PLANTVIEW

MAINTENANCE BASIS OPTIMIZATION



- Focuses attention on the maintenance activities which have the most effect on performance and reliability.
- Emphasizes condition monitoring tasks that help ensure potential failures are detected before they become functional failures.

To reduce production costs and enhance performance and availability, maintenance managers are constantly pressured to review and update their maintenance programs based on failure history, changing operating circumstances, industry best-practices and new predictive maintenance technologies. Since all equipment eventually fails, a maintenance strategy that identifies common failure causes and provides the most effective solutions to prevent or remedy these failures will be the most beneficial.

PlantView[®] Maintenance Basis Optimization (MBO) supports and facilitates the two approaches to defining the maintenance requirements of a physical asset: Reliability Centered Maintenance (RCM) and Plant Maintenance Optimization (PMO). RCM is a system of *establishment*. It is often used to develop the initial maintenance program for an asset. It focuses on identifying which failures are the most common and present the most risk to the goal of preserving system function. PMO is a method of *review*. It is often used where there is a reasonably good maintenance program already in place and an experience base of plant operation and equipment failure characteristics.

By combining rigorous Reliability Centered Maintenance (RCM) analysis with pre-defined templates and a flexible approach to determining criticality that is typical of Plant Maintenance Optimization (PMO), PlantView/MBO helps develop a sound maintenance basis that balances maintenance tasks and equipment reliability. PlantView/MBO facilitates the definition and optimization of the required maintenance tasks for equipment. The results of an MBO analysis will allow maintenance managers to focus their resources on performing the right tasks on the right equipment at the right time.

Benefits

- Develops a documented basis for the maintenance program.
- Helps devise the simplest and most cost-effective means of maintaining equipment.
- Focuses resources on the right maintenance strategy.
- Eliminates unnecessary and ineffective maintenance tasks.
- Adjusts content and frequency of time-directed PM tasks.
- Reduces unscheduled breakdown maintenance.
- Applies pre-defined "best practices / industry standard" maintenance templates to standardize the maintenance basis for similar equipment across the fleet.

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Features

- RCM: Defines System Functions and Functional Failures and performs Failure Modes and Effects Analysis.
- PMO: Develops Maintenance Basis Templates based on Equipment Type that captures prior experience on predictive / preventive maintenance (PdM/PM) tasks and frequencies.
- Develops Equipment Type Templates that document the failure mechanisms for each equipment type and the degradation modes and mechanisms for each sub-component.
- Maintenance Basis Change templates provide documented history for equipment specific PdM/PM changes, as well as justification, analysis and approval to modify the maintenance basis.
- Reduces implementation time and cost by performing detailed analysis of individual equipment and then applying the same analysis to similar equipment.
- Generates System Reports: Criticality, FMEA Summary, Maintenance Basis, Task Details, Undefined Criticality and Operating Classification.
- Generates Equipment Reports: Task Details, Maintenance Change Requests, Failure Mechanism Defense and Degradation Mechanism Defense.
- Controls maintenance costs by reducing the number of maintenance tasks and increasing the intervals between tasks.
- Increases the useful life of the equipment by ensuring each asset receives the maintenance required for it to meet its design intent.

MBO In Action

To achieve the goal of implementing a cost-effective maintenance program, it is necessary to select systems that have the largest impact on operations, safety and reliability. By using a logical step-by-step approach to determine the maintenance strategy for equipment in these systems, PlantView Maintenance Basis Optimization (MBO) allows you to document the basis for the maintenance program, more effectively manage change to the maintenance program and focus resources on doing the right task at the right time on the right equipment.



MBO supports several methods to determine Equipment Criticality and operational importance: 1) Classical RCM Analysis using System Functions, Functional Failures, Failure Modes and Effects Analysis (FMEA) for equipment associated with a functional failure, 2) Equipment based Failure Modes and Effects Analysis, 3) Critical/Non-Critical Questionnaire and 4) Equipment impact on Operations.

vigation Tree: Subjects	Syste	ems : Library Configuration : Maint	mance Basis		Actions		
Dystems /	Operating Classification Review			Owasce 1 Ash Handling	∧ Displays		
A to 8 Care Show				Update	System Definition		
Ar Qualty	Decription	Critical	Environment	Usage Go	System Description		
Ash Handling	01E10065 - BOTTOM ASH COOLING SYSTEM	NC-Non Critical	Harsh >	Frequent 💙 💕	Criticality Reports		
🔁 Boller 📄 Chemical Clean (Acid Wash)	01E10067 - BOTTOM ASH COOLING SYSTEM VALV	ES NC-Non Critical V	Harsh 🛰	Frequent 💙 💕	Criticality Summary (Brief)		
Condensate	01M10100-PY - 1 COAL NILL PYRITE SYSTEM	NC-Non Critical	Harsh 🗸	Frequent 🗸 💕	Nor-Critical Equipment (Brief)		
Superheater	01M10450 - NORTH BOTTOM ASH EJECTOR DISCHARGE VALVE	NC-Non Critical	Harsh 👩 Critica	dity Assessment - Internet Ex	wiprer -		
Electrical & Control Systems	01M10461 - NORTH BOTTOM ASH EJECTOR SOUR VALVE (V15-94)	M10451 - NORTH BOTTOM ASH EJECTOR SOURCE NC-Non Critical V 2 Hards X B R. B +					
Feed Water	01M10451-014 - NORTH BOTTOM ASH EJECTOR SOURCE VALVE (V15-9a) (operator)	RF-Run to Falure	Harsh Critica	lity Assessment 🛛 💀	1E10065 - BOTTOM ASH COOLING SYSTE		
Fuel Burning	01MH0019 - ECONOMIZER ASH TRANSPORT LINES	NC-Non Critical	Harsh Critical	Critical			
Generator	01M40031 - ECONOMIZER ASH HYDROVACTOR	CR-Otical	Harsh I -				
0 I and Gas Nanagement	01M40034-011 - ECONOMIZER ASH SYSTEM DUMP VALVES	CR-Citical V	Harsh Res	Instable To Provide Company Compa			
Process Steam	01MH0041 - UPPER PRECIPITATOR HYDORVACTOR	NC-Non Critical	Non-H Res				
Reheater	01M40047 - PRECIPITATOR ASH TRANSPORT LINE	S NC-Non Critical	Harsh Res				
Scrubber Service Air	01M40059 - BOTTON ASH PIT EJECTOR	NC-Non Critical	Harsh Res				
Service Facilities (Buildings &	01M401A40011 - UPPER PRECIPITATOR HOPPER 1	A CR-Oitical	Harsh 🗌 Res				
Superheater	01MH0223-P - ASH TRANSPORT BOTTOM ASH	NC-Non Critical	Harsh Res				
Support Equipment	01/H0420 - NORTH BOTTOM ASH HOPPER	NC-Non Critical	Harsh Non Crit	Non Critical			
Turbine	01M40421 - NORTH CLINKER GRINDER	NC-Non Critical	Harsh High	High repair/replacement cost or excessive corrective maintenance?			

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			·	Ser.	A		<u>e 1</u>
svigation Tree: Subjects			Systems : Library Configuration : Maintenance Basis			Actions	
() Systems	~	Crit	cial Equipment (Brief)	Cwasco 1 📷	~	Displays	1
Owasco 1	1	Serr	, although Eculpment in this System is evaluated at this Criticality there are no FFA defined.		System Definition		
Ar Quality		3-Significant Departure 20% or more				System Description	
Ash Handling		F	Employeest Name & Description	CHINE ID		Criticality Reports	
Boier			COMPOSED 1 A ACU COMPOSED 14 ACU COMPOSED 14 ACU COMPOSED		Critically Summer (Dial)		
Chemical Clean (Acid Wash)		Description: W02AAQYLBR01: SYSTEM G - UPPER PRECIPITATOR HOPPER 1A ASH DUNP VALVE				Critical Environment (Brief)	
Condensate		4-0	% Derating but possible generation loss due to extended asset failure			Criccar suppliers (see)	
Cooling Water		F	Fourment Name & Description	CMHS ID	Criticality Summary (Comprehensive		
Superheater		-	01M40421.4 - NORTH CLINKER GRINDER MOTOR	01H03421-8			
Economier		Development (international content - UNIT) - NORTH CLINKER GRUNDER MOTOR Oritical Equipment (international content - UNIT) - NORTH CLINKER GRUNDER MOTOR				Critical Equipment (Comprehensive)	2
Feed Water		*	01V15144 - HIGH PRESSURE GENERAL SERVICE WATER TO PYRITES CONTROL VALVE (V15-14-A)		Non-Critical Equipment		
PP - Fire Protection			Description: WolfWassonool: High Pressure develor: Service Wikter To Pockedizers		(Comprehensive)		
Fuel Burning	Н.	5-Potential Loss of Generation due to failure of redundant equipment				Task Reports	
Furnace		F (j) Equipment Name & Description CMHS ID				Reports	
Generator	11	✓ 01M40031 - ECONOMIZER ASH HYDROVACTOR 01M40031				To Do Items	
OI and Gas Nanagement		TRANSPORT LINES TO THE AIR/WATER SEPARATOR TANK, VACUUM BREAKER AND HPGSW VALVE.				6 B	
Plant Feed		7-L	oss of Asset Causes Significant Operational Inconvience			acreary	
Process sceam		B Exchanged Name & Description					
Scrubber		OUM0034-011 - ECONOMIZER ASH SYSTEM OWNER VALUES OUM40034-011					
Service Air		Description: WIGF00000000-011 SYSTEM G- ECONOMIZER ASH SYSTEM UNIT 1 DUMP VALVES HOPPERS					
Service Facilities (Buildings &			IT1 TERU ITS.				
Service Gases		8-L(iss of Asset Precludes Normal System or Equipment Operation				
Superheater		1	Equipment Name & Description	CMMS ID			
Support Equipment		4	01PSE2547 - ASH HAND I-SWITCH-PRESS	01PSE2547			
Switch Yard & Substation			P82D 6M695-12, in instrument data base				
Turbine	щ		01PXE3024 - BOTTOM ASH I-TRANS-LEVEL	01PXE3024			
Water Treatment			Description: W01FASARTX01: PXE 3024 - NORTH BOTTOM ASH HOPPER LEVEL TRANSPETTER, not on P8ID 6M695-7082, not in DCS or instrument data bases				
Repair & Storage	~	-	01P2E3145: ECONOMIZER HYDROVACTOR WATER PRESSURE TRANSMITTER PRE-3145	01PXE3145			
			Description: W26PAHF100: PXE-3145 - ECONOMIZER HYDROVACTOR WATER PRESSURE TRANSMITTER,		~		

Once a component has been determined as critical or non-critical, the next step is to select the type of tasks to be performed and their associated frequencies. MBO uses maintenance templates based on the type of equipment to define an Initial Standard Maintenance basis.



As required, copying and modifying standard templates for specific equipment produces a consistent, unique and traceable maintenance basis.



Associating a completed standard or custom maintenance basis to similar equipment establishes consistency and saves analysis resources.

igation Tree: Subjects		RCM Equipment : Lit	rary Configuration : Maintena	nce Basis			
Douipment	Similar Equipment	Management			Last Edited N	0wa ev 08, 2005 1	
Owasco 1		-			P	rocess Change	
Ar & Gas Flow	Source Equipment Name	01C00011: UNIT 1 DRIP/DRAIN	PANFI				
Ar Quality	CYME ID	01000011					
Asir Parlory	0.00.0	0100011					
Chenical Clean (Arid Wash)	Equipment In Condense	ate (Equipment Type: Control Panel)		_			
Confersate	Associated Equipment	01R20115 - SOLENOID CAB DEMIN P	01R20115 - SOLENOID CAB DEMIN POLISHER		How it works		
dla61C14 - 4160 VOLT BREAKER 61C-C14 NORTH HEATER FEE				Convert Equipment associated with this System Finder Finder			
3 01A61C15 - 4160 VOLT BREAKER 61C-C15 SOUTH HEATER F				and pressing PROCE	SS CHANGES.	is of the second	
1 01A61C7 - 4160 VOLT BREAKER 61C-C7 NORTH CONDENSER PL							
01A61C8 - 4160 VOLT BREAKER 61C-C8 CENTER CONDENSE	Existing Similar Equipm	Existing Similar Equipment (Identical Maintenance Basis)					
2 01A51C9 - 4160 VOLT BREAKER 61C-C9 SOUTH CONDENSER		Comut			Custom		
🖌 📸 01871A4D - 480 VOLT BREAKER 71A-4D NORTH HEATER DRAIN	Similar Equipment Name		CMMS ID		to RCM	MD	
01871ASD - 480 VOLT BREAKER 71A-SD CENTER HEATER DF	01C11670: UNIT 1 INST MOL	INT INSTRUMENT PANEL/CABINET/RACK	01C11670				
2 0187185D - 480 VOLT BREAKER 718-5D SOUTH HEATER DRF					-		
0187182A - 480 VOLT EREAKER 718- 2A NORTH BOILER FEED P	dici1770: UNIT 1 INST MOU	INT INSTRUMENT PANEL/CABINET/RACK	01011770				
018/1A2A - 480 VOLT BREAKER /1A-2A SOUTH BOLLER FEE	01C14170: UNIT 1 INST MOUNT INSTRUMENT PANEL/CABINET/RACK		01C14170				
CLEVIES - 400 YOLT DEDALE 716-34 HITS SOLITH VACUUM 10 01871634 - 400 YOLT DEDALE 716-34 HITS SOLITH VACUUM	01C14270: UNIT 1 INST MOL	INT INSTRUMENT PANEL/CABINET/RACK	NT PANEL/CABINET/RACK 01C14270				
 COLODITI: UNIT 1 DRIP/DRAIN PANEL 	ALCOLOGY, LANT & BUT HOURT BUT DESTRUCTIONS AND CARD TO ACC.		0101100		-		
2 01C11670: UNIT 1 INST HOUNT INSTRUMENT PANEL/CABIN	01C144/0: UNIT 1 INST MOU	INT INSTRUMENT PANEL/CABINET/RACK	STRUMENT PANEL/CABINET/RACK 01C14570				
alc11770: UNIT 1 INST HOUNT INSTRUMENT PANEL/CABIN	01C14570: UNIT 1 INST HOL	INT INSTRUMENT PANEL/CABINET/RACK					
3 01C14170: UNIT 1 INST HOUNT INSTRUMENT PANEL/CABIN	01C17270: UNIT 1 INST MOL	INT INSTRUMENT PANEL/CABINET/RACK	01C17270				
C 01C14270: UNIT 1 INST HOUNT INSTRUMENT PANEL/CABIN							
01C14470: UNIT 1 INST MOUNT INSTRUMENT PANEL/CABIN							
01C14570: UNIT 1 INST HOUNT INSTRUMENT PANEL/CABIN							
01C17270: UNIT 1 INST HOUNT INSTRUMENT PANEL/CABIN							
OICHEM08 - PREP I-CHEM-CLEAN							
CICHEM00 - PREP I-CHEM-CLEAN V8-23a							

The final step in the process is to reconcile this proposed maintenance basis with the existing maintenance program.



As operating experience is obtained, tasks and frequencies can be further optimized. Having the proper mix of predictive maintenance (PdM) and preventative maintenance (PM) tasks within the maintenance basis is essential to cost-effective maintenance.

PlantView/MBO is a comprehensive tool to help you establish, document, implement and maintain an effective maintenance strategy for your facility and equipment. It facilitates the application of industry standard best-of-breed maintenance practices to appropriate equipment in a systematic fashion. Well designed and implemented preventive and predictive maintenance programs can minimize unscheduled corrective maintenance, reduce equipment damage expenses and improve equipment availability.

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The PlantView[®] Suite

PlantView Logbooks is a part of a suite of integrated modules supporting the maintenance, operation, training and performance knowledge management processes that help facilities sustain optimal reliability, efficiency and safety. Each module automates information entry, storage, management and reporting for numerous facility functions. The software transforms internal work processes, enabling users to move efficiently from managing information to understanding the implications of that information, and ultimately to action. The PlantView Suite is divided into four disciplines: Maintenance, Operations, Continuous Improvement and Training. It consists of the following modules:

	Maintenance
Predictive Maintenance	Facilitates condition-based maintenance by collecting and storing diagnos- tic technology results, and facilitating the analysis of multiple technologies into an overall assessment of the equipment.
Maintenance Basis Optimization	By combining rigorous Reliability Centered Maintenance (RCM) analysis with pre-defined templates and a flexible approach to determining critical- ity, MBO helps develop a sound maintenance basis that balances mainte- nance tasks and equipment reliability.
Reports Library	Serves as a basic document repository targeted for major equipment main- tained on an annual basis. As reports are received from engineering teams, they are assigned a status and uploaded to PlantView.
Engineering Inspections	Standardizes the inspection of components and their associated evaluation criteria. Information is summarized in a grid representing the most recent evaluation that has been performed.
	Operations
Operations Logbooks	Replaces traditional paper logs, text documents, spreadsheets and home- grown portal solutions with a dedicated operator logs system. Assists in tracking and managing any problem from initial diagnosis all the way through remediation.
Risk Assessment	Supports Risk Informed Decision Making by using a 5x5 Risk Matrix that can be viewed across the enterprise to assess and prioritize risks.
Reliability Index Module	Replaces manual spreadsheets and monthly reports with a continuously up- dating Equipment Reliability Index that can provide a snapshot on a daily, weekly or monthly basis.
System Health	Keeps a running log of issues and concerns for a System or Program. Within a particular instance of a report, the responsible individual identifies issues, snapshots metrics and assigns action items.
	Continuous Improvement
Event Reports	When an event occurs at Site "A," other sites are notified through an event assessment providing a mechanism where the event is reviewed and it is determined if a similar event could happen at their site.
Corrective Actions	Documents how a particular problem/issue is corrected at a site. Once a Corrective Action Report (CAR) is created, it is assigned to a Champion and Team Leader until a solution is determined.
Self-Assessments	An Excellence Grid divides business objectives into categories, elements and sub-elements. Questions are defined with each, and an assessment is completed by multiple users. Management can use the results to focus on areas requiring improvement.
Observations	Observes activities to identify trends in safety, human performance and plant operations to prevent injuries and improve reliability.
	Training
Automated Training Manager	Creates training courses consisting of Lessons and Elements; each element has associated content, questions and skills. Profiles provide trainees with a cross-section of content focused on their job description.

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The PlantView[®] Suite can be installed in your own IT environment or externally hosted. For additional information, please e-mail info@power-vision.com.