Reliability Centered Maintenance

Contents

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Chapter 1

Overview

Topics:

Overview of the Reliability Centered Maintenance (RCM) Module

Reliability Centered Maintenance (RCM) is a process to establish the safe minimum levels of maintenance while ensuring an equipment continues to perform to its design function within the current operating context. It achieves this by providing a means for determining optimal maintenance and operational strategies based on the probability and consequence of the analyzed failure modes.

The GE Digital APM RCM implementation utilizes the following seven basic questions that are outlined in SAE Standard JA1012, "Evaluation Criteria for Reliability-Centered Maintenance (RCM) Processes":

1. Functions: What are the functions and desired performance of the (asset or system) in its present operating context?
2. Functional Failures: In what ways can it fail to fulfill its functions?
3. Failure Mode: What causes each functional failure?
4. Failure Effect: What happens when each failure occurs?
5. Failure Consequences: In what way does each failure matter?
6. Recommended Actions: What should be done to predict or prevent each failure?
7. Default Actions: What should be done if a suitable RCM task cannot be found?

Access the RCM Overview Page

About This Task

Procedure

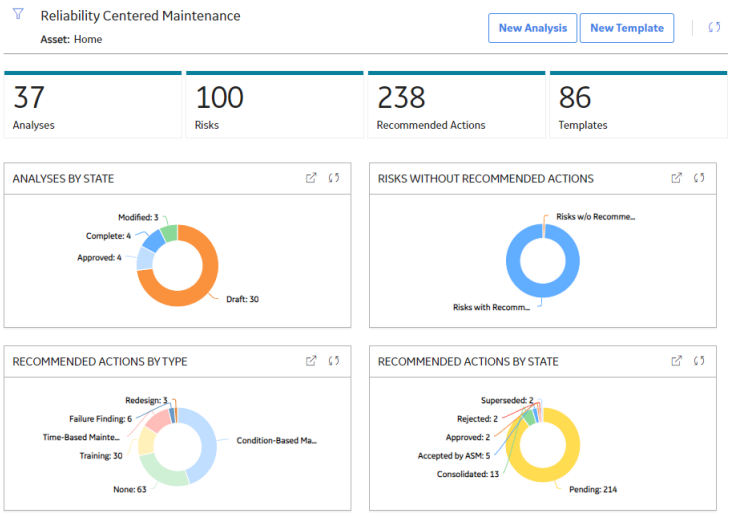
In the module navigation menu, select **Strategy** > **Reliability Centered Maintenance**.

The RCM Overview page appears, displaying the following tabs:

- **Analyses:**: All analyses in the module.
- **Risks:** All the failure modes and effects associated with the analyses in the module.
- **Recommended Actions:** All the recommendations associated with the analyses in the module.
- **Templates:** All templates in the module.

The page contains the following charts:

- **Analyses by State:** Plots the number of analyses in each state.
- **Risks Without Recommended Actions:** Plots the number of failure effects in analyses with and without associated recommended actions.
- **Recommended Actions by Type:** Plots the number of recommended actions of each type in all the analyses.
- **Recommended Actions by State:** Plots the number of recommended actions in each state in all the analyses.



Note: The **Reliability Centered Maintenance Overview** page is not updated automatically when you return to the previously opened tab. You can select to update the page.

You can select in the page to filter the information displayed on the **Reliability Centered Maintenance Overview** page to a specific time range or asset. When you filter by an asset, the page displays information for the selected asset and the assets under it in the hierarchy. The Home level includes information not related to an asset or related to an asset not in the Asset Hierarchy.

Reliability Centered Maintenance (RCM) Analysis Workflow

This workflow provides the basic, high-level steps for using this module. The steps and links in this workflow do not necessarily reference every possible procedure.

1. Create the RCM Analysis record.
2. Create the Analysis team.
3. Define the equipment and location list, which helps define the RCM system. Note that each RCM FMEA Asset record can optionally be linked to an Equipment or Functional Location record.
4. Define the functions of the system.
5. Define functional failures for each system function.
6. Define failure modes for each Functional Failure.
7. Define the failure effects for each Failure Mode.
8. Define Recommended Actions for each Failure Effect.

GE Digital APM provides various tools that you can use to accomplish these tasks. The tools that you use will depend on your personal preference.

Chapter 2

Workflows

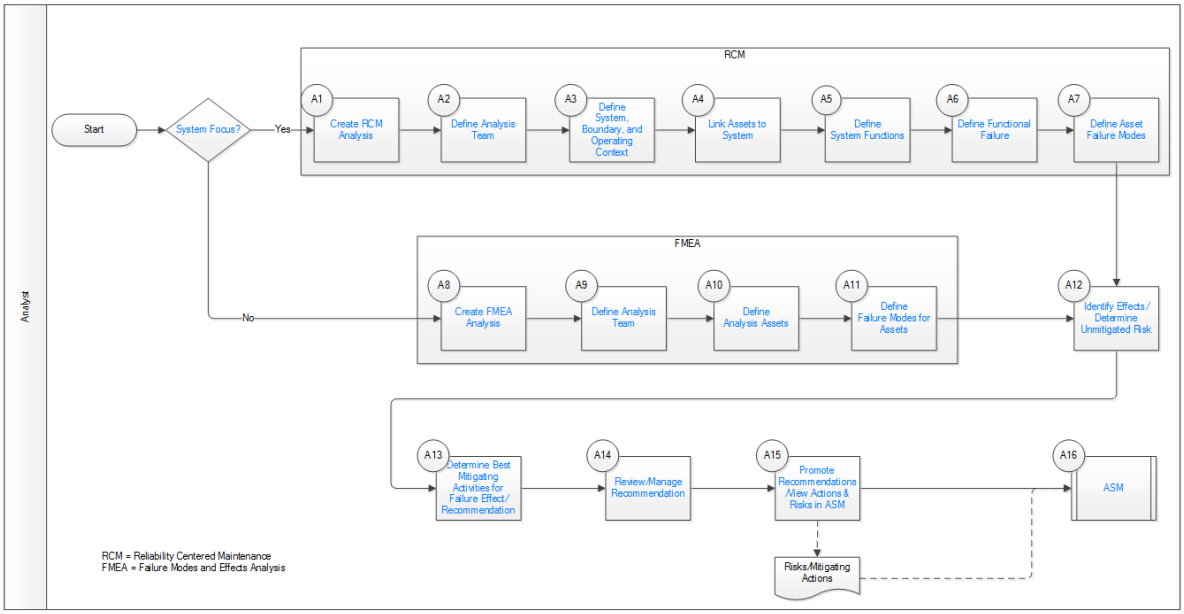
Topics:

APM Strategy: RCM and FMEA Workflow

The RCM workflow describes the process of determining optimal maintenance and operational strategies based on the probability and consequence of the analyzed failure modes. Reliability Centered Maintenance (RCM) is a process to establish the safe minimum levels of maintenance while ensuring equipment continues to perform to its design function within the current operating context.

The workflow focuses on identifying the potential failures of equipment and locations, describing the possible effect of each failure, and making recommendations for actions that can be taken to prevent the failures from occurring.

In the following workflow diagram, the blue text in a shape indicates that a corresponding description has been provided in the sections that follow the diagram. For more information, refer to the topic Interpreting the Workflow Diagrams.



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System Focus?

Persona: Analyst

Choose RCM if you need an analysis that is conducted at the system level. Choose FMEA if you need the analysis at the asset level.

Create RCM Analysis

Persona: Analyst

Create the RCM analysis and add details, including some high-level attributes such as analysis start date and a re-evaluation date.

Define Analysis Team

Persona: Analyst

Define at least one analysis team member, and probably more, who are subject matter experts from maintenance, operations, and engineering.

Define System, Boundary, and Operating Context

Persona: Analyst

Create the system in this step at a high level, including common identifier(s) relevant to site terminology. Create a boundary to clearly identify the system and system functions being analyzed. Typically, a drawing or drawings, such as P&ID, are referenced in this step with mark-ups showing boundaries for the analysis. It is useful to understand the operating context of the system. An operating context document is assembled and reviewed with the team. The operating context diagram will include system functional flow description, equipment list, operating parameter ranges, and references.

Link Assets to System

Persona: Analyst

Link the assets that comprise the system being analyzed, including all relevant equipment by tag or ID. This is an important step, because Failure Modes and mitigating Recommendations will be defined with respect to the ID.

Define System Functions

Persona: Analyst

Identify and document system functions as a prerequisite to identifying failures and Failure Modes, and to developing effective maintenance strategies. Primary functions are the basic reasons that the system is acquired and installed. Secondary functions are usually less obvious, but can still have serious failure

consequences and need to be understood. Define the function with a meaningful name and identify it with a function type of either Primary or Secondary. Quantify the functional performance in order to properly measure it.

Define Functional Failure

Persona: Analyst

Define the Functional Failure based upon the function statement. Functional Failure is the inability to perform the desired function. The Functional Failure can be a total failure or partial failure.

Define Failure Modes

Persona: Analyst

Define Failure Modes to clearly represent how the failures occur. For every failure, there is a least one Failure Mode, and often, there are multiple. Understanding Failure Modes is critical because maintenance activities are selected to address the modes.

Create FMEA Analysis

Persona: Analyst

Create an FMEA Analysis and add details, including some high-level attributes such as analysis start date and a re-evaluation date. Failure Modes and Effects Analysis (FMEA) focuses on actual equipment and locations. It analyzes how each piece of equipment or location can fail and the effect of each failure.

Define Analysis Assets

Persona: Analyst

Define the assets (equipment or functional locations) that make up the system being analyzed. This will include all relevant equipment by tag or ID. This is an important step, because Failure Modes and mitigating Recommendations will be defined with respect to the ID.

Define Failure Modes for Assets

Persona: Analyst

Define Failure Modes for each asset to clearly represent how the failures occur. For every failure, there is a least one Failure Mode, and often, there are multiple. Understanding Failure Modes is critical because maintenance activities are selected to address the modes.

Identify Effects/Determine Unmitigated Risk

Persona: Analyst

Identify the effects of failure and determine the unmitigated risk in order to understand the effects/consequences of failure and the probability of failure. Run decision logic, if necessary. Failure effects and consequences of failure are closely related and are often used interchangeably. Think of effects as the

direct outcome of failure and consequences as the safety (health/environment) or economic outcome. Together, consequence and probability define a criticality (or Risk) associated with failure. When assessing consequences of failure, first identify whether they are hidden or evident. Secondly, assess whether there are Safety, Health, and Environmental consequences. Two items, Stored Energy and Toxic Material, are usually key indicators of potential risk to personnel Safety, Health, and/or the Environment. After identifying failure risks to Safety, Health, and the Environment, all other failure risks are identified using economic terms. This identification is not an either/or process. It is highly likely that Safety, Health, and the Environment Failure Modes will also have an economic consequence.

Determine Best Mitigating Activities for Failure Effect/ Recommendation

Persona: Analyst

Decide the mitigating activities for the plan. The Maintenance Strategy is the outcome of the FMEA analysis. It is the plan (activities) to manage an asset. All maintenance actions fall into one of four categories:

- Time- or Cycle-Based (Preventive) maintenance actions
- Condition-Based (Predictive) maintenance actions
- Failure-Finding Tasks (Detective) maintenance actions
- Run-to-failure (Maintenance Inaction)

Review/Manage Recommendation

Persona: Analyst

Review and manage the recommendations that make up asset strategies for each asset in the system. Similar or duplicate recommendations designed to address different Failure Modes can sometimes be consolidated as one activity that requires only one visit (e.g., shutdown) in a given time frame. This clearly reduces the stress on the machine and on the plant operations. For example, the condition-based activity of Vibration Analysis will often be recommended to mitigate the failure modes associated with bearing wear, misalignment, and unbalance. These recommendations may be consolidated into one actionable recommendation to be managed forward, while also maintaining an association to mitigated Failure Modes.

Promote Recommendations/View Actions & Risks in ASM

Persona: Analyst

Promote recommendations so they can be managed as a comprehensive asset strategy. The recommendations will be represented in the asset strategy as actions to be reviewed, approved, and implemented.

Asset Strategy Management (ASM)

Persona: Analyst

RCM and FMEA are GE Digital APM workflows from which you can promote Risks and Mitigating Actions to ASM to create strategies based on those recommendations.

Go to the ASM Workflow.

Chapter 3

RCM Analyses

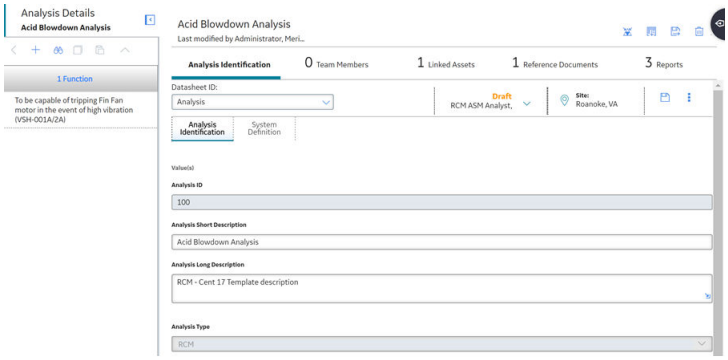
Topics:

Access an Analysis

Procedure

1. Access the **RCM Overview** page.
2. Select the **Analyses** tab.
   A list of analyses available in the database appear.
3. In the **Analysis Name** column, select the link for the analysis that you want to view.
   In a new page, the **Analysis Details** workspace for the selected analysis appears, displaying the **Analysis Identification** section for the selected analysis.

   The pane contains a hierarchy of functions included in the selected analysis. When you select a function, you will be able to view the hierarchy of the assets within the selected function.

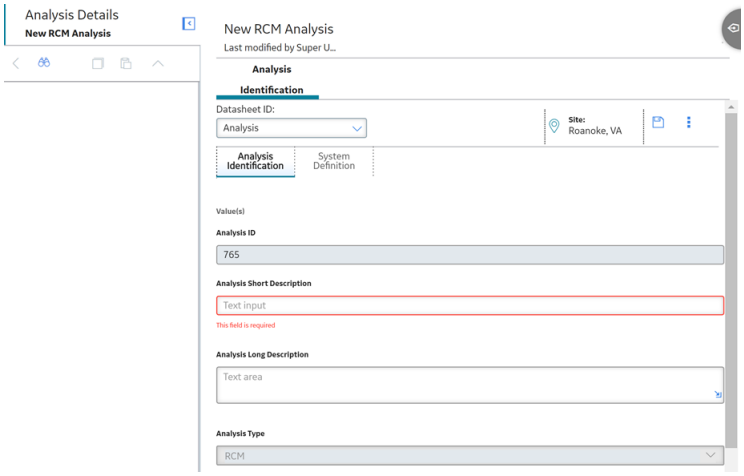


Create a New RCM Analysis

About This Task

Procedure

1. Access the RCM Overview page.
2. In the page, select **Create New Analysis**.
   In a new tab, the **New RCM Analysis** page appears, displaying the **Analysis Identification** section of the datasheet for the analysis.

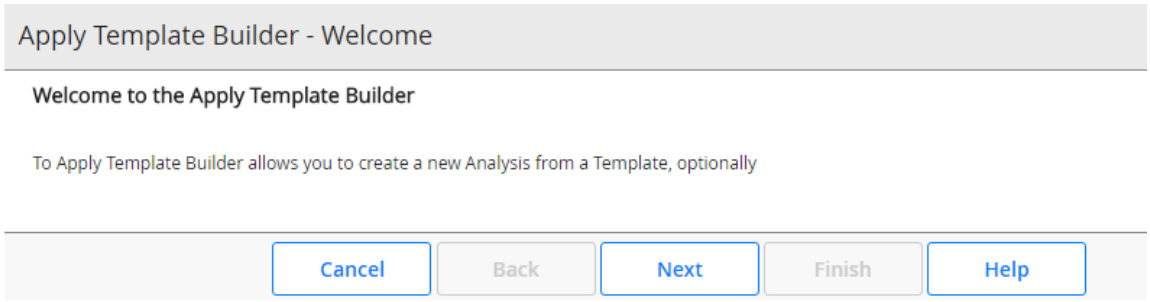


Create an Analysis from a Template

Procedure

1. Access the RCM Overview page, and then select the **Templates** tab.
   The list of templates appears.
2. Select the line in the grid containing the template from which you want to create an analysis, and then select .

   The **Apply Template Builder** window appears.



3. Select **Next**.

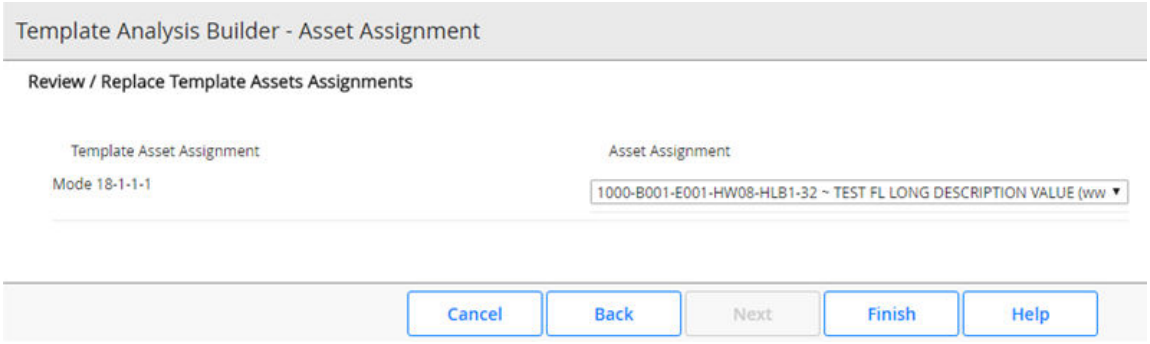
   The **Review Assets** screen appears.
4. Select **Select Replacements**.

   The **Asset Finder** window appears.
5. Select beside the assets that you want to add to the template, and then select **Done**.

   Note: You are only able to add assets that have the same site assignment as the analysis you are creating.

   The **Select Asset Replacements** screen appears displaying the assets you newly added.
6. Select **Next**.

   The **Asset Replacement** screen appears, displaying available failure modes for the template.



7. Using the Asset Assignment drop-down lists, select how you want to replace each previous template asset, and then select **Finish**.

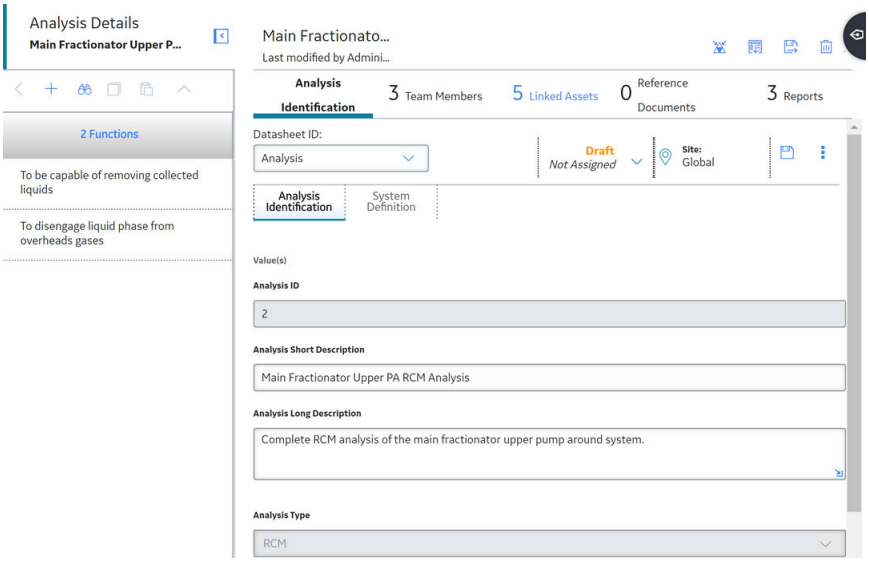
   The new analysis is created from the template.

Modify an RCM Analysis

About This Task

Procedure

1. Access the analysis that you want to modify.
   In a new tab, the **Analysis Details** workspace for the selected analysis appears, displaying the **Analysis Identification** section and the datasheet for the analysis.



2. As needed, enter values in the available fields.
3. Select .
   The changes to your analysis have been saved.

Copy and Paste Nodes in an Analysis or Template

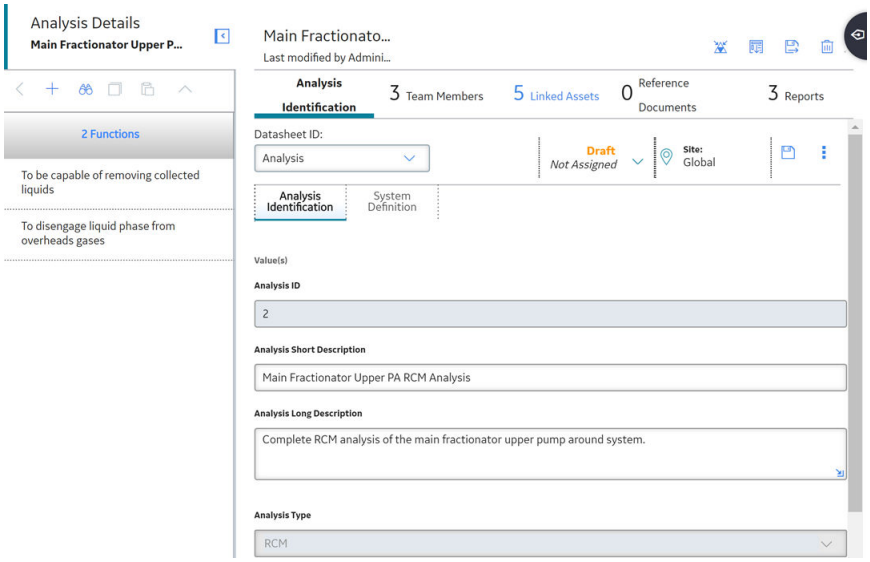
Procedure

1. Access an Analysis if you want to copy analysis nodes.

   -or-

   Access a Template if you want to copy template nodes.

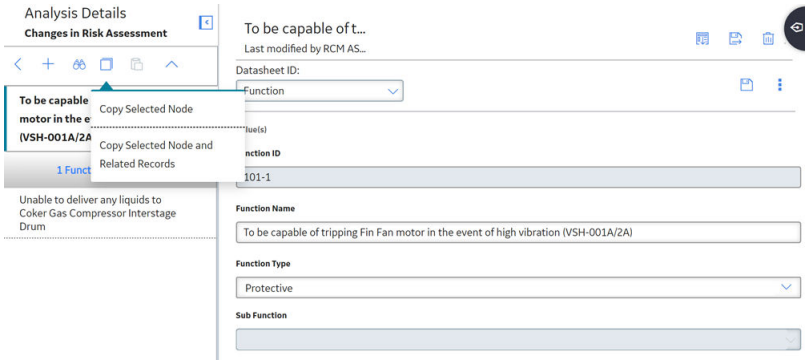
   In a new page, the workspace for the selected analysis or template appears.



2. In the pane, select the node that you want to copy.

   The button is enabled.

3. Select .
   A menu appears.



4. Select one of the following options:

   - **Copy Selected Node:** Copies only the selected node without any of the related records attached.
   - **Copy Selected Node and Related Records:** Copies the selected node as well as all related child records of that node.

     A message appears, confirming that the node has been copied.

5. Select the node where you want to place the copied node.
   The button is enabled.
6. Select .
   The copied node is pasted.

Promote an RCM Analysis to Strategy

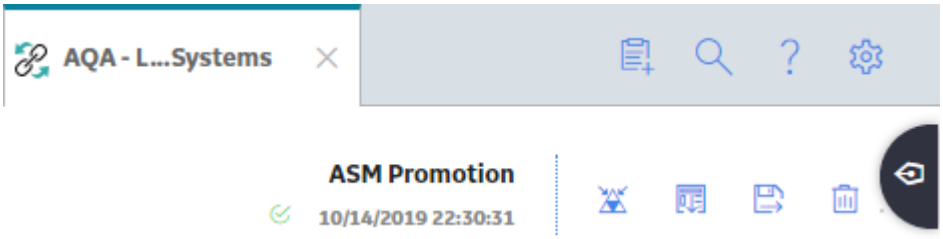
About This Task

Promoting an RCM analysis to an ASM strategy creates risks and actions in a new strategy from corresponding failure effects and Recommended Actions in an RCM analysis, respectively. Additionally, when you make subsequent changes to the original RCM analysis, you can also promote those changes to the strategy.

Procedure

1. Access an Analysis on page 11.
2. In the workspace, select .
   A message appears, asking you to confirm that you want to promote all of the pending Recommended Actions to ASM.
3. Select **Yes**.
   A progress indicator appears. Once the process is complete, the date and time of the last promotion appears.

   Note: If the process cannot be completed, an error message appears.

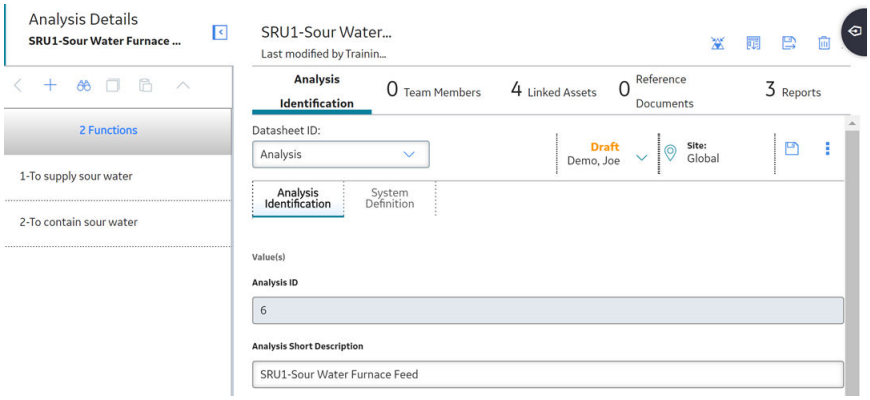


Use State Controls in RCM Analyses

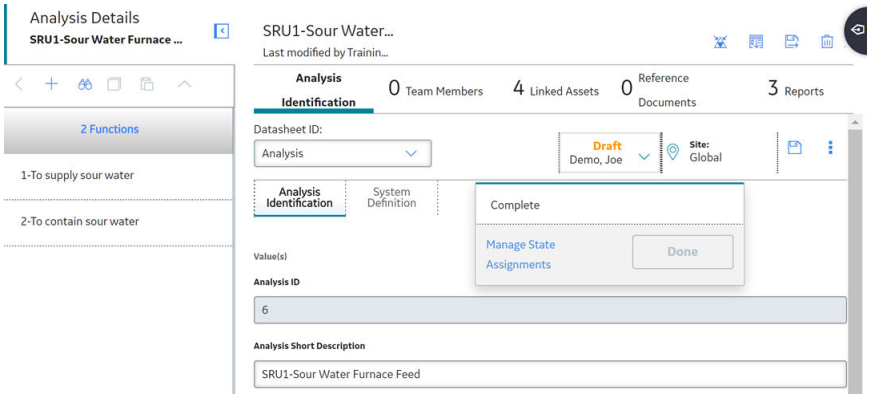
About This Task

Procedure

1. Access the analysis that you want to modify.
   In a new page, the **Analysis Details** workspace for the selected analysis appears, displaying the **Analysis Identification** section and the datasheet for the analysis.



2. In the analysis datasheet, select .
   The state control menu appears.



3. Select **Complete**.
   The Complete action is highlighted.
4. Select **Done**.
   The analysis is now in the Complete state.

Delete an RCM Analysis

About This Task

Procedure

1. Access the RCM Overview page, and then select the **Analyses** tab.
   The list of analyses appears.
2. In the list of analyses, highlight the line containing the analysis that you want to delete, and then select .
   A message appears asking you to confirm that you want to delete the analysis.
3. Select **Yes**.

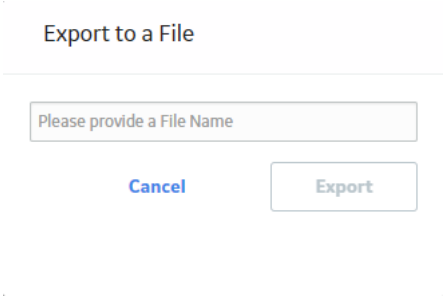
   The analysis is deleted.

   Note: You can also delete the analysis using the delete button ( ) while viewing the analysis that you want to delete.

Export an RCM Analysis

Procedure

1. Access the **RCM Overview** page.
2. Select the **Analyses** tab.
   The **Analyses** section appears, displaying a list of available analyses.
3. Select the check box next to the analyses that you want to export.
   The selected analyses are highlighted.
4. Select .
   The **Export to a File** window appears.



5. In the **Please provide a File Name** box, enter a name for the file.
6. Select **Export**.

Results

The selected analyses are exported to an Excel workbook.

Note:

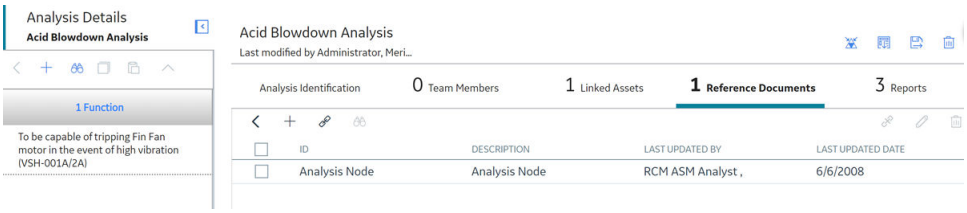
- You can also export an analysis from the **Analysis Details** workspace by selecting , and then selecting **Export**.
- All Secondary Actions associated with the analysis are also exported.

Access a Reference Document

Procedure

1. Access the analysis whose reference documents you want to access.
2. In the workspace, select the **Reference Documents** tab.

   The **Reference Documents** section appears, displaying a list of reference documents.



Tip: For more information, refer to the Reference Documents section of the documentation.

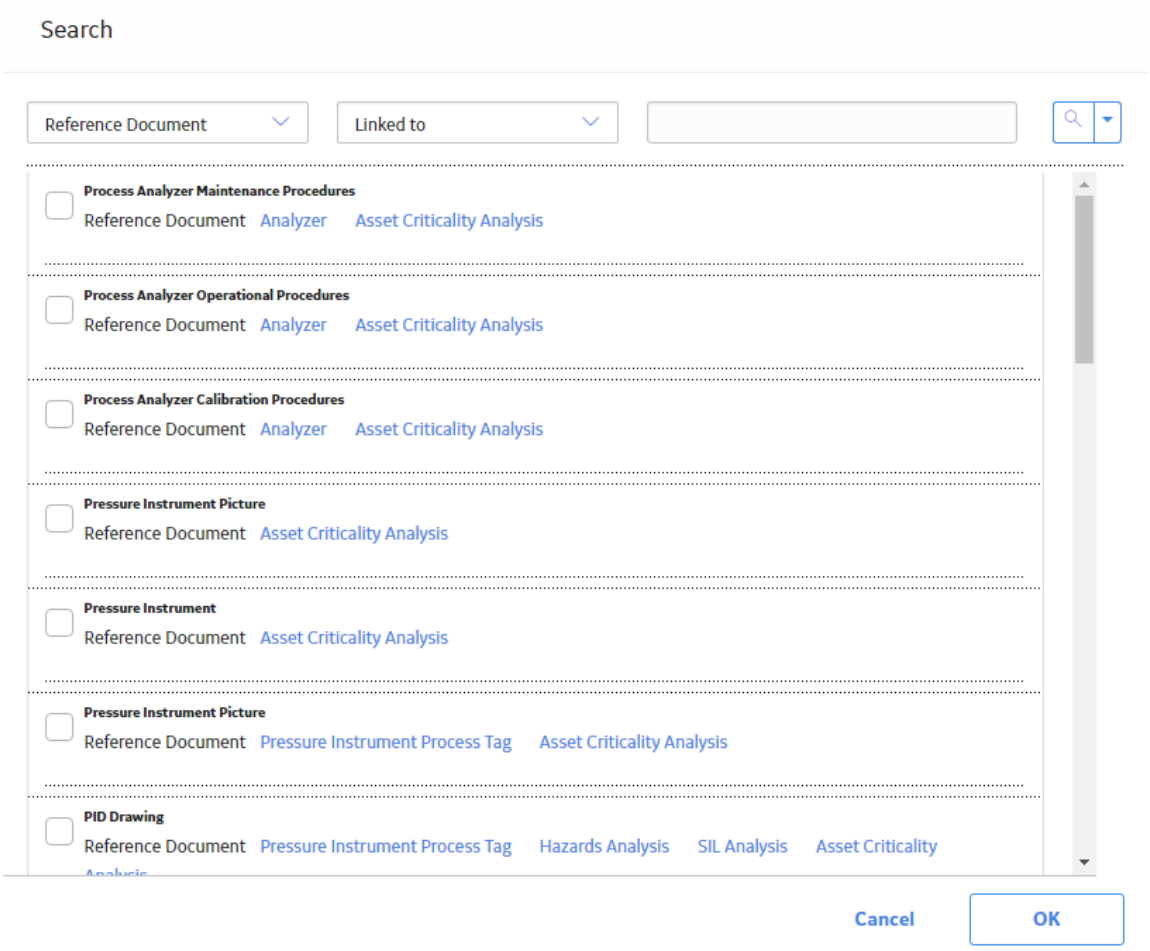
Link Reference Documents

Before You Begin

This topic assumes that there are existing documents in RCM that you want to link to your analysis.

Procedure

1. Access the Reference Documents which you want to link.
2. Select .
   The **Search** window appears.



3. Select the type of document you want from the **Linked To** drop-down box.

   -or-

   Enter the name that you want to search for in the search box, and then select .

   The results appear.
4. Select the documents that you want add, and then select **OK**.

   The selected reference documents are added to the analysis.

Tip: For more information, refer to the Reference Documents section of the documentation.

Delete a Reference Document

Before You Begin

This topic assumes that you have Reference Documents already attached to your RCM analysis.

Procedure

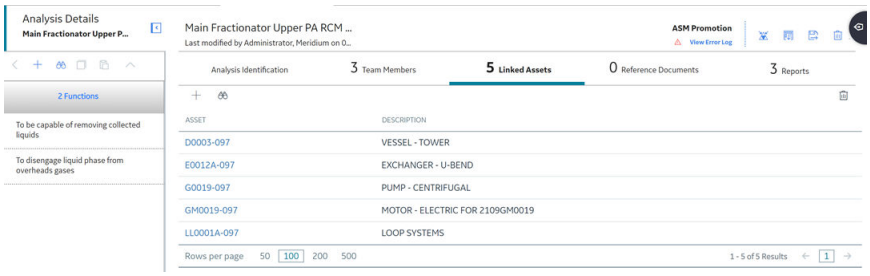
1. Access the **RCM Overview** page, and then select the **Analyses** tab.
   The list of analyses appears.
2. Select the analysis for which you want to search reference documents.
   In a new tab, the **Analysis Details** workspace for the selected analysis appears, displaying the **Analysis Identification** section.
3. Select the **Reference Documents** tab.
   The **Reference Documents** section appears.
4. Select the **Reference Document** that you want to delete, and then select .
   The reference document appears.
5. Select , and then select .
   A window appears, asking if you want to delete the entity.
6. Select **Yes**.
   Your reference document has been deleted.

   Tip: For more information, refer to the Reference Documents section of the documentation.

Access an Asset

Procedure

1. Access the analysis whose assets you want to access.
2. In the pane, select the asset that you want to access.



Tip: If needed, modify values in the available fields.

Filter RCM Analyses by Asset

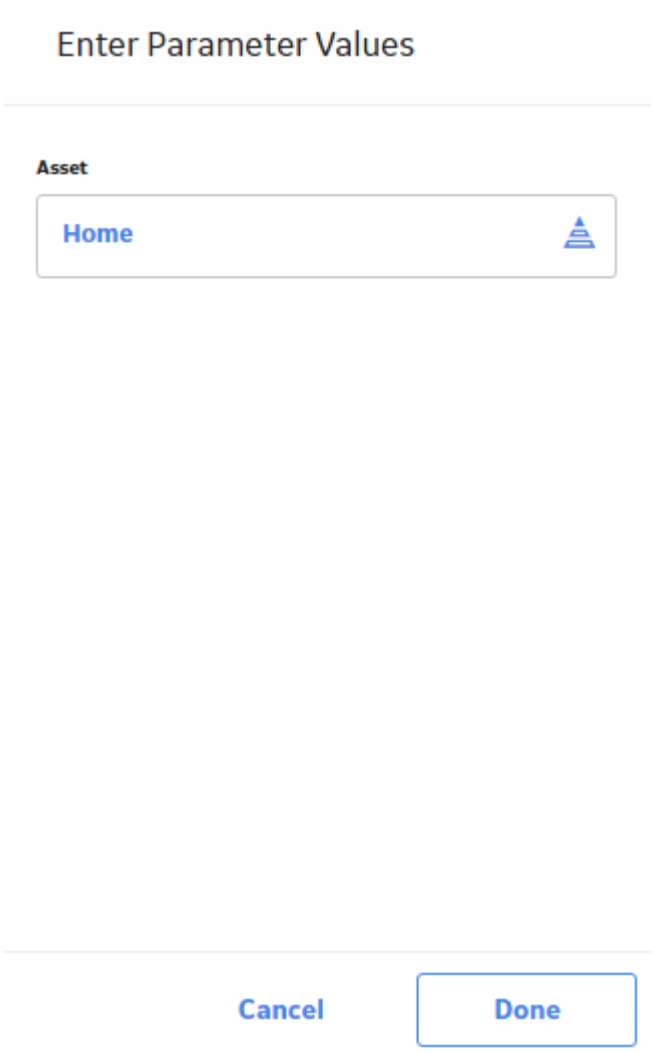
About This Task

GE Digital APM features asset-centric navigation. To filter strategies by asset, please follow the instructions below.

Procedure

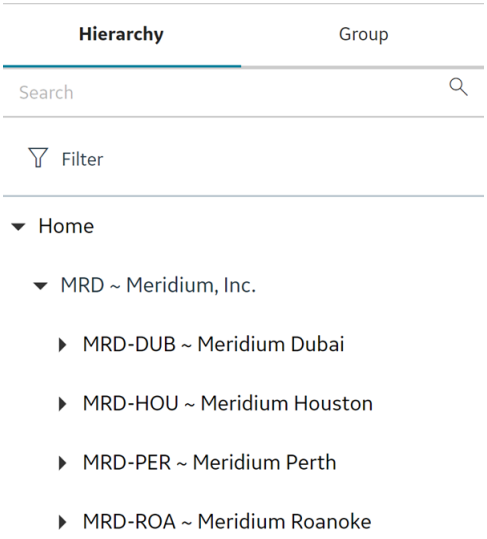
1. Access the RCM Overview page, and then select the **Analyses** tab.
   The list of analyses appears.
2. In the page, select .

The **Enter Parameter Values** window appears.



3. In the Asset field, select Home.

   The **Hierarchy** window appears.



4. Filter the assets. You can search through both Hierarchy and Groups by selecting the tabs in the window.
   - Using the **Hierarchy**, you can navigate to the smallest level of asset. You can also select **Search** to find assets not connected to a strategy.
   - Using the **Hierarchy**, if you select , it will allow you to filter by Category, Class, and Type.
   - Using the **Groups**, if you select , it will allow you to search by Relationship and Hierarchy Filter.
5. When you are finished filtering the assets, select **Done**.
   The **Asset** box is populated with the name of the selected asset.

Link Assets to an Analysis

Before You Begin

This procedure assumes that there are assets available to link to your analysis.

Procedure

1. Access the analysis that you want to modify.
   In a new tab, the **<Analysis Name>** workspace for the selected analysis appears, displaying the **Analysis Identification** section and the datasheet for the analysis.
2. Select the **Linked Assets** tab.
   The **Linked Assets** section appears.
3. In the section, select .
   The **Enter Parameter Values** window appears.
4. In the **Asset** section, select .
   The **Hierarchy** window appears, displaying the asset hierarchy.
5. Select a hierarchy level associated with the asset that you want to link to the analysis, and then select **Done**.

Note: You can search through both Hierarchy and Groups by selecting the respective tabs in the **Hierarchy** window.

The assets associated with the hierarchy level appear in the **Add Assets** window.

6. Select the check boxes next to the assets that you want to add to the analysis, and then select **Add**.

   Important: You must select assets that are part of the same site as the current analysis.

   The selected assets are linked to the analysis.

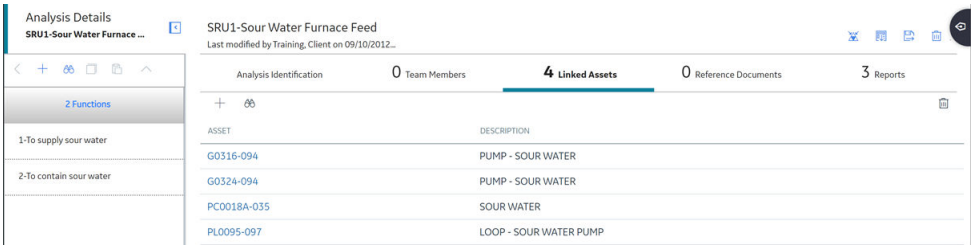
Delete an Asset

Before You Begin

This topic assumes that you have a pre-established RCM analysis with an asset that needs to be deleted.

Procedure

1. Access the **RCM Overview** page, and then select the **Analyses** tab.
   The list of analyses appears.
2. Select the analysis whose asset you want to delete.
   In a new tab, the **Analysis Details** workspace for the selected analysis appears, displaying the **Analysis Identification** section.
3. Select the **Linked Assets** tab.
   The **Linked Assets** section appears.



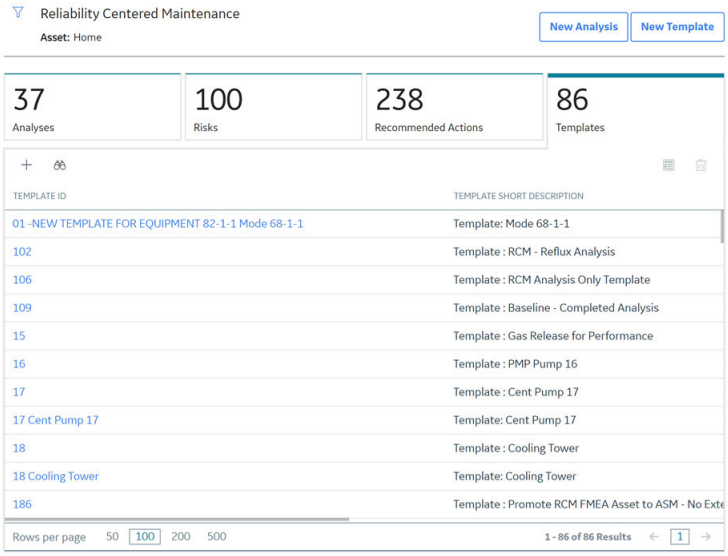
4. Select the asset that you want to delete.
   The selected asset is highlighted.
5. In the workspace, select .
   A message appears, confirming that you want to delete the selected item.
6. Select **Yes.**
   The asset is deleted.

   Note: If an asset is in use by one or more failure modes, you cannot remove the asset.

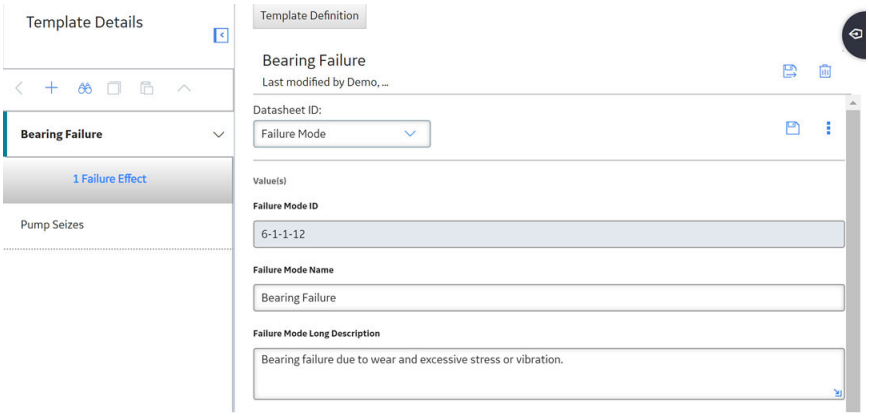
Access a Template

Procedure

1. Access the **RCM Overview** page.
2. In the workspace, select the **Templates** tab.
   The **Templates** section appears, displaying a list of Templates.



3. Select the Template that you want to access.
   The datasheet for the selected template appears.

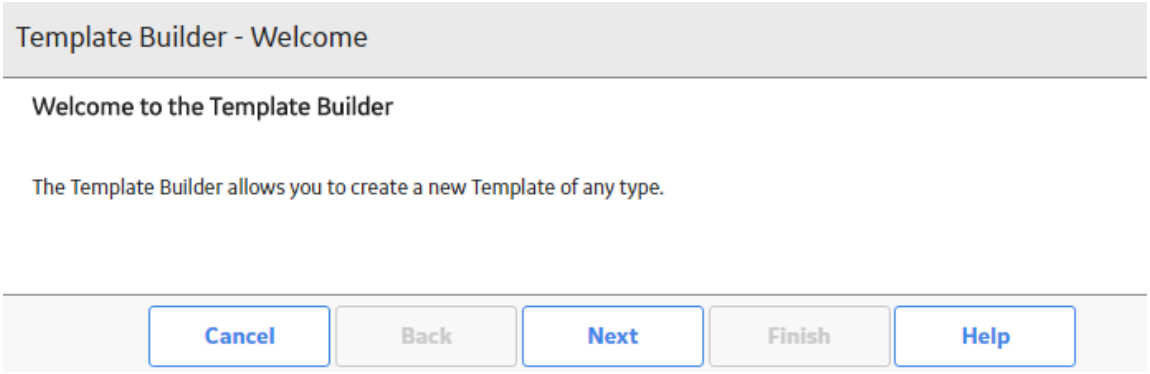


Tip: If needed, modify values in the available fields.

Create a Template

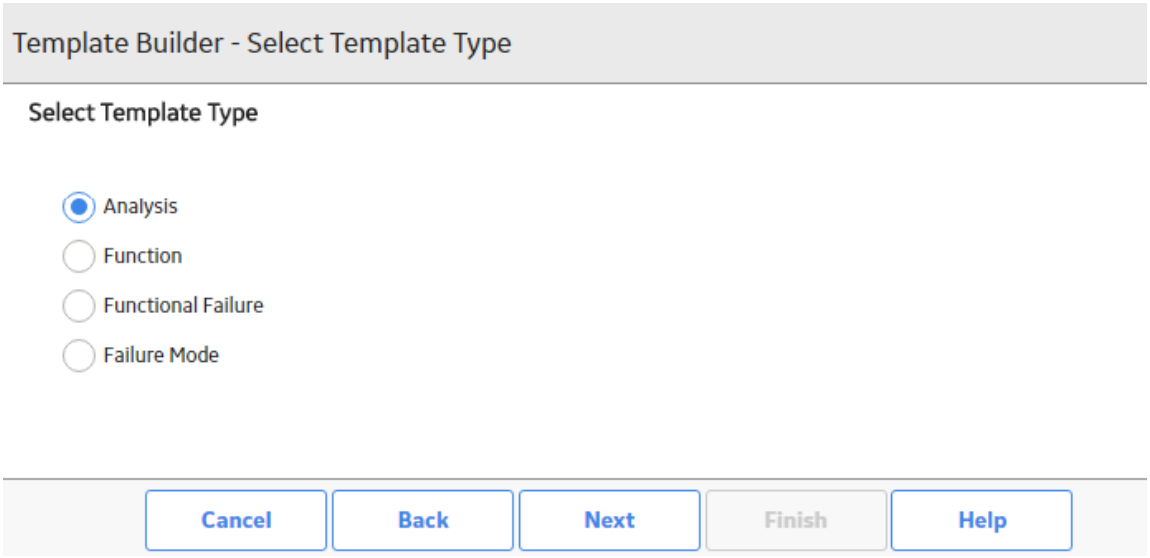
Procedure

1. Access the RCM Overview page.
2. In the page, select **New Template**.
   The **Template Builder** window appears.

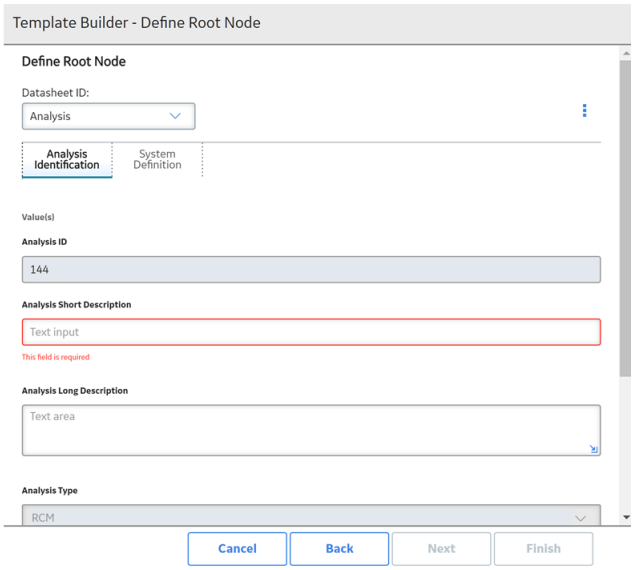


3. Select **Next**.

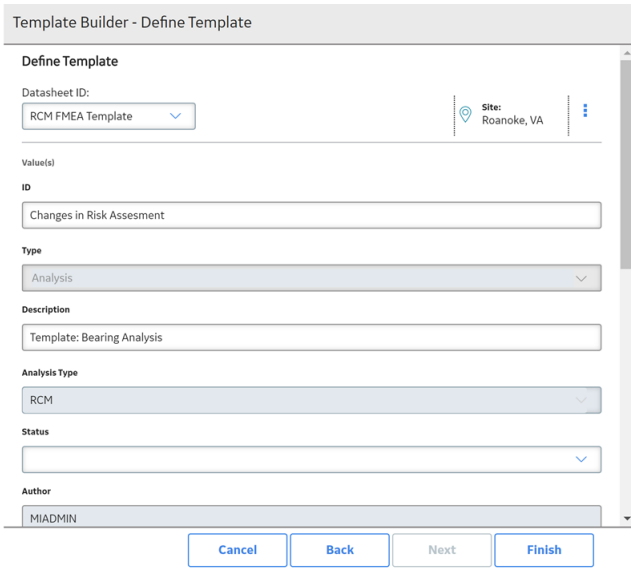
   The **Select Template Type** screen appears.



4. Select the template type you want to apply, and then select **Next**.
   The **Define Root Node** screen appears.



5. As needed, enter values in the available fields, and then select **Next**.
   The **Define Template** screen appears.



6. As needed, enter values in the available fields, and then select **Finish**.
   The new Template is added.

Save an RCM Analysis as a Template

About This Task

Procedure

1. Access the analysis which you want to save as a template.
2. In the workspace, select .
   The **RCM Template** window appears.
3. As needed, modify the values in the available fields.
4. Select .
   The analysis is saved as a template.

Use the Apply Template Builder

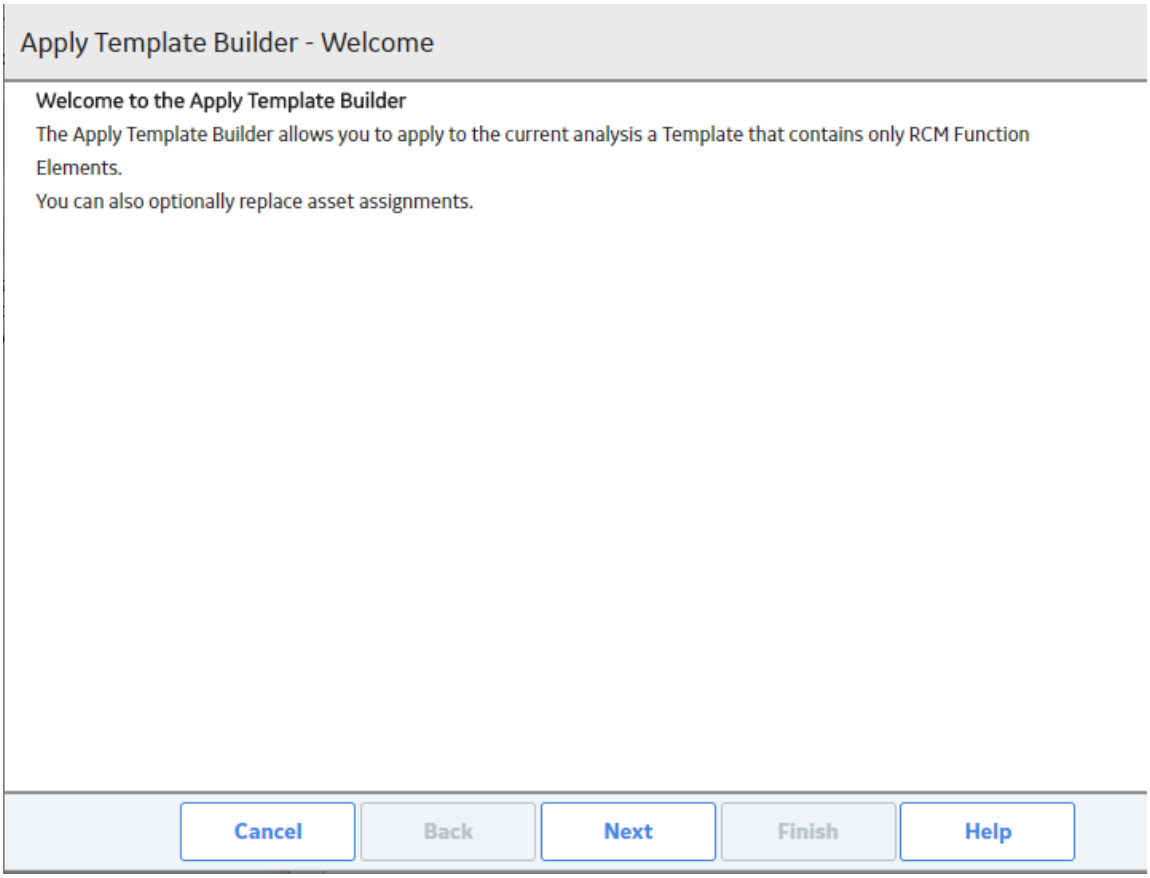
Before You Begin

- The template with which you are creating a new Analysis must be associated with at least one RCM FMEA Asset record.
- Link assets to the analysis.

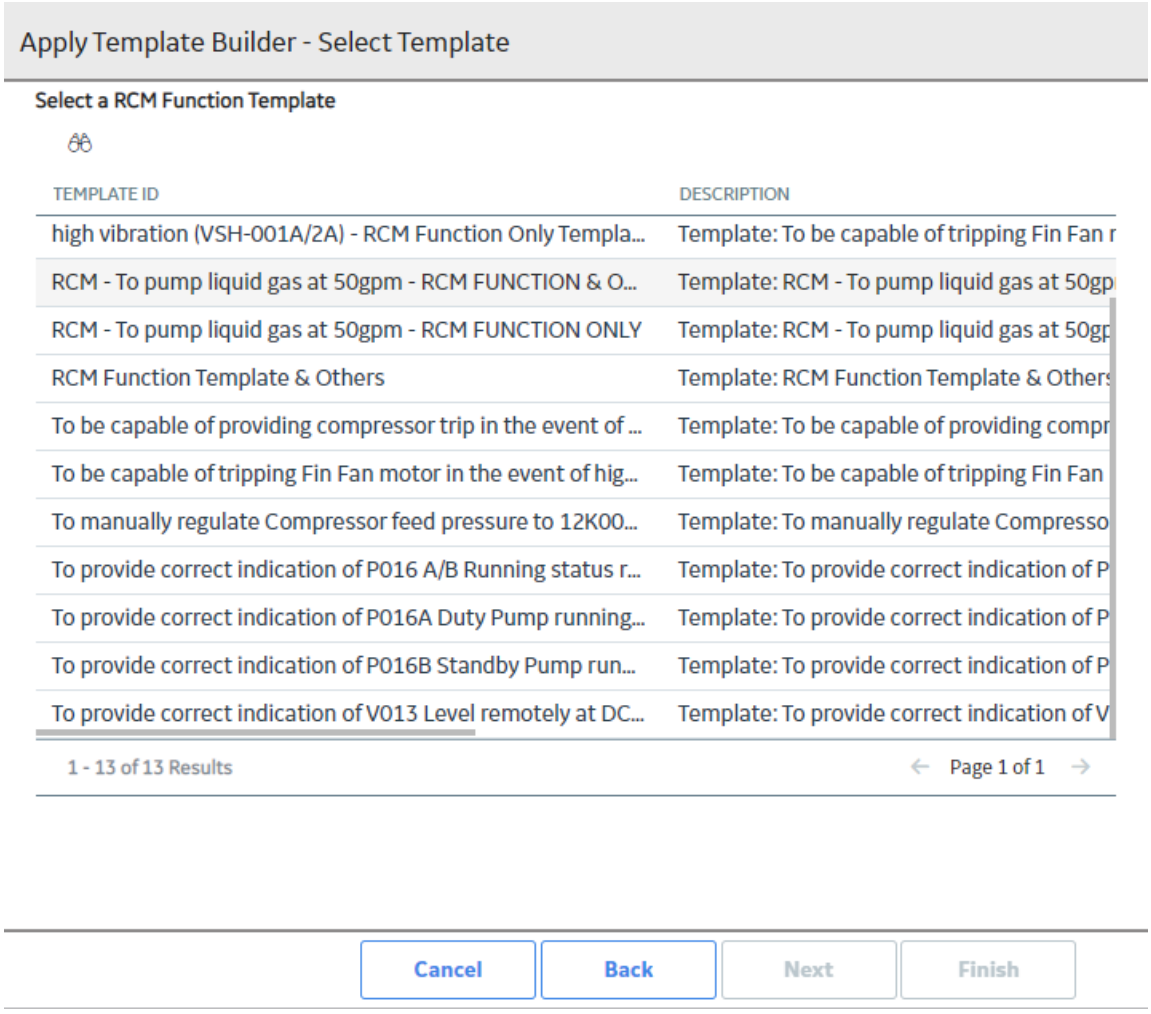
Procedure

1. Access the analysis.
2. In the workspace, select .

The **Apply Template Builder** window appears.

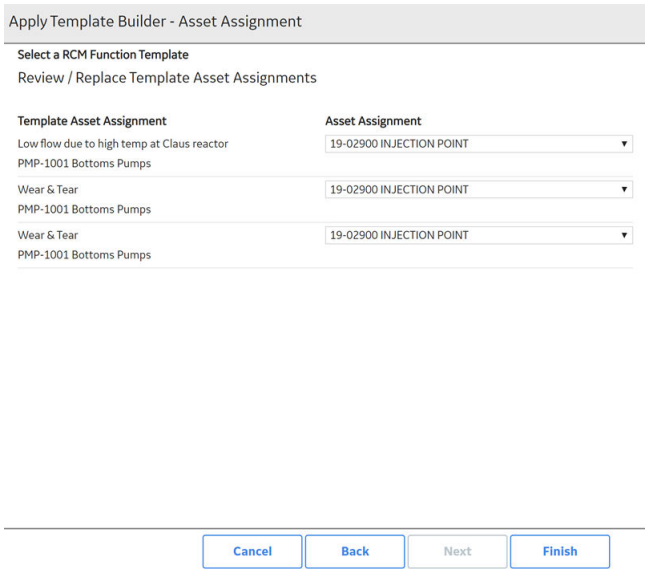


3. Select **Next**.
   The **Select Template** screen appears.



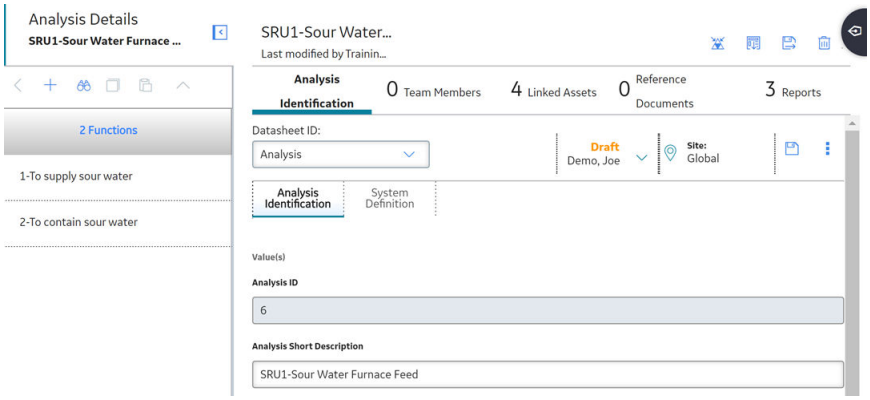
4. Select the template that you want to apply, and then select **Next**.

   The **Asset Assignment** screen appears, displaying the **Asset Assignment** drop-down list box. This field contains the assets that you linked in the **Linked Assets** section of the analysis.



5. In the **Asset Assignment** drop-down list box, select the asset that you want to associate with the failure mode, and then select **Finish**.

   The selected template is applied to the analysis and will be listed in the **Analysis Details** pane at the analysis level (Function, Functional Failure, or Failure Mode) that you selected.



   Note: All Secondary Actions from the template are also applied to the analysis.

Promote an RCM Template to ASM

About This Task

Promoting an RCM analysis template to an ASM template creates risks and actions in a new strategy template from corresponding failure effects and Recommended Actions in an RCM template, respectively. Additionally, when you make subsequent changes to the original RCM template, you can also promote those changes to the strategy template.

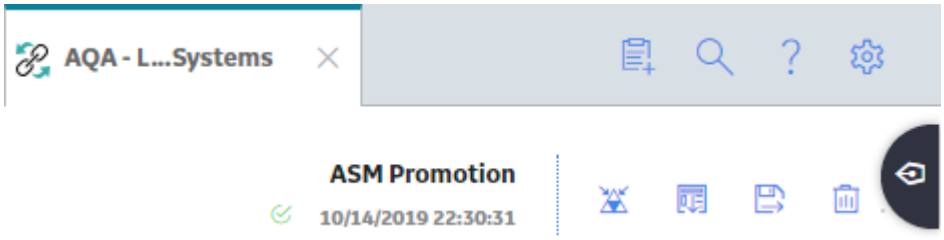
Procedure

1. Access a Template that you want to promote to ASM.

   Note: You can promote only Global templates to ASM.

2. In the workspace, select  .
   A message appears, asking you to confirm that you want to promote all of the pending Recommended Actions to ASM.
3. Select **Yes**.
   A progress indicator appears. Once the process is complete, the date and time of the last promotion appears.

   Note: If the process cannot be completed, an error message appears.



   Note: All the Secondary Actions are also promoted from RCM to ASM.

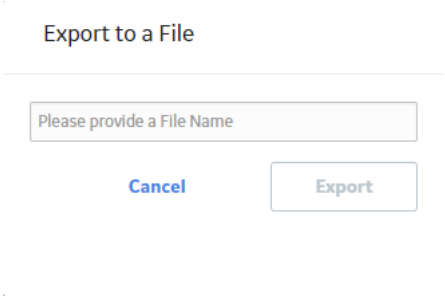
Export an RCM Analysis Template

Procedure

1. Access the **Reliability Centered Maintenance** overview page.
2. Select the **Templates** tab.
   The **Templates** section appears, displaying a list of available templates.
3. Select the check box next to the template that you want to export, and then select .

   Tip: If you want to export multiple RCM analysis templates, select the check boxes against the templates.

   The **Export to a File** window appears.



4. In the text box that appears in the **Export to a File** window, enter a name for the file, and then select **Export**.
   The selected template is exported to an Excel workbook.

   Note:

   You can also export an RCM analysis template from the **<Template ID>** workspace of the **Template Details** page by selecting , and then selecting **Export**.

Run Reports in RCM

About This Task

Procedure

1. Access the RCM Overview page, and then select the **Analyses** tab.
   The list of analyses appears.
2. Select the analysis in which you want to run a report.
   In a new tab, the **Analysis Details** workspace for the selected analysis appears, displaying the **Analysis Identification** section.
3. Select the **Reports** tab.
   The **Reports** workspace appears.
4. Select the report that you want to run.
   On a new page, the report opens and runs.

Note: Any report that is placed in the `Public\Meridium\Modules\RCM\Analysis` catalog folder will be shown in the list of reports. As long as the report uses the parameter ID of `Entity_Key`, the key of the analysis will be passed into the report automatically.

Chapter 4

Team Members

Topics:

Manage Team Members

A team is a group of individuals who will complete a specified task. You can add both GE Digital APM users and non-GE Digital APM users to a team.

You can access Team Members from an RCM analysis, as detailed in the Access Team Members topic.

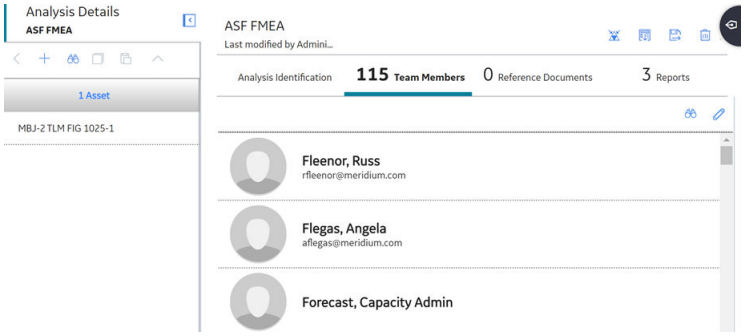
Tip: For details about working with teams and the **Team Members** section, refer to the Teams section of the documentation.

Access the RCM Team Members Section

About This Task

Procedure

1. Access the analysis in which you want to access team members.
   In a new page, the **Analysis Details** workspace for the selected analysis appears, displaying the **Analysis Identification** section.
2. Select the **Team Members** tab.
   The **Team Members** section appears.



3. In the section, select .
   The list of **Team Members** is displayed.

Next Steps

Search Team Members

Search RCM Team Members

About This Task

Procedure

1. Access **Team Members**.
2. In the list of available team members, select .
   A search box appears.

3. Enter your search criteria.
   The results appear.

Chapter 5

Functions

Topics:

About Functions

To prevent failures within a system, the functions of the system need to be defined. In an RCM Analysis, a function defines what the owner of the system wants it to do. A system can have one or more functions, each of which is defined in a separate record. To define all the possible functions of a system, it can be helpful to think through the functions of each individual piece of equipment and location belonging to a given system. For example, a function for a cooling tower may be defined with the following statement:

Provide 500 gallons per minute of water at a maximum of 90 degrees Fahrenheit under all ambient conditions.

The analysis team should also define whether each function is evident or hidden. Evident functions are those in which, under normal circumstances, an operating crew would notice a failure. Hidden functions are those in which a failure may not be noticed.

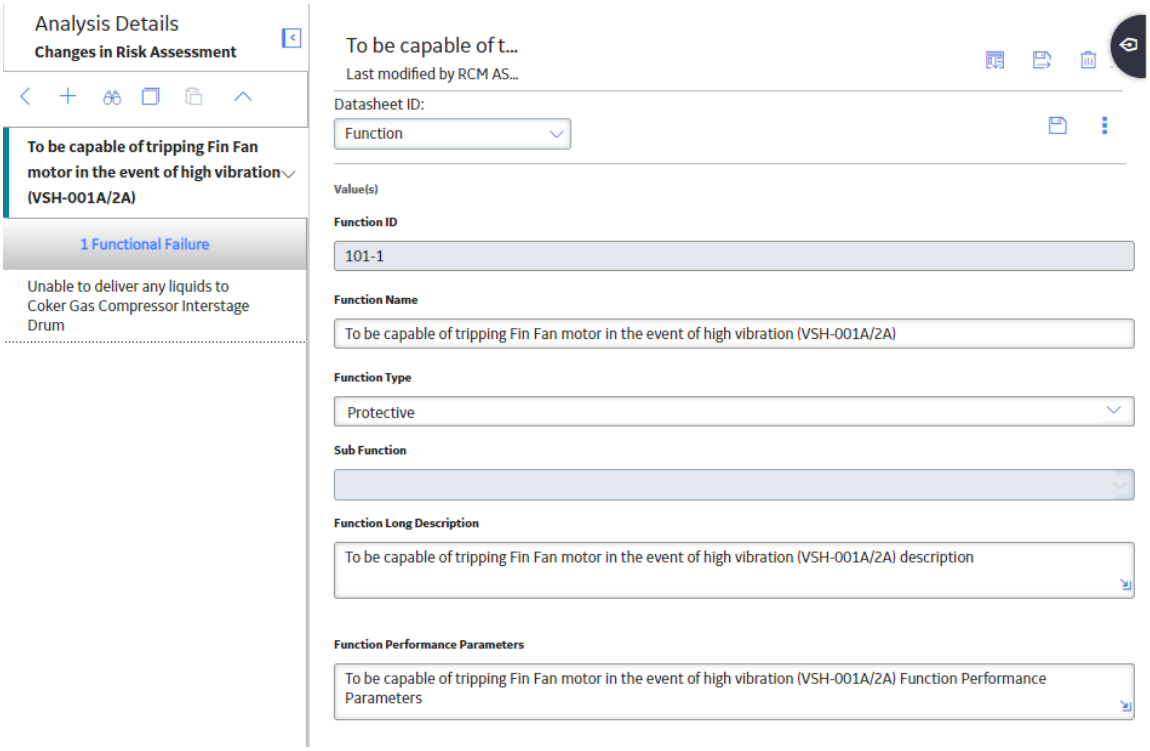
The SAE Standard JA1012, "Evaluation Criteria for Reliability-Centered Maintenance (RCM) Processes," specifies the following requirements for functions:

- The operating context of the asset shall be defined.
- All the functions of the asset/system shall be identified (all primary and secondary functions, including the functions of all protective devices).
- All function statements shall contain a verb, an object, and a performance standard (quantified in every case where this can be done).
- Performance standards incorporated in function statements shall be the level of performance desired by the owner or user of the asset/system in its operating context.

Access a Function

Procedure

1. Access the analysis for which you want to access a function.
2. In the pane, select the function that you want to access.
   The datasheet for the selected function appears.



Tip: If needed, modify values in the available fields.

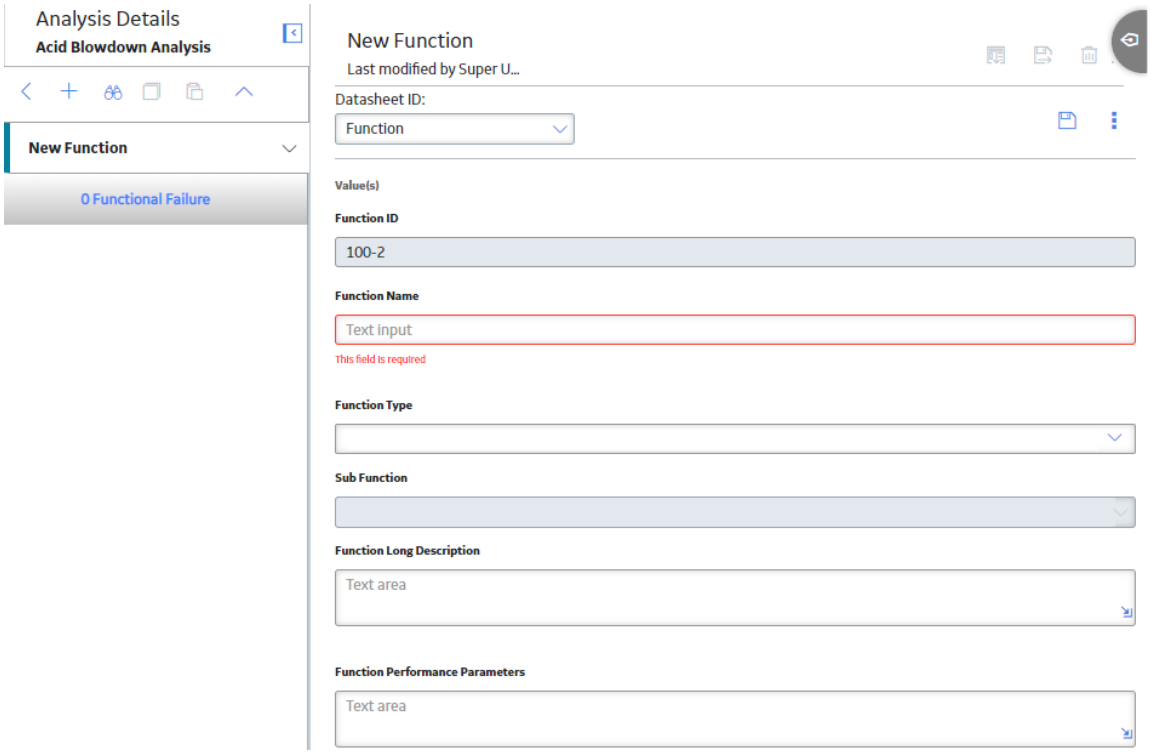
Create a New Function

Before You Begin

This topic assumes that you have a pre-established RCM analysis.

Procedure

1. Access the analysis for which you want to create a function.
2. In the pane, select +.
   The workspace for the new function appears, displaying the **RCM Function** datasheet.



3. As needed, enter data in the available fields.
4. Select .
   Your function has been saved.

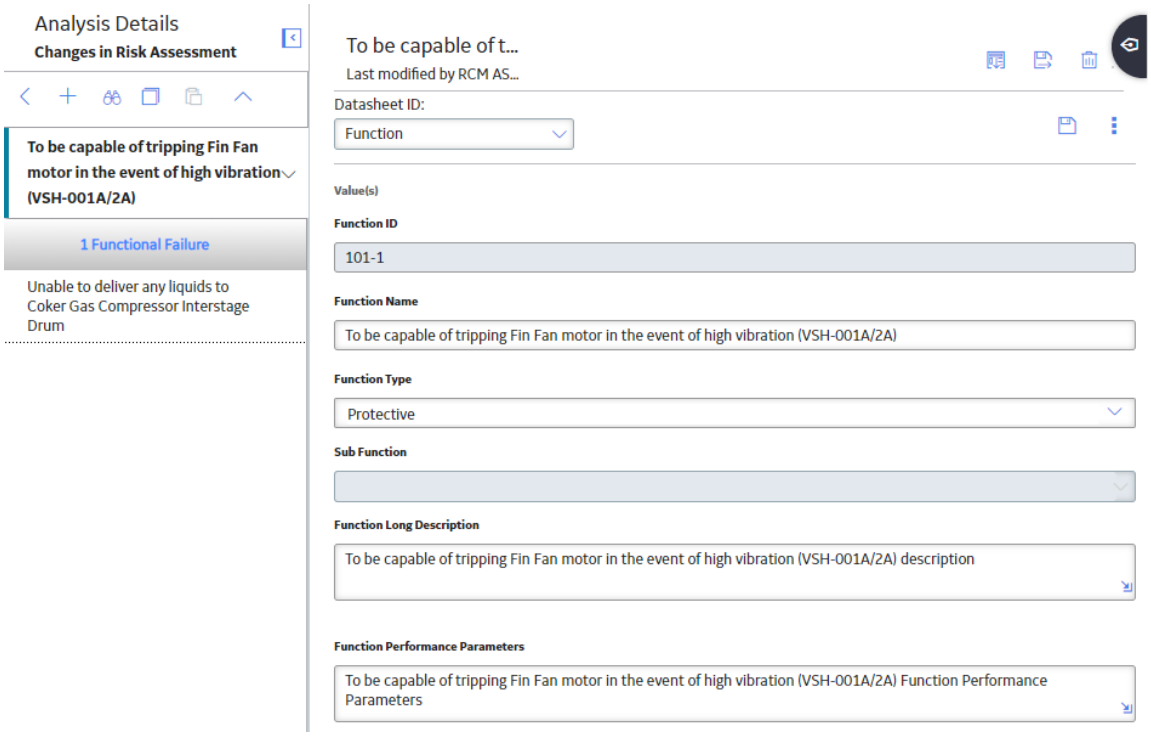
Modify a Function

Before You Begin

This topic assumes that you have a pre-established RCM analysis with functions.

Procedure

1. Access the analysis for which you want to modify a function.
2. In the pane, select the function that you want to modify.
   The workspace for the selected function appears, displaying the **RCM Function** datasheet.



3. As needed, modify the data in the available fields.
4. Select .
   Your modifications are saved.

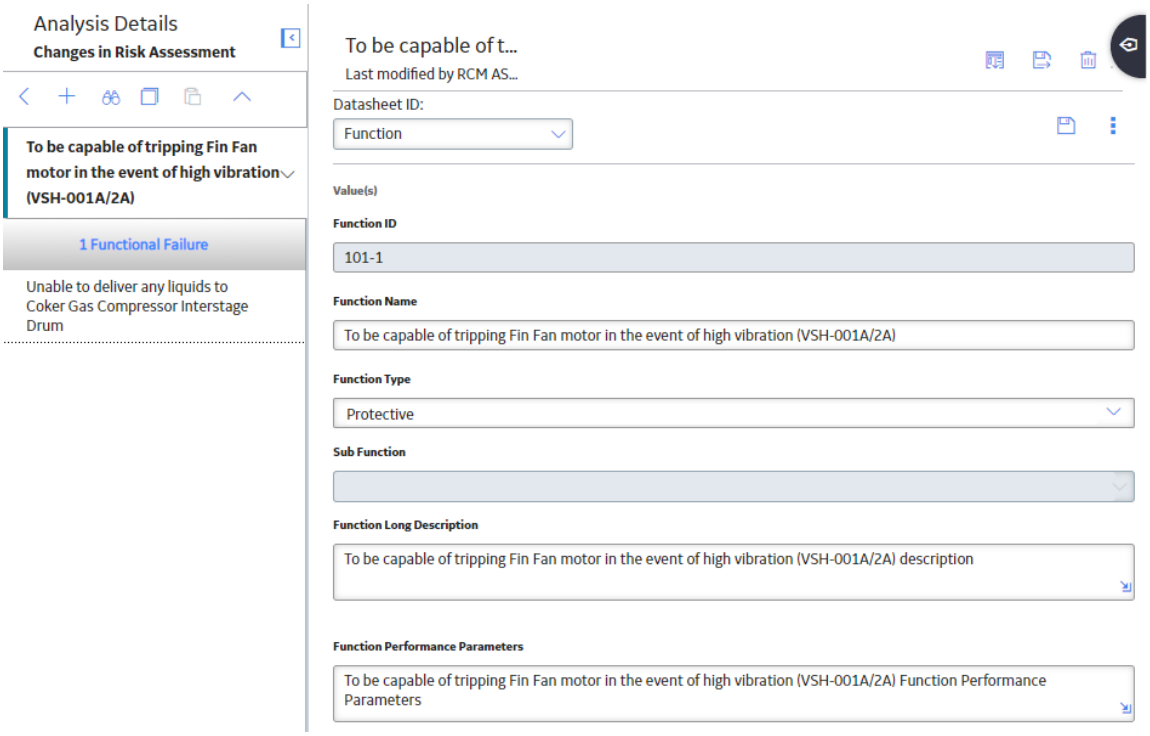
Delete a Function

Before You Begin

This topic assumes that you have a pre-established RCM analysis with functions.

Procedure

1. Access the RCM Overview page, and then select the **Analyses** tab.
   The list of analyses appears.
2. Select the analysis from which you want to delete a function.
   In a new tab, the **Analysis Details** workspace for the selected analysis appears, displaying the **Analysis Identification** section.
3. In the pane, select the function that you want to delete.
   The workspace for the selected function appears, displaying the **RCM Function** datasheet.



4. In the workspace, select .
   A message appears, asking you to confirm that you want to delete the function.
5. Select **Yes**.
   The function is deleted.

Chapter 6

Functional Failures

Topics:

About Functional Failures

After a system's functions have been defined, the next step is to define all the ways in which each function can fail, which is defined as a Functional Failure. For each function, the analysis team should consider each reasonable way in which a function could fail.

Example: Cooling Tower

The following example shows one possible function and a related Functional Failure for a cooling tower:

- **Functional Failure:** Unable to produce 500 gallons per minute of water due to failure of one supply pump.
- **Function:** Provide 500 gallons per minute of water at a maximum of 90 degrees Fahrenheit under all ambient conditions.

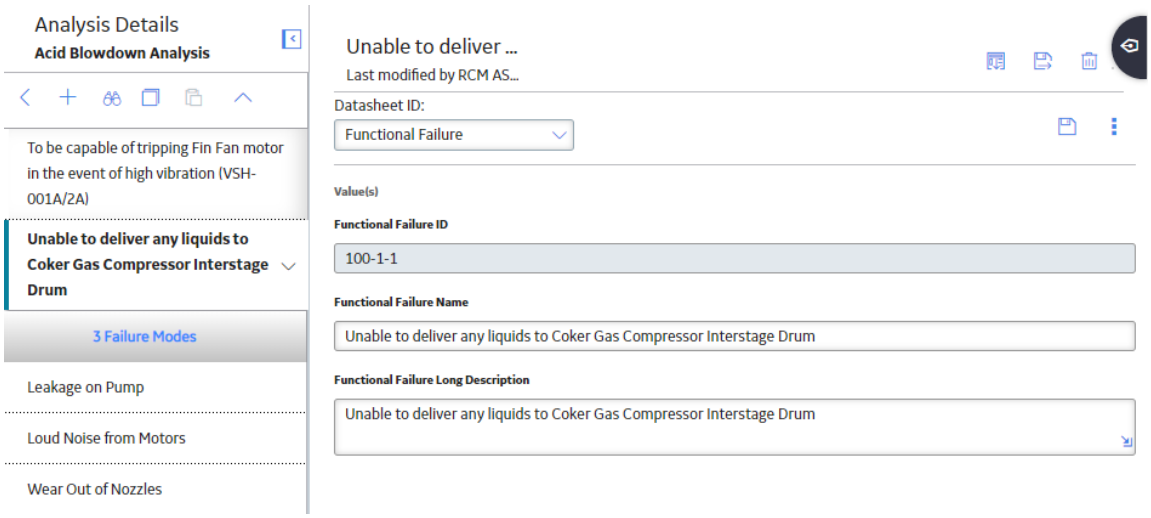
The following item is defined as a requirement for failures according to the SAE Standard JA1012, "Evaluation Criteria for Reliability-Centered Maintenance (RCM) Processes":

- All the failed states associated with each function shall be identified.

Access a Functional Failure

Procedure

1. Access the function for which you want to access a functional failure.
2. In the pane, select the functional failure that you want to access.
   The datasheet for the selected functional failure appears in the workspace.



Note: As needed, modify values in the available fields.

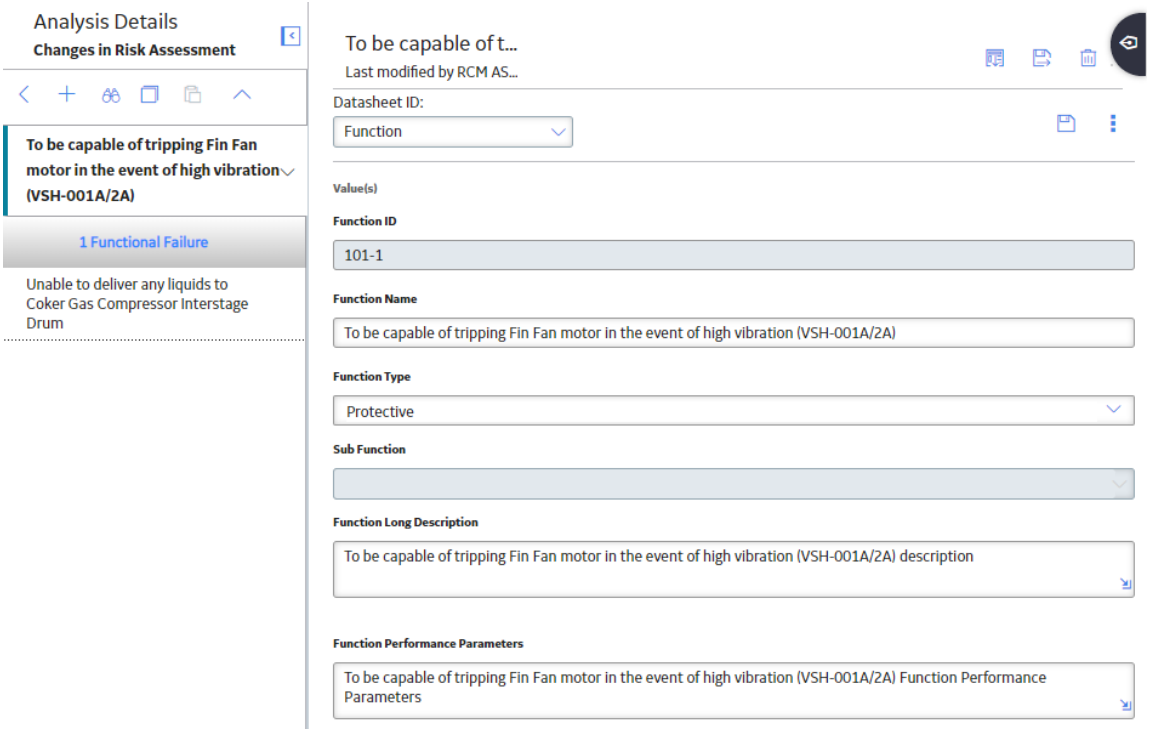
Create a Functional Failure

Before You Begin

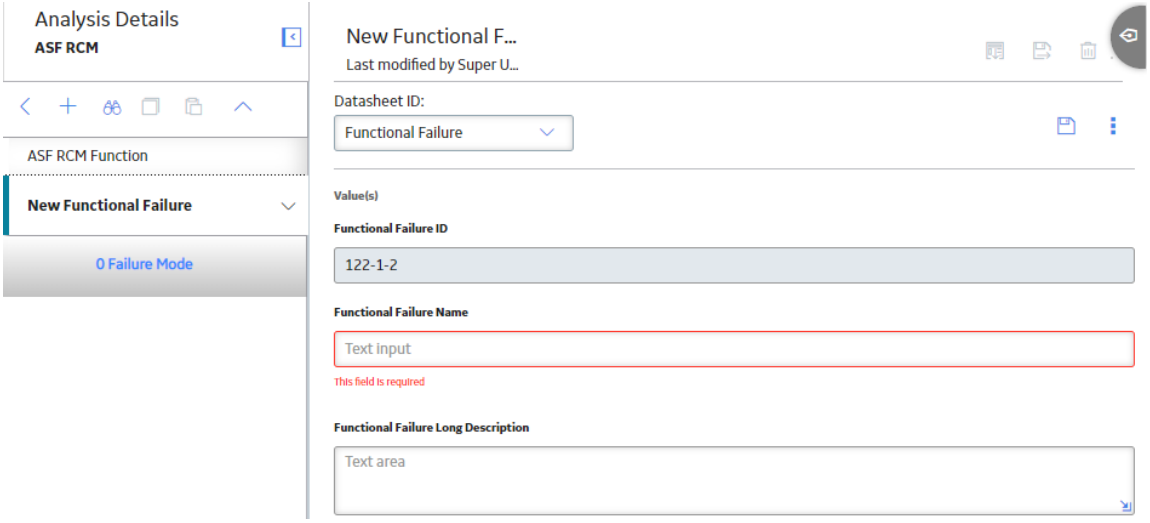
This topic assumes that you have a pre-established RCM analysis with functions.

Procedure

1. Access the function for which you want to create a functional failure.
2. In the pane select a function.
   The workspace for the selected function appears.



3. In the pane, select +, and then select **Add Functional Failure**.
   The workspace for the new functional failure appears.



4. As needed, enter values in the available fields.
5. Select .
   The functional failure is saved.

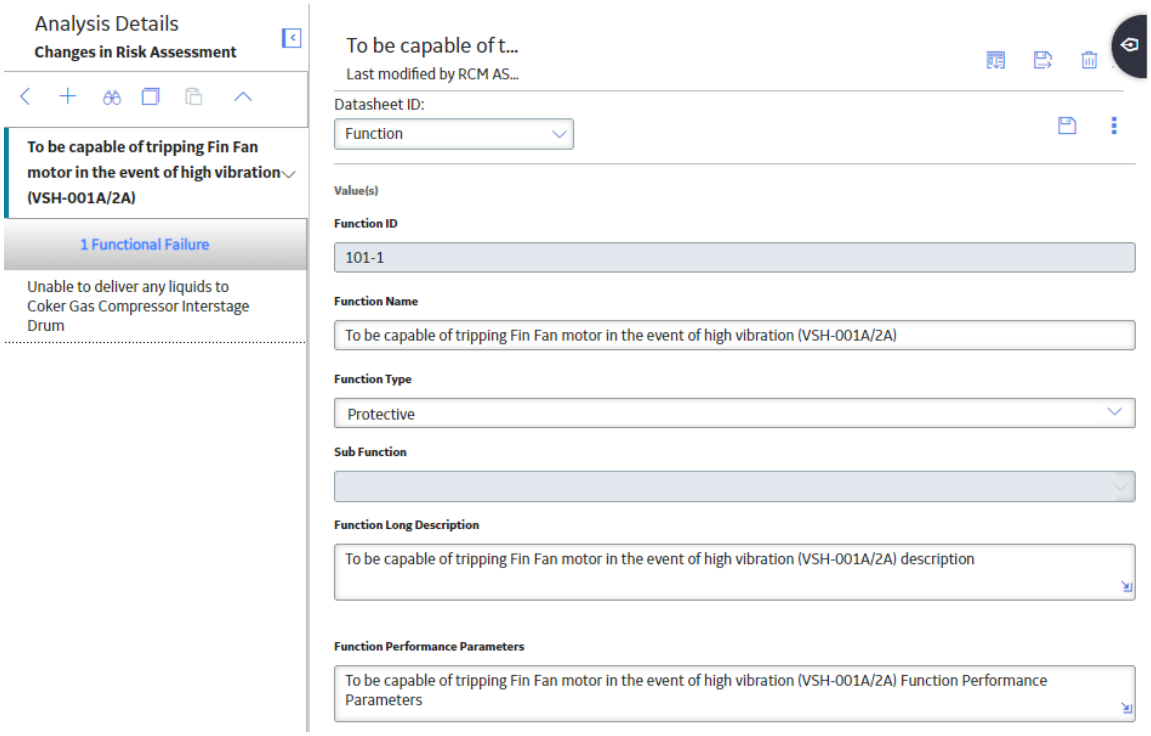
Modify a Functional Failure

Before You Begin

This topic assumes that you have a pre-established RCM analysis with functions.

Procedure

1. Access a Functional Failure, for which you want to modify the functions.



2. As needed, modify the values in the available fields.
3. Select .
   The changes to the functional failure are saved.

Delete a Functional Failure

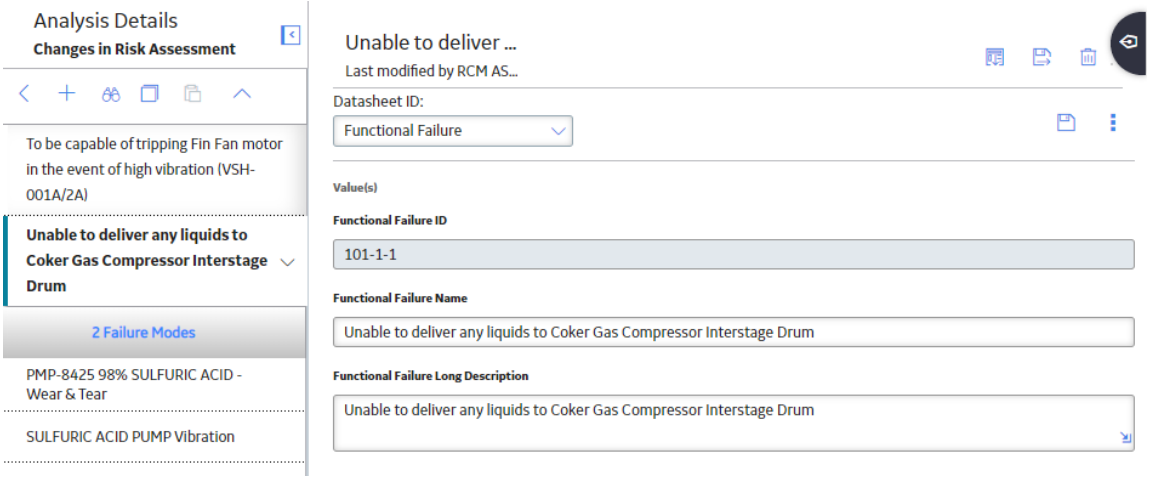
Before You Begin

This topic assumes that you have a pre-established RCM analysis with functions.

Procedure

1. Access the **RCM Overview** page, and then select the **Analyses** tab.
   The list of analyses appears.
2. Select the analysis containing the functional failure that you want to delete.
   In a new tab, the **Analysis Details** workspace for the selected analysis appears, displaying the **Analysis Identification** section.

3. In the pane, select the function that contains the functional failure that you want to delete.
   In the pane, the functional failures for the selected function appear.
4. In the pane, select the functional failure that you want to delete.
   The workspace for the selected functional failure appears.



5. Select  .
   A message appears, asking you to confirm that you want to delete the functional failure.
6. Select **Yes**.
   The functional failure is deleted.

Chapter 7

Failure Modes

Topics:

About Failure Modes

After you have defined all the Functional Failures, you can define one or more Failure Modes for each failure. The analysis team should determine which Failure Modes are likely to occur. If the RCM Analysis is being conducted on a system that does not yet exist physically, the mode(s) will be theoretical, unless other similar types of systems currently exist and historical data for those systems is available. Note that the SAE Standard JA1012, "Evaluation Criteria for Reliability-Centered Maintenance (RCM) Processes," recommends that an RCM team review all modes in which deterioration, design defects, and human error could cause the failure.

Details

Failure Modes are often closely related to individual pieces of equipment or components of the defined piece of equipment. Values stored at the equipment level allow the team to link a mode to a location, the equipment to that location, and a component to that equipment. Maintenance and reliability statistics for failure modes can be stored at the equipment or component level, and can be analyzed and updated using the GE Digital APM RCM module.

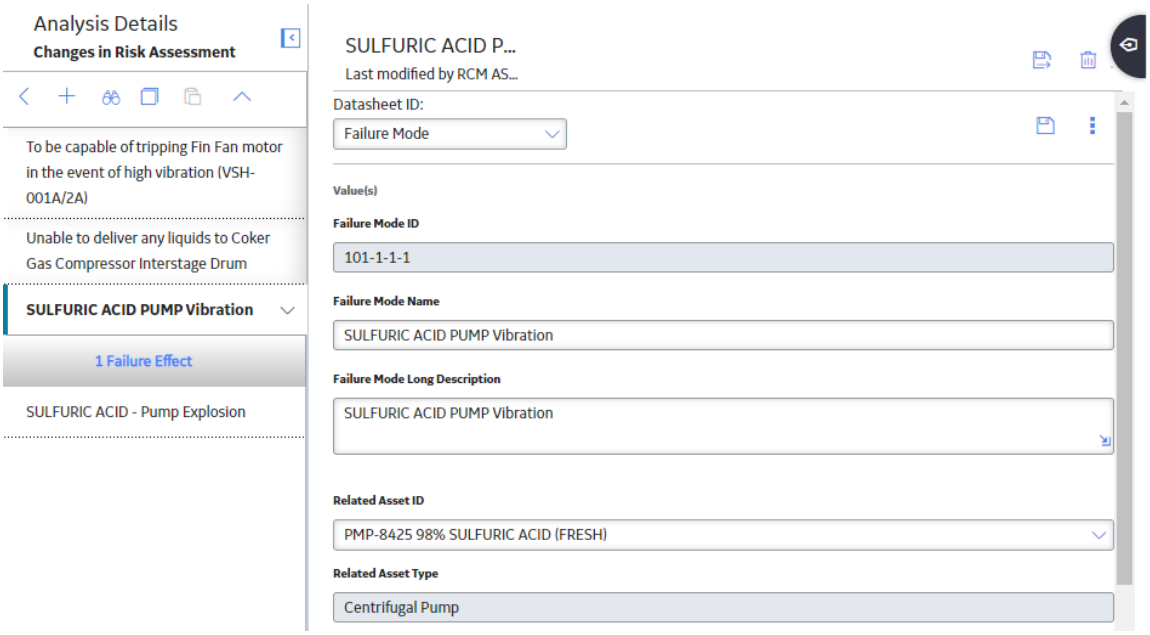
The SAE Standard JA1012, "Evaluation Criteria for Reliability-Centered Maintenance (RCM) Processes," defines the following requirements for Failure Modes:

- All Failure Modes reasonably likely to cause each Functional Failure shall be identified.
- The method used to decide what constitutes a reasonably likely Failure Mode shall be acceptable to the owner or user of the asset.
- Lists of Failure Modes should include: Failure Modes that have happened before, Failure Modes that are currently being prevented by existing maintenance programs, and Failure Modes that have not yet happened, but that are thought to be reasonably likely (credible) in the operating context.
- Lists of Failure Modes should include any event or process that is likely to cause a Functional Failure, including deterioration, design defects, and human error, whether caused by operators or maintainers (unless human error is being actively addressed by analytical processes apart from RCM).

Access a Failure Mode

Procedure

1. Access the functional failure for which you want to access a failure mode.
2. In the pane, select the failure mode that you want to access.
   The datasheet for the selected failure mode appears in the workspace.



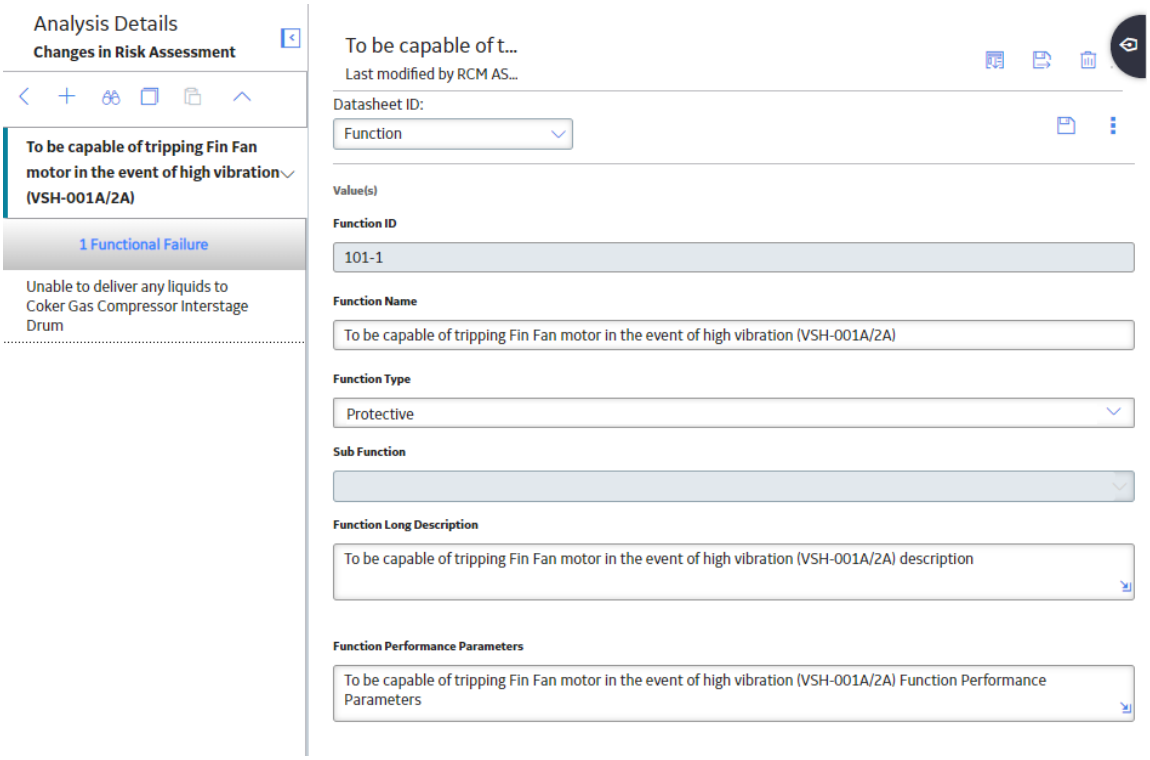
Create a Failure Mode

Before You Begin

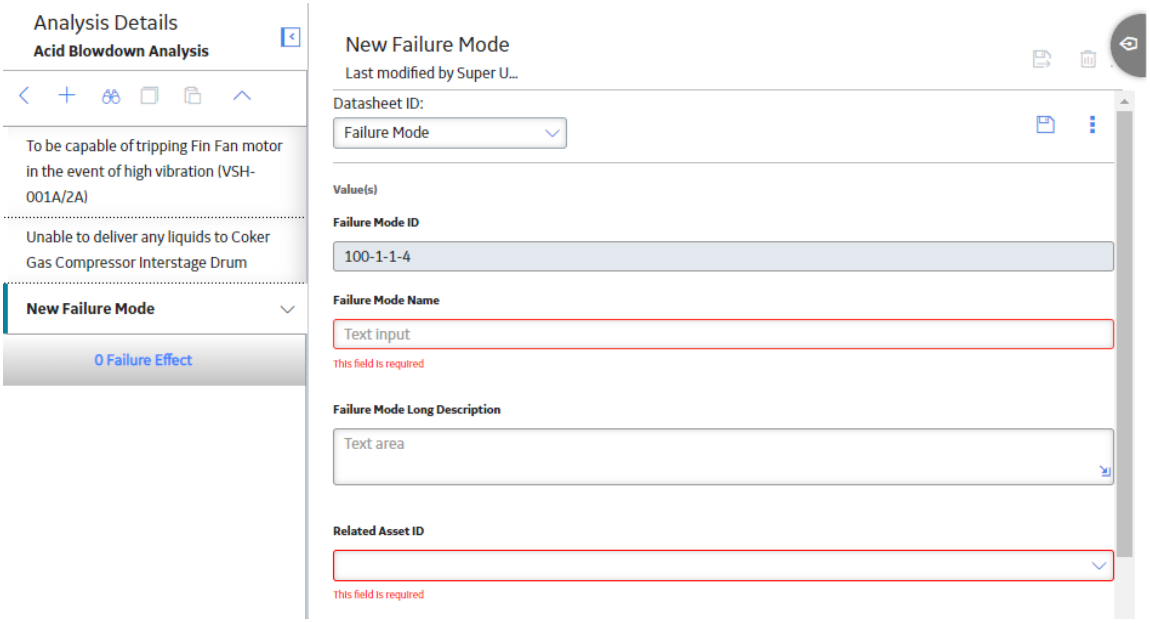
This topic assumes that you have a pre-established RCM analysis with functional failures.

Procedure

1. Access the analysis for which you want to create a Failure mode.
2. In the pane, select the function that contains the functional failure for which you want to create a failure mode.
   The list functional failures for the selected function appears.
3. In the pane, select the functional failure for which you want to create a failure mode.
   The workspace for the selected functional failure appears.



4. In the pane, select +, and then select **Add Failure Mode**.
   The workspace for the new failure mode appears.



5. As needed, enter values in the available fields.
6. Select 💾.
   The failure mode is saved.

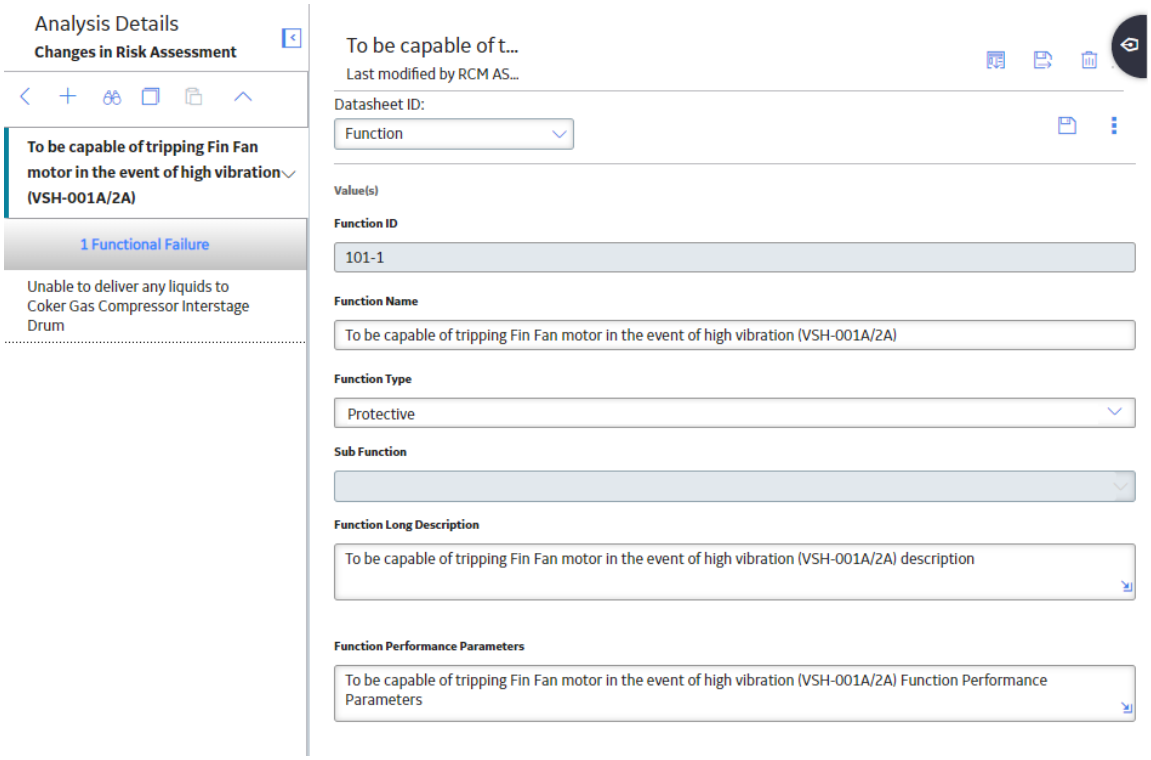
Modify a Failure Mode

Before You Begin

This topic assumes that you have a pre-established RCM analysis with functional failures.

Procedure

1. Access the Failure Mode which you want to modify.



2. As needed, modify the values in the available fields.

   Note: To link an Asset to a Failure Mode, from the Related Asset ID box drop-down menu, the assets identified for the analysis (and listed under the Linked Assets Tab) appear. Select the Asset you wish to link to this Failure Mode. The linked asset appears in the Related Asset ID box.

   Note: Only Recommended Actions for Failure Modes linked to Assets may be promoted to ASM.

3. Select .
   The changes to the failure mode are saved.

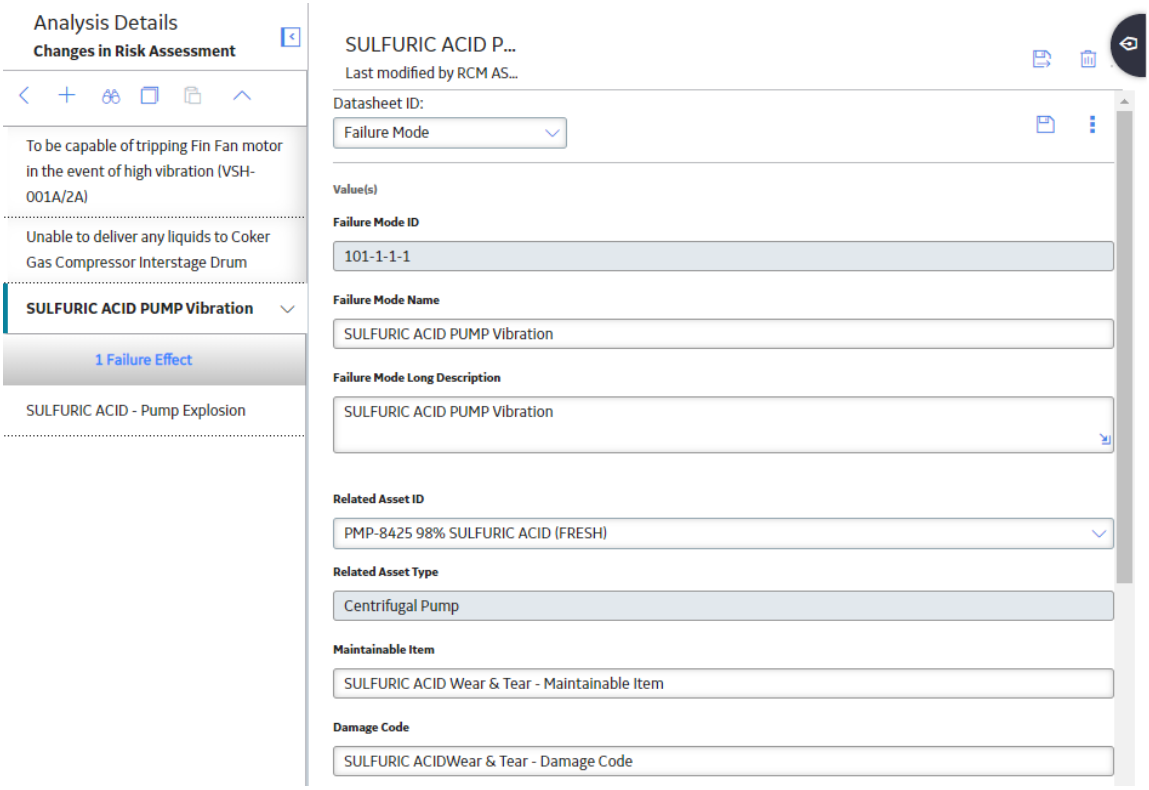
Delete a Failure Mode

Before You Begin

This topic assumes that you have a pre-established RCM analysis with functional failures.

Procedure

1. Access the RCM Overview page, and then select the **Analyses** tab.
   The list of analyses appears.
2. Select the analysis containing the functional failure whose failure mode you want to delete.
   In a new tab, the **Analysis Details** workspace for the selected analysis appears, displaying the **Analysis Identification** section.
3. In the pane, select the function that contains the functional failure whose failure mode you want to delete.
   In the pane, the functional failures for the selected function appears.
4. In the pane, select the functional failure whose failure mode you want to delete.
   In the pane, the failure modes for the selected functional failure appears.
5. In the pane, select the failure mode that you want to delete.
   The workspace for the selected failure mode appears, displaying the **Failure Mode** section.



6. Select .
   A message appears, asking you to confirm that you would like to delete the failure mode.
7. Select **Yes**.
   The failure mode is deleted.

Chapter 8

Failure Effects

Topics:

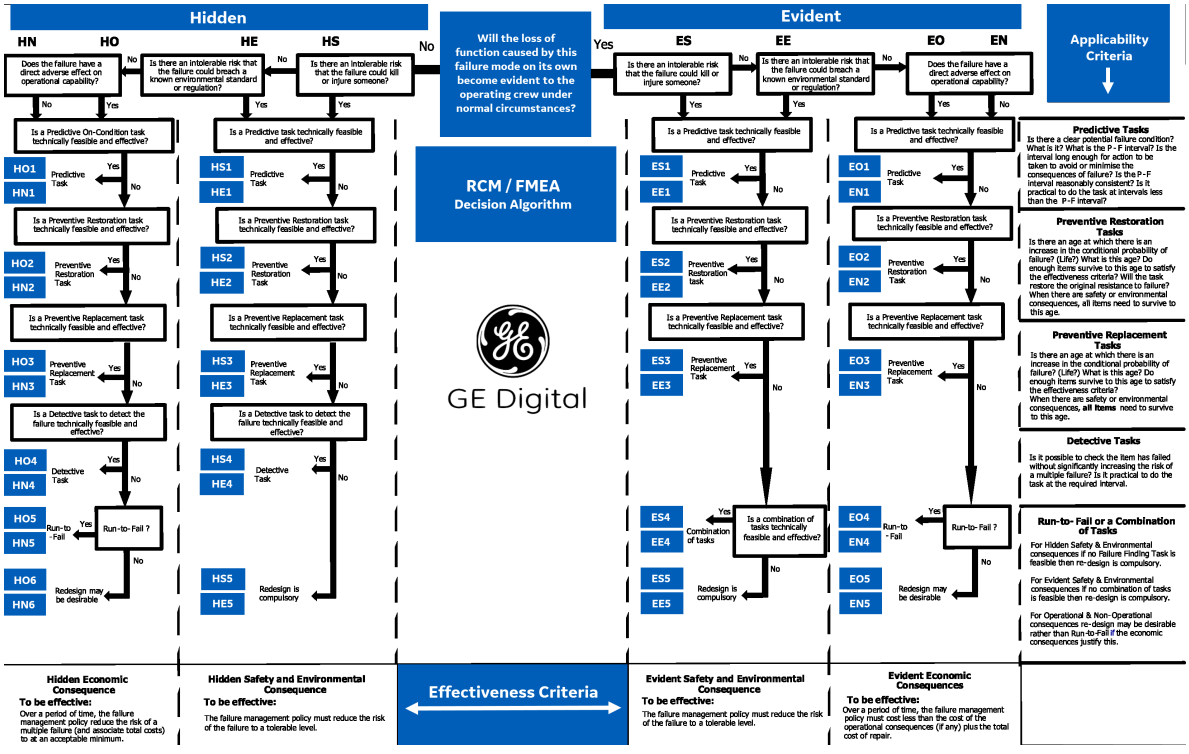
About Failure Effects

After all the Failure Modes have been defined, one or more Failure Effects can be defined for each Failure Mode. A Failure Effect documents the consequence of a failure occurring. Most RCM methodologies use Failure Effects to capture the safety, environmental, and economic (or production) impacts associated with a failure.

The SAE Standard JA1012, "Evaluation Criteria for Reliability-Centered Maintenance (RCM) Processes," defines the following requirements for Failure Effects:

- Failure Effects describe the cause if no specific task is done to anticipate, prevent, or detect the failure.
- Failure Effects include all the information needed to support the evaluation of the consequences of the failure, including the following data:
  - If the loss of function due to this failure mode becomes evident to the operating crew under normal circumstances.
  - If the failure (if anything) kills or injures someone.
  - If the failure (if anything) has an adverse effect on operational capability.
  - If the failure (if anything) breaches a known environmental standard or regulation.
  - If a predictive task technically feasible and effective.

The following Decision Logic Algorithm will help in evaluating the consequences of the failure:

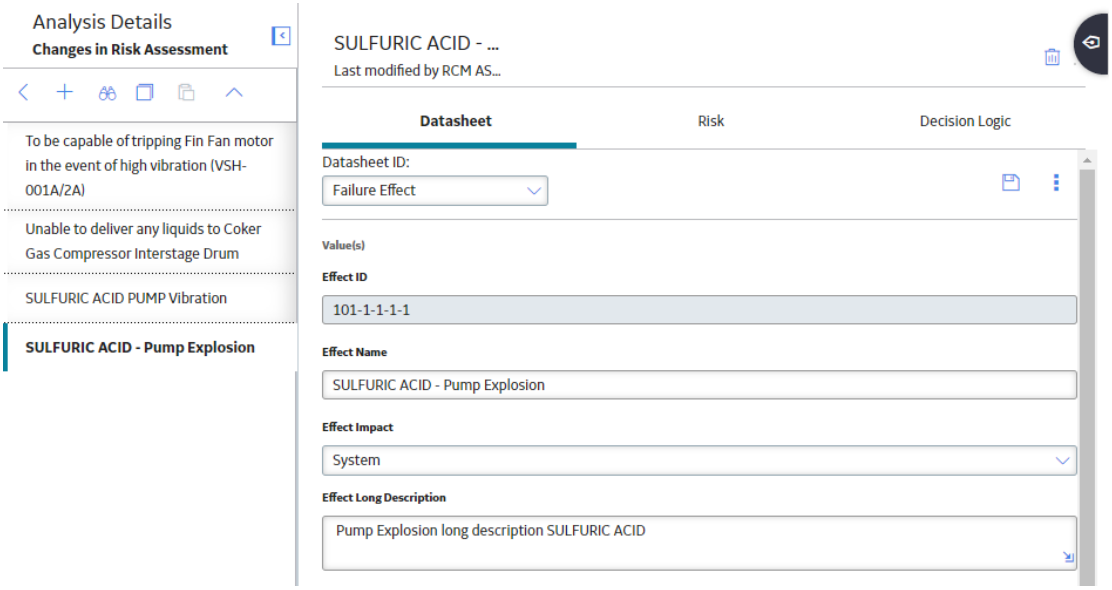


Access a Failure Effect

Procedure

1. Access the failure mode for which you want to access a failure effect.

2. In the pane, select the failure effect that you want to access.
   The datasheet for the selected failure effect appears in the workspace. The workspace also contains the following tabs:
   - **Risk:** Contains the risk associated with the selected failure effect.
   - **Decision Logic:** Contains a series of questions that will provide you a recommended action based on your responses.



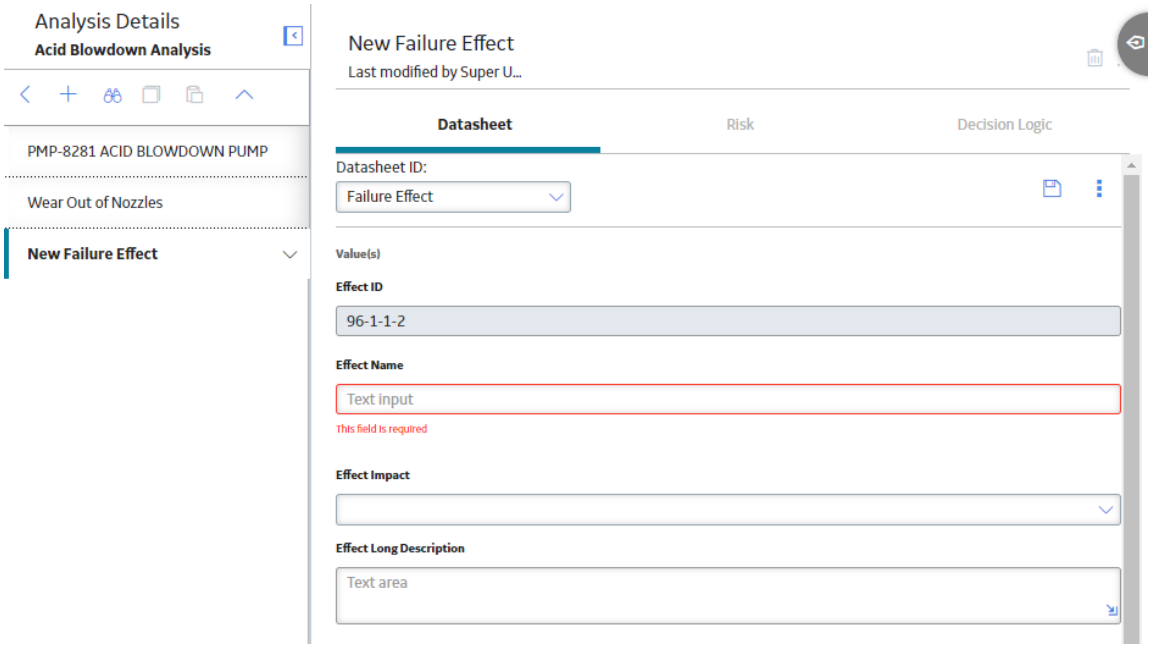
Create a Failure Effect

Before You Begin

This topic assumes that you have a pre-established RCM analysis with failure modes.

Procedure

1. Access the analysis for which you want to create a **Failure Effect**.
2. In the pane, select the function that contains the functional failure for which you want to create a failure effect.
   The list of functional failures for the selected function appears.
3. Select the functional failure for which you want to create a failure effect.
   The list of failure modes for the selected functional failure appears.
4. Select the failure mode for which you want to create a failure effect.
   The list of failure effects for the selected failure mode appears.
5. In the pane, select +, and then select **Add Failure Effect**.



6. As needed, enter values in the available fields.
7. Select .
   The failure effect is saved.

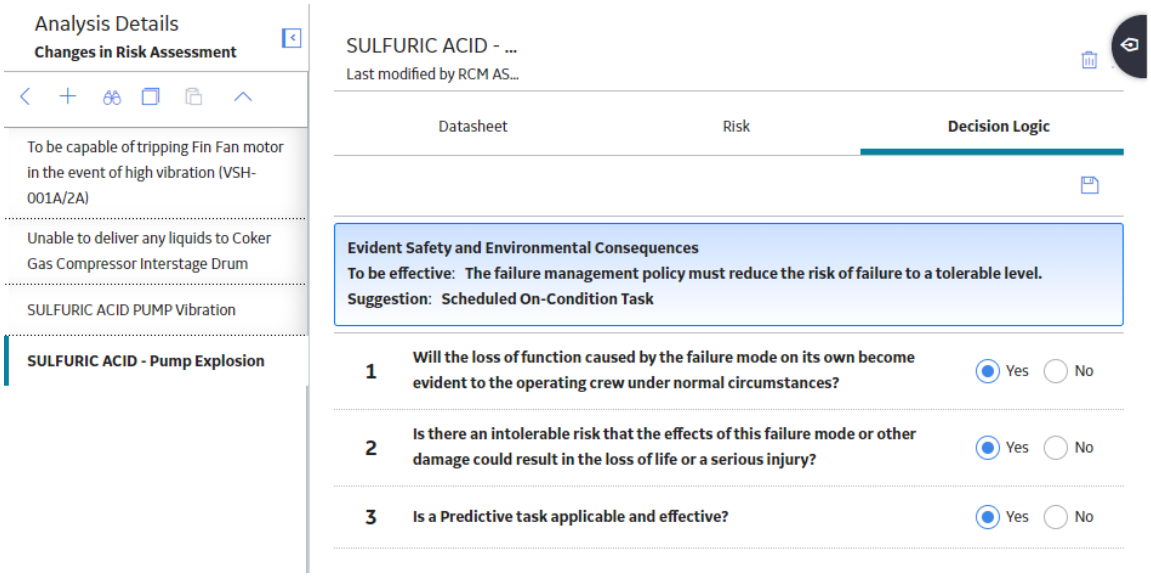
Use the Decision Logic Builder in RCM Failure Effects

Before You Begin

- The Decision Logic Builder guides you step-by-step through answering questions that will result in suggestions for mitigating a given failure effect. After you use the Decision Logic Builder to determine which actions should be taken to mitigate the effects of the failure, you can create Recommended Actions.
- The Decision Logic Builder will pose a series of Yes or No questions. When you complete all steps in the Decision Logic Builder, you will be presented with a recommended action that is based on your responses. You can then view a summary of your responses on the Decision Logic tab of the failure effect.
- The Decision Logic Builder is based upon the concepts and decision diagrams in SAE Standard JA1012, "A Guide to the Reliability-Centered Maintenance (RCM) Standard." The process and terminology used in the Decision Logic Builder are described in more detail in this standards document. To use the Decision Logic Builder effectively, you will need to be familiar with this standard.
- This topic assumes that you have a pre-established RCM analysis with failure modes.

Procedure

1. Access the **Failure Effect** for which you want to use Decision Logic.
2. Select the **Decision Logic** tab.
3. Select **Yes** or **No** to respond to the question.
   The next question is displayed immediately after you select the **Yes** or **No** button.



4. Continue selecting **Yes** or **No** in response to each question that appears. The number of questions that are presented will depend upon your responses.
   When you have responded to all the questions, a suggested action will appear.

   Note: Before the **Decision Logic** is saved, you can modify any of your previous answers by selecting the numbered button belonging to the answer that you want to change.
5. Select **Save.**

   Note: If you want to modify your responses, select on the **Decision Logic** tab, and then select the numbered button that belongs to the question to which you would like to modify the answer. Select **Save** to save the new Decision Logic recommendation. To abandon all modifications and retain previous values, you simply navigate anywhere away from the Decision Logic section.

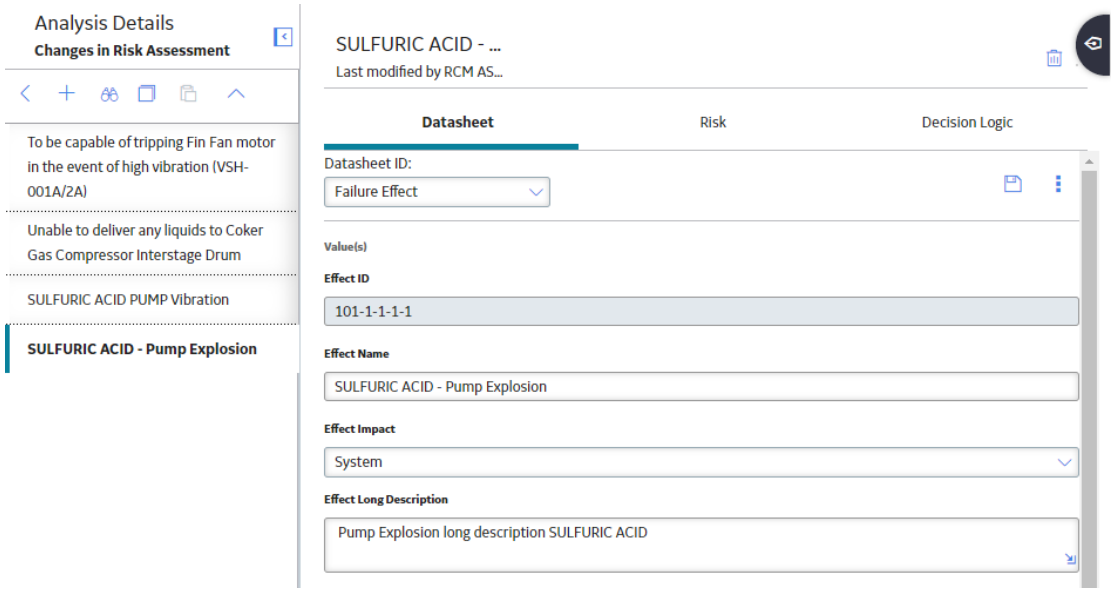
Modify a Failure Effect

Before You Begin

This topic assumes that you have a pre-established RCM analysis with failure modes.

Procedure

1. Access the failure mode for which you want to modify a failure effect.
2. In the pane, select the failure effect that you want to access.
   The datasheet for the selected failure effect appears in the workspace. The workspace also contains the following tabs:
   - **Risk:** Contains the risk associated with the selected failure effect.
   - **Decision Logic:** Contains a series of questions that will provide you a recommended action based on your responses.



3. As needed, modify the values in the available fields.
4. Select .
   The modifications to the failure effect are saved.

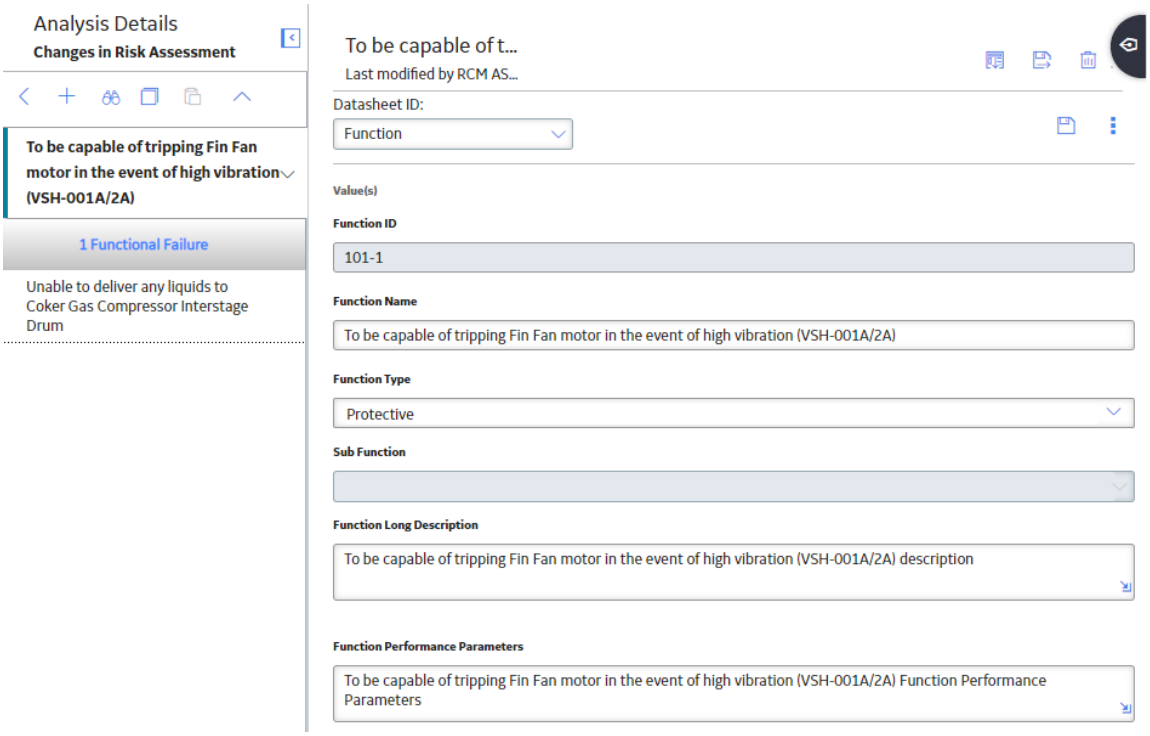
Delete a Failure Effect

Before You Begin

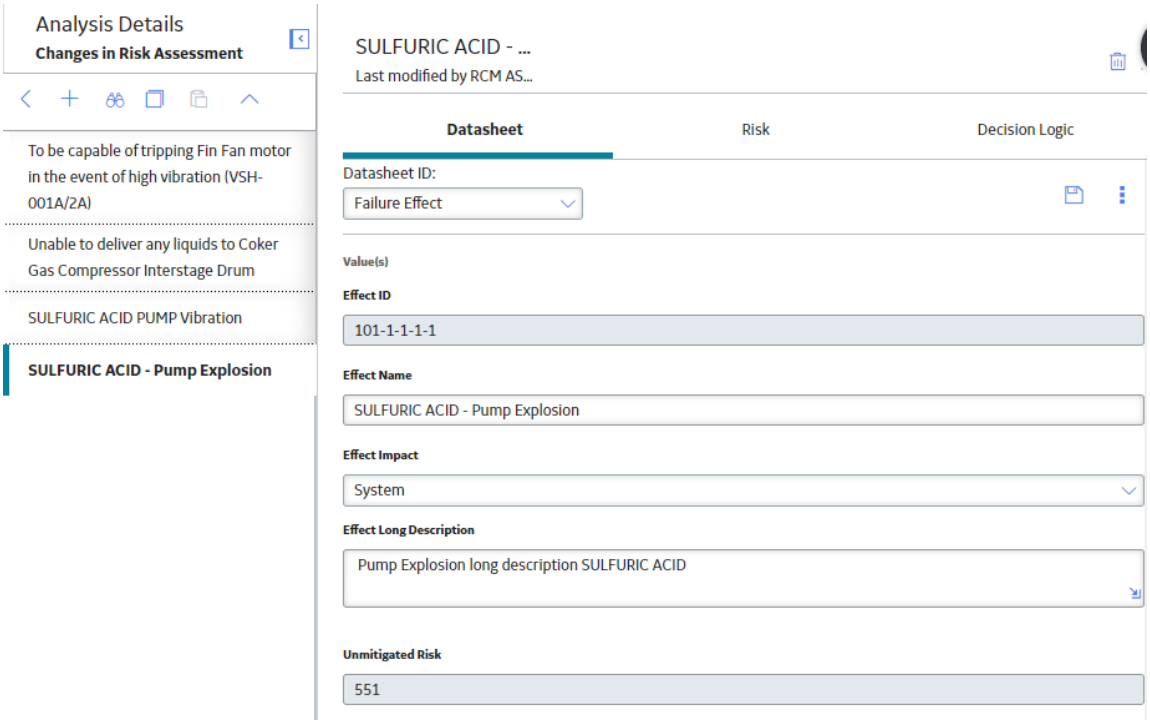
This topic assumes that you have a pre-established RCM analysis with failure modes.

Procedure

1. Access the RCM Overview page, and then select the **Analyses** tab.
   The list of analyses appears.
2. Select the analysis containing the Function whose Failure Effect you want to delete.
   In a new tab, the **Analysis Details** workspace for the selected analysis appears, displaying the **Analysis Identification** section.
3. In the pane, select the function that contains the Functional Failure whose Failure Effect you want to delete.
   In the left pane, the Functional Failures for the selected function appears.



4. In the left pane, select the Functional Failure whose Failure Effect you want to delete.
   In the pane, the Failure Modes for the selected Functional Failure appear.
5. In the pane, select the Failure Mode whose Failure Effect you want to delete.
   The workspace for the selected Failure Mode appears.
6. In the pane, select the **Failure Effect** that you want to delete.
   The workspace for the selected **Failure Effect** appears.



7. Select  .

A message appears, asking you to confirm that you want to delete your failure effect.

8. Select **Yes**.
   Your Failure Effect is deleted.

Chapter 9

Recommendations

Topics:

Manage Recommended Actions

Once an analysis is completed, Recommended Actions can be managed through the **Recommended Actions** pane. After Recommended Actions are successfully managed, the consolidated collection of Recommended Actions can be promoted to Asset Strategy Management.

You can access the **Recommended Actions** pane and add Recommended Actions from the **Failure Effect** workspace of an RCM or FMEA analysis.

Tip: For information about additional options available when working with the Recommendation records, refer to the Action Management section of the documentation.

Consolidate Recommended Actions

Before You Begin

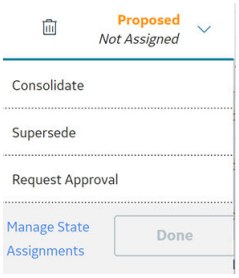
Note: This documentation assumes that you are working with Recommended Actions with subfamilies that include Consolidate.

Procedure

1. Access the **Recommended Actions** section.
2. Next to each Recommended Action that will be involved in the Consolidate operation, select the check box.

   Note: The Recommended Actions must be in the same family and same state.

3. In the page, select .
   The state control menu appears.



4. Select **Consolidate**, and then select **Done**.
   The **Consolidate Recommendations** window appears.
5. In the **Consolidate Recommendations** window, you can select either of the following options:
   - Select the dominant elements of the Recommended Actions that you are consolidating.

     -or-
   - Select **Merge Remaining Unselected**.
6. Select **Consolidate**.
   The selected Recommended Actions have been consolidated.

   Note: Any Secondary Actions that were linked to the recommendations and consolidated will be linked to the new consolidated target recommendation.

About SAE Standards in RCM Recommended Actions

Recommendation Management and SAE Standards

For each failure effect, one or more recommended actions can be defined. Generally, for the equipment or location and system owner, recommended actions should be designed to reduce to an acceptable level the probability and consequence of the related failure. Recommended Actions are the result of the Failure Mode and Risk Matrix Analysis. Each Failure Mode will have one or more Recommended Actions for how the failure can be avoided in the future.

After the Analysis team has fully analyzed the system, and while the information is still readily available, the team should define the criteria for reevaluation of the recommendation. For example, the analysis team can define whether a recommendation should be reevaluated based on time, a condition, a defined date, a system process change, or a change in the design code.

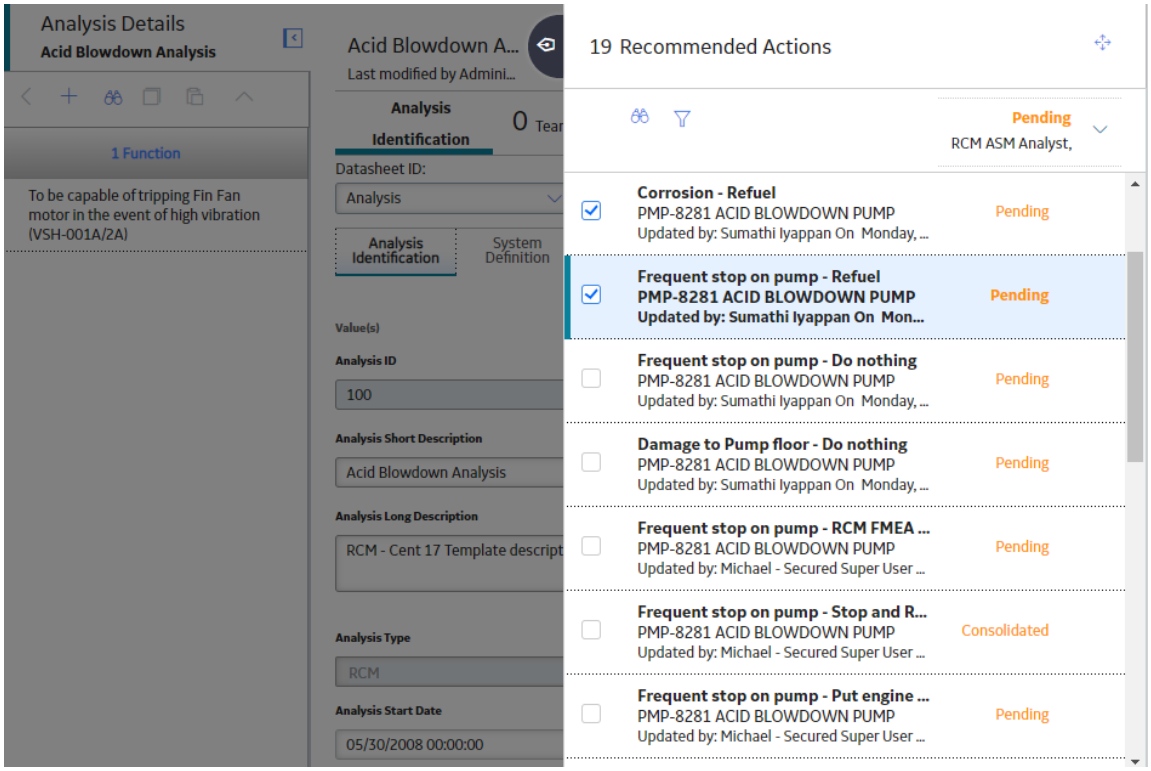
The SAE Standard JA1012, "Evaluation Criteria for Reliability-Centered Maintenance (RCM) Processes," specifies the following requirements for Recommended Actions. All Recommended Actions shall comply with the following criteria:

- In the case of an evident Failure Mode that has safety or environmental consequences, the task shall reduce the probability of the Failure Mode to a level that is tolerable to the owner or user of the asset.
- In the case of a hidden Failure Mode where the associated multiple failures have safety or environmental consequences, the task shall reduce the probability of the hidden Failure Mode to an extent which reduces the probability of the associated multiple failures to a level that is tolerable to the owner or user of the asset.
- In the case of an evident Failure Mode that does not have safety or environmental consequences, the direct and indirect costs of doing the task shall be less than the direct and indirect costs of the Failure Mode when measured over comparable periods of time.
- In the case of a hidden Failure Mode where the associated multiple failures do not have safety or environmental consequences, the direct and indirect costs of doing the task shall be less than the direct and indirect costs of the multiple failures plus the cost of repairing the hidden Failure Mode when measured over comparable periods of time.

Access Recommendations in RCM

Procedure

1. Access the **Failure Effect** for which you want to access recommendations.
2. Select  to expand the **Recommended Actions** pane.



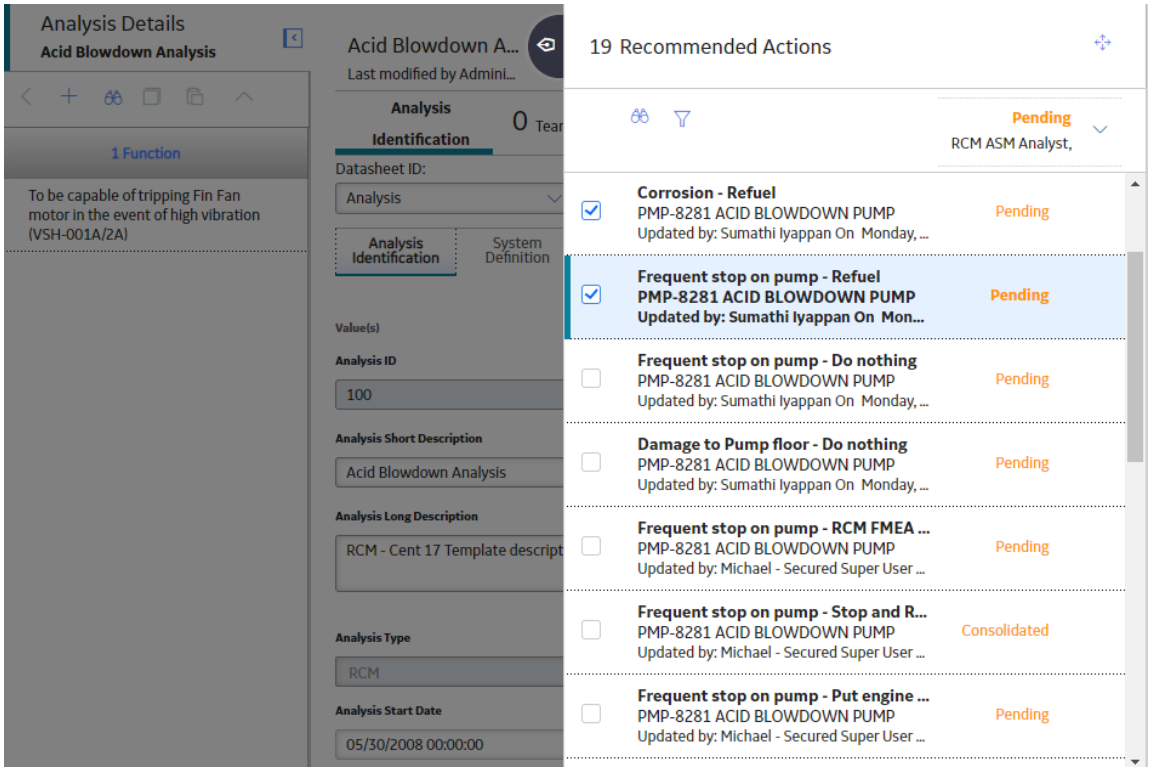
Note: To include action information in the recommendation, in the **Identification** section, select the **Action Information** tab, and then, as needed, enter values in the available fields.

Tip: For information about additional options available when working with recommendation records, refer to the Recommended Actions section of the documentation.

Add a Recommendation

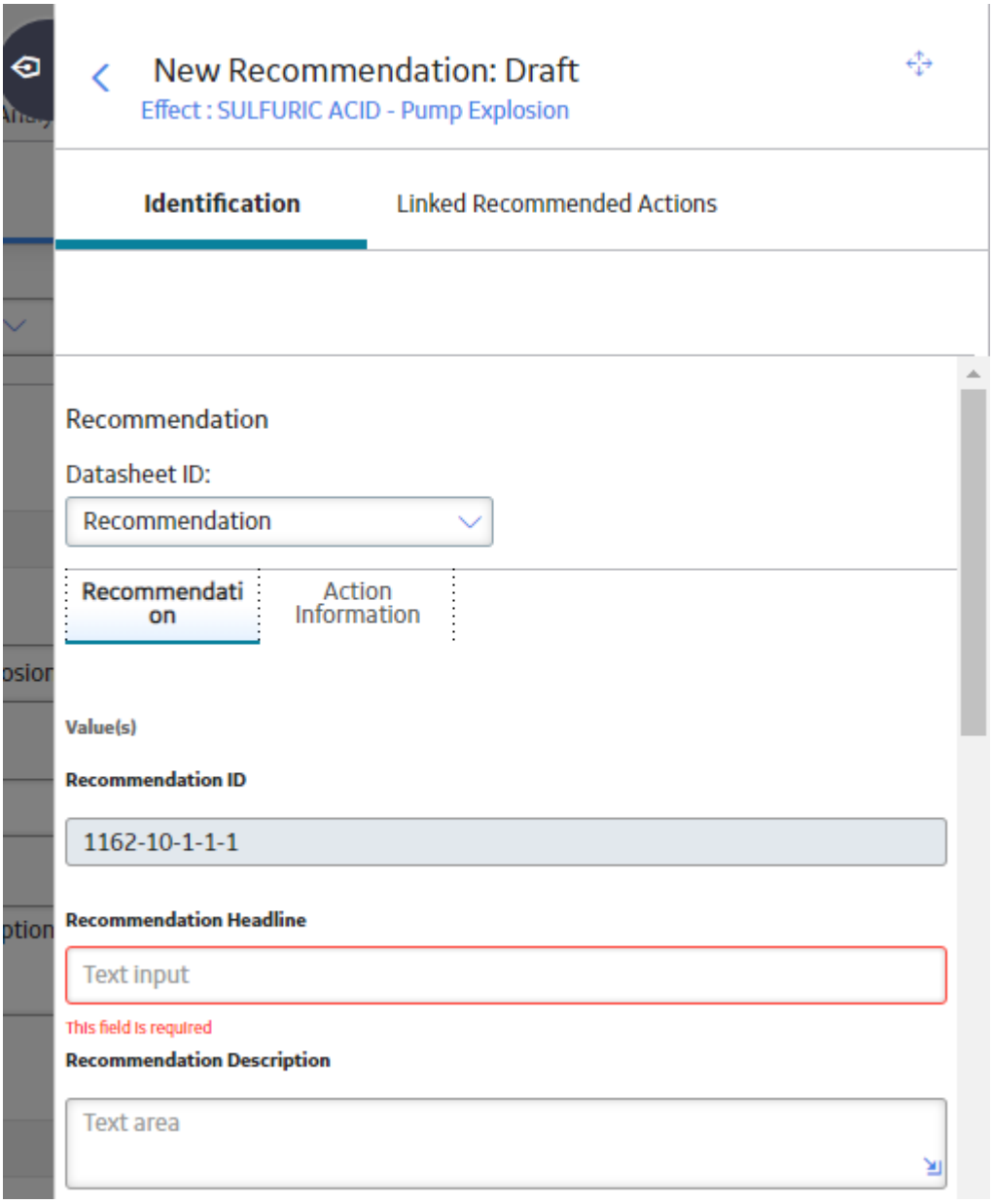
Procedure

1. Access the **Failure Effect** for which you want to add recommendations.
2. Select  to expand the **Recommendations** pane.



Note: If you want to expand the **Recommendations** pane, select at the upper right of the pane. Select it again to collapse the pane back to half size.

3. In the **Recommendations** pane, select +.
   The new recommendation pane appears, displaying the **Identification** section.



4. As needed, enter values in the available fields.
5. Optionally, to include action information in the recommendation, in the **Identification** section, select the **Action Information** tab, and then, as needed, enter values in the available fields.
6. Select .
   The Recommendation is saved.

Chapter 10

Secondary Actions

Topics:

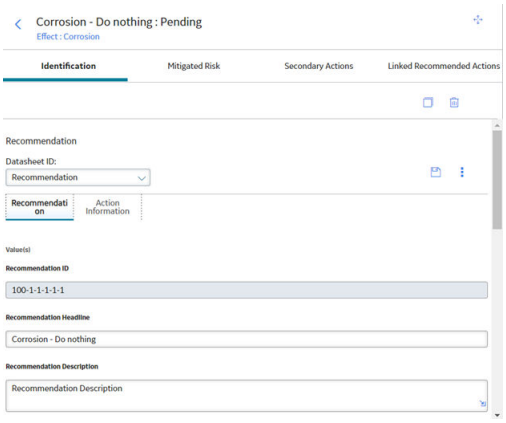
About Secondary Actions

A Secondary action is associated with a primary action. It defines the corrective actions that should be performed to mitigate an undesirable condition that is found while performing primary maintenance, monitoring, or data collection activity.

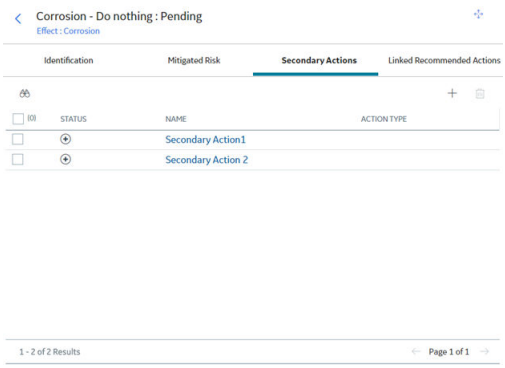
Access Secondary Actions

Procedure

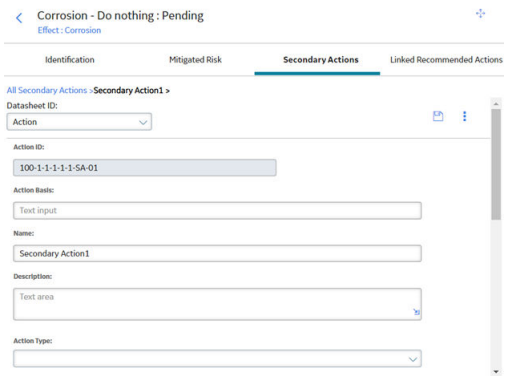
1. Access the **Recommendation** whose secondary actions you want to view.



2. Select the **Secondary Actions** tab.
   The **Secondary Actions** workspace appears displaying a list of associated secondary actions.



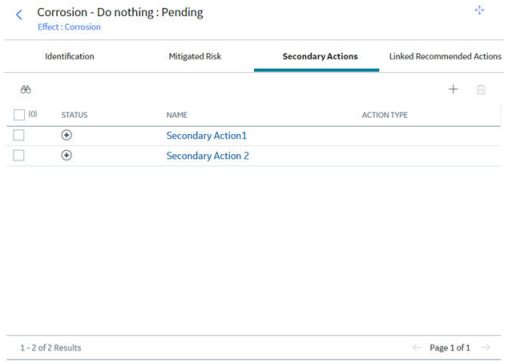
3. In the **Secondary Actions** section, select the action that you want to access.
   The datasheet for the selected secondary action appears.



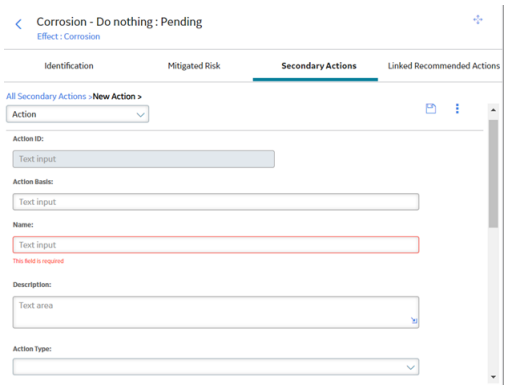
Create a Secondary Action

Procedure

1. Access **Secondary Actions**.
   The **Secondary Actions** workspace appears.



2. In the **Secondary Actions** section, select .
   A blank datasheet appears for the new secondary action record.

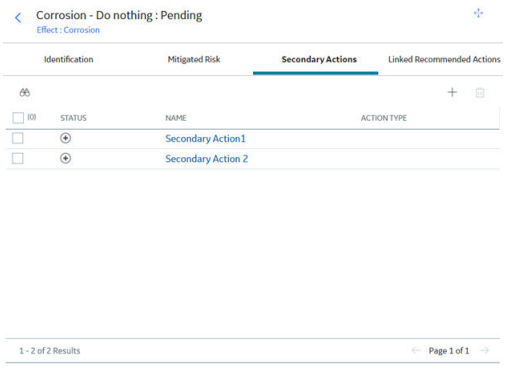


3. As needed, enter values in the available fields. For more information, refer to the RCM FMEA Recommendation Records section of the documentation.
4. Select .
   The record is saved.

Delete a Secondary Action

Procedure

1. Access **Secondary Actions**.
   The **Secondary Actions** workspace appears.



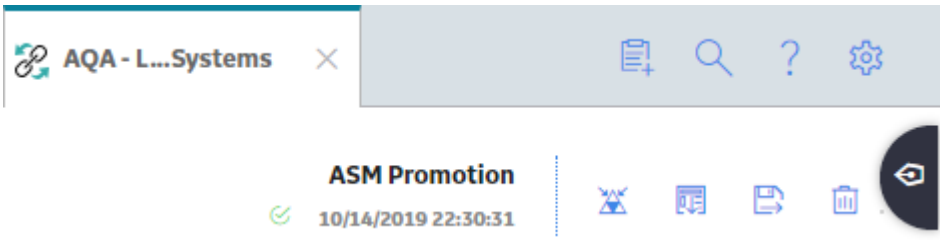
2. In the **Secondary Actions** section, select the row containing the secondary action that you want to delete, and then select .
   The secondary action is deleted.

Promote a Secondary Action to Strategy

Procedure

1. Access an Analysis on page 11.
2. In the workspace, select .
   A message appears, asking you to confirm that you want to promote all of the pending Secondary Actions to ASM.
3. Select **Yes**.
   A progress indicator appears. Once the process is complete, all the Secondary Actions are promoted from RCM to ASM, and the date and time of the last promotion appears.

   Note: If the process cannot be completed, an error message appears.



Chapter 11

Admin

Topics:

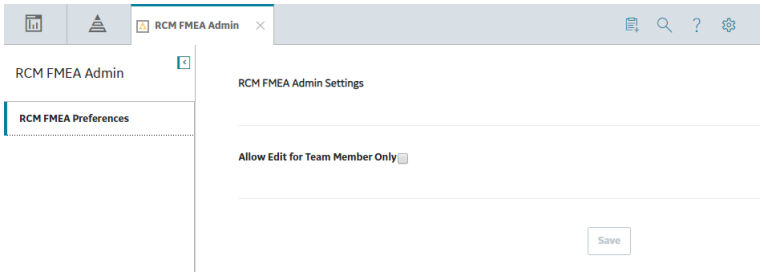
Access the RCM FMEA Admin Page

Before You Begin

- Ensure that your Reliability Centered Maintenance (RCM) license is active.
- Ensure that you are either a member of the MI RCM Administrator Security Group or a Super User.

Procedure

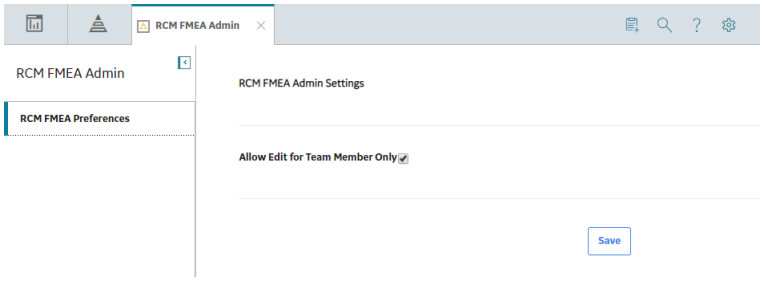
In the module navigation menu, select **Admin** > **Application Settings** > **RCM/FMEA**.
The **RCM FMEA Admin** page appears, displaying the **RCM FMEA Preferences** workspace.



Restrict Modifying the RCM Analysis and Child Records to Team Members Only

Procedure

1. Access the **RCM FMEA Admin** page.
2. Select the **Allow Edit For Team Member Only** check box, and then select **Save**.



Results

Only the Team Members can now modify the RCM Analysis and child records.

Chapter 12

Data Loader

Topics:

About the Reliability Centered Maintenance (RCM) Data Loader

The Reliability Centered Maintenance (RCM) Data Loader allows a user to load a full RCM Analysis from data in a fixed format Excel workbook. The Excel file provides worksheets that contain data to populate various nodes/records in the data model. These include RCM Analysis, Function, Functional Failure, Failure Mode, Failure Effects, Recommendations, mitigated and unmitigated risks, and Team members.

About the Reliability Centered Maintenance (RCM) Data Loader Requirements

The following data must be present prior to loading RCM data:

- Equipment Taxonomy
- Equipment and Functional Location records
- Team Member records

Mapping

The Reliability Centered Maintenance (RCM) Data Loader maps the datasheet columns in the Excel workbook to fields in GE Digital APM families by position. The captions may be changed as needed, but the column positions should not be moved.

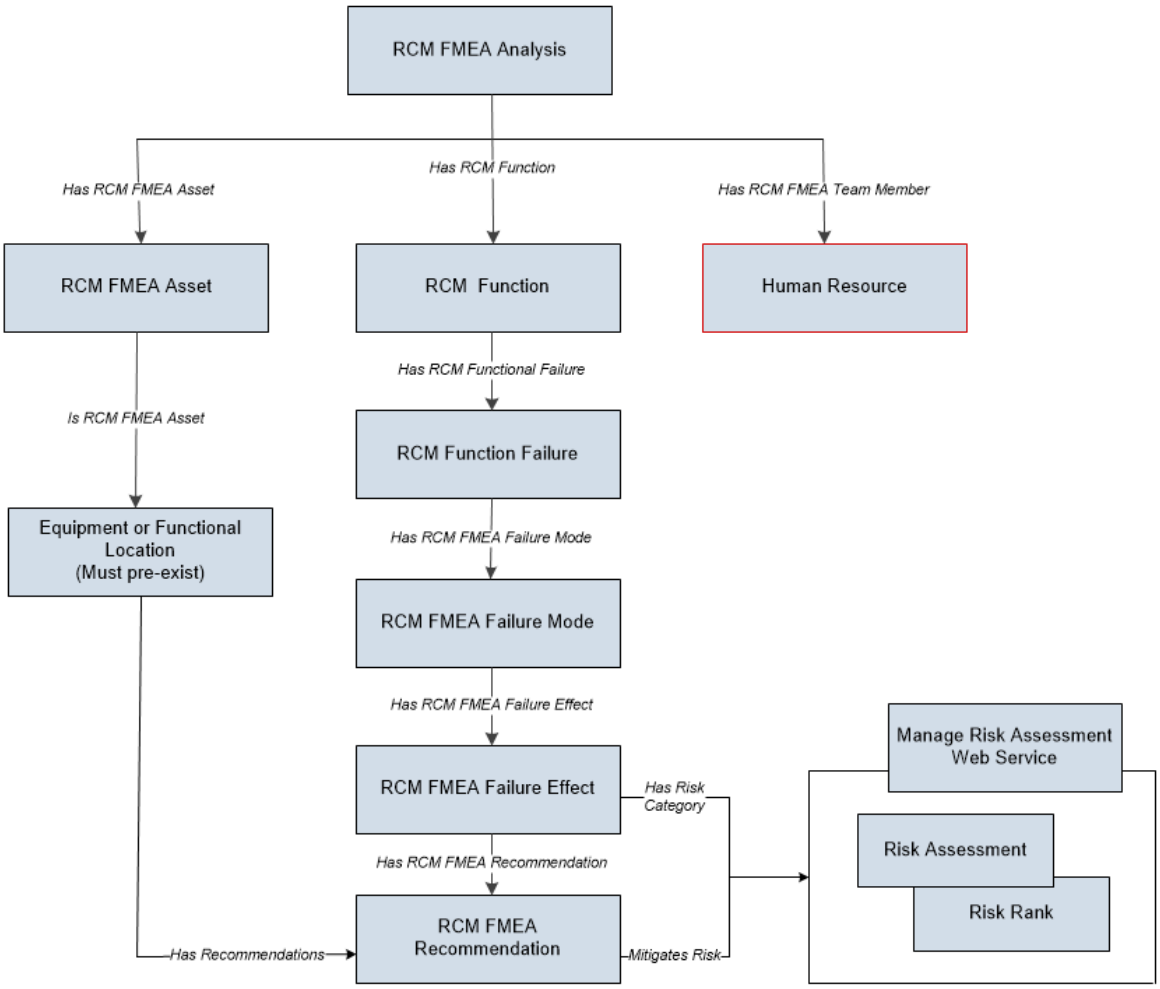
Security Settings

The Security User performing the data load operation must be associated with either the MI Data Loader User or MI Data Loader Admin Security Role as well as the MI Strategy Admin role or MI Strategy User role.

About the Reliability Centered Maintenance (RCM) Data Loader Data Model

The data for Reliability Centered Maintenance (RCM) families is loaded from a single Excel workbook containing multiple worksheets. This includes Analyses, Team Members, Functions, Functional Failures, Failure Modes, Failure Effects, and Recommendations.

Note: Elements outlined in red are not loaded by the data loader.



About the Reliability Centered Maintenance (RCM) Data Loader General Loading Strategy

This section describes any prerequisites to loading the data and the order in which the data will be loaded.

Note: Before reading this section, refer to the Data Model section.

Load Sequence

The RCM data load must be performed in a specific sequence to successfully populate fields, create records, and link them to the predecessor and/or successor records:

1. Create/Update RCM FMEA Analysis of type RCM.
2. Link the Existing Team Members to the Analysis. Team members exist in the Human Resource family and must exist prior to the load.
3. Create/Update an RCM FMEA Asset and link it to the analysis.
    a. Locate the physical asset (Equipment or FLOC) and link it to the RCM/FMEA Asset.
4. Create/Update RCM Function to the Analysis.
5. Create/Update RCM Functional Failure to the Function.

6. Create/Update a RCM FMEA Failure Mode to the Functional Failure.
7. Create/Update a Failure Effect and link it to the Failure Mode.
    a. Create the Unmitigated Risk Assessment and Risk Rank Records and link it to the Failure Effect.
8. Create/Update the RCM FMEA Recommendation and link it to the associated Failure Effect.
    a. Create the Mitigated Risk Assessment and Risk Rank Records and link it to the Failure Effect.
9. Create/Update RCM FMEA Secondary Actions and link it to the associated Recommendation.

About the Reliability Centered Maintenance (RCM) Data Loader Risk Assessment Management and Web Service

FMEA and RCM have mitigated and unmitigated risk assessments for Failure Effects and Recommendations respectively. Each Risk Assessment has related Risk Rank records which is in essence a sub-model. The FMEA loader uses the Risk Assessment service to manage the Risk Assessment and underlying Risk Rank records. Any changes here should be reflected in the Strategy FMEA Mappings Document.

Failure Effect

The Failure Effect also acts as the Risk Assessment record. Review the Failure Effect web service and you will see that the manage operation creates a Risk Ranks collection. There is no need to create an additional Risk Assessment record linked to the Failure Effect.

RCM FMEA Recommendation

The Recommendation will need to have a linked Risk Assessment record if there are mitigated values in the worksheet. The data loader should locate the Risk Assessment record linked to the Recommendation. If one exists, then update it.

If one does not exist, then use the Risk Assessment web service to create it and use the relationship Mitigates Risk [MIR_MITRISK] to relate it to the Recommendation.

Risk Assessment ID Field

You can use any combination of fields to uniquely identify the record, you are not limited to ID. The ID on the Risk Assessment record has no purpose but the Web Service requires it.

If the service requires an ID, then auto-generate is used with the understanding that it will not be used to do a lookup.

There are two entities and each has two scenarios with regards to the Risk Assessment. None of them require an ID since no attempt is being made to find a risk assessment by ID.

Entity	Scenario	Processing Assumptions	Additional Validation and Integrity Logic
Failure Effect	Unmitigated (Create new assessment)	Since the Failure Effect is the Risk Assessment, there is no need to create a Risk Assessment record.	The unmitigated fields on the Failure Effect Record should not be null if the user is loading RCM FMEA recommendations that have a mitigated risk rank. When created through the UI, the recommendation always inherits the unmitigated Risk Assessment from the failure effect and thus we could be creating a situation where there are Mitigated Risks without corresponding Unmitigated Risks. Conversely, a recommendation cannot have a Risk Assessment whose Failure Effect does not have one Risk Assessment, or else an out of sync condition will be created.
Failure Effect	Unmitigated (Update - assessment Exists)	Update the unmitigated risk fields on the failure effect	
RCM FMEA Recommendation	Mitigated (Create new assessment)	Check if there is an existing mitigated Risk Assessment linked to the Recommendation. There can only be one. If none exists, then one is created.	
RCM FMEA Recommendation	Mitigated (Update - assessment Exists)	Check if there is an existing mitigated risk assessment linked to the Failure Effect. If one does exist then update the Risk Assessment.	

About the Reliability Centered Maintenance (RCM) Data Loader Workbook Layout and Use

This section provides a high-level overview and explanation of how the data loader workbook is constructed.

In order to import data using the Reliability Centered Maintenance (RCM) Data Loader, GE Digital APM provides an Excel workbook, Reliability Centered Maintenance (RCM).xlsx, which supports baseline data loading RCM analysis in GE Digital APM.

The following table lists the worksheets that are included in the Reliability Centered Maintenance (RCM) Data Loader workbook.

Worksheet	Description
Configuration	This worksheet allows you to configure and group the fields which make family records unique when performing data loads.
Analysis	The analysis is the root record in the data model and is created first. Links to other records are established after the child record is created.

Worksheet	Description
Team Members	This worksheet is used to load data into the team members for the analysis. Team members are linked to the FMEA Analysis through the Has RCM FMEA Team Member relationship. **Note:** If the user wants to add team members, the individuals must already have an entry in GE Digital APM.
Functions	This worksheet is used to load data into the Functions for the analysis.
Functional Failures	This worksheet is used to load data into the Function Failures for the analysis.
Failure Modes	This worksheet is used to load data into the Failure Mode family node. The FMEA failure mode is linked directly to the virtual asset.
Failure Effects	This worksheet is used to load data into the Failure Effect family node. The failure effect is linked to both the Failure Mode and the associated recommendation. See the recommendation section for its relationship.
Recommendations	This worksheet is used to load data into the Recommendations. RCM Recommendations are linked to the associated Failure Effects. A Failure Effect can have multiple recommendations but each one must be unique.
Secondary Actions	This worksheet is used to load data into the Secondary Actions. Secondary Actions are linked to the associated Recommendations.

Analysis Worksheet

Field Caption	Field ID	Data Type (Length)	Comments
Analysis Short Description	MI_AN_SHORT_DESCR_CHR	Character (255)	This is a key field.
Analysis Long Description	MI_AN_LONG_DESCR_TX	Character (255)	None
Start Date	MI_AN_ANALY_START_DATE_DT	Date	None
End Date	MI_AN_ANALY_END_DATE_DT	Date	None
Re-Evaluation Date	MI_RCMANALY_ANALY_REEV_D	Date	None

Team Members Worksheet

Field Caption	Field ID	Data Type (Length)	Comments
Analysis Short Description	MI_AN_SHORT_DESCR_CHR	Character (255)	This is a key field.
User ID	SEUS_ID	Character (255)	This is a key field.

Relationship:

Predecessor	Relationship	Successor
MI_RCMANALY	MIR_HRCMTMMEM	MI Human Resource

Functions Worksheet

Field Caption	Field ID	Data Type (Length)	Comments
Analysis Short Description	MI_AN_SHORT_DESCR_CHR	Character (255)	This is a key field.
Function Name	MI_RCMFUNCN_NAME_C	Character (255)	This is a key field.
Function Type	MI_RCMFUNCN_TYPE_C	Character (40)	None
Sub Function	MI_RCMFUNCN_SUB_FUNCT_C	Character (50)	None
Function Long Description	MI_RCMFUNCN_LNG_DESC_T	Text	None
Function Performance Parameters	MI_RCMFUNCN_PRI_VAR_T	Text	None

Relationship:

Predecessor	Relationship	Successor
MI_RCMANALY	MIR_HRCMFNC	MI_RCMFUNCN

Functional Failures Worksheet

Field Caption	Field ID	Data Type (Length)	Comments
Analysis Short Description	MI_AN_SHORT_DESCR_CHR	Character (255)	This is a key field.
Function Name	MI_RCMFUNCN_NAME_C	Character (255)	This is a key field. Used to locate the Function ID for the Analysis.
Function Failure Name	MI_RCMFFAIL_NAME_C	Character (255)	This is a key field.
Functional Long Description	MI_RCMFFAIL_LNG_DESC_T	Text	None

Failure Modes Worksheet

Field Caption	Field ID	Data Type (Length)	Comments
Analysis Short Description	MI_AN_SHORT_DESCR_CHR	Character (255)	This is a key field.
Function Name	MI_RCMFUNCN_NAME_C	Character (255)	This is a key field.
Function Failure Name	MI_RCMFFAIL_NAME_C	Character (255)	This is a key field.
Failure Mode Name	MI_RCMFMODE_NAME_C	Character (255)	This is a key field.
Asset ID Value	ASSET_ID_CHR	Character (50)	This is a key field.
Asset ID Field	ASSET_FIELD_ID	Character	This is a key field.
Asset Family ID	ASSET_FAMILY_ID	Character	This is a key field.
CMMS ID	ASSET_CMMS_ID	Character	None
CMMS Value	ASSET_CMMS_VALUE	Character (50)	None
Long Description	MI_RCMFMODE_LNG_DESC_T	Text	None
Maintainable Item	MI_RCMFMODE_MAINT_ITEM_C	Character (50)	None
Damage Code	MI_RCMFMODE_CONDI_DAMA_C	Character (50)	None
Failure Pattern	MI_RCMFMODE_FAIL_SHP_FACT_C	Character (40)	None
PF Interval	MI_RCMFMODE_PF_INTER_N	Numeric	None
PF Interval Units	MI_RCMFMODE_PF_INTER_UNITS_C	Character (40)	None

Relationships:

Predecessor	Relationship	Successor	Comment
MI_RCMEQPMT	MIR_HRCMFMD	MI_RCMFMODE	Links to Equipment RCM FMEA Asset
MI_RCMFUNCN	MIR_HRCMFFL	MI_RCMFMODE	Links Failure Mode to RCM Function

Failure Effects Worksheet

Source Field Name	Field ID	Data Type (Length)	Comments
Analysis Short Description	MI_AN_SHORT_DESCR_CHR	Character (255)	This is a key field.
Function Name	MI_RCMFUNCN_NAME_C	Character (255)	This is a key field.
Function Failure Name	MI_RCMFFAIL_NAME_C	Character (255)	This is a key field.

Source Field Name	Field ID	Data Type (Length)	Comments
Failure Mode Name	MI_RCMFMODE_NAME_C	Character (255)	This is a key field.
Effect Name	MI_RCMFEFFT_NAME_C	Character (255)	None
Effect Long Description	MI_RCMFEFFT_LNG_DESC_T	Text	None
Effect Impact	MI_RCMFEFFT_EFF_IMPACT_C	Character (40)	None
(ENVIRONMENT) Consequence	ENVIRONMENT|MI_CONSE_N	Numeric	None
(ENVIRONMENT) Probability	ENVIRONMENT|MI_PROB_N	Numeric	None
(FINANCIAL) Consequence	FINANCIAL|MI_CONSE_N	Numeric	None
(FINANCIAL) Maintenance Cost	FINANCIAL| MI_RISK_MAIN_COST_N	Numeric	None
(FINANCIAL) Probability	FINANCIAL|MI_PROB_N	Numeric	None
(FINANCIAL) Production Loss	FINANCIAL| MI_RISK_PROD_LOSS_N	Numeric	None
(OPERATIONS) Consequence	OPERATIONS|MI_CONSE_N	Numeric	None
(OPERATIONS) Probability	OPERATIONS|MI_PROB_N	Numeric	None
(SAFETY) Consequence	SAFETY|MI_CONSE_N	Numeric	None
(SAFETY) Probability	SAFETY|MI_PROB_N	Numeric	None
Basis for Assessment	MI_RCMFEFFT_BASIS_T	Text	None

Relationships:

Predecessor	Relationship	Successor
MI_RCMFMODE	MIR_HRCMFEF	MI_RCMFEFFT

Recommendations Worksheet

Source Field Name	Field ID	Data Type (Length)	Comments
Analysis Short Description	MI_AN_SHORT_DESCR_CHR	Character (255)	This is a key field.
Function Name	MI_RCMFUNCN_NAME_C	Character (255)	This is a key field.
Functional Failure Name	MI_RCMFFAIL_NAME_C	Character (255)	This is a key field.
Failure Mode Name	MI_RCMFMODE_NAME_C	Character (255)	This is a key field.
Effect Name	MI_RCMFEFFT_NAME_C	Character (255)	This is a key field.
Headline	MI_REC_SHORT_DESCR_CHR	Character (255)	None
Description	MI_REC_LONG_DESCR_TX	Text	None

Source Field Name	Field ID	Data Type (Length)	Comments
Business Impact	MI_REC_IMPAC_CHR	Character (100)	None
Shutdown Required?	MI_RECRCM_SYS_SHUTDN_REQ_L	Boolean	None
Target Completion Date	MI_REC_TARGE_COMPL_DATE_DT	Date	None
Action Type	MI_RECRCM_ACTIO_TYPE_C	Character (5)	None
Interval	MI_RECRCM_INTER_N	Numeric	None
Interval Units	MI_RECRCM_INTER_UNITS_C	Character (50)	None
Nonrecurring	MI_RECRCM_NONRE_L	Boolean	Defaults to False when no value.
Performance Interval	MI_RECRCM_PERFO_INTER_N	Numeric	None
Performance Interval Units	MI_RECRCM_PERFO_INTER_UNITS_C	Character (50)	None
Estimated Cost	MI_RECRCM_ESTIM_COST_N	Numeric	None
Estimated Cost Basis	MI_RECRCM_COST_BASIS_C	Character (255)	None
Recommended Resource	MI_RECRCM_RECOMM_RSRC_C	Character	Must match a resource configured in the system picklist for this field.
(ENVIRONMENT) Consequence	ENVIRONMENT|MI_CONSE_N	Numeric	None
(ENVIRONMENT) Probability	ENVIRONMENT|MI_PROB_N	Numeric	None
(FINANCIAL) Consequence	FINANCIAL|MI_CONSE_N	Numeric	None
(FINANCIAL) Maintenance Cost	FINANCIAL| MI_RISK_MAIN_COST_N	Numeric	None
(FINANCIAL) Probability	FINANCIAL|MI_PROB_N	Numeric	None
(FINANCIAL) Production Loss	FINANCIAL| MI_RISK_PROD_LOSS_N	Numeric	None
(OPERATIONS) Consequence	OPERATIONS|MI_CONSE_N	Numeric	None
(OPERATIONS) Probability	OPERATIONS|MI_PROB_N	Numeric	None
(SAFETY) Consequence	SAFETY|MI_CONSE_N	Numeric	None
(SAFETY) Probability	SAFETY|MI_PROB_N	Numeric	None
Basis for Assessment	MI_RCMFEFFT_BASIS_T	Text	None

Relationships:

Predecessor	Relationship	Successor
MI_RCMFEFFT	MIR_HRCMREC	MI_RECRCM

Secondary Actions Worksheet

Source Field Name	Field ID	Data Type (Length)	Comments
Analysis Short Description	MI_AN_SHORT_DESCR_CHR	Character (255)	This is a key field.
Function Name	MI_RCMFUNCN_NAME_C	Character (255)	This is a key field.
Functional Failure Name	MI_RCMFFAIL_NAME_C	Character (255)	This is a key field.
Failure Mode Name	MI_RCMFMODE_NAME_C	Character (255)	This is a key field.
Effect Name	MI_RCMFEFFT_NAME_C	Character (255)	This is a key field.
Recommendation Headline	MI_REC_SHORT_DESCR_CHR	Character (255)	None
Name	MI_ACTION_SHORT_DESC_C	Character (255)	None
Description	MI_ACTION_DESCRIPTION_T	Character (255)	None
Basis	MI_ACTION_BASIS_C	Character (255)	None
Type	MI_ACTION_TYPE_C	Character (255)	None
Condition Monitoring Type	MI_ACTION_CM_TYPE_C	Character(50)	None
Interval	MI_ACTION_INTV_N	Numeric	None
Interval Units	MI_ACTION_INTV_UNITS_C	Character(50)	None
Resource Cost	MI_ACTION_RESOURCE_COST_N	Numeric	None
Shutdown Required	MI_ACTION_SHUTDOWN_L	Boolean	None

Relationship:

Predecessor	Relationship	Successor
MI_RECRCM	MIR_HS_SEC_ACTN	MI_ACTION

About the Reliability Centered Maintenance (RCM) Analysis Template Data Loader Workbook Layout and Use

This section provides a high-level overview and explanation of how the data loader workbook is constructed.

The following table lists the worksheets that are included in the RCM Analysis Template workbook.

Worksheet	Description
Templates	This worksheet is used to load data into the templates.
Analyses	The analyses are the root records in the data model and are created first. Links to other records are established after the child records are created.
Team Members	This worksheet is used to load data into the team members for the analysis. Team members are linked to the RCM Analysis through the Has RCM FMEA Team Member relationship. **Note:** If the user wants to add team members, the individuals must already have an entry in GE Digital APM.
Functions	This worksheet is used to load data into the Functions for the analysis template.
Functional Failures	This worksheet is used to load data into the Function Failures for the analysis template.
Failure Modes	This worksheet is used to load data into the Failure Mode family node.
Failure Effects	This worksheet is used to load data into the Failure Effect family node. The failure effect is linked to both the Failure Mode and the associated recommendation. See the recommendation section for its relationship.
Recommendations	This worksheet is used to load data into the Recommendations. RCM Recommendations are linked to the associated Failure Effects. A Failure Effect can have multiple recommendations but each one must be unique.
Secondary Actions	This worksheet is used to load data into the Secondary Actions. Secondary Actions are linked to the associated Recommendations.

Templates Worksheet

Field Caption	Field ID	Data Type (Length)	Comments
Template ID	MI_TM000000_ID	Character (255)	This is used to identify a template.
Site Reference Name	MI_SITEREF_NAME_C	Character (255)	This is a key field.
Template Short Description	MI_TM000000_SHRT_DSC_C	Character (255)	None
Template Long Description	MI_TM000000_LNG_DSC_T	Text	None

Analyses Worksheet

Field Caption	Field ID	Data Type (Length)	Comments
Template ID	MI_TM000000_ID	Character (255)	This is used to identify the template.
Analysis Short Description	MI_AN_SHORT_DESCR_CHR	Character (255)	This is a key field.
Analysis Long Description	MI_AN_LONG_DESCR_TX	Text	None
Start Date	MI_AN_ANALY_START_DATE_DT	Date	None
End Date	MI_AN_ANALY_END_DATE_DT	Date	None
Re-Evaluation Date	MI_RCMANALY_ANALY_REEV_D	Date	None

Team Members Worksheet

Field Caption	Field ID	Data Type (Length)	Comments
Template ID	MI_TM000000_ID	Character (255)	This is used to identify the template.
User ID	SEUS_ID	Character (255)	This is a key field.

Functions Worksheet

Field Caption	Field ID	Data Type (Length)	Comments
Template ID	MI_TM000000_ID	Character (255)	This is used to identify the template.
Analysis Short Description	MI_AN_SHORT_DESCR_CHR	Character (255)	This is a key field.
Function Name	MI_RCMFUNCN_NAME_C	Character (255)	This is a key field.
Function Type	MI_RCMFUNCN_TYPE_C	Character (40)	None
Sub Function	MI_RCMFUNCN_SUB_FUNCT_C	Character (50)	None
Function Long Description	MI_RCMFUNCN_LNG_DESC_T	Text	None
Function Performance Parameters	MI_RCMFUNCN_PRI_VAR_T	Text	None

Relationship:

Predecessor	Relationship	Successor
MI_RCMANALY	MIR_HRCMFNC	MI_RCMFUNCN

Functional Failures Worksheet

Field Caption	Field ID	Data Type (Length)	Comments
Template ID	MI_TM000000_ID	Character (255)	This is used to identify the template.
Analysis Short Description	MI_AN_SHORT_DESCR_CHR	Character (255)	This is a key field.
Function Name	MI_RCMFUNCN_NAME_C	Character (255)	This is a key field. This is used to identify the Function ID for the Analysis.
Function Failure Name	MI_RCMFFAIL_NAME_C	Character (255)	This is a key field.
Functional Long Description	MI_RCMFFAIL_LNG_DESC_T	Text	None

Failure Modes Worksheet

Field Caption	Field ID	Data Type (Length)	Comments
Template ID	MI_TM000000_ID	Character (255)	This is used to identify the template.
Analysis Short Description	MI_AN_SHORT_DESCR_CHR	Character (255)	This is a key field.
Function Name	MI_RCMFUNCN_NAME_C	Character (255)	This is a key field.
Function Failure Name	MI_RCMFFAIL_NAME_C	Character (255)	This is a key field.
Failure Mode Name	MI_RCMFMODE_NAME_C	Character (255)	This is a key field.
Asset ID	MI_RCMEQPMT_EQUIP_ID_C	Character (255)	This is a key field.
Asset Description	MI_RCMEQPMT_SHORT_DESC_C	Character (255)	This is a key field.
Long Description	MI_RCMFMODE_LNG_DESC_T	Text	None
Maintainable Item	MI_RCMFMODE_MAINT_ITEM_C	Character (50)	None
Damage Code	MI_RCMFMODE_CONDI_DAMA_C	Character (50)	None
Failure Pattern	MI_RCMFMODE_FAIL_SHP_FACT_C	Character (40)	None
PF Interval	MI_RCMFMODE_PF_INTER_N	Numeric	None
PF Interval Units	MI_RCMFMODE_PF_INTER_UNITS_C	Character (40)	None

Failure Effects Worksheet

Field Caption	Field ID	Data Type (Length)	Comments
Template ID	MI_TM000000_ID	Character (255)	This is used to identify the template.
Analysis Short Description	MI_AN_SHORT_DESCR_CHR	Character (255)	This is a key field.
Function Name	MI_RCMFUNCN_NAME_C	Character (255)	This is a key field.
Function Failure Name	MI_RCMFFAIL_NAME_C	Character (255)	This is a key field.
Failure Mode Name	MI_RCMFMODE_NAME_C	Character (255)	This is a key field.
Effect Name	MI_RCMFEFFT_NAME_C	Character (255)	This is a key field.
Effect Long Description	MI_RCMFEFFT_LNG_DESC_T	Text	None
Effect Impact	MI_RCMFEFFT_EFF_IMPACT_C	Character (40)	None
(ENVIRONMENT) Consequence	ENVIRONMENT|MI_CONSE_N	Numeric	None
(ENVIRONMENT) Probability	ENVIRONMENT|MI_PROB_N	Numeric	None
(FINANCIAL) Consequence	FINANCIAL|MI_CONSE_N	Numeric	None
(FINANCIAL) Maintenance Cost	FINANCIAL| MI_RISK_MAIN_COST_N	Numeric	None
(FINANCIAL) Probability	FINANCIAL|MI_PROB_N	Numeric	None
(FINANCIAL) Production Loss	FINANCIAL| MI_RISK_PROD_LOSS_N	Numeric	None
(OPERATIONS) Consequence	OPERATIONS|MI_CONSE_N	Numeric	None
(OPERATIONS) Probability	OPERATIONS|MI_PROB_N	Numeric	None
(SAFETY) Consequence	SAFETY|MI_CONSE_N	Numeric	None
(SAFETY) Probability	SAFETY|MI_PROB_N	Numeric	None
Basis for Assessment	MI_RCMFEFFT_BASIS_T	Text	None

Recommendations Worksheet

Field Caption	Field ID	Data Type (Length)	Comments
Template ID	MI_TM000000_ID	Character (255)	This is used to identify the template.
Analysis Short Description	MI_AN_SHORT_DESCR_CHR	Character (255)	This is a key field.
Function Name	MI_RCMFUNCN_NAME_C	Character (255)	This is a key field.
Function Failure Name	MI_RCMFFAIL_NAME_C	Character (255)	This is a key field.
Failure Mode Name	MI_RCMFMODE_NAME_C	Character (255)	This is a key field.
Effect Name	MI_RCMFEFFT_NAME_C	Character (255)	This is a key field.

Field Caption	Field ID	Data Type (Length)	Comments
Headline	MI_REC_SHORT_DESCR_CHR	Character (255)	None
Description	MI_REC_LONG_DESCR_TX	Text	None
Business Impact	MI_REC_IMPAC_CHR	Character (100)	None
Shutdown Required?	MI_RECRCM_SYS_SHUTDN_REQ_L	Boolean	None
Target Completion Date	MI_REC_TARGE_COMPL_DATE_DT	Date	None
Action Type	MI_RECRCM_ACTIO_TYPE_C	Character (5)	None
Interval	MI_RECRCM_INTER_N	Numeric	None
Interval Units	MI_RECRCM_INTER_UNITS_C	Character (50)	None
Nonrecurring	MI_RECRCM_NONRE_L	Logical	Defaults to False when no value.
Performance Interval	MI_RECRCM_PERFO_INTER_N	Numeric	None
Performance Interval Units	MI_RECRCM_PERFO_INTER_UNITS_C	Character (50)	None
Estimated Cost	MI_RECRCM_ESTIM_COST_N	Numeric	None
Estimated Cost Basis	MI_RECRCM_COST_BASIS_C	Character (255)	None
Recommended Resource	MI_RECRCM_RECOMM_RSRC_C	Character	Must match a resource configured in the system picklist for this field.
(ENVIRONMENT) Consequence	ENVIRONMENT|MI_CONSE_N	Numeric	None
(ENVIRONMENT) Probability	ENVIRONMENT|MI_PROB_N	Numeric	None
(FINANCIAL) Consequence	FINANCIAL|MI_CONSE_N	Numeric	None
(FINANCIAL) Maintenance Cost	FINANCIAL|MI_RISK_MAIN_COST_N	Numeric	None
(FINANCIAL) Probability	FINANCIAL|MI_PROB_N	Numeric	None
(FINANCIAL) Production Loss	FINANCIAL|MI_RISK_PROD_LOSS_N	Numeric	None
(OPERATIONS) Consequence	OPERATIONS|MI_CONSE_N	Numeric	None
(OPERATIONS) Probability	OPERATIONS|MI_PROB_N	Numeric	None
(SAFETY) Consequence	SAFETY|MI_CONSE_N	Numeric	None
(SAFETY) Probability	SAFETY|MI_PROB_N	Numeric	None
Basis for Assessment	MI_RCMFEFFT_BASIS_T	Text	None

Secondary Actions Worksheet

Field Caption	Field ID	Data Type (Length)	Comments
Template ID	MI_TM000000_ID	Character (255)	This is used to identify the template.
Analysis Short Description	MI_AN_SHORT_DESCR_CHR	Character (255)	This is a key field.
Function Name	MI_RCMFUNCN_NAME_C	Character (255)	This is a key field.
Functional Failure Name	MI_RCMFFAIL_NAME_C	Character (255)	This is a key field.
Failure Mode Name	MI_RCMFMODE_NAME_C	Character (255)	This is a key field.
Effect Name	MI_RCMFEFFT_NAME_C	Character (255)	This is a key field.
Recommendation Headline	MI_REC_SHORT_DESCR_CHR	Character (255)	None
Name	MI_ACTION_SHORT_DESC_C	Character (255)	None
Description	MI_ACTION_DESCRIPTION_T	Character (255)	None
Basis	MI_ACTION_BASIS_C	Character (255)	None
Type	MI_ACTION_TYPE_C	Character (255)	None
Condition Monitoring Type	MI_ACTION_CM_TYPE_C	Character(50)	None
Interval	MI_ACTION_INTV_N	Numeric	None
Interval Units	MI_ACTION_INTV_UNITS_C	Character(50)	None
Resource Cost	MI_ACTION_RESOURCE_COST_N	Numeric	None
Shutdown Required	MI_ACTION_SHUTDOWN_L	Boolean	None

Predecessor	Relationship	Successor
MI_RECRCM	MIR_HS_SEC_ACTN	MI_ACTION

Chapter 13

Deployment

Topics:

Deployment and Upgrade

Deployment and Upgrade content for various GE Digital APM modules has been consolidated into a single document. For more information, refer to the module-specific information in the APM Module Deployment and Upgrade document.

Chapter 14

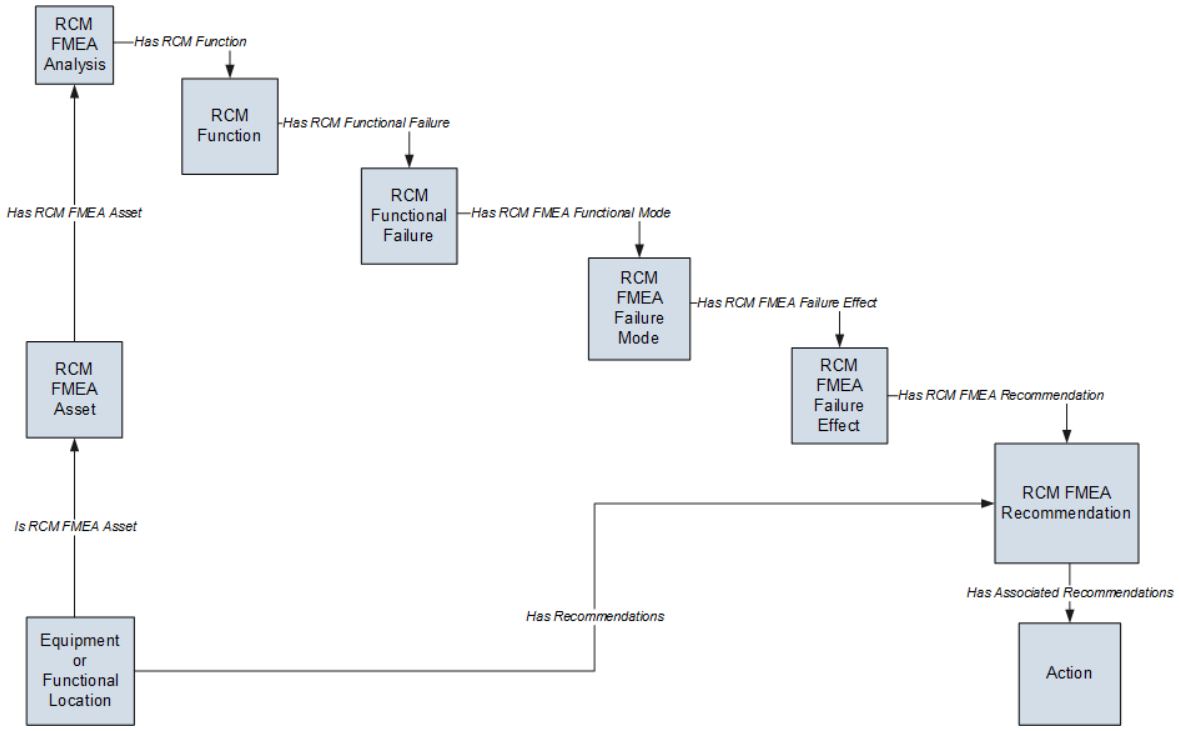
Reference

Topics:

General Reference

RCM Data Model

The following diagram shows how the families used in RCM are related to one another.



Note: In the diagram, boxes represent entity families and arrows represent relationship families that are configured in the baseline database. You can determine the direction of the each relationship definition from the direction of the arrow head: the box from which the arrow originates is the predecessor, and the box to which the arrow head points is the successor.

In the preceding diagram:

- The RCM FMEA Asset box represents a single RCM FMEA Asset record within an analysis. The RCM FMEA Analysis record can be linked to multiple RCM FMEA Asset records, each of which can be linked to an Equipment or Functional Location record.
- The Equipment or Functional Location box represents the Equipment or Functional Location family for which the Is RCM FMEA Asset, Has Recommendations, and Has Tasks have been defined between that family and the specified predecessor or successor.
- When an RCM FMEA Recommendation record is created for the analysis, the Recommendation record is linked to the Equipment or Functional Location record to which the RCM FMEA Asset record is linked.
- When an RCM FMEA Recommendation record is promoted to an Action record, the Action record will be linked to a Proposed Strategy record and associated with the Equipment or Functional Location record. For details, see the ASM Help.

Entity and Relationship Families used in RCM

The following table provides a summary of the entity families and relationship families that are used to develop an RCM Analysis.

Records in this entity family:	...Can be linked to records in this entity family:	...Through a relationship definition on this relationship family:
RCM FMEA Analysis	RCM Function	Has RCM Function
RCM Function	RCM Functional Failure	Has RCM Functional Failure
RCM Functional Failure	RCM FMEA Failure Mode	Has RCM FMEA Failure Mode
RCM FMEA Failure Mode	RCM FMEA Failure Effect	Has RCM FMEA Failure Effect
RCM FMEA Failure Effect	RCM FMEA Recommendation	Has RCM FMEA Recommendation

In addition, the following families and relationships are used by RCM by not within the analysis tree itself.

Records in this entity family:	...Can be linked to records in this entity family:	...Through this relationship:	Purpose
RCM FMEA Analysis	Human Resource	Has RCM FMEA Team Member	Facilitates the construction of the RCM Analysis Team Members list. Through this relationship, Human Resource records are linked directly to the RCM FMEA Analysis record.
RCM FMEA Analysis	RCM FMEA Asset	Has RCM FMEA Asset	Facilitates the construction of the RCM equipment list. In this way, the RCM FMEA Asset records are linked directly to the RCM FMEA Analysis record. Note, however, that RCM FMEA Asset records do not appear in the analysis tree of an RCM Analysis.

Records in this entity family:	...Can be linked to records in this entity family:	...Through this relationship:	Purpose
RCM FMEA Analysis	RCM FMEA Task	Has Tasks	Allows Task records generated from Recommendation records to be linked to the RCM FMEA Analysis record for which the recommendation was created. Note that in the current version of GE Digital APM, RCM FMEA Task records cannot be created from RCM FMEA Recommendation records. Instead, RCM FMEA Recommendation records can be used to create Action records in ASM. This relationship still exists, however, to support legacy RCM FMEA Task records.
RCM FMEA Recommendation	RCM FMEA Task	Has Tasks	Allows RCM FMEA Recommendation records to be linked to RCM FMEA Task records that are generated from those recommendations. Note that in the current version of GE Digital APM, RCM FMEA Task records cannot be created from RCM FMEA Recommendation records. Instead, RCM FMEA Recommendation records can be used to create Action records in ASM. This relationship still exists, however, to support legacy RCM FMEA Task records.
RCM FMEA Asset	Asset Strategy Template	Has Strategy	Facilitates the promotion of RCM FMEA Asset records to Asset Strategy records via Recommendation Management. This link is established when an RCM FMEA Analysis is linked to a physical or "virtual" piece of equipment or location for which you have defined Recommendation records.

Records in this entity family:	...Can be linked to records in this entity family:	...Through this relationship:	Purpose
RCM FMEA Asset	RCM FMEA Task	Has Tasks	Allows RCM FMEA Asset records to be linked to RCM FMEA Task records. This link is established only when a Task record is generated from a recommendation where the related RCM FMEA Asset record (i.e., the RCM FMEA Asset record that is linked to the RCM FMEA Analysis record) is not linked to an Equipment or Functional Location record. Note that in the current version of GE Digital APM, RCM FMEA Task records cannot be created from RCM FMEA Recommendation records. Instead, RCM FMEA Recommendation records can be used to create Action records in ASM. This relationship still exists, however, to support legacy RCM FMEA Task records.
RCM FMEA Asset	Task History	Has Task History	Facilitates the rejection of RCM FMEA Task records that are linked to RCM FMEA Asset records. When you reject an RCM FMEA Task record, a Task History record is created and linked to the RCM FMEA Asset record through the Has Task History relationship.
RCM FMEA Asset	Task History	Has Task History	Facilitates the rejection of RCM FMEA Task records that are linked to RCM FMEA Asset records. When you reject an RCM FMEA Task record, a Task History record is created and linked to the RCM FMEA Asset record through the Has Task History relationship.
RCM FMEA Analysis	RCM FMEA Template	Has Templates	Facilitates the creation of RCM Templates.
RCM FMEA Asset	RCM FMEA Template	Has Templates	Facilitates the creation of RCM Templates.

Records in this entity family:	...Can be linked to records in this entity family:	...Through this relationship:	Purpose
RCM Function	RCM FMEA Template	Has Templates	Facilitates the creation of RCM Templates.
RCM Functional Failure	RCM FMEA Template	Has Templates	Facilitates the creation of RCM Templates.
RCM FMEA Failure Mode	RCM FMEA Template	Has Templates	Facilitates the creation of RCM Templates.
RCM FMEA Recommendation	Mitigates Risk	Risk Assessment	Allows you to determine how a recommendation mitigates a risk.

RCM Security Groups

The following table lists the baseline Security Groups available for users within this module, as well as the baseline Roles to which those Security Groups are assigned.

Important: Assigning a Security User to a Role grants that user the privileges associated with all of the Security Groups that are assigned to that Role. To avoid granting a Security User unintended privileges, before assigning a Security User to a Role, be sure to review all of the privileges associated with the Security Groups assigned to that Role. Also, be aware that additional Roles, as well as Security Groups assigned to existing Roles, can be added via Security Manager.

Security Group	Roles
MI RCM User	MI Strategy Admin MI Strategy Power MI Strategy User
MI RCM Viewer	MI APM Viewer MI Strategy Admin MI Strategy Power MI Strategy User

Associating RCM Analyses with a Specific Site

Some companies that use the GE Digital APM software have facilities at multiple sites, or locations, where each site contains unique equipment and locations. If desired, you can define the sites in your organization and associate equipment and locations with the site to which they belong. When you create RCM Analyses for those pieces of equipment and locations, you will need to select the appropriate site on the Analysis datasheet of the RCM Analysis.

To help streamline the analysis-creation process, after you select a site on the Analysis datasheet, the GE Digital APM system will allow you to add Equipment and Functional Location records to the RCM Analysis only if those pieces of equipment and locations belong to that site.

You can also associate Risk Matrices with specific sites. If a Risk Matrix is associated with a site and an RCM Analysis is associated with the same site, when you define the unmitigated risk for a failure effect, rather than seeing the default Risk Matrix, you will see the Risk Matrix that is associated with that site.

The baseline family-level privileges that exist for these Security Groups are summarized in the following table.

Family Caption	MI RCM User	MI RCM Viewer
Entity families		
Action	View	View
Asset Criticality Analysis System	View	None
Consequence Definition	View	View
Decision Tree Consequence	View	View
Decision Tree Response	View	View
Decision Tree Structure	View	View
Human Resource	View, Update, Insert, Delete	View
Mitigates Risk	View, Update, Insert, Delete	View
Probability Definition	View	View
Protection Level	View	View
RCM FMEA Analysis	View, Update, Insert, Delete	View
RCM FMEA Asset	View, Update, Insert, Delete	View
RCM Function	View, Update, Insert, Delete	View
RCM Functional Failure	View, Update, Insert, Delete	View
RCM FMEA Failure Mode	View, Update, Insert, Delete	View
RCM FMEA Failure Effect	View, Update, Insert, Delete	View
RCM FMEA Recommendation	View, Update, Insert, Delete	View
RCM FMEA Template	View, Update, Insert, Delete	View
RCM FMEA Task	View, Update, Insert, Delete	View
Reference Documents	View, Update, Insert, Delete	View
Risk Assessment	View, Update, Insert, Delete	View
Risk Category	View	View
Risk Matrix	View	View
Risk Rank	View, Update, Insert, Delete	View
Risk Threshold	View	View
Site Reference	View	View
Task History **Note:** The Task History relationship family is inactive in the baseline GE Digital APM database.	View, Update, Insert, Delete	View

Family Caption	MI RCM User	MI RCM Viewer
Relationship Families		
Has Associated Recommendation	View	View
Has Consolidated Recommendations	View	View
Has Driving Recommendation	View	View
Has RCM FMEA Team Member	View, Update, Insert, Delete	View
Has RCM FMEA Analysis	View, Insert, Delete	None
Has RCM FMEA Asset	View, Update, Insert, Delete	View
Has RCM Function	View, Update, Insert, Delete	View
Has RCM Functional Failure	View, Update, Insert, Delete	View
Has RCM FMEA Failure Mode	View, Update, Insert, Delete	View
Has RCM FMEA Failure Effect	View, Update, Insert, Delete	View
Has RCM FMEA Recommendation	View, Update, Insert, Delete	View
Has Reference Values	View	View
Has Recommendations	View, Update, Insert, Delete	View
Has Reference Documents	View, Update, Insert, Delete	View
Has Risk	View	None
Has Risk Category	View, Update, Insert, Delete	View
Has Site Reference	View	View
Has Superseded Recommendations	View	View
Has Task History **Note:** The Has Task History relationship family is inactive in the baseline GE Digital APM database.	View, Update, Insert, Delete	View
Has Tasks	View, Update, Insert, Delete	View
Has Templates	View, Update, Insert, Delete	View
Is Based on RCM FMEA Failure Effect	View	View
Is RCM FMEA Asset	View, Update, Insert, Delete	View

With these privileges, any user who is a member of the MI RCM User Security Group will have access to ALL records involved in RCM Analyses. In addition to these baseline privileges, which you can grant by assigning users to the MI RCM User Security Group, you will need to grant RCM users permission to the Equipment or Functional Location family if it is related to the RCM FMEA Asset family through the Is RCM FMEA Asset relationship.

Note: You may also want to grant some users permission to modify the items in the following Catalog folders: `\\Public\Meridium\Modules\RCM`.

RCM System Code Tables

The following System Code Tables are used by RCM.

Table ID	Table Description	Function
MI_FUNCTION_SUB_TYPE	Function Sub Types	Used to populate the **Sub Function** list in RCM Function records.
MI_FUNCTION_TYPE	Function Type	Used to populate the **Function Type** list in RCM Function records.
SC_RECOM_RESOURCE	Recommended Resource	Used to populate the **Recommended Resource** list in RCM FMEA Recommendation records.

RCM URLs

There are two URL routes associated with RCM: **rcm/overview** and **strategy/rcm**. The following table describes the various paths that build on the routes, and the elements that you can specify for each.

Element	Description	Accepted Value(s)	Notes
rcm/overview: Displays the RCM Overview page. **strategy/rcm/analysis/<EntityKey>: Displays a specific analysis based on the entity key.**			
<EntityKey>	Specifies the analysis that you want to access.	Any numeric Entity Key that corresponds to an existing analysis.	Displays the specified analysis in a new tab.
strategy/rcm/template/<EntityKey>: Displays a specific template based on the entity key.			
<EntityKey>	Specifies the template that you want to access.	Any numeric Entity Key that corresponds to an existing template.	Displays the specified template in a new tab.

Example URLs

Example URL	Destination
rcm/overview	The **RCM Overview** page.
strategy/rcm/**analysis/64251519679**	The RCM analysis record with Entity Key 64251519679.
strategy/rcm/**template/64251519341**	The RCM template record with Entity Key 64251519341.

About Values Mapped From an RCM Template to Asset Strategy Template

When you promote an RCM template to an ASM template, several fields in the Asset Strategy Template family are populated with the fields that are mapped from RCM FMEA Template family.

Note: Some of the fields listed in the table are not available on any of the datasheets that are configured for the RCM FMEA Template and Asset Strategy Template family.

The following table lists the field mappings:

This field in RCM FMEA Template family:	...populates this field in Asset Strategy Template family
Template Long Description	Description
Template Notes	Template Notes
Template Short Description	Template Name
Template Category	Template Category
Criticality	Criticality
Duty	Duty
Service	Service

Failure Finding Activity in RCM Recommended Actions

When you define an RCM recommendation and specify the Action Type as Failure Finding, you can use the Failure Finding Activity cells to calculate the failure finding task interval (FFI).

The following equation is used to calculate FFI:

FFI = MTIVE x [(n + 1)(MTED)/MMF]1/n

Note that the information used for the FFI calculation is based upon the concepts in SAE Standard JA1012, "A Guide to the Reliability-Centered Maintenance (RCM) Standard." The process and terminology used in the FFI calculation are described in more detail in this standards document. To use the Failure Finding Activity cells effectively, you will need to be familiar with this standard.

In addition, the FFI calculation is based upon information in the book "Reliability-Centered Maintenance" by John Moubray.

The following table describes the Failure Finding Activity cells in the GE Digital APM Framework.

Cell	Description
MMF	Stores the mean time between multiple failures. For example, a 1 in 1,000,000 probability of a multiple failure in one year implies a mean time between failures of 1,000,000 years. The probability of multiple failures occurring in any one year is 1/MMF.
MTIVE	Stores the mean time between failures of the protective device.

Cell	Description
MTED	Stores the mean time between failures of the protected function. For example, if the demand rate of the protected function is once in 200 years, this equals a probability of failure for the protected function of 1 in 200 in any one year, or a mean time between failures of the protected function of 200 years. The probability of failure of the protected function in any one year is 1/MTED.
n	The number of protective devices.

RCM Site Filtering

RCM Analyses

Site filtering is applied to RCM analysis records by setting the site on the datasheet or by linking an asset with an existing site assignment to a global analysis. If you assign a site to an RCM analysis by linking an existing asset, then all of the records associated with the analysis inherit the same site. After the site is set for an analysis, you can only link assets with that same site assignment.

RCM Analysis Templates

When you create a new analysis template, you can use the **Site** control to set the site for the template, which then gets populated through all of the records associated with an analysis. You can apply any viewable template to any viewable analysis, regardless of the site assignment, as long as the risk matrices match.

Examples

Consider an organization that has two sites, Site X and Site Y, and then consider the following scenarios:

Scenario 1: User assigned to Site X and Site Y applies a template to an analysis

Template A is assigned to Site X. Analysis 1 is assigned to Site Y. The user applies Template A to Analysis 1, even though they have separate site assignments, as long as there are no conflicts between the risk matrices.

Scenario 2: User assigned to Site X and Site Y links an asset to an analysis

Equipment 1 is assigned to Site X and Equipment 2 is assigned to Site Y. Analysis 1 is assigned to Site Y. The user links Equipment 2 to Analysis 1, because they share the same site (Site Y).

The user is unable to link Equipment 1 to Analysis 1, because Equipment 1 would not appear in the list of available assets to link there due to site incompatibility. So, even though this multi-site user can view both Equipment 1 and Equipment 2, they cannot link an equipment to an analysis with an incompatible site assignment.

Family Field Descriptions

RCM FMEA Analysis Records

This topic provides an alphabetical list and description of the fields that exist for the RCM FMEA Analysis family and appear on its datasheet. The information in the table reflects the baseline state and behavior of these fields. This list is not comprehensive.

This family is enabled for site filtering, which means that records in this family can be assigned to a specific site, and will only be accessible to users who are assigned to the same site and have the appropriate license and family privileges. For more information, refer to the Sites section of the documentation.

Field	Data Type	Description	Behavior and Usage
Analysis Identification			
Analysis End Date	Date/Time	The end date for the analysis.	You can use the Calendar feature to select the date on which the analysis should end.
Analysis ID	Character	The ID of the analysis.	Generated automatically by the system. Cannot be modified.
Analysis Long Description	Text	A more detailed description of the analysis.	You can enter a description manually.
Analysis Re-Evaluation Date	Date/Time	The date scheduled between the start and end dates to re-evaluate analysis parameters.	This date cannot be before the Analysis Start Date.
Analysis Short Description	Text	A brief description of the analysis.	This is a required field.
Analysis Start Date	Date/Time	The start date for the analysis.	You can use the Calendar feature to select the date on which the analysis should begin.
Analysis Type	List	The type of analysis.	Generated automatically by the system. Cannot be modified.
System Definition			
System Boundary Description	Text	Details for the system boundary.	You can enter a description manually.
System Criticality	Character	The level of criticality for the system being analyzed.	This value is based on criticality evaluation outside of GE Digital APM, and therefore must be entered manually.

Field	Data Type	Description	Behavior and Usage
System Criticality Basis	List	The criticality basis for a system.	This field will contain one of the following values: • Calculated • Economic Analysis • Safety and Health Analysis • System Criticality Analysis • System Reliability Analysis
System ID	Character	The ID for the system.	Enter a value manually in the text box.
System Long Description	Text	Details for the system.	You can enter a description manually.
System Name	Character	The name of the system.	Enter a value manually in the text box.
System Notes	Text	Any notes necessary for the system.	You can enter your notes manually.
System Primary Drawing Number	Numeric	The number that references a drawing or diagram of the system.	This value is based on an indexing system outside of GE Digital APM, and therefore must be entered manually.

RCM FMEA Template Records

This topic provides an alphabetical list and description of the fields that exist for the RCM FMEA Template family and appear on its datasheet. The information in the table reflects the baseline state and behavior of these fields. This list is not comprehensive.

This family is enabled for site filtering, which means that records in this family can be assigned to a specific site, and will only be accessible to users who are assigned to the same site and have the appropriate license and family privileges. For more information, refer to the Sites section of the documentation.

Field	Data Type	Description	Behavior and Usage
Analysis Type	List	The type of analysis the template is based on.	This field is populated automatically with RCM and cannot be modified.
Approved Date	Date/Time	The date on which the template was approved.	You can use the Calendar feature to select the date on which the template was approved.
Approver	Character	The person who approved the template.	Enter the name and/or title of the approver.
Author	List	The user that created the template.	This field is generated automatically and cannot be modified.

Field	Data Type	Description	Behavior and Usage
Created On	Date/Time	The date on which the template was created.	This field is generated automatically and cannot be modified.
Criticality	Character	The degree to which an asset is functionally or economically important.	This field is read-only and populated automatically.
Description	Text	Details for the template.	You can enter a description manually.
Duty	Character	The duty cycle context under which the asset is operating (i.e., continuous or standby).	This field is read-only and the value is populated by the APT template data load.
ID	Character	The ID of the template.	This is a required field. It can be modified, but each template ID must remain unique.
Service	Character	The process and environmental conditions under which the asset is operating.	This field is read-only and the value is populated by the APT template data load.
Status	List	The status of the template.	This field will contain on of the following values: • Development • Approved • Obsolete
Template Category	Character	Any category name you want to assign to the template.	Enter a category in the field.
Template Notes	Text	Any additional information you want to provide about the analysis template.	Enter additional notes in the field.
Type	Text	The family of the record from which the template was created.	This field is generated automatically and cannot be modified.

RCM FMEA Asset Records

This topic provides an alphabetical list and description of the fields that exist for the RCM FMEA Asset family and appear on its datasheet. The information in the table reflects the baseline state and behavior of these fields. This list is not comprehensive.

This family is enabled for site filtering, which means that records in this family can be assigned to a specific site, and will only be accessible to users who are assigned to the same site and have the appropriate license and family privileges. For more information, refer to the Sites section of the documentation.

Field	Data Type	Description	Behavior and Usage
Asset Description	Text	Description of the asset.	You can enter a description manually.
Asset ID	Character	The original Equipment ID for the asset.	Populated automatically when you select an asset from the **Asset Finder**. This is a required field.
Asset Type	List	The type of asset.	Generated automatically by the system. Can be modified, if needed. This is a required field.
Purpose Statement	Text	Purpose of the asset.	You can enter a description manually.
RCM Asset ID	Character	The ID for the asset specific to the RCM module.	Generated automatically by the system. Cannot be modified.

RCM FMEA Failure Effect Records

This topic provides an alphabetical list and description of the fields that exist for the RCM FMEA Failure Effect family and appear on its datasheet. The information in the table reflects the baseline state and behavior of these fields. This list is not comprehensive.

This family is enabled for site filtering, which means that records in this family can be assigned to a specific site, and will only be accessible to users who are assigned to the same site and have the appropriate license and family privileges. For more information, refer to the Sites section of the documentation.

Field	Data Type	Description	Behavior and Usage
Effect ID	Character	The ID of the failure effect.	Generated automatically by the system. Cannot be modified.
Effect Impact	List	The level at which the failure effect has an impact.	The field will contain one of the following values: • Unit • Plant • System • Equipment
Effect Long Description	Text	Description of the failure effect.	You can enter a description manually.
Effect Name	Character	The name of the failure effect.	Enter a value manually in the text box. This is a required field.
Unmitigated Driving Risk Category	List	Unmitigated risk category from failure mode **Risk** section.	Generated automatically by the system. Cannot be modified.

Field	Data Type	Description	Behavior and Usage
Unmitigated Driving Risk Rank	Numeric	Unmitigated risk rank value assigned from failure mode **Risk** section.	Generated automatically by the system. Cannot be modified.
Unmitigated Financial Risk	Numeric	Unmitigated risk value assigned from failure mode **Risk** section.	Generated automatically by the system. Cannot be modified.
Unmitigated Risk	Numeric	Unmitigated risk value assigned from failure mode **Risk** section.	Generated automatically by the system. Cannot be modified.

RCM FMEA Failure Mode Records

This topic provides an alphabetical list and description of the fields that exist for the RCM FMEA Failure Mode family and appear on its datasheet. The information in the table reflects the baseline state and behavior of these fields. This list is not comprehensive.

This family is enabled for site filtering, which means that records in this family can be assigned to a specific site, and will only be accessible to users who are assigned to the same site and have the appropriate license and family privileges. For more information, refer to the Sites section of the documentation.

Field	Data Type	Description	Behavior and Usage
Damage Code	Character	The code associated with the damage type.	This value is based on an indexing system outside of GE Digital APM, and therefore must be entered manually.
Failure Mechanism	Character	The physical, electrical, chemical, and mechanical factors which cause a failure individually or in combination with other factors.	Enter factors which have induced the failure.
Failure Mechanism Description	Text	Description of the failure mechanism.	Enter a description for the failure mechanism.
Failure Mode ID	Character	The ID of the failure mode.	Generated automatically by the system. Cannot be modified.
Failure Mode Long Description	Text	Description of the failure mode.	Enter a description for the failure mode.
Failure Mode Name	Character	The name of the failure mode.	This is a required field.

Field	Data Type	Description	Behavior and Usage
Failure Pattern	List	The type of failure pattern exhibited by the asset.	The field will contain one of the following values: • Bathtub • Wearout • Increasing (zero early/ random) • Constant/random • Infant Mortality • Rapid Wearout
Maintainable Item	Character	An item from an EAM system, failure codes, etc.	This value is based on an indexing system outside of GE Digital APM, and therefore must be entered manually.
PF Interval	Numeric	The interval value for potential to failure of the asset.	Enter the number of the interval to be combined with the PF Interval Units.
PF Interval Units	List	Unit of measurement for the potential to failure of the asset.	The field will contain one of the following values: • Minutes • Hours • Days • Weeks • Months • Years

Field	Data Type	Description	Behavior and Usage
Related Asset ID	Character	The ID for the asset related to the failure mode.	This field contains a list of assets that are linked to the analysis. You can select any ID in the list. The selected asset will be linked to subsequent recommendation records. This is a required field.
Related Asset Type	List	The type of the asset that is related to the failure mode.	The Related Asset Type field is automatically populated with the Asset Type value from the associated Asset record. **Note:** If you modify the value in the Related Asset ID field of an existing Failure Mode record, the links to any Recommended Actions will also be updated. Note, however, that if RCM FMEA Task records have been linked to the Recommendation record, changing the Related Asset ID in the Failure Mode record will not update the link to the Task record. The RCM FMEA Task record will continue to be linked to the RCM FMEA Asset or Asset record to which the Recommendation record was linked when the Task record was originally created.

RCM Configuration Records

This topic provides an alphabetical list and description of the fields that exist for the RCM FMEA Analysis family and appear on its datasheet. The information in the table reflects the baseline state and behavior of these fields. This list is not comprehensive.

This family is enabled for site filtering, which means that records in this family can be assigned to a specific site, and will only be accessible to users who are assigned to the same site and have the appropriate license and family privileges. For more information, refer to the Sites section of the documentation.

Table 1:

Field	Data Type	Description	Behavior and Usage
Primary Family ID	Character (255)	The Family ID that will be used as the unique identifier.	
Primary Family Key Fields	Character (255)	The fields that uniquely identify Family Field.	

RCM Function Records

This topic provides an alphabetical list and description of the fields that exist for the RCM Function family and appear on its datasheet. The information in the table reflects the baseline state and behavior of these fields. This list is not comprehensive.

This family is enabled for site filtering, which means that records in this family can be assigned to a specific site, and will only be accessible to users who are assigned to the same site and have the appropriate license and family privileges. For more information, refer to the Sites section of the documentation.

Field	Data Type	Description	Behavior and Usage
Function ID	Character	The ID of the function.	Generated automatically by the system. Cannot be modified.
Function Long Description	Text	Description of the function that you are analyzing.	You can enter a description manually.
Function Name	Character	The name of the function.	This is a required field.
Function Performance Parameters	Text	Performance details for the function that you are analyzing.	You can enter a parameters manually.

Field	Data Type	Description	Behavior and Usage
Function Type	List	The type of function that you are analyzing for the associated asset.	This field will contain one of the following values: • Primary: • Secondary • Protective • Superfluous • Appearance **Note:** If you select Secondary in this field, the Sub Function field is activated.
Sub Function	List	The secondary function that you are analyzing for the associated asset.	This field is only activated when the Function Type field contains the value of Secondary. The field will contain one of the following values: • Environmental • Safety • Containment • Appearance • Protection • Efficiency/Economy • Superfluous

RCM Functional Failure Records

This topic provides an alphabetical list and description of the fields that exist for the RCM Functional Failure family and appear on its datasheet. The information in the table reflects the baseline state and behavior of these fields. This list is not comprehensive.

This family is enabled for site filtering, which means that records in this family can be assigned to a specific site, and will only be accessible to users who are assigned to the same site and have the appropriate license and family privileges. For more information, refer to the Sites section of the documentation.

Field	Data Type	Description	Behavior and Usage
Functional Failure ID	Character	The ID of the functional failure.	Generated automatically by the system. Cannot be modified.
Functional Failure Long Description	Text	Description of the functional failure.	You can enter a description manually.
Functional Failure Name	Character	The name of the functional failure.	This is a required field.

RCM FMEA Recommendation Records

This topic provides an alphabetical list and description of the fields that exist for the RCM FMEA Recommendation family and appear on its datasheet. The information in the table reflects the baseline state and behavior of these fields. This list is not comprehensive.

This family is enabled for site filtering, which means that records in this family can be assigned to a specific site, and will only be accessible to users who are assigned to the same site and have the appropriate license and family privileges. For more information, refer to the Sites section of the documentation.

Field	Data Type	Description	Behavior and Usage
Recommendation			
Asset ID	Character	The ID for the asset associated with the recommendation.	This field's value is automatically populated.
Asset Shutdown Required?	Boolean	Indicates whether or not the asset must be physically shut down after implementing the action.	Select the check box to flag for an equipment shutdown after the action is applied.
Business Impact	List	Indicates the scope of impact for carrying out the recommendation.	This field contains a list of the following values: • Plant • Unit • System • Equipment Select the value that defines the level of impact to carry out the recommendation.
Comments	Text	Any additional information pertaining to the recommendation.	N/A
Create Work Request?	Boolean	Indicates whether or not a work request should be generated for this recommendation.	Select the check box if you want a work request to be automatically generated for this recommendation.
Recommendation Description	Text	A description for the recommendation.	N/A
Recommendation Headline	Character	The title of the recommendation record.	This is a required field.
Recommendation ID	Character	A unique ID for the recommendation.	This field's value is automatically populated.
Target Completion Date	Date/Time	Target date for the recommendation's action to be executed.	Use the date/time selectors to select the date and time by which the action must be executed.

Field	Data Type	Description	Behavior and Usage
Technical Number	Character	The technical number for the associated asset of the recommendation.	This field's value is automatically populated.
Work Request Equipment	Text	The specific equipment associated with the work request.	This field's value is automatically populated.
Work Request Functional Location	Text	The specific functional location associated with the work request.	This field's value is automatically populated.
Work Request Reference	Text	The reference ID for the work request.	This field's value is automatically populated.
Action Information			
Failure Finding Activity	See an explanation of the Failure Finding Activity cell values.		
Action Type	List	The type of action associated with the recommendation.	This field contains a list of the following values: • Time-Based Maintenance (Preventative) (PM) • Condition-Based Maintenance (Predictive) (CM) • Redesign (DSN) • Procedure (PROC) • Training (TRN) • Failure Finding (FF) Select the action type from the corresponding action. The values are driven by system code table MI_ACTION_TYPE.
Display FFI Units As	List	The unit used to indicate the FFI value.	N/A
Estimated Cost	Numeric	The estimated cost for carrying out the action.	Enter the numeric value for the estimate cost of implementing the recommendation.
Estimated Cost Basis	Text	An explanation for the estimated cost of carrying out the action.	N/A
FFI	Numeric	Indicates frequency of failure finding tasks.	N/A

Field	Data Type	Description	Behavior and Usage
Interval	Numeric	The number of the interval unit corresponding to how often the action should be performed.	This value corresponds with Interval Units to give the complete frequency with which the action should be performed.
Interval Units	List	The unit of the interval corresponding to how often the action should be performed.	This value corresponds with Interval to give the complete frequency with which the action should be performed.
Nonrecurring	Boolean	Indicates whether the action should be on a recurring basis or only once.	Select the check box if you only want the action performed once instead of on a recurring basis.
Performance Interval	Numeric	Reference value for the interval of the performance of the action.	The values in the Performance Interval field is not used in any calculations in ASM. You can use them as reference values, but no logic is executed based on the values. All calculations that require an interval are based on the values in the Interval field and the Interval Units field.
Performance Interval Units	List	Reference value for the interval units of the performance of the action.	The values in the Performance Interval Units field is not used in any calculations in ASM. You can use them as reference values, but no logic is executed based on the values. All calculations that require an interval are based on the values in the Interval field and the Interval Units field.
Recommended Resource	Text/List	A custom entry for a resource to execute action.	Use the drop-down list and enter text into the **add caption** box that corresponds to the custom resource.
Use Calculated FFI Results	Boolean	Indicates whether or not you want to use the calculated FFI results.	N/A

Catalog Items

About the RCM Data Structure

The GE Digital APM RCM module uses families to represent the various components of an RCM Analysis, as defined by the standard, accepted RCM methodology. The GE Digital APM system leverages its fundamental entity and relationship family infrastructure to store data related to an RCM Analysis.

Each RCM Analysis is represented at the root level by an RCM FMEA Analysis record. FMEA Analyses use the same root analysis family. RCM Analyses are distinguished from FMEA Analyses via the Analysis Type field in the RCM FMEA Analysis record. The analysis type can be either RCM or FMEA. For an RCM FMEA Analysis that will be used for an RCM Analysis, the analysis type is RCM.

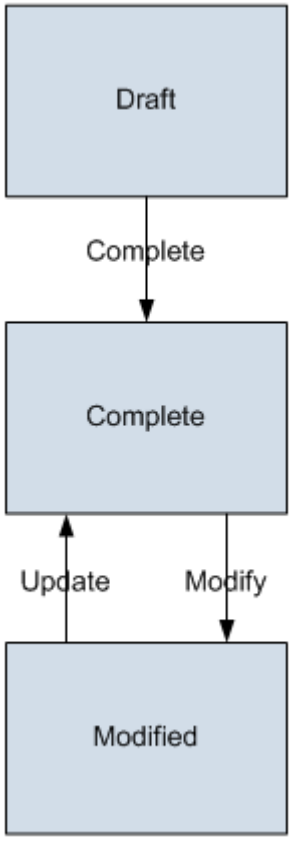
Note: Because both RCM and FMEA Analysis records belong to the same family, a query on the RCM FMEA Analysis family will return results that include all analyses of any type. To limit your results to include only one analysis type, you will need to include the Analysis Type field in your query and define criteria to filter on either RCM or FMEA.

For an RCM Analysis (a record in which the analysis type is RCM), the RCM FMEA Analysis record can be linked to RCM Function records through the Has RCM Function relationship. RCM Function records can be, in turn, linked to RCM Functional Failure records through the Has RCM Functional Failures relationship, and so on, for all components of the analysis. Together, the root RCM FMEA Analysis record and all the records that are linked to it, either directly or indirectly, make up the RCM Analysis.

RCM Analysis State Configuration

This topic describes the different analysis states in a Reliability Centered Maintenance (RCM) analysis configuration.

By default, the following baseline Stage Configuration exists for the RCM Analysis family.



Initial State

The Draft state is the initial state of all new RCM Analysis records.

Datasheet Configuration

By default, no states and operations will appear on the datasheet when you are viewing an RCM FMEA Analysis record in RCM, FMEA, the Record Manager, or the Bulk Data Form.

Reserved States and Operations

By default, no states or operations displayed in the preceding diagram are reserved. This means that you can remove or modify any of these states or operations. You can also add your own states and operations to the State Configuration.