



ME137

Improving Machinery Reliability: Practical Machinery Management for Process Plants

Course Introduction:

The course is designed to bridge the gap between the rather theoretical subject of Reliability Engineering and day-to-day equipment maintenance practice by emphasizing the common goals of RE and Maintenance.

It will be shown how various indices allow reliability performance tracking but are of little use when it comes to the identification of reliability improvement strategies. By using practical, real world examples, it will be demonstrated that the application of these techniques will provide a basis for improved equipment management and reduced maintenance costs. Participants are encouraged to bring their failure statistics (motors, pumps, machinery components, etc.) for manual (plotting) or computerized analysis. Similarly, equipment replacement decisions based on RE principles will be examined together with practical operating and maintenance strategies leading to the improvement of plant reliability.

The course explores reliability assessment techniques, such as Failure Mode and Effect Analysis (FMEA) and Fault Tree Analysis (FTA), of the equipment presently installed in the participants' plants. It will be shown how the results of these analyses can provide input into maintenance strategies and operating procedures and thus increase overall equipment availability. Through examples dealing with compression equipment, guidance is given on reliability assurance pertaining to new equipment purchases by means of design audits, reviews, and checklists.

Finally, generating and using equipment availability indices will be investigated and discussed.

Course Objectives:

Upon successful completion of this course, the delegates will be able to:

- Recognize the practical use of "Reliability Engineering" (RE) as it pertains to process plant equipment maintenance
- Understand the importance of equipment failure and/or repair data collecting
- Apply statistical techniques for the analysis of this data, enabling them to formulate maintenance and operating strategies designed to increase their plant equipment availability
- Perform maintenance cost saving Failure Mode and Effect Analyses (FMEA) and understand the principles of Fault Tree Analysis (FTA)
- Apply several techniques to improve equipment maintenance, operating, commissioning, installation and purchase

Who Should Attend?

This course is intended for maintenance and equipment reliability professionals, supervisors, and technicians involved in machinery reliability and availability management. Also, personnel from process industries such as refining, petrochemical, chemical, mining, pharmaceutical, fertilizer, pulp and paper manufacturing, food processing and utilities.

Course Outline:

Day 1:

Theory and Concept of Reliability

- Development of Reliability Engineering
- Definition and Concept of Reliability
- Task Definition of Equipment Maintenance

Reliability Theory Applied to the Analysis of Equipment Life Data

- Reliability Indices, their Use and Limitation
- Statistical Techniques: Trend Analysis

Day 2:

Statistical Techniques: Exponential Distribution Analysis

- How to Tell Bad Repairs from Bad Designs

Statistical Techniques: Weibull Analysis, Manual Plotting Methods vs. Computerized Approaches

- Practical Examples

Day 3:

Risk Assessment Using Weibull Analysis, Predicting Failure Frequency

Maintenance Strategies

- Equipment Replacement Decisions, Preventive vs. Corrective Maintenance Strategies
- Operating and Maintenance Strategies Leading to Reliability Improvement

Equipment Reliability Assessment

- Component Reliability and Maintainability (R&M) Analysis Identifies Weak Elements Leading to Appropriate Maintenance Strategies

Day 4:

Failure Mode and Effect Analysis

- FMEA and its Benefits to the Equipment Maintenance Process

Fault Tree Analysis

- FTA Detects Machinery System Conditions Which Can Lead to Undesired Events

Day 5:

Audits and Reviews as Reliability Assurance Tools

Building and Use of Reliability Checklists Using Compression Equipment as an Example

Generation and Use of Availability Indices

Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Methodology:

A variety of methodologies will be used during the course that includes:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion
- Presentation

Course Fees:

To be advised as per course locations. This rate includes participant's manual, Hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee / Tea
08:20 - 10:00	First Session
10:00 - 10:20	Coffee / Tea / Snacks
10:20 - 12:20	Second Session
12:20 - 13:30	Lunch Break & Prayer Break
13:30 - 15:00	Last Session

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