

Case Study

Maintenance Optimization of Legacy Assets

Summary

- ▶ The Contractor had a long-term contract to provide maintenance and logistics to sustain a class of navy ships at an agreed level of Operational availability (readiness).
- ▶ The platform was not meeting the contracted availability target, and the Contractor required a solution to identify alternative maintenance approaches to improve the availability of the platform, in the context of its Operational usage (Mission Profile) and Operating Environment.

Outcomes

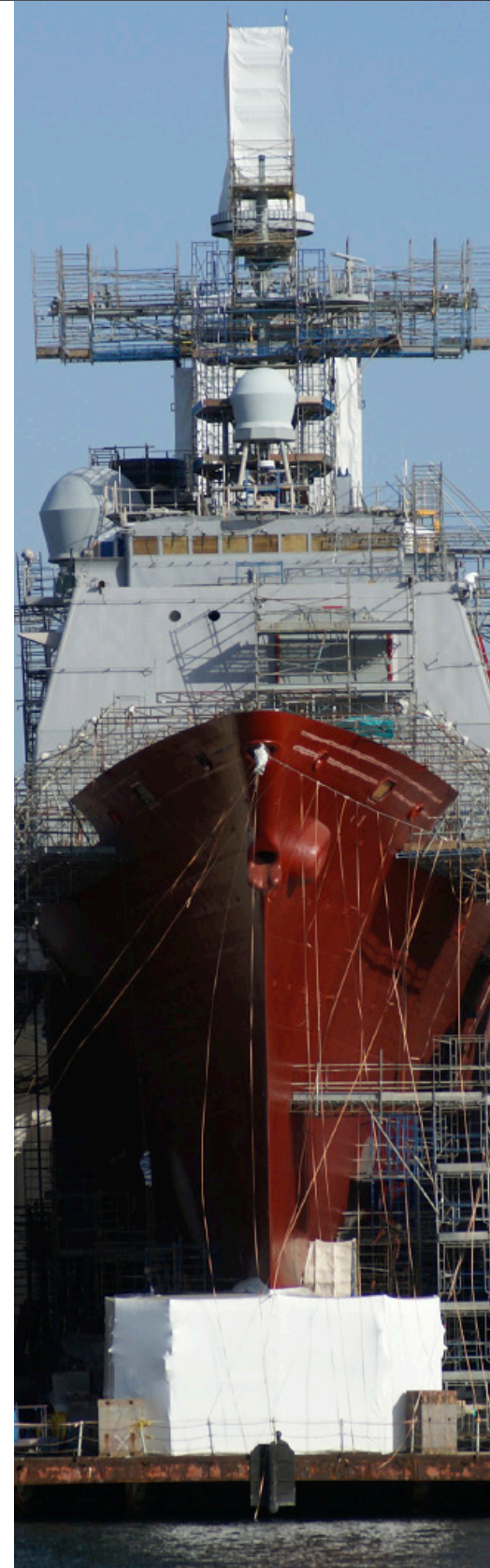
The results of the project included:

1. Gap analysis / validation of OEM maintenance recommendations based on operational data
2. Identified Poor Performers and recommended changes to the approach / periodicity of maintenance
3. Increased capability readiness (Operational Availability) of the platform
4. Reduced sustainment costs for the platform
5. Recommendations for design improvements
6. A knowledge base of failures and maintenance actions that the Contractor can reuse across the life of the platform / contract
7. A means of validating and communicating their analysis to the customer
8. Analysis solution to model the impact of mission profile / operating environment on maintenance costs

Process

The Contractor analysed the maintenance records for the platform to identify components that were failing more frequently than expected, and used MADE to:

1. Analysis of maintenance data to identify Poor Performing (PP) components / systems
2. Identify potential changes to the approach / periodicity of maintenance for PP components
3. Trade studies to increase capability readiness (Operational Availability) of the platform
4. Analysis solution to model the impact of mission profile / operating environment on maintenance costs
5. Calculate potential reduction in sustainment costs for the platform (Maintenance Costs)
6. Technical / economic validation of recommendations for design improvements
7. Create a knowledge base of failures and associated maintenance actions that the Contractor can reuse across the life of the platform / contract
8. A means of validating and communicating their analysis to the customer

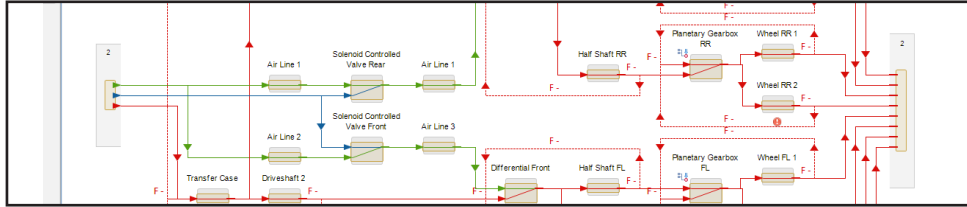


Outputs

MADe was used to generate the following deliverables:

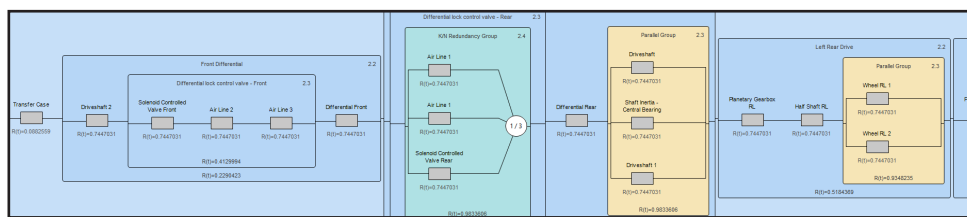
Functional Block Diagrams

Functional Block Diagrams of the selected systems



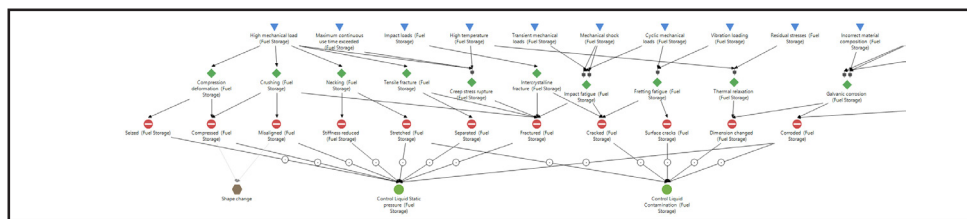
Reliability Block Diagrams

Reliability Block Diagrams of the systems (to identify PP components)



Failure Diagram

Failure diagrams of PP components (to capture associated physics of failure)



FMEA / FMECA

FMEA report for the systems (automatically) generated from the MADe model

IDENTIFICATION NUMBER	ITEM / FUNCTIONAL IDENTIFICATION (NOMENCLATURE)	FUNCTION	FAILURE MODES AND CAUSES	MISSION PHASE / OPERATIONAL MODE	FAILURE EFFECTS			FAILURE DETECTION MEANS	CORRECTIVE
					LOCAL EFFECTS	NEXT HIGHER LEVEL	END EFFECTS		
	Air Filter An air purifying device, removing particle contaminants from the air.	Refine Gas Contamination Modelled as a resistive device, slightly restricting air flow and removing particles.	High Contamination due to blocking of the Air Filter as a result of aging caused by contaminated input flow and input flow too slow resulting in Low Torque and High Force	1: Patrol 1 2: Loader 1 3: Patrol 2	Refine Gas Contamination High Loss of output	Convert Mechanical - rotational Torque Low (Diesel Engine) Loss of output	Convert Mechanical - linear Force High (APC Platform) Loss of output	Sensing Device	Condition-based Maintenance
	Refine Gas Mass Flow rate	Refine Gas Mass Flow rate Modelled as a resistive device, slightly restricting air flow and removing particles.	Low Mass Flow rate due to blocking of the Air Filter as a result of aging caused by contaminated input flow and input flow too slow resulting in Low Torque and High Force	1: Patrol 1 2: Loader 1 3: Patrol 2	Refine Gas Mass Flow rate Low Loss of output	Convert Mechanical - rotational Torque Low (Diesel Engine) Loss of output	Convert Mechanical - linear Force High (APC Platform) Loss of output	Operator Observation	Modify Mission
	Refine Gas Contamination	Refine Gas Contamination Modelled as a resistive device, slightly restricting air flow and removing particles.	High Contamination due to blocking of the Air Filter as a result of aging caused by contaminated input flow and input flow too slow resulting in Low Torque and High Force	1: Patrol 1 2: Loader 1 3: Patrol 2	Refine Gas Contamination High Loss of output	Convert Mechanical - rotational Torque Low (Diesel Engine) Loss of output	Convert Mechanical - linear Force High (APC Platform) Loss of output	Sensing Device	Condition-based Maintenance

Back - fit RCM

Back-fit RCM analysis conducted on PP components

