

Module Overview – MADE Modelling

Define the functional behaviour of a system and automate the FMEA

Key benefits

- ▶ Model Based FMEA
- ▶ Productivity based on automation of analysis and Libraries
- ▶ Configuration management across platform lifecycle
- ▶ Knowledge capture transfer – model parameters are saved and annotated
- ▶ Design decision support

Key features

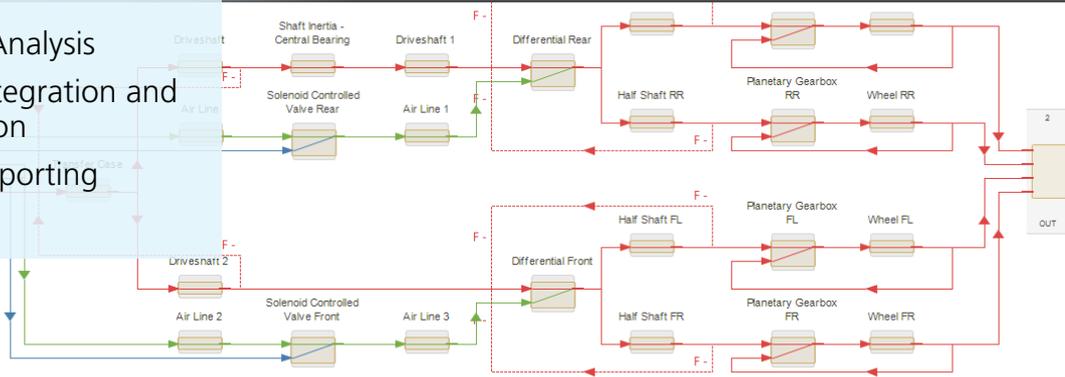
- ▶ Automated response path generation
- ▶ Data Quality Analysis
- ▶ CAD / PLM Integration and synchronisation
- ▶ Automated reporting templates

Overview

MADe Modelling is used to create a model of a system to identify the expected behavior and the impact of potential failures and risks associated with a configuration in an objective, repeatable and traceable process. The engineer can document how a system is expected to be used (Mission Profile Definition), where the system will be used (Environmental Scaling Impact) and this information is utilized to generate dynamic charting outputs and a FMEA report which will indicate detection means, compensating provisions and severity classification. MADe Modelling is consistent with Systems Engineering principles, can be integrated with CAD / PLM systems, and effectively implemented at any stage of the product lifecycle.

How does MADe Modelling work?

MADe uses qualitative simulation to automatically generate the functional dependencies in a system to identify how (Automated Dependency Mapping) and why (Failure Diagrams) failures propagate. The visual representation of the system is based on a standardized taxonomy of functions and failure concepts (MADe Taxonomies) to ensure consistency across an organization and facilitate knowledge capture & transfer. All changes to the structure and parameters in a MADe model are configuration managed to ensure traceability and and responsibility for changes (Annotations). MADe models are extensible and reusable (MADe Libraries).



FMEA

FMEA report is a legally or industry mandated process in most industries dealing with mission and safety critical systems. The FMEA report, derived from the model, shows failure modes and causes associated with the assigned mission phase and the effects. Failure detection and compensating provisions narratives are captured from the functional failure in the failure diagram.

IDENTIFICATION NUMBER	FUNCTION	FAILURE MODES	MISSION PROFILE / OPERATIONAL MODE	LOCAL EFFECTS	NEXT HIGHER LEVEL	EFFECTS	FAILURE DETECTION MEANS	COMPENSATING PROVISIONS
	Control Mechanism	High Drive of the Control System		Control Mechanism - Input Power High Failure to operate	Control Mechanism - Input Power High Failure to operate	Control Mechanism - Input Power High Failure to operate	Equipment Testing - Inspection	Replace
				Control Mechanism - Input Power High Failure to operate	Control Mechanism - Input Power High Failure to operate	Control Mechanism - Input Power High Failure to operate	Equipment Testing - Inspection	Replace
				Control Mechanism - Input Power High Failure to operate	Control Mechanism - Input Power High Failure to operate	Control Mechanism - Input Power High Failure to operate	Equipment Testing - Inspection	Replace
				Control Mechanism - Input Power High Failure to operate	Control Mechanism - Input Power High Failure to operate	Control Mechanism - Input Power High Failure to operate	Equipment Testing - Inspection	Replace

Figure 1: FMEA

Automated Dependency Mapping

Automated Dependency Mapping is generated from the MADe model to identify and capture the effects of a loss of function both 'upstream' and 'downstream' in the platform based on the physics of failure.

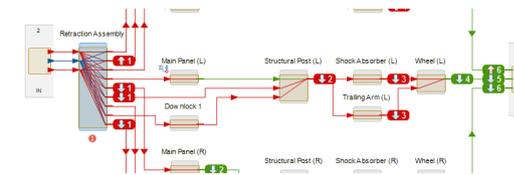


Figure 2: Automated Dependency Mapping

MADe Taxonomies

The MADe Taxonomy ensures that the definition and interpretation of engineering terminology is consistent across the organisation / enterprise.

- ▶ Failure taxonomy – causes, mechanisms, faults and symptoms
- ▶ Functional taxonomy – component's function and flow properties
- ▶ Environmental factors – system operates and its relative impacts

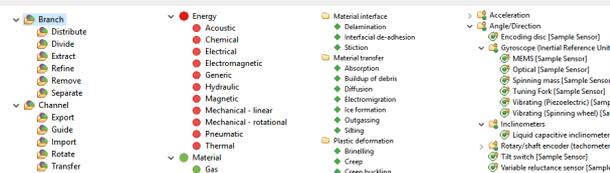


Figure 3: Function, Flow, Mechanism and Sensor taxonomy (from left to right)

