

Collect the right data, **connect** the proper resources and **ACT** to keep your maintenance plan on budget

ASSET RELIABILITY SERVICES

The Symboticware Asset Reliability Team offers the following services

CONDITION-BASED
MAINTENANCE

FAILURE MODE
ANALYSIS



CRITICALITY
ANALYSIS

PERFORMANCE
METRICS

The mission of Symboticware's ACT:

Our Asset Reliability Services guide and support our customers to maximize the value of their mobile asset data.

Symboticware helps companies get the capacity they expect from their mobile assets at the lowest maintenance cost possible.




MAXIMIZE YOUR ASSET DATA

The Symboticware Asset Reliability Team identifies data extraction points, and helps you maximize the value of on-board telemetry data.

Collect. Connect. ACT.

The best asset management strategy goes well beyond the basic manufacturer recommendations for planned maintenance.



-  Strategically **COLLECT** the right data to ensure that your assets are operating at full capacity
-  **CONNECT** the proper resources to the data to avoid unscheduled maintenance events
-  **ACT** to keep your maintenance plan on budget

HOW our Asset Services work:

Our team helps you gather bi-directional, store-and-forward data with remote configuration capabilities. Data collected is processed and analyzed on-board for real-time reporting and alerts. Data is also delivered on-surface to your data management system for centralized control and monitoring and added management reports through integration into existing mine infrastructure.

Criticality Analysis

Failure Mode Analysis

Condition-Based Maintenance

Performance Metrics



CRITICALITY ANALYSIS

PURPOSE

The foundation of a solid Condition-Based Asset Strategy is the initial Failure Mode & Effects Analysis (FMEA) for each asset. This can be done in a more uniform process by first defining Asset Criticality. By identifying the most critical components, you can more systematically implement the improvements that have greater effect on the overall organizational performance commitments.

METHODOLOGY

The first step in helping an organization develop an Asset Strategy is to identify each asset's criticality, and the impact its failure will have on the following:

- Safety
- Environmental
- Production
- Cost

Criticality
ANALYSIS
SAFETY
PROCESS
FMEA
STRATEGY
ASSET
maintenance
DETECT
component
method
define
environmental
production
SEVERITY
failure
critical
Failure Modes

FAILURE MODE EFFECTS & ANALYSIS

PURPOSE

FMEA is a systematic method of defining a Failure Mode, along with the frequency of the failure occurring, the severity should the failure occur, and the ability to detect the failure mode. From this process a Risk Priority Number (RPN) is defined to help users know which failure modes are the most critical to monitor.

METHODOLOGY

Using standard RCM practices, our team will facilitate the FMEA workshop for an organization. As the FMEA on a component is completed, the organization can define the type of maintenance strategy each failure mode will be associated with. If the failure mode has a high level of detectability, the organization may choose to define that failure mode as "Predictive" or "Condition Based". Failure Modes defined as "Condition Based" will then be researched and have logic developed to warn the organization when the failure mode reaches certain conditions of concern.



CONDITION-BASED MAINTENANCE

PURPOSE

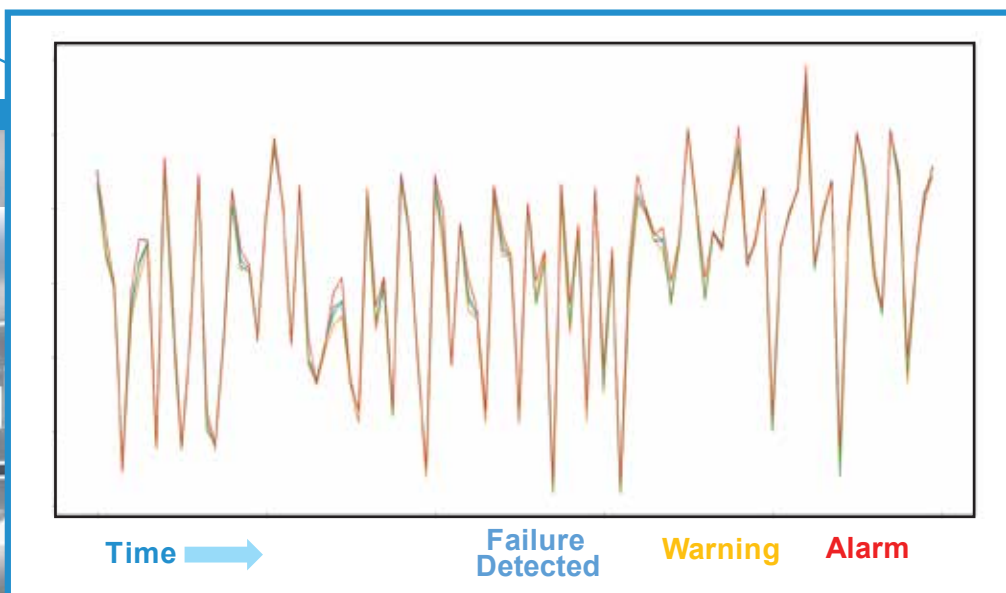
This service helps your team develop a step-by-step process to identifying failure modes, and create the work management workflow for all failure modes designated "CBM" during the Failure Mode Analysis.

CBM Failure Modes should meet one or more of these descriptions:

- Failure Mode is random, not fixed.
- Significant effects to safety, production, environment, or costs.
- Enough data to properly detect the failure mode.
- Cost effective to monitor, detect, and schedule repair or replacement based on condition

METHODOLOGY

Initial work will be done to build, test and validate condition based logic. Once validated, our team will collaborate with the organization to modify and adopt an updated Work Identification Process to incorporate condition based maintenance into their standard Planning/Scheduling processes.

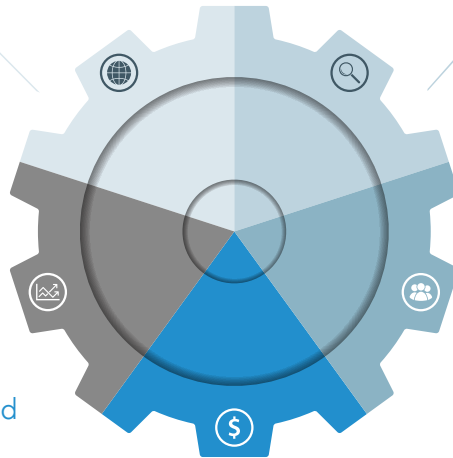


PERFORMANCE METRICS

PURPOSE

To assist an organization in defining, building, and presenting the KPIs associated with Asset Reliability. There are many KPIs that can be used:

- Mean Time Between Failure (MTBF)
- Availability
- Use of Availability
- 1st Down after Service
- Scheduled : Unscheduled Work Ratio



- Scheduled : Unscheduled Work Cost Ratio
- PM Efficiency (Time Study)
- PM Work Order Generation Trend
- Capacity Assurance (Target Production)
- Overall Equipment Effectiveness (OEE)
- 1st Down after Service

METHODOLOGY

Working closely with the organization to understand their targets for driving efficiency or cost gains, KPIs can be baselined to create continuous improvement programs that contribute to site-wide improvements.

