

**SAP (IAM)**

**Intelligent  
Asset  
Management**



## **Creating Failure Mode and Performing Effects Analysis**

## Document Control

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## Reference Documents

The following section describes relevant documentation:

Document Name	Description	Sharepoint Link
Creating Failure Mode and Performing Effects Analysis	Determining the application of Failure Modes and Effects Analysis (FMEA) on a wind turbine project	<a href="#"><u>Creating Failure Mode and Performing Effects Analysis.pdf</u></a>

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## 1. Creating Failure Mode and Performing Effects Analysis

### 1.1 Objective

After completing this lesson, you will be able to create a Failure Modes and Effects Analysis (FMEA) Assessment, systematically identifying potential failure modes and their consequences to enhance asset reliability.

### **Creation of Failure Modes and Effects Analysis (FMEA) Assessment**

#### 1.2 Key Terms, Used in This Lesson:

- 1. Failure Modes and Effects Analysis (FMEA):** A systematic method for evaluating processes to identify where and how they might fail and to assess the relative impact of different failures to identify the parts of the process that are most in need of change.
- 2. RCM (Reliability Centered Maintenance):** A process used to determine the maintenance requirements of any physical asset in its operating context. It's like FMEA in utilizing failure data to optimize maintenance strategies but differs in application and scope.
- 3. Risk Priority Number (RPN):** A numerical score that is calculated to estimate the risk associated with a potential failure mode within an FMEA assessment. It is determined by multiplying three factors: severity, occurrence, and detectability of a failure.
- 4. Technical Object:** In the context of FMEA, a physical asset or component that is being assessed for failure modes and effects.
- 5. Failure Data Profile:** A compilation of data related to failures, including types of failure modes, causes, and effects, associated with a specific technical object. This profile aids in systematically assessing and addressing potential failures.

6. **Severity:** Within the RPN calculation, this factor assesses the potential impact or consequence of a failure mode on the system or end users.
7. **Occurrence:** This factor estimates the likelihood or frequency at which a given failure mode might happen within the RPN calculation framework.
8. **Detectability:** A measure of how easily a failure can be detected before it occurs, factored into the RPN to help prioritize failures based on their potential to be identified and mitigated before causing impact.
9. **Failure Mode:** A specific way in which a component, system, process, or service could fail to meet the desired function or performance criteria.
10. **Cause:** The specific reason or mechanism that leads to the occurrence of a failure mode.
11. **Failure Effect:** The immediate consequences of a failure mode on the system's operation, user safety, or other critical system parameters.
12. **Maintainable Item:** Components or elements within a system that require maintenance to prevent failure modes from occurring.
13. **Function:** The intended action or role of a component within a system.
14. **Functional Failure:** The inability of a component or system to perform its intended function.
15. **Failure Mechanism:** The physical, chemical, or other processes that lead to a failure mode.
16. **Recommendations:** Suggested actions or strategies designed to mitigate or eliminate the risk associated with a failure mode, typically developed after assessing the RPN and understanding the failure's effects and causes.

## 2. Creation of Failure Modes and a Effects Analysis (FMEA) Assessment

Failure Mode and Effects Analysis (FMEA) is similar to RCM assessments in that failure data is configured to determine what is the most adequate response in the event of asset failure. This is laid out via a hierarchy of failure data and by having recommendations created for each combination of failure data to let the team know what the best way is to respond to a particular scenario of asset failure. The biggest difference between the two would be FMEA's use of a Risk Priority Number (RPN) calculated from values put in the failure mode and its cause(s). This RPN can be used to determine which technical objects have the largest impact from asset failure and which assets should be prioritized when it comes to potential failure.

### 2.1 Create the Assessment

On the main page of APM, choose the Manage FMEA Assessments tile. The tile is in the Asset Reliability Engineering tab and should be the first tile in the row.

The screenshot shows the SAP Asset Data and Information Management homepage. It features several cards for different modules:

- Asset Risk Assessment:**
  - Manage Risk & Criticality Assessments: 35.3 K
  - Manage Templates for Risk & Criticality Assessments: 29.9 K
- Asset Reliability Engineering:**
  - Manage FMEA Assessments: 218 (highlighted with a red box)
  - Manage RCM Assessments: 1.17 K
  - Manage Recommendations: 34.0 K
  - Implement Recommendations: 456
  - Manage Strategy Assessment for Classes: 14.5 K
- Asset Health Monitoring:**
  - Monitor Assets
  - Manage Technical Object Groups
  - Manage Minor Problems
  - Manage Technical Issues
  - Manage Alert Trends
  - Manage Rules

The screenshot shows the "Manage FMEA Assessments" page. At the top, there are filters for "Technical Object" and "Status". A red box highlights the "Create" button in the top right corner.

Assessment	Technical Object	Status	Changed On
MS Test FMEA Assessment 2402	Jaw crusher B (20014237)	In Process	Feb 26, 2024, 02:09:18 PM
BoosterPump_FMEA170894603429669	Pressure Vessel 2 (10544014)	Released	Feb 26, 2024, 06:18:49 AM
Test FMEA short description	Pressure Vessel 2 (10544014)	Released	Feb 26, 2024, 03:09:29 AM
AUTO_FMEA1708934678240227	Coal Yard (APIP-653-3281-8449)	Released	Feb 26, 2024, 03:06:42 AM
FMEA Short Description Test. FMEA Short ...	Pressure Vessel 2 (10544013)	Released	Feb 26, 2024, 02:46:25 AM
RAM-R24-2602	Pressure Vessel 2 (10544011)	Released	Feb 26, 2024, 02:23:21 AM
Test FMEA short description	Pressure Vessel 2 (10544007)	Released	Feb 26, 2024, 02:00:59 AM
AUTO_FMEA1708930566397908	Pressure Vessel 2 (10544006)	Released	Feb 26, 2024, 01:44:03 AM
Test FMEA short description	JL COUNTER AGAIN (10542545)	Released	Feb 25, 2024, 11:47:15 PM
AUTO_FMEA1708933294146319	bag for support (10543964)	Created	Feb 24, 2024, 10:51:06 AM
Test FMEA short description	test eu10 (10386353)	Created	Feb 23, 2024, 03:17:55 PM
AUTO_FMEA1708929549427454	test eu10 (10386351)	Released	Feb 23, 2024, 03:14:26 PM
FMEA Short Description check. FMEA Short...	test eu10	Released	Feb 23, 2024, 01:03:25 PM
RAM-R23-2602			
asdasd			
daada			
Test FMEA short description			
AUTO_FMEA17087194547646			
Test FMEA short description			
AUTO_FMEA17087190467535			
Test FMEA short description			

On the Manage FMEA Assessments page, you will see all previous FMEA assessments that were created as well as additional information pertaining to them such as the technical object it was performed on, the status, and so on. You can also use the filters at the top of the page to locate a particular assessment. At the top right of the page, choose the Create button to open a pop up to create the assessment.

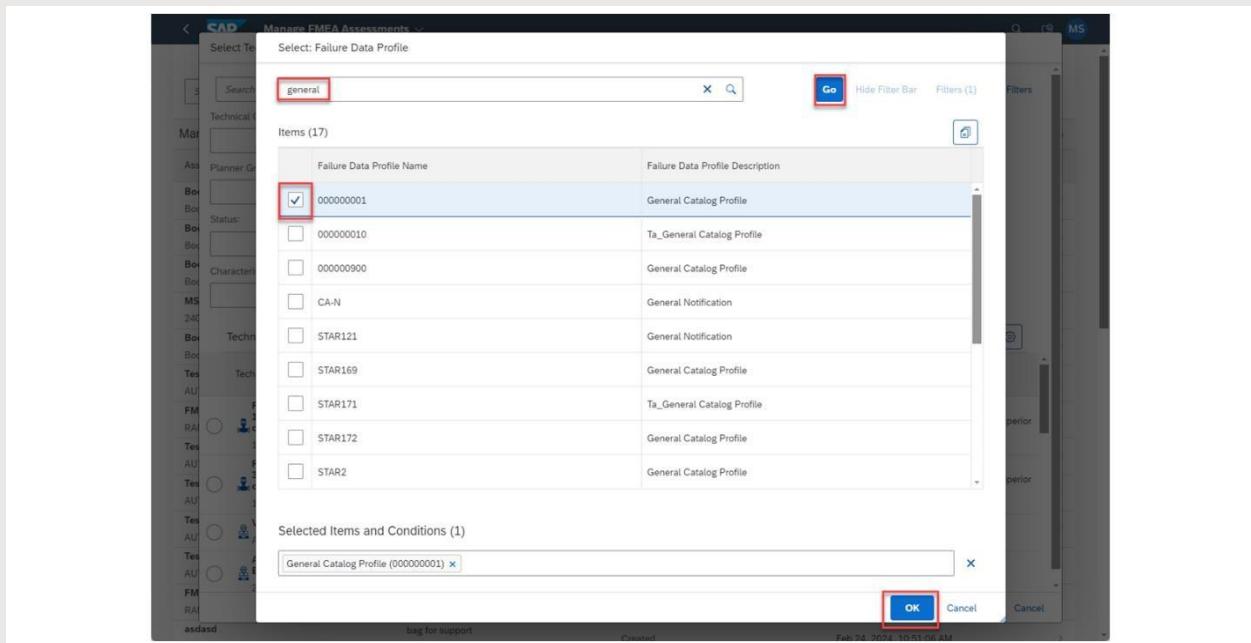
The screenshot shows the SAP Manage FMEA Assessments screen. A modal dialog titled "New Assessment" is open. It contains fields for "Assessment:" (containing "FMEA\_Assessment\_Motor") and "Description:" (containing "FMEA Assessment Motor"). At the bottom of the dialog is a "Technical Object:" field with a dropdown arrow icon, which is highlighted with a red box. Below the dialog is a table listing various FMEA assessments with columns for "Assessment", "Technical Object", "Status", and "Changed On". One row in the table also has its "Technical Object:" field highlighted with a red box.

Enter the assessment name as well as its description. The assessment name will limit you to allowed characters that can be entered and will warn you if an invalid character is entered. Provide an optional long text as well if desired. Once those fields are put in, choose the Technical Object bar on the bottom of the pop up to assign a technical object to the assessment.

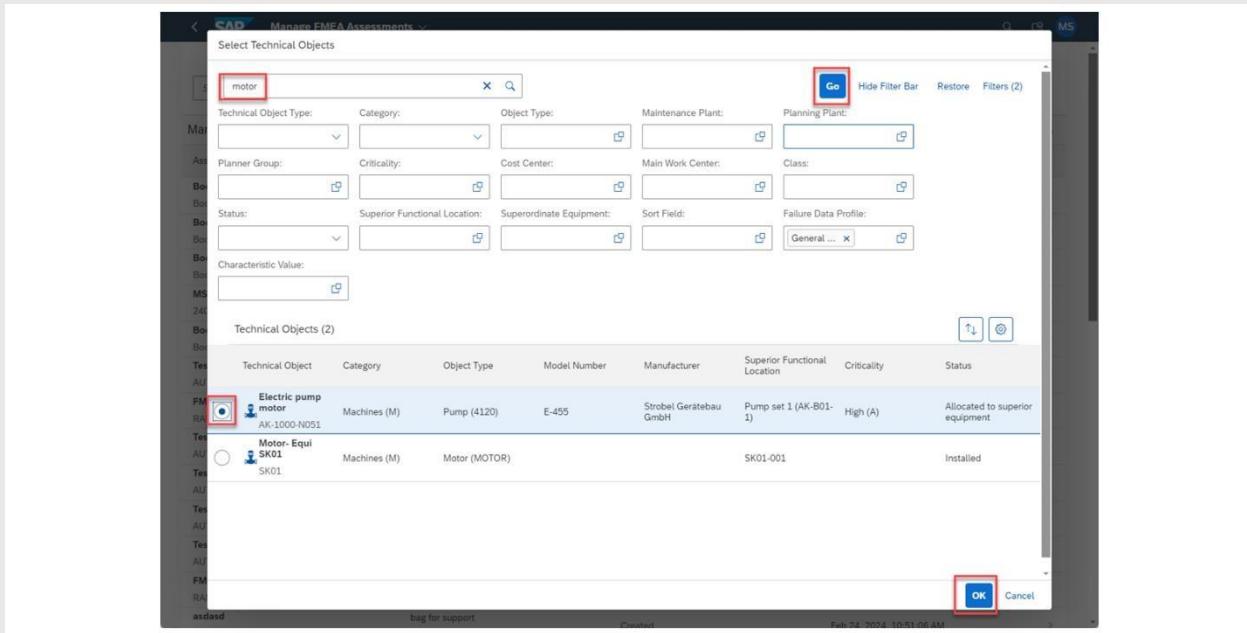
The screenshot shows the SAP Select Technical Objects dialog. It includes search and filter fields for "Technical Object Type", "Category", "Object Type", "Maintenance Plant", "Planning Plant", "Planner Group", "Criticality", "Cost Center", "Main Work Center", "Class", "Status", "Superior Functional Location", "Superordinate Equipment", "Sort Field", and "Failure Data Profile". Below these fields is a table titled "Technical Objects (371,510)". The table lists four entries, each representing a "Pressure Vessel" with a circular icon. The columns include "Technical Object", "Category", "Object Type", "Model Number", "Manufacturer", "Superior Functional Location", "Criticality", and "Status". The "Failure Data Profile" field from the previous dialog is also visible here, highlighted with a red box. At the bottom of the dialog are "OK" and "Cancel" buttons.

On this page, a list of technical objects appears that can be selected from. Filters can be configured to determine which technical objects you want to appear on your list given whatever filter criteria is selected. By default, no filter criteria are selected. A search bar is also available to determine which technical object you wish to perform the assessment on.

For our case, we will filter the technical object we want to perform the assessment on via its Failure Data Profile. Choose the Failure Data Profile filter button to open the Failure Data Profile selection pop up.



We can scroll through all the failure data profiles here and find one we like or use the search bar to locate a particular one. Type out the search criteria in the search bar and choose the blue Go button near the top right to search for a particular profile. Check one or more *Failure Data Profiles* to use for the filter. Once finished, choose the blue *OK* button at the bottom of the page.



Now with the filter selected for the Failure Data Profile, we can set up more filters or enter a string in the search bar to further specify the technical object to perform the assessment on. Choose the blue GO button at the top to apply the filters made here to our technical object list. The technical object list will be updated according to the filters that have been set up. In this case, it was only one filter and one search criterion. Choose the technical object the FMEA assessment is to be performed on by choosing the radio button associated with the technical object on the left of the page. Only one technical object can be selected. choose the blue OK button at the bottom of the page to finish selecting the technical object to be used for the assessment.

The screenshot shows the SAP Manage Strategy Assessment for Classes interface. A modal dialog box titled "Assign Failure Data Profile" is open, displaying a list of failure data profiles. The list includes categories like Causes (5), Failure Effects (6), Maintainable Items (B), Failure Mechanisms (C), and Failure Modes (D). On the right side of the dialog, there are columns for "Code Group", "Codes", and "Changed On". A "Search" bar is at the top of the list. At the bottom of the dialog, there are "Assign" and "Cancel" buttons.

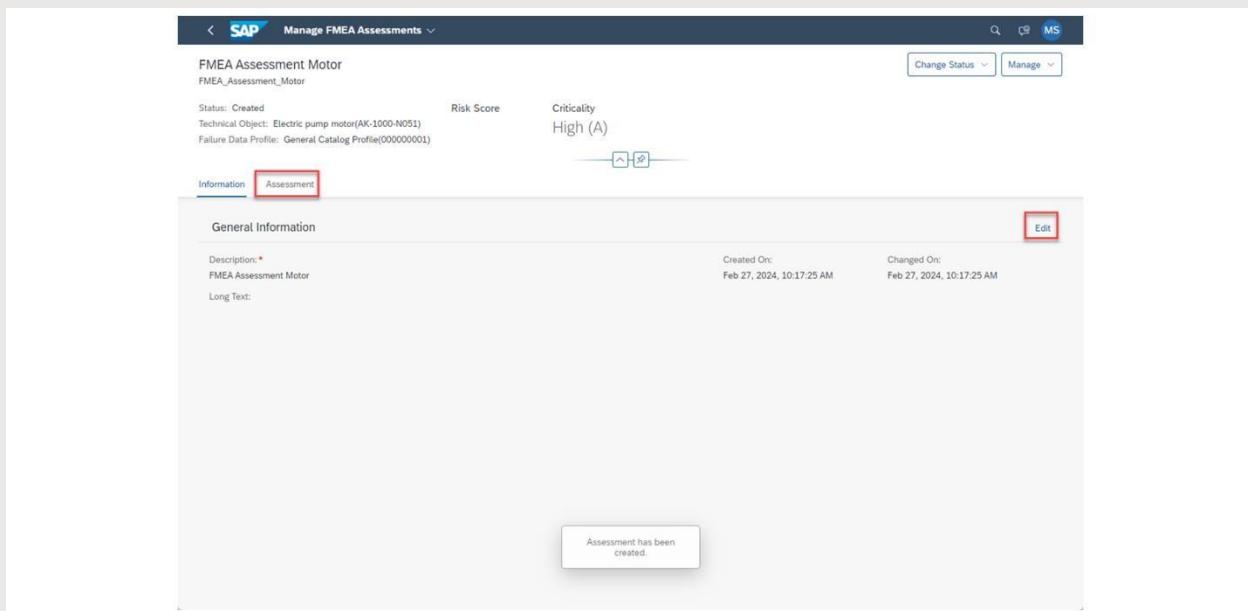
On a side note, make sure that the failure data profile the assessment is being performed on has at least one failure mode, cause, and failure effect assigned to it so the assessment can be performed. You can check the contents of a failure data profile in APM by going into the Manage Strategy Assessment for Classes tile, choosing the Create button on that page, and viewing the contents of the Failure Data Profile under the Failure Data Profile section. Use the Filter on that page to see if there are Causes, Failure Effects, and Failure Modes present.

The screenshot shows the SAP Manage FMEA Assessments interface. A modal dialog box titled "New Assessment" is open, showing fields for "Assessment" (containing "FMEA\_Assessment\_Motor") and "Description" (containing "FMEA Assessment Motor"). Below these, there is a "Long Text" field with placeholder text "Jaw on" and a "Failure Data Profile" dropdown set to "General Catalog Profile (000000001)". At the bottom of the dialog are "Save" and "Cancel" buttons. The background shows a list of existing FMEA assessments.

With the technical object selected and all other mandatory fields filled in, choose the blue Save button at the bottom of the pop up to finish creating the FMEA assessment.

Configure the Failure Data up through the Failure Mode:

Once the assessment has been created, a small pop-up box on the bottom of the page will alert you that the assessment creation has been successful. We will enter the Information tab, that provides general information on the assessment. If the technical object the assessment is being performed on already had a risk and criticality assessment performed on it, it will show the risk score and/or the ABC indicator from that assessment on the top of the page. This is not relevant to this assessment specifically, however. If you want to change the Description and Long Text fields of the assessment, choose the Edit button at the right of the page to do so. To continue with the FMEA assessment, choose the Assessment tab to the right of the Information tab.

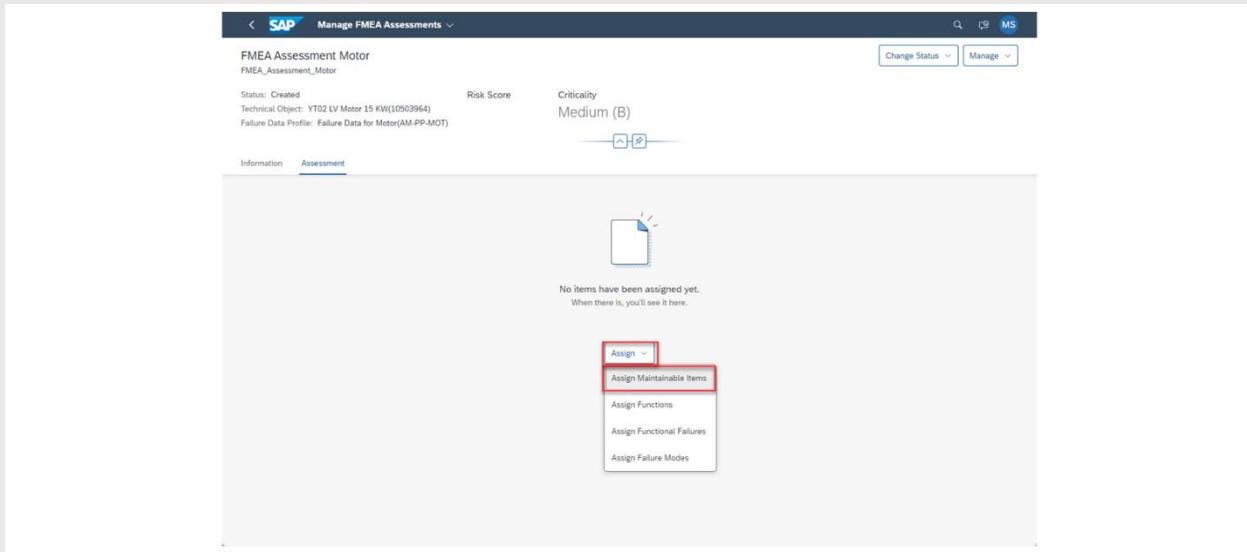


This is where you will assign the failure data to the FMEA assessment. The only required failure data for an FMEA assessment are the failure modes, causes, and effects. All other failure data is optional for the assessment. Failure data entered in FMEA as well as RCM assessments follow the failure data hierarchy. Under this

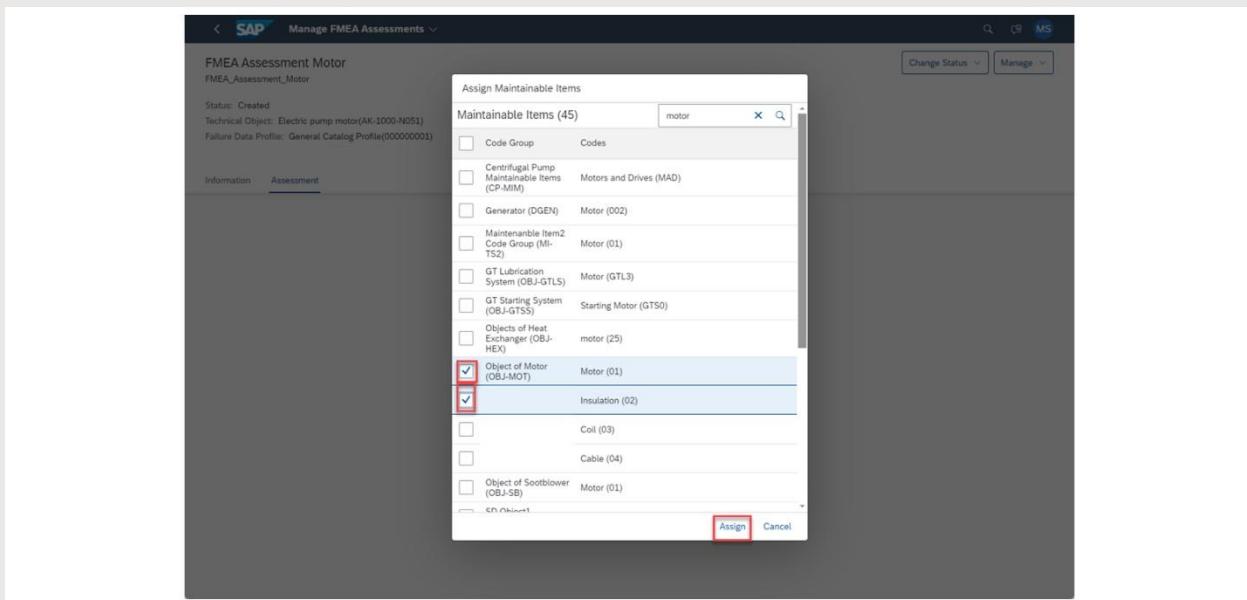
hierarchy, only certain failure data can be assigned under other failure data. The top of the hierarchy is the maintainable item, then the function, functional failure, and failure mode. The failure mechanism, cause, and failure effect are all under the failure mode and are of the same level. When a type of failure data is higher in the hierarchy, any failure data lower in the hierarchy can be assigned underneath it. For example, a function can have one or more functional failures, failure modes, and the failure data underneath the failure mode (failure mechanisms, causes, & failure effects) assigned underneath the failure mode. A function cannot have a maintainable item or function assigned underneath it because that failure data is either at the same level or higher in the hierarchy.

Here is a table to better explain the concept:

Failure Data	Hierarchy Level
Maintainable Item	1
Function	2
Functional Failure	3
Failure Mode	4
Failure Mechanism	5
Cause	5
Failure Effect	5

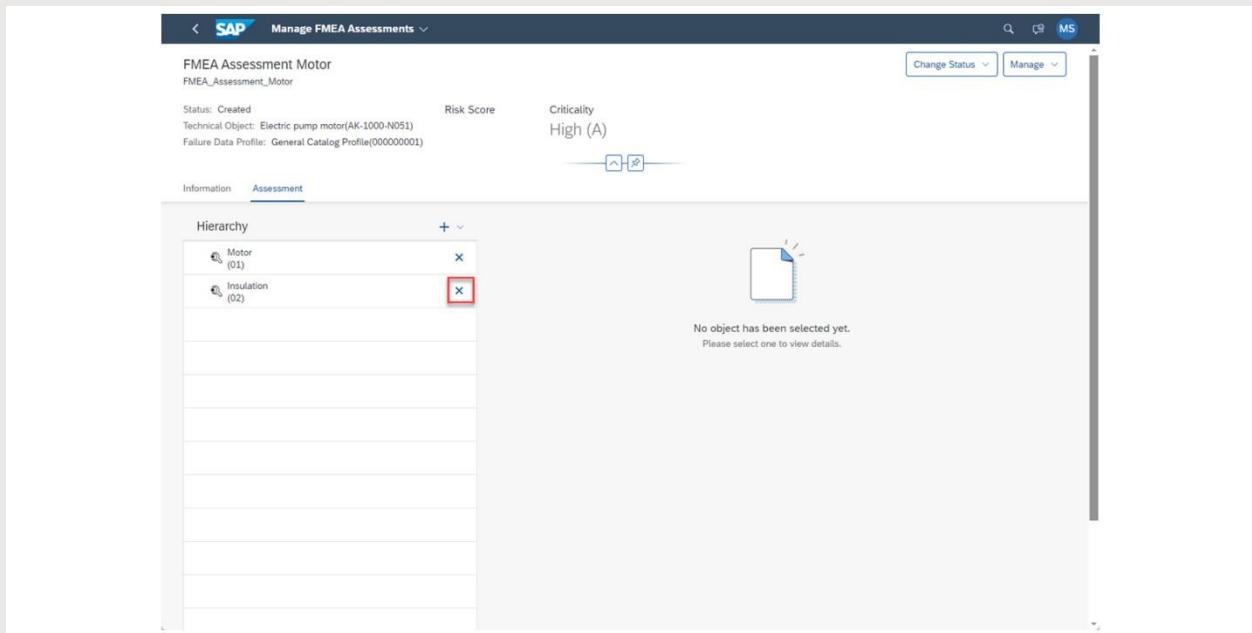


For the assessment here, choose the *Assign* drop down button in the middle of the page. Choose the first item in the drop down, which is the *Assign Maintainable Items* button.

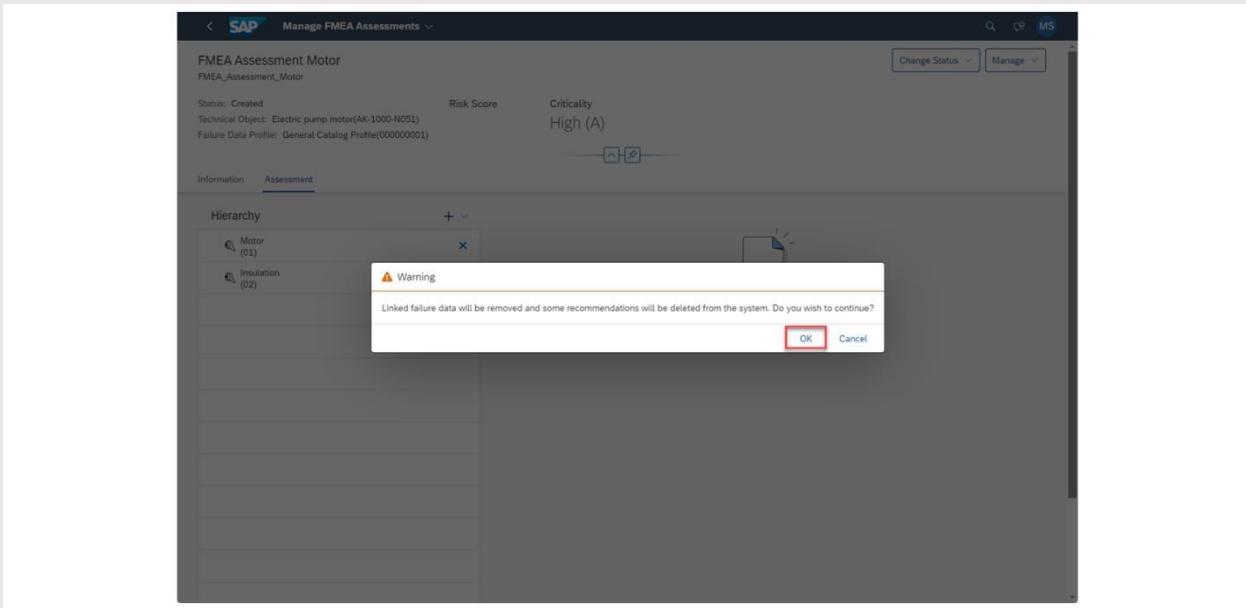


In the pop up, check one or more maintainable items for the assessment. Note that for an assessment to be released, it must have an RPN calculated for all

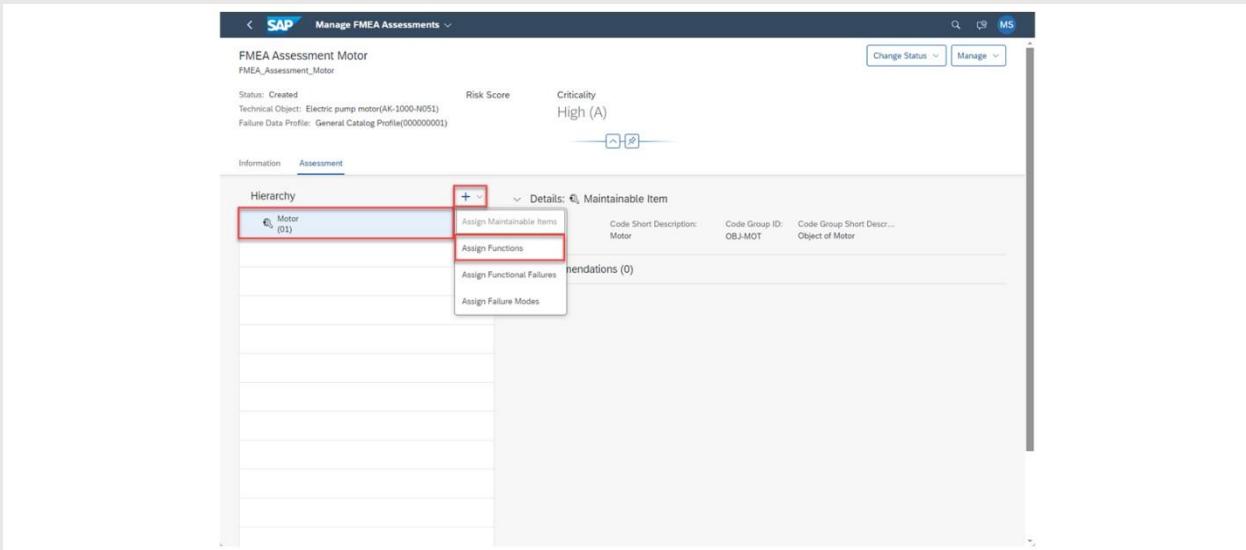
branches of the failure data hierarchy. If one branch is incomplete, then the assessment cannot be released. You can also use the search bar to look for a particular item in the list if the one you want to select doesn't appear. Once all maintainable items have been selected, choose the Assign button at the bottom of the pop up.



I've decided that not all the failure data that I've assigned to my assessment I want to keep. To remove failure data from the hierarchy, choose the x next to the failure data. It will remove that failure data and any failure data underneath it from the hierarchy. In this case, there is no other failure data underneath the maintainable item I want to get rid of so it will only remove the one maintainable item chosen.

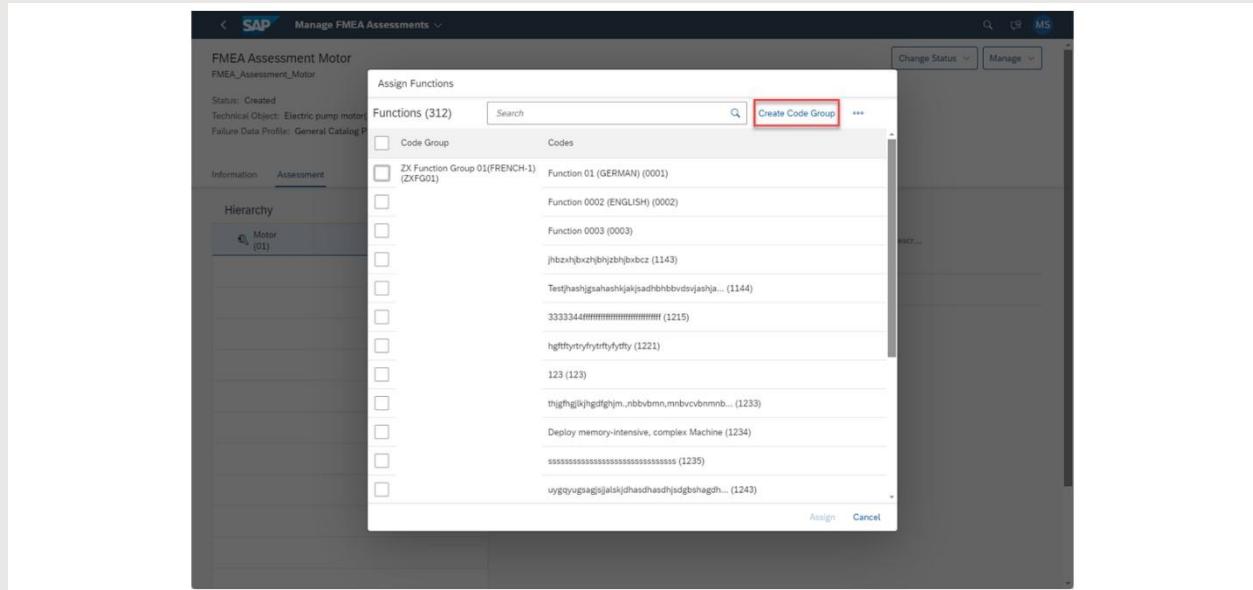


On the warning pop up, choose *OK* to continue with the process.



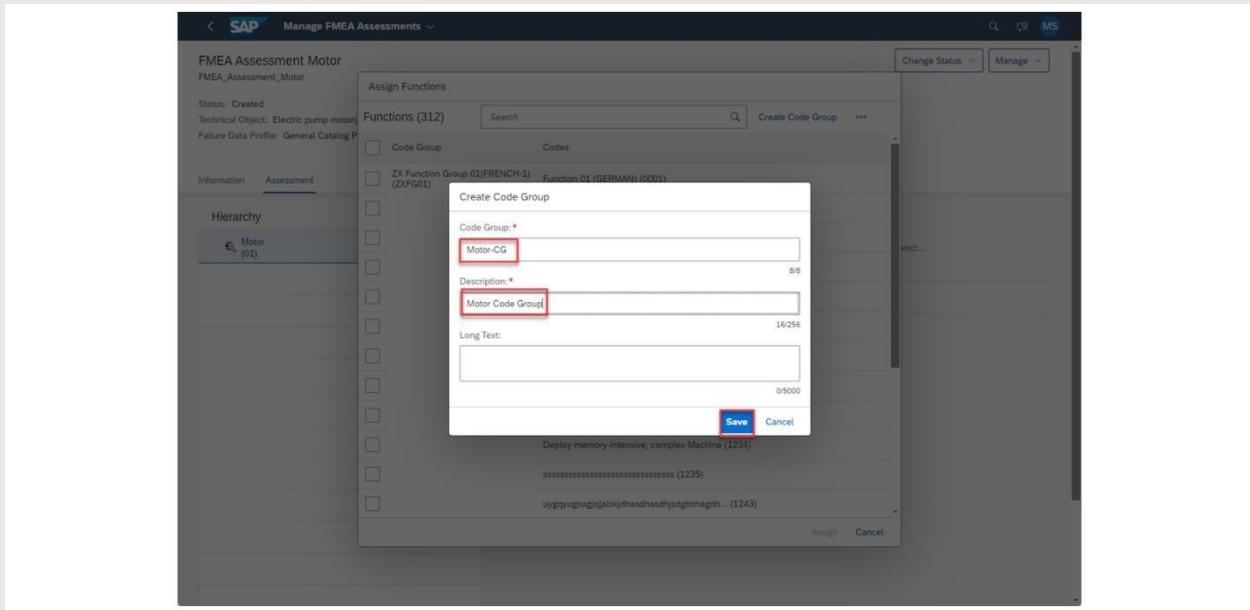
Now we want to assign more failure data underneath the maintainable item we've just assigned. Choose the maintainable item in the hierarchy and choose the + button to assign failure data underneath the maintainable item. Choose the Assign Functions button as that will be the next failure data assigned to the

assessment. Note that because we are assigning failure data underneath the maintainable item, the option to assign another maintainable item underneath it is not available.

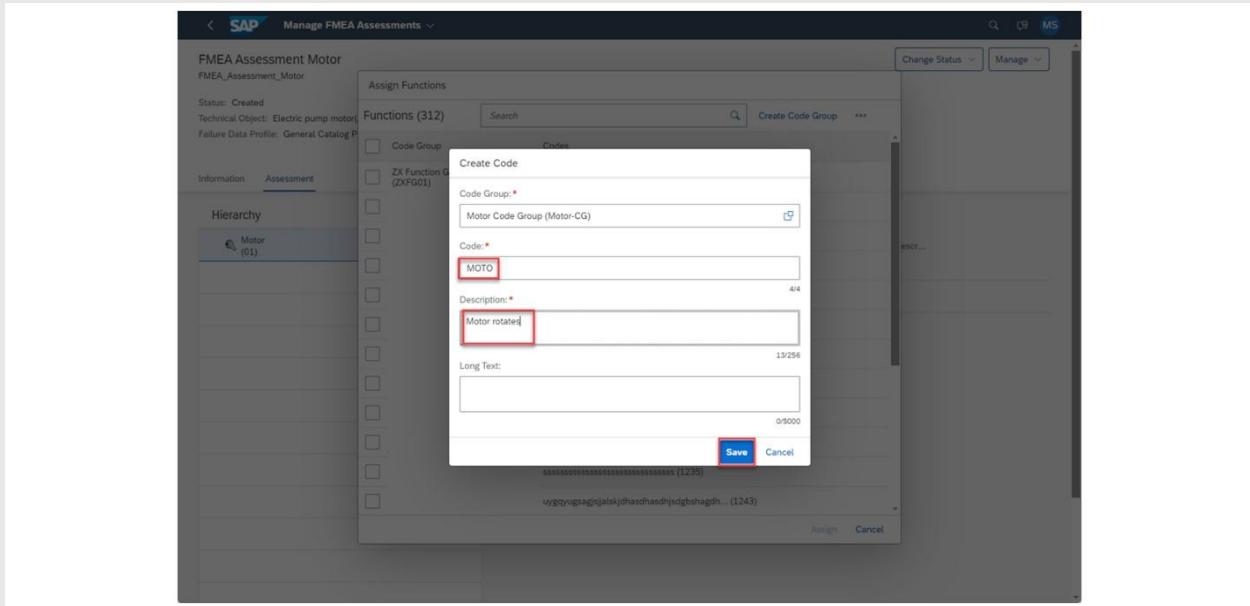


Functions and Functional Failures are different from all other failure data as both functions and functional failures only exist within APM and do not come from the Failure Data Profiles that are created and assigned to a technical object within S4. Therefore, all functions and functional failures are available to choose from in APM when doing an FMEA or RCM assessment and that failure data can be created during the assessment itself.

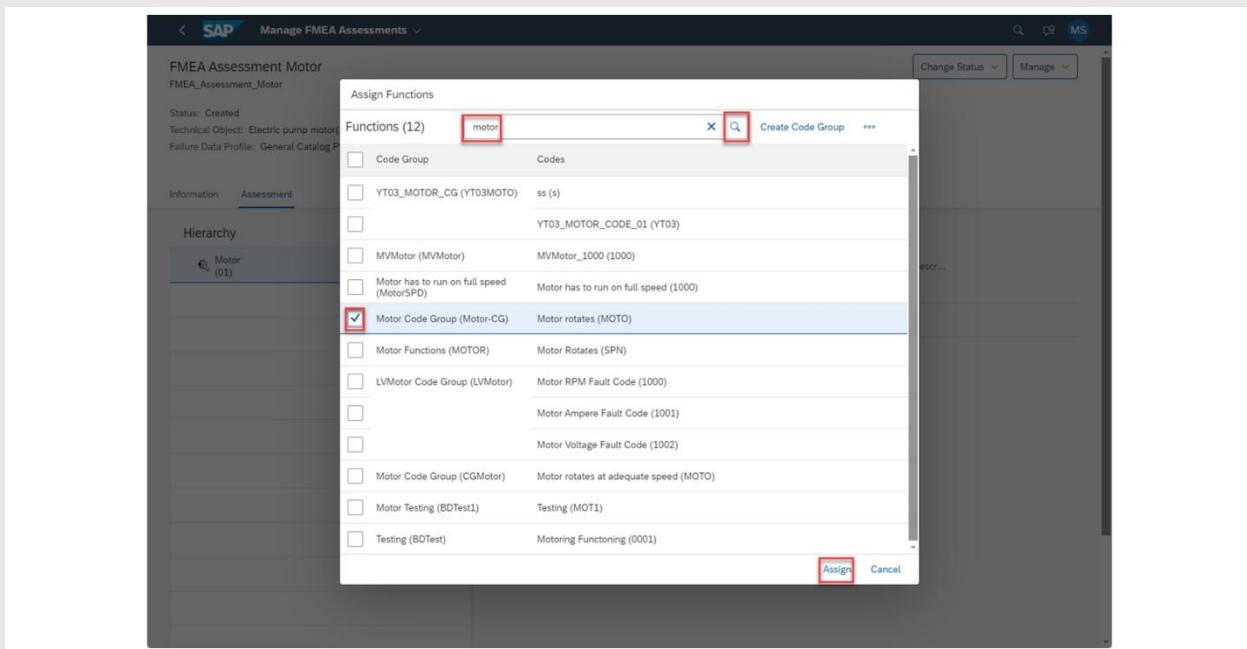
On the Assign Functions pop up, we can select an existing function or create our own. We will create our own here. Functions and functional failures must be created within a code group, which is basically an organization of the failure data based on a particular category. Choose the *Create Code Group* button to create the code group our function will be in.



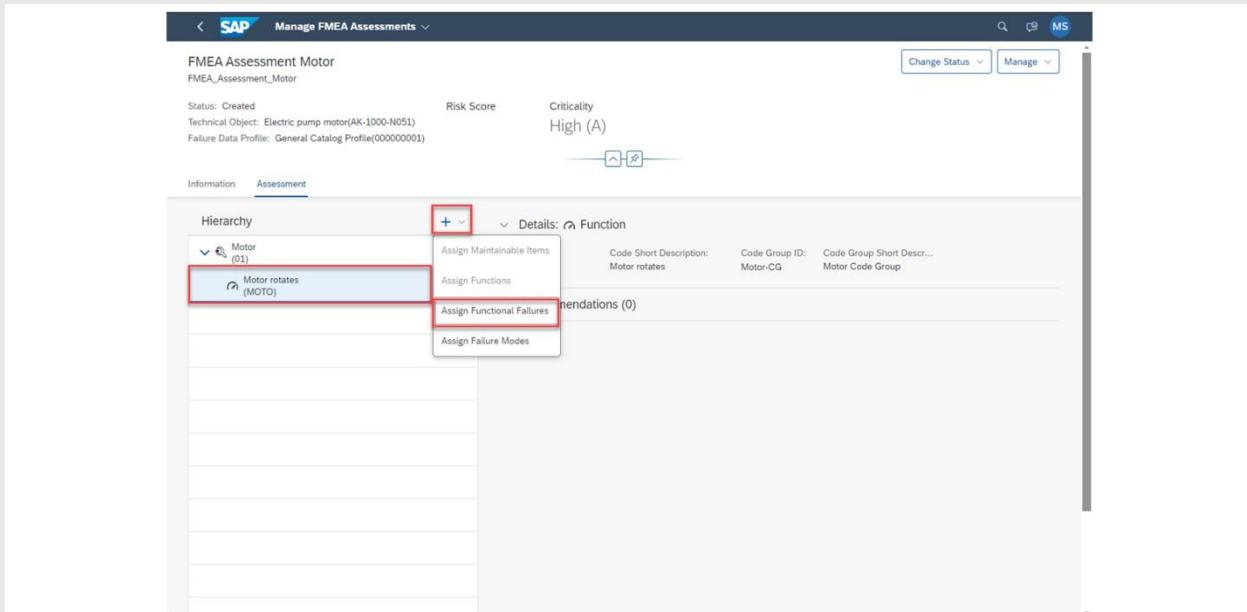
Enter the Code Group name, the Description, and an optional Long Text. Choose the blue Save button once finished.



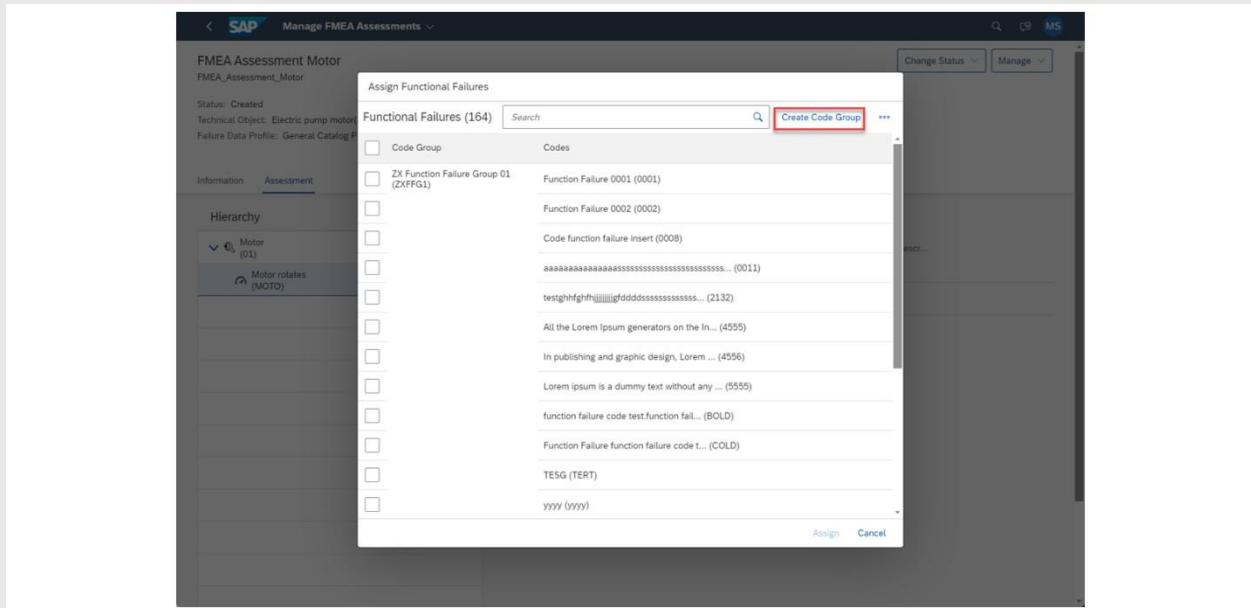
It will automatically prompt to create a code for the code group. Enter the Code name and Description before choosing the blue Save button to finish creating the Code and Code Group.



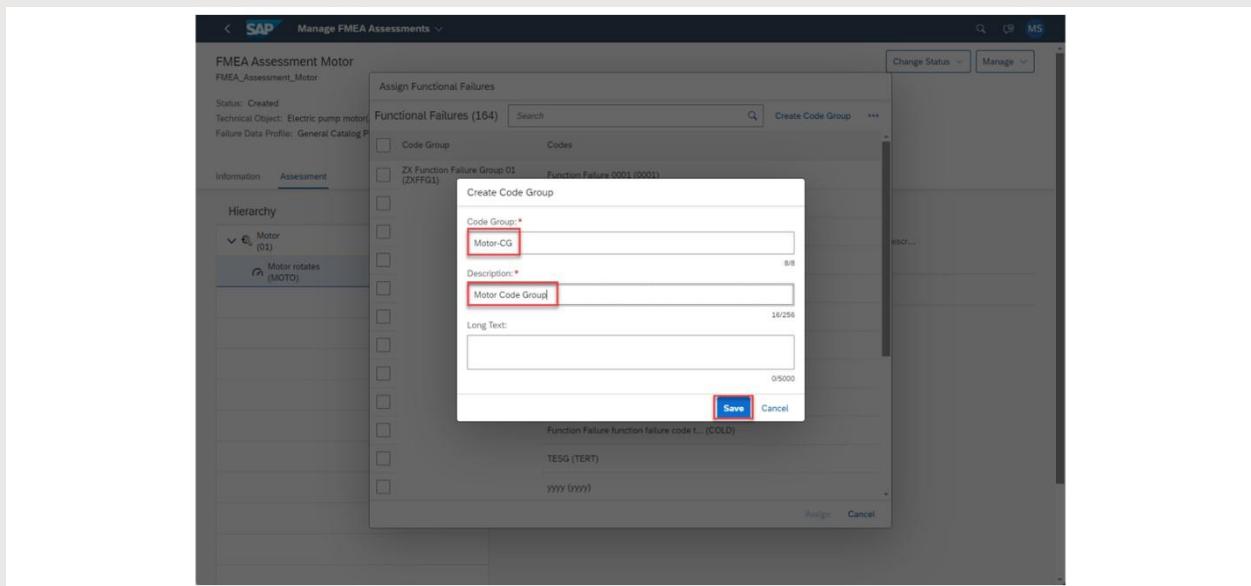
Once created, either create more functions in the code group or check the function to assign. Use the search bar on the top of the page to find the newly created function if it doesn't appear on the list.



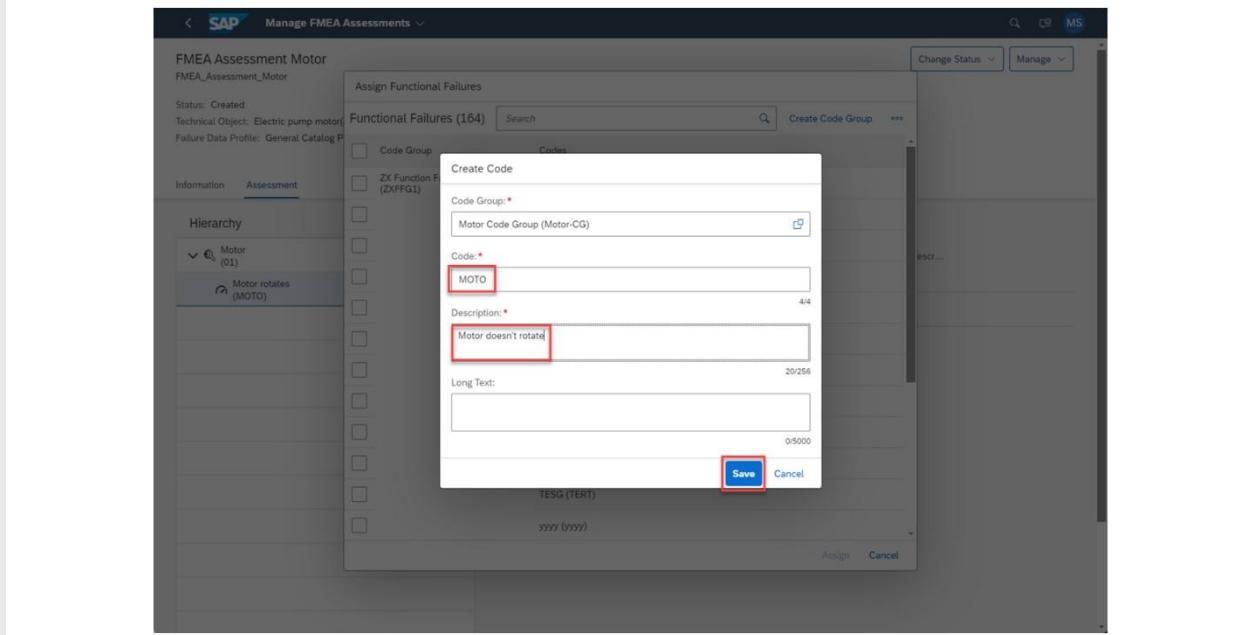
The function has now been assigned to the maintainable item. From here, you can either create a functional failure underneath the function or a failure mode. We will do the same for functional failure. Choose the function if not already in it, then choose the + button, followed by the Assign Functional Failures button from the dropdown.



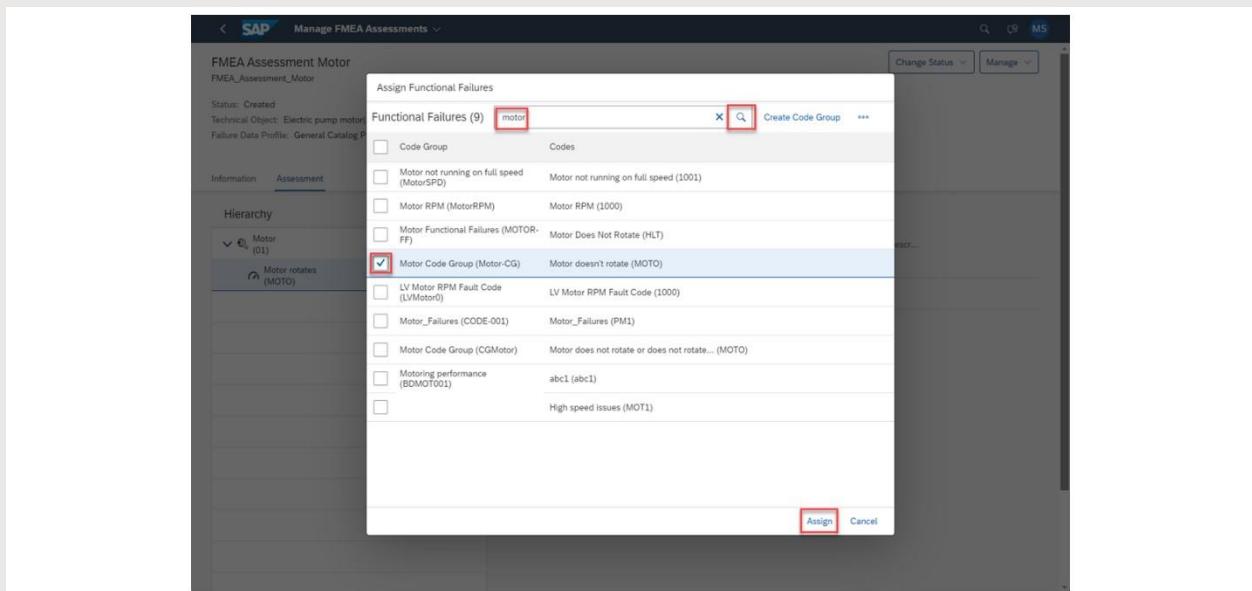
Choose the Create Code Group button to create a new Code Group followed by a new functional failure code for the group. If you want to check off an existing functional failure, that works too.



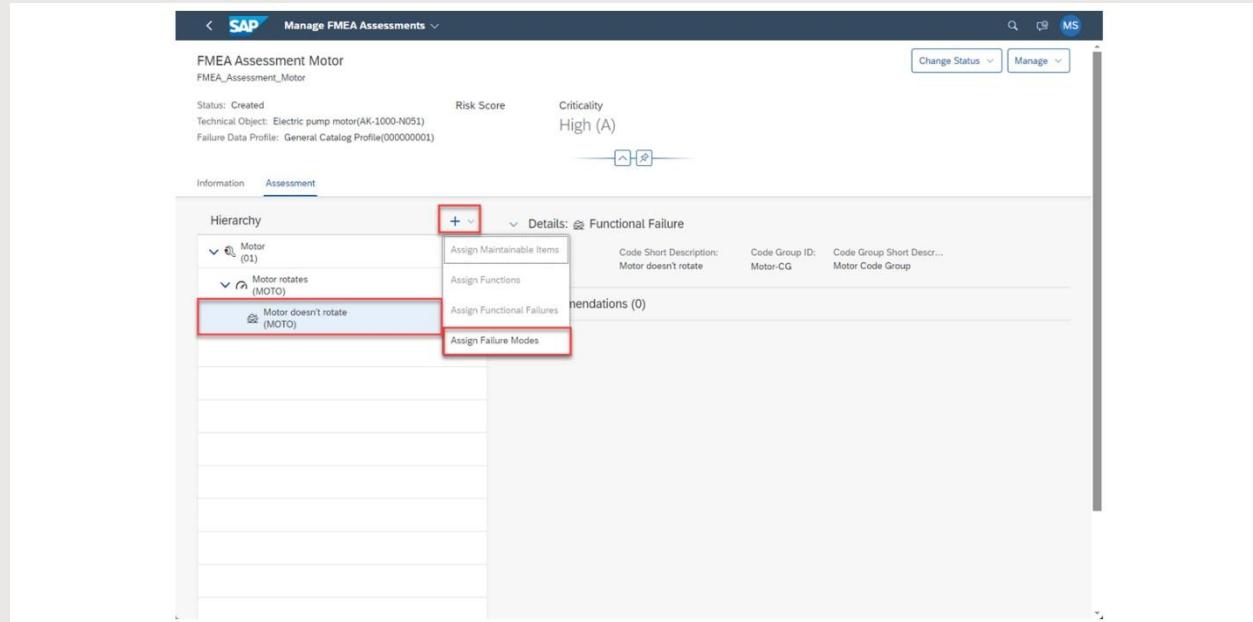
Enter the Code Group name and Description, then choose the blue Save button.



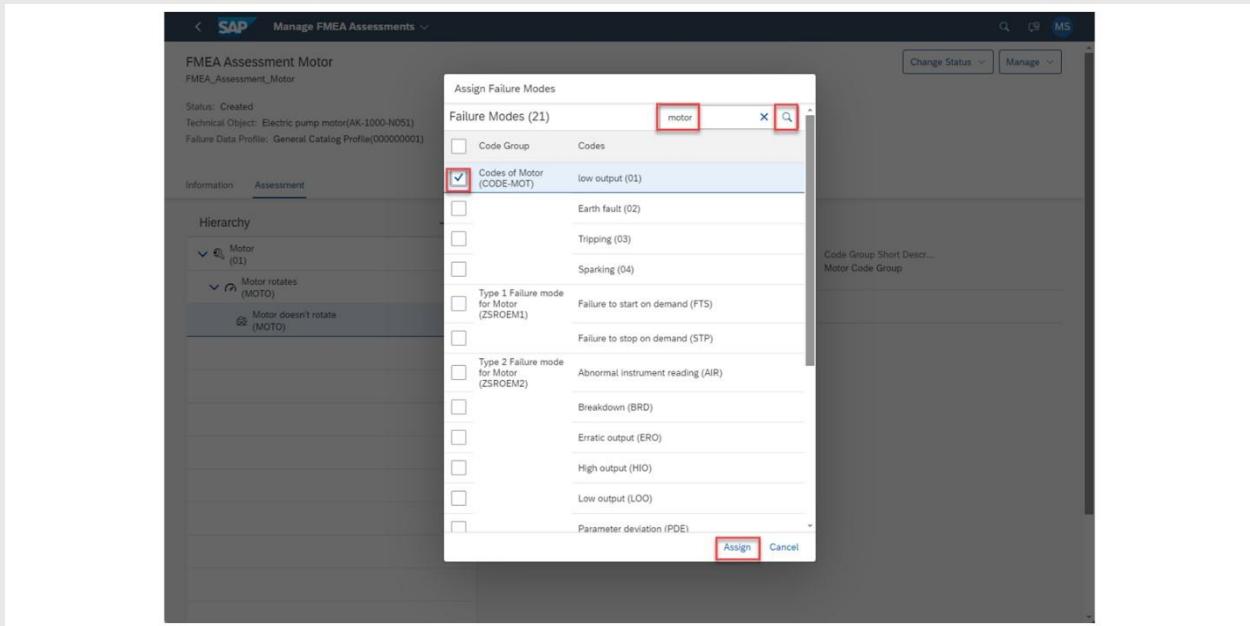
Now create the functional failure code for the code group by entering the Code name and Description. Choose blue Save button once finished.



Use the search bar to find the newly created functional failure. Once found, check the functional failure off and choose the Assign button at the bottom of the pop up.



The failure mode will be one of the two critical pieces of failure data used for the FMEA assessment as this is where the risk score will be set and with the cause(s) underneath it. If the functional failure is selected, choose the + button and then the Assign Failure Mode button in the dropdown.



Similar to the maintainable item list, there are a group of failure modes that come from the failure data profile associated with the technical object we are performing the assessment on. Check the failure mode(s) you want to perform the assessment on and then choose the Assign button on the bottom of the pop up. Use the search bar if necessary.

## 2.2 Configure RPN Calculation

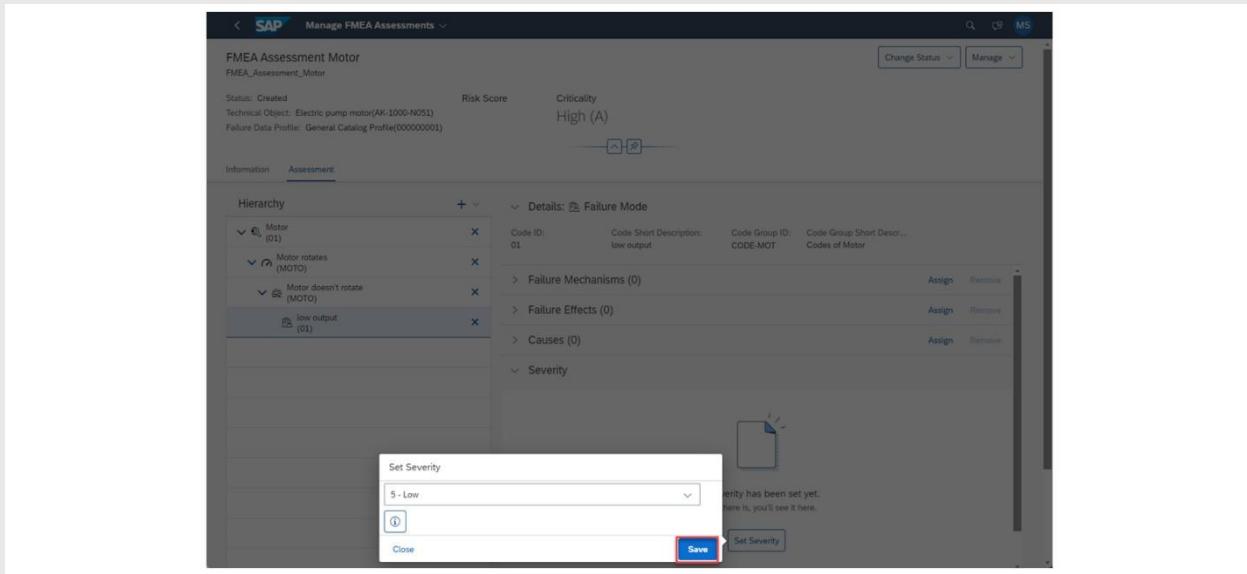
Now with the failure mode assigned, the main part of the FMEA assessment can be performed. This is configuring the risk score for the assessment. The way risk score is calculated is by multiplying the severity of the failure mode, the occurrence of the cause, and the detectability of the cause. The values for each of these three matrices range from 1 - 10, with 1 being the lowest and 10 the highest. Scores ranging from 1 - 99 are grouped into a low score, 100 - 199 as a medium score, and all scores above 200 as a high score. Assuming there are multiple causes assigned to a failure mode, the failure mode cause combination with the highest score will show as the risk score for the failure mode.

The first thing to do is to set the severity for the failure mode. Choose the failure mode in the hierarchy if not already selected and choose the Severity dropdown. Now choose on the Set Severity button in the middle of the Severity section.

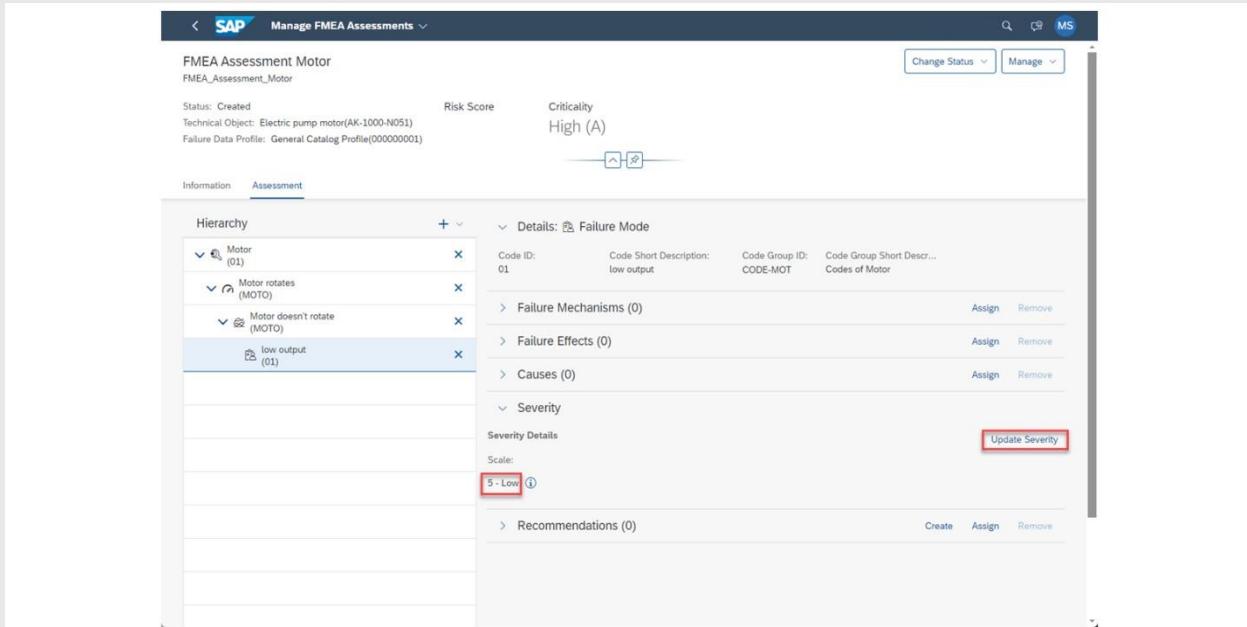
The screenshot shows the SAP FMEA Assessment interface for a motor. The hierarchy on the left includes 'Motor (01)', 'Motor rotates (MOTO)', 'Motor doesn't rotate (MOTO)', and 'low output (01)'. The 'Failure Mode' section on the right shows 'Code ID: 01', 'Code Short Description: low output', and 'Code Group ID: CODE-MOT'. Below this are sections for 'Failure Mechanisms (0)', 'Failure Effects (0)', 'Causes (0)', and 'Severity'. A note says 'No Severity has been set yet. When there is, you'll see it here.' with a 'Set Severity' button.

This screenshot shows the same interface as above, but with a modal dialog box open over the 'Severity' section. The dialog lists severity levels from 1 to 10. The level '5 - Low' is highlighted with a red border. At the bottom of the dialog are 'Close' and 'Save' buttons, with the 'Save' button being highlighted with a blue border.

The severity pop up will now appear on the screen with a drop down to select the severity level for the failure mode. The severity can be selected from 1 - 10. Choose on the drop down and select a severity rating. Optionally, choose on the information icon to find out more information on each severity and in what scenario it should be chosen.



With the severity set, choose the blue Save button to save the severity of the failure mode.



Now with the severity saved, the severity section will update to the value selected. The severity value can also be changed via the Update Severity button.

The screenshot shows the SAP FMEA Assessment interface. On the left, there's a navigation pane with tabs for 'Information' and 'Assessment'. Under 'Assessment', a 'Hierarchy' tree is displayed with nodes: 'Motor (01)', 'Motor rotates (MOTO)', 'Motor doesn't rotate (MOTO)', and 'low output (01)'. To the right, under 'Failure Mode', there are sections for 'Failure Mechanisms (0)', 'Failure Effects (0)', 'Causes (0)' (with an 'Assign' button highlighted with a red box), 'Severity', and 'Recommendations (0)'. At the top right, there are buttons for 'Change Status' and 'Manage'.

Now with that set, we need to add one or more causes to the assessment so we can add the detectability and occurrence values to the FMEA assessment. Choose the *Assign* button in the *Causes* to do this.

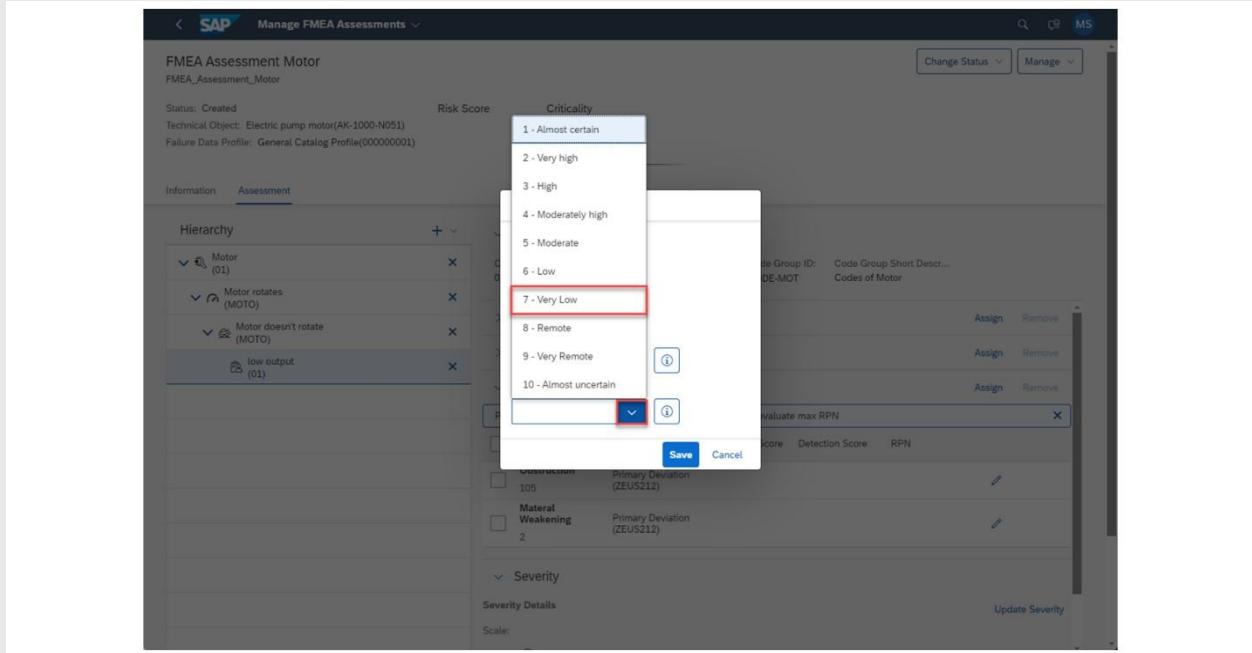
This screenshot shows the 'Assign Cause' dialog box overlaid on the SAP FMEA interface. The dialog lists various causes with checkboxes. Two checkboxes are checked: 'Obstruction (105)' and 'Material Weakening (2)'. Both of these checkboxes are highlighted with red boxes. At the bottom of the dialog, there are 'Assign' and 'Cancel' buttons, with 'Assign' also being highlighted with a red box.

Check off at least one cause from the list. When finished, choose the Assign button to assign the selected causes to the failure mode.

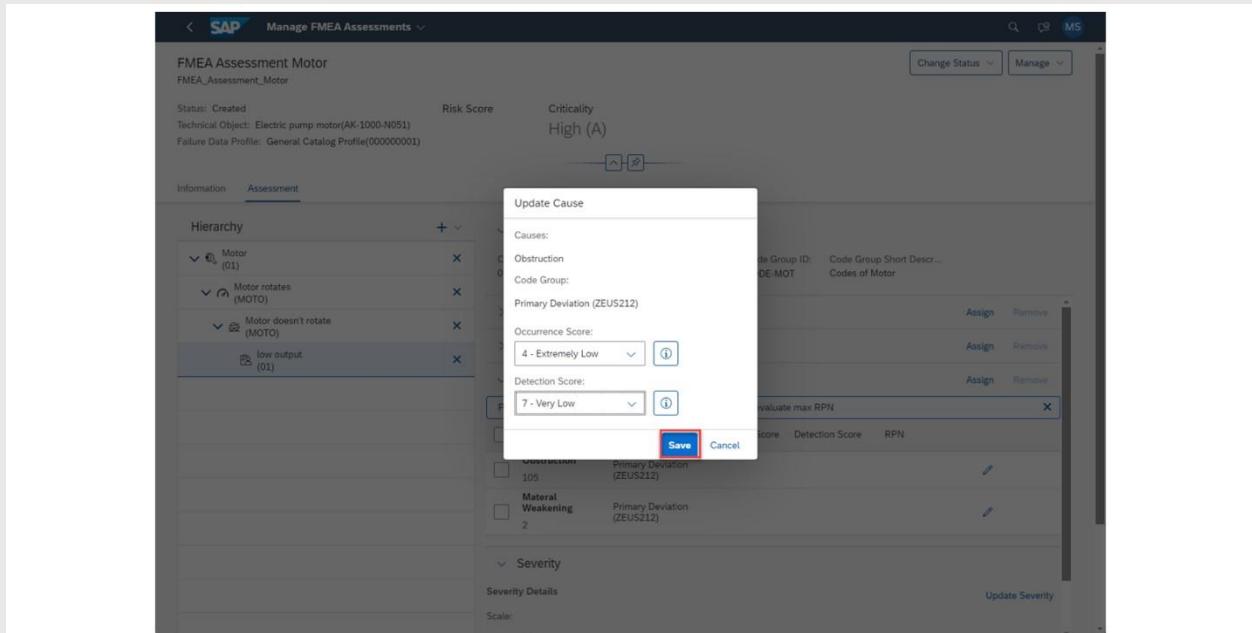
Cause	Code Group	Occurrence Score	Detection Score	RPN
Obstruction	105	Primary Deviation (ZEUS212)		
Material Weakening	2	Primary Deviation (ZEUS212)		

Back on the failure mode page, we will see the causes that were assigned to the failure mode. In this section, we see a column for Occurrence Score and Detection Score. To fill those in for the specific cause, choose the Edit button to assign those scores to the selected cause.

Just like with the severity score selection, there are two dropdowns to select the occurrence and detection scores. Choose the dropdown for occurrence and choose a score from the list.



Repeat the same process for the detection score.



Choose the blue Save button once both scores have been assigned.

Cause	Code Group	Occurrence Score	Detection Score	RPN
Obstruction 105	Primary Deviation (ZEUS212)	4	7	140
Material Weakening 2	Primary Deviation (ZEUS212)			

With the occurrence and detection scores entered for the cause, we can see that the RPN has been calculated by multiplying those two scores together as well as the severity score set earlier. In the example shown in the screenshots, the severity score was 5, the occurrence score was 4, and the detection score was 7, leading to a total RPN score of 140. If there are any remaining RPN scores to calculate, continue to do so.

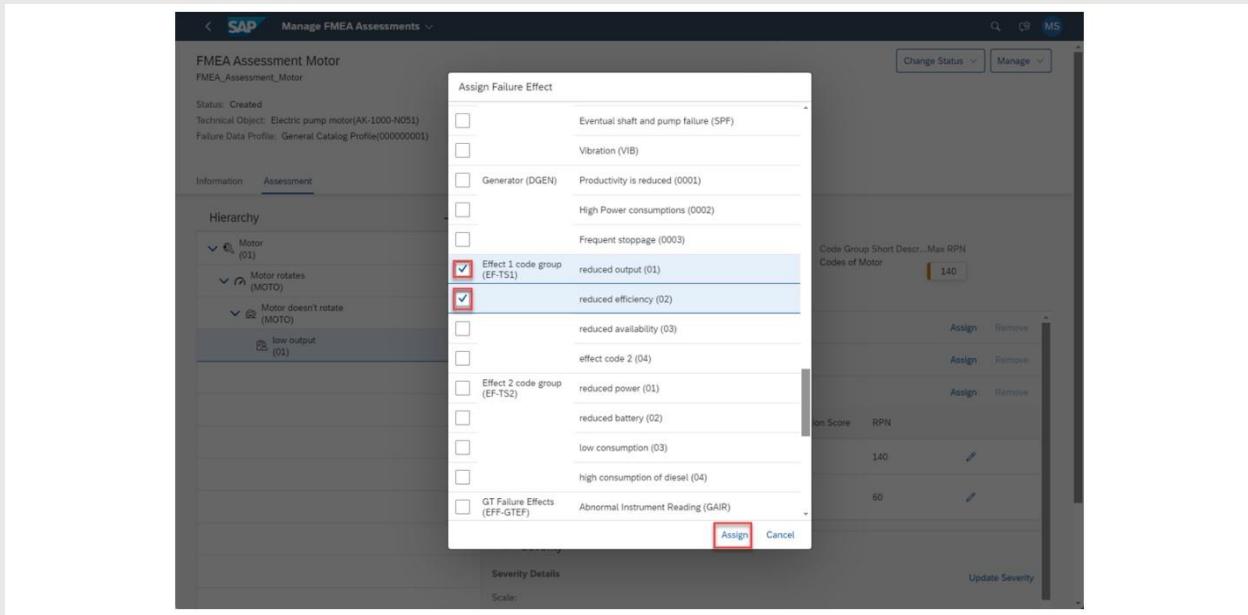
Cause	Code Group	Occurrence Score	Detection Score	RPN
Obstruction 105	Primary Deviation (ZEUS212)	4	7	140
Material Weakening 2	Primary Deviation (ZEUS212)	3	4	12

With another RPN calculated, we can see that a new field in the failure mode details section has appeared, that being the Max RPN section. With every failure mode being able to have as many RPNs calculated as there are causes, the RPN that will show up for the failure mode will be the largest of them all. In the screenshot below, I have an RPN of 140 with one cause and another RPN of 60 with another. It took the first RPN calculated as my failure mode's RPN because it was the bigger of the two.

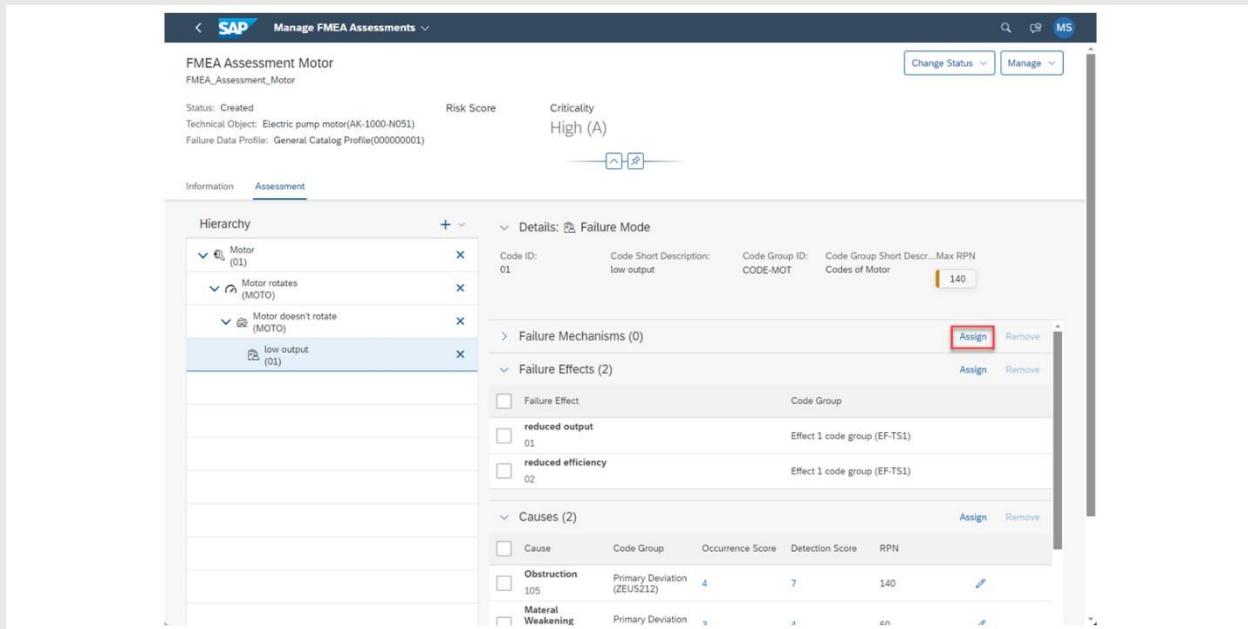
## Set Up Additional Failure Data and Recommendations and Release Assessment

While it is not necessary to calculate the RPN, failure effects are required for the assessment to be released. The process of assigning failure effects and the optional failure mechanisms are the exact same as assigning causes underneath the failure mode. With the failure mode selected, choose on the *Assign* button in the *Failure Effects* section.

The screenshot shows the SAP FMEA Assessment interface. At the top, it displays the status as 'Created' for the technical object 'Electric pump motor(AK-1000-N051)'. The risk score is 'Medium' and the criticality is 'High (A)'. On the right, there are buttons for 'Change Status' (set to 'In Process') and 'Manage'. The main area is divided into sections: 'Information' and 'Assessment'. Under 'Assessment', the 'Hierarchy' tree shows 'Motor' (01), 'Motor rotates (MOTO)', and 'Motor doesn't rotate (MOTO)' with 'low output' (01) selected. The 'Failure Mode' section shows 'Code ID: 01', 'Code Short Description: low output', 'Code Group ID: CODE-MOT', and 'Code Group Short Descr.: Max RPN' with a value of '140'. The 'Failure Mechanisms (0)' and 'Failure Effects (0)' sections both have an 'Assign' button highlighted with a red box. The 'Causes (2)' section lists 'Obstruction' (Cause 105) with a RPN of 140 and 'Material Weakening' (Cause 2) with a RPN of 60. The 'Severity' section includes a 'Scale:' input field and a 'Update Severity' button.



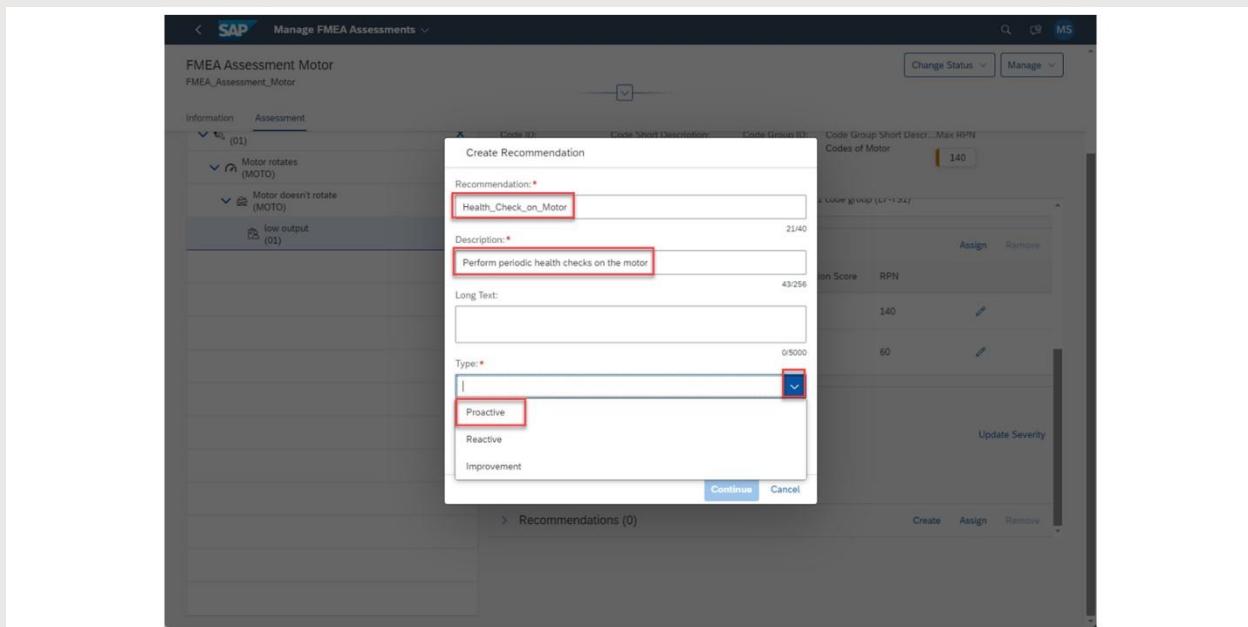
Check the failure effects to assign to the failure mode and choose the *Assign* button once finished.



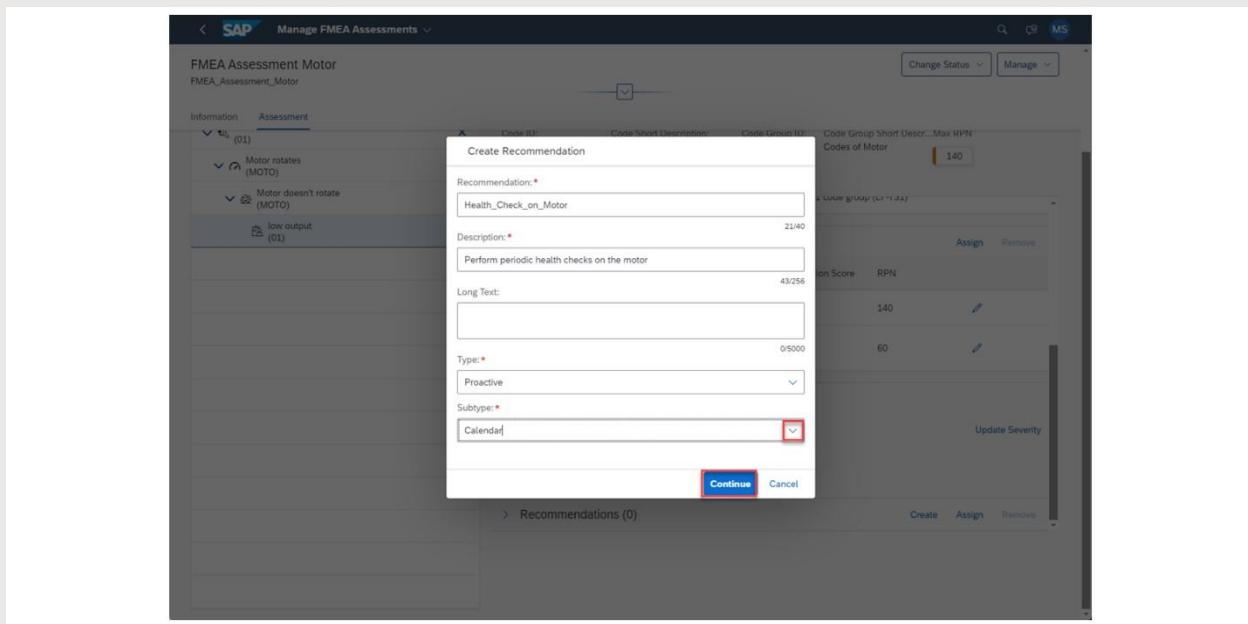
Optionally, perform the same for the failure mechanisms.

The screenshot shows the SAP FMEA Assessment Motor interface. On the left, a tree view lists failure modes: 'Motor rotates (MOTO)' and 'Motor doesn't rotate (MOTO)'. Under 'Motor rotates (MOTO)', there is a child node 'low output (01)'. To the right, the 'Assessment' tab is selected. It displays failure mode '01' with code ID '01', short description 'low output', code group 'CODE-MOT', and max RPN '140'. Below this, failure mode '02' is listed with code ID '02', short description 'Motor doesn't rotate (MOTO)', code group 'CODE-MOT', and max RPN '140'. A table titled 'Causes (2)' shows two entries: 'Obstruction 105' (Primary Deviation ZEUS212, Occurrence Score 4, Detection Score 7, RPN 140) and 'Material Weakening 2' (Primary Deviation ZEUS212, Occurrence Score 3, Detection Score 4, RPN 60). Below the causes, a 'Severity' section shows a scale from 1 to 5, with '5 - Low' selected. At the bottom, a 'Recommendations (0)' section has a 'Create' button highlighted with a red box.

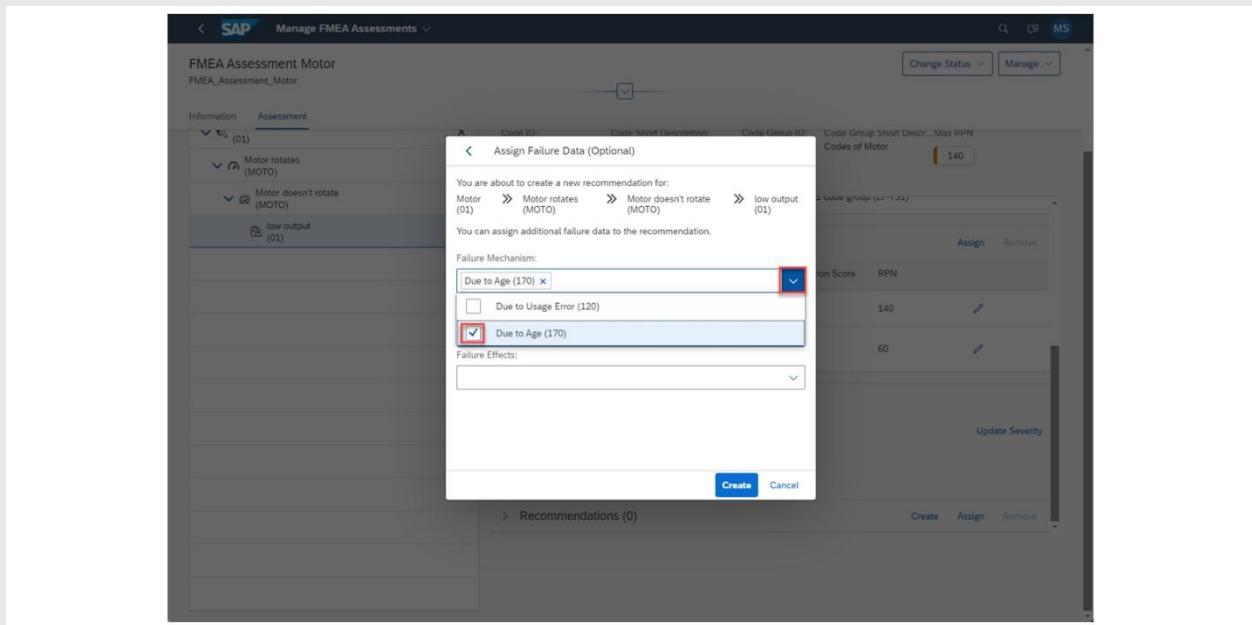
With the RPNS calculated and the effects added to the assessment, one last thing we can do is create recommendations underneath the failure mode. We will be saying that given the combination of failure data associated with the recommendation, this is the suggestion that is made to mitigate the problems that may arise. Scrolling down to the bottom of the failure mode screen, the Recommendations section is available, and we can either create or assign a recommendation to the assessment. Recommendations can only be assigned if they've already been created within the same assessment. Choose the Create button in the Recommendations section to create a new recommendation.



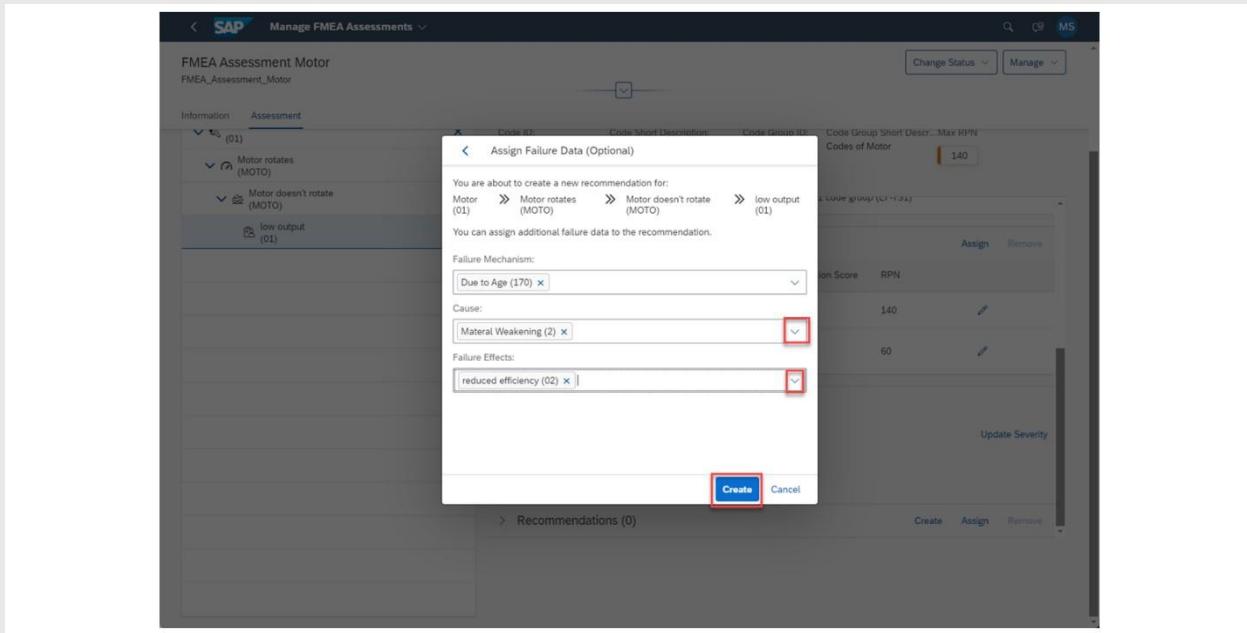
Enter the Recommendation name and Description as well as choosing a recommendation type from the Type dropdown.



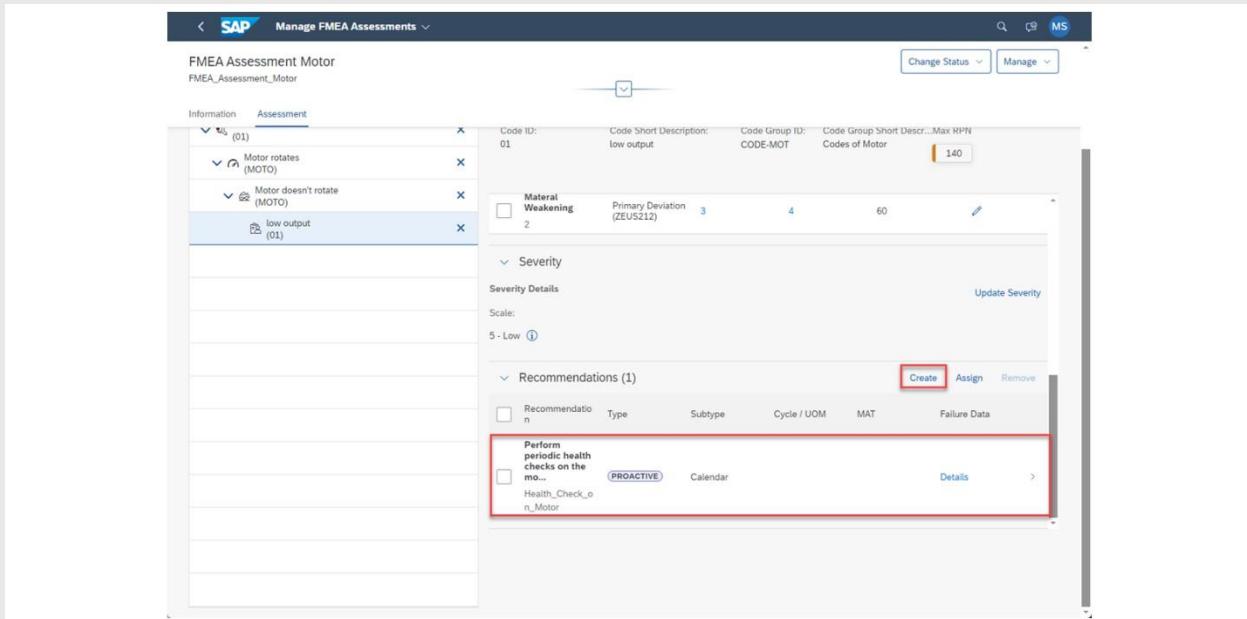
If the Proactive Type is chosen from the dropdown, then a subtype must also be selected as well. Select the Subtype from the dropdown and choose the blue *Continue* button once finished to move on to the next section of the recommendation creation page.



Now we can optionally assign the failure data to our recommendation that we've assigned to the failure mode we created the recommendation from. If there was no failure data present in a particular section, then the option to assign that failure data would not be present. If no failure data is present under the failure mode at the time of recommendation creation, this section would be skipped. Choose the dropdown for the failure data you wish to add and check the desired data. You can choose one or more options from each section.



Repeat this process for all the remaining failure data to assign and then choose the blue Create button once finished to finish creating the recommendation.



Now the recommendation has been created and assigned to the assessment. Choose the recommendation to view it and set additional details in the Manage Recommendations section. You can also create more recommendations as well.

The screenshot shows the SAP FMEA Assessment Motor page. At the top right, there is a 'Change Status' dropdown menu with options: 'In Process' (highlighted in red) and 'Released'. Below this, there is a table for 'Recommendations (4)' with columns for Type, Subtype, Cycle / UOM, MAT, and Failure Data. The recommendations listed are:

- Update motor usage to correct application... (REACTIVE)
- Perform health check (PROACTIVE)
- Perform Health Check (PROACTIVE)
- Perform periodic health

Now with all the data entered into our assessment, we can finally release the assessment. To release the assessment, it must be in the status of In Process. By default, all assessments start off in the Created status. To change the status from Created to In Process, choose the *Change Status* dropdown at the bottom of the page and choose the *In Process* button. Note that when the status changes to In Process, the *Manage* tab will disappear and the ability to delete the assessment will not be possible anymore.

The screenshot shows the SAP FMEA Assessment Motor page. At the top right, there is a 'Change Status' dropdown menu with options: 'In Process' (highlighted in red) and 'Released' (highlighted in red). Below this, there is a table for 'Recommendations (4)' with columns for Type, Subtype, Cycle / UOM, MAT, and Failure Data. The recommendations listed are:

- Update motor usage to correct application... (REACTIVE)
- Perform health check (PROACTIVE)
- Perform Health Check (PROACTIVE)
- Perform periodic health

Repeat the same process again to change the assessment from In Process to Released. When an assessment is released, it cannot be further edited.

The screenshot shows the SAP FMEA Assessment interface for the 'Motor' component. The top navigation bar includes the SAP logo and the title 'Manage FMEA Assessments'. The main content area displays the following details:

- FMEA Assessment Motor**
- Status:** Released (highlighted with a red box)
- Technical Object:** Electric pump motor(AK-1000-N051)
- Risk Score:** Criticality High (A)
- Hierarchy:**
  - Motor (01)
  - Motor rotates (MOTO)
    - Motor doesn't rotate (MOTO)
      - low output (01)
- Failure Mode:**
  - Code ID: 01, Code Short Description: low output, Code Group ID: CODE-MOT, Code Group Short Description: Codes of Motor, Max RPN: 140
- Failure Mechanisms (2):**

Failure Mechanism	Code Group
Due to Usage Error 120	Failure (ZEUS205)
Due to Age 170	Failure (ZEUS205)
- Failure Effects (2):**

Failure Effect	Code Group
reduced output 01	Effect 1 code group (EF-TS1)
reduced efficiency 02	Effect 1 code group (EF-TS1)

If successful, the status will change to Released and the assessment cannot be updated anymore. If there is an issue with the assessment that prevents it from being released, an error message will appear stating what the issue is.

### 3. Lesson Summary: Creation of Failure Modes and a Effects Analysis (FMEA) Assessment

In this lesson, we explored the application of Failure Modes and Effects Analysis (FMEA) on a wind turbine project to improve reliability and safety. The process involved:

1. **Identifying Potential Failures:** We examined critical components like blades and gearboxes for possible failure modes, such as material fatigue or lubrication issues.
2. **Assessing Risks:** Using Risk Priority Numbers (RPN), we evaluated the severity, occurrence, and detectability of each failure, prioritizing those with the highest risk.
3. **Developing and Implementing Mitigation Strategies:** Strategies were formulated to address high-risk failures, including improved maintenance and material upgrades.
4. **Continuous Improvement:** We committed to regular FMEA reviews to update our strategies based on new insights or technological advances.

#### 3.1 Key Outcomes:

- Enhanced safety and efficiency of the wind turbine project.
- Prevention of downtime and extension of component lifespan.

#### 3.2 Key Learnings:

- The importance of a systematic approach to risk management.
- The value of preventive measures and continuous improvement in complex systems.