

Partial Track-Out

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Partial Track-Out

Estimated time to read: 8 minutes

Partial Track-Out is an operation that relates to **Material**, which is one of the most important objects in the system as it represents any raw material, inventory or work-in-progress (wafers, dies, modules, printed circuit boards, capacitors, etc.).

A **Material** is partially tracked out when only a certain amount of the original **Material** is required to be processed. This is quite common with large production orders that need to be broken down into smaller quantities and use the **Partial Track-Out** operation to split and track out materials for a more continuous processing.

This document will guide you through the setup of a **Partial Track-Out** scenario.

Overview

A **Partial Track-Out** happens when a **Material** is tracked in at a **Resource** in a **Step** and only a fraction of the quantity should be tracked out to a new **Material**.

Info

The original Material stays tracked in at the same Resource with the remaining quantity, and the Step must be configured to allow partial track-outs.

Scenario Setup

To enable partial track-outs, follow the steps described in the table below:

Step Number	Step	Description
1	Create context resolution entry	Create the entry in the StepSplitTrackOutContext Smart Table for context definition. This step is not mandatory if you have the Enable Step for Partial Track-Out option set, because you can use the Split and Track-Out operation without any default value in the mentioned Smart Table.
2	Enable Step for Partial Track-Out	Set the Use Split and Track-Out property in the Step to allow partial track-outs.

Table: Steps to setup the Partial Track-Out related entities

After the setup of these entities is performed, you can process a **Material** and perform a **Partial Track-Out** at the configured **Step**. The steps below will help you to create the adequate scenario:

Step 1: Create context resolution entry

You have to configure the system to allow partial track-outs at a specific context. The [StepSplitTrackOutContext](#) Smart Table provides a wide range of possibilities, and these allow you to define a different set of contexts to perform partial track-outs (depending on the needs of your process). You can define the following different contexts:

Field	Description
Step	On which Step will partial track-out be enabled.
Product	On which Product will partial track-out be enabled.
Product Group	On which Product Group will partial track-out be enabled.
Flow	On which Flow will partial track-out be enabled (applies to the immediate parent Flow of the Step where the Material is currently, and not to the Top Level Flow).
Resource	On which Resource will partial track-out be enabled.
Resource type	On which Resource Type will partial track-out be enabled.
Model	On which Resource Model will partial track-out be enabled.

Table: StepSplitTrackOutContext Smart Table keys

This means you can define that partial track-outs can take place for a specific **Step** in a variety of possible combined contexts, depending on the resolution, and precedence key, which you define in the Smart Table. For more information on context resolution, see [Smart Tables](#).

For each of these possible context definitions, you have to define three values that will be applied if the context is resolved:

Field	Description
Enable Quantity Override	Whether the default quantity can be overridden. If set as <code>false</code> , you can still override the quantity unless the feature <code>Material.TrackOutQuantityManual</code> is disable for your user's role.
Track-Out Material Mode	Whether the Material to be tracked-out is the Parent Material or the Child. Possible options: - <code>Child</code> - the Child is tracked-out and a split is required for the last Material . The Parent Material is terminated. - <code>ChildExceptLast</code> - The Child Material is tracked-out except for the last Material , where no split is required and the Parent Material will be tracked-out instead.
Material Losses Mode	Whether losses are incurred on the Material that is tracked-out or the one that stays; the Track-Out Losses Mode property of the Step must be different to None. Possible options: - <code>InProcessMaterialExceptLast</code> - <code>TrackedOutMaterial</code>

Table: StepSplitTrackOutContext Smart Table values

As a quick example, the configuration below defines that a Split and Track-Out operation can happen at the **Mixing Step** and the **Mixer-05 Resource**, with the following characteristics:

- A Child **Material** will be created with Primary Quantity = **10** units. This value can be overridden due to the Enable Quantity Override property being set to **true**.
- The original **Material**, now Parent to the split Child **Material**, will remain in state In Process, with **10** units removed from the original Primary Quantity.
- The **Material** that will be tracked-out will be the Child **Material** of the main **Material**, and any losses will be incurred by the original **Material**.

Step Split Track Out Context (Active)

Step: **Step** Product: **Product** Product Group: **Product Gr...** **Advanced**

Step Split Track Out Context (1)

STEP	PRODUCT	PRODUCT GROUP	FLOW	RESOURCE	RESOURCE TYPE	MODEL	DEFAULT QUANTITY	ENABLE QUANTITY OVERRI	TRACK-OUT MATERIAL	MATERIAL LOSSES MODE
<input type="checkbox"/> Mixing				Mixer-05			10	<input checked="" type="checkbox"/>	Child Except Last	In Process Material Except Last

Step 2: Enable Step for Partial Track-Out

A vital property must be enabled in the **Step** to allow partial track-outs:

Property	Description
Use Split and Track-Out	Whether partial track-outs (also known as Split and Track-Out in Critical Manufacturing MES) will be used at the Step .

Table: Step relevant property

Mixing

Refresh Edit More

General Actions

Mixing (Active)

DETAILS

Step

Name: Mixing
Description: Mixing Step
Type: Process
Universal State: Active

Information

Processing Type: Process
Display Order: 18
Material Sort Rule Set:
Resource Sort Rule Set: Resource Queue Size
Lot Traveler:
Material Label:

Material Tracking

Pass-Through: No
Sub-Material Track State: 0
Depth:
Link Dispatch and Track-In by: Yes
Default:
Link Track-Out and Move Next: No
by Default:
Track-Out Losses Mode: Main Material
Use Split and Track-Out: **Yes**

DETAILS

LOGICAL NAMES
AREAS
REASONS
FUTURE ACTIONS
COSTING
SAMPLING
INSPECTIONS

Scenario example

Consider a **Material** **MAT_0003** currently queued at the **Mixing Step**:

Mixing

Refresh Dispatch and Track-Transaction Change Split Hold Off-Flow Record Loss/Bonus Attach Grade Material Create Sub-Products Store Reset Data Collection Perform Post Data Print View Reports Add Request View More Views Layout

STEP

Materials 11 Resources

STATE: ALL PRODUCT: Belgas [A] X FLOW: Flow Material Name

1 Item Selected

	MATERIAL	QTY	UNITS	PRODUCT	FLOW	STEP	PRIORITY	STATE	IN OFF-FLOW
<input type="checkbox"/>	Cookie01	20	Kg	Belgas [A]	CookiesFlow [A] Mixing	5	5	Queued	X
<input type="checkbox"/>	Cookie02	20	Kg	Belgas [A]	CookiesFlow [A] Mixing	5	5	Queued	X
<input type="checkbox"/>	Cookie03	20	Kg	Belgas [A]	CookiesFlow [A] Mixing	5	5	Queued	X
<input type="checkbox"/>	Cookie04	20	Kg	Belgas [A]	CookiesFlow [A] Mixing	5	5	Queued	X
<input type="checkbox"/>	Cookie05	20	Kg	Belgas [A]	CookiesFlow [A] Mixing	5	5	Queued	X
<input type="checkbox"/>	Cookie06	20	Kg	Belgas [A]	CookiesFlow [A] Mixing	5	5	Queued	X
<input type="checkbox"/>	Cookie07	20	Kg	Belgas [A]	CookiesFlow [A] Mixing	5	5	Queued	X
<input type="checkbox"/>	QuarlosCookie	13	Kg	Belgas [A]	CookiesFlow [A] Mixing	5	5	Queued	X
<input checked="" type="checkbox"/>	MAT_0003	30	Kg	Belgas [A]	CookiesFlow [A] Mixing	5	5	Queued	X
<input type="checkbox"/>	MAT_0001-000	10	Kg	Belgas [A]	CookiesFlow [A] Mixing	5	5	Processed	X
<input type="checkbox"/>	MAT_0001	10	Kg	Belgas [A]	CookiesFlow [A] Mixing	5	5	In Process	X

Rows per Page: 25 Page 1 of 1 (11 Records)

DETAILS

HOLDS/OFF-FLOWS (0)

PROTOCOL INSTANCES (0)

DOCUMENTS (0)

Dispatch the **Material** to a **Resource** configured to allow partial track-outs. In this case, Dispatch and Track-In are linked, so both will be performed at once:

Dispatch and Track-In Material

RESOURCE

MAT_0003 (Queued) / Belgas [A] (Belgas Cookies) / Mixing / 30 Kg

Available Resources

- Mixer-01 Mixer-01 Resource
- Mixer-02 Mixer-02 Resource
- Mixer-03 Mixer-03 Resource
- Mixer-04 Mixer-04 Resource
- Mixer-05 Mixer-05 Resource**

Resource Details

Name: Mixer-05
Description: Mixer-05 Resource
Area: Cookie Manufacturing
Priority: 2
Material(s) Dispatched: 0
Material(s) In Process: 1
Running Mode:
Service: Mixing
State: Standby

Resource State

New State: Productive

Comments:

Cancel Track-In

After the **Material** is Processed, end processing by performing **Track-Out**. The wizard then opens a new page called **Split Information**, and the default value for quantity configured in the smart table is automatically filled-in:

Track-Out Material

RESOURCE STATE
SPLIT INFORMATION
RECORD LOSS/BONUS

MAT_0003 (InProcess) / #Belgas [A] (Belgas Cookies) / ● Mixing / 30 Kg

Split Material to Track-Out Information

*Primary Quantity (Kg): 10

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

Container: Container

Position:

Comments:

Cancel < Back Next >

As seen in the image above, the name of the Split Material to Track-Out can be automatically generated according to the Name Generated defined in this configuration

/Cmf/System/Configuration/Business/NameGenerators/SplitAndTrackOut/. However, you can override it by entering a name of your choice in the Name field.

Note

If a BOM is configured for any scenario and the Assembly Type is set to Explicit or Explicit Add, there are two additional preconditions to allow Partial Track-Out:

- Assembled Units must be the same as the Primary Units (example: both Assembled and Primary Units must be Cookies).
- Assembled Quantity is higher than zero or Sub-Material Count is higher than zero.

In this case, since the smart table definition allows you to change the primary quantity to track out, you can change the default value. You can also define whether the Child **Material** is put in a specific **Container** and position, provided the **Container** allows it.

Note

You can even decide that you want to perform a complete Track-Out instead of a partial one. Just choose the total quantity of the Material and a "normal" Track-Out will take place with no Material split. In this situation, the rest of the configuration possibilities are hidden.

Track-Out Material

RESOURCE STATE
SPLIT INFORMATION
RECORD LOSS/BONUS

MAT_0003 (InProcess) / dtp Belgas [A] (Belgas Cookies) / Mixing / 30 Kg

* Primary Quantity (Kg): 30

Comments:

Cancel
Back
Next

Regarding losses, the definition of the smart table was to have the Parent (or In Process) **Material** incur the losses. Hence, apply a loss and check the result after the operation concludes.

Track-Out Material

RESOURCE STATE
SPLIT INFORMATION
RECORD LOSS/BONUS

MAT_0003 (InProcess) / dtp Belgas [A] (Belgas Cookies) / Mixing / 30 Kg

Loss Reasons (Total: 2 Kg)

Broken	2 Kg
Broken	
Burned	0 Kg
Cookie is burned	

Final Quantity: 8 Kg

Loss Reasons Details

Reason: Broken

Loss Quantity (Kg): 2

Comments:

Cancel
Back
Track-Out

After the operation is completed, the information for the split (Child) **Material** is displayed.

Track-Out Material

1 RESULTS

MAT_0003 (InProcess) / Belgas [A] (Belgas Cookies) / Mixing / 30 Kg

✓ Material(s) was/were tracked out successfully.

New Material(s):

MAT_0003-000000001

You can see that the Child **Material** is in the Processed state, in the same **Step** with a Primary Quantity equal to the value defined in the wizard:

MAT_0003-000000001 (Active)

DETAILS

Material

Name: MAT_0003-000000001
Description: MAT_0003
Type: Production
Universal State: Active
System State: **Processed**

Basic Information

Form: Lot
Facility: Cookie Factory
Product: Belgas [A]
Product Description: Belgas Cookies
Product Group:
Product Group Description:
Parent:
Approved: Yes
Capacity Class:
Current Send-Ahead Run:

Flow and Step

Flow: CookiesFlow [A]
Step: **Mixing**
Flow Path: CookiesFlow [A] > Mixing

Quantities

Primary Quantity: **10 Kg**
Secondary Quantity:
Target Quantity:

Sub-Materials

Sub-Materials: 0
Sub-Material Primary 0 Kg
Quantity:
Sub-Material Secondary
Quantity:

Resource and Container

Resource:
Resource Bin/Position:
Resource Area:
Container:
Container Position:


Now you should check the main **Material**, which has the Primary Quantity calculated as follows:

$$\text{New Primary Quantity} = \text{Original Primary Quantity} - (\text{Partial Track-Out Quantity} + \text{Loss Quantity})$$

MAT_0003 (Active)

DETAILS

Material



Name: MAT_0003

Description: MAT_0003

Type: Production

Universal State: Active

System State: In Process

Basic Information

Form: Lot

Facility: Cookie Factory

Product: Belgas [A]

Product Description: Belgas Cookies

Product Group:

Product Group Description:

Parent:

Approved: Yes

Capacity Class:

Current Send-Ahead Run:

Quantities

Primary Quantity: 18 Kg

Secondary Quantity:

Target Quantity:

Sub-Materials

Sub-Materials: 0

Sub-Material Primary Quantity: 0 Kg

Sub-Material Secondary Quantity:

You can finally confirm the genealogy of both **Materials**:

GENEALOGY

Refresh

ASCENDANTS DESCENDANTS

NEWEST 4 OPERATION: ALL

MAT_0003

Split to

08/09/2022 04:29 PM

MAT_0003-000000001

MAT_0003 > Split to

Split Details

Date: 08/09/2022 04:29 PM

Material: MAT_0003

Product: Belgas [A]

Product Description: Belgas Cookies

Step: Mixing

Primary Quantity: From 30 to 20 Kg

Split Materials (1)

MATERIAL	PRODUCT	PRIMARY QTY	PRIMARY UNITS	SECONDARY QTY	SECONDARY UNITS
MAT_0003-000000001	Belgas [A]	10	Kg		

Info

It is also possible to use this Partial Track-Out operation with Materials that have Sub-Materials.

In short, this diagram represents the flow of a traditional Partial Track-Out operation:

```
graph TD
    A[MAT_0003, Queued, 30 units] -->|Dispatch and Track-In| B[MAT_0003, InProcess, 30 units]
    B -->|Track-Out| C{SPLIT AND TRACK-OUT}
    C -->|Main| D[MAT_0003, InProcess, 20 units]
    D -->|Loss| F[MAT_0003, InProcess, 18 units]
    C -->|Split| E[MAT_0003-000000001, Processed, 10 units]
```

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 A,B,D,F mermaid_entity
class E mermaid_entitylinked
class C mermaid_nonbusinessdata
```



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