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1. GENERAL

* The Company applies a combination of:

Preventive maintenance, &

Condition-based maintenance, which is derived from condition monitoring and survey activities.

* The purpose of this system is to:

Identify machinery, equipment & technical systems involved in the operation of the ship, &

Establish a series of planned maintenance activities and inspections.

Establish through Risk Assessment and PMS history the criticality of the systems.

* The company’s planned maintenance tasks are integrated within the computerized PMS and / or the requirements of *Sec 5 Following The PMS Maintenance Tasks* / (Record keeping) of this procedure.

1. ELECTRONIC PLANNED MAINTENANCE SYSTEM (E-PMS)

## General

* **SAIL-PMS** is the class approved ‘Computer Based Planned Maintenance System’ adopted on Company Vessels.
* This system, which is synchronized between ship & shore database, includes:

Schedule of Planned maintenance tasks.

Manufacturer’s recommended maintenance requirements.

Work instructions and associated Risk Assessment.

Equipment & machinery history.

Record of completed planned and unplanned maintenance.

Spare Parts Management.

Defect Reporting System.

Vessel certificates validity and accuracy monitoring

Class Survey plans and history

(Conditions of Class/ Class status reports, extensions, dispensations and exemptions)

Fire and Safety Equipment maintenance plan and Historical data

Third Party repairs history

* The vessel Maintenance Program is divided into two broad categories:

Engine Department Maintenance

Deck Department Maintenance

* It covers all on-board equipment including all navigation, the deck, engine, cargo handling and all electronic equipment and machinery.

Familiarization with E-PMS

* For reference and guidance on board the crew can refer to:

Instructions manual of the PMS software.

Instructions integrated in the program.

Responsibility: Crew Department

Ensure all Senior Officers undergoes training on the use of the e-PMS platform prior joining the vessels.

## Engine Department Maintenance

|  |  |
| --- | --- |
| * **INFORMATION** | |
| Considerations taken during preparation of Maintenance program: | Close monitoring of the operating hours of the individual major components of Main and Auxiliary Engines, &  Inspections required to be carried out for auxiliary machinery and other technical systems. |
| Overall maintenance is the combination of | Classification and Flag Administration requirements  Standing Planned Maintenance Activities  Condition of machinery  List of work to be carried out issued in the form of Maintenance Instructions or Job Order lists left by attending Superintendent. |

Responsibility: Chief Engineer

* Implement the individual maintenance program kept on board.
* Carry out the Maintenance activities as detailed in the vessel’s specific computerized planned maintenance system () or in form PMS 26 (For new takeover vessels as explained in [*sec 3*](#sec_3)*)*

## Deck Department Maintenance

Responsibility: Master, with the assistance of the Chief Officer

* Ensure that the Company’s Deck Department Maintenance program requirements as described in electronic PMS and the relevant sections OSM are satisfied.
* Periodically inspect and report the condition of all items of the following categories of equipment / systems to office:

Load line requirements.

Life-saving appliances

Fire-fighting arrangements.

Navigational equipment

General safety and cargo equipment

Pollution control

Deck fittings and piping.

Deck machinery and mooring equipment.

Accommodation

Cleanliness and sanitation

Cargo gear

External shell plating

Decks and deck fittings

Superstructure

Cargo tanks

Fore peak and after tanks.

Segregated ballast tanks

Potable water tanks

Chain lockers.

* For Life Saving Appliances and Fire Fighting equipment/systems follow relevant maintenance plan
* Which will be audited during Supt’s attendance.
* Furthermore, some items are duplicated in the e-PMS.
* These maintenance plans are ship specific and have been developed in accordance with SOLAS Chapter III, Regulations 20 & 36 and Chapter II-2, Regulation 14.

1. MANUAL PLANNED MAINTENANCE SYSTEM (MANUAL PMS)

* ‘Manual PMS’ means it can be in the form of simple microsoft excel sheet where basic recordkeeping, sorting and simple formula reminders can be obtained.
* There may be cases when vessel does not have an operational E-PMS, e.g.:

New Vessel coming into Company management and the E-PMS has not yet been configured.

E-PMS is not operational due to a technical/ software related fault.

* In such cases Company allows a ‘Manual PMS’ form PMS 26 as an interim measure, pending arrangement of E-PMS, provided, following is complied with:

|  |  |
| --- | --- |
| **Scenario** | **Requirement** |
| New Vessel: | * A New vessel coming into Management may use Manual PMS for up to 6 Months. * For any use of more than 6 months: * Raise a Non-Conformity Report, * Attempt to close the same at the earliest. |
| Malfunction of E-PMS: | * For any use of Manual PMS due to malfunction of E-PMS: * Raise a Non-Conformity Report * Attempt to close the same at the earliest. |

1. DEVELOPMENT & IMPLEMENTATION OF E-PMS FOR NEW ACQUISITIONS

## Process Flow – Development & Implementation of the PMS

AFTER TAKEOVER – DEVELOPMENT & IMPLEMENTATION

BEFORE TAKEOVER – PLANNING & PREPARATION

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Stage** |  | **Action By** |  | **Action** | |
|  |  |  |  |  | |
| Gathering Data |  | Technical Department |  | * To the extent possible, start gathering data, particulars, manuals, plans of the vessel even before taking over (as part of MOC process). * In case of:   • Yard delivery – seek same from the yard/ makers etc.  • 2nd Hand Vessel - Try & obtain same from previous managers.   * Check if copy of previously used PMS, can be obtained from previous managers. * Check if data from a sister vessel is available. | |
| **â** |  |  |  | **â** | |
| Creating Manual PMS |  | Technical Department |  | * Based on the preliminary data gathered, create a Manual PMS. * See sec *3 Manual Planned Maintenance System (Manual PMS)* | |
| **â** |  |  |  | **â** | |
| Input by Observers |  | Technical Department |  | * Share Manual PMS created with the available information with the ‘Observers assigned for takeover’ for their input/ verification. | |
|  |  |  | **â** | |
|  | Observers |  | * Cross check the equipment/ machinery on board and complete the information in the Manual PMS. * Submit to Tech. Dept for review & finalizing before takeover. | |
| **â** |  |  |  | **â** | |
| Sharing Manual PMS |  | Technical Department |  | * Finalize Manual PMS and share with the Ship staff to be used in the interim. | |
| **â** |  |  |  | **â** | |
| Using Manual PMS |  | Ship Staff |  | * Follow & Update Manual PMS till E-PMS is fully developed. * Forward copy of the same to Technical Supdt. monthly. | |
|  |  |  | **â** | |
|  | Technical Department |  | * Monitor vessel’s PMS Reporting & follow up. | |
| **â** |  |  |  | **â** | |
| Development of E-PMS |  | Technical Department |  | * Oversee development/ configuration of E-PMS.  1. Target not exceeding 6 months.  * Also see Sec *4.2* & Sec *4.3* * Configuration will be done by a dedicated team. | |
| **â** |  |  |  | **â** | |
| Review for Accuracy & Fine tuning |  | Technical Department |  | * Once configured, activate PMS Software for vessel use. * Make any changes, if necessary, as per feedback from ship staff. | |
|  |  |  | **â** | |
|  | Ship Staff |  | * Review & Verify accuracy of PMS for Vessel specific components & correct details (Make, Model, Type, Spares, Job frequency etc.) | |
| **â** |  |  |  | **â** | |
| Commission PMS |  | Technical Department |  | * Commission the On-Board E-PMS Software. |

## Equipment And Machinery Required To Be Included in PMS

* As a minimum include following equipment and machinery in the Planned Maintenance System:

Navigation & Radio equipment.

Engine machinery including Safety Equipment.

Deck machinery including Safety Equipment.

Cargo handling machinery/equipment.

Hull structure.

Electronic equipment.

Tanks Inspection Interval.

Pipelines Hydro Test.

## Considerations When Identifying Maintenance Tasks & Schedules

* Consider following when identifying maintenance tasks and schedule for above equipment:

Builder/maker's recommendations.

Regulatory Requirements (including Class and Flag State)

Industry Recommendations and Best Practices.

Risk assessment/ Criticality of the equipment.

Common marine and engineering practices.

Past Experience from other vessels in the fleet:

* Unplanned maintenance instances and defects reported.
* Root cause analysis of Incidents, near misses etc. identifying maintenance as a factor.
* Inspections and audits identifying maintenance as a factor.

Past experience of shore /ship staff.

Actual condition of equipment, machinery and steelwork as derived from:

* Inputs by the observers pre-takeover,
* Inputs by the ship staff/ superintendent after takeover
* Monitored performance & condition during the PMS set up & Implementation period.

1. FOLLOWING THE PMS MAINTENANCE TASKS

Planning

Responsibility: All Officers with Responsibility under PMS

* Keep a track of the tasks coming due under your responsibility in the PMS.
* Electronic PMS will automatically identify any outstanding item and item will turn ‘Red’.
* Plan effectively such that the tasks do not become outstanding (overdue).
* Plan and carry out the maintenance (both deck and engine) in accordance with the following factors:

Running hours

Builder/maker's recommendations

Actual condition/criticality of equipment, machinery and steelwork as derived from:

Monitored performance.

Monitored condition.

Past experience (both ship and shore staff)

Class and Flag State requirements

Common marine and engineering practice

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| * **GRACE PERIOD**   There may be cases where a certain maintenance is not practical on/before the exact due date e.g., Unexpected long port stay, Transiting a high-risk area, Critical operations underway etc.  For sake of practicality, Company allows a Grace period for the outstanding tasks before it requires escalation to shore management.    The Grace period is:   |  |  | | --- | --- | | For Periodic maintenance: | * End of the month when the task becomes due. * If the task comes due in month’s last week, then 1 week from due date. | | For maintenance based on Running Hours: | * 168 running hours |   Irrespective of the grace period, the job will still be counted as outstanding if it crosses the due date.  Grace period applies only to the escalation to shore management. |

Recordkeeping

Responsibility: All Officers with Responsibility under PMS

* Maintain record of PMS activities, together with the required reporting to the Office.

Responsibility: Master and Chief Engineer

* Ensure that the necessary records, as listed below are completed and forwarded to the Office at the required frequencies as per form MAL 06 Controlled Documents & Forms Register.

|  |  |
| --- | --- |
| **Form Code** | **Form Title** |
| ANM 03 | * Winch Brake Test Form |
| ANM 04 | * Mooring Ropes Wires Slings Inventory and Condition Report |

|  |  |
| --- | --- |
| BUN 04 | * Internal Bunker and Lub-oil Transfer Checklist |
| BUN 05 | * Bunkers report |

|  |  |
| --- | --- |
| ERM 01 | * ER Pre-Arrival Checklist |
| ERM 02 | * ER Pre-Departure Checklist |
| ERM 05 | * Change over Procedure for UMS Operation |
| ERM 06 | * Daily Log for ICCP, MGPS & Shaft Earthing Device |
| ERM 08 | * Engine log abstract |

|  |  |
| --- | --- |
| HSE 03 | * Safety Area Inspection |
| HSE 26 | * Lifting Appliances Checklist |
| HSE 28 | * Portable & Fixed Gas Equipment Calibration Record |

|  |  |
| --- | --- |
| PMS 01 | * Certificates status list |
| PMS 02 | * Statutory surveys on board preparation guidelines |
| PMS 03 | * Hull & Deck Maintenance Schedule, Record Report |
| PMS 04 | * Work Schedule & Job Order record log - Deck |
| PMS 06 | * Engine Job log |
| PMS 08 | * Megger test report |
| PMS 09 | * Defect report |
| PMS 10 | * Biannual Main & Critical Spares Inventory List |
| PMS 11 | * Biannual main spares inventory |
| PMS 12 | * Monthly running hours report |
| PMS 13 | * Tail shaft & stern tube monitoring report |
| PMS 14 | * Overhauling report |
| PMS 15 | * Monthly aux. Engines performance report |
| PMS 16 | * Aux Engine Crankshaft deflection report |
| PMS 17 | * Diesel Generator Overhauling Report |
| PMS 18 | * Monthly Main Engine Performance report |
| PMS 19 | * M/E cylinder inspection report |
| PMS 20 | * Main Engine Bearings Inspection Report |
| PMS 21 | * Main Engine Inspection Through Scavenge Ports |
| PMS 22 | * Main Engine Exhaust Valve Condition Report |
| PMS 23 | * Main Engine Crank Shaft Deflection Report |
| PMS 24 | * Main Engine Holding Down Bolts & Tie Rods Checklist |
| PMS 25 | * Details of main engine indicator cards |
| PMS 26 | * Maintenance Plan for Engine Department |
| PMS 27(A~F) | * Alarm set points and test method |

|  |  |
| --- | --- |
| VMR 03 | * Goods Landing Note |
| VMR 07 | * Batteries Inventory Log |

Responsibility: Superintendent Engineer

* Review / screen above forms.
* Issue proper instructions, where necessary.

Monitoring

Responsibility: Chief Engineer & Chief Officer

* Ensure compliance with above.

Responsibility: Superintendent Engineer

* Ensure that all tasks onboard are completed timely as per the schedule.
* In case of any overdue item:

Follow up with the vessel,

Provide any assistance required, until satisfactory close out.

Responsibility: Superintendent Engineer (For Engine Related) & Marine Superintendent (For Deck/ Navigation Related)

* Ensure compliance with the company’s KPI standards (MAL 01) for tolerable overdue tasks.
* Ensure that all e-PMS tanks onboard are completed properly as per given guidelines.
* In case of any reported discrepancy in above KPIs:

Follow up with the vessel, &

Assist for satisfactory closure.

1. RESHEDULING OF PMS MAINTENANCE TASKS

* For resheduling of critical equipment tasks refer to [*Doc 4.1.5 Management of Critical Equipment*](safety/sms?id=4.1.5)

Responsibility: Chief Engineer

* Prepare a list of forthcoming PMS jobs anticipated to remain outstanding.
* Submit timely to the technical superintendent along with:

Valid reasons for the same.

Risk Assessment.

* Request for justified postponement or for further resources.
* Rescheduling of PMS job may be required in only extreme circumstances due to unavoidable conditions such as:

• The length of voyage.

• Duration of port stay.

• Non-availability of spares.

• Non-availability of any resources

Responsibility: Technical Superintendent

* Review the justification & if in agreement, submit to Technical Manager and/or the DPA for approval.

Responsibility: Technical Manager and/or the DPA

* Review the justification provided & risk assessment.
* Provide approval for an occasional postponement, if:

Risk is acceptable, &

Satisfied with the additional control measures covering:

Manufacturers recommendations,

Redundancy systems,

Criticality of the equipment

Previous experience with the system / equipment,

Setting new clear time frames for completion.

* Assign a specific Time frame for completion.
* Maximum Rescheduling Period can be, the lesser of:

• 20% of Scheduled Frequency/ Running Hours, or

• 3 months.

* Technical Superintendent can postpone the Task only once.

Any subsequent postponement must be approved by the Technical Manager.

* Upon decision, clearly state:

Conditions under which rescheduling is valid.

New time frame for completing the tasks.

1. Do not carry out postponement as a routine practice.
2. MODIFYING THE PMS MAINTENANCE TASKS

* This may be carried out on case-by-case basis for items like Job Frequency, nature of checks etc.

## Factors to Consider

* Factors that may prompt a change in the PMS are:

Manufactures’ revised instructions and service letters for maintenance

Change of Class or regulatory requirements affecting the PMS

Experience gained from the operation of specific equipment, including:

* Change of operational conditions,
* Analysis of performance data,
* Alteration of spare parts’ specification,
* Proactive approach to prevent defects etc.

## Execution

* Execution of Proposals for PMS changes is as follows:

|  |  |
| --- | --- |
| Proposal by: | * Chief Engineer or Master |
| Reviewed/ Processed by: | * Technical Superintendent * Reviews the frequency of the performed inspections. * Reviews the suggestions of the superintendents that have for the enhancement and modification of the planned activities. * Reviews the suggestions of the vessel's Senior Officers * Cooperates with the HSQE dept. on amendments implementation. |
| Authorization by: | * Technical Manager after a Management of Change process |
| Implementation by: | * Chief Engineer following written instructions from Technical Dept. |

* Responsibilities and interrelation of both functions is shown in the attached “PMS Responsibilities & Interrelation Chart”.

1. MONITORING & ANALYSIS OF PMS & DEFECT REPORTING DATA

* For details on ‘Defect Reporting System’, see [*Doc 4.1.3 Defect Reporting System*](safety/sms?id=4.1.3)

Responsibility: Technical Manager

* Overall monitor the progress of corrective actions and the status of the identified defects/deficiencies.

Responsibility: Technical coordinator

* Monitor below monthly for all vessels:

Status of defects.

Number and nature of any outstanding maintenance tasks for:

* Individual vessels, &
* Fleet as a whole.
* Express this number as % of the total number of monthly planned maintenance tasks as well.
* Record the data monthly with a running year-to-date figure.

Reason for tasks being outstanding.

Identification of any assistance required, such as spare parts or shore technicians.

* On quarterly basis, present the data and analysis to senior management during the Management Review Meetings.
* Use analysis of Defect reports to assess:

• Need to amend PMS tasks (Frequency, Nature of checks etc.).

• Minimum spare parts required.

• Any Recurring Defects in the equipment and reasons for the same.

Responsibility: Management Review Committee

* Quarterly, review the data (as per MRM agenda & MAL 01) to identify if shore assistance or other corrective actions are required, either:

Fleet wide basis or

Individual vessels.

* This review process is through and aims towards providing an accurate picture of the overall fleet technical status and includes required information such as:

• Status of defects,

• Description of outstanding maintenance tasks,

• Identification of additional assistance required in terms of spare parts and shore technicians,

• Effectiveness of maintenance program.

* Based on the analysis of the defects:

Amend the PMS tasks as appropriate.

Review the list of minimum spares require on board.

1. COMPLIANCE

|  |  |
| --- | --- |
| Standard | Reference |
| TMSA | * TMSA\_4.1.1, TMSA\_4.1.3, TMSA\_4.1.4, TMSA\_4.3.1 |
| SIRE (2.0) | * VIQ\_10.4.1 |