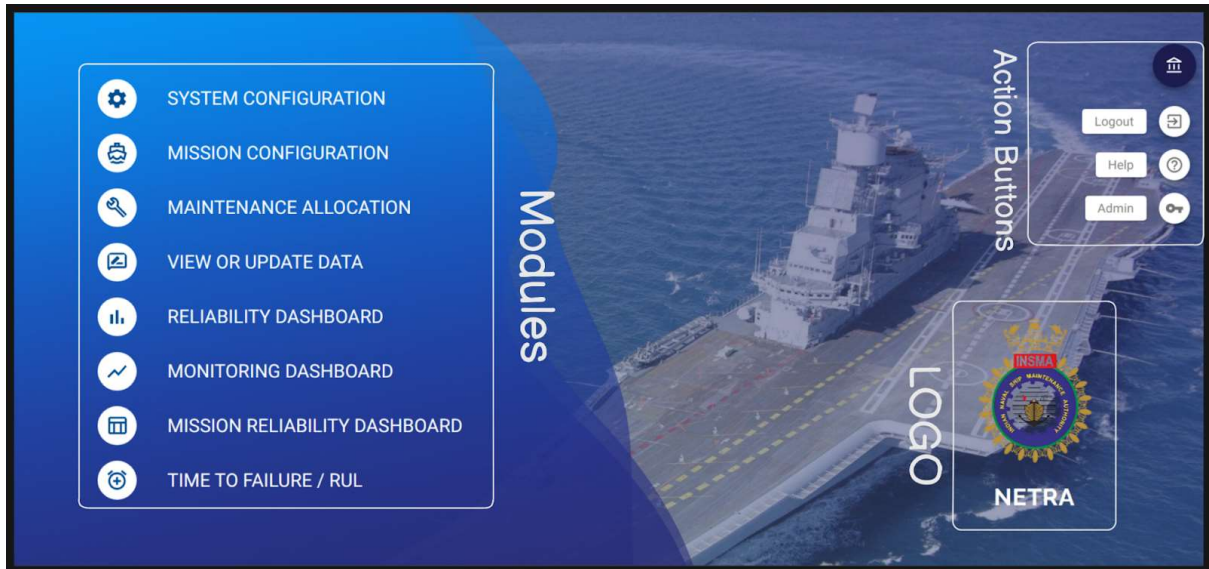


# MAINTENANCE ALLOCATION



## NETRA

## HOME PAGE



## MODULE UNDER CONSIDERATION: SYSTEM CONFIGURATION



The Maintenance Allocation module comprises two essential submodules: "Create Maintenance Plan," which is employed for the purpose of generating maintenance plans, and "Conduct RCM Analysis," utilized to execute Reliability-Centred Maintenance (RCM) analyses.

# CREATE MAINTENANCE PLAN:-

## STRUCTURE OF CREATE MAINTENANCE PLAN

NAVIGATION

Ship Name  
Ship Category  
Ship Class  
Command  
Department  
Equipment Name  
Nomenclature

**USER SELECTION**

SUBMIT

Selected Component:

☐ Run to Failure ☐ Condition Based Maintenance

**RADIO BUTTONS**

SAVE

**RADIO  
BUTTONS  
TOGGLED UI**

**Navigation:-** contains different buttons to various modules and home.



### User Selection:-

Ship Name  
Ship Category  
Ship Class  
Command  
Department  
Equipment Name  
Nomenclature

SUBMIT

### Radio Buttons:-

Selected Component:

☐ Run to Failure ☐ Condition Based Maintenance

SAVE

## Radio Buttons Toggled UI:-

- Run To Failure:-

Selected Component:

☒ Run to Failure ☐ Condition Based Maintenance

SAVE

Run To Failure

- Condition Based Maintenance:-

Selected Component:

☐ Run to Failure ☒ Condition Based Maintenance

SAVE

Failure Mode to be inspected

Intermittent Monitoring ☒ Continuous Monitoring ☐

Number of parameters

SUBMIT

Define parameters






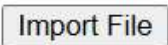
| Channel/Paramet... | Unit | Minimum Value | Maximum Value | P | F | Frequency |
|--------------------|------|---------------|---------------|---|---|-----------|
| No Rows To Show    |      |               |               |   |   |           |

ADD SENSOR DATA

DOWNLOAD BLANK CSV

IMPORT FILE

## BUTTONS:-

| Buttons   | Use  |
|---|--|
|  | Set the equipment selected in the user selection for maintenance.                        |
|  | Saves the data entered in radio button toggled UI to the database.                       |
|  | Generate the number of rows in the define parameters table.                              |
|  | Navigate to the Add Sensor Data module, helpful after the sensor is created.             |
|  | Download a blank CSV with predefined Excel columns used to create a sensor creation CSV. |
|  | Upload the sensor creation CSV and display the data in the define parameters table.      |

## STEPS TO CREATING A MAINTENANCE PLAN:-

### Step 1: Set Equipment for Maintenance

1. Navigate through the input fields of user selection:

- Ship Name
- Ship Category
- Ship Class
- Command
- Department
- Equipment
- Nomenclature

2. Click on the "Submit" button. This will set the selected equipment for maintenance.

|                           |                               |                              |                    |        |
|---------------------------|-------------------------------|------------------------------|--------------------|--------|
| Ship Name<br>SHIP 1       | Ship Category<br>DESTROYER    | Ship Class<br>KOLKATA(P-15A) | Command<br>WESTERN | SUBMIT |
| Department<br>ENGINEERING | Equipment Name<br>GAS TURBINE | Nomenclature<br>GT 1         |                    |        |

## Step 2: Choose Maintenance Plan Type

3. Decide on the type of maintenance plan:

- If "Run to Failure" is chosen:
  - No additional parameters are needed.
  - Click on the "Save" button to save the maintenance plan.

Home

Settings

Bar Chart

Message

External Link

|                           |                               |                              |                    |        |
|---------------------------|-------------------------------|------------------------------|--------------------|--------|
| Ship Name<br>SHIP 1       | Ship Category<br>DESTROYER    | Ship Class<br>KOLKATA(P-15A) | Command<br>WESTERN | SUBMIT |
| Department<br>ENGINEERING | Equipment Name<br>GAS TURBINE | Nomenclature<br>GT 1         |                    |        |

Selected Component:GT 1

☒ Run to Failure

☐ Condition Based Maintenance

SAVE

Run To Failure

- If "Condition-Based Maintenance" is chosen:
  - Select the relevant failure mode for which you want to consider a condition-based plan.

- Choose between "Intermittent Monitoring" or "Continuous Monitoring."

The screenshot shows the first three steps of a configuration interface. Step 1: Ship Name (SHIP 1), Ship Category (DESTROYER), Ship Class (KOLKATA(P-15A)), Command (WESTERN), Department (ENGINEERING), Equipment Name (GAS TURBINE), Nomenclature (GT 1). Step 2: Selected Component: GT 1, Run to Failure (unselected), Condition Based Maintenance (selected). Step 3: Failure Mode to be inspected (Thermal Overload), Intermittent Monitoring (selected), Continuous Monitoring (unselected).

### Step 3: Define Parameters for Condition-Based Maintenance

4. Enter the number of parameters you want to create for the selected failure mode.

5. Click on the "Generate Rows" button. This will generate the specified number of rows in the "Define Parameters" table.

The screenshot shows the fourth step of the configuration interface. Step 4: Number of parameters (2), GENERATE ROWS button. The "Define parameters" table is empty. The interface also includes buttons for ADD SENSOR DATA, DOWNLOAD BLANK CSV, and IMPORT FILE.

### Step 4: Enter Sensor Creation Data

6. In the "Define Parameters" table, enter the sensor creation data for each parameter.

- This may include information such as parameter name, sensor type, threshold values, etc.

Failure Mode to be inspected: Thermal Overload

Intermittent Monitoring ☐ Continuous Monitoring ☒

Number of parameters: 2 GENERATE ROWS

Define parameters

| Channel/Parameter Na... | Unit  | Minimum Value | Maximum Value | P   | F   |
|-------------------------|-------|---------------|---------------|-----|-----|
| Temperature             | deg C | 100           | 400           | 150 | 450 |
| Pressure                | Bar   | 5             | 11            | 6   | 12  |

ADD SENSOR DATA DOWNLOAD BLANK CSV IMPORT FILE

If intermittent Monitoring , then a “Frequency” column will be added to the "Define Parameters" table.

Failure Mode to be inspected: Thermal Overload

Intermittent Monitoring ☒ Continuous Monitoring ☐

Number of parameters: 2 GENERATE ROWS

Define parameters

| Channel/Paramet... | Unit  | Minimum Value | Maximum Value | P   | F   | Frequency |
|--------------------|-------|---------------|---------------|-----|-----|-----------|
| Temperature        | deg C | 100           | 400           | 150 | 450 | 10        |
| Pressure           | Bar   | 5             | 11            | 6   | 12  | 5         |

ADD SENSOR DATA DOWNLOAD BLANK CSV IMPORT FILE

7. Click on the "Save" button to save the entered sensor creation data to the database(Sensor will be created).

8. Click on the “Add Sensor Data” button,to add sensor data.

## CONDUCT RCM ANALYSIS:-

### STRUCTURE OF CONDUCT RCM ANALYSIS:-



NAVIGATION

Ship Name

Ship Category

Ship Class

Command

Department

USER SELECTION

SEARCH

RCM ANALYSIS AREA

Navigation and user selection are same as in create maintenance plan

### Rcm Analysis Area:-

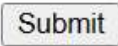



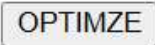
Select Assemblies to be included for RCM Analysis :

Select Component for criticality :

SAVE DOWNLOAD REPORT GENERATE REPORT OPTIMIZE

Is is critical for safety?

## BUTTONS:-

| Buttons   | Use  |
|---|--|
|  | Set the equipment selected in the user selection for "RCM ANALYSIS". |
|  | Saves the data entered in the "RCM ANALYSIS AREA" to the database.   |
|  | Generates the RCM report.  |
|  | Downloads the report in the pdf format.                              |
|  | Directs the user to pm optimization module.                          |

## STEPS TO PERFORM RCM ANALYSIS OF ANY EQUIPMENT:-

### Step 1: Set Equipment for RCM Analysis

1. Navigate through the input fields of user selection:

- Ship Name
- Ship Category
- Ship Class
- Command
- Department
- Equipment
- Nomenclature

2. Click on the "Submit" button. This will set the selected equipment for RCM analysis.

### Step 2: Select Assemblies for RCM Analysis

3. A new section will appear, prompting the user to select assemblies to be included in the RCM analysis.

|                           |                               |                              |                    |        |
|---------------------------|-------------------------------|------------------------------|--------------------|--------|
| Ship Name<br>SHIP 1       | Ship Category<br>DESTROYER    | Ship Class<br>KOLKATA(P-15A) | Command<br>WESTERN | SUBMIT |
| Department<br>ENGINEERING | Equipment Name<br>GAS TURBINE | Nomenclature<br>GT 2         |                    |        |

### Step 3: Select Component for Criticality

4. After selecting assemblies, choose critical components for further analysis.

|   |   |      |                 |                 |          |
|---|---|------|-----------------|-----------------|----------|
| Select Assemblies to be included for RCM Analysis :<br>GT 2 | Select Component for criticality :<br>gas turbine 2 gas turbine 1 | SAVE | DOWNLOAD REPORT | GENERATE REPORT | OPTIMIZE |
|---|---|------|-----------------|-----------------|----------|

### Step 4: Answer Incremental Questions

5. Answer a series of questions with yes or no responses. These questions should be presented incrementally, with each subsequent question appearing based on the previous answer.

|   |   |      |                 |                 |          |
|---|---|------|-----------------|-----------------|----------|
| Select Assemblies to be included for RCM Analysis :<br>GT 2 | Select Component for criticality :<br>gas turbine 2 gas turbine 1 | SAVE | DOWNLOAD REPORT | GENERATE REPORT | OPTIMIZE |
|---|---|------|-----------------|-----------------|----------|

|   |     |
|---|-----|
| Is critical for safety?                         | Yes |
| Is Sensor based condition monitoring available? | No  |
| Is Inspection Procedure available?              | Yes |
| Is Feasible?                                    | No  |
| Is Preventive Maintenance available?            | No  |

### Step 5: Netra's RCM Analysis Suggestion

6. Based on the user's responses, Netra (or the system) suggests an RCM analysis plan for the selected equipment.

Yes

Is Feasible?

No

Is Preventive Maintenance available?

No

Ship Name: SHIP 1

Component Name: GAS TURBINE

RCM Analysis: Design Improvement is Recommended!!

Step 6: Save Report

7. Click on the "Save" button to save the RCM analysis plan.

Step 7: Generate Report

8. Click on the "Generate Report" button to generate a detailed RCM analysis report.

Step 8: Download Report

9. Click on the "Download Report" button to download the generated report in PDF format.

NETRA

|             |  |        |
|-------------|--|--------|
| SHIP NAME   |  | SHIP 1 |
| SYSTEM NAME |  | GT 2   |

| No. | System        | Platform | Component   | RCM Plan                            |
|-----|---------------|----------|-------------|-------------------------------------|
| 1   | gas turbine 1 | SHIP 1   | GAS TURBINE | Design Improvement is Recommended!! |
| 2   | gas turbine 2 | SHIP 1   | GAS TURBINE | Design Improvement is Recommended!! |