

change management

# Change Management Tutorial

## Introduction

This tutorial will introduce the purpose of **Change Management** in Critical Manufacturing MES.

It will also describe how **Change Management** helps plan, implement, and approve changes while maintaining stability and transparency in operations.

This will be achieved by highlight scenarios where **Change Management** is critical, such as with versioned entities and approval workflows.

In Critical Manufacturing MES, **Change Management**, which is represented by using the **Change Set** entity, plays a crucial role in ensuring that changes within the manufacturing processes, systems, or operations are implemented effectively, without causing disruptions or introducing risks.

A **Change Set** is an object which is used to bundle together changes to versioned objects. Bear in mind that the **Change Set** only refers to the versioned data of the object, so, the global data is not part of the **Change Set**.

Moreover, a **Change Set** itself has a system defined state model described in the next figure.

```
graph TD
  Start -->|Create Change Set| A1
  A1[Created] -->|Request Change Set Approval| A2[In Approval]
  A2 -->|Rework Change Set| A1
  A2 -->|Approve Change Set| L1[Approved]
  A2 -->|Reject Change Set| C1[Rejected]

classDef mermaid_title color:#000, fill:#fafafa, stroke:#fafafa, stroke-width:0x, font-size:100%, font-weight:200;
classDef mermaid_start color:#000, fill:#fafafa, stroke:#fafafa, color:#fafafa, stroke-width:0x, font-size:100%, visibility: hidden;
classDef mermaid_businessdata color:#000, fill:#65CDE8, stroke:#65CDE8, stroke-width:0px, font-size:100%;
classDef mermaid_nonbusinessdata color:#000, fill:#B7DEE8, stroke:#B7DEE8, stroke-width:0px, font-size:100%;
classDef mermaid_entity color:#000, fill:#FB9F53, stroke:#FB9F53, stroke-width:0px, font-size:100%;
classDef mermaid_entitylinked color:#000, fill:#FCD5B5, stroke:#FCD5B5, stroke-width:0px, font-size:100%;
classDef mermaid_context color:#000, fill:#B9CDE5, stroke:#B9CDE5, stroke-width:0px, font-size:100%;
classDef mermaid_optional color:#000, fill:#B7DEE8, stroke:#65CDE8, stroke-width:1px, font-size:100%, stroke-dasharray: 5 5;
classDef mermaid_state color:#000, fill:#d7e4bd, stroke:#000, stroke-width:1px, font-size:100%, font-weight:300;
class Main mermaid_entity
class Start mermaid_start
class A1,A2,A3,A4,A5,A6,A7,A8,A9,A10,A11,A12 mermaid_state
class L1,L2,L3,L4,L5,L6 mermaid_state
class C1,C2,C3,C4,C5,C6 mermaid_context
class N1,N2,N3,N4,N5,N6 mermaid_nonbusinessdata
```

A **Change Set**, when created, goes to the state Created. In that state, one can add multiple **Change Set Items** which are versions of the change-controlled entities. Then the **Change Set** is sent for approval - at this time, all **Change Set Items** become frozen, that is, they cannot be changed. The **Change Set** can then be rejected or approved. In case the **Change Set** is rejected, all associated **Change Set Items** are terminated. In case that the **Change Set** is approved, all **Change Set Items** become Active. The **Change Set**

contains an additional property - Make Change Set Items effective on approval - which will try to make all **Change Set Items** effective after the **Change Set** has been approved.

**Note**

The Approval Type of State reviewers is as follows:

- Approver - if the Reviewer is set as Approver they must explicitly approve the Change Set at a certain state (this action is mandatory and relevant).
- Observer - if the Reviewer is set as Observer they can add, approve or reject, but the response is not required and not relevant for the Change Set approval, but it will be kept in the historical details of the state transition approval.

## Tying Everything Together

```
graph TD
    Main[Change Set] -.- A1[Approval Role]
    N1[Approval Workflow] -.- Main
    Main === L1[Change Set Item]
    A1[Approval Role] -.- L1
    L1 --- A3[Product]
    L1 --- A4[Flow]
    L1 --- A5[...]

classDef mermaid_title color:#000, fill:#fafafa, stroke:#fafafa, stroke-width:0x, font-size:100%, font-weight:200;
classDef mermaid_start color:#000, fill:#fafafa, stroke:#fafafa, color:#fafafa, stroke-width:0x, font-size:100%, visibility:hidden;
classDef mermaid_businessdata color:#000, fill:#65CDE8, stroke:#65CDE8, stroke-width:0px, font-size:100%;
classDef mermaid_nonbusinessdata color:#000, fill:#B7DEE8, stroke:#B7DEE8, stroke-width:0px, font-size:100%;
classDef mermaid_entity color:#000, fill:#FB9F53, stroke:#FB9F53, stroke-width:0px, font-size:100%;
classDef mermaid_entitylinked color:#000, fill:#FCD5B5, stroke:#FCD5B5, stroke-width:0px, font-size:100%;
classDef mermaid_context color:#000, fill:#B9CDE5, stroke:#B9CDE5, stroke-width:0px, font-size:100%;
classDef mermaid_optional color:#000, fill:#B7DEE8, stroke:#65CDE8, stroke-width:1px, font-size:100%, stroke-dasharray: 5 5;
class Main mermaid_entity
class A1,A2,A3,A4,A5,A6,A7,A8,A9,A10,A11,A12 mermaid_businessdata
class L1,L2,L3,L4,L5,L6 mermaid_entitylinked
class C1,C2,C3,C4,C5,C6 mermaid_context
class N1,N2,N3,N4,N5,N6 mermaid_nonbusinessdata

click Main "../../business-data/change-set"
click A1 "../../administration/security/roles"
click A3 "../../business-data/product"
click A4 "../../business-data/flow"
```

For the purpose of this tutorial, the **Flow** entity will be used for the Basic and Advanced setup examples that follow. For more information, see [Create Flow](#).

## Basic Setup

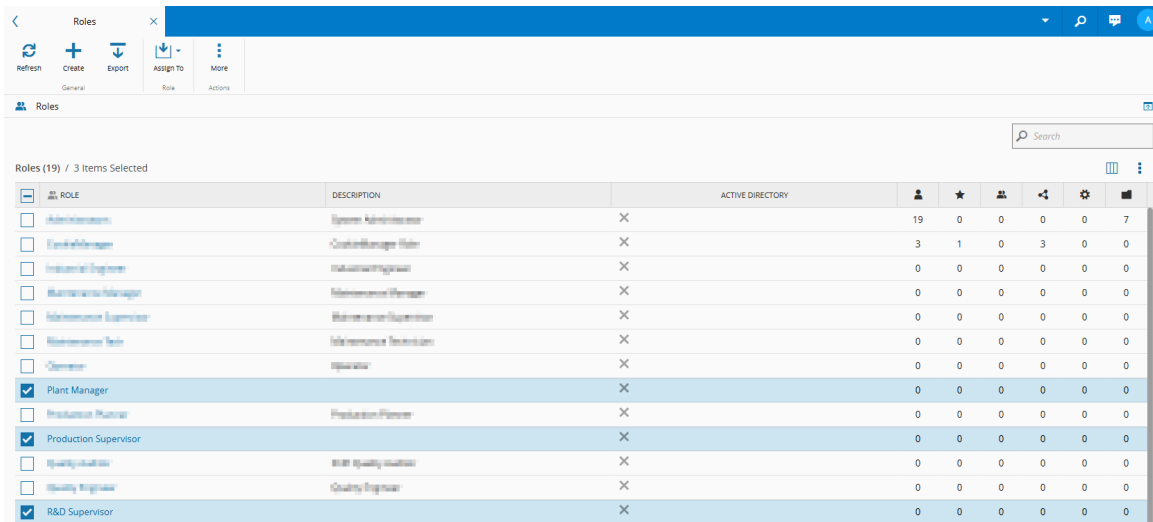
### Roles

To begin setting up a basic **Change Management** scenario, you need to create the **Roles** you will be using.

For the purpose of this tutorial, you should create and use the following **Roles**:

- R&D Supervisor - will approve changes

- Production Supervisor - will finalize approval
- Plant Manager - will act as an observer



ROLE	DESCRIPTION	ACTIVE DIRECTORY	Person	Star	Group	Share	Settings	Info
<input type="checkbox"/> Administrator	System Administrator	X	19	0	0	0	0	7
<input type="checkbox"/> ControlManager	ControlManager Role	X	3	1	0	3	0	0
<input type="checkbox"/> Industrial Engineer	Industrial Engineer	X	0	0	0	0	0	0
<input type="checkbox"/> Maintenance Manager	Maintenance Manager	X	0	0	0	0	0	0
<input type="checkbox"/> Maintenance Supervisor	Maintenance Supervisor	X	0	0	0	0	0	0
<input type="checkbox"/> Maintenance Tech	Maintenance Technician	X	0	0	0	0	0	0
<input type="checkbox"/> Operator	Operator	X	0	0	0	0	0	0
<input checked="" type="checkbox"/> Plant Manager	Plant Manager	X	0	0	0	0	0	0
<input type="checkbox"/> Production Planner	Production Planner	X	0	0	0	0	0	0
<input checked="" type="checkbox"/> Production Supervisor	Production Supervisor	X	0	0	0	0	0	0
<input type="checkbox"/> Quality Control	Quality Control	X	0	0	0	0	0	0
<input type="checkbox"/> Quality Engineer	Quality Engineer	X	0	0	0	0	0	0
<input checked="" type="checkbox"/> R&D Supervisor	R&D Supervisor	X	0	0	0	0	0	0

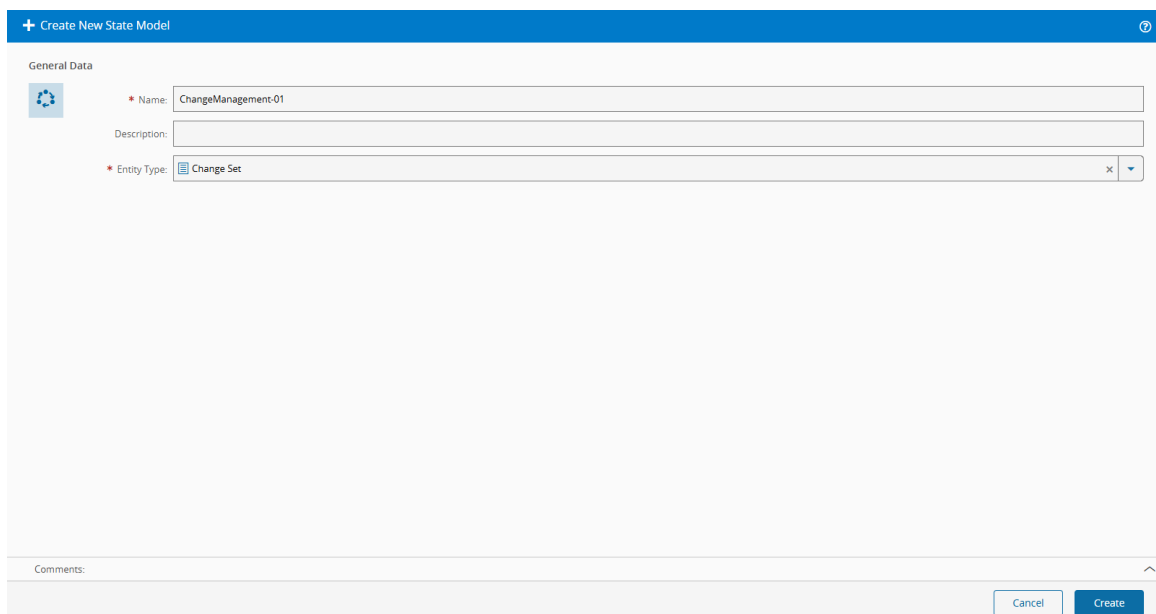
**Note**

The Roles above were assigned to the Administrator user for the purpose of this tutorial.

For more information, see [Roles](#).

## State Model

After the **Roles** are created, you need to create a **State Model** in which your approval workflow will be configured. Remember that the Entity Type to apply to your **State Model** is **Change Set** as this is what defines **Change Management** in Critical Manufacturing MES:



**Create New State Model**

General Data

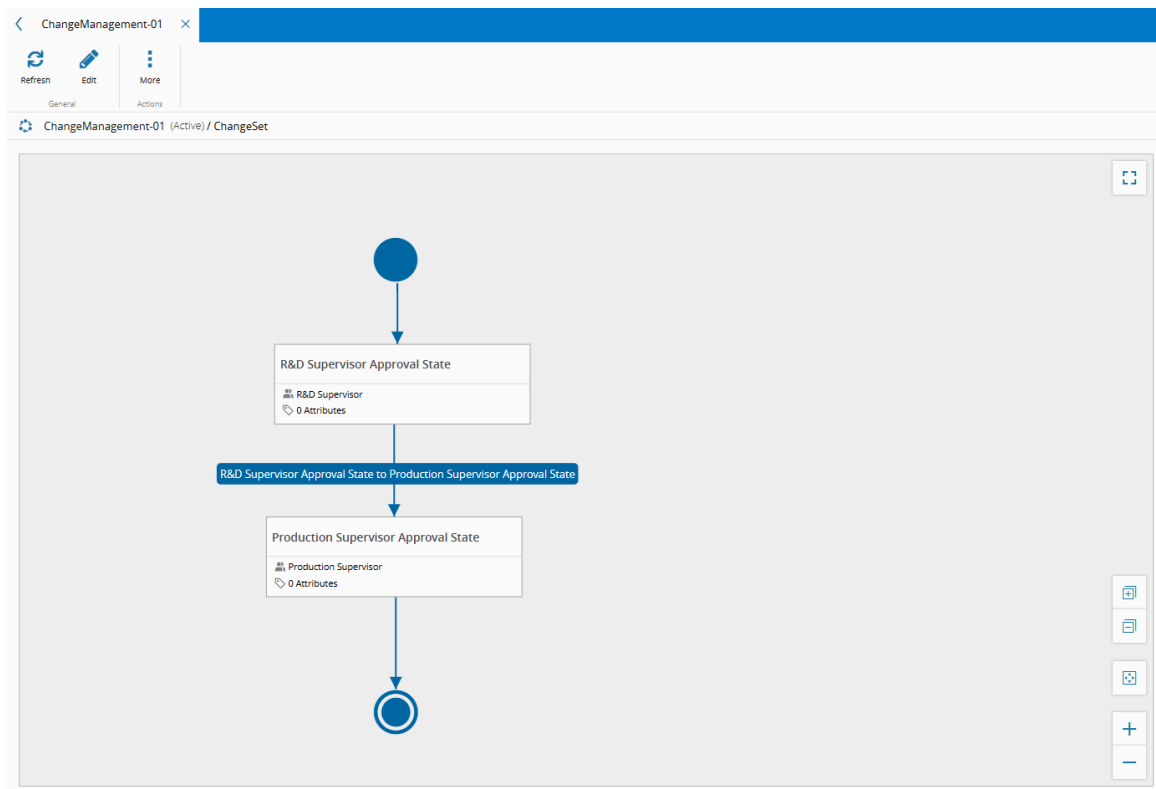
\* Name:

Description:

\* Entity Type:

Comments:

When you select **Create**, you are taken to the Flowchart view page where by using the **Edit** button, on the top ribbon, you can create your **State Model** or approval workflow. When your approval workflow is completed, use the **Save** button on the top ribbon to keep your changes:



**i Info**

When you Save the approval workflow, the name of the transition is automatically provided.

For more information, see [State Models](#).

### Create Versioned Object

The next step is to create a versioned object for which you will create a **Change Set** with the configurations set out above.

For this tutorial, the **Flow** entity was used as an example:

1. In the **Business Data** menu, select **Flow**.
2. In the **Flow** page, select **New** on the top ribbon.
3. For the **Change Set** step, select to **Create** new rather than use an already existing **Change Set**.
4. Create the **Change Set** and in the General Data be sure to enable Requires Approval, select Workflow for the Approval By option, and enter the Workflow **State Model** that was created previously:

**Create Change Set**

GENERAL DATA

**General Data**

Name: FlowChangeSet-01

Description:

\* Type: General

**Information**

Category: Change Set Change Category

Urgency: Change Set Urgency

Owner: Employee

**Approval**

Requires Approval:

Approval By:  Role  Workflow

Workflow: ChangeManagement-01

Comments:

Cancel Create

**Info**

For this example Workflow was used, but the difference between Approval Role and Approval Workflow is as follows:

- Approval Role - single approver for less complex processes (example: demo flow).
- Approval Workflow - multi-role approval for more complex processes (example: production flow).

5. Select **Create** to complete the **Change Set**. For more information, see [Create Change Set](#).

6. Back in the Create Flow wizard, select **Next** to continue:

**Create Flow**

CHANGE SET GENERAL DATA

**Change Set**

Change Set: FlowChangeSet-01

Approval Role:

**Change Set Items (0)**

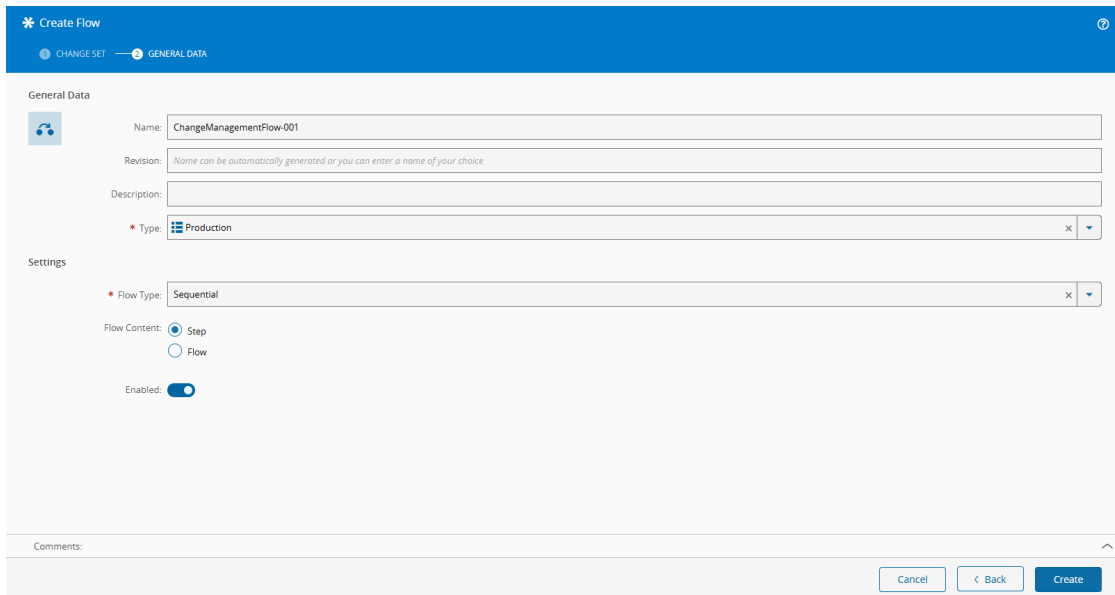
NAME	TYPE	APPROVAL ROLE
No data to show.		

Rows per Page: 25 Page 1 of 1 (0 Records)

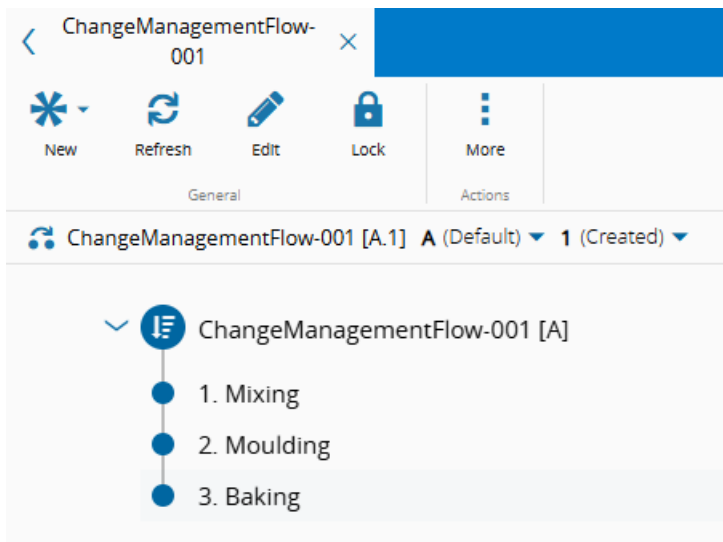
Comments:

Cancel < Back Next >

7. Complete the General Data of the **Flow** and select **Create** at the end:



8. You are now going to **Edit** and **Save** your **Flow**:

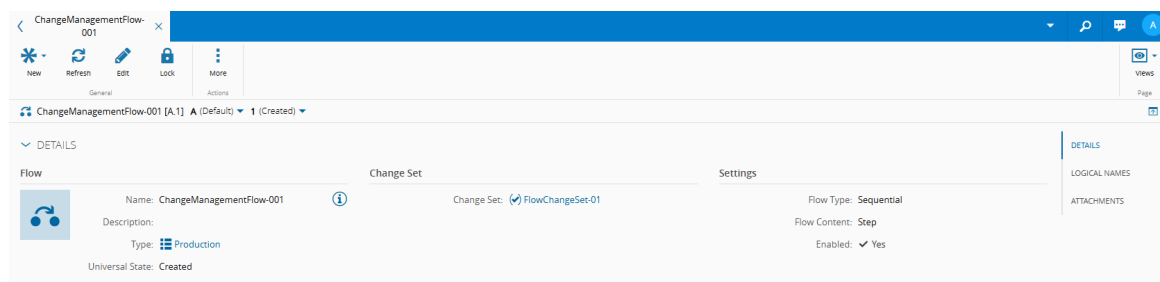


For more information, see [Create Flow](#).

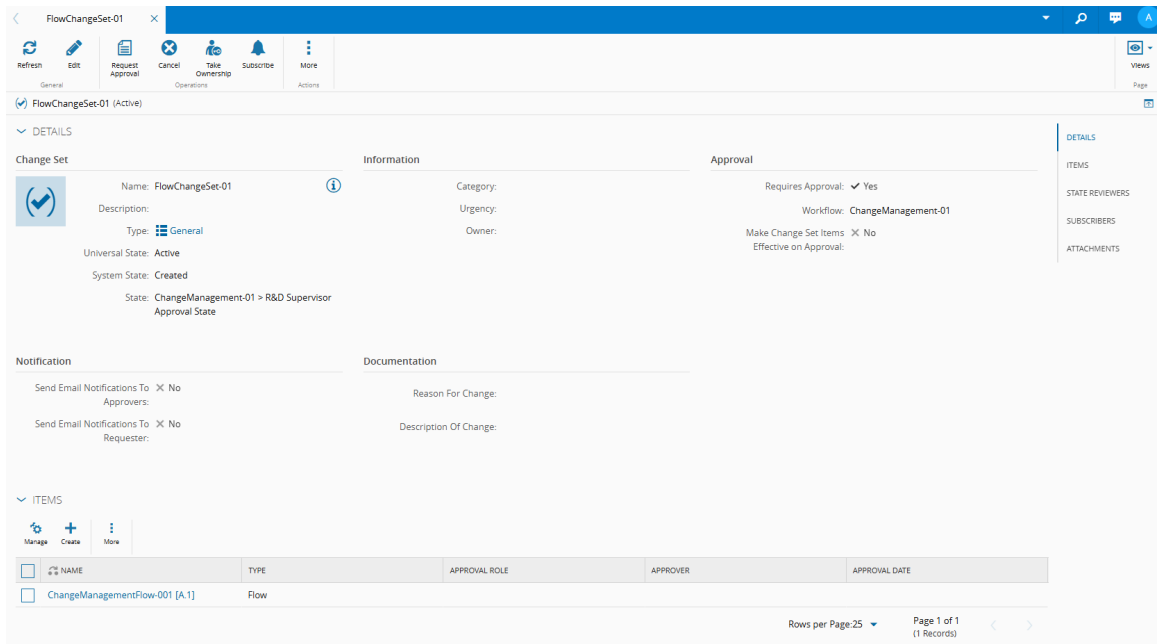
## Change and Approval Process

From the **Change Set** created for the **Flow**, which is available in the **Details** page of the **Flow**, let's walk through the change and approval process.

Here you can see the **Change Set** in question:



When you open it, this is what you see:

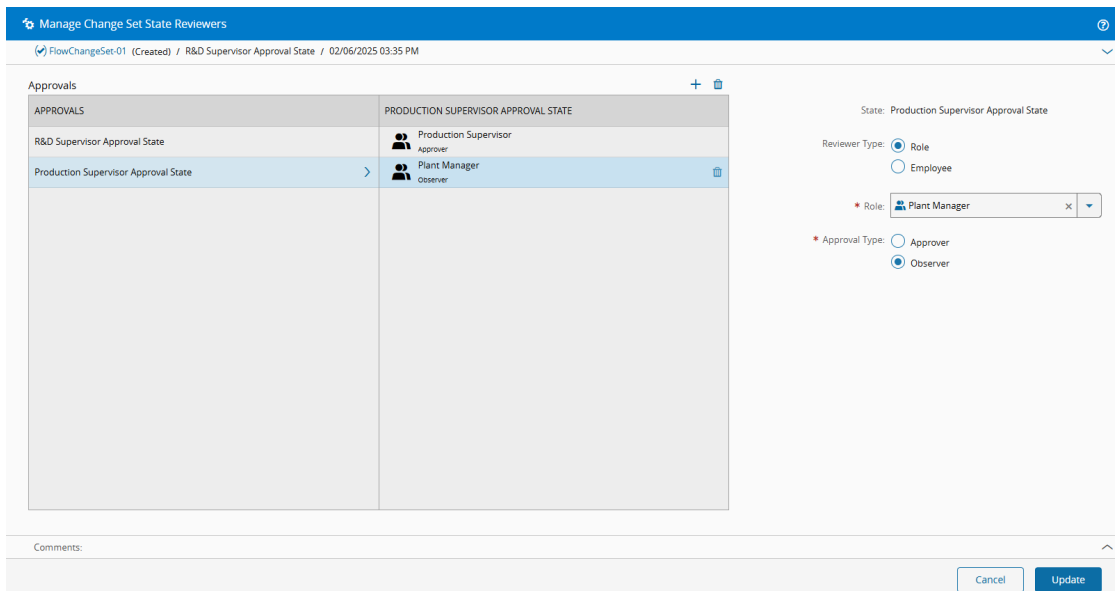


And notice how the name of the created **State Model**, and the first state of the approval workflow are available in the **State** field.

### Set Observer

Now, before continuing with the change and approval process, and because in this tutorial the Plant Manager was set as an Observer, you need to manage this **Role**, and confirm other **Roles**, in the **State Reviewers** section, as follows:

1. Select the **State Reviewers** section.
2. Select **Manage** and add the Plant Manager as an Observer:

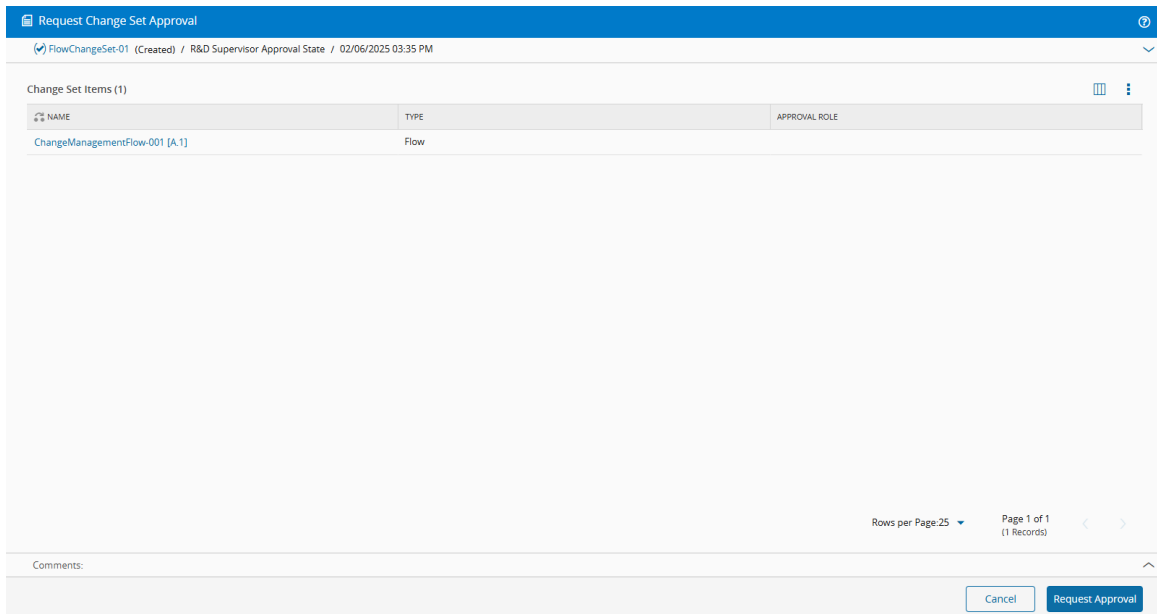


### Note

The Observer is aware of what is happening with the Change Set, and can approve or not, but this Role's approval is not mandatory to approve the Change Set - this Role is a passive onlooker.

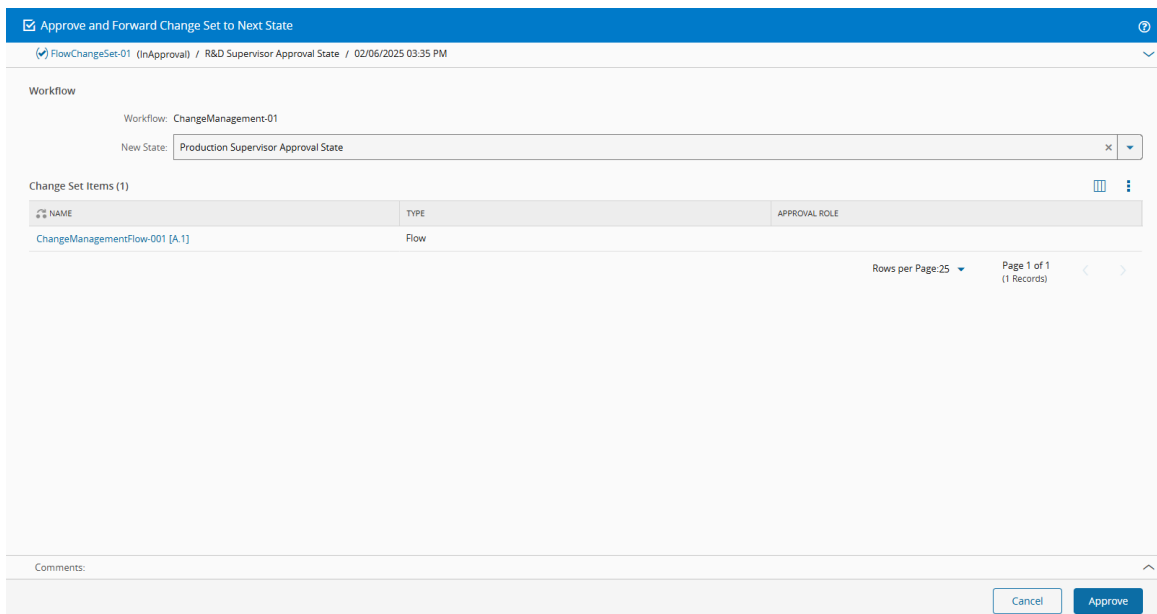
### 3. Select **Update**.

Returning to the change and approval process, and back in the **Details** page of the **Change Set**, select the **Request Approval** button on the top ribbon, and then again in the wizard:



NAME	TYPE	APPROVAL ROLE
ChangeManagementFlow-001 [A.1]	Flow	

Select the **Approve** button on the top ribbon, and then again in the wizard to approve the first state of the approval workflow and move on to the next one:



Workflow

Workflow: ChangeManagement-01

New State: Production Supervisor Approval State

NAME	TYPE	APPROVAL ROLE
ChangeManagementFlow-001 [A.1]	Flow	

Back in the **Details** page of the **Change Set**, select the **Request Approval** button on the top ribbon. In the Approve Change Set wizard, select the appropriate Reviewer, this is, the Approver, and select **Next**:

Approve Change Set

REVIEWERS APPROVE

FlowChangeSet-01 (InApproval) / Production Supervisor Approval State / 02/06/2025 03:35 PM

Search

Reviewers (2) / 1 Item Selected

REVIEWER	REVIEWER FUNCTION
<input checked="" type="checkbox"/> Production Supervisor	Approver
<input type="checkbox"/> Plant Manager	Observer

Rows per Page: 25 Page 1 of 1 (2 Records)

Comments:

Cancel < Back Next >

In the Approve step, select **Approve** to complete the operation:

Approve Change Set

REVIEWERS APPROVE

FlowChangeSet-01 (InApproval) / Production Supervisor Approval State / 02/06/2025 03:35 PM

Change Set Items (1)

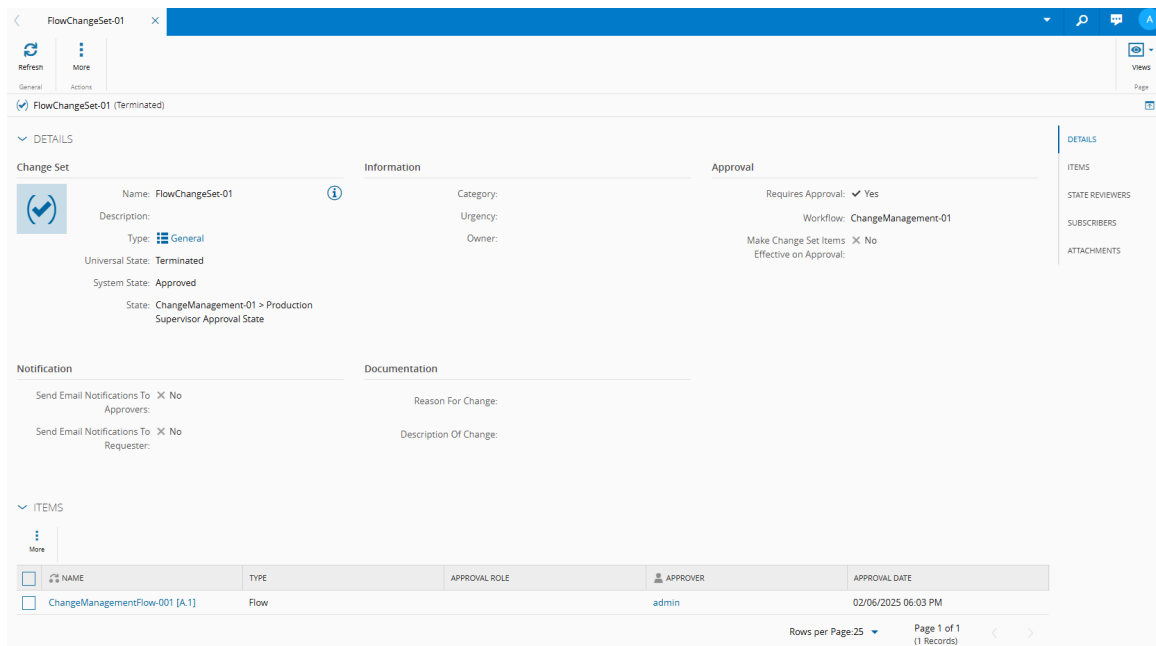
NAME	TYPE	APPROVAL ROLE
ChangeManagementFlow-001 [A.1]	Flow	

Rows per Page: 25 Page 1 of 1 (1 Records)

Comments:

Cancel < Back Approve

As you can see, the Universal State of the Change Set is now Terminated (was Active) and the System State is Approved (was Created). Additionally, the State information now relates to the last state of the State Model:



**FlowChangeSet-01 (Terminated)**

**DETAILS**

**Change Set**

- Name: FlowChangeSet-01
- Description:
- Type: General
- Universal State: Terminated
- System State: Approved
- State: ChangeManagement-01 > Production Supervisor Approval State

**Information**

- Category:
- Urgency:
- Owner:

**Approval**

- Requires Approval: Yes
- Workflow: ChangeManagement-01
- Make Change Set Items: No
- Effective on Approval:

**Notification**

- Send Email Notifications To Approvers: No
- Send Email Notifications To Requester: No

**Documentation**

- Reason For Change:
- Description Of Change:

**ITEMS**

NAME	TYPE	APPROVAL ROLE	APPROVER	APPROVAL DATE
ChangeManagementFlow-001 [A.1]	Flow		admin	02/06/2025 06:03 PM

Rows per Page: 25 | Page 1 of 1 (1 Records)

## Advanced Setup

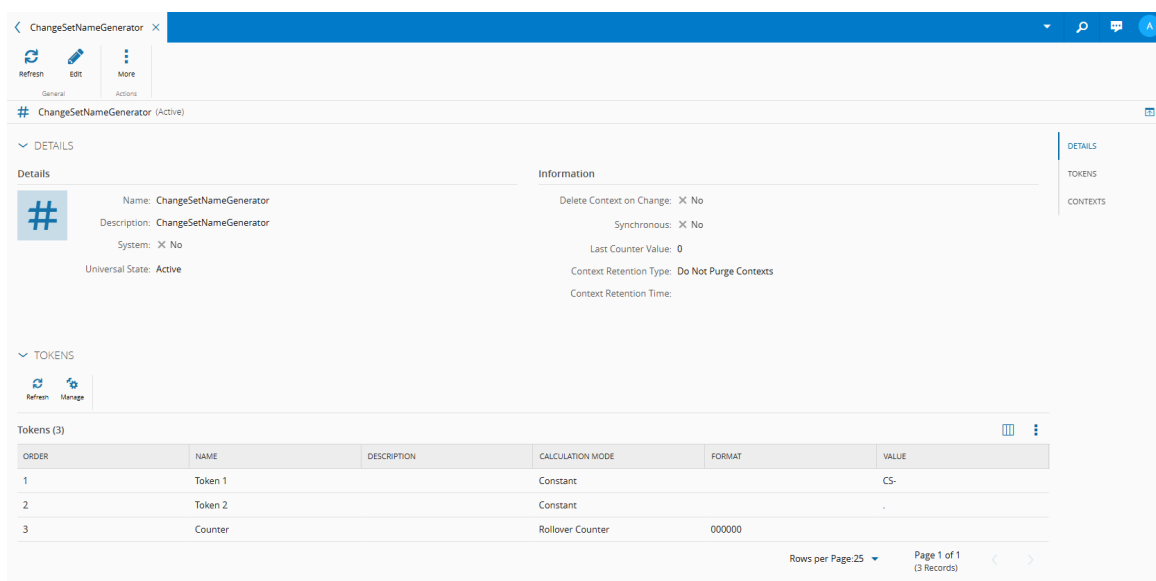
The aim of this type of setup is to make the most of Critical Manufacturing MES by removing additional and repetitive configurations when we are using the system.

This means that by using an Advanced Setup you will not have to constantly create a new **Change Set** when you create a new versioned entity or object.

So let's look at how you can automate this setup and configure the system for your benefit.

## Name Generator

Your starting point will be in the **Administration** menu, **Name Generators** page, where you will create a Change Set Name Generator to be used later in this setup:



**ChangeSetNameGenerator (Active)**

**DETAILS**

**Details**

- Name: ChangeSetNameGenerator
- Description: ChangeSetNameGenerator
- System: No
- Universal State: Active

**Information**

- Delete Context on Change: No
- Synchronous: No
- Last Counter Value: 0
- Context Retention Type: Do Not Purge Contexts
- Context Retention Time:

**TOKENS**

ORDER	NAME	DESCRIPTION	CALCULATION MODE	FORMAT	VALUE
1	Token 1		Constant		CS-
2	Token 2		Constant		
3	Counter		Rollover Counter	000000	

Rows per Page: 25 | Page 1 of 1 (3 Records)

For more information, see [Name Generators](#)

## Entity Types

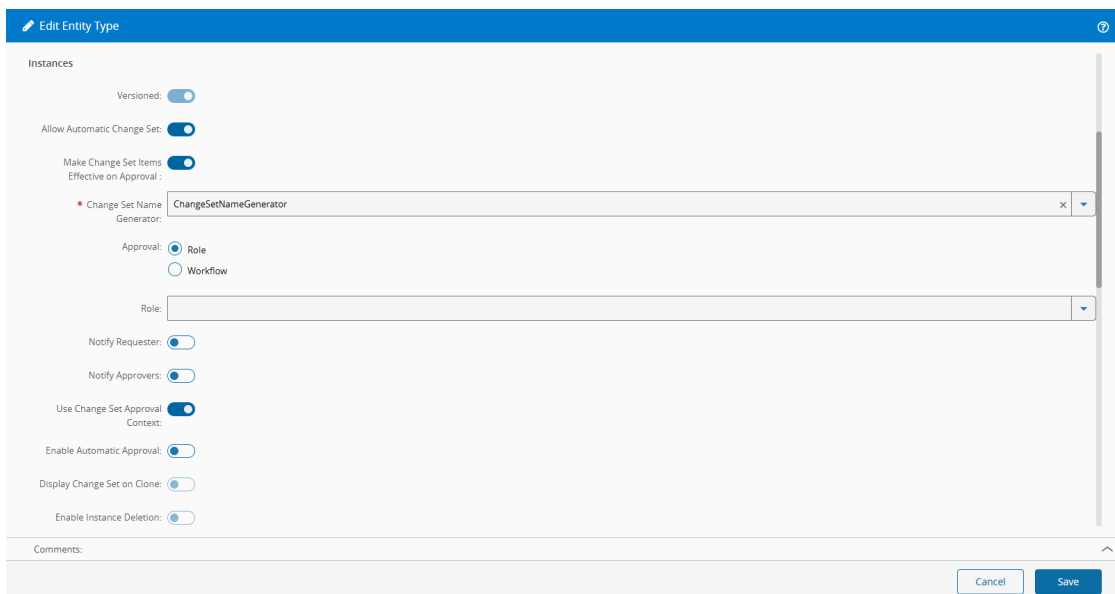
Now, in the **Entity Types** page of the **Administration** menu, configure the **Flow** object for the purpose of this example.

Follow the steps below to configure the necessary fields:

1. In **Entity Types**, create of search for the **Flow** object. For more information, see [Entity Types](#).
2. As you already have the **Flow** in the system, you can simply select the **Edit** button on the top ribbon.
3. In **Edit** mode, and in the Instances section, be sure to:
  - Allow Automatic Change Set
  - Make Change Set Items Effective on Approval
  - Enter the created Change Set Name Generator
  - Use Change Set Approval Context - where approvals can be defined depending on the context

**i Info**

If the Use Change Set Approval Context property is enabled, when this entity creates and automatic Change Set, it will have to confirm this in the [ChangeSetApprovalContext](#) smart table.

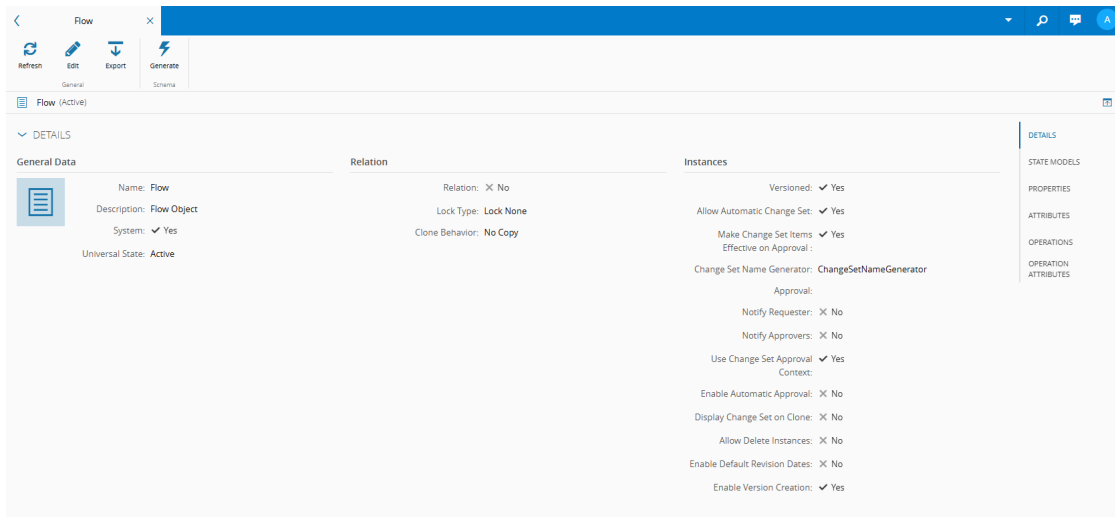


The screenshot shows the 'Edit Entity Type' configuration page for the 'Instances' section. The page has a blue header with the title 'Edit Entity Type' and a help icon. Below the header, the 'Instances' section contains several configuration options:

- Versioned:
- Allow Automatic Change Set:
- Make Change Set Items Effective on Approval:
- Change Set Name Generator:
- Approval:  Role  Workflow
- Role:
- Notify Requester:
- Notify Approver:
- Use Change Set Approval Context:
- Enable Automatic Approval:
- Display Change Set on Clone:
- Enable Instance Deletion:

At the bottom of the page, there is a 'Comments' section and two buttons: 'Cancel' and 'Save'.

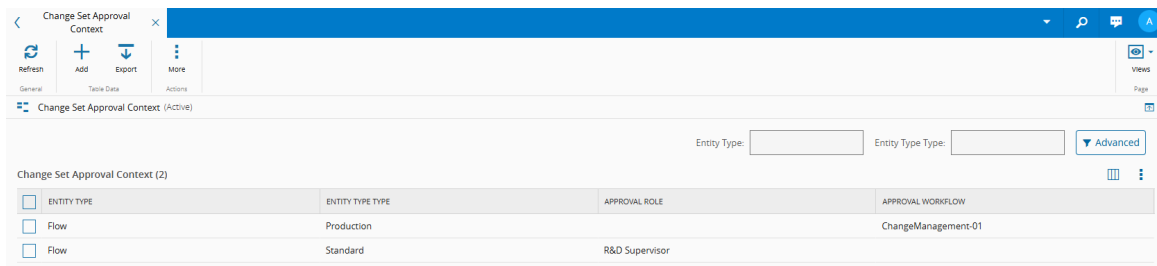
4. Select **Save** to complete the operation:



## Change Set Approval Context

Next, in the **Administration** menu, configure the **Change Set Approval Context** smart table.

For the purpose of this tutorial, both Approval Role and Approval Workflow were configured, and will then be tested:



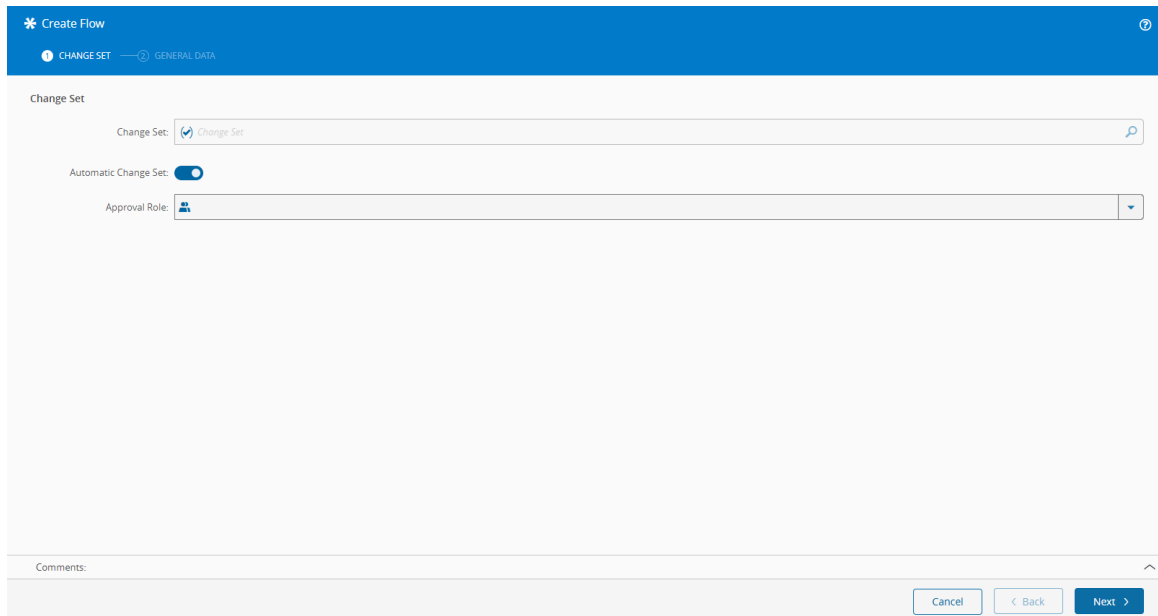
For more information, see [Smart Tables](#).

### **i** Info

A Change Set can have an Approval Role or an Approval Workflow, but not both.

## Approval Role Test

When you now create a **Flow** (versioned entity), there is no need to create a **Change Set** because you configured it to be automatic:



**Create Flow**

CHANGE SET — GENERAL DATA

Change Set

Change Set:

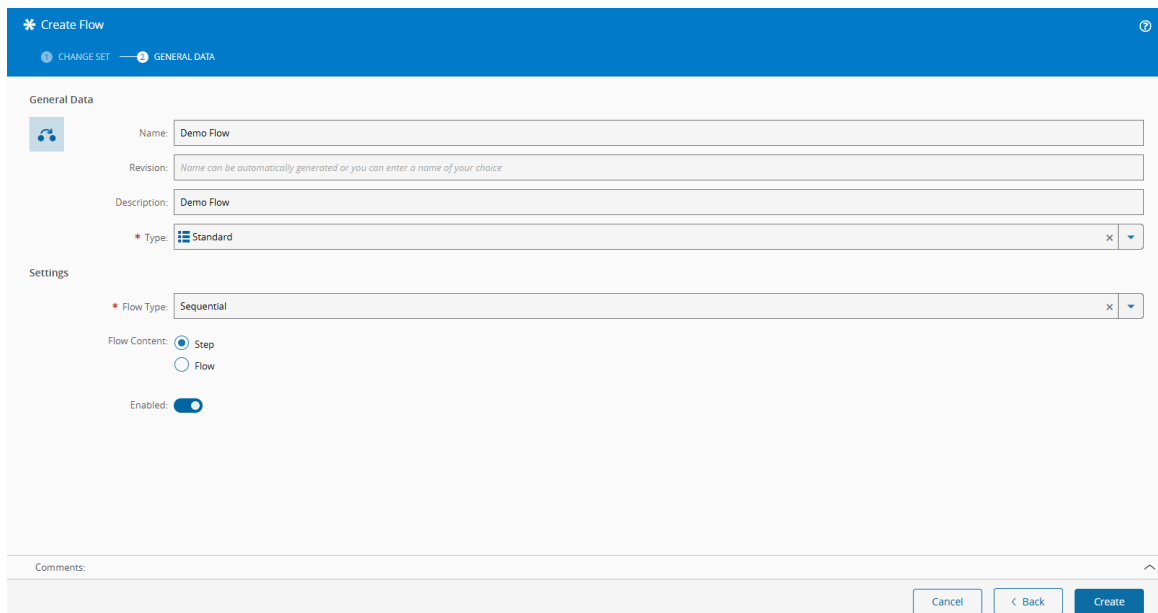
Automatic Change Set:

Approval Role:

Comments:

Cancel < Back Next >

Select **Next** and create a **Flow** with the Type as Standard (under Entity Type Type in the smart table above):



**Create Flow**

CHANGE SET — GENERAL DATA

General Data

Name:

Revision:

Description:

\* Type:

Settings

\* Flow Type:

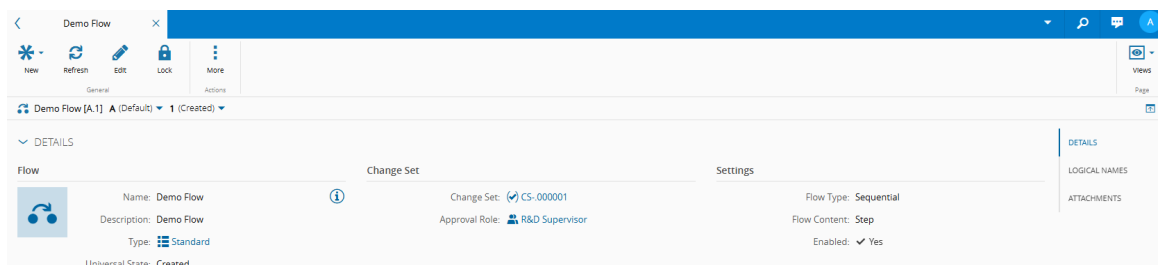
Flow Content:  Step  Flow

Enabled:

Comments:

Cancel < Back Create

When the **Flow** is created you can clearly see the **Name Generator** at work:

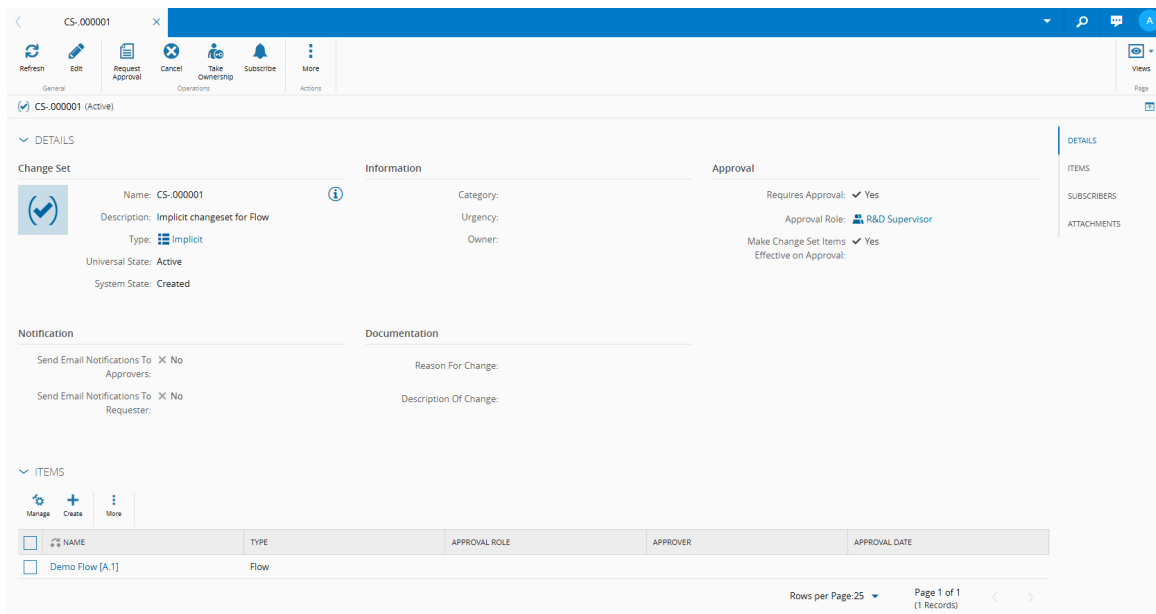


Demo Flow

Flow

Flow	Change Set	Settings
<p>Name: Demo Flow</p> <p>Description: Demo Flow</p> <p>Type: Standard</p> <p>Universal State: Created</p>	<p>Change Set: CS-000001</p> <p>Approval Role: R&amp;D Supervisor</p>	<p>Flow Type: Sequential</p> <p>Flow Content: Step</p> <p>Enabled: Yes</p>

Additionally, if you open the **Change Set** itself, you can further confirm the configurations that were set including the Approval Role details (single approval):



CS-000001 (Active)

**DETAILS**

**Change Set**

Name: CS-000001  
 Description: Implicit changeset for Flow  
 Type: Implicit  
 Universal State: Active  
 System State: Created

**Information**

Category:  
 Urgency:  
 Owner:

**Approval**

Requires Approval: Yes  
 Approval Role: R&D Supervisor  
 Make Change Set Items: Yes  
 Effective on Approval:

**Notification**

Send Email Notifications To: No  
 Approvers:  
 Send Email Notifications To: No  
 Requester:

**Documentation**

Reason For Change:  
 Description Of Change:

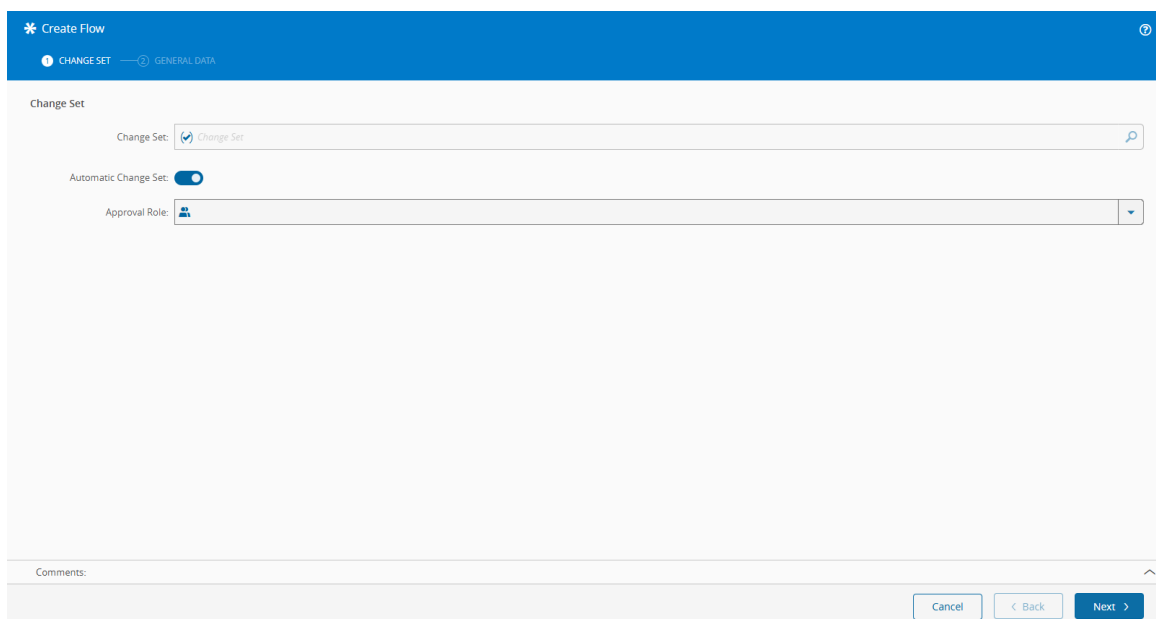
**ITEMS**

NAME	TYPE	APPROVAL ROLE	APPROVER	APPROVAL DATE
Demo Flow [A.1]	Flow			

Rows per Page: 25 | Page 1 of 1 (1 Records)

### Approval Workflow Test

You can now create a **Flow** (versioned entity), with the Type as Production (under Entity Type Type in the smart table above). The **Change Set** will again be automatic:



**Create Flow**

CHANGE SET — GENERAL DATA

**Change Set**

Change Set: Change Set

Automatic Change Set:

Approval Role: R&D Supervisor

Comments:

Cancel | Back | Next

Select **Next** and create a **Flow** with the Type mentioned above:

**Create Flow**

CHANGE SET — GENERAL DATA

**General Data**

Name:

Revision: Name can be automatically generated or you can enter a name of your choice

Description:

\* Type:

**Settings**

\* Flow Type:

Flow Content:  Step  Flow


Enabled:

Comments:

When the **Flow** is created you can clearly see the **Name Generator** at work:

Production Flow


DETAILS

Flow	Change Set	Settings
 <p>Name: Production Flow</p> <p>Description: Production Flow</p> <p>Type: Production</p> <p>Universal State: Created</p>	<p>Change Set: CS-000002</p>	<p>Flow Type: Sequential</p> <p>Flow Content: Step</p> <p>Enabled: Yes</p>

Additionally, if you open the **Change Set** itself, you can further confirm the configurations that were set including the Approval Workflow details (multi-role approval):

CS-000002

DETAILS

Change Set	Information	Approval
 <p>Name: CS-000002</p> <p>Description: Implicit changeset for Flow</p> <p>Type: Implicit</p> <p>Universal State: Active</p> <p>System State: Created</p> <p>State: ChangeManagement-01 &gt; R&amp;D Supervisor Approval State</p>	<p>Category:</p> <p>Urgency:</p> <p>Owner:</p>	<p>Requires Approval: Yes</p> <p>Workflow: ChangeManagement-01</p> <p>Make Change Set Items: Yes</p> <p>Effective on Approval:</p>

Notification

Send Email Notifications To:  No

Reason For Change:

Send Email Notifications To:  No

Description Of Change:

ITEMS

NAME	TYPE	APPROVAL ROLE	APPROVER	APPROVAL DATE
<input type="checkbox"/> Production Flow [A.1]	Flow			

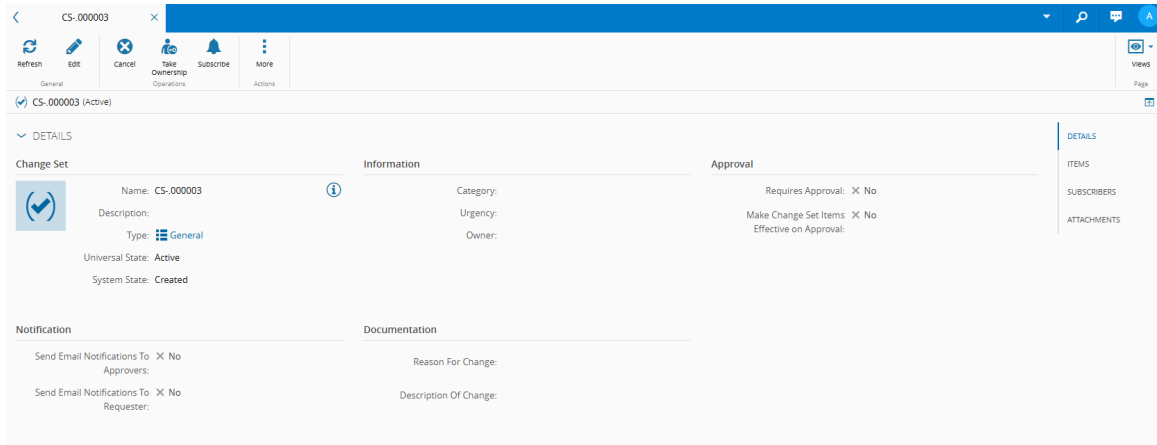
Rows per Page: 25 Page 1 of 1 (1 Records)

**Note**

Depending on the scenarios you are using, there may be dependencies between the versions of the versioned entities being used.



### Subscribe to Notifications

You can **Subscribe** and **Unsubscribe** to **Change Set** notifications by selecting the **Subscribe** button on the top ribbon:

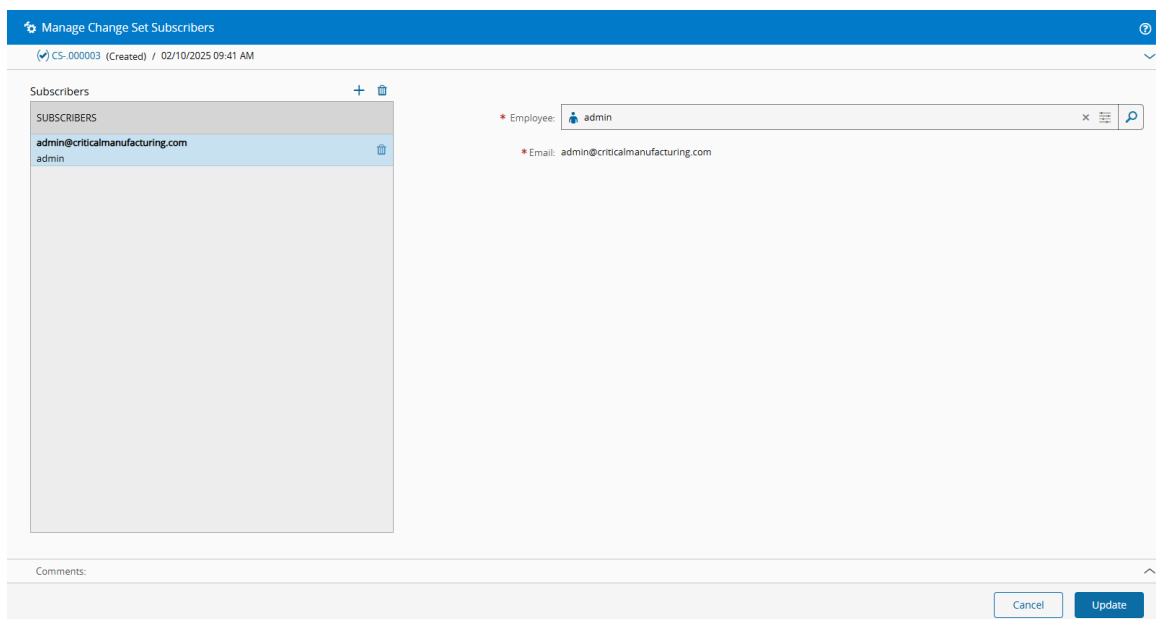


**Note**

Subscribers receive updates and notifications without interacting directly with approvals.

Icon	Description
	Select to subscribe to <b>Change Set</b> notifications (you are not yet part of the Change Set Subscription List).
	Select to unsubscribe from <b>Change Set</b> notifications (you are already part of the Change Set Subscription List).

You can add Subscribers to the **Change Set** by going to the **Subscribers** section and managing **Subscribers** by adding or removing employees:



Manage Change Set Subscribers

CS-000003 (Created) / 02/10/2025 09:41 AM

Subscribers

SUBSCRIBERS

admin@criticalmanufacturing.com

admin

\* Employee: admin

\* Email: admin@criticalmanufacturing.com

Comments:

Cancel Update

For more information, see [Manage Change Set Subscribers](#).

You are now ready to take full advantage of the **Change Set** entity, and are better equipped to understand how **Change Management** works.