

# Effectively Employing AMS Machinery Manager for Rotating Mechanical Assets



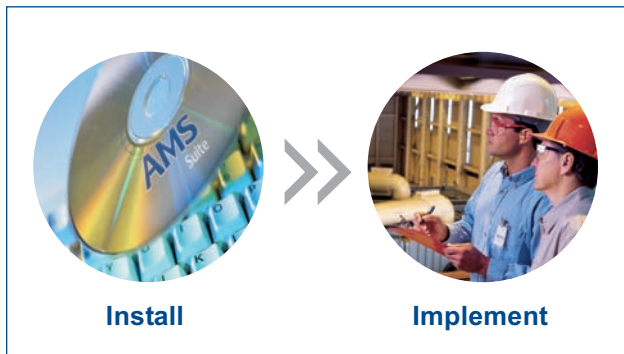
*Improve operational value from your rotating mechanical assets by taking AMS Machinery Manager to the next level.*

- *Increase effectiveness of your maintenance and operations staff by taking full advantage of AMS Suite: Machinery Health Manager*
- *Leverage your technology investment by integrating AMS Machinery Manager into daily work practices to drive productivity improvements*
- *Use predictive diagnostics to more effectively prioritize maintenance tasks*

## **Increase Productivity By Integrating Technology Into Your Daily Work Processes**

When mechanical issues are affecting plant availability, you need predictive diagnostics for fast, accurate decisions. How can technology be part of the daily work processes so this information is most efficiently used? Fully implementing AMS Machinery Manager allows you to focus your limited resources on the right assets.

When you partner with Emerson's Asset Optimization Services experts, we help ensure you are getting the most from your rotating mechanical assets. Asset Optimization Services are offered in scalable modules so you can move to the next level of asset performance.



*Emerson's Install and Implement Services provide a structured approach for successful adoption of AMS Suite.*

## Install Services

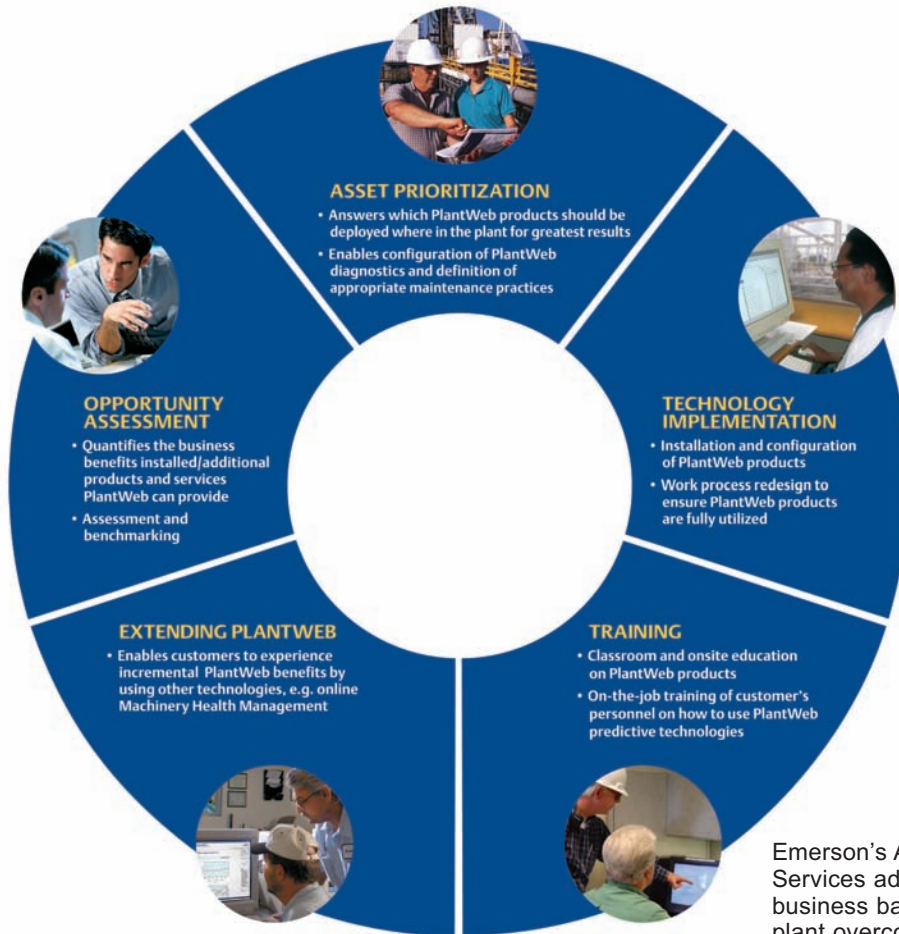
Install is designed to provide an interactive introduction to AMS Machinery Manager capabilities. An Install-certified specialist will get AMS Machinery Manager configured and working by doing the following:

- Review system architecture
- Establish/confirm name and measurement locations
- Install and license software
- Configure networks and establish communication
- Create/validate accurate database
- Set up analysis parameters/alert sets
- Review basic software functions and navigation
- Review formal training opportunities
- Back up database

## Implement Services

After Install, Services are completed, Implement Services are performed. Implement Services are designed to optimize your AMS Machinery Manager and integrate the full functionality of the system with re-engineered maintenance tasks. An Emerson Asset Optimization Service Engineer will perform the following services:

- Perform facility walkdown and ensure all machines are identified
- Hold awareness training event to establish a common understanding of the process and gain organizational alignment
- Evaluate overall work flow processes and recommend industry best practices based on observations
- Establish benchmarks and Key Performance Indicators (KPIs)
- Validate priority of rotating mechanical assets. Map into functional requirements and create a Maintenance Strategy Blueprint
- Re-engineer rotating mechanical maintenance tasks
- Optimize the AMS Machinery Manager database. Review and validate analysis parameter sets and alarms.
- Set up RBMview reporting capabilities
- Develop required labor forecasts for optimized program implementation
- Mentoring/Review of new maintenance tasks and procedures
- Develop path forward considerations and present project report
- Verify system operation, confirm impact of system performance to KPIs



Emerson's Asset Optimization Services address specific business barriers and help your plant overcome them, moving you from a reactive plant to a best cost producer.

## What Can Asset Optimization Services Do For My Plant?

Through the expertise of Emerson's Asset Optimization Services, the capabilities of AMS Machinery Manager can be fully deployed in your facility to drive improved decision-making. Streamlining daily maintenance, implementing predictive maintenance for enhanced performance, and operating with your maintenance resources fully optimized are a few outcomes from an Asset Optimization Services engagement.

Asset Optimization Services takes you a step further by re-engineering work tasks in your maintenance management system (CMMS/ERP) allowing you to integrate AMS Machinery Manager's capabilities rather than using work

processes that rely on traditional, less-effective means. For example, AMS Machinery Manager brings savings to basic activities such as the time spent analyzing and diagnosing rotating equipment. The power of real-time asset health integration and AMS Machinery Manager is fully leveraged when the CMMS produces work procedures that use your technology investment. Similarly, taking full advantage of the AMS Machinery Manager applications brings integration with multiple predictive maintenance technologies for a complete picture of mechanical asset health. Asset Optimization Services for AMS Machinery Manager ensures re-engineered maintenance work processes to improve manpower efficiency and help you become a best cost producer.

Asset Optimization Services	Services Task	Duration(hours)		Operations Area Supervisor	RESOURCES INVOLVED Maintenance				Front Office		
		Machines 75	200		Area Supervisor	Reliability Engineer	Area Planner	Area Scheduler	Safety Officer	Plant Leadership	
Install AMS Suite: Machinery Health Manager	Review System Architecture	24	52		✓	✓					
	Establish/confirm name and measurement locations					✓					
	Install and License Software						✓				
	Configure Networks and Establish Device Communication						✓				
	Create/Validate Initial database Structure							✓			
	Setup analysis parameters/alert sets							✓			
	Review Basic Software Functions and Navigation							✓			
	Review Formal Training Opportunities						✓	✓			
	Back up Database							✓			
<b>Total Hours</b>	<b>24</b>	<b>52</b>									
Implement AMS Suite: Machinery Health Manager	Ensure all tags are identified	2	4			✓					
	Level Of Awareness Training	7	7	✓	✓	✓	✓	✓		✓	
	Review/Evaluate Work Flow Execution	4	4				✓				
	Key Performance Indicator (KPI) Development	1	1	✓	✓	✓	✓	✓		✓	
	Asset Prioritization Analysis/Validation	4	4	✓	✓	✓	✓	✓		✓	
	RE-Engineer Maintenance Tasks	5	12		(Work Performed by Asset Optimization Services Engineer)						
	Strategy Blueprint - Work Task Activities and Periodicities	1	2	✓	✓	✓	✓	✓		✓	
	Optimize AMS Device Manager Database	3	8		(Work Performed by Asset Optimization Services Engineer)						
	Set-Up RBMView	1	1		(Work Performed by Asset Optimization Services Engineer)						
	Develop Labor Cost Forecast	1	1		✓	✓	✓	✓			
	Mentoring Review of Maintenance Tasks	2	5		(Work Performed by Asset Optimization Services Engineer)						
	Create Load Table for CMMS	8	8		(Work Performed by Asset Optimization Services Engineer)						
Path Forward Discussions/ Project Report*	8	8	✓	✓	✓	✓	✓		✓		
Verify System Operation**	16	16	✓	✓	✓	✓	✓	✓	✓		
<b>Total Hours</b>	<b>63</b>	<b>81</b>									

\* Note - Path Forward Discussions/Project Report\* - one hour meeting with all personnel, Other 'time' is for Individual/Department project report findings discussions/validation.

\*\* Note - Verify System Operation\*\* - Return visit, time allotted for two days system operation/verification with all Departments, majority time spent with users.

Asset Optimization Services are offered in scalable modules, allowing you to choose when you and your facility's schedule are ready for the next level of support. Emerson believes that every facility is unique and has its own maintenance needs. That's why Emerson will design an Asset Optimization Services engagement schedule

around your facility's unique needs. Shown in the table above is a sample schedule (see Duration Hours) to give an idea of how Install and Implement Services can fit into your plant resources schedule, including who will be involved in the various steps. Emerson will optimize the time of plant personnel for minimal production impact.

Implement Services Deliverables

- Strategy Blueprint (1)
- High level work flow diagram and evaluation (2)
- Configuration and optimization of machine asset hierarchy structure and database (3)
- Re-engineered maintenance tasks (4)
- Review and validation of analysis parameter sets (5)
- Verification of analysis parameter alarm limits (6)
- Set up RMBview reporting capabilities (7)

Knowledge For Improved Maintenance Practices

The Strategy Blueprint matches the predictive maintenance technologies to the priority of your assets, providing a tool to more effectively implement your asset maintenance strategy. The Strategy Blueprint outlines the recommended combination of predictive maintenance technology and preventive maintenance procedures for prioritized equipment. It is the result of a systematic review and compilation of applicable maintenance procedures for an asset. Once you have established an initial Strategy Blueprint, it becomes a baseline to use for continuous improvement comparison.

**Asset Maintenance Blueprint**

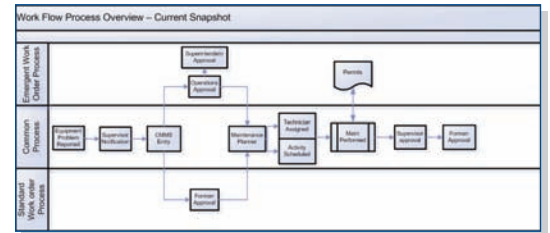
M = monthly  
W = weekly  
D = daily  
Number = Months  
AR = As Required  
PlantWeb Services

Asset Description	Asset ID #	MPI	Predictive Diagnostics	Time-Based PM & Inspection	Life Renewal PM	ManHrs
5 Central Air Compressor	ER-67-CA-AC-5	762 M 6 6	3	12	12 12 M	16.5
5 Central Air Compressor Motor	ER-67-CA-M-5	738 M 12 6	3	12 36	12 12	2.2
6 Saltwater Booster Pump	ER-6-SW-P-6	563 M 3 6	6	AR	12 12	8.7

6 Saltwater Booster Pump Motor	ER-6-SW-M-6	562 M 12 6	D 12 36	12 12	12 12	7.2
4 Traveling Screens	ER-67-SW-S-4	416 3				
4 Screen Wash Pump Motor	ER-67-SW-M-4	410 M 12 6		12 12	12 12	38.3
70 East Air Preheater	ER-70-CBA-AH-70E	323 M 6 6	W			7.2
70 West Induced Draft Fan	ER-70-IG-F-70WWD	302 M 6 12 12			3 W 12	43.0
70 West Induced Draft Fan Motor	ER-70-FGM-70WWD	302 M 12 6 6	6	24 24		19.1
77W HP Feed Water Heater	ER-70-FDW-EX-77W	302	M		60	36 60
60 East Self Sustaining Aux Steam Regulator	ER-60-AS-PCV-410	281	12	D 12	AR AR	24 24
70 Main Feed Reg Valve	ER-70-FDW-LCV-1010-2	258	12	D 12	AR AR	24 24
70 Main Gas Supply Solenoid Operated Valve (Bg70)	ER-70-G-SOV-47	258	12	D 24	AR AR	60 60
CO to Storage Reg Valve LCV75	ER-70-CO-LCV-75	250	12	D	AR AR	24 24
Main Feed Oil Isolation Valve	ER-60-FD-M-178	239				24 48
CO Hotwell Backs Reg Valve LCV78	ER-70-CO-LCV-78	215	24	D	AR AR	24 24
1A 61 Transformer (13.8-440)	ER-6ED-13-MB-TA61	212 12 12 12 12		12	M	10.1
61 Circ Water Pump	ER-6-CRW-P-61CWP	200 3 12 6	6	24 36	AR 12	AR 60
61 Circ Water Pump Motor	ER-6-CRW-M-61CWP	200 3 12 6	6	24 36	AR 12	AR 5.9

(1)



(2)

**Analysis Parameter Set 8 - AC MTR, ROLLING BRG (1600) - DB27**

Description	Parameter	Type of Parameter	Lower Frequency	Upper Frequency
PK-PK MAUFOR	DFLTU	P-P Wave	0.0	0.0
CREST FACTOR	DFLTU	Crest	0.0	0.0
SUBHARMONICS	DFLTU	DRD INT	0.0	0.0
1xTS	DFLTU	DRD INT	0.0	1.4
2xTS	DFLTU	DRD INT	1.4	2.4
3-8xTS	DFLTU	DRD INT	2.4	8.4
9-25xTS	DFLTU	DRD INT	8.4	25.4
25-75xTS	DFLTU	DRD INT	25.4	75.0
2xLINE FREQ	DFLTU	HZ INT	95.0	105.0
1K-20kHz	ACCEL	HZ WFD	1000.0	20000.0

(5)

Navigator-Vibration

diffs.rbm  
diffs2.rbm  
Example.rbm

VIBRATION

MACHINE

MOTOR

Machine 2 Outer Race Screw Comp

Survey Date: 03-Sep-05  
Analyst: Administrator (Inactive)  
Operational Significance: (0) - Essential

Problem Status: Open

Severity: 100 - High Alarm  
Certainty: 5 - Certain  
Desired Urgency: 90 - Severe

DMS Alert: Inboard

Problem Detail (A)  
Criteria: Status=Open

Area: VA Vibration Area  
Equipment: Machine 2 Outer Race Screw Comp

Title: 24-0-0-04 - BPFO defect - Compressor. Freq

Fault: BPFO defect

Explanation: This is a screw compressor. Inside the screw compressor, the male screw compresses the air into the female screw compressor. In other words, there are 3 different rotating speeds inside the machine. The 3 speeds are: Outer Screw: 2340 RPM; Male Screw: 3870 RPM; Female Screw: 5920 RPM. There is also a Screw Pass Frequency at 6 x Male Screw or 4 x Female Screw. On this kind of equipment, it is normal to find harmonics families at one of these frequencies. When important amplitudes are found in these frequencies, it is normal to find a BPFO defect in between all these harmonic families, with a BPFO frequency family at 312 Hz.

(3)

Work Practice

PLANT MAINTENANCE

MEDIUM VOLTAGE MOTORS

1. PURPOSE
  - 1.1 The purpose of this work practice is to provide the necessary steps to safely perform maintenance on medium voltage motors.
2. PREREQUISITES
  - 2.1 Personnel Requirements
  - 2.2 Equipment Required (PPE) - As Required
  - 2.3 Job Requirements
  - 2.4 Safety Requirements
3. SAFETY, ENVIRONMENTAL AND SOCIAL RESPONSIBILITY
  - 3.1 Environmental and Social Responsibility: "As Required"
  - 3.2 Safety: "As Required"
4. RESPONSIBILITIES
  - 4.1 Job Supervisor
  - 4.2 Job Worker
5. PROCEDURE
  - 5.1 Lock out the motor.
  - 5.2 Disconnect the motor from the power source and verify that the motor is de-energized.
  - 5.3 Ground the motor.
  - 5.4 All safety procedures should be followed when working on the motor.
  - 5.5 All safety procedures should be followed when working on the motor.

Periodic Alarm Limit Set [061] - DB28

Set Description: Motor - Vibration - Rollings

Maximum Deviations (dB): 0.0

PARAMETER	UNITS	ALARM	FAULT	ALERT	WEAR SIDE	BASELINE RATIO	DB*
OVERALL	VELBC	SW-A	0.5	0.0	0.0	1.25	
PK-PK MAUFOR	VELBC	SW-A	0.4	0.25	0.0	1.0	
CREST FACTOR	VELBC	SW-A	0.3	0.15	0.0	1.25	
SUBHARMONICS	VELBC	SW-A	0.3	0.15	0.0	1.0	
1xTS	VELBC	SW-A	0.15	0.00	0.0	1.0	
2xTS	VELBC	SW-A	0.15	0.00	0.0	2.0	
3-8xTS	VELBC	SW-A	0.020	0.004	0.0	2.0	
9-25xTS	VELBC	SW-A	0.0	0.0	0.0	0.0	
25-75xTS	VELBC	SW-A	0.0	0.0	0.0	0.0	
2xLINE FREQ	VELBC	SW-A	0.0	0.0	0.0	0.0	
1K-20kHz	ACCEL	SW-A	0.0	0.0	0.0	0.0	
PARAMETER 11	ACCEL	SW-A	0.0	0.0	0.0	0.0	
PARAMETER 12	ACCEL	SW-A	0.0	0.0	0.0	0.0	

(4)

(7)

## Work Order Creation with CMMS

AMS Machinery Manager provides diagnostic information on rotating equipment to AMS Suite: Asset Performance Management and enables the integration of this information into your CMMS application.

With AMS Suite APM's CMMS integration, you can create work notifications based on an asset's current condition. Key diagnostic information automatically populates the work notification and you can also attach specific asset recommendations. AMS Suite APM can also bring in work history data from the CMMS application so you can see the status of current work orders and the history of work performed on your assets.

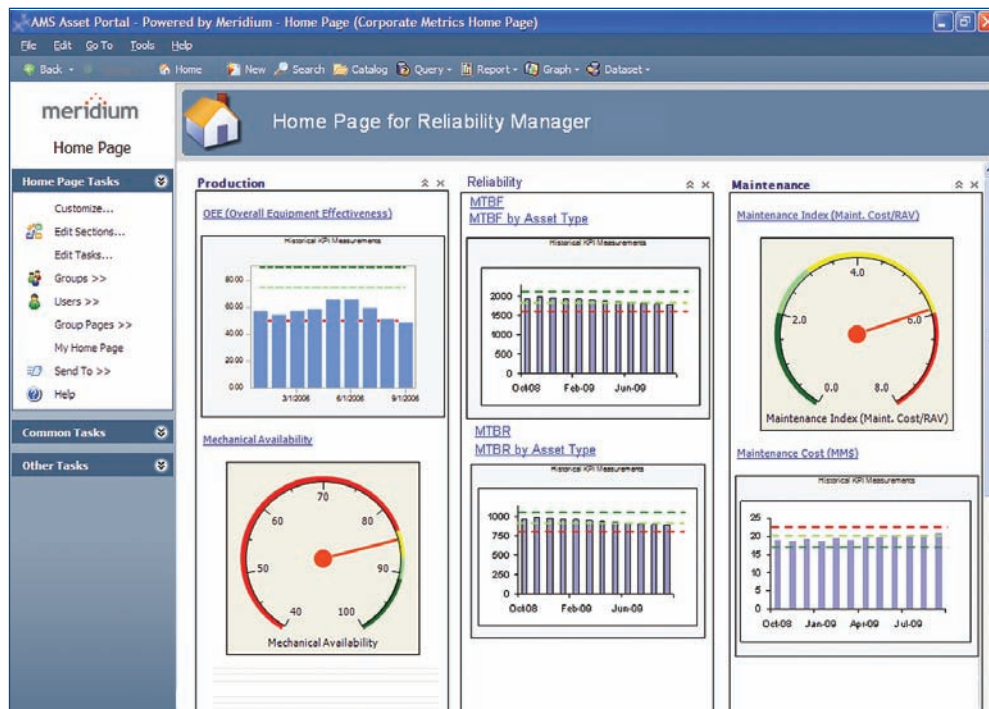
CMMS integration allows your entire organization to drive to common goals by uniting asset information with business data to fuel key metrics.

## Advanced Analysis Capabilities

AMS Suite APM makes finding the information you need simple and efficient. You can customize your homepage with the information you use most, including charts, graphs, and links to additional details.

Create queries to look more closely at asset data in order to target specific problems and identify root cause of issues.

Use the Metrics and Scorecards module to create and track custom metrics to reveal under-performing assets and develop world-class maintenance strategies. Data in this module will generate key performance indicator (KPI) results that are displayed graphically in charts, graphs, and dials. This way, you can always see how your performance compares to your business goals.



Sample Metrics Home Page

## Asset Optimization Services for Rotating Mechanical Assets

### Install

Part Number	Description
PW-INST-MMXXXX	XXXX = Number of Machines 75 - 500 (increments of 25) 500 - 1000 (increments of 50) 1000 - 4000 (increments of 500)

### Implement

Part Number	Description
PW-IMPL-MMXXXX	XXXX = Number of Machines 75 - 500 (increments of 25) 500 - 1000 (increments of 50) 1000 - 4000 (increments of 500)

## AMS Suite APM Proposal Requests for CMMS Integration

AMS Suite APM's connection to AMS Machinery Manager requires some specification/validation work between you and Emerson. Please contact your local Emerson sales representative for details.

### Emerson Process Management

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