESD

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- Emergency response to the critical situation
- Emergency response team roles
- How to react appropriately in a support role
- How to react appropriately as a member of the emergency response team
- Locating all ESD activation devices on an installation
- Identifying a situation which requires an ESD
- Prompt and effective methods of reporting a situation which requires an ESD
- Activating the appropriate level of ESD
- Reporting activation of ESD
- Identifying an emergency response situation
- Reacting appropriately to an emergency response situation as support to, or as a member of the emergency response team
- Determine required SIL ratings using at least 3 different methods as listed in IEC 61511
- Assess your plant's compliance with the latest international safety standards
- Understand the fundamentals of IEC 61511 and IEC 61508 which you can apply immediately to your plant
- Help your company to comply with the best available practices for their safety control systems
- Configure safety systems to minimize or avoid spurious trips and create the potential to reduce production losses.
- Know what can be done and what should not be done with PLCs and smart sensors

TRAINING METHODOLOGY:

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions and motivate everybody to find the right answers. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of the multiple-choice type will be made available on a daily basis to examine the effectiveness of delivering the course.

Very useful Course Materials will be given.

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- 30% Lectures
- 30% Workshops and work presentation
- 20% Group/individual Work or projects & Practical Exercises
- 20% Videos& General Discussions, Case studies etc....30% Lectures

WHO SHOULD ATTEND?

- Instrumentation and control engineers and technicians
- Process Engineers/ Supervisors and Process Operators
- Design, installation and maintenance engineers and technicians in the process industries

COURSE OUTLINE

1) Introduction to Plant Safety Systems:

- The Need for Safety Instrumentation
- Terms used for safety systems
- The objectives of a shutdown control system
- Mitigation of Risk
- Concept of layers of protection
- Safety, Reliability, and Availability
- Hazard associated with refinery process operation
- Hazard and Risk
- Hazards Analysis
- Risk and risk reduction
- Protection layers and risk
- Typical actions from ESD systems
- Typical actions from PSD systems
- Typical actions from Fire Detection and Protection system FDP
- Safety Process Model
- Risk evaluation
- Risk assessment
- The measurement of risk
- risk classification chart
- Fatal accident rate (FAR)
- Safety Integrity Level (SIL)
- Concept of PFD
- Definitions of SILs for Low Demand Mode
- Safety Architectures General Guidelines

2) ESD & Isolation Systems Standard:

- Burner Management System (BMS),
- Combustible Fluid,
- Emergency Depressuring System,

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- Emergency Isolation Valve (EIV),
- Emergency Shutdown System (ESD),
- ESD system Philosophy,
- ESD & Isolation system standard.
- Different level of ESD – CAUSE & EFFECTS
- Fail-Safe, Fault-Tolerant System,
- HAZOP,
- High Integrity Pressure Protective Systems (HIPPS),
- Fire and gas system (F&G)
- Probability of Failure on Demand (PFD),
- Safety Availability,
- Safe State, Safety Integrity Level (SIL).
- Safety Life Cycle.
- Safety Requirements Specification,
- Triple Modular Redundant (2003) ESD.
- ESD Input, Output and Startup Bypasses
- ESD Alarm and Pre-Alarm Requirements
- ESD Layers of Shutdown

3) **Safety & Reliability:**

- Design critical control or Emergency Shutdown Systems for safety AND Reliability Design Considerations
- Spurious Events
- Voting, Field Devices and logic solvers

4) Initiator & Final Control Elements:

Process control system and basic Instrument
Initiators & final control elements
Initiators:

- Pressure switches,
- Flow switches,
- Level switches,
- Temperature switches
- Smart Transmitter.

Final Control Element

- Convential control valve.
- Double acting positioner.
- Smart positioner control valve.
- Solenoid valve (Hydraulic).

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5) Safety Integrity Level:

- What is SIL Determination
- Safety Integrity Level (SIL) determination techniques
- Qualitative techniques and risk index
- SIL Assessment General Guidelines
- Low Demand Example
- Quantitative systematic approach
- The risk graph approach
- SIL classification by risk parameters chart
- Independent Layer Of Protection (IPL)
- LOPA Model
- Layer of Protection Analysis
- LOPA Process

6) Voting Principles & Diagnostic:

- Voting principles
- Typical Master/Slave Redundant PLC
- 2oo3 (TMR) configuration
- Degradation behavior after fault detection

7) Logic Solver Evolution:

- SIS essential characteristics
- SIS reliability block diagram
- Fault tolerance concepts/architecture conventions
- IEC fault tolerance rules
- Example of redundancy in a trip system
- Why standard PLCs are not suitable for SIS
- Failure modes
- Characteristics of safety PLCs
- Basic arrangement of TMR safety
- Advantages of analog transmitters over switches
- Design techniques to minimize failures

8) Fault Detection, Consequence Prevention, and Control of Defeat.

- Fault Detection, Consequence and Prevention
- Fault Recognition
- Fault Detection – Designed In
- Failure Modes and Design
- Fault Tolerance
- Average probability-to-fail-on-demand (PFDavg)
- Control of Defeat (COD)

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- Prerequisites for Defeating
- Initial and Extended Defeat

9) Pressure Relief Devices:

- OVERPRESSURE PROTECTION
- Most Common Causes Of Overpressure
- Overpressure Relief Devices
- Pressure Relief Valve (PRV)
- Rupture Disc (RD)
- Maximum Allowable Working Pressure (MAWP)
- Maximum Allowable Operating Pressure (MAOP)
- Pressure Relief Valve (PRV)

10) HIPPS High Integrity Pressure Protection System:

- Overpressure Protection per API Recommended Practice 521
- RP-521 HIPPS To Safeguard Against Overloading Relief
- Active Relief Devices on Global Plant Power Failure
- HIPPS Design Intent
- Overpressure Protection for "Flare Avoidance"
- Overpressure Protection for "Flare Avoidance"
- Safeguarding Against Liquid Relief

NOTE:

Pre & Post Tests will be conducted.

Case Studies, Group Exercises, Group Discussions, Last Day Review &Assessments will be carried out.

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