T-005 RELIABILITY, AVAILABILITYM AND MAINTAINABILITY (RAM) ANALYSIS FUNDAMENTALS

A condensed, yet detailed introduction to RAM Analysis that gives participants the tools to specify, evaluate, understand, and use RAM Analyses provided by specialised vendors

While reliability modeling has existed for 40 years, its most effective application to the oil and gas industry had to await the development of key event-driven simulation tools. RAM Analysis is a structured process to mathematically simulate the stochastic performance of plant hardware, process systems and local/global system networks.

This course walks the participants through the features that facilitate the simulation of real operating plants such as feed variability, feed prioritization, product demand variability, operating rules with rate management triggers, conditional logic, equipment & sub-system reliability through statistical distributions, customer product contracts, co-producer swap arrangements, resource allocation rules, unit operations product yields, stream flow routing, recycle loops, logistics, intermediate stream blending and yield rules - basically, all essential components in a petrochemical and complex production network.

RAM studies are used to:

- Ensure current, new and revamped plants can meet defined operating premises such as production levels, availability targets, and environmental regulations for the lowest capital investment.
- Make objective data-driven decisions around appropriate equipment capacity, sparing philosophy and system/hardware selection options.
- Assure project funding entities or lenders that their investment results in the expected production return.
- Determine storage and logistics requirements, and
- Assist with defining feed and product contracts as well as security of supply.

This course shows the key aspects of a RAM model, its success factors, its risk areas and readies the participants to correctly understand, specify, scrutinize, and use RAM models provided by specialized third parties.

Comprehensive lecture notes are provided with the course.

Who should Attend?

The course is suitable for the following:

- Plant maintenance engineers
- Reliability engineers and operators
- Project and design engineers

Duration

2 days

Course structure and content

A 2-day technical course aimed at responsible managers and engineers:

Chapter 1 : Introduction To RAM Analysis

- What It Is
- Why Do It
- What Are The Benefits
- When To Do It
- What Is Required
- What Level Of Detail – System To Component Level
- Who Needs To Participate
- What Are The Outcomes
- Example Cases

Chapter 2 : RAM Underpinnings

- Definitions
- Relevant Statistical Background
- Repairable Vs Non-Repairable Systems
- Failure Distributions
- Failure Data
- Available Data Sets (E.G. OREDA)
- Process / System Background Pre-Requisite

Chapter 3 : Study Methodology & Its Foundation

- What Documents / Data Are Required
- Failure Data Acquisition And Analysis
- Study Basis Document
- Model Generation And Verification
- Analysis Of Model Results
- Sensitivity And “What-If” Cases
- Reporting

Chapter 4 : Modelling software

- History
- Analytical Vs Simulation
- Relevance, Selection And Application
- System, Flow, Logic And Reliability Block Diagrams
- Connectivity To Rca And Maintenance Strategy

Chapter 5 : Specifying / Supporting / Auditing / Utilizing Vendor Conducted RAM Studies

- Key Elements In Request For Proposal
- Evaluating Submitted Proposal
- Interactive Vs. “Hands-Off” Studies
- Auditing Models And Outcomes
- Using Results To Optimize Design And Capital / Life-Cycle Costs.

Training Outcome:

Equip Company's personnel with requisite expertise to effectively prescribe, audit and utilize externally conducted RAM studies.

On completion of the course, you should be able to:

- Utilize RAM studies to optimize asset design so as to achieve overall project objectives at lowest capital or life-cycle costs.
- Reduce overall cost of conducting externally conducted RAM studies.
- Application of RAM technology to client-specific plants and projects.

Course Presenter

Dr. Nazim Nathoo: He is a reliability modelling expert who formerly worked for Shell for 35 years. Working cooperatively over several years with a well-known simulation software provider and internal Shell experts, he articulated the development of requisite features that facilitated the simulation of real operating plants. He has completed over 150 RAM studies to date.