From maintenance strategy to work order – and back

Audun Grimstad
Audun@lighthouse.no

Lighthouse

About Lighthouse

Leading experts on SAP Intelligent Asset Management

Intelligent Asset Management specialists

A proven track record delivering innovative and efficient services and solutions to asset-intensive industries.

Application development for SAP APM and EAM

Our own Lighthouse Apps provide powerful and efficient additions and extensions to standard APM and EAM functionality.

A trusted partner for your digital journey

Our experienced team offers expert advisory., project management- and business consulting services.

Asset Management Excellence by Lighthouse

We transform the complexity of asset management into streamlined digital solutions that drive operational excellence. As specialists in SAP's Intelligent Asset Management suite on the SAP Business Technology Platform, we find the path to optimised asset performance for leading enterprises across a range of industries.

Services:

- Implementation expert consulting & strategic advisory
- Proof of Value for SAP IAM (Quick–start Package)
- Migration to SAP APM, ECC to S/4, etc.
- SAP BTP and AI development, SAP Fiori apps

Products (available on SAP Store):

- Health, Safety, Environment and Quality (HSEQ)
- Asset Health Acceleration Suite (IoT & CBM)
- Asset Strategy Acceleration Suite (Reliability Engineering, strategy and APM to PM integration
- Syna Plan to Pay for Drilling & Well Operations

Asset Management leaders’ top objectives

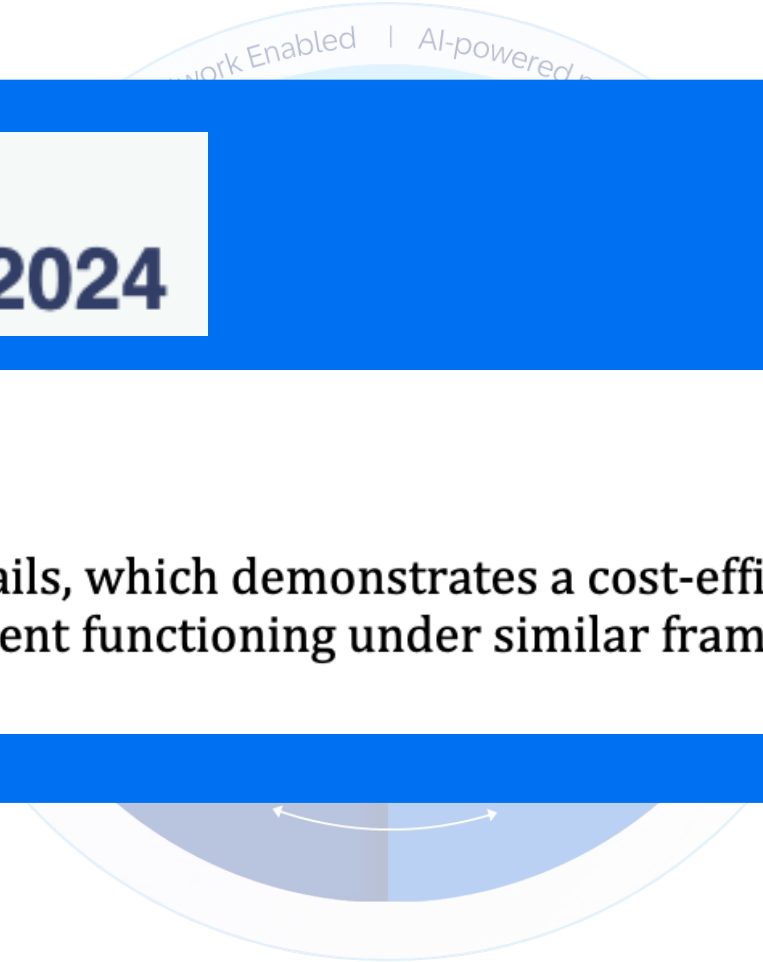
External forces are compounded by ill-equipped internal systems and operational struggles

Asset Management leaders’ top objectives

1. Asset reliability and uptime focusing on

risk.

Conquering these objectives requires every asset and service process to work in unison:



des. 2024 Publisert

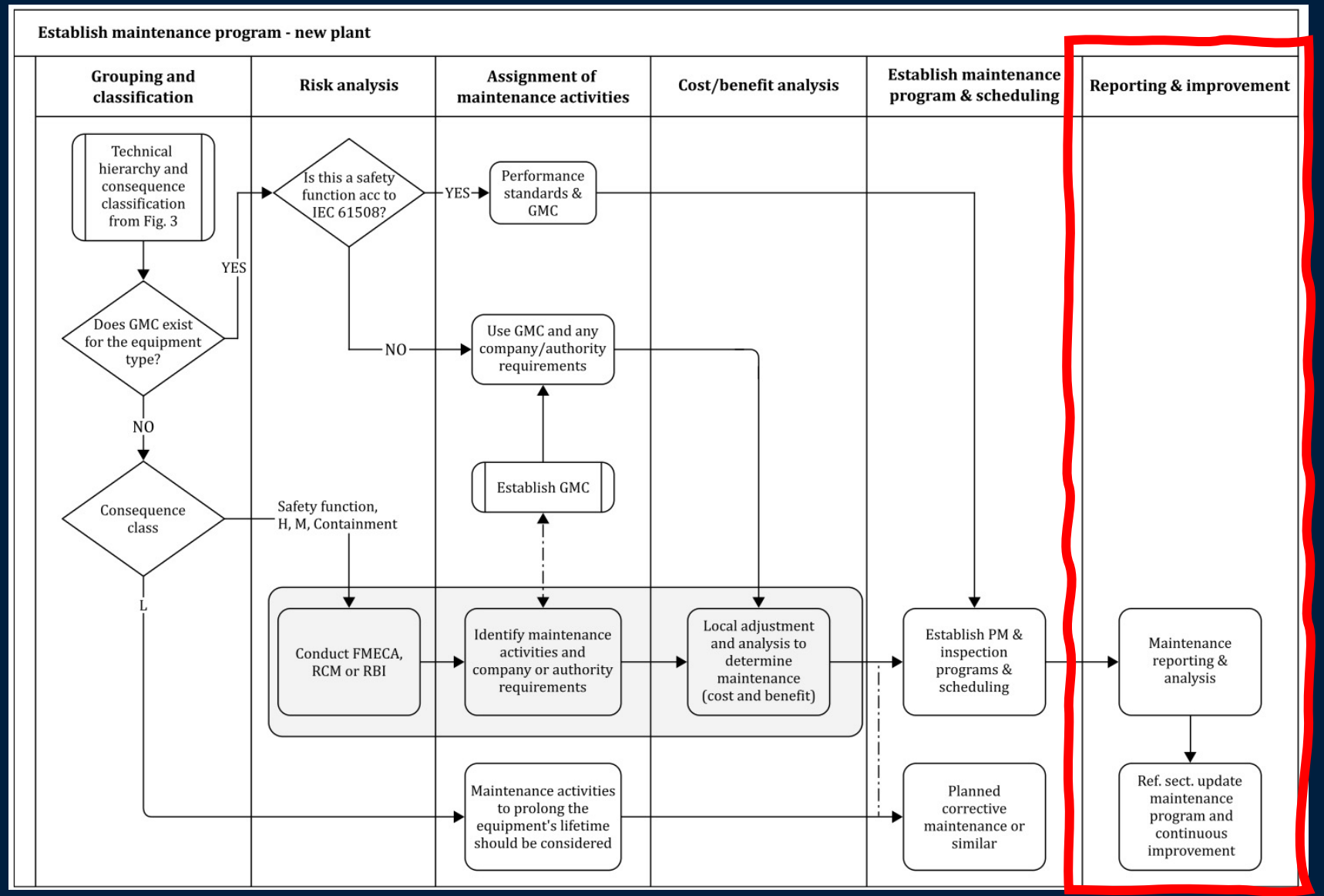
NORSOK Z-008:2024

3.28
GMC
generic maintenance concept
set of maintenance actions, strategies and maintenance details, which demonstrates a cost-efficient maintenance method for a defined generic group of equipment functioning under similar frame and operating conditions

NORSOK Z-008: Establishing a maintenance programme

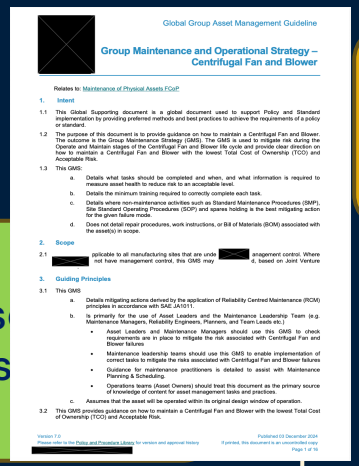
GMCs outside SAP APM causes problems:

1. **Connection** between strategies and assets is missing
2. **Updates**, improvements and change processes are **complex** and time-consuming
3. Measuring and assessing the **efficiency** of maintenance strategies is difficult (impossible?)



A very simplified model …

Generic Maintenance Concept


Global Group Asset Management Guideline

Group Maintenance and Operational Strategy – Centrifugal Fan and Blower

Relates to: Maintenance of Physical Assets FCoP

1. Intent

1.1 This Global Supporting document is a global document used to support Policy and Standard implementation by providing preferred methods and best practices to achieve the requirements of a policy or standard.

1.2 The purpose of this document is to provide guidance on how to maintain a Centrifugal Fan and Blower. The outcome is the Group Maintenance Strategy (GMS). The GMS is used to mitigate risk during the Operate and Maintain stages of the Centrifugal Fan and Blower life cycle and provide clear direction on how to maintain a Centrifugal Fan and Blower with the lowest Total Cost of Ownership (TCO) and Acceptable Risk.

1.3 This GMS:

a. Details what tasks should be completed and when, and what information is required to measure asset health to reduce risk to an acceptable level.

b. Details the minimum training required to correctly complete each task.

c. Details where non-maintenance activities such as Standard Maintenance Procedures (SMP), Site Standard Operating Procedures (SOP) and spares holding is the best mitigating action for the given failure mode.

d. Does not detail repair procedures, work instructions, or Bill of Materials (BOM) associated with the asset(s) in scope.

2. Scope

2.1 [redacted] pplicable to all manufacturing sites that are unde [redacted] anagement control. Where [redacted] not have management control, this GMS may [redacted] d, based on Joint Venture

3. Guiding Principles

3.1 This GMS

a. Details mitigating actions derived by the application of Reliability Centred Maintenance (RCM) principles in accordance with SAE JA1011.

b. Is primarily for the use of Asset Leaders and the Maintenance Leadership Team (e.g. Maintenance Managers, Reliability Engineers, Planners, and Team Leads etc.)

- Asset Leaders and Maintenance Managers should use this GMS to check requirements are in place to mitigate the risk associated with Centrifugal Fan and Blower failures
- Maintenance leadership teams should use this GMS to enable implementation of correct tasks to mitigate the risks associated with Centrifugal Fan and Blower failures
- Guidance for maintenance practitioners is detailed to assist with Maintenance Planning & Scheduling.
- Operations teams (Asset Owners) should treat this document as the primary source of knowledge of content for asset management tasks and practices.

c. Assumes that the asset will be operated within its original design window of operation.

3.2 This GMS provides guidance on how to maintain a Centrifugal Fan and Blower with the lowest Total Cost of Ownership (TCO) and Acceptable Risk.

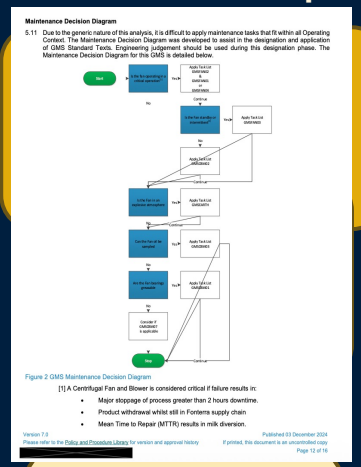
[redacted]

Version 7.0 Published 03 December 2024

Please refer to the Policy and Procedure Library for version and approval history If printed, this document is an uncontrolled copy

[redacted] Page 1 of 16

Cons
class


Maintenance Decision Diagram

5.11 Due to the generic nature of this analysis, it is difficult to apply maintenance tasks that fit within all Operating Context. The Maintenance Decision Diagram was developed to assist in the designation and application of GMS Standard Texts. Engineering judgement should be used during this designation phase. The Maintenance Decision Diagram for this GMS is detailed below.

Figure 2 GMS Maintenance Decision Diagram

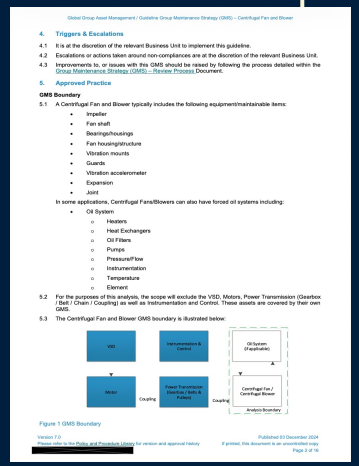
[1] A Centrifugal Fan and Blower is considered critical if failure results in:

- Major stoppage of process greater than 2 hours downtime.
- Product withdrawal whilst still in Fonterra supply chain
- Mean Time to Repair (MTTR) results in milk diversion.

Version 7.0 Published 03 December 2024

Please refer to the Policy and Procedure Library for version and approval history If printed, this document is an uncontrolled copy

[redacted] Page 12 of 16


Global Group Asset Management / Guideline Group Maintenance Strategy (GMS) – Centrifugal Fan and Blower

4. Triggers & Escalations

4.1 It is at the discretion of the relevant Business Unit to implement this guideline.

4.2 Escalations or actions taken around non-compliances are at the discretion of the relevant Business Unit.

4.3 Improvements to, or issues with this GMS should be raised by following the process detailed within the Group Maintenance Strategy (GMS) – Review Process Document.

5. Approved Practice

GMS Boundary

5.1 A Centrifugal Fan and Blower typically includes the following equipment/maintainable items:

- Impeller
- Fan shaft
- Bearings/housings
- Fan housing/structure
- Vibration mounts
- Guards
- Vibration accelerometer
- Expansion
- Joint

In some applications, Centrifugal Fans/Blowers can also have forced oil systems including:

- Oil System
  - Heaters
  - Heat Exchangers
  - Oil Filters
  - Pumps
  - Pressure/Flow
  - Instrumentation
  - Temperature
  - Element

5.2 For the purposes of this analysis, the scope will exclude the VSD, Motors, Power Transmission (Gearbox / Belt / Chain / Coupling) as well as Instrumentation and Control. These assets are covered by their own GMS.

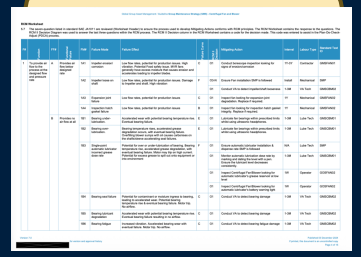
5.3 The Centrifugal Fan and Blower GMS boundary is illustrated below:

Figure 1 GMS Boundary

Version 7.0 Published 03 December 2024

Please refer to the Policy and Procedure Library for version and approval history If printed, this document is an uncontrolled copy

[redacted] Page 2 of 16


RCM Worksheet

Using the RCM decision logic tree described in standard SAE JA1011 each assessed Functional Failure is shown the process used to develop Mitigating Actions conforms with RCM principles. The RCM Worksheet contains the sequence to the questions. The RCM II Decision Diagram was used to answer the last three questions within the RCM process. The RCM II Decision column in the RCM Worksheet contains a code for the decision made. The code was entered to search the Plan Do Check Refine (PDCA) process.

No	Function	Ref	FFID	Failure Mode	Failure Effect	Effect Type	RCM II Decision	Mitigating Action	Interval	Labour Type	Operation Time
1	To provide air flow to the process at the designed flow rate pressure	A	1A1	Unable to restart	Low flow rate, potential for production issues. Safe operation. Process/Plant trip/shut down. Will be identified during operator walk around. Will require restart and re-commission reading to enable restart.	C	CF	Control of Electrical Hazardous Energy by lock or electrical isolation	01.07	Contractor	8MAN-HRS
			1A2	Impeller loose on shaft	Low flow rate, potential for production issues. Damage to impeller and shaft. High vibration	F	TD/HF	Ensure Fan Installation BMP is followed	Install	Mechanical	8MP
							CF	Conduct VA to detect Impeller/shaft looseness	1 HR	VA Tech	1MAN-HRS
			1A3	Expansion joint failure	Low flow rate, potential for production issues	C	CF	Inspect fan looking for expansion joint degradation. Replace if required	01	Mechanical	2MAN-HRS
			1A4	Inspection hatch door failure	Low flow rate, potential for production issues	B	HF	Inspect fan looking for inspection hatch gasket degradation. Replace if required	01	Mechanical	2MAN-HRS
			1B1	Bearing system lubrication	Accelerated wear with potential bearing damage/seizure, Eventual bearing failure.	F	CF	Lubricate fan bearings whilst areas that is safe to do so using ultrasonic headphones.	1 HR	Lube Tech	1MAN-HRS
			1B2	Bearing over-lubrication	Bearing temperature rise, accelerated grease degradation, Eventual bearing failure. Potential Fire/Explosion scenario with oil vapours (ethanol) on hot surfaces (bearing housing)	E	CF	Lubricate fan bearings whilst areas that is safe to do so using ultrasonic headphones. Ensure the lubricant level decreases between fills	1 HR	Lube Tech	1MAN-HRS
			1B3	Displacement automatic lubricator failure (grease type)	Potential for over or under lubrication (Hearing, Temperature rise, accelerated grease degradation, with potential bearing damage/seizure. Eventual bearing failure) Potential for impact grease is spilt into the equipment or the environment	F	CF	Ensure automatic lubricator installation & dispense rate BMP is followed	1HR	Lube Tech	8MP
							CF	Monitor automatic lubricators that are safe to do so using ultrasonic headphones and ensure they lubricate and have decreased between fills	1 HR	Lube Tech	1MAN-HRS
							CF	Inspect Centrifugal Fan/Blower looking for automatic lubricator's grease reservoir at low level	1HR	Operator	SOOP1HR2
							CF	Inspect Centrifugal Fan/Blower looking for automatic lubricator's battery warning light	1HR	Operator	SOOP1HR2
			1B4	Bearing seal failure	Potential for contaminant or moisture ingress to bearing, leading to accelerated wear. Potential bearing degradation. Eventual bearing failure. Slow trip, Vibration	C	CF	Conduct VA to detect bearing damage	1 HR	VA Tech	1MAN-HRS
			1B5	Bearing lubricant degradation	Accelerated wear with potential bearing damage/seizure. Eventual bearing failure. Slow trip, Vibration	C	CF	Conduct VA to detect bearing damage	1 HR	VA Tech	1MAN-HRS
			1B6	Bearing fatigue	Increased vibration. Accelerated bearing wear with eventual failure. Slow trip. No airflow	C	CF	Conduct VA to detect bearing fatigue damage	1 HR	VA Tech	2MAN-HRS

[redacted]

Version 7.0 Published 03 December 2024

Please refer to the Policy and Procedure Library for version and approval history If printed, this document is an uncontrolled copy

[redacted] Page 13 of 16

Represented through

SAP APM Strategy

Linked to

SAP APM Recommen-dation

SAP PM PM programme

Change, update, improve

Lighthouse

A typical GMC document

[redacted]

Global G

Group Maintenance

Relates to: Maintenance of Physical Assets FCoP

1. Intent

1.1 This Global Supporting document is a global doc implementation by providing preferred methods and bes or standard.

1.2 The purpose of this document is to provide guidance c The outcome is the Group Maintenance Strategy (GM Operate and Maintain stages of the Centrifugal Fan ar how to maintain a Centrifugal Fan and Blower with Acceptable Risk.

1.3 This GMS:

a. Details what tasks should be completed measure asset health to reduce risk to an a

b. Details the minimum training required to co

c. Details where non-maintenance activities s Site Standard Operating Procedures (SOP for the given failure mode.

d. Does not detail repair procedures, work inst the asset(s) in scope.

2. Scope

2.1 [redacted] pplicable to all manufacturing sites that a not have management control, this GM

3. Guiding Principles

3.1 This GMS

a. Details mitigating actions derived by the app principles in accordance with SAE JA1011.

b. Is primarily for the use of Asset Leader Maintenance Managers, Reliability Enginee

- Asset Leaders and Maintenanc requirements are in place to mitig Blower failures
- Maintenance leadership teams sh correct tasks to mitigate the risks a
- Guidance for maintenance practi Planning & Scheduling.
- Operations teams (Asset Owners) of knowledge of content for asset m

c. Assumes that the asset will be operated wit

3.2 This GMS provides guidance on how to maintain a Cen of Ownership (TCO) and Acceptable Risk.

Version 7.0
Please refer to the Policy and Procedure Library for version and approval histo
[redacted]

Maintenance Decision Diagram

5.11 Due to the generic nature of this analysis, it is difficult to apply mair Context. The Maintenance Decision Diagram was developed to of GMS Standard Texts. Engineering judgement should be us Maintenance Decision Diagram for this GMS is detailed below.

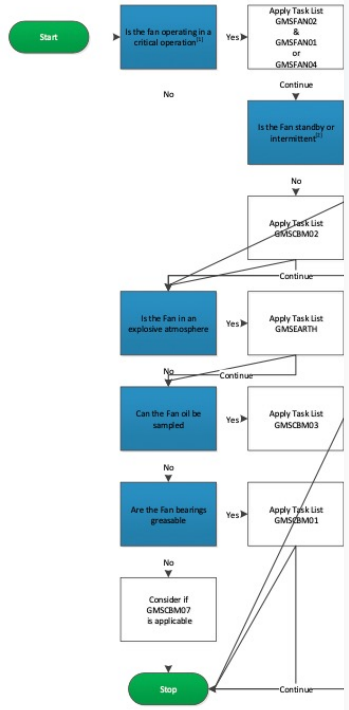


Figure 2 GMS Maintenance Decision Diagram

[1] A Centrifugal Fan and Blower is considered critical if fail

- Major stoppage of process greater than 2 ho
- Product withdrawal whilst still in Fonterra sup
- Mean Time to Repair (MTTR) results in milk

Version 7.0
Please refer to the Policy and Procedure Library for version and approval history
[redacted]

RCM Worksheet

5.7 The seven-question listed in standard SAE JA1011 are reviewed (Worksheet Header) to ensure the process used to develop Mitigating Actions conforms with RCM principles. The RCM Worksheet contains the response to the questions. The RCM II Decision Diagram was used to answer the last three questions within the RCM process. The RCM II Decision column in the RCM Worksheet contains a code for the decision made. This code was entered to assist in the Plan-Do-Check-Adjust (PDCA) process.

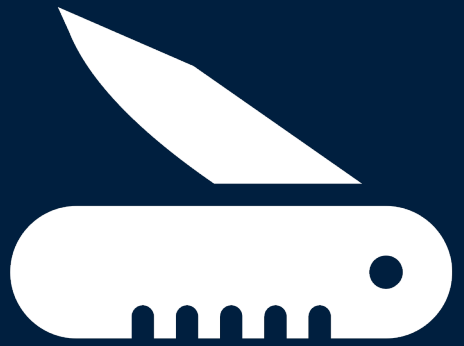
F#	Function	FF#	Functional Failure	FM#	Failure Mode	Failure Effect	Failure Curve	RCM II Decision	Mitigating Action	Interval	Labour Type	Standard Text ID
1	To provide air flow to the process at the designed flow and pressure rate	A	Provides air flow below designed rate	1A1	Impeller erosion/ corrosion	Low flow rates, potential for production issues. High vibration. Potential Food safety issue. MVR fans generally have excess moisture that causes erosion and accelerates loading to impeller blades.	C	O1	Conduct borescope inspection looking for signs of erosion/corrosion	1Y-3Y	Contractor	GMSFAN01
				1A2	Impeller loose on shaft	Low flow rates, potential for production issues. Damage to Impeller and shaft. High vibration	F	O3-N	Ensure Fan installation SMP is followed	Install	Mechanical	SMP
								O1	Conduct VA to detect impeller/shaft looseness	1-3M	VA Tech	GMSCBM02
				1A3	Expansion joint failure	Low flow rates, potential for production issues	C	O1	Inspect fan looking for expansion joint degradation. Replace if required.	1Y	Mechanical	GMSFAN02
				1A4	Inspection hatch gasket failure	Low flow rates, potential for production issues	B	O1	Inspect fan looking for inspection hatch gasket integrity. Replace if required.	1Y	Mechanical	GMSFAN02
		B	Provides no air flow at all	1B1	Bearing under-lubrication.	Accelerated wear with potential bearing temperature rise. Eventual bearing failure.	E	O1	Lubricate fan bearings within prescribed limits whilst using ultrasonic headphones.	1-3M	Lube Tech	GMSCBM01
				1B2	Bearing over-lubrication.	Bearing temperature rises, accelerated grease degradation occurs, with eventual bearing failure. Overfilling blower sumps with oil causes carbonises on the shafts/sleeve accelerating seal failures.	E	O1	Lubricate fan bearings within prescribed limits whilst using ultrasonic headphones.	1-3M	Lube Tech	GMSCBM01
				1B3	Single-point automatic lubricator incorrect grease dose rate	Potential for over or under-lubrication of bearing. Bearing temperature rise, accelerated grease degradation, with eventual bearing failure. Motor may trip on high current. Potential for excess grease to spill out onto equipment or into environment	F	O1	Ensure automatic lubricator installation & dispense rate SMP is followed	N/A	Lube Tech	SMP
								O1	Monitor automatic lubrication dose rate by marking and dating the level with a pen. Ensure the lubricant level decreases consistently.	1-3M	Lube Tech	GMSCBM01
								O1	Inspect Centrifugal Fan/Blower looking for automatic lubricator's grease reservoir at low level	1W	Operator	GOSFAN02
								O1	Inspect Centrifugal Fan/Blower looking for automatic lubricator's battery warning light	1W	Operator	GOSFAN02
				1B4	Bearing seal failure	Potential for contaminant or moisture ingress to bearing, leading to accelerated wear. Potential bearing temperature rise & eventual bearing failure. Motor trip. No airflow.	C	O1	Conduct VA to detect bearing damage	1-3M	VA Tech	GMSCBM02
				1B5	Bearing lubricant degradation	Accelerated wear with potential bearing temperature rise. Eventual bearing failure resulting in no airflow.	C	O1	Conduct VA to detect bearing damage	1-3M	VA Tech	GMSCBM02
				1B6	Bearing fatigue	Increased vibration. Accelerated bearing wear with eventual failure. Motor trip. No airflow.	C	O1	Conduct VA to detect bearing fatigue damage	1-3M	VA Tech	GMSCBM02

Lighthouse

Key project goals

- Store and maintain the entire GMC inside SAP
- Edit and versioning functionality

- Generate strategies from the GMC document
- Prepare plant-specific strategies
- Create recommendations



- Build implementation func for recommendations
- Match recommendations with Task list operations on the tags
- Track implementation status

Analyse the maintenance operations and associated documents and process data with an eye on improving/informing the GMC – thus closing the loop.

GMC management solution

Lighthouse

Give us feedback

Strategy Implementation Overview

v1.0.1

Sync Strategies

Strategies (Total)	Strategies (To Implement)	Strategies (Implemented)	Catalog Profile	Class	Responsible	
2730	2730	0				Go

MTC Overview | Planning Plant Overview

MTC (7)

Search | View Generic Strategies | Create MTC

MTC Id	MTC Description	Published Version	Date Published	Catalog Profile	Classes	Draft Version	Last Modified By	Last Modified	Strategies (Total)	Strategies (To Implement)	Strategies (Implemented)	Responsible
6	Electrical Motors	2.0 (Active)	18.03.2026	EM0000001	EM, EM_HVM, EM_LVM				294	294	0	Electrical
7	Fire and Gas Detection	1.0 (Active)	23.02.2026	FG0000001	FG_SD, FG_GDPIR, FG_GDLOSIR, FG_GDLOSLA, FG_GDCAT, FG_GDACO, FG_FD, FG_FDV, FG_HD, FG_OMD, FG_CP, CL_PLCFC				854	854	0	
14	Centrifugal, Positive Displacement and Submersible Pumps	1.0 (Active)	24.02.2026	PU0000001	PU_PA_CEN, PU_PB_REC, PU_PD_MEE, PU_UTILITY, PU_PF_DIA, PU_PX_OTH, PU_PC_ROT, PU_PE_GEA, PU_PG_SCR, PU_PH_SUB, PU_PS_SUB				1582	1582	0	
18	Safety & Automation System (SAS)					1.0 (Draft)	system	02.03.2026, 12:54:00				
	PLCs and Non-											

FMEA tables

Lighthouse

Give us feedback

Overview / Mtc Editor /

Centrifugal, Positive Displacement and Submersible Pumps

v1.0.1

Versions | Edit

Status: Active | MTC Version: 1.0 | MTC ID: 14 | Date Published: 24.02.2026 | Responsible:

Tables | General Information

Rename | Add | Delete

- Centrifugal pumps
  - Centrifugal Pumps
- Positive displacement pumps
  - Reciprocating Pumps
  - Diaphragm, Metering and Miscellaneous Pumps
  - Rotary Pumps, Gear and Screw Pumps
- Submersible pumps
  - Submersible pumps

Catalog Profile: PU0000001 Classes: PU_PA_CEN

FMEA | MTA

FMEA for Centrifugal Pumps

Add | Delete

Failure Mode	Function Failure	Failure Effect	Failure Cause	MTBF	Dangerous Failure	Hidden/Evident	Failure Development	FMEA Justification	Task Type	Tasks
FTS Failure to start on demand	Fails to transfer fluid at all	No rotational torque supplied to pump. Fail to pump fluid. Damage/shutdown of pump.	Driver/motor or gearbox/coupling failure	27000	Yes/No	Evident/Hidden	Random failure		First Line Maintenance MON – Monitoring INSP - Inspection	O1, C2, C3, C4, I2, T1
VIB Vibration	Fails to transfer fluid at all	No rotational torque supplied to pump. Fail to pump fluid. Damage/shutdown of pump.	Bearing failure due to lack of lubrication. Increased bearing temperature/vibrations .	2160	Yes/No	Evident/Hidden	Age, Unpredictable		First Line Maintenance SCM-Scheduled Maintenance MON – Monitoring INSP - Inspection	O1, M1, M3, M4, M11, C2, C3, C4
			Bearing failure due to mechanical damage/wear (fretting, brinelling etc .)	NA	No	Evident/Hidden	Age, Unpredictable		First Line Maintenance SCM-Scheduled Maintenance MON - Monitoring	O1, M3, M4, M6, M11, C2, C3, C4
			Shaft bowed .	NA	No	Evident/Hidden	Random failure		First Line Maintenance SCM-Scheduled Maintenance MON - Monitoring	O1, M3, M4, M6, M11, C2, C3, C4
	Loss of ignition source control	Ignition hazard, (PIS-5.01)-	Bearing failure due to lack of	NA	Yes	Evident/Hidden	Age, Unpredictable	[33,34]	First Line Maintenance	O1, M3, M4, M6, M11, C2,

FMEA tables

Lighthouse

Give us feedback

Overview / Mtc Editor /

Centrifugal, Positive Displacement and Submersible Pumps

v1.0.1

Versions | Edit

Status: Active | MTC Version: 1.0 | MTC ID: 14 | Date Published: 24.02.2026 | Responsible:

Tables | General Information

Rename | Add | Delete

- Centrifugal pumps
  - Centrifugal Pumps
- Positive displacement pumps
  - Reciprocating Pumps
  - Diaphragm, Metering and Miscellaneous Pumps
  - Rotary Pumps, Gear and Screw Pumps
- Submersible pumps
  - Submersible pumps

Catalog Profile: PU0000001 Classes: PU_PH_SUB, PU_PS_SUB

FMEA | MTA

FMEA for Submersible pumps

Add | Delete

Failure Mode	Function Failure	Failure Effect	Failure Cause	MTBF	Dangerous Failure	Hidden/Evident	Failure Development	FMEA Justification	Task Type	Tasks
FTS Failure to start on demand	Fails to transfer fluid at all	No rotational torque supplied to pump. Fail to pump fluid. Damage/shutdown of pump	Driver/motor failure	80000	Yes/No	Hidden/Evident	Random failure		First Line Maintenance MON - Monitoring	T1, O1
			Connector - Loose casing, conductor and metal wedges, short circuit in power transmission bars	75000	Yes/No	Hidden/Evident	Age, Unpredictable		SCM-Scheduled Maintenance	M6, I1, T1
VIB Vibration	Fails to transfer fluid at all	No rotational torque supplied to pump. Fail to pump fluid. Damage/shutdown of pump	Bearing failure due to lack of lubrication. Increased bearing temperature/vibrations.	80000	Yes/No	Hidden/Evident	Age, Random failure		First Line Maintenance SCM-Scheduled Maintenance MON - Monitoring	C3, O1, M3, T1, C4, M1, M4
			Bearing failure due to mechanical damage/wear (fretting, brinelling etc.)	NA	No	Hidden/Evident	Age, Unpredictable		First Line Maintenance SCM-Scheduled Maintenance MON - Monitoring	C4, M3, M6, C3, O1, M4, T1

Maintenance Tasks

Lighthouse

Give us feedback

Overview / Mtc Editor /

Centrifugal, Positive Displacement and Submersible Pumps

v1.0.1

Versions | Edit

Status: Active | MTC Version: 1.0 | MTC ID: 14 | Date Published: 24.02.2026 | Responsible:

Tables | General Information

Rename | Add | Delete

- Centrifugal pumps
  - Centrifugal Pumps
- Positive displacement pumps
  - Reciprocating Pumps
  - Diaphragm, Metering and Miscellaneous Pumps
  - Rotary Pumps, Gear and Screw Pumps
- Submersible pumps
  - Submersible pumps

Catalog Profile: PU0000001 Classes: PU_PH_SUB, PU_PS_SUB

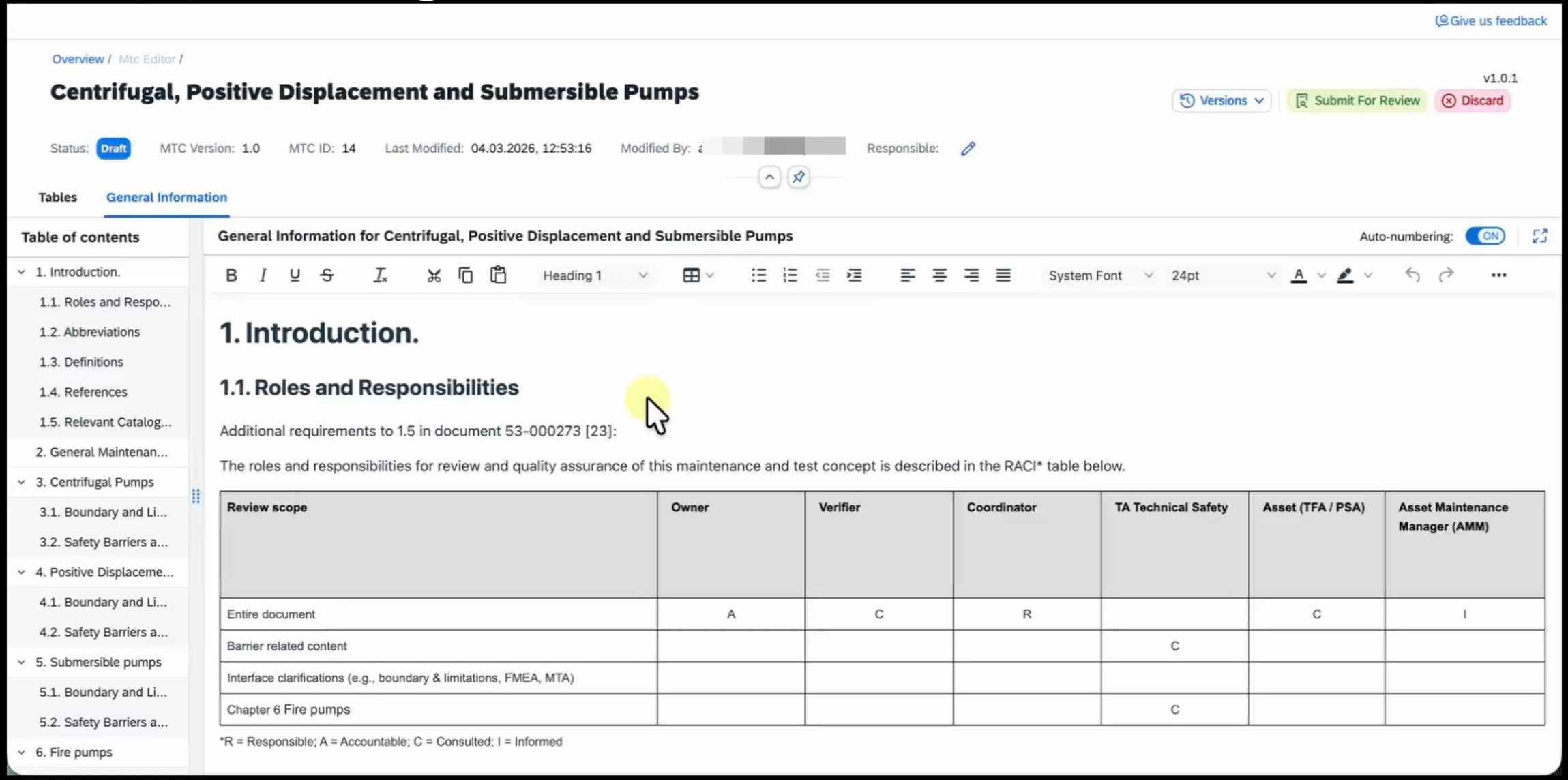
FMEA | MTA

MTA for Submersible pumps

Task No	Task	Task Details	Measuring Point (barriers)	CRW (barriers)	Interval	Task Justification	Comments	Linked Recommendations
C1	Continuous monitoring	Monitoring of mech seal, leakage and barrier fluid temperatur. Refill if required	NA		See comment		Continous monitoring of seal leakage if level transmitters are mounted on barrier fluid tanks and/or barrier fluid temperatures. If not online measurement, checked in task M1.	
C2	Continuous monitoring	Monitoring of discharge pressure and/or flow	NA		See comment		Continous monitoring of pump performance	
C3	Continuous monitoring	Monitoring oil, temperature and/or consumption and or dP over filter	NA		See comment		Continous monitoring of oil system if transmitters are mounted, temperature and level. If not online measurement, checked in task M3.	
C4	Continuous monitoring	Monitoring of vibrations	NA		See comment		Continous monitoring of vibration if instrumented, otherwise offline measurement in task M4.	
I1	Pulling and exchange or close inspection of submerged pumps	Pulling caisson and sea/firewater pump. Control for marine growth and changing of anodes. Close inspection	NA	NO	48-120 Months 96-120 Months (super duplex)		Evaluation of equipment history to be performed before pulling pump	
I3	Inspection coupling before assembly	Check certificate/data sheet for coupling before				Prevents ignition sources – hot surfaces.	Coupling certificate/data sheet should state	

Supporting information (free text)

Lighthouse



GMC landing page

Lighthouse

Give us feedback

v1.0.1

Strategy Implementation Overview

Sync Strategies

Strategies (Total)	Strategies (To Implement)	Strategies (Implemented)	Catalog Profile	Class	Responsible	
2730	2730	0				Go

MTC Overview | Planning Plant Overview

MTC (7)

Search | View Generic Strategies | Create MTC

MTC Id	MTC	Published Version	Date Published	Catalog Profile	Classes	Draft Version	Last Modified By	Last Modified	Strategies (Total)	Strategies (To Implement)	Strategies (Implemented)	Responsible
6	Ele	2.0 (Active)	18.03.2026	EM0000001	EM, EM_HVM, EM_LVM				294	294	0	Electrical
7	Fire and Gas Detection	1.0 (Active)	23.02.2026	FG0000001	FG_SD, FG_GDPIR, FG_GDLOSIR, FG_GDLOSLA, FG_GDCAT, FG_GDACO, FG_FD, FG_FDV, FG_HD, FG_OMD, FG_CP, CL_PLCFC				854	854	0	
14	Centrifugal, Positive Displacement and Submersible Pumps	1.0 (Active)	24.02.2026	PU0000001	PU_PA_CEN, PU_PB_REC, PU_PD_MEE, PU_UTILITY, PU_PF_DIA, PU_PX_OTH, PU_PC_ROT, PU_PE_GEA, PU_PG_SCR, PU_PH_SUB, PU_PS_SUB				1582	1582	0	
18	Safety & Automation System (SAS)					1.0 (Draft)	system	02.03.2026, 12:54:00				
	PLCs and Non-											

Planning plant: Implementation

Lighthouse

Give us feedback

Strategy Implementation Overview

v1.0.1

Sync Strategies

Strategies (Total)	Strategies (To Implement)	Strategies (Implemented)
2730	2730	0

MTC Overview | Planning Plant Overview

Planning plants (14)

See All Asset Strategies

Planning Plant Id	Planning Plant	Strategies (Total)	Strategies (To Implement)	Strategies (Implemented)
3011	[redacted]	195	195	0
3012	[redacted]	195	195	0
3013	[redacted]	195	195	0
3014	[redacted]	195	195	0
3020	[redacted]	195	195	0
4001	[redacted]	195	195	0
5000	[redacted]	195	195	0
5002	[redacted]	195	195	0
6000	[redacted]	195	195	0
6006	[redacted]	195	195	0
7000	[redacted]	195	195	0
7520	[redacted]	195	195	0
8101	[redacted]	195	195	0
8301	[redacted]	195	195	0

Strategy view: Class + Failure mode

Lighthouse

Give us feedback

Overview / Strategies /

Asset Specific MTC Strategies

v1.0.1

Planning Plant: 8101 ×

MTC Description: 14 ×

Class:

Failure Mode:

Status:

Go Adapt Filters

Strategies (113)

Planning Plant ID	Planning Plant	MTC Name	MTC ID	Class Code	Class Name	Failure Mode Code	Failure Mode Name	Task No	Flags	Status	Lifecycle Stage
8101	[redacted]	Centrifugal, Positive Displacement and Submersible Pumps	14	PU_PF_DIA	DIAPHRAGM PUMP	OHE	Overheating	O1, C1, M3, M6, I1		Created	
8101	[redacted]	Centrifugal, Positive Displacement and Submersible Pumps	14	PU_PA_CEN	CENTRIFUGAL PUMP	STD	Structural deficiency	M9		Created	
8101	[redacted]	Centrifugal, Positive Displacement and Submersible Pumps	14	PU_PE_GEA	GEAR PUMP	BRD	Breakdown	C1, O1, M1, M7, I2		Tasks Selected	
8101	[redacted]	Centrifugal, Positive Displacement and Submersible Pumps	14	PU_PH_SUB	SUB PUMP W. SUB MOT	ELP	External leakage - process medium	I1, M1, C1, O1		Tasks Selected	
8101	[redacted]	Centrifugal, Positive Displacement and Submersible Pumps	14	PU_PS_SUB	SUB PUMP NON-SUB MOT	INL	Internal leakage	T1, M1, C1, M6		Created	

Strategy: Adapt to plant

Lighthouse

Give us feedback

Overview / Strategies / Tasks /

Internal leakage (INL)

v1.0.1

Change Status

Planning Plant:

MTC: Centrifugal, Positive Displacement and Submersible Pumps

MTC ID: 14

Class: PU_PS_SUB

Catalog Profile: PU0000001

Function Failure: Fail to contain fluids during operation

Strategy Status: Created

Tasks

Provide Reason

No IoT sensor connected.

OK Close

Task List

	Task No	Flags	Task	Task Details	Me			Task Justification	Comments	Recommendation	Related Failure C...
	C1		Continuous monitoring	Monitoring of mech seal, leakage and	NA		See comment		Continous monitoring of seal		
	M1		Visual inspection and equipment	Visual inspection of pumps top-side	NA	YES	1 -12 Months		Dependent on pump (1-12		
	M6		Check lubrication/barrier	Check oil level and top up/change if	NA	NO	2-3 Months		Based on lubrication		
	T1		Function test	Start fire pump and run for at least 1	B_PUMP_FIRE_FUNCTEST	YES	1 Week		Applies only to FW pumps		

From Strategy to Recommendation

Lighthouse

Give us feedback

Overview / Strategies / Tasks /

Internal leakage (INL)

v1.0.1

Change Status

Planning Plant:

MTC: Centrifugal, Positive Displacement and Submersible Pumps

MTC ID: 14

Class: PU_PS_SUB

Catalog Profile: PU0000001

Function Failure: Fail to contain fluids during operation

Strategy Status: Tasks Selected

Tasks

Task List

Assign Create

	Task No	Flags	Task	Task Details	Measuring Point (...	CRW (barriers)	Interval	Task Justification	Comments	Recommendation	Related Failure C...
◉	M1		Visual inspection and equipment	Visual inspection of pumps top-side	NA	YES	1 -12 Months		Dependent on pump (1-12		ⓘ
○	M6		Check lubrication/barrier	Check oil level and top up/change if	NA	NO	2-3 Months		Based on lubrication		ⓘ
○	T1		Function test	Start fire pump and run for at least 1	B_PUMP_FIRE_FUNCTEST	YES	1 Week		Applies only to FW pumps		ⓘ

Links to recommendation

Lighthouse

Give us feedback

Overview / Strategies / Tasks /

Internal leakage (INL)

v1.0.1

Change Status

Planning Plant:

MTC: Centrifugal, Positive Displacement and Submersible Pumps

MTC ID: 14

Class: PU_PS_SUB

Catalog Profile: PU0000001

Function Failure: Fail to contain fluids during operation

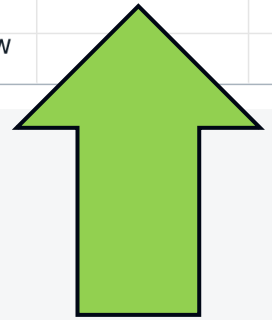
Strategy Status: Tasks Selected

Tasks

Task List

Assign Create

	Task No	Flags	Task	Task Details	Measuring Point (...	CRW (barriers)	Interval	Task Justification	Comments	Recommendation	Related Failure C...
◉	M1		Visual inspection and equipment	Visual inspection of pumps top-side	NA	YES	1 -12 Months		Dependent on pump (1-12		ⓘ
○										IAA-PU_PS_SUB-...	
○	M6		Check lubrication/barrier	Check oil level and top up/change if	NA	NO	2-3 Months		Based on lubrication		ⓘ
○	T1		Function test	Start fire pump and run for at least 1	B_PUMP_FIRE_FUNCTEST	YES	1 Week		Applies only to FW pumps		ⓘ



APM Manage Recom; assign TOs

Lighthouse

Select Technical Objects

Go | Hide Filter Bar | Restore | Filters (3)

Technical Object Type: | Category: | Object Type: | Maintenance Plant: | Planning Plant: | Planner Group: | Criticality:

Cost Center: | Main Work Center: | Class: SUB PUMP... | Status: 2 Items | Superior Functional Location: | Superordinate Equipment: | Sort Field:

Failure Data Profile: Pumps (PU... | Characteristic Value:

Technical Objects (8)

Technical Object	Category	Object Type	Model Number	Manufacturer	Superior Functional Location	Criticality	Status	Class	Failure Data Profile	Planning Plant
FIREWATER PUMP A 71PS0001A	Equipment unit ID (FEL) (6)	SUB PUMP W. SUB MOT (PU-PS-SUB)			FIREWATER PUMP DIESEL GENERATOR PACKAGE (IAA-71XD0001A)	High Risk Safety (E)	Created	Main Functiona on Class AIN)	PU0000001	
FIREWATER PUMP B 71PS0001B	Equipment unit ID (FEL) (6)	SUB PUMP W. SUB MOT (PU-PS-SUB)			FIREWATER PUMP DIESEL GENERATOR PACKAGE (IAA-71XD0001B)	High Risk Safety (E)	Created	n Functiona on Class AIN)	PU0000001	
FIREWATER PUMP C 71PS0001C	Equipment unit ID (FEL) (6)	SUB PUMP W. SUB MOT (PU-PS-SUB)			FIREWATER PUMP DIESEL GENERATOR PACKAGE (IAA-71XD0001C)	High Risk Safety (E)	Created	n Functiona on Class AIN)	PU0000001	
SEA WATER LIFT PUMP 50PS0001A	Equipment unit ID (FEL) (6)	SUB PUMP W. SUB MOT (PU-PS-SUB)			SEAWATER LIFT PUMP CAISSON A (C2) (IAA-50CX0001A)	High Risk Productio n (M)	Created	n Functiona on Class AIN)	PU0000001	
SEA WATER LIFT PUMP	Equipment unit ID (	SUB PUMP W. SUB			SEAWATER LIFT PUMP CAISSON B (	High Risk Productio		n Functiona		

OK | Cancel

AI assisted Connection from APM to PM

Lighthouse

Standard

Recommendations (143)

By Recommendation | By Operation

Recommendation ID	Source (FMEA/MTA)	Task	Interval	# Technical Objects	Barrier Relevant	Planning Plant	Class	Operations Assigned	Handled
-56		Performance Monitoring	See comment	0	No		EM_LVM	0 Objects	No
-EM_LVM-42	Electric motors	Condition and Performance Monitoring	See comment	0	No		EM_LVM	0 Objects	No
-EM-M1	Electric motors	Replace lubricant	See comment	5	NO		EM	0 Objects	No
-EM_LVM-21	Electric motors	Condition and Performance Monitoring	See comment	0	No		EM_LVM	0 Objects	No
-EM_LVM-37	Electric motors	Condition and Performance Monitoring	See comment	0	No		EM_LVM	0 Objects	No
-EM_LVM-78	Electric motors	Condition and Performance Monitoring	See comment	0	No		EM_LVM	0 Objects	No
-EM_LVM-57	Electric motors	Condition and Performance Monitoring	See comment	0	No		EM_LVM	0 Objects	No
-EM_LVM-13	Electric motors	Condition and Performance Monitoring	See comment	0	No		EM_LVM	0 Objects	No
-EM_HVM-test	Electric motors	Condition and Performance Monitoring	See comment	0	NO		EM_HVM	0 Objects	No
-EM_LVM-69	Electric motors	Condition and Performance Monitoring	See comment	0	No		EM_LVM	0 Objects	No
-EM_LVM-28	Electric motors	Condition and Performance Monitoring	See comment	0	No		EM_LVM	0 Objects	No
-EM_HVM-3	Electric motors	Condition and Performance Monitoring	See comment	0	No		EM_HVM	0 Objects	No
-EM_LVM-86	Electric motors	Condition and Performance Monitoring	See comment	0	No		EM_LVM	0 Objects	No
-EM_LVM-82	Electric motors	Condition and Performance Monitoring	See comment	0	No		EM_LVM	0 Objects	No
-EM_LVM-45	Electric motors	Condition and Performance Monitoring	See comment	0	No		EM_LVM	0 Objects	No
-EM_LVM-mh	Electric motors	Daily monitoring	Daily	387	NO		EM_LVM	6 Objects	Yes
-EM_LVM-87	Electric motors	Condition and Performance Monitoring	See comment	0	No		EM_LVM	0 Objects	No
-EM_HVM-1	Electric motors	Daily monitoring		0			EM_HVM	0 Objects	No
-EM_LVM-49	Electric motors	Condition and Performance Monitoring	See comment	0	No		EM_LVM	0 Objects	No

Standard

Work Center:

Auto Suggestions:

Go | Adapt Filters

Assigned Operations (6)

Unassign

Operation ID	Description	Maintenance Item	Work Center	Long Text	Reccomendations Assigned	Similarity Score
0170	Visuell inspek. hydrauliske systemet 3M	VEDLIKEHOLD AV PIDESTAL KRAN - 3M	LILOG	Visuell inspek. hydrauliske systemet 3M Visuell sjekk det hy... Show More	5 Objects	High
0170	Visuell inspek. hydrauliske systemet 3M	VEDLIKEHOLD AV PIDESTAL KRAN - 6M	LILOG	Visuell inspek. hydrauliske systemet 3M Visuell sjekk det hy... Show More	5 Objects	High
0170	Visuell inspek. hydrauliske systemet 3M	VEDLIKEHOLD AV PIDESTAL KRAN - 12M	LILOG	Visuell inspek. hydrauliske systemet 3M Visuell sjekk det hy... Show More	4 Objects	High
0510	Visuell inspeksjon av el. Motor 12M	VEDLIKEHOLD AV PIDESTAL KRAN - 12M	EIELE	Visuell inspeksjon av el. Motor 12M Verifiser at motoren er ... Show More	1 Objects	High
0170	Visuell inspek. hydrauliske systemet 3M	VEDLIKEHOLD AV PIDESTAL KRAN - 60M	LILOG	Visuell inspek. hydrauliske systemet 3M Visuell sjekk det hy... Show More	1 Objects	High
0010	Visuell inspeksjon og rengjøring -12 M	FV VSD OIL TRANSFER PUMPS	EIELE	Visuell inspeksjon og rengjøring -12 M Jobbeskrivelsen er ba... Show More	1 Objects	High

Unassigned Operations (345)

Assign

Operation ID	Description	Maintenance Item	Work Center	Long Text	Reccomendations Assigned	Similarity Score
0010	Ettertrekking og inspeksjon -12 M	FV/SERT. PÅ PEDESTAL KRAN, EKSTERN	TESPE	Ettertrekking og inspeksjon -12 M .	6 Objects	Medium
0030	Ex-kontroll detaljert - motor 24M	FV PEDESTAL KRAN ELE OG INS	EIELE	Ex-kontroll detaljert - motor 24M El-motorer med EXDE-kode s... Show More	6 Objects	Medium
0040	Isolasjonstest - 48M	FV PEDESTAL KRAN ELE OG INS	EIELE	Isolasjonstest - 48M	5 Objects	Medium
0015	Ex-Visuell insp motor/slepering- 12M	FV PEDESTAL KRAN ELE OG INS	EIELE	Ex-Visuell insp motor/slepering- 12M	4 Objects	Low
0520	Funksjonstest av nødkjøringssystem 12M	VEDLIKEHOLD AV PIDESTAL KRAN - 12M	MISKR	Funksjonstest av nødkjøringssystem 12M Funksjonstest nødkjør... Show More	0 Objects	Low
0530	Funksjon sjekk av motorvarmere 12M	VEDLIKEHOLD AV PIDESTAL KRAN - 12M	EIELE	Funksjon sjekk av motorvarmere 12M Funksjonssjekk motorvarme... Show More	0 Objects	Low

Take-home message

(1)

SAP provides endless flexibility for solving all kinds of problems

(2)

Import and include GMCs, RCM results, FMECAs, Recommendations etc. in your SAP

Start your move towards a closed-loop maintenance process

(3)

Lighthouse offers a full service scope for advisory, implementation, development and apps covering the entire E2E EAM area

Lighthouse

Lighthouse Consulting AS
Prinsens gate 18
0152 Oslo
+47 90 59 87 62

hi@lighthouse.no
www.lighthouse.no

Lighthouse-no

SAP Asset Performance Management

How to start?

Lighthouse

SAP Partner

PoV Timeline: 90 Days Execution Plan

Week 1-2 | Week 3-8 | Week 9-12

1 Setup & Data Integration

- Discovery workshop
- Deploy & configure environment
- Connect to ECC or S/4HANA
- Connect customer data sources (as applicable)

2 Use Case Definition, testing & implement-tation

- Workshop to identify PoV business processes- and workflows
- Define and describe scenarios, use cases and KPIs
- Weekly QA and demo workshop

3 Findings & Roadmap

- Review insights & findings
- Deliver gap analysis including strategy to close gaps
- Present roadmap for implementation

Productive use of APM

Lighthouse


Lighthouse