Lifetime Reliability • Solutions

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Implementing Reliability Centered Maintenance: From Analysis to Action

Day 1			
Key Topics	**Schedule**	**Design/Topics**	**Benefits**
Foundation Reliability Knowledge	**08.30** **09.30**	**Physics of Failure** • Why parts fail **Equipment Failure Curves** • Early Life – Random – Age • Maintenance strategy selection **Risk Management** • The components of risk • Measuring risk **Maximum Reliability** • Series and Parallel Systems • Life-cycle considerations • Quality and Precision • Human Factors	• Identifies the types of situations that cause equipment failure • Explains why maintenance is done • Explains equipment life-cycle strategies
Recognising Equipment Risk	**9.30** **10.30**	**Equipment Criticality** • Identifying systems critical to plant safety and profitability and matching the maintenance effort. **Activity 1 – Perform Equipment Criticality Analysis**	• Match maintenance and reliability management strategies to operating risk
Identifying Effects of Failure	**Break 10.30 to 10.45** **12.00**	**Failure Modes and Effect Analysis (FMEA)** • Identifying failures and ways to eliminate them • Identifying the root-cause • Feasible ways (technically) of analysis **Activity 2 – Perform an FMEA**	• Methods to eliminate possible failure increases the reliability and integrity of equipment
Proactive Maintenance	**12.00** **12.30pm Lunch to 13.15** **14.30**	**Maintenance Strategy Selection** • *Selecting Preventive and Predictive Tasks* to maintain reliable plant equipment in the most cost-effective manner while meeting the challenge of regulatory compliance. • *Operating Risk Reduction with RCM* to identify the most practical, cost-effective and technically correct tasks in maintaining equipment function • *Precision Maintenance* and how workmanship quality produces high reliability **Case Study 1: Maintenance Strategy Development** **Activity 3: Maintenance Strategy Selection from FMEA Activity**	• 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
Making Reliability Centered Maintenance Work	**14.30** **Break 15.00 to 15.15** **17.00**	**Changing to Better Maintenance Practices** • 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 • Measuring likely improvement of RCM strategy **Case Study2: Fuel Terminal Automated Valve RCM** **Case Study3: Maintenance Strategy for Gas Compressor/Turbine from RCM Analysis**	• To get the increased reliability and integrity of equipment that RCM can deliver needs the proper practices to be introduced and used

Day 2			
Key Topics	**Schedule**	**Design/Topics**	**Benefits**

Integration of RCM and Implementation of Strategies	**08.30**
	
	Break 10.15 to 10.30
	
	Lunch 12.30 to 13.30
		Design Principles of Low-Cost, Usable, Reliable, Maintainable & Safe System
		• 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
		Case Study4: Change Management – How a Power Provide moved from Third Quartile to Top Decile Ranking
		Metrics to track effectiveness of equipment
		• The metrics to check the effectiveness of the implementation
		  • Proactive Condition Monitoring
		  • MTBF improvement measures
		  • Duane/Crow-AMSAA plots
		  • Operational improvement measures
		Activity 4 – Conduct RCM ++ Exercise
			• 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

Optimize Your Maintenance Systems	**13.30**
	
	14.30
		• **Computerized Maintenance Management System**
		Access, standardize all relevant information regardless of location and format *(work orders, maintenance schedules, regulatory requirements, resource skills)*
		• **Maintenance Planning and Scheduling**
		Optimize RCM plans and schedules *(taking into account priorities, skill sets, time and Resource constraints, etc)*; track work orders and resource usage
		• **Developing and Implementing RCM for a Limited Staffed**
		  • Standardize equipment and parts
		  • Precision Operation – degradation management
		  • TPM - Operator Maintenance activities
		  • Precision Maintenance skill set
		  • Teamwork Organisation Structure
		  • Error-proofing work activities
			• 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

Looking Forward - Modernization in Reliability	**14.30** **Break 15.30 to 15.45**	**Techniques of Reliability Growth** • Weibull Analysis – recognizing failure causes • Human Factors Management • Reliability Growth Cause Analysis (RGCA) **Activity 5 – Conduct an RGCA**	• Apart from the short RCM method covered in the course, there are new Maintenance Optimization ideas that can be used
Take Home Plan	**15.45** **16.45**	**Case Study 5 – Implementing RCM in the Australian Coal Industry** **Activity 6 - Attendees identify list of activities to increase or optimize reliability at their facility and develop first-steps implementation plan**	• Provide Attendees with initial actions to improve their plant performance by using RCM
Wrap-up and End	**16.45** **17.00**	• Summarize the course key points • Complete feedback questionnaire	