

Implementing Reliability Centered Maintenance RCM

From Analysis to Action (online course by distance education)

Module 1			
Item	Key Topics	Design/Topics	Benefits
1	Foundation Reliability Knowledge	<p>Physics of Failure</p> <ul style="list-style-type: none"> Why parts fail <p>Equipment Failure Curves</p> <ul style="list-style-type: none"> Early Life – Random – Age Maintenance strategy selection <p>Risk Management</p> <ul style="list-style-type: none"> The components of risk Measuring risk <p>Maximum Reliability</p> <ul style="list-style-type: none"> Series and Parallel Systems Life-cycle considerations Quality and Precision Human Factors 	<ul style="list-style-type: none"> Identifies the types of situations that cause equipment failure Explains why maintenance is done Explains equipment life-cycle strategies
2	Recognising Equipment Risk	<p>Equipment Criticality</p> <ul style="list-style-type: none"> Identifying systems critical to plant safety and profitability and matching the maintenance effort. <p>Activity 1 – Perform Equipment Criticality Analysis</p>	<ul style="list-style-type: none"> Match maintenance and reliability management strategies to operating risk
3	Identifying Effects of Failure	<p>Failure Modes and Effect Analysis (FMEA)</p> <ul style="list-style-type: none"> Identifying failures and ways to eliminate them Identifying the root-cause Feasible ways (technically) of analysis <p>Activity 2 – Perform an FMEA</p> <p>Activity 3 – Access Failure Consequences</p> <p>Activity 4 – Identify Hidden Failures</p>	<ul style="list-style-type: none"> Methods to eliminate possible failure increases the reliability and integrity of equipment
4	Proactive Maintenance	<p>Maintenance Strategy Selection</p> <ul style="list-style-type: none"> <i>Selecting Preventive and Predictive Tasks</i> to maintain reliable plant equipment in the most cost-effective manner while meeting the challenge of regulatory compliance. <i>Operating Risk Reduction with RCM</i> to identify the most practical, cost-effective and technically correct tasks in maintaining equipment function <i>Precision Maintenance</i> and how workmanship quality produces high reliability <p>Case Study1: Maintenance Strategy for Gas Compressor/Turbine from RCM Analysis</p> <p>Activity 5: Maintenance Strategy Selection from FMEA Activity</p>	<ul style="list-style-type: none"> Highlight possible issues/challenges of maintenance Getting the bigger picture of the issues, possible solutions and benefits of implementation Which selections will actually deliver reliability improvements
5	Making Reliability Centered Maintenance Work	<p>Changing to Better Maintenance Practices</p> <ul style="list-style-type: none"> Purpose of RCM – on-condition based maintenance RCM – The 7 basic questions Describing and listing functions Performance Standards Applying the RCM process What RCM achieves: Example RCM Maintenance Strategy Development Measuring likely improvement of RCM strategy <p>Case Study2: Fuel Terminal Automated Valve RCM</p> <p>Activity 6 – Confirm Value of a Chosen Maintenance Strategy</p>	<ul style="list-style-type: none"> To get the increased reliability and integrity of equipment that RCM can deliver needs the proper practices to be introduced and used

Module 2			
Item	Key Topics	Design/Topics	Benefits
6	Integration of RCM and Implementation of Strategies	<p>Design Principles of Low-Cost, Usable, Reliable, Maintainable & Safe System</p> <ul style="list-style-type: none"> Identifying Project and Operating Risk Setting Reliability Standards Reducing Operating Risk at Design Maximizing Availability Controlling Human Factors Quality Control – setting pass/fail criteria Importance of Standardization Accuracy controlled procedures <p>Activity 7 – Develop an ACE 3T error proof procedure</p> <p>Case Study 3: RCM of a Flow Control Valve</p> <p>Activity 8 – Do an RCM on a Pump Set</p> <p>Case Study 4: Change Management – How a Power Provider moved from Third Quartile to Top Decile Ranking</p> <p>Metrics to track effectiveness of equipment</p> <ul style="list-style-type: none"> Metrics to check the effectiveness of RCM implementation Proactive Condition Monitoring MTBF improvement measures Duane/Crow-AMSAA plots Operational improvement measures 	<ul style="list-style-type: none"> The principles of reliable and maintainable, high performance plant Ways of integrating all the knowledge obtained in Day 1 and implementing it for the benefit of the organization Effective implementation uses key metrics to better utilize resources, enhance coordination among related projects and improve project planning and estimation; Proactively identify the risks of failing to complete the schedule and budget targets; reduce the process overhead of measurement data collection, consolidation and analysis at different levels in the project hierarchy How to make RCM really work
7	Optimize Your Maintenance Systems	<ul style="list-style-type: none"> Creating a Useful Maintenance Management System Access, standardize all relevant information regardless of location and format (<i>work orders, maintenance schedules, regulatory requirements, resource skills</i>) Maintenance Planning and Scheduling Optimize RCM plans and schedules (<i>taking into account priorities, skill sets, time and Resource constraints, etc</i>); track work orders and resource usage Developing and Implementing RCM with a Limited Staff <ul style="list-style-type: none"> Standardize equipment and parts Precision Operation – degradation management TPM - Operator Maintenance activities Precision Maintenance skill set Teamwork Organisation Structure Error-proofing work activities 	<ul style="list-style-type: none"> Easily share RCM knowledge —benchmark standards best practices, maintenance history, regulatory guidelines, etc. among those who need it, in a form that works best for them Establish a mature maintenance process early in the plant life to maximize the effectiveness of the RCM program, minimize unnecessary activities, and increase the reliability and worth of plant & equipment RCM for sites with a small number of maintenance and operations staff
8	Looking Forward - Modernization in Reliability	<p>Techniques of Reliability Growth</p> <ul style="list-style-type: none"> Weibull Analysis – recognizing failure causes Human Factors Management Reliability Growth Cause Analysis (RGCA) <p>Activity 9 – Conduct an RGCA</p>	<ul style="list-style-type: none"> Apart from the short RCM method covered in the course, there are new Maintenance Optimization ideas that can be used
9	Take Home Plan	<p>Case Study 5 – Implementing RCM in the Australian Coal Industry</p> <p>Activity 10 – Attendees identify list of activities to increase or optimize reliability at their facility and develop first-steps implementation plan</p> <p>DO A WORKPLACE RCM ACTIVITY</p>	<ul style="list-style-type: none"> Provide Attendees with initial actions to improve their plant performance by using RCM