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# Containers

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### DOCUMENT ACCESS

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# Containers

*Estimated time to read: 9 minutes*

## Overview

A **Container** is a standardized physical carrier used to hold, protect, organize, and move **Materials**, parts, or other containers throughout manufacturing and logistics processes.

A Container acts as the interface between production, storage, and transportation. It ensures that items can be handled safely, efficiently, and repeatedly across the shop floor.

Manufacturers design containers to match:

- The size and weight of the contents
- The sensitivity of the Materials
- The handling methods used on the shop floor, such as manual handling, forklifts, conveyors, AGVs, or robots

Industrial containers can be:

- Returnable or disposable
- Standard or custom-designed
- Made from plastic, metal, wood, or composite materials

Beyond simple storage, containers support lean manufacturing principles by enabling:

- Visual management
- Work-in-process control
- Ergonomic handling
- Quality protection
- Traceability

A container is therefore not just a box. It is a critical logistics and production asset that connects material flow, safety, efficiency, and quality across the industrial shop floor.

## Examples

<b>FOUP for Semiconductor Wafers</b>	<b>SMT Board Magazine</b>
--------------------------------------	---------------------------



**Pallet**

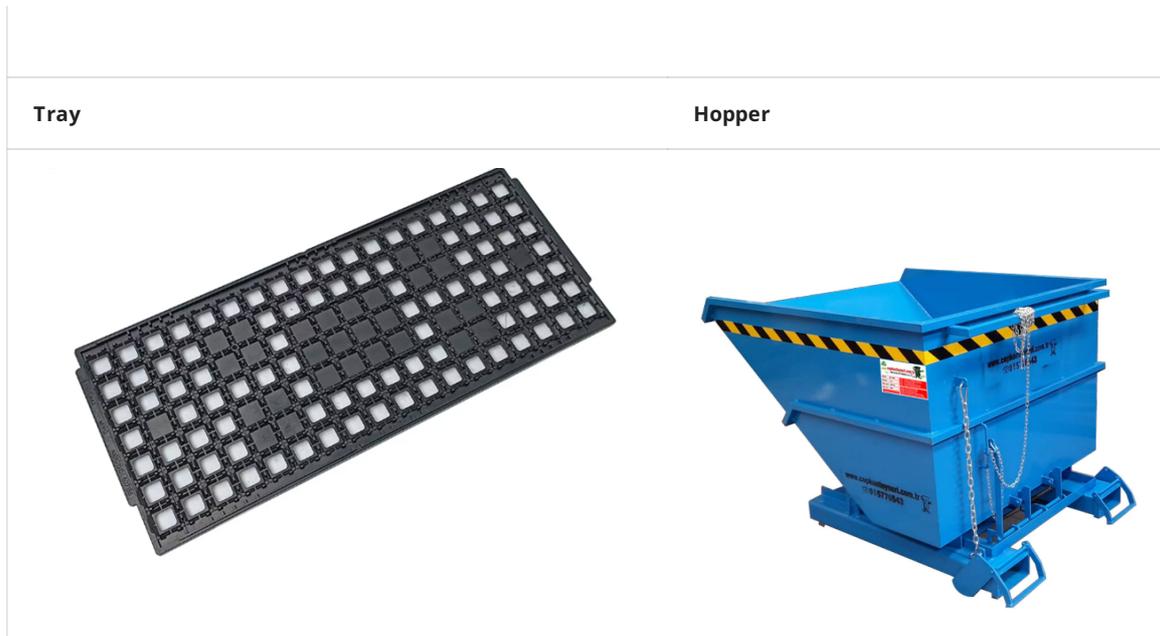
**Trolley of Boxes**



**SMT Feeders Cart**

**ESD Box**





## Containers in MES

A **Container** is an object of the **Container** entity that can hold **Materials**, **Resources**, or other **Containers**.

A **Material Container** has a capacity defined by positions available for a given **Material** unit. A **Container** can hold multiple **Materials**, but each position can contain only one **Material**.

Each position:

- Is identified by a unique number
- Has a defined capacity based on specific units

The same concept applies to:

- **Containers** that hold **Resources**
- **Containers** that hold other **Containers** (SubContainers)

flowchart TD

```
SC[Sub Container]
C[Container]
```

```
F[Facility]
MC[Material Container]
CR[Container Resource]
```

```
M[Material]
R[Resource]
```

```
SC --> C
```

```
C --> F
C --> MC
C --> CR
```

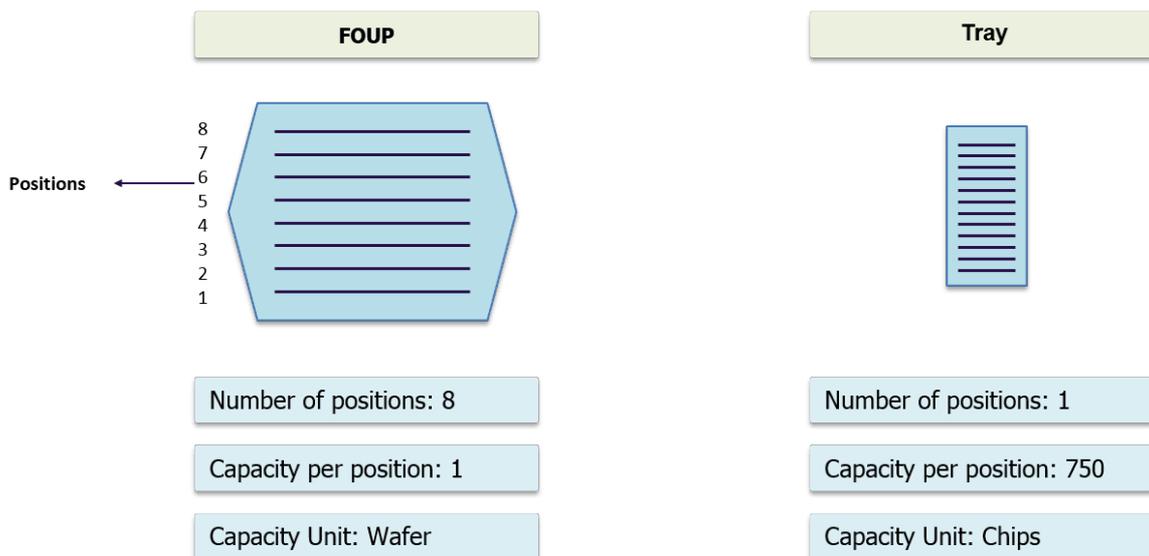
```
MC --> M
CR --> R
```

```
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 C,SC mermaid_entity
class F,M,P,R mermaid_businessdata
class MC,CR mermaid_nonbusinessdata
```

A **Container** can be modeled in different ways:

- **Magazine** — one position with multiple units per position (for example, a tray holding several units of the same Material)
- **FOUP (Front-Opening Universal Pod)** — multiple positions with one unit per position (for example, a wafer carrier)
- **Hybrid models** — combinations of both approaches



A **Container** can also be associated with a **Resource** when the Resource supports the position unit types defined in that Container type.

## State Model

Containers have a system-defined state model:

- **Available** — the Container can be used (empty or full)
- **Unavailable** — the Container cannot be used
- **In Transit** — the Container is shipping Materials to another Facility

```
graph TD
  Start -->|Create Container| A1
  A1[Available] -->|Make Container Unavailable| A2[Unavailable]
  A2 -->|Make Container Available| A1
  A1 -->|Ship Material| L1[In Transit]
  L1 -->|Unship Material<br>Receive Material| A1
```

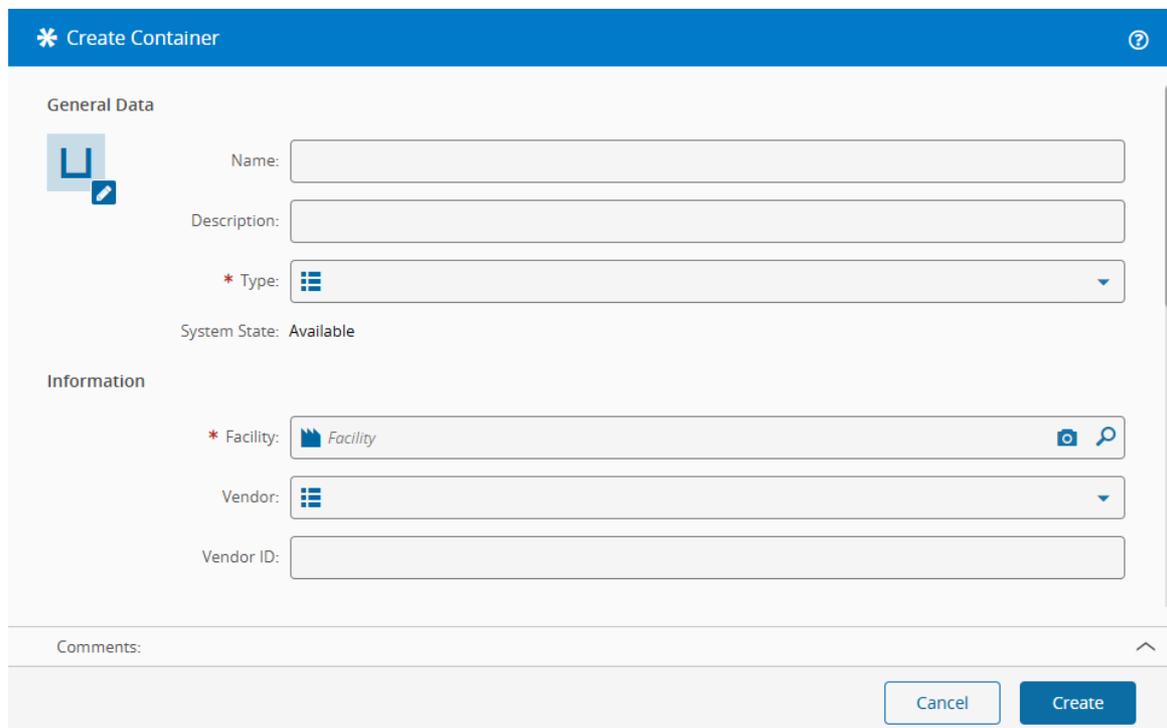
```
classDef mermaid_start color:#000, fill:#fafafa, stroke:#fafafa, color:#fafafa, stroke-width:0x,
font-size:100%, visibility: hidden;
classDef mermaid_entitylinked color:#000, fill:#FCD5B5, stroke:#FCD5B5, stroke-width:0px, font-
size:100%;
classDef mermaid_state color:#000, fill:#d7e4bd, stroke:#000, stroke-width:1px, font-size:100%,
font-weight:300;
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_entitylinked
```

You can also create custom **State Models** for Containers.

## Container Creation

The Container creation wizard includes several required fields:

- **Name** — identifies the Container
- **Type** — used in configuration tables for container restrictions
- **Facility** — defines where the Container will be used



Additional configuration fields include:

- **Position Unit Type** — defines whether the Container holds Materials, Containers, or Resources
- **Total Positions** — defines the number of usable positions
- **Capacity Validation Mode** — available only for Material containers

If the **Capacity Validation Mode** is set to **Unit**, you can define the maximum Material quantity per position using **Capacity per Position**.

### Info

For more information, refer to the User Guide: [Create Container](#)

**\* Create Container** ?

Positions

Position Unit Type:  Material  
 Container  
 Resource

Auto Generated:

Unlimited:

\* Total Positions:

\* Capacity Validation Mode:  x ▾

\* Capacity Unit:  ▾

\* Capacity per Position:

\* Orientation:  x ▾

Position Sorting:  Ascending  
 Descending

Comments: ^

## Container Operations

### Manage Positions

Use **Manage Positions** to add or remove objects from Container positions.

The operation works the same way for all **Container Position Unit Types**:

- Material
- Container
- Resource

For **Material** or **Container**:

**Container Positions**

Container of Material (Available)

Container Positions (Used 3/100)

- Cookie01
- Cookie02
- Cookie03** ×
- Empty
- Empty
- Empty
- Empty

Position Details

Material:

Product:

Product Description: Belgas Cookies

Step:  Mixing

Primary Quantity: 20 Kg

Secondary Quantity:

Comments:

For **Container of Containers**, define the relationship between the container and sub-container in the **Container Type Relation** Generic Table.

Container Type Relation (1)

<input type="checkbox"/>	MAIN CONTAINER TYPE	SUB CONTAINER TYPE
<input type="checkbox"/>	Trolley	Box

**Container Positions**

Container of Container (Available)

Container Positions (Used 1/100)

- Container of Material** ×
- Empty
- Empty
- Empty
- Empty
- Empty
- Empty

Position Details

Container:

Description:

Type:  Box

Comments:

For **Container of Resources**, define the relationship in the **Container Resource Relation** Generic Table.

Container Resource Relation (1)

<input type="checkbox"/>	CONTAINER TYPE	RESOURCE TYPE
<input type="checkbox"/>	Table	Feeder

Container Positions

Container of Resource (Available)

Container Positions (Used 2/100)

Feeder01
Feeder02
Empty

Position Details

Resource: Feeder02

Description:

Type: Feeder

System State: Up

State:

Comments:

Cancel Update

## Empty

The **Empty** operation removes all objects from the Container.

## Store

The **Store** operation places the Container in a **Storage Resource** located in any **Area** that belongs to the Container **Facility**.

Precondition:

The Storage Resource must have **Position Unit Type = Container**.

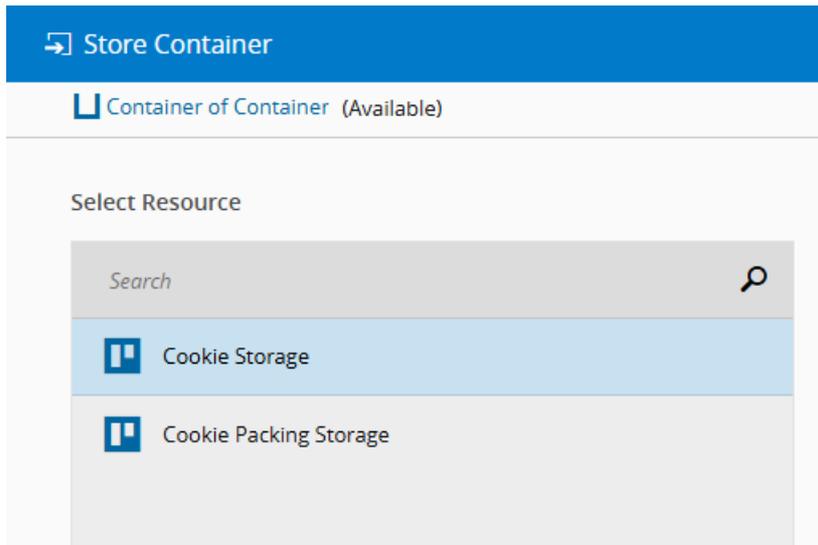
 Cookie Storage (Active)

---

**Positions**

---

Position Unit Type: Container



## Retrieve

The **Retrieve** operation removes the Container from storage.

## Dock

Use **Dock** to dock a Container to a **Resource**.

Docking can occur on Resources with the following processing types:

- **Load Port**
- **Process**

### Load Port Docking

Requirements:

- The Resource must have a **Load Port Type** selected
- The **Position Unit Type** must be **Container**

**Edit Resource** ?

GENERAL DATA ADDITIONAL INFORMATION

**Load Port Information**

\* Load Port Type:  x ▼

**Positions**

\* Position Unit Type:  x ▼

Container Type:  ▼

Track Positions:

Auto Generate Positions:

Total Positions:

**Other Information**

Enable Request MAO on State Change:

Resource Group:

Comments: ^

**Example:**

In SMT lines, loader and unloader machines handle magazines of electronic boards.



### Process Docking

Requirements:

- The Resource must have **Locations enabled**
- A valid **Location** must be selected

■ Dock Container ?

■ Cart1 (Available) ▼

**Resource**

\* Resource: ■ CM-Resource A × 🔍

\* SMT: ■ Loc1 × 🔍

Description:

System State: Up

Area: ■ CM-Area

Priority: 5

Used Positions: 0

Total Positions: 10,000

Comments: ^

Cancel
Dock

When docking a **Container of Resources** (for example feeder carts), the system automatically considers the Resources as consumable feeds in the docking Resource.

**Example:**

In SMT lines, component placement machines can handle multiple feeder carts.





The docking Resource must have:

- **Has Resource Locations** enabled
- **Location Type** defined
- **Dimensions** configured

 Edit Resource

GENERAL DATA   ADDITIONAL INFORMATION   LOCATIONS

**Locations**

Has Resource Locations:

Location Type:

\* Dimension X Size:

\* Dimension Y Size:

Locations must include:

- Location
- Position Count
- Position Consumable Feed Type
- Enabled status

✎ Edit Resource
?

GENERAL DATA
ADDITIONAL INFORMATION
LOCATIONS

Locations + 🗑️

Loc1 <small>Description</small>	🗑️
Loc2 <small>Description</small>	
Loc3 <small>Description</small>	
Loc4 <small>Description</small>	

Locations Details

Name: Loc1

Description:

Barcode ID:

\* Location X:

\* Location Y:

\* Position Count:

\* Position Consumable Feed Type: ☰ Feeder x ▾

Enabled:

Comments: ^

Cancel
Save

## Undock

The **Undock** operation removes the Container from the Resource.

🗑️ Undock Container
?

🗑️ Cart1 (Available)
⌵

**Resource**

Name: 🗑️ CM-Resource A

SMT: 🗑️ Loc1

Description:

System State: Up

Area: 🗑️ CM-Area

Priority: 5

Used Positions: 0

Total Positions: 10,000

Comments: ⌶

Cancel Undock

## Add

Use the **Add** operation to assign the current Container to a **Parent Container**.

Define the relationship in the **Container Type Relation** Generic Table.

Container Type Relation (1)	
MAIN CONTAINER TYPE	SUB CONTAINER TYPE
<input type="checkbox"/> Trolley	Box

🗑️ Add Container to Container
?

🗑️ Container of Material (Available)
⌵

**Container Details**

\* Container: 🗑️ Container of Container x 🔍

Description:

Type: 🗑️ Trolley

Position: Auto Generated ⌵

Used Positions: 0/100

Vendor Id:

Comments: ⌶

Cancel Add

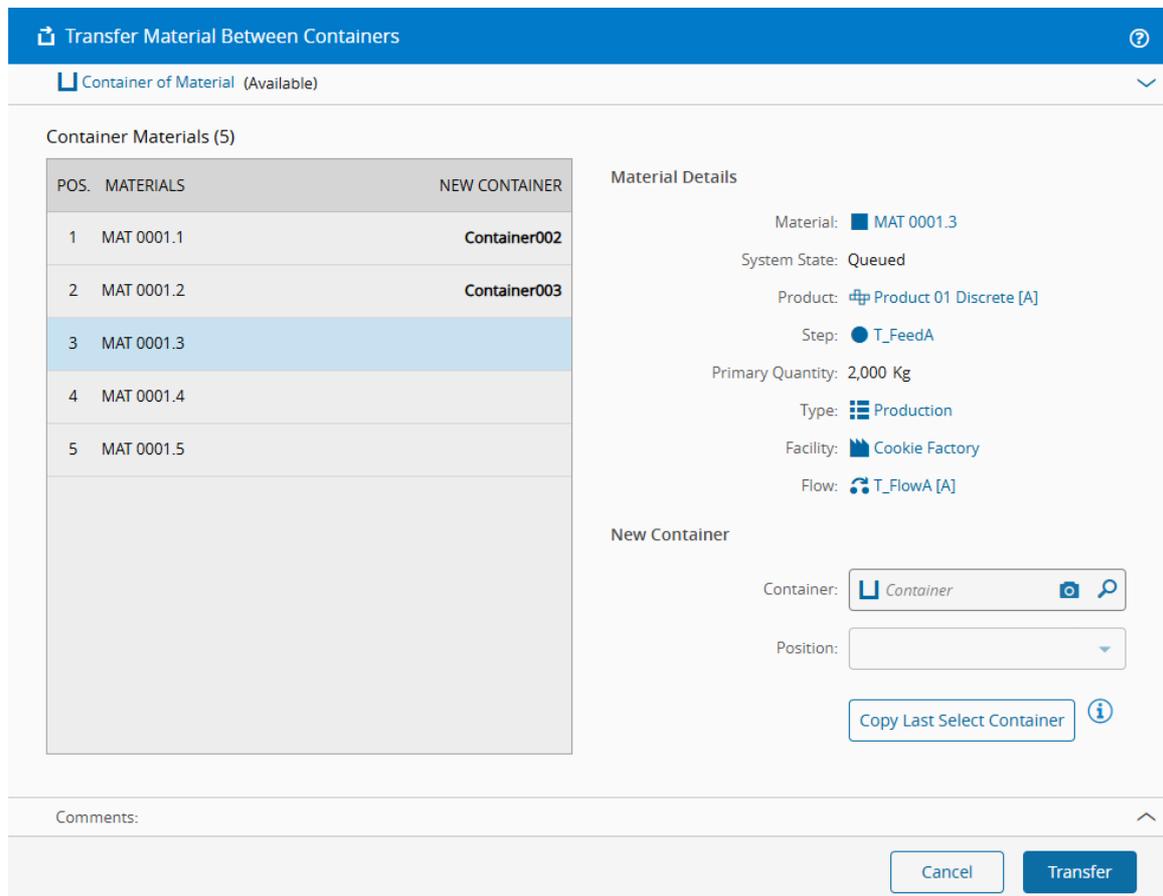
## Transfer

The **Transfer** operation transfers the contents of a Container to another Container.

The operation name varies depending on the **Container Position Unit Type**:

- Transfer Materials
- Transfer Resources
- Transfer Containers

You can transfer each position to a different Container.



**Transfer Material Between Containers**

Container of Material (Available)

POS.	MATERIALS	NEW CONTAINER
1	MAT 0001.1	Container002
2	MAT 0001.2	Container003
3	MAT 0001.3	
4	MAT 0001.4	
5	MAT 0001.5	

**Material Details**

Material: MAT 0001.3  
 System State: Queued  
 Product: Product 01 Discrete [A]  
 Step: T\_FeedA  
 Primary Quantity: 2,000 Kg  
 Type: Production  
 Facility: Cookie Factory  
 Flow: T\_FlowA [A]

**New Container**

Container:     
 Position:   
 

Comments:

### Make Unavailable

Sets the **System State** of the Container to **Unavailable**. In this state, the Container is not visible in selection lists.

### Make Available

Changes the Container **System State** back to **Available**.

### Container View

The **Container View** displays the Container layout and contents.

You can:

- Visualize positions and assigned objects
- View details of the selected position

- Customize visible columns in **View Options**

The screenshot shows the 'Container of Material' view. The main area contains a table with the following data:

Parent Material	Material	Product	Step	Quantity
1	Cookie01	Biscuits (A)	Mixing	20 Kg
2	Cookie02	Biscuits (A)	Mixing	20 Kg
3	Cookie03	Biscuits (A)	Mixing	20 Kg
4	Cookie04	Biscuits (A)	Mixing	20 Kg
5	Cookie05	Biscuits (A)	Mixing	20 Kg
6	Cookie06	Biscuits (A)	Mixing	20 Kg
7	Cookie07	Biscuits (A)	Mixing	20 Kg

The right sidebar, titled 'PANELS', includes a 'VIEW OPTIONS' section with the following toggles:

- Parent Material:
- Material:
- Material Type:
- Product:
- Product Description:
- Product Group:
- Step:
- Flow:
- Facility:
- Quantity:

## Container Maintenance View

The **Container Maintenance View** displays scheduled and ad-hoc **Maintenance Action Orders (MAO)** related to the Container.

For more information, refer to [Maintenance Management](#).

The screenshot shows the 'Container of Material' view in maintenance mode. The main area displays a calendar for January 2026. The date 14th is highlighted in yellow. The 'Activities' sidebar on the right shows:

- USAGE BASED (0)
  - No usage based activities
- AD-HOC (0)
  - No ad-hoc activities

## Material Container Type Context

The **Material Container Type Context** Smart Table defines restrictions for container usage.

You can restrict container types based on:

- **Area**
- **Step**
- **Product**
- **Product Group**
- **Material Type**
- **Material Form**
- **Material State**
- **Capacity Class**

You can also define the **maximum number of usable positions** for a Container type.

 **Note**

To select a Step in this Smart Table, enable the Use Container Restrictions property.

### Example

Example configuration using **Step**, **Material Type**, and **Container Type**.

Material Container Type Context (1)									
AREA	STEP	PRODUCT	PRODUCT G	MATERIAL TYPE	MATERIAL FORM	MATERIAL STATE	MATERIAL CAPAC	CONTAINER TYPE	CONTAINER MAX
	CM-StepA			Production				Box	

In this configuration, when you attempt to add a **Material** of type **Production** at the selected Step, only Containers of type **Box** appear in the selection list.

 Add Material to Container 

SMT Test1 (Queued) /  CM-Product A [A] /  CM-StepA / 500 EA

**Container Details**

\* Container:   

Position:

- Container of Material
- Container of Material1
- Container of Material2
- Container of Material3
- Container of Material4

*5 results* ▼ Advanced

Comments: 

Cancel
Add

**Container**



Name: **Container of Material**

Description:

Type:  **Box**

Universal State: **Active**

System State: **Available**



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