SCANDINAVIAN ACADEMY

For Training and Development

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location : Sweden - Norrköping - Timmermansgatan100 | P.O.BOX : 60359

# Course: Optimizing Equipment Maintenance & Replacement Decisions

| Code | City | Hotel | Start | End | Price | Language - Hours |
|---|---|---|---|---|---|---|
| 557 | Munich (Germany) | Hotel Meeting Room | 2025-09-22 | 2025-09-26 | 5950 € | En - 25 |

## Introduction

- Is your equipment (fixed or mobile) failing before planned replacement?
- Are you unable to execute maintenance tasks because spare parts are not available?
- Have you made significant investment in CBM methods and tools but struggle to realize the benefit?
- Do you have lots of data from oil analyses but still struggling to accurately predict your equipment breakdowns?
- Do you know how to determine optimum asset life?
- Are you struggling to justify the economics of asset replacement?
- Are you having difficulties in deciding whether to rebuild or replace your equipment to minimize the life cycle costs?
- Do you need to optimize your emergency spare requirements?

If you answer YES to any of the above questions, this seminar is for you.

## Seminar Objectives

### The objectives of the program can be summarized as follows:

- To focus on the techniques of optimization – the single most important thrust of this learning program. Whether the decision is about work-crew sizes, or the replacement of component-parts or entire equipment units, the concept of making

the very best, most optimal, decision will be the principal concern of the training program.

- To equip the participating maintenance managers, planners and schedulers and engineers with the know-how to select the most appropriate analytical tools for their maintenance decision-making.
- Reflecting the growing focus of industrial safety and the profusion of safety-related litigation – think of transportation accidents, chemical spills, and mining disasters – the program will show how safety objectives relate to the optimization models, and will underline the advantages of having a well-documented and rigorously-executed program of maintenance and replacement.
- To introduce the critical decision-making topics that can make a significant difference to the in-service time of equipment, to the costs related to doing maintenance too often or too seldom, and the optimization of asset utilization.
- To not only cover the classic need-to-know material in the area, but to acquaint the participants with leading-edge and on-the-horizon approaches that they will encounter in the near future.

## Training Methodology

The seminar will combine presentations with interactive practical exercises, supported by numerous case studies. Delegates will be encouraged to participate actively in relating the methodologies and tools presented during the 5-day course to the particular needs of their workplace.

## Organisational Impact

### Focus on the most advanced techniques for Maintenance Optimization

- Select the most appropriate Analytical tools for maintenance decision making
- Relate Safety objectives to optimization models
- Introduce Critical Decision-Making Topics

- Acquaint with Leading-Edge and On-The-Horizon approaches
- Continue to Apply the Course-Learning to your workplace problems
- Equipment maintenance and replacement decision are frequently based on informed opinions or subjective responses to common situations. In this course, we will deal with procedures based on careful research that is firmly rooted in reality. The course is intended to give you the tools needed to make data-driven decisions, which you can apply in your own environment and upon which you can rely to help you in developing appropriate programs. With so much data available, we often find ourselves in the bewildering position of being data – rich but information poor. We may have all the raw data we'll ever need at our fingertips; but unless we can interpret and integrate it properly, it is of little use. To refine this data into useful information, we need the appropriate tools.
- This course is designed to give you those tools. Our time is limited, and our individual interests and concerns vary. So we may not solve your particular problems in this course. However, I hope it will at least provide you with the concepts and techniques you need to address problems that arise as you carry out your responsibilities.
- Engineers
- Professionals of Plant operations
- Facility Professionals
- Mechanical, Maintenance and Operation Supervisors
- Maintenance or Reliability professionals who are responsible for maintaining and managing the physical equipment assets of a Plant/Facility

## Who Should Attend?

The ideal candidate for this seminar is an Engineer, Professional of Plant operations, Facility Professional, Maintenance or Reliability professional who is responsible for maintaining and managing the physical equipment assets of a Plant/Facility. He or she represents large Facilities and Plants from industries such as Oil and Gas, Petrochemical and Fertilizer, Pulp and Paper, Cement and Ceramics, Power Generation and Utilities, Primary Metals, and Heavy Manufacturing and Facilities.

# Programme Outline

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**Day 1 – Physical Asset Management & Reliability Concepts**
**From Maintenance Management to Physical Asset Management**

- Challenges of physical asset management
- The maintenance excellence pyramid
- Reliability through the operator: Total Productive Maintenance
- Reliability by design: Reliability Centered Maintenance
- Optimizing Maintenance & Replacement Decisions

**Reliability Improvement through Preventive Maintenance**

- Analysis of Component Failure Data
- Probability Density Function
- Reliability Function
- Hazard Function
- Weibull Density
- Infant Mortality
- Bath-Tub Curve

**Exercise in Analysing Component Failure Data Using the Weibull Distribution**

- Estimating the Weibull Parameters
- Using Median Rank Tables
- The role of the RelCode software Package

**Dealing with Censored Data, the 3-Parameter Weibull, and the Kolomorgov-Smirnov Test**

- Upper-End Censoring, Multiply Censored Group Data
- Estimating the Location Parameter in the Weibull Distribution
- Checking the Goodness-of-Fit of the Distribution

**Day 2 – Reliability Improvement through Preventive Maintenance (continued)**

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Component Replacement Procedures including Glasser’s Graph

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Block Replacement Policies

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Age-Based Replacement Policy

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Setting Policies based on Safety Constraints, Cost-Minimization and Availability-Maximization

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Repairable systems

**Case Studies in Component Preventive Replacement**

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Including boiler plant, bearings, pumps, sugar feeds, compressor valves, and centrifuges

**Spare parts provisioning**

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Fast moving spares

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Emergency (insurance) spares

**Case studies in spares provisioning**

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Including line replaceable units (LRUs), cylinder heads, repairable conveyor electric motors and utility transformers

**Group and individual exercises**

**Day 3 – Reliability Improvement through Inspection**

**Inspection Frequency and Depth for equipment in continuous operation**

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Inspection Intervals to Maximize Profit

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Maximizing Equipment Availability

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Inspection Intervals for Equipment Used in Emergency Situations (e.g. protective devices)

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Case studies including oil and gas field equipment such as pressure safely valves (for protective devices)

**Health-Monitoring Procedures**

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Proportional Hazards Modelling

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Spectroscopic Oil Analysis Programs

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Optimization of Condition-Based Maintenance Procedures

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Role of software for CBM optimization

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Case studies including food procession industry (vibration monitoring), pulp and paper and shipping equipment such as compressors (vibration monitoring) and diesel engines (oil analysis), turbines in an electrical generating station (pressure measurements)

**Demonstration of software for optimizing condition-based maintenance decisions**

**Day 4 – Reliability Improvement through Asset Replacement**
**Aspects of Discounted Cash Flow Used in Capital Equipment Replacement Analysis**

- Estimating the Interest Rate Appropriate for discounting
- Present-Value Calculations
- The effects of Inflation in the Analysis
- Calculating the Equivalent Annual Cost (EAC)

**Economic Life of Capital Equipment**

- The “Classic” Economic Life Model
- Before-and-After Tax Calculations
- The Repair-vs-Replace Decision
- Life-Cycle Costing
- Technological Improvement

**Case Studies in Capital Equipment Replacement**

- Including seamers in the food processing industry and combustion engines in the oil and gas sector

**Group and individual exercises**
**Clinic: Hands-On Use of PC Software for Capital Equipment Replacement Analysis**

- Participants will solve pre-set problems

**Day 5 – Effective Use of Maintenance Resources**
**Organizational Structure, Crew Sizes, Workshop Resource Requirements**

- Balancing Maintenance Costs against Plant Reliability
- Establishing the optimal number of machines to have in a workshop
- Resource Requirements Using Queuing Theory and Simulation
- Utilization of Outside Resources
- Lease-Vs-Buy Decision

The Scandinavian Academy for Training and Development adopts the latest scientific and professional methodologies in training and human resource development, aiming to enhance the efficiency of individuals and organizations. Training programs are delivered through a comprehensive approach that includes:

- Theoretical lectures supported by PowerPoint presentations and visual materials (videos and short films).
- Scientific evaluation of participants before and after the program to measure progress and knowledge acquisition.
- Brainstorming sessions and practical role-playing to simulate real-life scenarios.
- Case studies tailored to align with the training content and participants work nature.
- Assessment tests conducted at the end of the program to evaluate the achievement of training objectives.

Each participant receives the training material (both theoretical and practical) in printed form and saved on a CD or flash drive. Detailed reports, including attendance records, final results, and overall program evaluations, are also provided.

Training materials are prepared professionally by a team of experts and specialists in various fields. At the end of the program, participants are awarded a professional attendance certificate, signed and accredited by the Scandinavian Academy for Training and Development.

**Program Timings:**

- 9:00 AM to 2:00 PM in Arab cities.
- 10:00 AM to 3:00 PM in European and Asian cities.

**The program includes:**

- A daily buffet provided during the sessions to ensure participants comfort.