Critical manufacturing
an ASM PT company

# Material Assembly

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# Material Assembly

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Assembly is the process of combining individual materials into a new and different product, which can be a finished product or merely part of it, during manufacturing.

The assembly operation entails materials being joined together using permanent or semipermanent methods.

An Assembly may also refer to a Bill of Material (BOM), which is the name given to the assembly items or materials needed for a given Material Assembly process.

This document will guide you through the setup and usage of the different Material Assembly modes available in Critical Manufacturing MES.

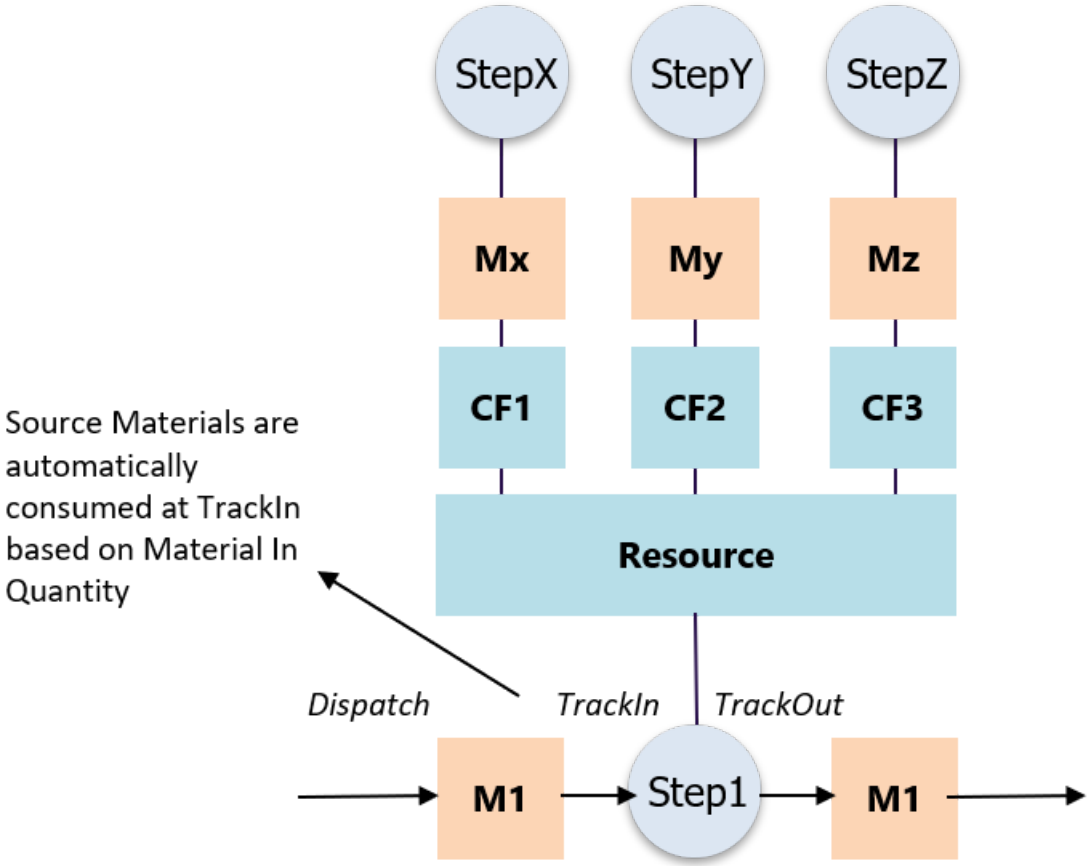
## Overview

Assemble can be performed in four ways:

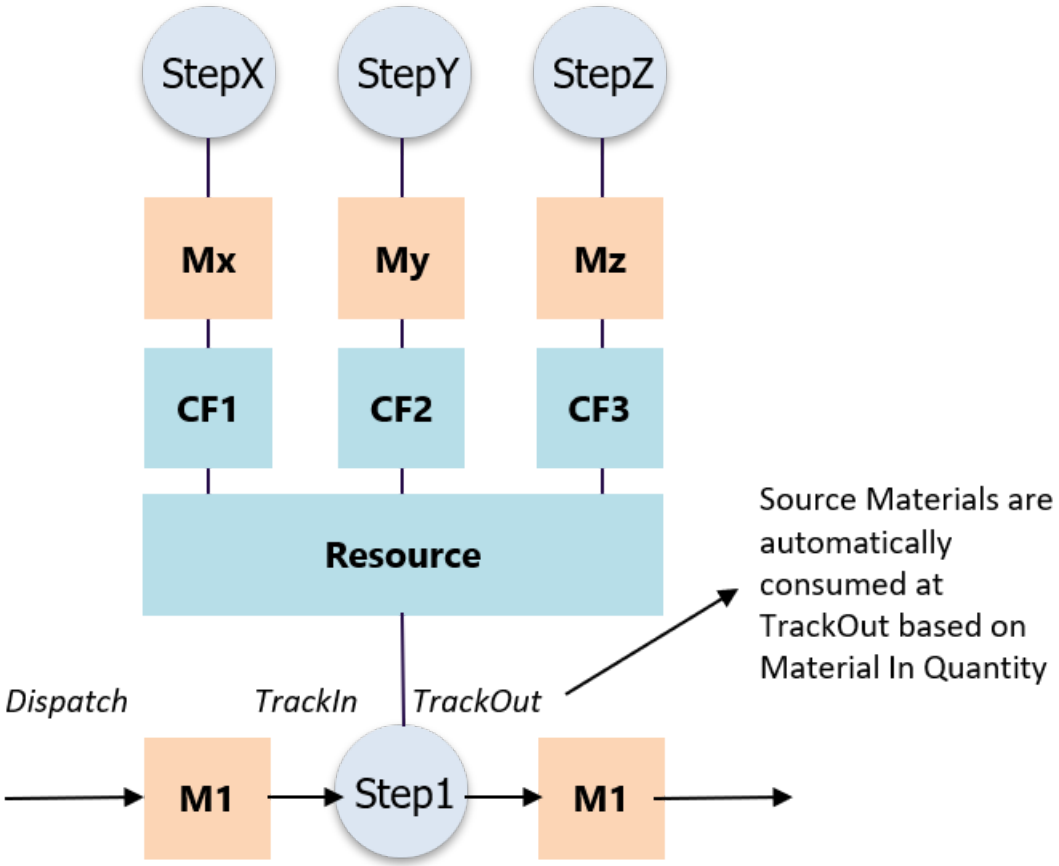
- **AutomaticAtTrackIn** - where source materials are consumed automatically at track in, without changing the quantity of the main material.
- **AutomaticAtTrackOut** - similar to AutomaticAtTrackIn except that the BOM consumption takes place at track out.
- **Explicit**, where source materials must be consumed explicitly between Track In and Track Out. The quantity of the main material is not changed, and it needs to be fully assembled (up until the primary quantity).
- **ExplicitAdd**, where source materials must be consumed explicitly between Track In and Track Out and the quantity of the main material is increased with each assemble.

## Automatic

### Automatic at TrackIn




Automatic at TrackOut

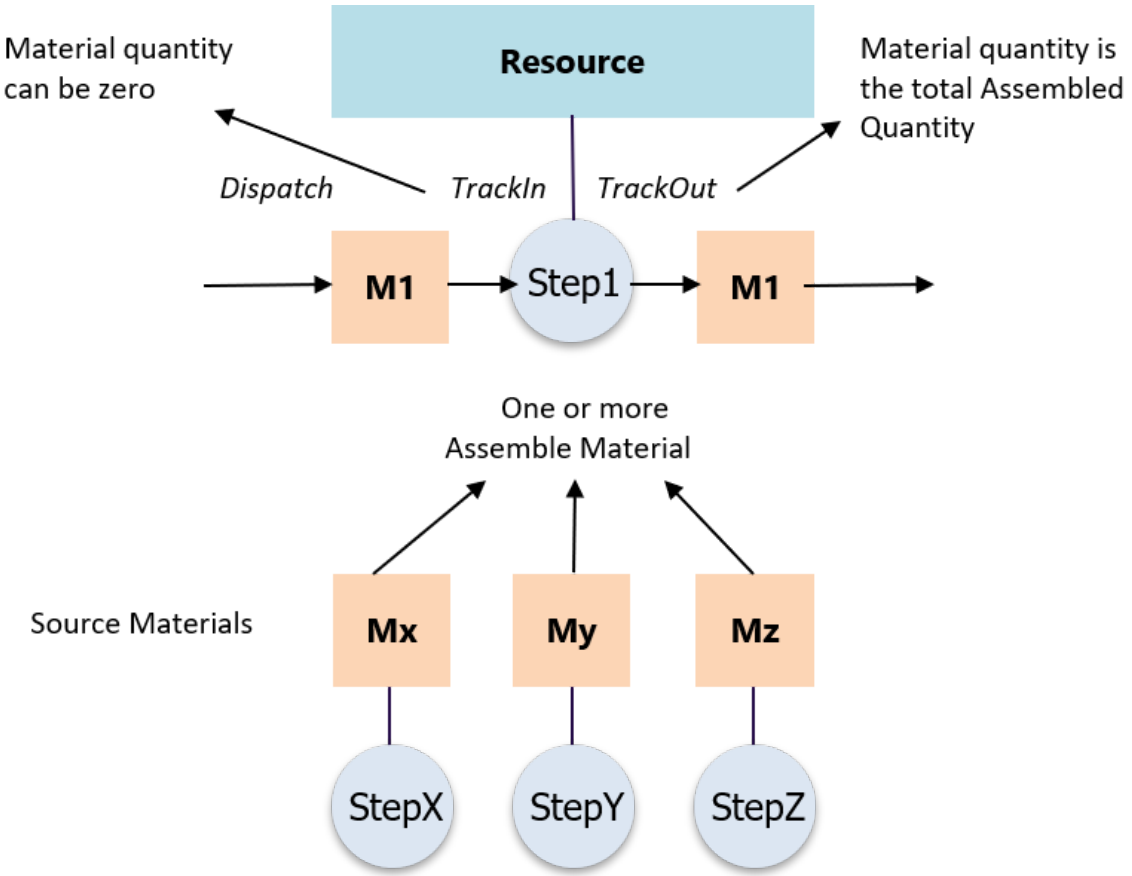


The following list specifies the sequence of steps necessary to configure an automatic assemble material:

1. Create a BOM - note that a BOM is a versioned object which needs to go through the change management process and that it's bound to a specific target Product.
2. Associated the BOM to the right Step context. To do that, it's necessary to edit the Step BOM context and specify that the Assembly Type is either AutomaticAtTrackIn or AutomaticAtTrackOut.
3. Be sure that the Resource which provides Services to the Step where the material will be assembled has at least as many Sub-Resources of type Consumable Feed as there are BOM Source Products defined in the BOM.
4. Create as many source Materials of the Source Products defined in the BOM in enough quantities to fulfill the required assemble quantities. These Materials need to be attached as consumable to the Sub-Resources of the main Resource. Note that the Source Materials must be in the defined BOM Step and that in order to be able to attach the source Materials to the respective Consumable Feeds, there must be a match between the Material required Service and the Consumable Feed Resource provided Services. The Consumable Feed Services must be defined with the processing type Consumable Feed.
5. Create the main Material and move it to the Step where it should be assembled.
6. Track In the main Material. Note that at Track-In the system will verify that the Resource has all the materials (which must have not expired) in the necessary quantities to fulfill the BOM requirements.
7. In case that the Assemble Type is defined as *AutomaticAtTrackIn*, the BOM consumption will be performed automatically during the Track In transaction. The main Material quantity is not changed.
8. In case that the Assemble Type is set to *AutomaticAtTrackOut*, the BOM consumption will take place automatically during the Track Out transaction. The main Material quantity is not changed.

## Manual

### Explicit




The following list specifies the sequence of steps necessary to configure a manual assemble material:

1. Create a BOM - note that a BOM is a versioned object which needs to go through the change management process and that it's bound to a specific target Product.
2. Associated the BOM to the right Step context. To do that, it's necessary to edit the Step BOM context and specify that the Assembly Type is Manual.
3. Create as many source Materials of the Source Products defined in the BOM in enough quantities to fulfill the required assemble quantities.These Materials need to be Queued in the defined BOM Step. Note that for assemble purposes, the Source Materials can not have expired, that is, if an expiration date is defined, it must be in the future.
4. Create the main Material and move it to the Step where it should be assembled.
5. Track In the main Material.
6. While the Material is In Process, perform as many Assemble Materials as desired:
7. In the case that the Assembly Type is *Explicit*, the main Material primary quantity must be fully assembled before the Material can be tracked out and its primary quantity remains unchanged after each assemble transaction.
8. In the case that the Assembly Type is *ExplicitAdd*, the main Material can be tracked out at any time and every time an assemble transaction takes place, the primary quantity is increased.
9. Track Out the main Material.

## Weigh And Dispense

There is a special Material Assembly mode when used through the Weigh and Dispense operation that has several configuration needs that apply to that specific use case. If you wish to know more about this

operation, please consult the Weigh and Dispense tutorial or open the operation page under the Weigh and Dispense operation page in the User Guide.

## Replacing a previously assembled Material

If a user needs to replace a Material that has been previously assembled, the process is two-fold but will present to the user as a single transaction. If the user chooses to perform the tasks separately (i.e. disassembling a Material and assembling again with the new Material), the Disassemble action will reduce the AssembledQuantity property and return the consumed quantity to other source Materials according to the definitions of the BOM.

However, if the user chooses to use the Replace Material operation, both the Disassemble and Assemble operations will be performed sequentially, with the main difference being that the quantity to disassemble and assemble is not moved back to the source Materials but rather consumed in the Assembly process.

**Note**

It should be noted that when a BOM is configured in the *BOMContext* table with *ReplaceAndDisassemble* as the Assembly Type, the system will allow Replacing and Disassembling/Assembling to be used without a previous Assembly process. In this case, after the Material is tracked-in, the Assembled Quantity of the Material is set to the same value of the Primary Quantity.

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