Module Overview – MADe Prognostics and Health Monitoring

made
decisions better MADe...

Design and optimize a system's diagnostic capability

Key benefits

- Model-based approach
- Analyze inherent diagnostic capability
- Automated sensor set generation
- Optimization of diagnostics based on technical and economical metrics
- Diagnostic decision support

Key features

- Generation of sensor sets utilizing a genetic algorithm
- Constraints and targets for coverage and number of sensors
- Comparisons between legacy, user defined and automatically generated sets

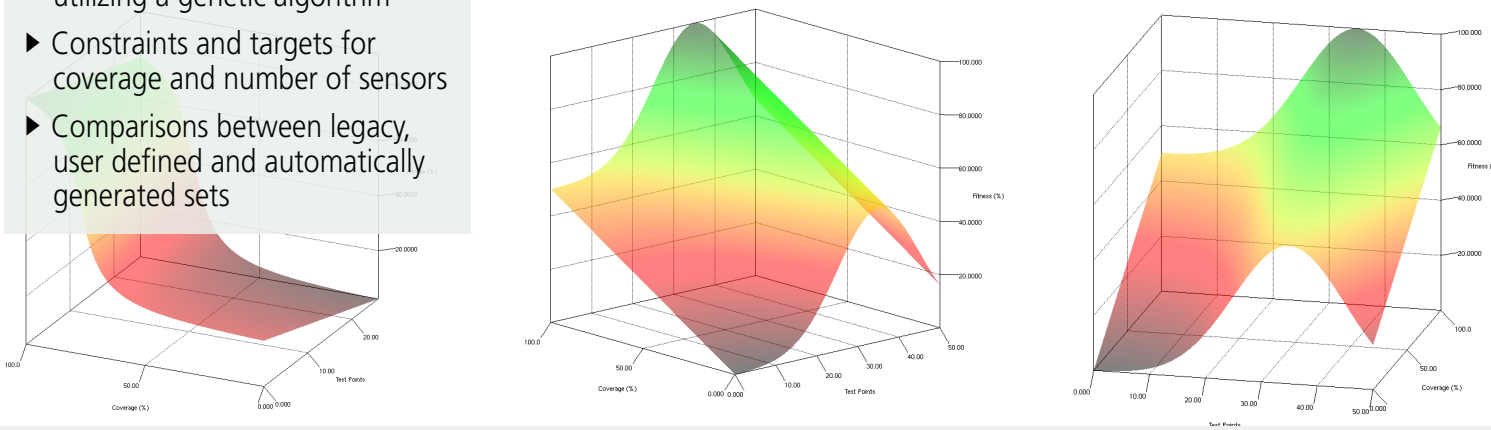
Overview

The PHM module is used to design/validate the diagnostic requirements for Condition Based Maintenance (CBM) of complex systems in an integrated analysis solution. User defined and automatically designed sensor sets are analysed for diagnostic coverage and probability of detection. It enables optimization of sensor selections based on failure mode coverage and metrics (cost and weight). The key question the model aims to address is whether any specific sensor "buys its way onto the system."

This module is used to analyze and assess a system's sensing capability. It uses an intuitive user interface with a structured work-flow to allow rapid generation of sensor sets spanning multiple Levels of Indenture (LOI).

How does MADe PHM work?

MADe PHM module uses a genetic algorithm to generate analysis sensor sets based on user constraints of maximum coverage, number of sensors and depth of analysis. It facilitates the assessment of a legacy system's existing diagnostic capability (Legacy Sensor Set), user driven custom sensor allocations (User Sensor Sets) and the generation of sensor sets automatically (Analysis Sensor Sets).



Genetic Algorithm for Analysis Sensor Sets

MADe's genetic algorithm enables the user to allocate parameters such as number of sensors, target coverage and the depth of analysis. MADe PHM uses these parameters to generate a range of potential sensor sets which best fits these criteria.

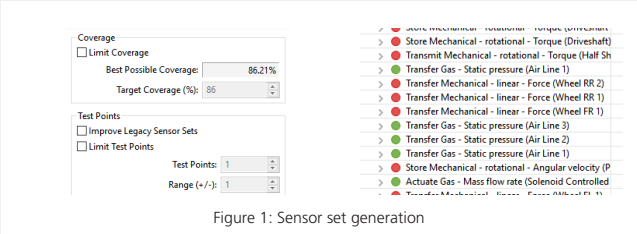


Figure 1: Sensor set generation

Sensor Allocation and Optimization

When sensor sets are generated, specific sensors are allocated to components to achieve the specified set coverage. When all sensors are allocated, the parameters of each sensor are entered to enable optimization based on user defined restrictions such as maximum cost and weight of the sensor sets.

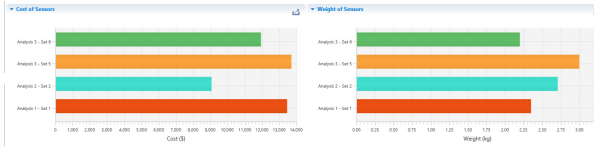


Figure 2: Sensor Allocation

Diagnostic Rules and Ambiguity Groups

MADe automatically operates the rule sets for how specific failures in the system are identified as well as rules for isolating a failure to a group of potential failures (ambiguous failures). These may be leveraged for maintenance guidelines and onboard diagnostic capabilities.

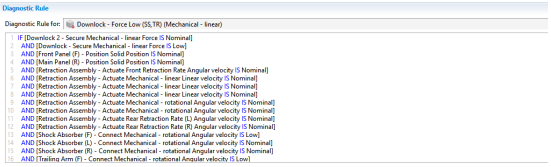


Figure 3: Diagnostic Rules

PHMTechnology
www.phmtechnology.com

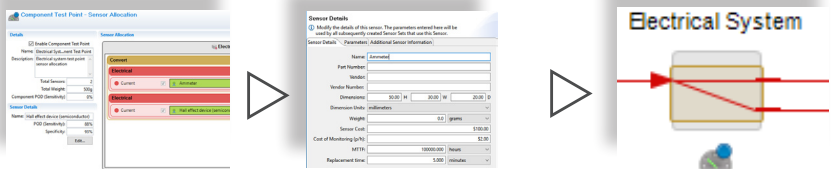
To arrange for a demonstration, please contact us at info@phmtechnology.com

MADe Module: Prognostics and Health Monitoring

Functionality

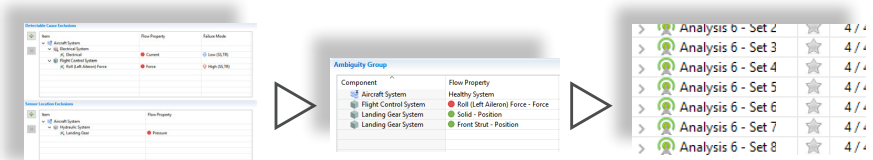
Component Test Point

Component Test Point → Sensor parameters → Allocated Test Point



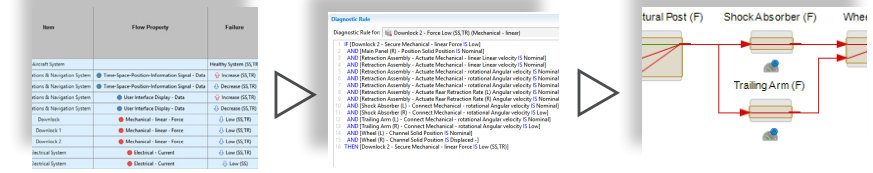
Sensor Allocation

Exclusions → Ambiguities → Sensor sets



Diagnostic Sets

Propagation Table → Diagnostic rules → PHM System Model



Sensor Comparisons

Coverage → Cost → Weight

Outputs

- Diagnostic Sets
- Sensor Set trade study
- Diagnostic Assessment
- Diagnostic Rules
- Component Test Points Reports

Features

- Component Test Point
- Diagnostics Analysis
- Sensor Set Design
- Sensor Parameters
- Sensor Set Optimization

Other Modules

- MADe Modelling
- MADe SRA – Safety and Risk Assesment
- MADe RAM – Reliability Availability and Maintainability

Licensed Plugin

- Teamcenter Integration

Minimum System Requirements	
Processor	32-bit, AMD Athlon II X2 or Intel Core i3 2.8 GHz
RAM	4GB
Hard disk	1GB for installation, 2GB additional free space for saving projects and related files
OS	Windows XP Service Pack 2
Resolution	1366x768 High Definition screen resolution
Java	Java 8 Standard Edition (bundled)

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