

DRIVING ASSET MANAGEMENT ***FORWARD***

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Enhancing Asset Performance with Reliability Strategies in Maximo Application Suite

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Maven Asset Management

Driving Asset Management Forward

LV Maximo Users Group

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Abstract

RCM - We all know these three letters but what do they really mean. RCM is a well-known concept, but its full potential is often underutilized. If you feel your organization is in a reactive maintenance cycle, struggling to determine which assets require what prescriptive work, MAS has a solution that you can benefit from. In this discussion, we will take a brief look at RCM and what we can do with MAS's new application, Reliability Strategies, to transition from reactive to proactive maintenance. Even if you have an established PM program, you may be interested in what Reliability Strategies has to offer. Bottom line, MAS expands the tools available to further optimize asset performance, minimize downtime, and maximize operational efficiency.



Agenda

RCM

MAS Portfolio

Reliability Strategies

Conclusion

Q&A



RCM

Response Centered Maintenance

- Focusing on the art of responding to failures
- No time for analytics (FMEA)
- No time for improvements

If it isn't broken, don't fix it!

Limited work plans

No planning, no scheduling

Hard to Improve

Reliability Centered Maintenance

- Maximize Equipment Availability
- Enhance Safety and Environmental Compliance
- Optimize Maintenance Resources
- Extend Asset Life

Asset Criticality

FMEA

Failure Consequences

Maintenance Strategies – PM, PdM, RTF

Monitor



RCM

Response Centered Maintenance

- Focusing on the art of responding to failures
- No time for analytics (FMEA)
- No time for improvements

- Continuous cycle
- Moving from one fire to the next
- Morale
- Cultural shift

Reliability Centered Maintenance

- Maximize Equipment Availability
- Enhance Safety and Environmental Compliance
- Optimize Maintenance Resources
- Extend Asset Life

- Reduces unplanned downtime
- Lowers maintenance costs by avoiding unnecessary repairs
- Improves overall plant efficiency and reliability
- Enhances workplace safety by preventing hazardous failures



RCM

~~Response Centered Maintenance~~

- Focusing on the art of responding to failures
- No time for analytics (FMEA)
- No time for improvements

Reliability Centered Maintenance

- Maximize Equipment Availability
- Enhance Safety and Environmental Compliance
- Optimize Maintenance Resources
- Extend Asset Life

ITS ALL ABOUT
THE DATA



MAS Product Portfolio

MAS Applications

Maximo/Manage

Scheduler Linear Calibration

Reliability Strategies

Health

Monitor

Predict

Visual Inspection

MAS Industry Solutions

Manage Utilities

Manage Transportation

Manage Nuclear

Manage Oil & Gas

Manage Aviation

Manage Civil Infrastructure

MAS Add-on Solutions

Maximo Optimizer (Scheduler+)

Manage Health, Safety & Environment

Manage Asset Configuration Manager

Manage Service Provider

Manage Spatial

Manage ERP Connector for SAP

Manage ERP Connector for Oracle

Manage Work Day Connector

Manage Tririga and Envizi Connectors

Maximo IT

Accelerator Catalog

New!



Maximo Reliability Strategies

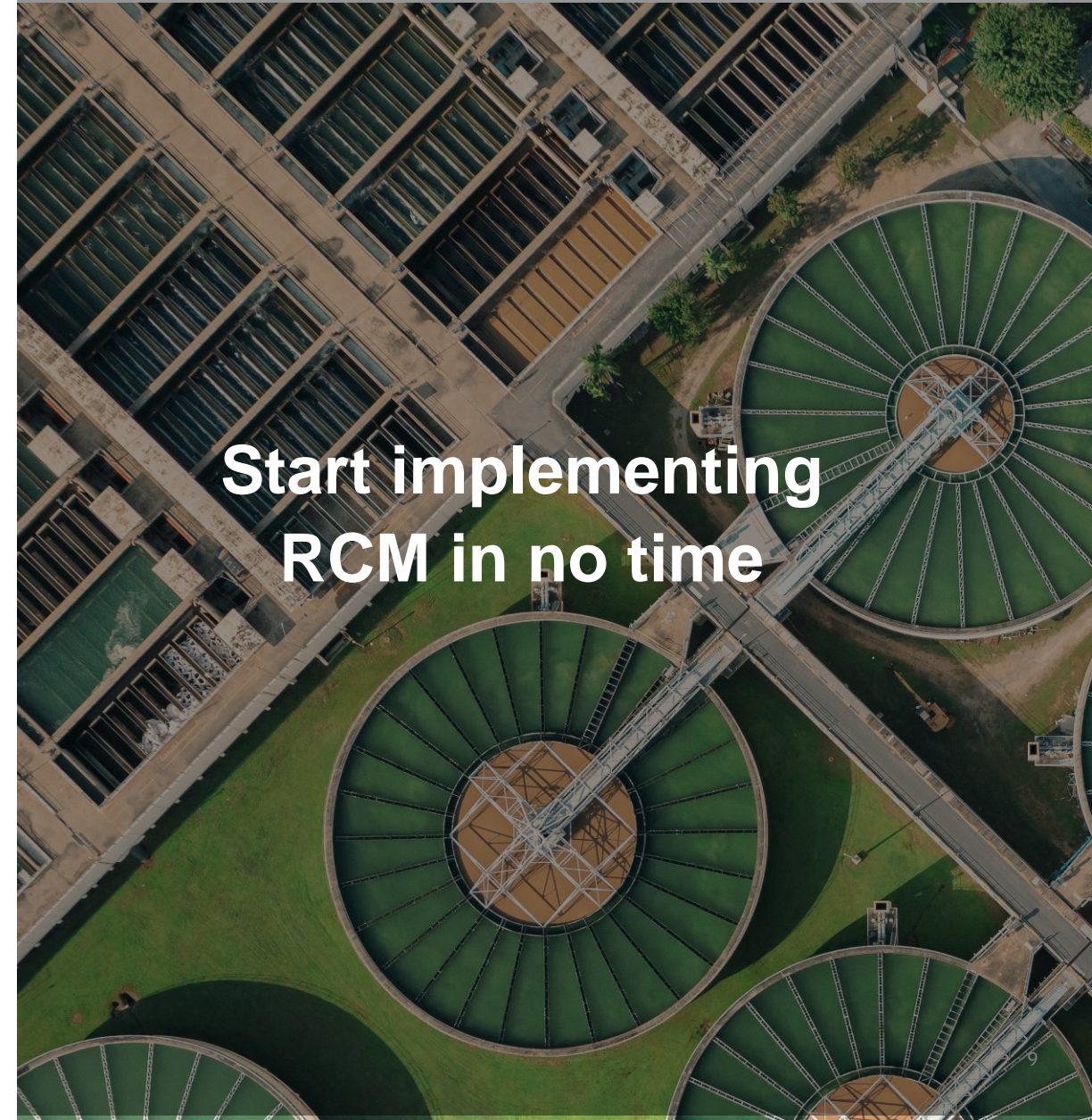
Makes It Easy

A dedicated RCM/FMEA app with included content library integrated with IBM Maximo Manage

Reliability Strategies **App**
(Manage add-on)



Reliability Strategies **Library** (Accelerator)

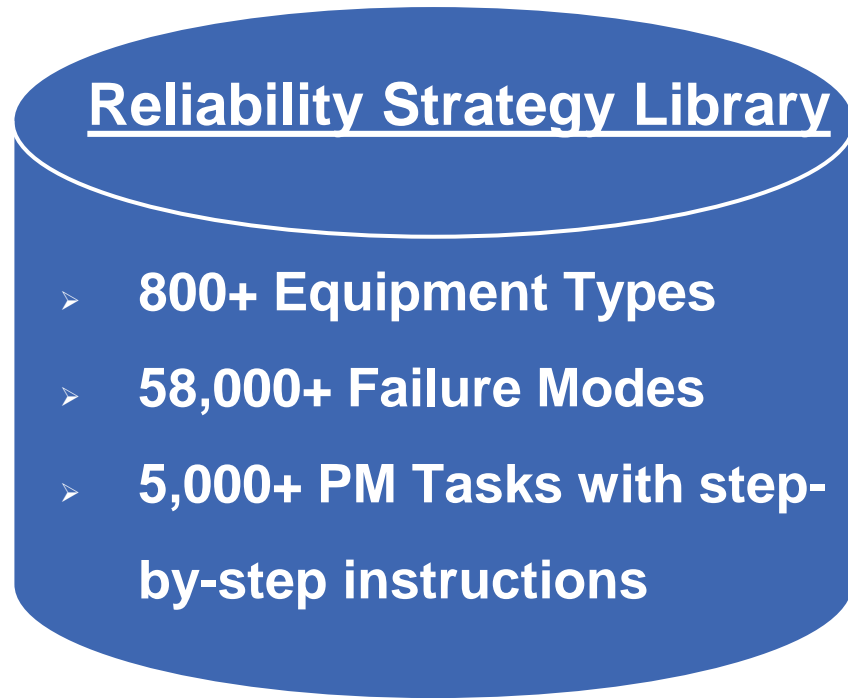


Start implementing
RCM in no time

Maximo Reliability Strategies

Pre-Built Strategies for 800+ Asset Types

Based on 25 years of large-scale RCM studies and 32,000 years of professional industry experience



Features for each asset include

- Defined Boundary Conditions
- PM tasks and intervals organized by operating context (criticality, duty cycle and service conditions)
- PM tasks one to one mapping with failure modes
- PM effectiveness ranking at detecting specific failure modes
- Cross industry asset coverage

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Maximo Reliability Strategies

Pump - Horizontal – Multi Stage - Double Suction - Axially Split Case – Mechanical Seal – Radial Bearing – Oil Lube



20 Failure Locations

124 Failure Modes

- Degraded Lubricant
- Gear Drive Oil Pump Failure
- Misalignment

Operating Context

Select Operating Context:

- Duty Cycle
- Criticality
- Service Conditions

Tailor based on context:

- Commercial Real Estate
- Oil & gas
- Manufacturing
- Utilities / Powergen
- Mining
- Hydro
- Wastewater

Reliability Strategies

Baseline

PMs with intervals by operating context

Job Plans

- Tasks
- Step-by-Step Guides

Asset	Asset type	Asset configuration
Pump	Centrifugal	Pump - Horizontal - Multistage - Axially Split Case - Mechanical Seal - Radial-Sleeve Bearings-Oil Lubed

Get strategy →

- Overview
- Failure modes
- Mitigation activities

Strategy details

Failure modes
128

Mitigation activities
10

View failure modes →

View mitigation activities →

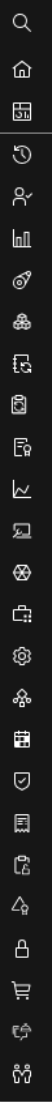
Boundary

The boundary of a Multi Stage Axially Split Case Type horizontal pump with mechanical seals and oil lubricated radial and sleeve bearings for the purpose of this database is defined to include the following:

Includes

- Suction and Discharge flanges
- Gear drive oil pump and auxiliary oil pump
- Lube oil cooling heat exchanger or internal bearing cooler
- Pump and its foundation
- Detectors, sensors, and alarms (e.g. bearing temperature and vibration, aux. oil pump pressure switch)





Strategy library / Strategy

Asset: Pump × Asset type: Centrifugal × Asset configuration: Pump - Horizontal - Multistage - Axially Split Case - Mechanical Seal - Radial-Sleeve Bearings-Oil Lubed ×

Get strategy →

- Overview
- Failure modes**
- Mitigation activities

Wear
Failure influences (7)
Distortion due to improper pump startup
Distortion due to pipe strain
Improper assembly, materials, or operation
Normal wear
Off-BEP Operation or flashing in leak-off system
Poor process fluid quality
Vibration
Bearing Oil Slinger Ring

Vibration

Parent
Balancing Device - Wear

Stressors
Vibration

Wear out time
Conditional Wear Out - 2 to 5 year(s) based on operating context

Functional failure
Functional Failure Results in In-Service Failure with Limited Warning Period

Repair time
24.00 hours

Discovery opportunities
Thrust bearing temperature, Balance line leakoff pressure or flow, Vibration, Inspection

Mitigation

Activity	Effectiveness
Refurbishment	High
Vibration Analysis	High
Performance Trending	High



Asset: Pump × Asset type: Centrifugal × Asset configuration: Pump - Horizontal - Multistage - Axially Split Case - Mechanical Seal - Radial-Sleeve Bearings-Oil Lubed ×

Get strategy →

Overview Failure modes **Mitigation activities**

Operating context ⓘ

Preview activities in all contexts

Criticality: Critical Minor
 Duty cycle: High Low
 Service condition: Severe Mild

Activities

- Refurbishment
- Functional Testing
- Vibration Analysis**
- Oil Analysis
- Performance Trending
- Oil Filter Change, Clean, and Inspect

Activity frequencies for all operating contexts

The following table contains all recommended mitigation activities and frequencies. For example, 2Y means that the activity is recommended every two years.

Recommended frequency per operating context

Activity	CHS	CLS	CHM	CLM	MHS	MLS	MHM	MLM
Refurbishment	AR	AR	AR	AR	AR	AR	AR	AR
Functional Testing	NA	AR	NA	AR	NA	AR	NA	AR
Vibration Analysis	1M	3M	1M	3M	3M	1Y	3M	1Y
Oil Analysis	3M	6M	3M	6M	2Y	2Y	2Y	2Y
Performance Trending	2Y	2Y	2Y	2Y	NR	NR	NR	NR
Oil Filter Change, Clean, and Inspect	2Y	2Y	2Y	2Y	2Y	2Y	2Y	2Y
System Engineer Walkdown	3M	3M	3M	3M	3M	3M	3M	3M
Operator Rounds	1S	1S	1S	1S	1D	1D	1D	1D
Acoustic Monitoring	AR	AR	AR	AR	AR	AR	AR	AR
Seal Replacement	AR	AR	AR	AR	AR	AR	AR	AR

...in bearings and other rotating components before failure occurs. For CHM shaft, the balancing device, and gear drive and auxiliary oil pumps, as well as wear flow noise such as cavitation. In a full PM program for CHM conditions, the failure

...the existence of problems

...ed to be reasonably effective. It is left up to the user to assemble these lists into



Conclusion

- Reactive is not good!
- Data is vital and valuable
- Do you have a long-term plan
- Reliability Strategies in MAS is a great starting point
- Improved asset availability
- Reduced downtime
- Increased productivity
- Reduced costs
- Increased efficiency
- Better decisions
- Reduced risk

MAS expands the tools available to further optimize asset performance, minimize downtime, and maximize operational efficiency.





Questions & Answers



Thank you!

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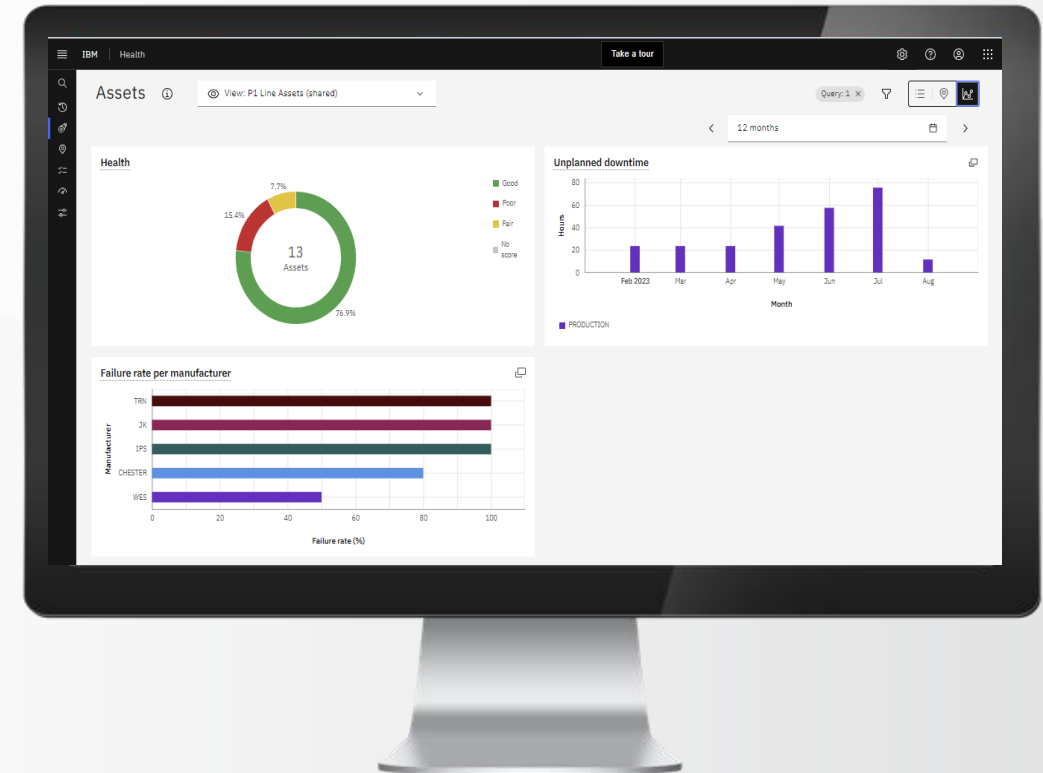


MAS Health



Global view of Asset Health with condition-based actions and replacement planning

- Dashboard with cards, map view, spreadsheet view
- Organizational view and health drilldown
- Flexible health scoring by asset type or groups
- Refurbish / replace prioritization
- Tight Maximo Integration
 - Same database
 - Same Views (Queries)
 - Same work order creation features



https://www.youtube.com/watch?v=RFAGO_ChoRE

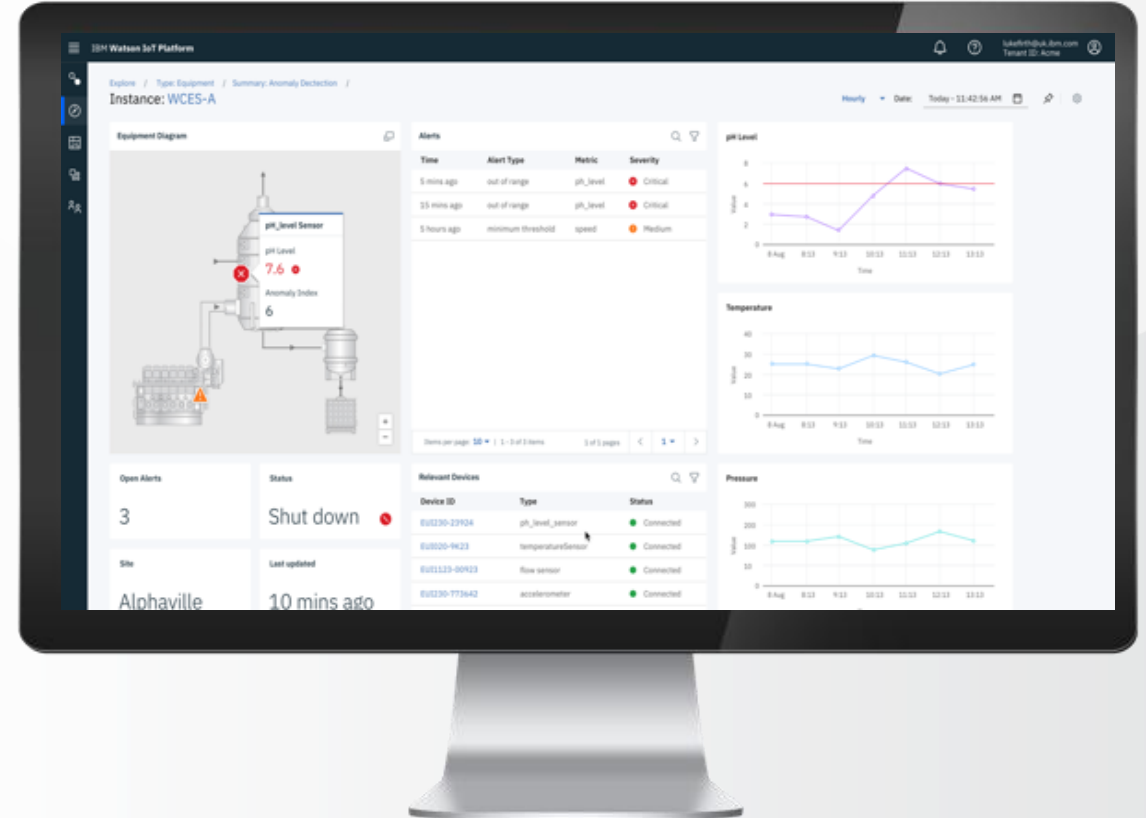
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MAS Monitor

Enterprise-wide monitoring and AI-based anomaly detection



- Rapid data integration
- Scalable dashboard filtering and management
- Increasing integration with Maximo
 - Usage of Asset Hierarchies
 - Auto-generation of work orders



MAS Predict



Predict asset failures and understand factors that contribute to failures

- Utilize templates to build common predictive models
- Incorporate sensor data into models
- Score predictive models using Watson Machine Learning
- View pre-built visualizations

