OMDEC
Optimal Maintenance Decisions Inc.

Training Programs

SUMMARY:

OMDEC recognizes that software is only as good as the skills of the people who use it. With this as an operating principle, we have developed a range of training programs that improve the usefulness of the software and at the same time make it easy to use.

But we not only concentrate on training for software. Maintenance Education is a critical part of our philosophy. Maintenance Managers have to be able to compete for funds and for attention in the Executive suite. They therefore not only have to have a good grasp of their own body of knowledge, they have to understand and be comfortable using the language and techniques that are in common use among the organization's executives. Much of our training is targeted at filling this gap.

A key partner in our training programs is the University of Toronto. The UofT is the #1 ranked university in Canada, and is dedicated to extending high quality education into the workplace. Under the leadership of the Professional Development Centre, UofT Certificates are available on the successful completion of many of our programs. OMDEC Certificates of Accomplishment are available based on attendance, participation and successful completion of a final test.

A sample of our main programs is shown below; contact us for more details. Other programs are also available – if you do not see what you want, then simply contact us at info@omdec.com or check our website.

AVAILABLE OPTIONS FOR THE CUSTOMER

1. Open course – available to attendees in the relevant technical area
2. Industry specific – through an association, or targeted at selected industry – course will be tailored for that industry
3. Company Specific – tailored for that company

SUMMARY of TOPICS OFFERED:

1. Introduction to Reliability
2. Reliability = Profitability (Financial Management in Maintenance)
3. Maintenance Strategy
4. Best Practice Tools
5. Managing Change in Maintenance
6. Performance Management and KPI's
7. CMMS Overview and Management
8. CMMS Selection

9. CMMS Implementation Planning
10. CMMS Value Improvement
11. RCM Overview and Management
12. TPM Concepts and Implementation
13. Maintenance Outsourcing
14. Writing Effective Work Orders
15. Project Management in Maintenance
16. Expert Systems
17. Failure Management and Reporting
18. Project Management (General)
19. RFID and Bar-coding

OPTIONS for DURATION AND BUNDLING INTO PROGRAMS

1. Modules vary from one half day to 2 days depending on the depth required, the amount of discussion and the type of workshops
2. Modules should be bundled into programs of not less than 3 days
3. Can be run back to back in the same week or subsequent weeks
4. Can bundle different topics for different attendees

Some examples of bundled programs follow (details available on all programs)

Physical Asset Management Certificate Program:

Carrying the University of Toronto Certificate of Accomplishment, this is staged in two five-day parts which may be completed back to back or with a gap between the sessions. Course Leaders are Dr Andrew Jardine, Professor of Mechanical and Industrial Engineering at the University of Toronto, and Ben Stevens, President of OMDEC. For North American-based programs, alternative course leaders may be used.

The Attendee of this course is typically an engineer, manager of plant operations, facility manager or maintenance professional who is responsible for maintaining and managing the physical equipment assets of your plant. He typically represents large facilities and plants from industries such as mining, oil and gas, pulp and paper, utilities, primary metals, heavy manufacturing and large sophisticated facilities.

The program is designed as a participative workshop, blending lectures, group discussions, mini-case studies and self-tests. It covers a broad spectrum of Physical Asset Management topics; a sample of these topics follows:

Part 1: Optimizing Maintenance & Replacement Decisions - Andrew Jardine – 5 days

– **Basic Statistics, Risk Assessment and Economics**
- Analysis of component failure data
- Probability density, reliability, and hazard functions
- Definition of failure: Weibull analysis
- Where do you place your maintenance efforts?
- Present-value calculations
- Calculating the optimum replacement point

– **Optimizing Maintenance and Replacement Decisions**
- Reliability improvement through preventive replacement

- Use of OREST for optimizing preventive replacement strategies
- Forecasting spare parts requirements including capital spares
- Reliability improvement through inspection – Establishing optimal frequency and depth
- Reliability improvement through asset replacement
- Use of AGE/CON and PERDEC software for capital equipment replacement

– **Optimizing Condition Based Maintenance Decisions;**

- Condition-based maintenance from first principles
- Data acquisition, signal processing and decision-making
- A CBM information strategy
- Using "intelligent agents" in CBM
- Refining CBM inspection intervals – "the elusive P-F Curve"
- Determining the 'significant' condition indicators
- Optimally interpreting condition data

Part 2 Reliability Improvement and Maintenance Excellence – Ben Stevens – 5 days

– **Leadership and Control**

1. The Physical Asset Excellence Cube as used for best practices
2. Maintenance assessments as the starting point
3. Benchmarking benefits and pitfalls
4. Exploring the basics of financial management

- Performance measures – executive, asset management and maintenance operations
- Balanced scorecards in physical asset management

– **Risk and Reliability**

- Risk defined as the cost of failure and the probability of failure
- Risk impact upon decision-making
- Best practices in maintenance
- Tools and techniques to evaluate the probability of failure

– **Implementing Maintenance Optimization**

- Improving CMMS value
- Maintenance improvement and its impact on ROI
- Increasing the returns from Physical Asset management
- Using CMMS to introduce and improve cost control
- Future directions for CMMS

– **Reliability Management**

- Failure management – the diagnosis, reporting and analysis of failures
- The role of engineering and statistical analysis
- The role and optimization of Condition Based Maintenance.
- RCM - failure modes, failure effects and consequences
- Implementing and managing the RCM project
- RCM benefits and pitfalls
- Tying RCM into CMMS and CBM

Asset Management Masterclass:

This is a very successful five day program targeted at Physical Asset Managers and Supervisors who want to arm themselves to better manage their departments. It is designed as a Management Program, and allows ample time for discussions and case studies. It covers ten main topics as follows:

1. Introduction to Reliability - The program will lay a solid basis with an exploration of equipment reliability, its implications and impact on the selection of asset management tactics.

2. Financial Management of Physical Assets - The financial management of physical assets is ignored by most maintenance managers. Included in this session will be:
   - the basics of financial management
   - defining project return on investment
   - life cycle costing
   - budgeting and cost reporting.
   - calculating breakdown cost

3. Best Practice Tools In Asset Management - With the increasing pressure to do more with less, companies are increasingly turning to ways of improving their return on investment and the quality of asset management. "Best Practices" is one of the most well recognized of these tools.

4. Asset Management Strategy - Far too many companies' maintenance departments are still in react mode often because there is no clear strategy beyond the production and sales groups. This session deals with why maintenance strategy should be an issue for your organisation and, more importantly, how to go about developing one, how do you sell it and who to?

5. Performance Improvement - An integral part of the strategy should be performance management – if you are not tracking, how do you know you are improving? Emphasis will be placed on:
    - Understanding and developing the different levels of performance measures – executive, asset management and maintenance operations
    - How to set up and maintain a performance management system
    - How to select and maintain the right performance indicators
    - The use of performance measures once you have them

6. Computerised Maintenance Management Systems (CMMS) And Enterprise Asset Management (EAM) - CMMS and EAM are probably the most important tools to have been adopted by organisations around the world in the last 20 years. Huge amounts of money have been spent on them, yet their success rate still remains very low. This session will explore why it is that the value is not there and then ask the question "what can we do about it?" The following themes will be the core of the session's discussion:
    - Identifying whether your CMMS is delivering ROI and maintenance improvement
    - How the returns can be increased
    - Using CMMS to introduce and improve cost control
    - factors which control the returns and costs,

7. Reliability Centred Maintenance (RCM) - a maintenance technique that has become indispensable in many industries around the world – RCM, but yet often fails to have its full impact. This session will take a managerial view of the benefits to be derived from implementing Reliability Cantered Maintenance, as well as the difficulties. Specifically we will cover:
    - The key components of RCM, such as failure modes, failure effects and consequences
    - Necessary conditions before attempting RCM
    - How best to implement and manage the RCM project
    - How to identify and plan to achieve the benefits and avoid the pitfalls
    - Maintaining RCM as an on-going, continuous improvement tool
    - Linking RCM with CMMS

8. Failure Management - We all know that total failure avoidance is impossible – even with RCM; here we focus on failure management – the diagnosis, reporting and analysis of failures. Delegates will explore practical measures that will be directly applicable to their workplace.

9. Total Productive Maintenance (TPM) is another well recognized maintenance technique. TPM places the emphasis on close collaboration between the maintenance staff and the operators in building teamwork into every day on-the-job tasks. The process is well-established, but many TPM's fail. In this session, we will concentrate on:
    - Fully understanding the elements of TPM
    - Defining the requirements for success and matching it to the delegates workplace
    - The key implementation steps

- Understanding the requirements for on-going success and reasons for failure

10. Expert Systems - the leaders in the maintenance management field are now recognizing that the next big step takes them into the realm of engineering and statistical analysis – in other words, we have all this data, but what information can we extract from it so as to drive action? Expert systems are emerging as the response to this. In this session, we will look at:
    - How Expert Systems relate to the current tools such as CMMS, RCM and CBM – Condition Based Maintenance
    - Several expert systems – for example:
        - A Proportional Hazards Modelling system (how to define which of several conflicting readings are really affecting the results)
        - Systems that define which failure curves apply to an equipment
        - How to define the best time to replace or trade an equipment or vehicle
    - The conditions that need to exist in a company before they will be successful
    - How they can be used and maintained on a on-going basis

Reliability = Profitability (Financial Management in Maintenance)

The emergence of the PAM Manager as a Business Manager – a Manager who is responsible to the Organization's Executives for optimizing the use of financial resources – requires the modern PAM Manager become familiar with the basics of financial management and financial measurement. We call this Financial Exec-speak; it covers the way senior execs think and talk about the spending and investment of resources in the various parts of their business – including PAM. Like it or not, PAM Managers are in competition with their internal colleagues for allocation of resources. Continually reduced budgets remains us that we are not winning this competition. If PAM Managers are to secure the necessary resources to do the jobs that need to be done to protect their assets, (and better still, for them to take a place at the Executive table), then they must become comfortable with Financial Exec-speak.

To sell PAM concepts to Executives, we must use the Financial KPI's that are already familiar to them; but we must adapt them to show the true purpose of PAM – namely to add value to the organization. Every PAM Manager needs to be fluent in the Financial KPI's – ROI, Profit, Cash Flow, DCF, IRR (and other TLA's). These are the Financial Benchmarks of our business; they measure the impact of PAM on the bottom line.

This program provides an introduction to these tools and how they can be used to increase the impact of the PAM Manager in achieving their business goals. And NO! you do not need to be an accountant to understand and benefit from this program. Case studies and practical workshops will be used extensively throughout the program.

Session 1: Impact of Reliability on Profitability

- Looking at Reliability through Executive eyes – defining it, measuring it
- Exploring Financial KPI's and their use in PAM
- How companies build unreliability into their business – and at what cost

- Using Financial KPI's to measure the cost of downtime, failures, breakdowns and slowdowns
- Risk and the PAM Manager
  - understanding and measuring risk
  - forecasting future risk
  - creating the best response to risk
- Using risk management to decide the "shutdown or continue to run" argument

Session 2: PAM Projects large and small

- Using Project Proposals to gain the resources needed to do the job
- Preparing PAM proposals – core components of a smart proposal
- Identifying and valuing the costs and benefits of projects
- Financial KPI's for Projects
- How to deal with time horizons, inflation, depreciation, cost of capital etc
- Presenting your proposal
- Back-up data and supporting documentation

Session 3: PAM Financial Reporting

- PAM as a Value-centre – not a cost centre, not a profit centre.
- Basic reports for managing PAM costs – defining them and where to get them
- Using cost reports to manage the PAM business
- Turning cost reports into Budgets for PAM that make sense
- Measuring and reporting PAM value and contribution to the bottom line.

Session 4: Life Cycle Costing

- What is Life Cycle Costing and why do we need it?
- The value of LCC in decision-making
- Costs to include, costs to exclude – and where this data is coming from
- Planning and implementing LCC - what is the process
- Problems along the way – understanding them and avoiding them
- Lessons to be learned from LCC
- Benefits and costs of LCC – should we proceed?

Improving the Value from your CMMS/EAM:

Computerised Maintenance Management Systems are the most important tools to have been adopted by maintenance organisations around the world in the last 20 years. Huge amounts of money have been spent on them, yet their success rate still remains low. This is a 3 or 4 day program (depending on the number of workshops included)

This workshop will show you how to successfully implement CMMS or customise and update your existing CMMS to increase value from the system and improve equipment reliability. Key elements:

- History and structure of CMMS
- CMMS vs. EAM
- Objectives and values of CMMS
- CMMS in facilities maintenance and production maintenance – is there a difference?
- Best practice in CMMS – how does your CMMS match up?
- Using CMMS to improve the materials supply chain
- Key CMMS reports to run your business
- Increasing the ROI from your CMMS
- CMMS and RCM – enhance each other
- Using CMMS for maintenance improvement
- Beyond CMMS – using CMMS to build your maintenance knowledge base
- CMMS – where next?

Selecting your CMMS/EAM:

A three day program designed specifically for those clients who are tackling the problem of selecting and acquiring a CMMS or EAM. There are hundreds of suppliers out there – each claiming their own special benefits and expertise. This program lays out the very simple and practical steps that users should go through in order to buy the system that is right for them.
Taking a step by step approach, the course covers:

- Setting the project objectives
- The team and the team leader
- Initial training
- Requirements specifications
- Request for Information
- Validating bidders
- Request for Proposal
- Scoring the Responses
- Preparing the short list
- Staging the demonstrations
- Scripts and demos
- Final selection
- Reference checking
- What happens next?

This is a practical workshop program where attendees will be expected to actively participate in case studies and discussions.

EXAKT, LIVING RCM and Reliability – Technical Training

This course will provide attendees with a practical grounding in **Evidence Based Maintenance** and the key OMDEC products **EXAKT and LIVING RCM**. This approach to information in maintenance answers the recurring question, "Given a situation described by observations and information, how should the maintenance department interpret that data so as to arrive at the *best* maintenance decision. For example, should we:

1. maintain / replace / renew a particular system or component immediately, or
2. plan to maintain /replace / renew in a specified time period, or
3. continue operation until the next observation?

CBM optimization and other reliability analysis techniques, by supporting such decisions through rigorous methods, will improve equipment reliability at lowest cost, safely.

The course will convey best practices for the effective management of information in maintenance. Such methods centre around the CMMS-to-RCM integrity relationship as featured in LIVING RCM. Participants will learn how to manage, continually grow, and use their knowledge of failure behaviour naturally in everyday practice. This change in thinking will open a horizon of possibilities with regard to the practical application of reliability analysis software tools, such as EXAKT, Pareto, Weibull,

Jackknife, and proportional hazard modeling. Exercises and examples will unfold as the course proceeds.

Participants will have the opportunity to practice the use and application of EXAKT and LIVING RCM.

Murray Wiseman – VP Technology, OMDEC Inc - has developed and will present this course
Duration - 3 days including practical workshops.
Attendees - Users of OMDEC software and methodologies
Format - Discussions, workshops, exercises, lectures, hands-on software application.

Course content -- Day 1:

1. Probabilistic influences on failure and the role of CBM.
2. Maintenance knowledge management.
3. Populating significant work orders.
    1. Potential failures, functional failures, and suspensions
    2. Referencing the reliability knowledge record.
4. Software for knowledge management and reliability analysis.
    1. Introduction to LIVING RCM and EXAKT
    2. Weibull analysis, Pareto analysis, Jack-knife analysis, failure rate curve
5. A complex item.
6. The use of recorded information.
7. The knowledge functions of the CMMS
8. The unified modeling language for specifying the requirements of maintenance knowledge management.
9. Anticipated and actual reliability experience.
10. Living RCM and its interface with LIVING RCM
11. The dissection of key performance indicators for policy improvement.
12. Reliability terminology
13. Measurement of the effects of gradual improvement.
14. Failure rate curves for potential and functional failure.
15. The measurement of CBM Effectiveness.
16. Internal and external variables.
17. Anatomy of CBM: data acquisition, signal processing, decision making
18. Assumptions in the traditional CBM model
19. CBM and risk management

EXAKT – Principles and Capabilities

1. Proportional hazard model
2. The transition probability model
3. The cost model
4. Sensitivity analysis
5. Building and deploying an optimized CBM decision model.
6. Data cleaning and validation
7. Non-rejuvenating repairs and CBM
8. A data model for complex items.
9. Progressively intrusive layers of CBM
10. CBM decision making with an expert system.

Day 2 - EXAKT – Practical Application

1. Exercise in the development and deployment of a CBM intelligent decision agent.
2. Exercise in CBM modeling of a complex item
3. Exercise in data validation
4. Exercise in data smoothing
5. A cost and availability model
6. The pillars of RCM: FMEA, decision algorithm, age exploration
7. The seven RCM questions (RCM II, SAE JA1011 standard), Failure modes and effects analysis (FMEA)
    1. Functional analysis
    2. Failure analysis
8. Cause analysis - how deep, how detailed, why things fail
9. Effects analysis
10. Consequence determination and the CBM algorithm
11. Practice exercises

Day 3 - LIVING RCM

1. Principles of configuration
2. A typical operating LIVING RCM/BI-Cycle system
3. Maintenance statistics and reliability analysis
    1. Conditional probability
    2. Probability density, distribution, survival, and hazard functions
    3. Expected value, variance, and standard deviation of a random variable
    4. Weibull analysis
    5. Dealing with censored data - the 3-parameter Weibull and the Kolmogorov-Smirnov test statistic, Weibull software
4. Aspects of discounted cash flow used in capital equipment replacement analysis.
    1. Estimating the interest rate appropriate for discounting
    2. Present-value calculations and the effects of inflation in the analysis
    3. Calculating the equivalent annual cost
    4. Selecting the best alternative to minimize life-cycle cost.
5. Spares management
    1. Repairable and non-repairable spares
    2. Point reliability
    3. Interval reliability
    4. Cost minimization
    5. Availability maximization

6. LIVING RCM Practical Application

More courses will be added from time to time.

Ben Stevens
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