Handle Abort Mid Process

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The Handle Abort Mid Process feature supports the configuration of wafer classification and defines the actions to be applied for each classification.

It ensures the correct action is taken for each wafer or set of wafers when the process is unexpectedly interrupted.

> **Note**
>
> No special licenses are required to use this functionality.

Overview

This tutorial covers the following sections:

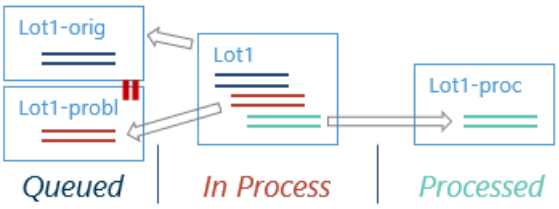
- **Feature overview** - Explains how Handle Abort Mid Process is intended to be used.
- **Scenario** - A simplified example to help understand the underlying logic.
- **Configuration** - A step-by-step guide with screenshots and links to key documentation.
- **Execution** - Using the feature to run the setup and see it in action, including a video walkthrough.

Feature

This feature enables the creation of a Processing Issue, allowing users to classify the processing state of each sub-material (for example, processed, not processed, issue).

Based on the defined classification, the system automatically executes the appropriate disposition actions, which typically include:

- Split and Track Out the processed sub-materials.
- Split the mid-process sub-materials (according to each issue type), abort them, send to rework, and place them on hold.
- Abort the remaining non-processed sub-materials from the original lot.



After classifying each sub-material, a **Protocol** can be opened with a workflow for issue investigation when a sub-material is classified as having an issue or being in an unknown state. Following the investigation,

the sub-material's processing state and classification can be updated.

The corresponding disposition actions are then automatically triggered once the **Protocol** is closed.

A Future Merge can be automatically set to join all the materials back together once the pending sub-materials are reprocessed.

Scenario

Configuration

To assess how this industry and production requirement is addressed, consider a simplified model:

Basic entities like **Step**, **Resource**, **Flow**, **Product**, and **Material** can be configured as detailed below:

- **Step** - `Coating`
- **Resource** - `COATER-001`
- **Flow** - `Flow_Metallurgy`
- **Product** - `Engine Block H08-P9`
- **Material** - `Engine Block H08-P9.002` (this **Material** has three sub-materials)

> **Note**
>
> This is the Master Data file used to create this model.

Lookup Tables

There are several **Lookup Tables** that need to be configured for this scenario:

1. SemiProcessingClassification

NAME	DESCRIPTION	ENABLED
Issue	Sub-Material has a processing issue	✓
Not Applicable	Sub-Material or Slot was not involved in the process (e.g. skipped material or empty container position)	✓
Not Processed	Sub-Material was not started	✓
Processed	Sub-Material was completely processed	✓
Unknown	Sub-Material processing status is unknown	✓

2. SemiProcessingIssueAction

NAME	DESCRIPTION	ENABLED
Abort	Aborts the sub-materials	✓
Hold	Sets the sub-material group on hold	✓
Rework	Sends the affected sub-material group to a Step-configured Rework Flow	✓
Terminate	Terminates the affected sub-materials	✓
Track Out	Tracks out the sub-materials	✓

> **Info**
>
> This table should not be updated with more actions, as this would require subsequent changes to the actual application code.

3. SemiProcessingIssueActionPlan

NAME	DESCRIPTION	ENABLED
Abort	Aborts the sub-materials	✓
Abort and Hold	Aborts the sub-materials and puts them on hold	✓
Do Nothing	No Action to be taken	✓
Hold	Sets the sub-material group on hold, without taking any other actions	✓
Rework	Sends the affected sub-material group to a Step-configured Rework Flow	✓
Terminate	Terminates the affected sub-materials	✓
Track Out	Tracks out the sub-materials	✓
Track Out and Wait	Tracks out the selected sub-materials and waits to get merged with the remaining ones	✓

4. SemiProcessingIssueMergeOption

NAME	DESCRIPTION	ENABLED
Merge on Current Step	Merge back the materials when all are Processed in the current/issue Step	✓
Merge on Future Step	Merge back the materials when reaching (Queued) a specific Step	✓
No Merge	Materials will not be merged automatically	✓

> **Info**
>
> This table should not be updated with more actions, as this would require subsequent changes to the actual application code.

Generic Tables

There are several **Generic Tables** that need to be configured for this scenario:

1. SemiProcessingClassificationSettings

   Define the default action to be executed per Processing Issue and whether a **Protocol** can be triggered. If the Can Trigger Protocol option is enabled, the **Material** opens a **Protocol** after classifying wafers. The actions are executed only after closing the **Protocol**.

Semi Processing Classification Settings (5)

CLASSIFICATION	DEFAULT ACTION PLAN	SPLIT SEQUENCE	CAN TRIGGER PROTOCOL
Processed	Track Out	2	✗
Issue	Abort and Hold	4	✓
Not Applicable	Do Nothing	5	✗
Not Processed	Abort	1	✗
Unknown	Abort and Hold	3	✓

2. SemiProcessingIssueActionPlans

   Define the default actions to be executed for a set of wafers based on the Processing Issue and specify whether a merge occurs.

ACTION PLAN	ACTION 1	ACTION 1 REASON	ACTION 2	ACTION 2 REASON	ACTION 3	ACTION 3 REASON	FUTURE MERGE OPTION	MERGE STEP
Abort	Abort						Merge on Current Step	
Abort and Hold	Abort		Hold	SemiProcessingIssue			Merge on Current Step	
Do Nothing							Merge on Current Step	
Hold	Hold	SemiProcessingIssue					Merge on Current Step	
Rework	Abort		Rework	SemiReworkReason			Merge on Current Step	
Terminate	Terminate	SemiLossReason					No Merge	
Track Out	Track Out						Merge on Current Step	
Track Out and Wait	Track Out		Hold	SemiProcessingIssue			Merge on Current Step	

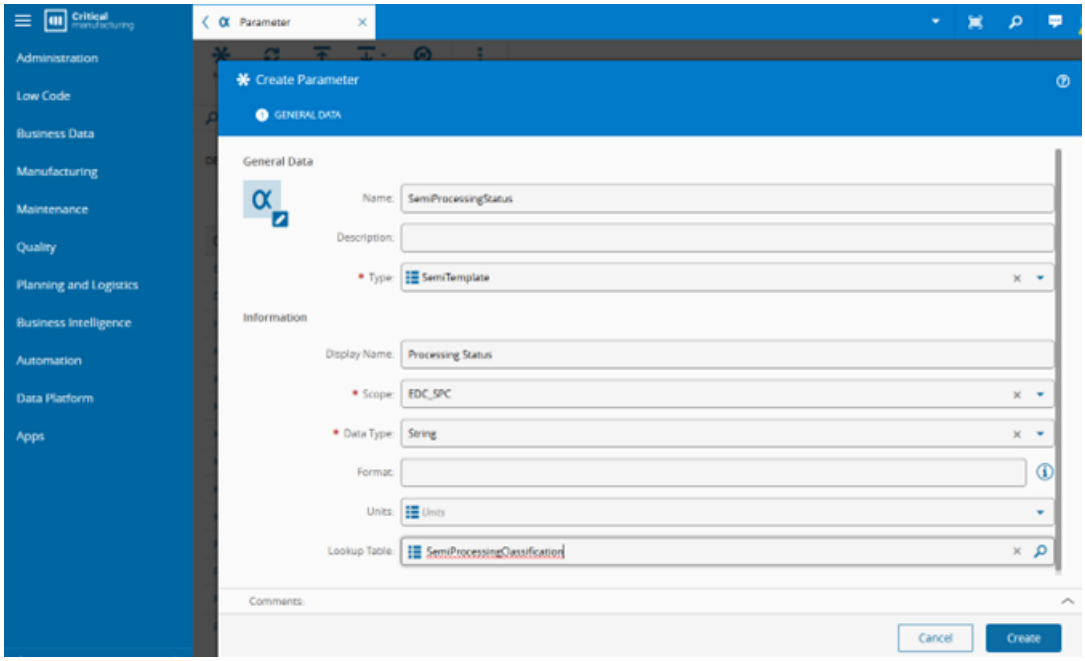
Note

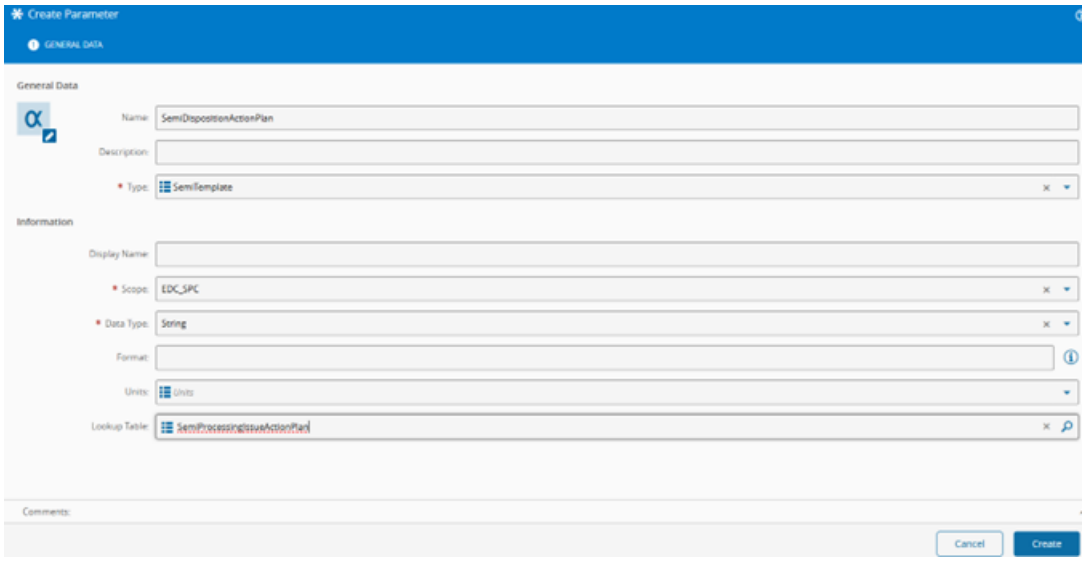
This is the Master Data file used for this scenario.

Smart Tables, Protocols, and Data Collection

For all remaining configurations, follow these steps:

1. Create these two **Parameters**:

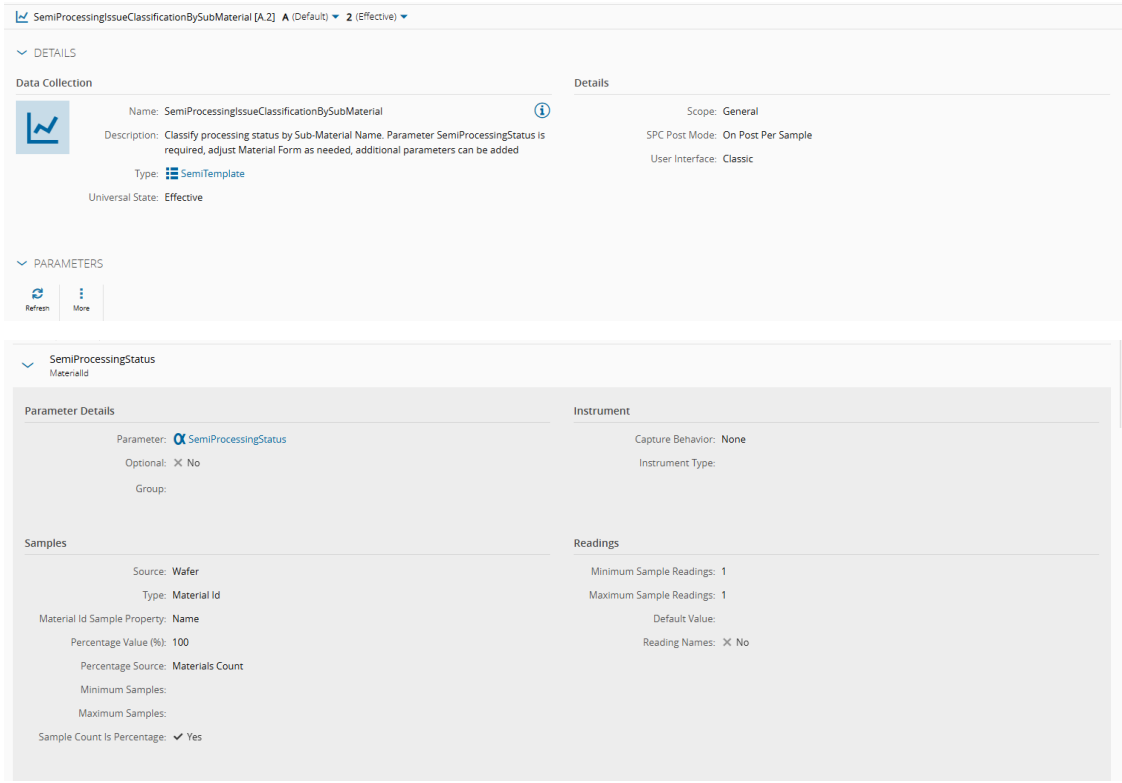




Useful Documentation

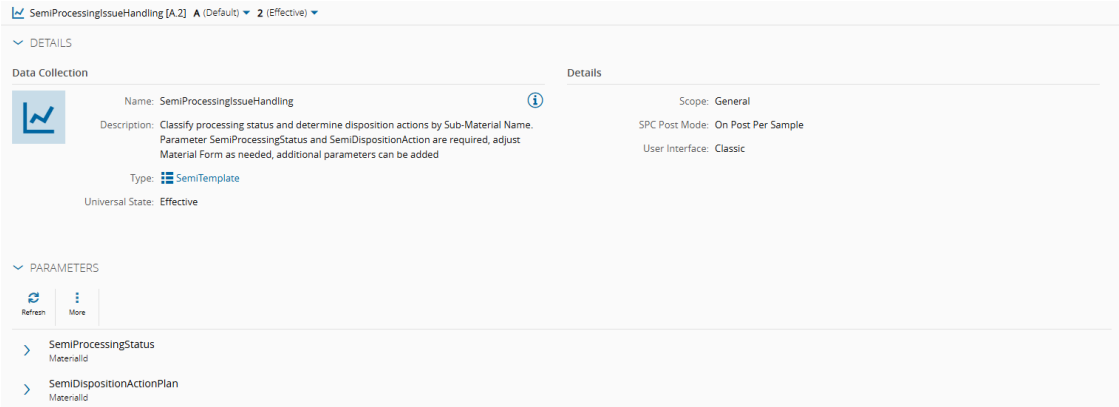
- Create Parameter
- How to: Create a Parameter

2. Create a **Data Collection**:



The second **Data Collection** will be used later in the second scenario of this tutorial.

3. Assign both **Parameters** to the **Data Collection** created above:



Useful Documentation

- Create Data Collection
- How to: Create a Data Collection
- MaterialDataCollectionContext
- How to: Add Value to Smart Table

Note

There is a specific Entity Type - **SemiDataCollectionInstanceProtocolInstanceRelation** - to support the Handle Abort Mid Process functionality.

4. Fill in these two configuration entries with the names of the **Parameters** created above.

   These configuration entries are filled by default in the system.

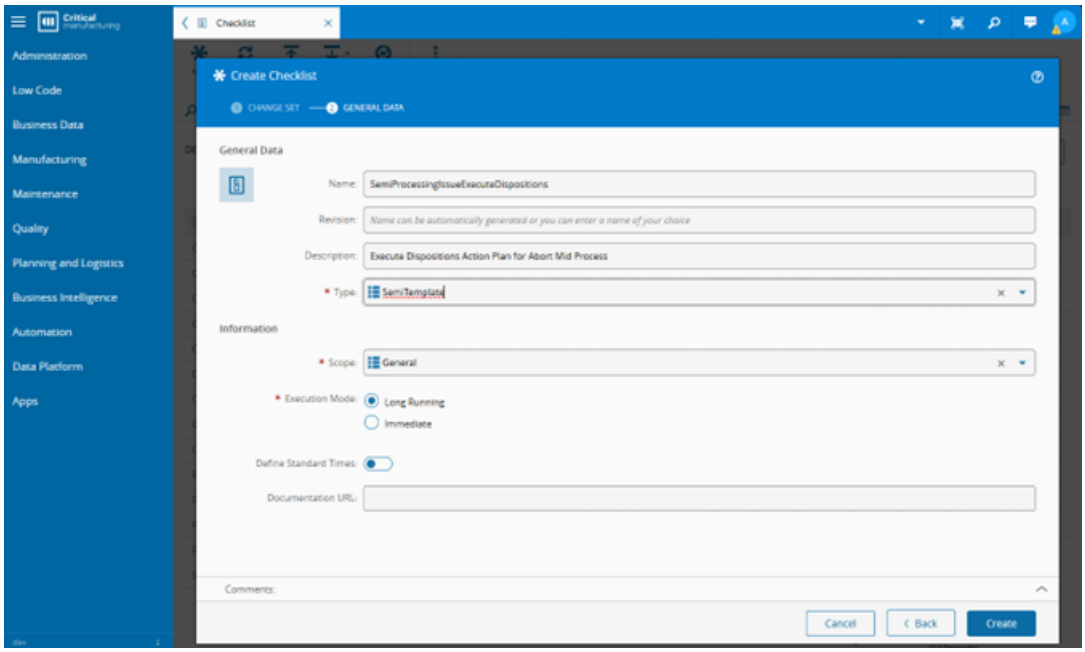
Entries (47)

PATH	NAME	VALUE
/Semi/ProcessingIssueHandling/DispositionActionPlanParamName/	DispositionActionPlanParamName	SemiDispositionActionPlan
/Semi/ProcessingIssueHandling/ProcessingStatusParamName/	ProcessingStatusParamName	SemiProcessingStatus

Useful Documentation

- Configuration

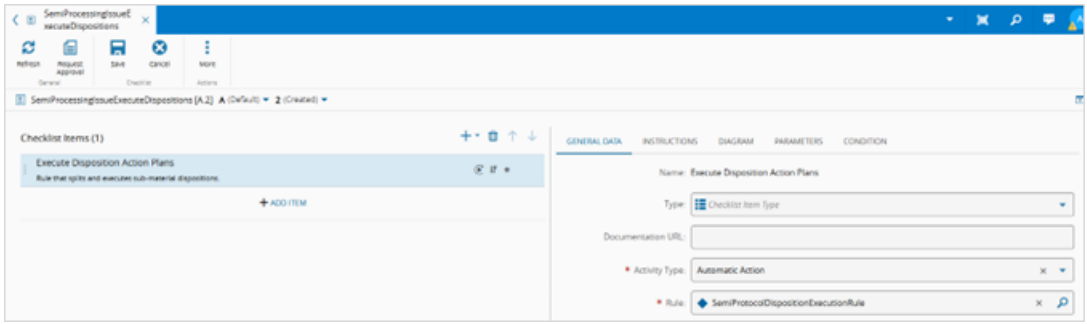
5. Create a **Checklist**:



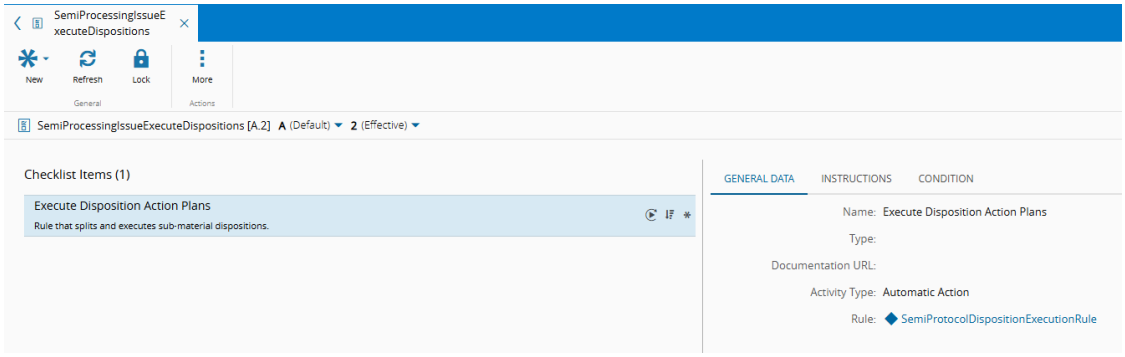
For this scenario, use the following settings in the General Data:

- Activity Type - Automatic Action
- Rule - insert the out-of-the-box **Rule** called `SemiProtocolDispositionExecutionRule`

For the Handle Abort Mid Process, this **Rule** will be automatically triggered when closing the **Protocol** and it will execute the actions defined in the **Data Collection**.



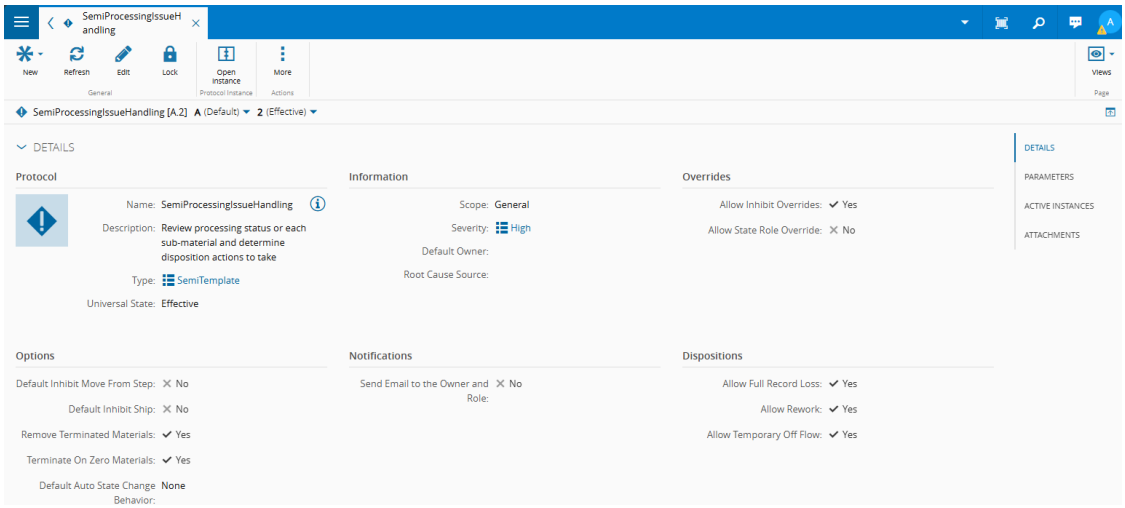
This **Checklist** is assigned to the **Protocol** to execute the actions automatically.



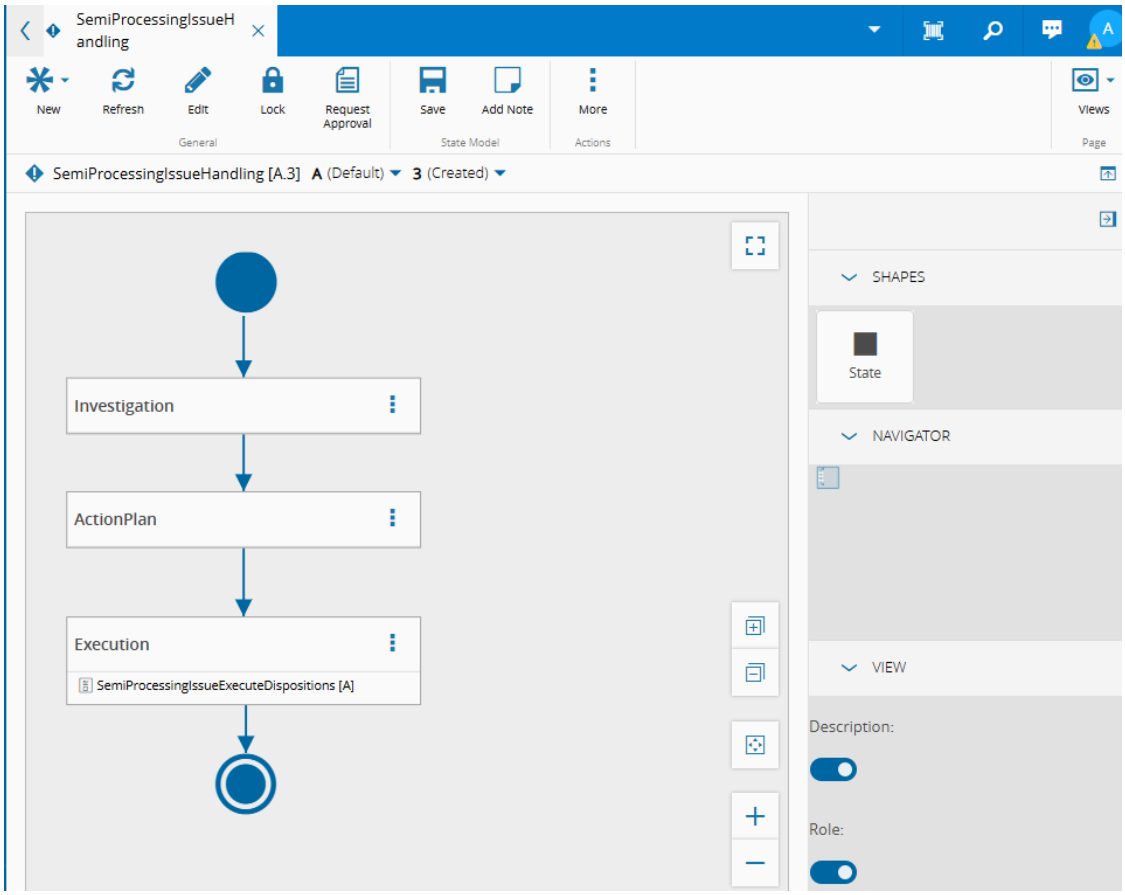
Useful Documentation

- Create Checklist
- How to: Create a Checklist

6. Create a **Protocol**:



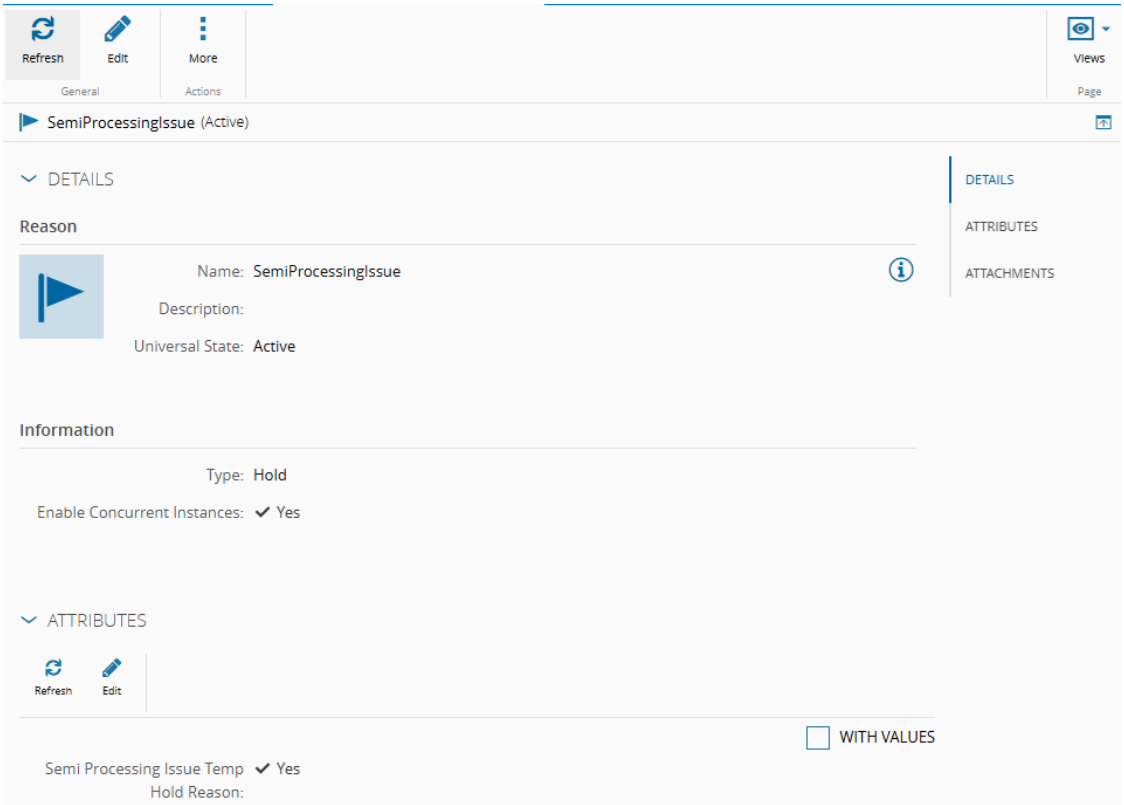
7. Create the desired states of the **Protocol** and add the previously created **Checklist** in one of them:



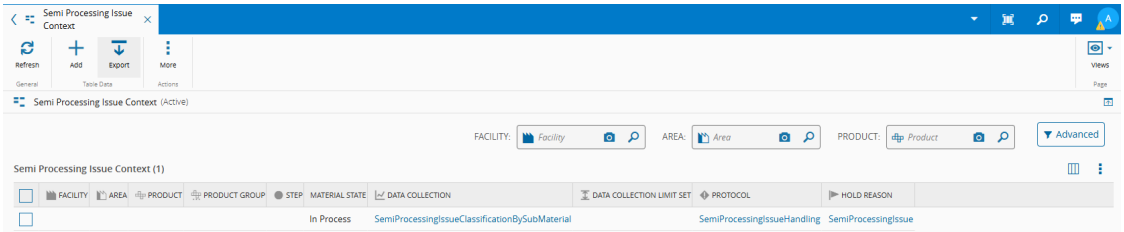
Useful Documentation

- Create Protocol

8. Create a Hold **Reason** and assign it to the steps where this behavior occurs. The reason must have the `SemiProcessingIssueTempHoldReason` attribute set to true. This means the system searches for Hold reasons with this attribute enabled when performing an automatic release. This attribute is automatically created by the system.



9. Fill in the SemiProcessingIssueContext table based on the image below:
    - Assign the **Data Collection** previously created.
    - Assign the **Protocol** previously created.
    - Define the Hold **Reason** to be used for placing the **Material** on Hold while the **Protocol** is being executed.



> **Note**
>
> This is the Master Data file used for this scenario.

Execution

This section explores the Handle Abort Mid Process operations. To test and execute this functionality, follow the use case outlined in a step-by-step scenario and demonstrated in the video at the end of the description.

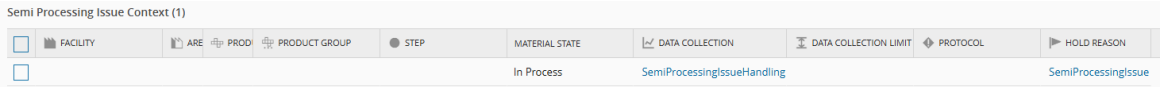
First Scenario

1. In the **Step** `Coating`, select the **Material** `Engine Block H08-P9.002` and ensure the sub-materials are assigned to a **Container**.
2. Perform a **Material** Track In.

3. With the **Material** in the In Process state, select **Open Issue**.
4. Classify wafers according to the classification below:
   - Wafer 1 as `Processed`
   - Wafer 2 as `Processed`
   - Wafer 3 as `Unknown`
5. The entire **Material** is placed on Hold and a new **Protocol** is opened. The system selects the Hold Reason defined in theSemiProcessingIssueContext table.
6. Execute the **Protocol**.
7. After closing the **Protocol**, splits are performed according to the previously assigned classification:
   - Wafer 1 and 2 perform Track Out and then wait for wafer 3.
   - Wafer 3 is aborted and placed on Hold.
8. For wafer 3, perform Release, Track In, and Track Out to the Coating **Step**. After Track Out, this wafer is merged back into the remaining lot.

Second Scenario

For this scenario, use the same **Step** and **Materials**. However, in the SemiProcessingIssueContext table, change the **Data Collection** to `SemiProcessingIssueHandling` and remove the **Protocol**.



1. In the **Step** `Coating`, select the **Material** `Engine Block H08-P9.002` and assign the sub-materials to a **Container**.
2. Perform a **Material** Track In.
3. With the **Material** in the In Process state, select **Open Issue**.
4. Classify the **Processing status** based on the classification below:
   - Wafer 1 as `Processed`
   - Wafer 2 as `Processed`
   - Wafer 3 as `Not Processed`

5. Classify the **Disposition Action** based on the actions below:
    - Wafer 1 as `Hold`
    - Wafer 2 as `Hold`
    - Wafer 3 as `Abort`
6. Execute the **Protocol**.
7. After closing the **Protocol**, splits are performed according to the **Disposition Action** defined previously:
    - Wafer 1 and 2 on hold.
    - Wafer 3 is aborted.
8. This disposition is executed according to the Disposition action provided during the **Data Collection** execution - `SemiDispositionActionPlan` parameter.
    - This parameter overrides the default actions defined in the SemiProcessingClassificationSettings Generic Table.
9. For wafer 3, perform Track In and Track Out to the `Coating` **Step**.
10. For wafer 1 and 2, perform Release and Track Out.
11. After Track Out, both lots are automatically merged.

Info

For more information on Handle Abort Mid Process, see Processing Issue Handling - on Equipment Abort mid-process in the User Guide.

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