

PRACTICAL HA OPS, TRIPS AND ALARMS



YOU WILL LEARN:

- The hazard study life cycle and safety life cycle models
- Principles and procedures of Hazop studies
- Hazard analysis methods and application of fault tree analysis
- Protection system principles based on alarms and trips
- Introduction to functional safety standards IEC 61508 and IEC 61511
- The concept of safety integrity levels and methods for determination of SIL targets
- How to convert Hazop outputs into safety requirements specifications
- To use the latest software tools for Hazops

WHO SHOULD ATTEND:

- Process plant engineers, technicians and supervisors involved in new plant projects or in the modification or upgrading of existing plants
- Loss prevention officers, trainee Hazop team leaders
- Plant managers, project managers and planners seeking an awareness of the role of Hazops in overall safety management
- Instrument and electrical engineers, process control engineers and system integrators who are likely to be participants in Hazops or who will be asked to engineer safety control systems
- Commissioning engineers and plant supervisors, process maintenance technicians



The Workshop

- Do you have trips and safety interlocks in your plant? Are they good enough or are they perhaps over-designed and much more expensive than necessary? Are you or your company aware of how Hazard Studies should define risk reduction requirements? Are you actually using hazard studies at all?
- Are you aware that safety systems are rated according to need using a scale of SILs? What does this mean and what are the cost implications? How do these things relate to regulatory requirements?

How will this workshop help?

- If you work with hazard studies it helps to know how trips and alarms are supposed to be built
- If you work with trips and alarms it helps to know how hazard studies are supposed to be performed

The link between the two is critical: It is not unusual for the plant safety systems to be out of touch with the original problem analysis. This is one of main causes of accidents on process plants.

How can you deal with this problem?

The answer is the integrated approach to safety management.

New international standards combined with well-proven hazard study methods can improve safety management in your company.

Scope of the Workshop

The workshop describes the role of hazard studies in risk management and then proceeds with basic training in Hazop techniques. The concepts of risk reduction and some techniques of hazard analysis are introduced at this stage. Training in alarm and trip systems concentrates on features that are relevant to project teams at the Hazop study stages. These include the practical implications and costs of calling for trips and the often-confusing subject of safety integrity levels (SILs) and how they are determined.

A number of practical exercises support the training information and allow participants test their understanding of the material provided in the training manual.

Practical Sessions

There are six practical exercises which you will undertake over the two days.



The Program

DAY ONE

INTRODUCTION TO HAZARD STUDIES

- Introduction to hazards and risks
- Safety management principles; risk assessment and risk reduction
- Concepts of ALARP and Tolerable Risk
- Regulatory frameworks and examples from EU, USA, Australia, RSA
- Methods of identifying hazards
- Methods of assessing hazards

HAZARD STUDIES AT LEVEL 1 AND LEVEL 2

- Life cycle model for hazard study levels
- Hazard study1: Concept and definition phase: methods
- Hazard study 2: Design and development phase. Tools and checklists

Practical exercise: level hazard study example

RISK REDUCTION MEASURES

- The concept of "Equipment under Control"
- Failures of operators and control systems as contributors to hazards
- Layers of protection
- Process and operational safety measures
- The role of alarms in safety, principles of alarm management
- Safety instrumented protection systems, principles of separation.
- The role of hazops in defining alarms and trips

HAZARD STUDIES AT LEVEL 3: HAZOP METHOD

- Introduction to IEC 61822: Application guide for hazops
- Hazop study procedure for the design & development phase
- Purpose, context and outcomes of the hazop
- Principles of guide word examination procedure
- Design representation and selection of elements for study
- Study procedure and examples

Practical Exercise: trial hazop study and recording of results

DAY TWO

PLANNING AND LEADERSHIP OF HAZOP STUDIES

- Relationship to project phases
- Preparatory work
- Roles and responsibilities of the hazop team
- Duties of the study leader

Practical exercise: hazop team trial study and report

SAFETY INSTRUMENTED SYSTEMS (SIS)

- Principles of risk reduction by instrumented protection systems
- Introduction to standards IEC 61508 and IEC 61511
- The safety life cycle model and the role of hazard studies
- Specifying SIS requirements from the hazard studies
- Meaning of safety integrity and the SIL ratings

Practical exercise: determine the SIL requirements of an SIS application

HAZARD ANALYSIS METHODS

- Principles of FMEA
 - Principles of Fault Tree Analysis (FTA)
- Practical exercise: fault tree analysis for process control problem

KEY FACTORS IN THE CHOICE OF PROTECTION SYSTEMS

- Technology choices and their implications for cost
- Programmable safety systems and certification of equipment
- Issues of reliability and redundancy
- SIL ratings versus cost
- Nuisance trips versus safety availability

EXERCISE IN CONVERTING HAZOP OUTPUT TO ALARM AND TRIP REQUIREMENTS

- Examples of requirements specifications
- Examine and use the latest software tools available for:
 - Hazard study worksheets and lifecycle records
 - Determination of SIL ratings
 - Calculation of trip system reliabilities

Practical exercise: hazop report and specification outputs