Without well designed equipment no industrial concern can produce. Without good maintenance these well designed machines become impotent relics.

Terotechnica
MAINTENANCE COLLEGE






MAINTENANCE PROGRESS

STUDIES IN MAINTENANCE

A Tradition of Excellence

We have been involved in the maintenance training field for 25 years, and have trained more than 6000 maintenance practitioners in the science of maintenance engineering and management.

Studies in Physical Asset Management

Maintenance as discipline has lately given birth to two standards: ISO 55001 and PAS 55.

Life on today's earth is not sustainable without production equipment keeping our economies afloat. To have this, we need running production equipment. This leads to the inevitable need for production equipment to be maintained.

However, maintenance seems to be so simple to the average person. You surely just service equipment once in a while and repair it when it is broken?

This is not true. Because we need more and more income to sustain life on earth, equipment becomes bigger, more complex, more expensive and more productive. An associated effect of this is that it is more and more important to keep equipment running for as long as possible to achieve maximum productivity levels.

All of the above make maintenance training more important than ever. Maintenance people at all levels should not only be trained in their specific discipline, but also in the relevant level of maintenance management, maintenance technology, specific maintenance expert areas, specific methodologies, and the specific equipment involved.

The potential benefit of correct maintenance training is huge. It brings understanding of your role in the maintenance organisation and empowers you to understand and practise the various techniques that are relevant to your position in the organisation.

In short, maintenance training provides an organisation with much more production capability for a relatively modest investment.

Be Prepared for a Rewarding Position in the Fast Growing Maintenance Profession.

Maintenance is one of the fastest growing professions in both the industrial and nonindustrial world. The proliferation of technology in the modern world leads to maintenance being necessary for all technology.

This includes technology from as small as cellphones and MP3 players to computers, printers, copiers, and cars. Moreover, it also involves the historic terrain of maintenance, namely units such as food processing plants, large haul trucks, shovels and draglines on mines, process plants, heavy ironmaking machinery, power generation plants, and industrial printing presses.

All of these necessary production devices need preventive care and repair to keep the wheels of our society turning. For this to happen, people must be thoroughly prepared for their role in both understanding the intricacies of maintenance engineering and its management. For those that understand this challenge and faces its obligations unstintingly, there are huge rewards to be gained.

Table of Contents

COMPREHENSIVE COURSES

SHORT COURSES

Considerable savings, both in time and money, can be brought about by having any of the above courses presented in-house. Attractive discounts are offered. Please contact us for quotations. Terms and conditions apply.

C101 Asset Management for Maintenance Artisans

This course intends to assist artisans in getting into a habit of first thinking before acting.

The maintenance artisan is the direct executional arm of the maintenance department. But not only that; this person is also the one who has to perform the direct liaison with the production operator/miner, has to do the final planning, and has to think through the exact method of performing the task at hand. He/she thus not only needs to be trained well technically, but must also understand the principles involved in maintaining equipment proactively and manage him-/herself well.

Artisan training has undergone a significant degree of downgrading the last few decades. At the same time the remuneration of some artisans is also on a downward spiral. The effect of this is firstly that some maintenance-critical knowledge is missing from the 'toolbox' of the typical artisan. Secondly, the typical artisan is not equipped with the personal planning and management skills to manage maintenance situations effectively. Thirdly, maintenance artisans have a wrong attitude towards paperwork, which is very detrimental to the maintenance outcome. Fourthly, maintenance artisans tend to lack activity potential due to motivational problems and a negative attitude.

This course is aimed at putting the maintenance function in perspective for the artisan, provide the necessary skills, emphasize good relations with the production function, underline the importance of proper communication, and promote a proactive and positive attitude.

Credits 4*, level 4**

*The course comprises 20 hours of study of which 16 hours are in class, with a further 4 hours of private study.

**Occupational Certificate level.

Course Content

Day 1 – General Maintenance Principles

- Course Objectives and Results
- The Maintenance Function in Context
- The Role of the Artisan
- The Artisan as Manager
- Success Through Communication
- Relations with Operations Personnel
- Principles of Preventive Maintenance
- The Use of Information
- Being Pro-active
- Lubrication
- Ball and Rolling Bearing Maintenance
- Corrosion Control
- Equipment Cleaning

Day 2 – Involvement and Techniques

- Condition Based Maintenance an Introduction
- Fault Finding
- Maintenance Systems
- The maintenance plan and the Artisan
- Paperwork and the Artisan
- Safety
- Housekeeping
- Machinery Alignment
- V-belt drives
- Flexible Couplings
- Electric Motors
- Control Components
- Lighting
- Maintenance Supervisor's Task List
- Maintenance Planner's Task List

Who Should Attend

The course is intended for maintenance artisans and those who manage them.

C201 Asset Management for Maintenance Supervisors

The Maintenance Supervisor needs to be able to get results through people.

It is certainly so that the technology that the maintenance function maintains, needs a sophisticated approach to maintenance. However, there is a growing gap between this need and maintenance's ability to fulfil it.

The person that plays a critical role in this is the maintenance supervisor. He/she must firstly understand and embrace modern maintenance technologies (such as Condition Based Maintenance, Laser Alignment, and Tribological Practice), methodologies (such as Reliability Centred Maintenance), and Systems.

Course Content

Module 1 (Day 1)
Asset Management / Maintenance Principles
- How does it work?
  - The two cycles of the economy
- What does maintenance need to achieve?
  - The objectives of operations
  - The objectives of maintenance
  - The goal is teamwork
  - Quality the principle behind success
  - Downtime vs Uptime
- How do we maintain?
  - Business principles of maintenance
  - Failure Modes: what are they?
  - The options
  - Asset Management (PAS 55 and ISO 55000)

Module 2 (Day 2) – Maintenance Types
- Introduction
  - The terminology trap
  - Maintenance Strategy Tree
  - RCM for Supervisors
- Prevention
  - Use Based Maintenance
  - Condition Based Maintenance
- Corrective Maintenance
- Design-out Maintenance
  - Types of design-out

Module 3 (Day 3) – People Aspects
- Successful leadership
- Understanding your team
- Leadership styles
- Motivating the Maintenance team
- Decision-making
- Conflict Handling
- Developing your own leadership talents

Module 4 (Day 4) – Supervision I
- Definition
- Who should become a Maintenance Supervisor?
- Basic Management Theory
- The practical use of the Basic Management Theory (POLC) by the Maintenance Supervisor
- Effective communication in the Maintenance team
- Personal Planning and Time Management
- Managing Preventive/Pro-active Maintenance
- Maintenance Control
- Maintenance Budgeting and Cost Control
- Managing Safety and Housekeeping
- Managing Quality

Module 5 (Day 5) – Supervision II
- Maintenance Systems – the nerve centre of the maintenance function
- Maintenance Systems and Supervision
- Managing system feedback
- Workshop organisation
- Manpower requirements
- Manpower selection and training
- Maintenance Supervisor's Task List

Secondly, the role of maintenance workers implementing and effectively using these technologies, methodologies, and systems is critical to the success of the organisation. And the only person that can ensure that this does occur is the Maintenance Supervisor.

He/she should be able to get the best (sometimes even the almost impossible) from maintenance artisans and workers to ensure that this gap is closed properly. The problem is that maintenance supervisors are mostly appointed from amongst the artisan fraternity and have to supervise on the little knowledge regarding supervision that he/she gained from his/her previous supervisor(s).

Although this often teaches one the negatives of wrong supervision and some of the positives, it is simply not enough to produce the supervisor that will get quality maintenance output through other people.

This course above all focusses on three aspects of supervision, namely to be open for new learning, getting results through people, and manage the facilities/resources to his/her disposal effectively. Its aim is to effectively motivate and equip the maintenance supervisor for his/her role in ensuring maintenance success.

Who Should Attend

The course is intended for maintenance supervisors, maintenance charge hands, and artisans who have to perform supervisory relief.

Credits 12*, level 5**

*The course comprises 60 hours of study of which 32 hours are in class, with a further 12 hours of private study, and 16 hours for an assignment.

**Occupational Certificate level.

C301 Maintenance Planning

No worthwhile maintenance task can take place without good planning.

If one compares maintenance to the human body, maintenance planning provides the thinking capacity that determines what work to do, and when, while the artisans provide the doing capacity of the hands and feet, and supervisors provide the controlling function of the brain, steering the hands and feet.

Because nothing in life takes place before it has been thought through, no worthwhile maintenance task can take place before planning (naturally including any planning done by supervisors and artisans).

Maintenance planning fulfils a crucial role in the organisation. Maintenance success is absolutely dependent on good scheduling of maintenance work, proper task planning, and timely procurement of parts and materials. The Maintenance Planner plays a critical role in achieving this essential outcome.

The course thus has as its purpose to prepare Maintenance Planners for this role. This includes training in the various scheduling techniques, such as simple time slot scheduling, detailed network scheduling of maintenance shutdowns and projects, as well as batch workshop scheduling. It also includes training in task planning methods, procurement methods, use of maintenance systems, task flow optimisation, maintenance information analysis, and the support of maintenance management through well defined and formatted reporting.

The course is extremely hands-on, allowing candidates to practice the skills learnt through practical application during four to five group assignments per day. This is augmented by an application project following course completion.

Course Content

Module 1 – Basic Principles
- The Maintenance Function in Context
- Maintenance Objectives
- Importance of the Maintenance Function
- Benefits of Quality Maintenance
- Condition Based Maintenance Principles
- Use Based Maintenance Principles
- Maintenance Planner's Task List

Module 2 – Scheduling/Task Planning
- **Scheduling**
  - Maintenance Scheduling Classes
  - Pert/Critical Path Scheduling
  - Time Slot Scheduling
  - Batch Workshop Scheduling
  - Work Prioritisation
- **Task Planning**
  - Manpower planning
  - Plant Availability
  - Procurement of Spares/Materials
  - Procurement of External Services
  - Procurement of Special Equipment/Manpower
  - Safety/Quality Requirements
  - Importance of Good Co-ordination
  - Liaising with Supervisor

Module 3 – Principles of Systematic Maintenance
- The role of Maintenance Planning in the Organisation
- Maintenance Policy/Procedures and the Planner
- Maintenance Plan Basics
- Work/Information/Personnel/Material Flow
- Plant Codification
- Long Term Planning/Budgeting
- Work Load Forecast
- Costing Possibilities
- Creating the Budget

Module 4 – System Issues
- Typical Structure of Planning Systems
- Components of Planning Systems
- Major Functions
- Major Databases
- Interaction Between Components
- System Inputs
- Population of the Database
- Event Inputs
  - Breakdowns
  - Work Requests
  - Changes in Maintenance Plan
  - Annual Budget/Production Forecast
  - Personnel Changes
  - Organisational Changes
- Work Feedback
- Importance of Correct Inputs
- Managing the Quality of the Input Process
- System Outputs
- Major Reports and Their Uses
- Work Documentation Listing
- Use of Work Documentation
- Managing the System – the MIS Audit
- MIS Success Factors

Module 5 – Management Support
- **Main Management Reporting Categories**
  - Cost Reporting/Control
  - Equipment Performance
  - Failure Frequencies
  - Personnel Utilisation/Efficiency
- **Analysis of Maintenance Results**
  - Pareto Analysis
  - Smoothing Techniques
  - Trending Techniques
  - Standard Setting
  - Process Control Techniques
- **Principles of Good Management Reporting**
  - Summarised Formats
  - Graphical Outputs
  - Concentrate on Vital Few
  - Suggest Solutions

Who Should Attend

The course is intended for maintenance planners, maintenance supervisors, artisans and those who manage them.

Credits 16*, level 5**

*The course comprises 80 hours of study, of which 40 hours are in class, with a further 16 hours of private study, and 24 hours for the assignment.

**Occupational Certificate level.

C302 Advanced Maintenance Planning

Make sure that your artisans are used efficiently by giving them tasks that are "ready to go" ***

While the Maintenance Planning course (C301) fundamentally prepares a planner for the task of planning, more is required to ensure a high level of output from the planning function. This has led to many requests for an advanced course.

Maintenance planning is the function that ensures that the correct maintenance actions are performed to the right equipment at the right time, and having all necessary preparation and resources in place. It is furthermore arguably the function that ensures that all maintenance actions can be completed correctly and efficiently.

Maintenance Planning is becoming more and more important to secure the success of maintenance actions. The theory and tools of maintenance planning are also becoming more sophisticated.

While the Maintenance Planning course (C301) prepares planners to understand all facets of the planning process, it does not:

- Address the full spectrum of the planning function (it is just too much).
- It does not prepare a planner for taking the role of senior or head planner.

This course (C302) is ideally aimed at the further development of maintenance planners after they successfully completed the course in Maintenance Planning or a similar preparatory course and had time to implement and integrate that knowledge in practice.

Course participants receive a copy of the 316 page book: Maintenance Planning, Scheduling & Coordination (second edition) by Don Nyman & Joel Levitt. Joel Levitt is one of the leading American maintenance authors, while Don Nyman is an authority on Maintenance Organisation, Control Systems, Planning and Scheduling, and Functional Improvement.

Course Content

Module 1 – Introduction

- Overview
  - Background
  - Definitions
  - The Planner's Role
  - Time Management
  - Objectives of Work Preparation
  - Prerequisites for Success
- Review of Preventive Maintenance from C301
  - Maintenance Objectives
  - Quality Maintenance
  - Maintenance Strategies
  - Condition Based Maintenance Principles
  - Use Based Maintenance Principles
- Review of Scheduling from C301
  - Scheduling Classes
  - Scheduling Techniques
  - Critical Path Method Scheduling
  - Time Slot Scheduling
  - Batch Workshop Scheduling
  - Work Prioritisation
  - Application of Techniques in Maintenance Scheduling
- Review of Task Planning from C301
- Maintenance Planning in the business
- Organising the Planning Function

Module 2 – Task design

- Introduction
- Select Tasks for Improvement
- Record the Relevant Facts
- Examine the Facts
- Develop Improved Tasks
- Implement (install) the Improved Methods
- Maintain the Improved Methods
- Task Specification: The Process of Defining Maintenance Tasks Properly

Module 3 – Task Standards

- Principles
  - Introduction
  - Objectives
  - Techniques
  - Rate of Working
  - The Unit of Work
- Procedures
  - Four essentials of time study
  - The concept of a standard rate of working
  - Breaking the task into elements
  - Repetitive work
  - Rating
    - Effectiveness
    - Speed
- Relaxation and Contingency Allowances
- Analytical Estimating
- Comparitive Estimating

Module 4 – Detailed Task Planning

- Assembling the Work Package
  - Micro-Planning
  - Criteria of a Planned Job
  - Steps of the Planning Process
  - The Value of Planning
  - The Necessity of a Good Business Technical Library
  - Components of the Work Package
- Detailed Planning of the Task
  - Screening of Work Requests
  - Assessing and Scoping the Job to be Performed
  - Job Research to Avoid Redundant Planner Effort
  - Job Breakdown with Detailing and Sequencing of Job Steps
  - Material Take-offs and Procurements
  - Assembling the Planned Job Package
  - Receipt of Feedback and Reflecting it in Updated Job Plans

Continued on Page 5

*** Tasks that are 'ready to go' are ones for which all the necessary resources (men, materials, permits, instructions, drawings, manuals, etc.) are available for the artisan to complete the task without delays.

Credits 16*, level 5**

*The course comprises 80 hours of study, of which 40 hours are in class, with a further 16 hours of private study, and 24 hours for the assignment.

**Occupational Certificate level.

C302 Continued

- Task Requirements Planning
  - The Importance of Good Logistical Support
  - The Planner's Role in the Materials Management Process
  - The Planner's Role in Rebuilding
  - Just in Time and Proactiveness
- Compiling the Weekly Schedule
  - Backlog Management
  - Scheduling Techniques
  - Job Loading
  - Job Schedule
  - Labour Deployment
  - Scheduling Guidelines
- Closing the Task
  - Method
  - Schedule Compliance
  - Supplementary Metrics
- Backlog Management
  - The key to Successful Maintenance Management
  - Establishment of Control Limits
  - Work Order Status Codes
  - Backlog Reporting

Module 5 – Planning Support

- Maintenance – Production Coordination
  - Introduction
  - The Weekly Coordination Meeting
- Support in the Task Execution Phase
  - The Planners Function vs That of the Supervisor
  - Three Important Functions
  - Daily Schedule Adjustment
  - Planner Support During Task Execution
  - The Morning Meeting
- Planning Efficiency
  - Introduction
  - Direct Measures of Planner Effectiveness
  - Indirect Measures of Planning Effectiveness
  - The follow-up Critique
  - Activity Sampling
- CMMS Support
  - Introduction
  - Main Outputs of a Good CMMS
  - Characteristics of a Good CMMS
  - The CMMS's Role in Planning Support

Who Should Attend

The course is intended for maintenance planners, maintenance supervisors, artisans and those who manage them.

C301 or a similar course is strongly recommended as preparation for this course.

Textbook Provided

C501 Maintenance Shutdown and Project Management

Short shutdown turnaround times are vital to profitability.

Maintenance abounds with projects, originating from the objective of high plant uptime. These include a seemingly perpetual stream of small and not so small improvement projects requested by production, as well as those deemed necessary by observation of failure trends.

Furthermore, the nature of the equipment being maintained often necessitates grouping preventive maintenance actions into shutdown occasions, varying from a weekly maintenance shift to extended maintenance occasions, ranging from a few days to a week or more. As lost production time is expensive, these events need to be managed closely using project management principles. It is consequently necessary to have a sound knowledge of the subject.

Course Content

Day 1 – Project Management – A Primer

I. Definitions
  1. Project Management
  2. Shutdown Management

II. Scheduling Principles
  A. Maintenance Scheduling Classes
  B. Network Scheduling (PERT/Critical Path Method Scheduling)
    1. Definitions
    2. Activity on Arrow Technique

III. Getting started with Microsoft Project

IV. Scheduling Principles (continued)
  1. Activity on Node Technique
  2. Scheduling Formats

V. Creating a Task List: Hands-on Excercise

VI. Scheduling Principles (continued)
  1. Resource Planning
  2. Setting Up a Network Plan

Day 2 – Scheduling and Project Management Principles

I. Scheduling Principles (continued)
  1. Multiple time estimates
  2. Understanding the schedule

II. Setting up resources: Hands-on Excercise

III. Scheduling Principles (continued)
  1. Managing a Project Using the Schedule
  2. A Cautionary Note

IV. Project Management Principles
  1. Sources of Projects in Maintenance
  2. Identifying Valid Project Management Instances
  3. The Maintenance Project Manager – a Profile
  4. The Use of Project Management Principles to Advantage

V. Assigning Resources to Tasks: Hands-on Excercise

VI. A Business Case for Shutdowns
  1. Historical Perspective on Maintenance and Shutdowns
  2. The Objectives of Maintenance
  3. Shutdowns as a Means to Implement the Maintenance Objectives

VII. Class Assignment

VIII. Formatting and Printing your Plan: Hands-on Excercise

Project and Shutdown Management embraces a variety of disciplines, including detailed project scheduling, task planning and control, purchasing control, cost control, and the ability to coordinate actions under highly pressurised circumstances.

The course in Shutdown and Project Management endeavours to provide the necessary theoretical foundation to equip maintenance people with the necessary skills to facilitate successful Maintenance Shutdowns and Project Management occasions. It is presented by a seasoned maintenance manager with extensive experience in this field.

The course is presented in an alternating fashion, with hands-on practical sessions in the use of Microsoft Project to facilitate project planning and control being interspersed between successive project management foundational sessions. Course documentation includes a comprehensive course file, and the book 'Microsoft Project 2010 Step by Step' (or the older 'Microsoft Project 2007 Step by Step' until our stocks are depleted), by Carl S. Chatfield and Timothy D. Johnson, Microsoft Press'.

IX. Preventive Maintenance Principles
  1. Pro-activeness
  2. Maintenance Strategy Options

X. Class Assignment

XI. Tracking Progress on Tasks: Hands-on Excercise

Day 3 – Shutdown and Project Planning Principles I

I. Preventive Maintenance Principles (continued)
  1. Condition Based Maintenance Principles

II. Fine-tuning Task Details: Hands-on Excercise

III. Individual Assignment: Hands-on Excercise

IV. Preventive Maintenance Principles (continued)
  1. Use Based Maintenance Principles
  2. Variability in Component Lives

V. Fine-tuning Resource and Assignment Details: Hands-on Excercise

VI. Detailed Project Planning
  1. Determining the Scope of the Task

VII. Fine-tuning the Project Plan

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Credits 16*, level 5** **CPD Points: 5**

*The course comprises 80 hours of study, of which 40 hours are in class, with a further 40 hours for the assignment.

**Occupational Certificate level.

C501 Continued

Day 4 – Shutdown and Project Planning Principles II

VIII. Detailed project planning (continued)
1. Manpower Planning
2. Procurement
   a) Procurement of Spares and Materials

IX. Detailed Project Planning (continued)
1. Procurement (continued)
   a) Procurement of External Services, Including Renting of Special Equipment
   b) Procurement of Manpower
2. Safety and Quality Requirements
   a) Internal Quality
   b) External Quality

X. Class Assignment

XI. Printing Project Information: Hands-on Excercise

XII. Project Management
1. Management Planning
   a) Why is Planning Important?
   b) The Planning Process
   c) Planning and Control

XIII. Tracking Progress on Tasks and Assignments: Hands-on Excercise

Project Management (continued)
1. Project Organisation
2. Project Leading
3. Project Control

Class Assignment

Viewing and Reporting Project Status: Hands-on Excercise

Day 5 – Successful Shutdown Management

I. The shutdown Steering Group
1. Constitute the Steering Group
2. The Shutdown Steering Group Agenda

II. The Shutdown Manager

III. The Shutdown Planning Office

IV. Determining the Shutdown Scope

V. Getting the Project Back on Track: Hands-on Excercise

VI. Shutdown Planning Process

VII. Pre-shutdown Work

VIII. Post-shutdown Re-planning

IX. Applying Advanced Formatting to the Project Plan: Hands-on Excercise

Hands-on work is based on the Microsoft Press book 'Microsoft Project 2007/2010 Step by Step' by Carl S. Chatfield and Timothy D. Johnson, of which each student receives a copy.

Important note: Students have to bring a laptop computer for the hands-on exercises performed during the course.

Who Should Attend

The C501 course is primarily intended for maintenance managers (to manage maintenance shutdowns and maintenance projects), and secondly for maintenance planners (who need to plan shutdowns and maintenance projects).

Laptop computer required – refer to terms and conditions on Course Registration form.

Textbook Provided

C702 Reliability Engineering in Asset Management

Reliable equipment produces sustainable production and safety results.

Reliability is a built-in design feature of any physical asset. The designer makes decisions that influence the reliability of the machine/system in a major way. These decisions cannot be significantly changed during the operating and maintenance phase (the working life of the asset) without rebuilding the asset.

Naturally, achieving the designed-in reliability requires that the asset be maintained and operated so that failures are managed and their consequences minimised. This goes without saying, but does not change the fact that we cannot fundamentally improve the built-in reliability of the system in a major way.

If the machine is not maintained properly, the built-in reliability of the system will be affected negatively. Although reliability cannot be fundamentally improved through maintenance, it can at least be preserved by the appropriate quality maintenance actions. This can be achieved in two ways, namely by ensuring that the right maintenance actions are taken, and that these maintenance actions are carried out diligently and in a professional manner by the maintenance staff.

Asset Management / Maintenance engineers need to be the operating company's experts on the subject of reliability. They are firstly necessary to guard the reliability of operating equipment against degradation and abuse. Secondly, they should be the initiators of reliability improvement drives, leading to higher operating capability and thus profit.

Course Content

Module 1 (Day 1)

I. Introduction – The Asset Management Context
1. Maintenance Cycle Business Model
2. Reliability is Conceived By the Designer
3. Reliability as Result is Achieved By Maintenance
4. Maintenance as the custodian of Reliability

II. The Concept of Reliability
1. What is Reliability Engineering?
2. The Meaning of Reliability in Engineering
3. Failure frequency – A Measure of Reliability
4. Time Domain Distribution of Failures
5. Reliability as the Probability of Success
6. Concepts in Reliability

III. The Definition of Reliability

IV. Reliability of Systems
1. Series Systems
2. Parallel Systems
3. Stand-by Systems
4. Bayes' Theorem

Module 2 (Day 2)

I. The Reliability Functions
1. The Exponential Reliability Function
2. System Reliability vs. Reliability of Components
3. Reliability and Unreliability Enumerated
4. The Hazard Function
5. The General Reliability Function
6. Failure Density Function

II. Reliability Mathematics
1. Probability Concepts
2. Continuous Distribution Functions
3. Statistical Confidence
4. Goodness of Fit
5. Point Processes

III. Lifetime Distributions
1. Discrete Distributions
2. System Lifetime Distributions

IV. The Maintenance Connection
1. Preventive Maintenance Strategy
2. FMEA, FMECA
3. The Role of RCM
4. Maintainability
5. Integrated Logistic Support

Module 3 (Day 3)

I. Parametric Lifetime Models
1. Exponential Distribution
2. Weibull Distribution
3. Other Lifetime Distributions

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Credits 16*, level 6** **CPD Points: 5**

*The course comprises 80 hours of study, of which 40 hours are in class, with a further 40 hours for preparation for tests and the final examination.

**Higher Diploma level.

C702 Continued

II. Probability Plotting
1. Ranking of Data
2. Lognormal Plots
3. Weibull Plots
4. Extreme Value Plotting
5. Hazard Plotting

III. Analysing Reliability Data
1. Pareto Analysis
2. Accelerated Test Data Analysis
3. CUSUM Charts
4. Reliability Demonstration

IV. Lifetime Data Analysis
1. Point Estimation
2. Interval Estimation
3. Likelihood Theory
4. Censoring
5. Choice of Time Between Overhauls

V. Reliability Improvement Fundamentals
1. Reliability and Integrity Growth
2. The Use of SWIFT (Structured what if technique)

Module 4 (Day 4)

I. The Bridge Between Material/Equipment Degradation and Unreliability
1. Degradation Rate Modelling
2. Degradation Mechanisms
3. Time-to-failure Modelling

II. Advanced Analysis
1. Competing Risks
2. Accelerated Life
3. Reliability Analysis of Repairable Systems
4. Proportional Hazards Modelling

III. Parametric Estimation for Models Without Covariates
1. Exponential Distribution
2. Weibull Distribution

Module 5 (Day 5)

I. Parametric Estimation for Models with Covariates
1. Accelerated Life
2. Proportional Hazards Modelling

II. Assessing Model Adequacy
1. Chi-Square Test
2. Kolmogorov-Smirnov
3. Confidence Limits

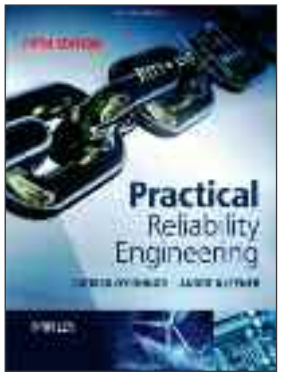
III. Reliability Management
1. Reliability Policy
2. Integrated Reliability Programmes
3. Measuring Reliability
4. Specifying Reliability
5. Managing Suppliers
6. The Reliability Manual

Who Should Attend

The course is intended for asset management / maintenance reliability engineers, and maintenance engineers.

Laptop computer required – refer to terms and conditions on Course Registration form.

Textbook Provided



C901 Maintenance Practice for Asset Management Engineers

The Asset Management / Maintenance Engineer has the task of translating strategic issues to tactical issues and vice versa.

Asset Management / Maintenance Engineers are typically well educated in one of the pure disciplines of engineering, and mostly not specifically trained in the field of Maintenance Engineering. They thus tend to solve maintenance problems using an out-and-out engineering design approach, rather than using the full diversity of principles and techniques available in Maintenance Engineering to manage failure in the organisation well.

In the book 'The 7 Habits of Highly Effective People' by Stephen Covey, the seventh habit is called 'Sharpening the Sword', which implies that effective people continuously work on the previous six habits, doing them better and better.

Now, asset management / maintenance engineers also need to learn certain 'habits', which are central to maintenance practice. Many of these individual pieces of knowledge may even routinely be picked up during the practice of maintenance, but may not be integrated well enough. This course intends to provide such sharpening of the sword leading to Asset Management / Maintenance Engineering professionalism and excellence.

It is a sad fact that most asset managers / engineers do not understand their own business well enough, not due to any fault of their own, but because they were never taught their business. Because of this they tend to practice a combination of design (which they understand) and repair (which the artisans working for them understand). But the business of being able to manage the reliability and failures of diverse equipment designed by others, are foreign to them. It is only lately that small numbers of maintenance experts over the world started really understanding this and started training maintenance practitioners in the theory of failure and its management. This knowledge can then be translated into proper scientifically based maintenance strategies and plans, which leads to the right maintenance actions being performed on equipment.

Also, because of having to understand the design of diverse pieces of equipment, as well as its multitudes of failure mechanisms, the right outcomes in terms of availability and reliability of equipment need specialist management knowledge. Such knowledge should be specifically tailored for the maintenance engineer.

The Maintenance Practice for Asset Management Engineers course are made up of the following main interest areas:

- Maintenance Strategic Management
- Failure and its Management
- Reliability Centred Maintenance
- Condition Based Maintenance
- Management Methods
- Basic People Management
- Basic Lubrication Theory
- Basic Failure Cause Analysis
- Basic Maintenance Planning

Continued on Page 8

Credits 16*, level 6** **CPD Points: 5**

*The course comprises 80 hours, of which 40 hours are in class, with a further 40 hours for the assignment.

**Higher Diploma level.

Course Content

Module 1 (Day 1)

I. Introduction
II. Asset Management in Perspective
  1. Objectives
  2. Engineering vs Management
  3. Nature of Failure
III. The Asset Management / Maintenance Department – Its Focus and Function
  1. Asset Management / Maintenance Models
  2. Maintenance Profit Impact
  3. Quality of Maintenance
IV. CBM – an Introduction
  1. Principles of CBM
  2. Role of CBM
  3. Benefits of CBM

Module 2 (Day 2)

I. Risk Management
  1. Risk Calculation
  2. Continuous Improvement
  3. HAZOP
II. Introduction to Renewal Theory
  1. Maintenance Strategies
  2. Basic Failure Analysis Concepts
  3. Basic Renewal Theory
III. Reliability Methods
  1. FMEA (Failure Modes and Effects Analysis)
  2. FMECA (Failure Modes, Effects and Criticality Analysis)
IV. Strategic Management
  1. Strategy Gap
  2. Total Productive Maintenance (TPM)
  3. Managing for the New Millennium

Module 3 (Day 3)

I. Replacement Decision Making
  1. Cost/Profit Optimisation Models
  2. Computerised Analysis
  3. Interpretation of Results
II. Management Methods
  1. Balanced Score Card
  2. Being Pro-active
  3. Decision Making Methods
    a. Pareto Principle
    b. Curve Smoothing
    c. Queuing Theory
    d. Decision Support
III. Planning for Success
  1. Policy Making
  2. Objective Setting
  3. Annual Plan
IV. People Management
  1. Value Systems
  2. Leadership Styles
  3. Motivation

Module 4 (Day 4)

I. RCM – Introduction
  1. RCM Principles
  2. Selecting Failure Modes
II. Capital Replacement
  1. Principles
  2. Life Cycle Cost Models
  3. Challenger/Defender Models
III. Lubrication
  1. Friction
  2. Lubricant Viscosity
  3. Lubrication Mechanisms
  4. Lubricant Grading Schemes
  5. Lubricant Selection
IV. Maintenance Performance Measurement
  1. The Need for Maintenance Performance Measurement
  2. Parameters to be Measured
  3. Typical Maintenance Performance Indices
  4. The Integrated Approach to Measurement
  5. The Use of Indices in the Control of Maintenance

Module 5 (Day 5)

I. RCM – Using the Methodology
  1. Selecting Tasks
  2. Setting up the Process
  3. Managing the Process
II. Failure Cause Analysis
  1. Inspection
  2. Wear Debris Analysis
  3. Materials Analysis
  4. Failure Pictures
  5. Examples
III. Maintenance Auditing
  1. The Need for Auditing
  2. Auditing Techniques
  3. The Two Audits: Physical Audit and Systems Audit
  4. The Components of the Auditing Process
  5. Design of the Auditing Process
  6. Organisation of the Auditing Process
  7. Performing the Audit
  8. Evaluating the Results of the Audit

Who Should Attend

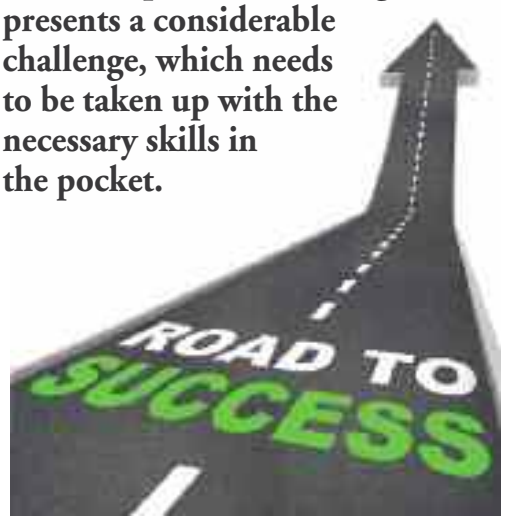
This course is intended for maintenance engineers and asset managers. Its purpose is to 'convert' technical people from the traditional engineering disciplines (mechanical, electrical,etc.) into fully fledged asset managers / maintenance engineers.

Laptop computer required – refer to terms and conditions on Course Registration form.

Textbook Provided

C902 Leadership in Asset Management

Leadership in Asset Management presents a considerable challenge, which needs to be taken up with the necessary skills in the pocket.



The Asset Management / Maintenance function intends keeping the Physical Assets in its care in a good operational condition. Its objective is to sustain a high level of Operational Readiness (Availability, Reliability, Operability, and Qualibility), at acceptable levels of Safety, Environmental Risk, and Cost.

Leadership in Asset Management involves leading the functions of Asset Management / Maintenance. It particularly keeps itself busy with achieving success through people. The objective of its companion course, C901, is to equip engineers with knowledge regarding the strategic and tactical aspects of Asset Management / Maintenance Engineering.

Even so, C901 cannot include all the necessary learning to prepare an individual to be a top class Asset Manager / Maintenance Manager. C902 fulfills that purpose. The two together produce the foundation for Asset Management Excellence and Career Progression.

Leading the Asset Management function needs considerable skill. It is much more than just managing technical results. Asset Managers need to steer the function to have the greatest effect on the output of the organisation.

Continued on Page 9

C902 Continued

To achieve this the Asset Manager should:

1. Understand the Asset Management / Maintenance function and the factors causing success well.
2. Be able to analyse and understand maintenance situations.
3. Have a good knowledge of modern management methods.
4. Understand that success comes through people.

This course aims to provide the skills, knowledge, and innovative capacity to practicing Asset Managers / Maintenance Managers to make them into successful achievers. This includes addressing and teaching them knowledge and vocational insight into issues such as:

- The profit impact of a properly run Asset / Maintenance department.
- The challenges and dilemmas inherent to maintenance today; how to manage it, understanding the 'New Maintenance Management Paradigm'.
- Classical Management Theory as a basis for success.
- Leadership and its critical role in maintenance.
- Achieving personal mastery, so as to be enabled to lead others successfully.
- Maintenance logistics – the 'logics' of the maintenance organisation – its role in achieving a successful maintenance department.
- Creating and maintaining a workplace culture that fosters success.
- Managing and developing a workforce to achieve success.

Course Content

Module 1 – Understanding Asset Management
I. Historic Roots
II. Introduction
III. Asset Management in Perspective
1. Objectives
2. Engineering vs Management
3. Nature of Failure

IV. The Asset Management / Maintenance Department – Its Focus and Function
1. Profit Impact
2. Asset Management / Maintenance Models
3. Quality of Maintenance

V. Asset Management Policy
VI. Management Planning
VII. Maintenance Performance Measurement
1. The Need for Maintenance Performance Measurement
2. Maintenance Performance Indices
3. The "Balanced Scorecard" as a Measurement System

Module 2 – The New Asset Management Paradigm
I. Maintenance Strategic Gap
1. Holistic Approach
2. The Asset Management Strategy Gap
3. Divide and Conquer

II. People Paradigms
1. Teams
2. Total Productive Maintenance (TPM)

3. Making it Work
1. Strategic Alliances
2. Leading from the Front
3. Being Pro-active
4. Steps to Success

Module 3 – Leadership
I. Defining Leadership
II. What is so Important About Leadership?
III. Development of the Leadership Model
IV. New Leadership Perspectives
V. Leadership Skills
1. Empowerment
2. Decision Making, Problem Solving and Capitalising on Opportunity
3. Communication
4. Motivation
5. Influencing skills
6. Conflict Handling
7. Discipline
8. Development

VI. Personal Mastery
1. Mindsets
2. The power of Choice
3. Creating a Vision
4. Psychological robustness
5. Critical Success Factors
6. Leadership and Change

Module 4 – Maintenance Logistics
I. Definition
II. Workshop
1. Workshop Layout Design
2. Workshop Organisation
   - Work Area Design
   - Tools and Equipment
   - Office Facilities
   - Personnel Facilities
   - Work Environment
   - Work Support
3. Workshop Flow

III. Maintenance Scheduling
IV. Quality Management
1. Quality definitions
2. Establishing a Quality Culture
3. Quality Systems

V. Purchasing Management
VI. Inventory Management
VII. Systems Management
1. Cost Control and Reduction
2. Management Through Information
3. Maintenance Systems
4. Managing the System – The MIS Audit
5. MIS Success Factors

Module 5 – Culture the Binding Force
I. Organisational Culture – A Definition
II. Elements of Organisational Culture
III. Culture Iceberg
IV. Culture Change
V. Cultural Problems
VI. Adaptive culture

Module 6 – Successful People Management
I. Motivation
1. Personal Value system
2. Needs Theories
3. People are Important

II. People Development
1. Situational Leadership
2. Training and Skills Development
3. Self-development: The Johari-window

III. A Learning Culture

Who Should Attend

The course is intended for asset managers, maintenance engineers, and all others who manage the asset management /maintenance function.

Credits 16*, level 6** **CPD Points: 5**

*The course comprises 80 hours of study, of which 40 hours are in class, with a further 40 hours for the assignment.

**Higher Diploma level.

Textbook Provided

C903 RCM Facilitation and Analyses

RCM is the best tool available to decide what maintenance to do to your equipment.

RCM = Reliability Centred Maintenance. The maintenance of physical assets needs to be scientifically determined based on reliability considerations. Reliability stands at the centre. This is the principle that improved the safety of modern jet liners and many industries to the level which improves the quality of our lives greatly.

Modern production equipment design is complex. It thus needs to be maintained scientifically. So how do you decide what maintenance to do on your critical production equipment? By deciding which failures are the ones that matter and then designing maintenance tasks for them.

The maintenance suggested by the manufacturer of your equipment often leads to one of two things. These are over-maintenance or under-maintenance.

The reasons for this are:

1. **The manufacturer does not understand your specific production circumstances.**
2. **The manufacturer is often over-conservative in their approach to ensure that their good name is preserved. This leads to unnecessary expensive maintenance.**

Reliability Centred Maintenance (RCM) has become an industry standard. It is the tool of choice for the design and development of effective maintenance plans.

One of the key drives behind RCM was to assure a high level of safety performance. The safety record of modern passenger airliners bears this out. Similar success has been achieved in many industries using RCM.

Courses in RCM

We present two courses in RCM: C903 and S801. They provide a good theoretical and practical base for the use of the RCM technique.

The difference between the two courses are:

- The three day short course (S801) teaches RCM as technique.
- The five day course (C903) adds two days. These two days essentially adds facilitation skills to S801.

Course Content

Module 1 – RCM Principles

- Historical Background
- Principles Underlying RCM
- Failure Modes and Effects Analysis (FMEA)
- Basic Renewal Theory
- The Nature of Failure
- Maintenance Strategies
- Failure Modes, Effects and Criticality Analysis (FMECA)

Module 2 – Select Failure Modes

1. Prioritisation of Plant Items
2. Identification of Maintenance Significant Items (MSI's)
3. Prioritisation of MSI's
4. Determining the Functions(s) of Each MSI
5. Determine the Functional Failure(s) for Each Function
6. Determine the Failure Mode(s) for Each Functional Failure
7. Determine the Consequence of Each Failure Mode

Module 3 – Select Maintenance Tasks

- Technical Feasibility and Economical Feasibility
  8. Selecting Suitable Maintenance Tasks
- Optimising / determining maintenance intervals

Workshop: Use the techniques learnt to develop a maintenance plan for an example technical system.

Module 4 – Compile Maintenance Plan, RCM Living Programme

- Failure Characteristics
- The Nature of Failure
- Repairable Systems Analysis
- NHPP Cost Modelling
- Integrated Failure Data Analysis
- Facilitation Techniques
- Case Study

Module 5 – RCM Facilitation

Workshop: Do Facilitation and Analysis for an Example Technical System.

Who Should Attend

The C903 course is recommended for facilitators of RCM sessions. The S801 course is meant for participants in RCM design sessions. Any person who needs to apply the RCM logic to a system or parts of a system will also benefit from any of the two courses.

Laptop computer required – refer to terms and conditions on Course Registration form.

Credits 16*, level 6** **CPD Points: 5**

*The course comprises 80 hours of study, of which 40 hours are in class, with a further 40 hours for the assignment.

**Higher Diploma level.

Textbook Provided

C904 RCM ProAktiv: Advanced Reliability Centred Maintenance

Excellence in RCM practice: RCM ProAktiv

The idea of RCM was conceived in the late sixties of the previous century by the airline industry to achieve acceptable levels of maintenance for aircraft. This was followed by a carry-over of these concepts first to the military and then to general industry (circa 1980).

RCM has been practiced widely since then, but especially so from the early nineties. It has now become necessary to take RCM practice to a new, advanced level.

RCM ProAktiv does exactly this by developing the original RCM methodology both in width and depth of application. In the present course known RCM concepts are thus revisited, expanded, and explored comprehensively.

This course is based on the book RCM ProAktiv: a proactive approach to Reliability Centered Maintenance - a complete view, by our principal, Dr Jasper L. Coetzee. Dr Coetzee is also lecturing this particular course.

Because of the advanced nature of the course, candidates that want to enrol need to have successfully completed the following two courses as a prerequisite for this course:

- **C702:** Reliability Engineering in Asset Management
- **C903:** RCM Facilitation and Analyses

This course thus builds on the foundation already established in our C702 and C903 courses. Apart from shortly revisiting the Reliability and RCM foundations, the student should be in a position to quickly grasp and use the advanced concepts as taught in this course.

Who Should Attend

The C904 course is recommended for Reliability Engineers, Maintenance Engineers, Asset Managers, and RCM Facilitators that intend enriching their practice of RCM to a full RCM ProAktiv level.

Laptop computer required – refer to terms and conditions on Course Registration form.

Credits 20*, level 6**

*The course comprises 100 hours of study, of which 40 hours are in class, with a further 60 hours for an assignment.

**Higher Diploma level.

Course Content

Module 1 – Essential Background

- An overview of the RCM process
  - RCM – a definition
  - Historic review
  - Structure of RCM
- RCM in organisational context
  - Conceptual framework
  - The Maintenance Cycle
  - Maintenance a 'holistic' problem
  - Maintenance Risk and its reduction
  - Maintenance Strategy options
- The context of RCM

Module 2 – A foundation for applying RCM ProAktiv successfully

- Problem Areas
  - Problems in the application of RCM
  - Problems in the definition of RCM
  - The scientific basis of RCM
- RCM Framework
  - Outline of the RCM process
  - Preservation of function
  - Tracking diagram
- Preparing for RCM Application
  - Determining the scope of RCM application
  - Information assembly

Module 3 – Finding the failure modes that will lead to an excellent maintenance plan

- Identification of failure modes
  - FMEA process
  - Identification of functions, functional failures, failure modes, and failure effects
  - Example application
- Prioritisation of failure modes
  - FMECA process further developed
  - The risk approach
  - Classification of failure modes
- Case Study part 1

Module 4 – An advanced view of the Task Selection process

- Task types
- Task selection process
- Technical/Economical Feasibility
- Technical selection criteria
- Default tasks
  - Classical RCM
  - RCM ProAktiv
- Documenting the task selection results
- Case Study part 2

Module 5 – Assembling and implementing the RCM ProAktiv Maintenance Plan

- Putting the RCM ProAktiv Plan together
  - Finding the correct task frequencies
  - Performing task packaging
  - Critically assess whether the plan will achieve the goals
- Putting the RCM ProAktiv Plan into effect
  - The benefit of limiting the scope of RCM
  - RCM in task context
  - Practical application issues
    - Progressive application
    - Continuous improvement
- Factors governing the success of the RCM ProAktiv process

Textbook Provided

S801 Reliability Centred Maintenance

RCM is the best tool available to decide what maintenance to do to your equipment.

RCM = Reliability Centred Maintenance. The maintenance of physical assets needs to be scientifically determined based on reliability considerations. Reliability stands at the centre. This is the principle that improved the safety of modern jet liners and many industries to the level which improves the quality of our lives greatly.

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Courses in RCM

We present two courses in RCM: C903 and S801. They provide a good theoretical and practical base for the use of the RCM technique.

The difference between the two course are:

- The three day short course (S801) teaches RCM as technique.
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Course Content

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4. Determining the Functions(s) of Each MSI
5. Determine the Functional Failure(s) for Each Function
6. Determine the Failure Mode(s) for Each Functional Failure
7. Determine the Consequence of Each Failure Mode

Module 3 – Select Maintenance Tasks
- Technical Feasibility and Economical Feasibility
8. Selecting suitable maintenance tasks
- Optimising / determining maintenance intervals

Workshop: Use the techniques learnt to develop a maintenance plan for an example technical system.

Note: This short course forms the first three days of the RCM Facilitation course (C903)

Who Should Attend

The C903 course is recommended for facilitators of RCM sessions. The S801 course is meant for participants in RCM design sessions. Any person who needs to apply the RCM logic to a system or parts of a system will also benefit from any of the two courses.

Laptop computer required – refer to terms and conditions on Course Registration form.

Credits 8*, level 6**

CPD Points: 3

*The course comprises 40 hours of study, of which 24 hours are in class, with a further 16 hours for the assignment.

**Higher Diploma level.

Textbook Provided

S802 Asset Management for Executives

Knowledge is necessary to steer the Asset Management / Maintenance function successfully

Asset Management / Maintenance is inescapably part of the production success of any business. As such it is dependent on machinery or buildings to generate a profit or service.

Those people steering such organisations inevitably need some knowledge of the Asset Management / Maintenance function. Such knowledge will enable them to steer the Asset Management / Maintenance function successfully.

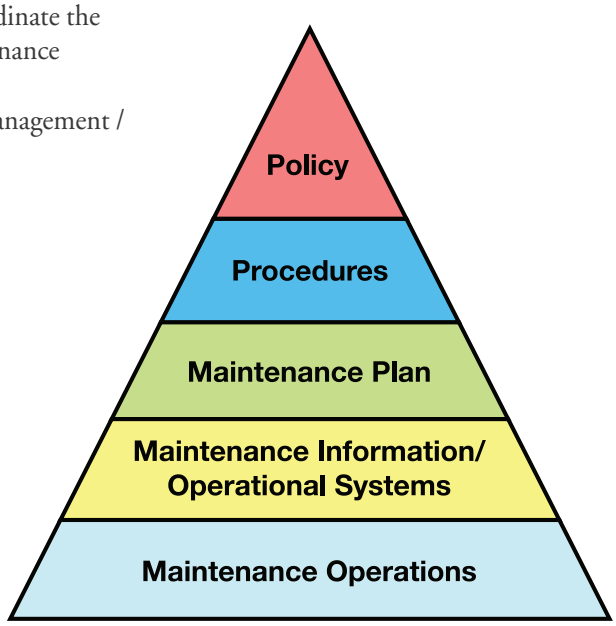
This course was specifically designed with these top managers in mind.

More and more courses on various Asset Management / Maintenance topics become available. The Asset Management world is being reshaped through the application of new techniques and philosophies being presented at such courses. However, the lack of knowledge higher up in the organisation often limits the possibility of achieving success through such improvement drives.

Some of the executives who should provide the necessary co-ordination are not able to do so because of their own lack of understanding of the processes involved.

This course is meant to provide in this important need:

- It presents an overview of a variety of Asset Management / Maintenance topics.
- Asset Management and Production executives are equipped to lead Maintenance improvement drives.
- Assists in understanding the correlation between the various subject areas better.
- Make informed choices.
- Intelligently drive and co-ordinate the Asset Management / Maintenance department.
- Achieve world class Asset Management / Maintenance practice.



Course Content

Module 1 – Asset Management Fundamentals
- Objectives
- Asset Management / Maintenance Modelling
- Profit Impact
- Annual Planning Process
- Analysis of Asset Management Results
- Asset Management Trends

Module 2 – Maintenance Engineering Fundamentals
- Definition of Maintenance Engineering
- Maintenance Strategies
- Replacement Decision Making
- RCM Fundamentals
- Maintenance Plan Development
- Principles of Condition Based Maintenance
- Implementing CBM

Module 3 – Advanced Asset Management Concepts

I. Asset Management Performance Measurement
1. Typical Measurement Indices
2. Integrated Approach
3. Control of Maintenance

II. Asset Management / Maintenance Auditing
1. Auditing principles
2. Organising/Performing the audit
3. Managing using the audit's results

III. Asset Management Success
1. Asset Management Excellence
2. The Maintenance Work Ethic
3. Closing the Strategic Gap

Who Should Attend

The course is intended for all who need to have a total overview of the modern Asset Management / Maintenance function and the newest maintenance philosophies and techniques.

The accent is on the (strategic) needs of top ranking Asset Management / Maintenance and Production executives.

Credits 8*, level 6** **CPD Points: 3**

*The course comprises 40 notional hours, of which 24 hours are in class, with a further 16 hours for the assignment.

**Higher Diploma level.

Textbook Provided

S803 Root Cause Failure Analysis

Root Cause Analysis is one of the most potent tools in the fight against failure.

Root Cause Analysis is used in a routine way in most medical situations. It is recognised that a symptom has an immediate cause, which can in turn be caused by a deeper seated problem. Physicians also understand that you cannot just jump in and start treating the symptoms. You need to stop to consider whether there's actually a deeper problem that needs your attention.

If you only address the symptoms – what you see on the surface – the problem will almost certainly happen again... which will lead you to re-address the same symptoms, again, and again, and again. If, instead, you look deeper to find out why the problem is occurring, you can remedy the underlying systems and processes that cause the problem.

We in maintenance also work with 'patients', machine patients. In the same way as with patients in the medical case, we have to find problems through the use of Root Cause Analysis.

Root Cause Analysis seeks to identify the origin of a problem. It uses a specific set of steps, with associated tools, to find the primary cause of the problem, so that you can:

- Determine what happened.
- Determine why it happened.
- Decide on an action to reduce the risk of it happening again.

Root Cause Analysis typically leads to one or more of the following three basic types of causes:

- Physical causes – something physical failed or stopped working.
- Human causes – somebody did something wrong, made a judgment error.
- Organisational causes – a system, process, or policy that people use to make decisions or do their work is inadequate.

The course's main aim is to equip course participants with sufficient skills to be able to do the following:

- Put in place a group of people with the necessary qualities to perform Root Cause Analyses successfully.
- Define the problem clearly and unambiguously.
- Perform the required data assembly through learnt investigation and exploration techniques.
- Find the root cause through various techniques, including cause and effect diagrams, and the 5M method.
- Generate solutions to the problem, find the best solution, implement the solution.

The accent of the course is on practical application through group work. The purpose of this is for students to internalise the method well.

Credits 12*, level 5**

CPD Points: 5

*The course comprises 60 hours of study, of which 40 hours are in class, with a further 20 hours for the assignment.

**Occupational Certificate level.

Course Content

Day 1 – Problem Solving Fundamentals
- Brain Dominance Test
- The Competitive Edge
- Ned Herman's Whole Brain Theory
- Understanding the Brain
- Whole Brain Thinking
- Using Mindmaps
- Using These Principles in Managing People (and Yourself)

Day 2 – Failure Cause Analysis Fundamentals
- Introduction to RCFA
- What failure? (Defining the Problem)
- Determining the problem boundaries
- The 11 Problem Definition Steps
- Root Cause – A True Pursuit?
- Mental Barriers to Creative Thinking
- Brainstorming – Idea Generation
  1. Team Work & Team Management
  2. Team Development
  3. Management & Team Responsibility
  4. Verbal Brainstorming

Day 3 – Principles of RCFA
- Introduction to the RCFA Wall Chart
- The Cause and Effect Principle
- Fault Tracing Fundamentals
- The RCFA Analysis Process
- Creative Idea Evaluation
- Judgment
- Critical Thinking

Day 4 – Getting RCFA to Work
- Solution Implementation
- Selling the Plan
- Planning the Plan
- What Can Go Wrong? Risk Analysis
- Implementation Monitoring
- Time Management
- Team Facilitation

Day 5 – RCFA Workshop
- Using the RCFA Wall Chart
- Problem Statement
- Individual Group Analysis
- Class Synthesis

Who Should Attend

The course is intended for maintenance people who need to cope with maintenance problem situations.

Included with this course:

Internationally acclaimed Herrmann Brain Dominance (HBDI) assessment and feedback by a HBDI professional.

See www.hbdi.com

Herrmann International

S804 Decision Making in Maintenance

Asset Management / Maintenance is not for sissys. Fortunately, there are tools available to make us heroes.

Asset Management / Maintenance practitioners are often faced with situations where they need to take challenging decisions. Such decisions are mostly based on limited information and years of experience. While experience and gut feel are invaluable in such situations, it can often be enhanced by good analysis.

Typically, maintenance decisions require the evaluation of alternative solutions in terms of various maintenance criteria such as cost, failure history, time to repair, time to failure and uptime.

The course Decision-making in Maintenance is aimed at providing such analysis tools. Specifically, it addresses the following decision making areas:

- Preventive maintenance decisions
- Component replacement decisions
- Asset replacement decisions
- Repairable Systems decisions
- Condition Based Maintenance decisions
- Maintenance resource decisions
- Outsourcing decisions

The course intends to enable maintenance practitioners to be able to:

- Use a variety of mathematical and statistical techniques to assist them in maintenance decision making.
- Apply the techniques of component replacement decision-making, reconditioning decision-making, and equipment replacement decision-making to limited scale problems, using standard student copies of commercially available software.
- Develop proper maintenance strategies for the assets under their care.
- Do basic failure analyses.
- Find the optimal replacement age of components.
- Develop an essential understanding of capital replacement decision making models and techniques.

Who Should Attend

The course is intended for maintenance managers, maintenance engineers and other maintenance personnel who need to make important maintenance decisions regarding the different aspects of maintenance (both managerial and technical decisions).

Laptop computer required – refer to terms and conditions on Course Registration form.

Course Content

Day 1
- Introduction to Decision Making
- Maintenance Strategies and Their Role in the Analysis of Component Failure Data
- Exercise on Gear Failures
- Unaided Decisions

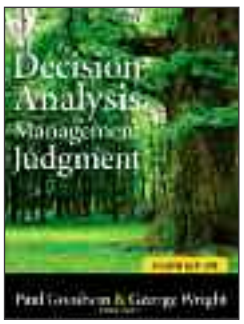
Day 2
- Test 1
- Renewal Theory
- Individual Exercises in Analysing Component Failure Data Using the Weibull Distribution I
- Individual Exercises in Analysing Component Failure Data Using the Weibull distribution II
- Multiple Objectives: SMART I

Day 3
- Test 2
- Asset Replacement Decisions
- Multiple Objectives: SMART II
- Class Assignment

Day 4
- Test 3
- Component Replacement Decisions
- Student Exercises Using M-Analyst
- Condition Based Decisions

Day 5
- Using Simulation to Decide on Maintenance Strategy
- Outsourcing decisions
- Examination

Textbooks Provided



Credits 12*, level 6** **CPD Points: 2**

*The course comprises 60 hours of study, of which 40 hours are in class, with a further 20 hours preparation for tests and a final examination.

**Higher Diploma level.

S805 Maintenance Control

Good control makes success a snap!

Maintenance Control is the twin of Maintenance Planning. Without control the maintenance plan that was created may never be achieved.

Maintenance Control is the function that ensures that good results are achieved. Without proper control you are only hoping for the best. With good control, you set the seal on quality maintenance.

One gets the idea that maintenance control is not regarded as important in most courses – including our own. Maintenance planning is seen as important by most. Some highlights ideas such as Total Productive Maintenance (TPM). Others stress methods such as Reliability Centred Maintenance (RCM). Course upon course insist on these as solutions to all maintenance problems.

Undoubtably, these are important! But they can never be separated from good control. Control is the 'cherry on the cake' of a good plan. It makes sure that the objectives of the plan have been met.

Good control has four elements:

- Strategic steering of maintenance.
- Tactical steering of the maintenance actions - this is based on a good maintenance plan.
- Sound performance management.
- Operational planning and control.

Most organisations focus on only one or two of these elements. This leads to them only achieving mediocre results - excellence is only to be had by those who both plan and control well.

The objective of this course is to rectify this situation. Remember, good control is the 'cherry on the cake'!

Course Content

Module 1

Maintenance Control Basics

1. The Four Components of Maintenance Control
2. Various Control Loops in the Maintenance Department
3. A Control Systems View of Maintenance
4. The Importance of Measurement to Facilitate Control
5. Maintenance Performance Control Aspects
6. Maintenance Auditing as a Means of Control

Module 2

Advanced aspects of Maintenance Control

1. Maintenance Cost Control
2. Maintenance Supply Chain Efficiency Control
3. Quality Control of Maintenance Supplies
4. Control of Maintenance Planning and Execution
5. Control Over Availability of Critical Spares
6. Maintenance Work Quality Control
7. Computerised Maintenance Management Systems
8. Using Information for Effective Control
9. Multi-level Maintenance Work as a Means to Improved Control
10. Control of the Design Process as a Means to Good Maintenance Results
11. The Big Picture: Maintenance Strategic Control

Who Should Attend

The course is intended for maintenance practitioners who want to improve their organisation's performance in this very important area.

Credits 6*, level 5**

CPD Points: 2

*The course comprises 30 hours of study, of which 16 hours are in class, with a further 14 hours for the assignment.

**Occupational Certificate level.

Textbook Provided

S808 Asset Management Logistics

Asset Management Logistics is one of the critical aspects underlying the maintenance and management of production and service assets in an industrial/service organisation.

One can have an excellent asset management strategy, a good maintenance plan, an efficacious maintenance organisation, and experienced personnel. But if these are not supported by a fit for purpose logistical infrastructure, the results of the maintenance effort will be disappointing. The same is true regarding the long term management of these assets for maximum gain.

Asset Management Logistics includes the following:

- The logical flow of people, work, materials, parts, information, etc. in the maintenance work situation.
- Proper layout design and equipping of the maintenance organisation.
- Proper design of maintenance plans, procedures, and support services to ensure supportability of production equipment.
- Maintenance Inventory and Procurement systems that ensures an effective and efficient supply chain to support ongoing maintenance work.
- Job design and work measurement that sets realistic standards for maintenance work execution.
- Techniques of Forecasting, Planning, Maintenance Scheduling, and Project Management as means to plan and organise the asset management function well.

There are no formal courses or books on the subject of Asset Management Logistics. Consequently, the design of the logistical elements built into most asset management organisations are based on very flimsy grounds. This course is meant to rectify this situation.

Who Should Attend

This course is intended for asset managers, maintenance managers, maintenance engineers and other maintenance personnel who need to understand the fundamental organisation and flow of work in a maintenance business to properly support the operational processes.

Credits 8*, level 6**

*The course comprises 40 hours of study, of which 24 hours are in class, with a further 16 hours for the assignment.

**Higher Diploma level

Course Content

Day 1: Introduction to Asset Management Logistics

- What is asset Management Logistics?
- Importance of Asset Management Logistics
- The Asset Life Cycle as the Logistical context
- What is included?
- Logistics feeding the Asset Management Business
  - Supportability Analysis
  - Systems Engineering
  - Maintenance Concept
- Integrated Logistical Support
- Logistics inside the Asset Management Business
  - Overview
  - Facility location
  - Design for capacity
  - Organisation Design

Day 2: Logistics inside the Asset Management Business

- Layout Design
  - Layout Types
- Work Flow
  - Heuristics
  - Workflow as idea
  - Why is flow so important?
  - Workflow central to logistics
  - Workflow and efficiency
- Task Design
  - The Maintenance Plan
  - Task Analysis
  - Task Content
  - Task execution time
- Support Services
  - Maintenance Planning
  - Scheduling Shutdown Management

Day 3: Logistical Support

- Computerised Maintenance Management Systems
  - CMMS Success Factors
  - System Architechture
  - System Success determined by
  - Input Quality
  - Managing System Success
  - Essential CMMS Functions and
  - Features for Technology Driven Businesses
- Provisioning
  - Introduction
  - Stockholding
  - Purchasing

S811 Water Treatment Plant Operation and Maintenance

Water treatment is a very serious and emotive issue at this time.

This topic is continuously in the news. Local governments struggle to operate and maintain water treatment plants successfully. Some large industrial organisations have the same problem. In the meantime the environment and consumers of water are at risk.

The need for operations and care of different production plants is similar – i.e. the operational and maintenance principles are the same. Yet, water treatment plants clearly do have many aspects that are unique.

The course touches on both operations and maintenance issues. Its objective is to train both operations staff and maintenance staff. What's more, it deals with both fresh water supply plants and wastewater treatment plants.

The course addresses the following areas:

Day 1: Water Treatment and Maintenance Principles: Nature's water treatment cycle, Water quality requirements, Water treatment system overview, Wastewater sources, Maintenance Principles: The maintenance function in context, Principles of Preventive Maintenance, Plant Inspection.

Day 2: Water Treatment Technology: Operation and Maintenance I: Water intake and screening, Coagulation and Flocculation, Sedimentation, Biological Treatment, Filtration, Disinfection, Distribution, Discharge Effluent, Maintenance of Water Plant components: Pump Maintenance, Pipeline Maintenance, Maintenance of Civil Structures, Lubrication, Corrosion Control, Machinery Alignment, V-belt drives, Flexible Couplings, Electric Motors, Control Components, Lighting.

Day 3: Water Treatment Technology: Operation and Maintenance II: Water Delivery Quality, Monitoring water quality, Advanced treatment of Wastewater, Membrane Separation Technologies, Ion Exchange, Solids Management.

Course Content

Day 1
Water Treatment and Maintenance Principles

1. Introduction
2. Nature's Water Treatment Cycle
3. Water Quality Requirements
4. Water Treatment System Overview
5. Wastewater Sources
6. Maintenance Principles
7. The Maintenance Function in Context
8. Principles of Preventive Maintenance
9. Plant Inspection

Day 2
Water Treatment Technology: Operation and Maintenance 1

1. Water Intake and Screening
2. Coagulation and Flocculation
3. Sedimentation
4. Biological Treatment
5. Filtration
6. Maintenance of Water Plant Components:
7. Pump Maintenance
8. Pipeline Maintenance
9. Maintenance of Civil Structures
10. Lubrication
11. Corrosion Control
12. Machinery Alignment
13. V-belt Drives
14. Flexible Couplings
15. Electric Motors
16. Control Components
17. Lighting

Day 3
Water Treatment Technology: Operation and Maintenance 2

1. Disinfection
2. Distribution
3. Discharge Effluent
4. Water Delivery Quality
5. Monitoring Water Quality
6. Advanced Topics
7. Advanced Treatment of Wastewater
8. Membrane Separation Technologies
9. Ion Exchange
10. Solids Management
11. Caring for Equipment:
12. Principles of Care
13. Inspection
14. Lubrication

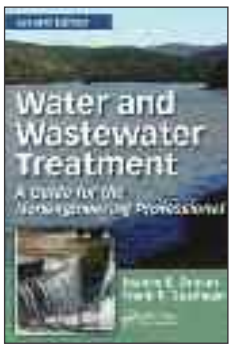
Who Should Attend
The course is intended for both operations and maintenance staff. It is also meant for managing staff.

Credits 8*, level 5**

*The course comprises 40 hours or study, of which 24 hours are in class, with a further 16 hours for the assignment.

**Occupational Certificate level.

Textbook Provided



S812 Road Maintenance

No economy can be sustainably vibrant without good roads.

Our roads are a key asset to the South African Economy. It plays a sizeable role in our ability to produce and distribute. And it also gives us the ability to commute fast from place to place. The road system can thus rightly be described as a national asset. The quality of the roads determines the speed and safety with which people and goods can move. It is thus a key element in creating wealth.

Large parts of our road network fell into disrepair over the last 20 years. One of the reasons for this is the change in goods/material transport strategy. It was decided in the late 80's to change from largely rail transport to mainly road transport. Another reason for this state of affairs is a lack of proper road maintenance.

This situation needs to be dealt with soon. It will need a mixed strategy. The first component of such strategy will need to be road repair / road rebuilding. Where repair is still viable it should be the chosen option. But where the road's structure has been damaged, it will have to be rebuilt. The second part of such mixed plan of action calls for a program of preventive maintenance. This is vital to prevent a future recurrence of this state of affairs.

A blend of road surface restoration and preventive maintenance will have three effects. It will firstly help to allow people and goods to move safely. Secondly, it will ensure that our road network is kept in a good condition. Lastly, it will keep the long term cost of roads to the economy at an acceptable level.

A good road surface preventive maintenance scheme is made up of a whole range of methods. The goal of these are to increase road surface life in a cost-effective and efficient way. A scheme with the right mix of strategies can result in an ongoing good road surface condition. This concept, as simple as it seems, has not been fully accepted by road authorities. They thus opt for reactive repairs rather than for prevention.

The course addresses the following areas:

- Maintenance Principles
- Road Design
- Road Pavement Repairs
- Preventive Maintenance of Roads
- Road Condition Assessment
- Implementing and using a Road Condition Database

Road condition inspection plays a key role in road maintenance. It is the main input prompting preventive action. It is covered for both flexible (i.e. asphalt) and rigid (i.e. concrete) surfaces.

Guidelines are amongst others also provided for:

- Sealing of cracks
- Patching and pothole repairs
- Spray patching
- Repairs to storm drainage ducts
- Service trenches
- Repairs associated with service access openings
- Partial and full-depth repairs

Recommendations are practical - it centres on methods and products that are effective and improve road surface life.

Credits 6*, level 5**

*The course comprises 30 hours of study, of which 16 hours are in class, with a further 14 hours for the assignment.

**Occupational Certificate level.

Course Content

Day 1 – Maintenance Principles
- The maintenance Function in Context
- Principles of Preventive Maintenance
- Effectiveness of Preventive Maintenance
- Maintenance Strategies

Road Design
- Types of roads
- Design of local roads

Road Pavement Repairs: General

Road Pavement Repairs: Flexible Pavements
- Crack Treatments
- Surface Treatments
- Pothole Patching and Repair

Preventive Maintenance I
- Introduction to Preventive Maintenance
- Types of Preventive Maintenance
- Crack & Joint Sealing
- Chip Seal
- Micro Surfacing
- Overband Crack Fill

Day 2 – Road Pavement Repairs: Rigid Pavements
- Repair Materials
- Full Depth Repair
- Partial Depth Repair
- Slabjacking
- Subsealing
- Asphalt Undersealing
- Diamond Grinding
- Load Tranfer Restoration
- Polymer Concrete

Preventive Maintenance II
- Scheduling Preventive Maintenance
- Selecting Preventive Treatments

Road Condition Assessment
- Distress Identification and Severity
- ASTM D-6433 07 Standard for Pavement Condition Index Surveys

Road Condition Database
- Road Inspection
- Pavement Rating System
- Road Database Software

Who Should Attend

The course is designed to address specific needs of those who manage and oversee road pavement maintenance activities, select maintenance treatments, specify maintenance techniques and materials, supervise field maintenance operations, and provide quality assurance.

S813 Economical Replacement and Life Cycle Management

The life cycle cost of a system does not start at system procurement, but at the moment that somebody has the idea that such system should exist. Such idea is then typically passed on to a designer / design team, who starts designing the system (through the generic design phases of (I) conceptual design, (II) preliminary design, and (III) detailed design). The design process normally also includes the system development process, involving the construction and testing of prototypes.

These early stages of the life cycle are critically important, because a very high proportion of the total system life cycle costs are committed at these early stages through the design decisions that are made.

Our aim is then to studying life cycle costing, so to attain an understanding of how to minimise the costs over the life cycle of the equipment, firstly through design inputs, but also through meaningfully influencing the maintenance and operation of the equipment over its operational life.

Course Content

Day 1
Foundational Facts
1. Introduction
2. Stages in the Life Cycle
3. Basic principles
4. Basic concepts
5. Annual Compounding

Day 2
Engineering Economics
1. Test 1
2. Valuation Models
3. Methods for Comparing Different Projects
4. Choosing Among Investment Alternatives

Day 3
Life Cycle Analysis
1. Test 2
2. Life Cycle Cost Definitions
3. Introduction
4. Why use LCC?
5. What Goes into LCC?
6. Trade-off Tools for LCC
7. Engineering Facts
8. Adding Uncertainty to the LCC Results

Day 4
Equipment Replacement
1. Test 3
2. Equipment Replacement and Retirement
3. Depreciation and Taxes

Day 5
Estimation
1. Estimation: Theory and Practice
2. Examination

Who Should Attend

The course is intended for asset managers, maintenance engineers, maintenance managers, and all others that need to know about Life Cycle Cost Management and Capital Replacement.

Laptop computer required – refer to terms and conditions on Course Registration form.

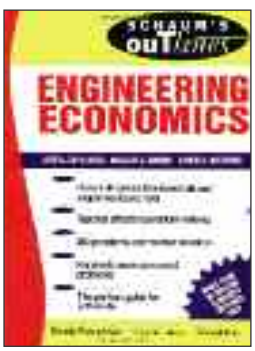
Credits 12*, level 6**

CPD Points: 5

*The course comprises 60 hours of study, of which 40 hours are in class, with a further 20 hours preparation for tests and the final examination.

**Higher Diploma level.

Textbook Provided



S820 What is Asset Management and how does it differ from Maintenance?

Critical changes affecting Maintenance and Production people.

Production as well as service organisations have traditionally discharged their duty towards their owners / founders /stakeholders by operating and maintaining production/service assets. For this purpose there existed a production/service department and a maintenance department in most firms.

Since the sixties of the previous century there was a progressive realisation that production assets need to be managed comprehensively by production organisations. Maintaining them is not the total answer. The idea of Physical Asset Management (mostly simply called Asset Management) was conceived.

Asset Management includes Maintenance, but much more than that. It broadly includes the following four main stages:

1. Asset conceptualisation, design, development, and production.
2. Asset (and support infrastructure) selection, procurement, and installation.
3. Asset operation and maintenance
4. Asset disposal

This led to the British PAS 55 Standard (2003, updated in 2008), followed by an International set of standards, called ISO 55000. These address the need for developing the typical organisation's Maintenance function to a full blown Asset Management Function.

The questions now asked by most Maintenance (as well as Production) people are:

1. What is the difference between what I have been doing and what I am supposed to be doing in future?
2. Will these standards really contribute to a better future for our businesses?
3. What is the real difference between Maintenance and Asset Management?
4. What do I have to do?

The present course intends answering these questions, so that business managers (production and maintenance) can start planning for the new future specified by these standards.

Can Maintenance and Production people disregard these changes?

These changes will have at least as great an effect as that of the various safety, quality, and environmental standards. It is critical to build an understanding of these changes now and start planning for the future.

Who Should Attend

Maintenance Managers, Maintenance Engineers, Reliability Engineers, Production Managers, Business Managers.

Credits 6*, level 6**

*The course comprises 30 hours of study, of which 16 hours are in class, with a further 14 hours for an assignment.

**Higher Diploma level.

Course Content

Module 1 (Day 1) – Overview of the relationship between Maintenance and Asset Management

– An overview of Maintenance
- Historical perspective
- What does maintenance contribute?
- What is lacking in the maintenance approach?

– What is Asset Management?
- The asset life cycle
- Scope of Asset Management
- Historical background
- Assets and Asset Management
- The management of Assets
- Required outputs

Module 2 (Day 2) - The deeper relationship between Maintenance and Asset Management

– Understanding the Maintenance / Asset Management relationship
- The Maintenance Cycle
- The Asset Management Cycle. What are the similarities?

What are the differences?

– ISO 55000 – the set of Asset Management standards
- The evolution of Asset Management standards
- PAS 55: Predecessor of ISO 55000
- ISO 55000: A set of Asset Management standards
- Establishing a broad understanding of ISO 55000

S821 Understanding ISO 55000

ISO 55000 is about using the organisation's assets for maximal gain.

Important Note: If unsure of the background to the ISO 55000 standard, read the ***"S820: What is Asset Management and how does it differ from Maintenance"*** page.

The discipline of Asset Management is increasingly important. In Asset Management full regard for achieving maximum benefit from the organisations' assets is intended. Such expertise draws from all functions within an organisation: from business, financial, human resources, as well as operations and maintenance management. It is particularly challenging, therefore, to gain a good understanding of the discipline across the whole breadth of the knowledge base.

The ISO 55000 standard assists asset intensive businesses to achieve excellence in Asset Management. This is of critical importance when dealing with shareholders and regulators, who expect first-class results from the business' assets.

In deciding whether Asset Management is for your organisation, consider the following questions:

- Do you understand the risk profile associated with your asset portfolio and how this will change over time?
- Can you demonstrate the business consequences of reducing/increasing your capital investment or maintenance budgets by 10% over the next five years?
- Can you justify your planned asset expenditures to external stakeholders?
- Can you easily identify which investment projects to defer when there are funding or cash flow constraints?
- Do you have the appropriate asset data and information to support your Asset Management decision-making?
- Do you know if your people have the right competencies and capabilities to manage your assets?
- Do you know which Asset Management activities to outsource?

The ISO 55000 set (ISO 55000, ISO 55001, ISO 55002) of International Standards is primarily intended for use by:

- Those involved in the establishment, implementation, upkeep and improvement of an asset management system
- Those involved in delivering asset management activities and services
- Those needing to assess an organisation's ability to meet legal, regulatory and contractual requirements

Course Content

Module 1
- Introduction
  - Benefits of ISO 55001
  - Tips for implementing ISO 55001
- Structure and contents of the ISO 55001 standard
- Terms and definitions
- What is Asset Management?
- Asset Identification
- Asset Management and Organisational effectiveness
- Framework for an Asset Management System

Module 2
- Elements of an Asset Management System
- Asset Management in Organisational context
- Determining the scope of the Asset Management System
- Leadership in asset Management
- Leadership and Commitment
- Organisational Roles and Responsibilities
- Planning for Asset Management

Module 3
- Asset Management System Support
  - Resources
  - Competence
  - Communication
  - Information Requirements
- Asset Management System Operation
  - Operational Planning and Control
  - Management of Change
  - Outsourcing
- Asset Management System Performance Evaluation
  - Monitoring System outcomes
  - Internal Auditing
  - Management Review
- Asset Management System Improvement
  - Nonconformity and Corrective action
  - Preventive action
  - Continuous Improvement
- Integrated Management systems Approach
- How to obtain ISO 55001 certification

Credits 8*, level 6**

*The course comprises 40 hours of study, of which 24 hours are in class, with a further 16 hours for an assignment.

**Higher Diploma level.

Who Should Attend

Maintenance Managers, Maintenance Engineers, Reliability Engineers, Production Managers, Business Managers.

S822 Implementing ISO 55000

ISO 55000 is about using the organisation's assets for maximal gain

Important Note: If unsure of the background to the ISO 55000 standard, read the ***"S820: What is Asset Management and how does it differ from Maintenance"*** page.

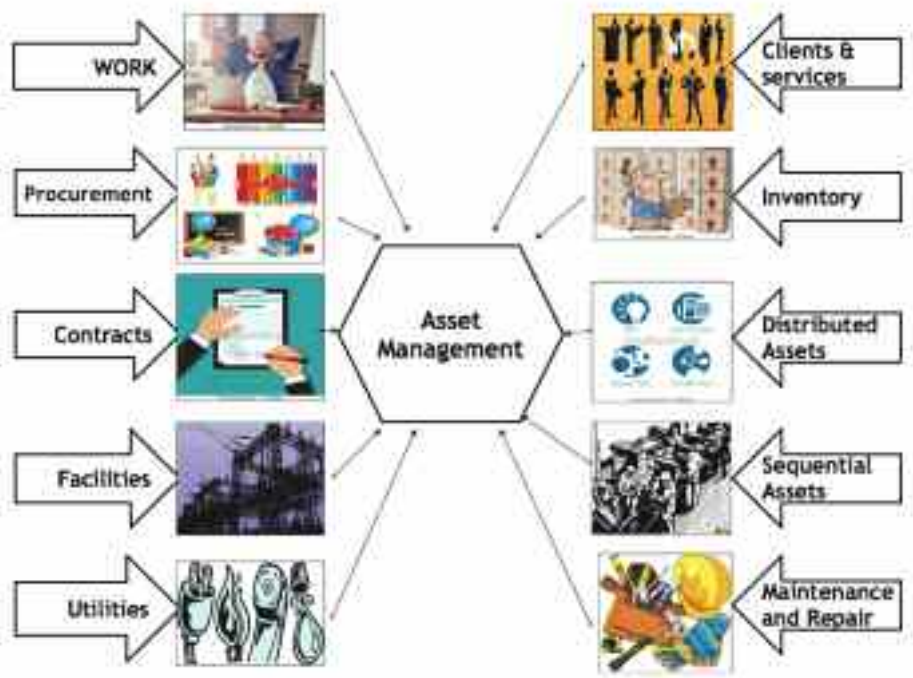
The discipline of Asset Management is increasingly important. In Asset Management full regard for achieving maximum benefit from the organisations' assets is intended. Such expertise draws from all functions within an organisation: from business, financial, human resources, as well as operations and maintenance management. It is particularly challenging, therefore, to gain a good understanding of the discipline across the whole breadth of the knowledge base.

The ISO 55000 standard assists asset intensive businesses to achieve excellence in Asset Management. This is of critical importance when dealing with shareholders and regulators, who expect first-class results from the business' assets.

The S822 course is meant to assist the organisation in implementing the ISO 55000 standard. It assumes that the participant understands what the ISO 55000 standards entail (per the S821 course).

Benefits of implementing ISO 55000 includes:

- The application of an asset management system provides assurance that the organisation's objectives can be achieved consistently and sustainable over time.
- Asset management enables an organisation to examine the need for, and performance of, assets and asset systems at different levels.
- Aligning the asset management objectives with the organisational objectives, as well as linking asset reports to financial reports, improves the organisation's effectiveness and efficiency.
  - Additional benefits:
  - Improved financial performance
  - Managed risk
  - Improved organisational sustainability



Course Content

Module 1
- ISO standards implementation principles
- Determining ISO 55000 implementation readiness
- Determine what value will be added
- Building asset Management competence
- Setting a Baseline for comparison

Module 2
- Setting up a Steering Committee
- Planning for implementation
- Process improvement and best-practice implementation
- Documentation Design
- Creating an Asset Management culture

Module 3
- Project Management
- Change Management
- Ensuring long term success
- ISO 55000 Certification

Credits 8*, level 6**

*The course comprises 40 hours of study, of which 24 hours are in class, with a further 16 hours for an assignment.

**Higher Diploma level.

Who Should Attend

Maintenance Managers, Maintenance Engineers, Reliability Engineers, Production Managers, Business Managers.

Diploma Study

The Terotechnica Maintenance College offers a Diploma in Maintenance Management. The diploma consists of approximately 30 one day modules plus in the order of six assignments (one per course taken) and a final project.

There is a great need for good maintenance training. That, combined with the fact that maintenance offers an excellent career, makes a good diploma course an excellent option for preparation for a wonderfully rewarding life. Our training is known for its success in preparing one well for your maintenance career.

The diploma can be made up of any of the courses in this Course Catalogue (Comprehensive Courses and Short Courses) – the total weight of the course-work for the diploma is 44 credits plus a 16 credit final project).

The courses can be done in attendance according to our public course schedule or in a distance learning mode. Class attendance is recommended if at all possible. Credit can be obtained for modules already passed in previous study with us.

Important Note: Students that apply for diploma study need to pass an entry test before being accepted for diploma study. This is simply to ensure that they have a reasonable chance of succeeding in the diploma study.

Subject Choices

The diploma consists of a number of comprehensive courses and short courses, combined in one coherent logical diploma that specialises in one of the main areas of industrial maintenance. Prospective students need to choose courses from the existing comprehensive courses and short courses presented by the Terotechnica Maintenance College – the specific course combination has to make sense and has thus to be approved by the College before enrollment.

For further information visit our website at
http://www.terotechnica.com or phone our Registrar, Hendrik Keller.

Course Registration Form

Request to Register for Course (code): _____

Dates: _____

ID Number: _____

Title: _____ First Name: _____

Initials: _____ Surname: _____

Names Preferred on Certificate: _____

Work Telephone: (_____) _____

Fax Number: (_____) _____

Home Telephone: (_____) _____

Mobile (Cell): (_____) _____

E-mail: _____

NB. Company's VAT Registration Number: _____

Company name: _____

Employer: _____

Name of Immediate Supervisor: _____

Current Occupation: _____

Years Experience: _____

Highest Academic Qualification: _____

Where did you hear about this course? _____

Is this your first M-Tech course? _____

If not, please list courses attended: _____

Purchase order number or reference: _____

Postal address for original invoice: _____

Name of responsible person in accounts department: _____

Accounts department phone: _____ Fax: _____

Terms and Conditions

Cancellations are accepted in writing and without penalty up to 10 working days prior to the commencement of the course. Substitutes will be accepted. Learners cancelling in writing less than 10 days prior to the commencement of a course will be liable to pay a 30% cancellation fee. If no prior written notification is received, learners will be liable to pay the full course fee.

In case of insufficient applications for a course, M-Tech Consulting Engineers (Pty) Ltd reserves the right to cancel the course, in which case all learners will be informed and all fees refunded immediately.

A learner will only be enrolled once confirmation of payment has been received or if acceptable arrangements regarding payment have been made.
M-Tech Consulting Engineers (Pty) Ltd. reserves the right to change the course content if deemed necessary.

Please note: Some courses require a personal laptop computer to be supplied by the student himself/herself (if a work computer, installation of software must be possible without IT intervention). Refer to the specific course page.

I hereby accept the terms and conditions outlined above.

Signature: _____ Date: _____

Notes

Terotechnica
MAINTENANCE COLLEGE

A DIVISION OF M-TECH
MAINTENANCE TECHNOLOGY PEOPLE

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