Centre for Management Technology®
into our 25th year

2-day intensive program on

Reliability-Centered Maintenance (RCM) - Implementation, Application & Best Practices

For Facilities Engineers / Managers, Maintenance Engineers / Managers, Design Engineers, Production And Manufacturing Engineers, Procurement Engineers, Process Engineers, Process Designers, Plant Engineers, Technicians And Any One Involved In Maintenance Engineering And Would Like To Widen Their Knowledge.

22-23 December 2008 | JW Marriott Hotel | Kuala Lumpur

Course Highlights

- RCM A Maintenance Discipline
- The Nature Of Failure
- The Four Basic Maintenance Tasks
- Developing The Initial Programme
- Evolution Of The RCM Programme
- Applying RCM Theory To Machines
- RCM Analysis Of Systems
- RCM Analysis Of A Plant
- RCM Analysis Of Structures
- Completing The Maintenance Programme
- The Use Of Operating Information
- The Role Of Scheduled Maintenance

INTRODUCTION

Reliability-centered maintenance (RCM) is based on the following precepts:

- A failure is an unsatisfactory condition. There are two types of failures: functional failures, usually reported by operating engineering staff, and potential failures, usually discovered by maintenance engineering staff.
- The consequences of a functional failure determines the priority of maintenance effort. These consequences fall into four categories:
  - Safety consequences, involving possible loss of the equipment and its occupants
  - Operational consequences, which involve an indirect economic loss as well as the direct cost of repair
  - Nonoperational consequences, which involve only the direct cost of repair
  - Hidden-failure consequences, which involve exposure to a possible multiple failure as a result of the undetected failure of a hidden function

A reliability-centered maintenance program includes only those tasks which satisfy the criteria for both applicability and effectiveness. The applicability of a task is determined by the characteristics of the item, and its effectiveness is defined in terms of the consequences the task is designed to prevent.

- There are four basic types of tasks that engineers can perform, each of which is applicable under a unique set of conditions. The first three tasks are directed at preventing functional failures of the items to which they are assigned and the fourth is directed at preventing a multiple failure involving that item:
  - On-condition inspections of an item to find and correct any potential failures
  - Rework (overhaul) of an item at or before some specified age limit
  - Discard of an item (or one of its parts) at or before some specified life limit
  - Failure-finding inspections of a hidden-function item to find and correct functional failures that have already occurred but were not evident to the operating engineering staff.

The RCM decision diagram provides a logical tool for determining which scheduled tasks are either necessary or desirable to protect the safety and operating capability of the equipment.

- The resulting set of RCM tasks is based on the following considerations:
  - The consequences of each type of functional failure
  - The visibility of a functional failure to the operating crew (evidence that a failure has occurred)
  - The visibility of reduced resistance to failure (evidence that a failure is imminent)
  - The age-reliability characteristics of each item
  - The economic tradeoff between the cost of scheduled maintenance and the benefits to be derived from it
- A multiple failure, resulting from a sequence of independent failures, may have consequences that would not be caused by any one of the individual failures alone. These consequences are taken into account in the definition of the failure consequences for the first failure.
- A default strategy governs decision making in the absence of full information or agreement. This strategy provides for conservative initial decisions, to be revised on the basis of information derived from operating experience.

Day 1
Monday, 22 December 2008

9.00 **INTRODUCTION**

A MAINTENANCE PHILOSOPHY

RCM A MAINTENANCE DISCIPLINE

- The Evolution Of RCM Analysis
- The Basis Of RCM Decision Logic
- Reliability Problems In Complex Equipment
- An Overview Of Maintenance Activities

10.30 Morning Coffee

10.45 **PART ONE: THEORY AND PRINCIPLES**

THE NATURE OF FAILURE

- The Definition Of Failure
- The Detection Of Failures
- The Consequences Of A Failure
- Multiple Failures
- The Failure Process
- Failure In Complex Items
- Quantitative Descriptions Of A Failure
- Age-Reliability Characteristics

THE FOUR BASIC MAINTENANCE TASKS

- Scheduled On-Condition Tasks
- Scheduled Rework Tasks
- Scheduled Discard Tasks
- Scheduled Failure-Finding Tasks
- Characteristics Of The Basic Tasks
- The Dimensions Of A Scheduled-Maintenance Programme
- Product Improvement As Preventive Maintenance

1.00 Lunch & Zohor

2.00 **DEVELOPING THE INITIAL PROGRAMME**

- The Nature Of Significant items
- The RCM Decision Process
- Use Of The RCM Decision Diagram
- Determining Cost Effectiveness
- Age Exploration
- Packaging The Maintenance Tasks

3.30 Afternoon Tea

3.45 **EVOLUTION OF THE RCM PROGRAMME**

- The Uses Of Operating Data
- Reacting To Serious Failures
- Refining The Maintenance Program
- Revisions In Maintenance Requirements
- The Product-Improvement Process
- RCM Programs For In-Service Equipment

5.00 End of Day 1

Day 2
Tuesday, 23 December 2008

PART TWO: APPLICATIONS

9.00 **APPLYING RCM THEORY TO MACHINES**
- A Summary Of RCM Principles
- Organization Of The Program-Development Team
- Beginning The Decision Process
- The Information Flow In Decision Making

RCM ANALYSIS OF SYSTEMS
- Characteristics Of System Items
- Assembling The Required Information
- Analysis Of Typical System Items
- Establishing Task Intervals

10.30 Morning Coffee

10.45 **RCM ANALYSIS OF A PLANT**
- Characteristics Of Plant Items
- Assembling The Required Information
- Failures Of The Basic Engine Function
- Failures Of Secondary Engine Functions
- The Role Of Age Exploration

RCM ANALYSIS OF STRUCTURES
- Characteristic Of Structural Items
- The Structural Inspection Plan
- Assembling The Required Information
- RCM Analysis Of Structural Items
- Establishing Initial Inspection Intervals
- Structural Age Exploration

1.00 Lunch & Zohor

2.00 **COMPLETING THE MAINTENANCE PROGRAM**
- Other Scheduled-Maintenance Tasks
- Packaging The Maintenance Workload

THE USE OF OPERATING INFORMATION
- Typical Information Systems
- Typical Types Of Routine Analysis
- Modifying The Maintenance Program
- Intervals: An Information Program
- Resolving Differences Of Opinion
- Purging The Program

3.30 Afternoon Tea

3.45 **THE ROLE OF SCHEDULED MAINTENANCE**
- Safety, Reliability, And Scheduled Maintenance
- The Design-Maintenance Partnership
- RCM Programs For In-Service Equipment
- Expansion Of RCM Applications

5.00 End of Course

AFTER ATTENDING THIS COURSE, YOU WILL RETURN TO YOUR JOB…

1. Developing a working knowledge of RCM systems.
2. Differentiating between the different classes of maintenance.
3. Understanding better the design, construction, operations and maintenance requirements of equipment and systems.
4. Implementing strategies and methodologies to create an effective maintenance programme.
5. Increasing your knowledge and skills to identify and address operational problems at all levels.
6. Implementing mechanisms to measure equipment performance at all levels.
7. Analysing and understanding the impact of RCM on the maintenance strategy.
8. Developing and implementing an effective maintenance budget.
9. Using life cycle costing techniques to deliver best practice maintenance.
10. Implementing maintenance plans that are cost effective and aligned to the organisation's strategic goals.
11. Improving performance by developing detailed specifications with service partners.
12. Establishing an effective maintenance team.

WHO SHOULD ATTEND

Facilities Engineers / Managers, Maintenance Engineers / Managers, Design Engineers, Production And Manufacturing Engineers, Procurement Engineers, Process Engineers, Process Designers, Plant Engineers, Technicians And Any One Involved In Maintenance Engineering And Would Like To Widen Their Knowledge.

METHODOLOGY

Lectures, Discussion, Exercises & Calculations to ensure participants have a better understanding to improve their efficiency level.

Program topics, speakers and schedules published herein are confirmed as at printing time. Please refer to the event's timetable page at **www.cmtevents.com** for the most up-to-date information.

REGISTRATION

BEST PRACTICES IN RELIABILITY-CENTERED MAINTENANCE (RCM)

Name
Position
Email
Name
Position
Email
Tel Fax

Company
Address
City/Postcode Country
Approving Manager's Name
Position
E-mail

Update your details at ***www.cmtevents.com***

081297 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Fees: The full Registration Fee includes cost of all sessions, luncheon, coffee/ tea & documentation.

	1 Person	Group fee for 3 or more* (from the same company)
Regular Fee	**RM2,295**	**RM1,995 (MIN SAVINGS OF RM900)**

** Terms and conditions apply.*

Cancellations, Refunds & Transfers: A full refund will be promptly made for all written cancellations 3 weeks before the meeting. Thereafter, cancellations are not refundable. A substitute may be made at any time.

Cheques : Crossed & payable to **"Centre for Management Technology Sdn Bhd"**

Photocopy Registration Form to Preserve Brochure Copy. December 2008

TO REGISTER

Online : **www.cmtevents.com**
Email : **adminkl@cmtsp.com.sg**
Fax : (603) 2162 6393
Tel : (603) 2162 7322
Post to : Lot 7.03, 7th Floor, North Block, The Ampwalk, 218 Jalan Ampang, 50450 Kuala Lumpur

TELEGRAPHIC TRANSFER

Account Name: **Centre for Management Technology Sdn Bhd**
A/C No: **3 - 0903390 - 12**
Bank: Public Bank Berhad
Branch: Grd Floor, Menara Public Bank Jalan Ampang
Swift Code: PBBEMYKL
TT must include additional RM10 for Beneficiary's Bank charges. ***Delegates must bear all bank charges and local taxes (if applicable). Fees must be NETT of ALL charges.***

CERTIFICATE OF COMPLETION

A Certificate of Completion will be awarded upon successful completion of each course. This serves as evidence of your personal and professional commitment to you career.

COURSE TIMING
Registration: 8.30 am, Course Begins: 9.00 am,
Morning Coffee: 10.30 am, Lunch: 1.00 pm to 2.00 pm,
Tea Break: 3:30 pm, Course Ends: 5.00 pm

CMT into our 25th year is a global conference organizer HQ in Singapore. CMT's dedicated team works closely with market leaders to analyze the latest industry trends and provide information supporting your decision making. Our annual 60 events encircle the globe from Asia Pacific to the Middle East to New Europe/Russia and Latin America.

Register online ~ www.cmtevents.com

LEARN FROM THE BEST

Ir. N. JAYASEELAN obtained his Higher National Diploma in Mechanical Engineering from Leeds Polytechnic (UK) and subsequently a Bachelors Degree (Honours) in the same discipline from the University of Malaya.

He has about 25 years of working experience in various industries, which includes building maintenance, foundry, manufacturing, marine, water and sewerage industries, etc. He has vast theoretical and practical knowledge on preventive, predictive, corrective and reliability centered maintenance (RCM).

He was a recipient of the Association of Overseas Technical Scholarships (AOTS) award on two occasions, awarded by the Ministry of Economy, Trade and Industry of Japan. **Jayaseelan was also a member of the working group to draw up the energy efficiency and energy conservation guidelines for pumps and compressors for Malaysian industries organised by the Institution of Engineers, Malaysia, Pusat Tenaga Malaysia, and the Ministry of Energy, Water and Communications (KTAK)**.

He also actively writes technical articles for various international journals and magazines.

Jayaseelan is a Graduate Member of the Board Of Engineers (BEM), Malaysia, a Corporate Member of the Institution of Engineers, Malaysia (IEM), a Member of the Institution of Mechanical Engineers, United Kingdom (IMechE), an Associate Member of the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) and a Member of the American Society of Mechanical Engineers (ASME).