

Operation Resequencing Functionality in Oracle Fusion Manufacturing



**TRINAMIX WHITE PAPER,
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Just as in life, manufacturing processes do not always follow a straight path. Often shop floor requires flexibility to perform operations out of sequence. Traditional ERP manufacturing routings functionality allows setting up operation steps in a sequence. ERP work execution module allows operation bookings only in the sequence as defined in the routing. This works well when there is a hard constraint where a subsequent operation cannot be performed without a previous operation completed. A classic example of this is a machine shop where steps must be performed in a sequence.

However, on many production floors, it is possible to perform operations out of sequence. On assembly lines, sub-modules are manufactured in parallel that is then assembled at the final assembly station. In instrument or medical device manufacturing, if certain components are not available to assemble on a board, it is possible to do subsequent testing operations first and then complete the previous operation when components become available. Sometimes production cell is not available to perform a step, but another cell is available to do a subsequent step first.

To ensure optimum utilization of resources, meet customer commitments and maintain on-time delivery of products, it is necessary to re-sequence operations on the production floor.

To summarize, resequencing of operation steps on a work order is required when:

1. It is possible to perform production steps in parallel.
2. Some production resources are unavailable, but it is possible to continue work on subsequent steps in other production cells.
3. Shortage of components on a production step, but it is only possible to complete other steps down the line and return to skipped steps when components become available.

So far, resequencing has been handled outside the ERP system. The work has been done out of sequence and recorded on paper. After the constraint is resolved, the work order execution is then recorded in the ERP. These work-around increases noise in the system because:

1. Components consumed (backflushed) on out-of-sequence steps are not recorded in real-time in ERP.
2. Industries such as medical device/drug manufacturing require electronic signatures. Performing steps on the floor, but not recording them in the system in real-time is a red flag in audits.
3. Create additional work for manually charging resource hours when the actual hours are reported usually by operator clock-in / clock-out.
4. Not provide an accurate picture of work being performed on the floor and work pending.
5. Planning system blocks the resource availability when the work has already been completed in re-sequenced steps.

Solved Issues of the past.

Oracle Fusion Manufacturing Cloud has released a new functionality as part of release 22A that allows resequencing of work order operations during execution.

With this feature, customers can now ensure:

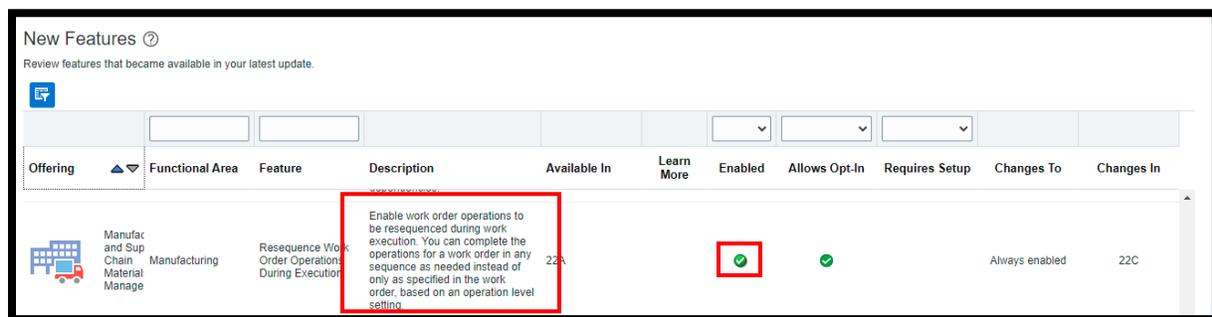
- On-time delivery of shipments and keeping customer commitments
- Optimum utilization of production resources
- Real-time reporting of operations, component consumption, labor hours
- Compliance with regulations 21CFR Part11, GxP ensuring electronic signatures

Setups to enable the features:

To enable the operation resequencing feature in the system, first, you need to Opt-in feature. Also, there are a few setups that need to be performed.

Enable Opt-in feature:

This feature is not available in versions before 22A and by default is not available in 22A. It must be enabled under **New Features** Opt-ins.



Picture 1: Screenshot for 'Opt-in Enablement'

Once the Opt-in feature is enabled, the 'Allow Resequencing' field will be visible, and checkbox gets enabled.

Work definition:

This set of resequencing enabled operations must be preceded and followed by a 'Count Point' enabled operations, which act as checkpoints or Toll Gate operations during execution. Resequenceable operations are supported for all work definition types and work methods, including serial, tracked manufacturing, and both discrete and process manufacturing. Any number of Resequenceable operations are defined within a set of 'Count Point' enabled operations.

Resequencing allowed operation must be a Count Point operation. As shown in the screenshot below, as sequence 20 is not yet count point enabled, hence 'Allow resequencing' checkbox is not available.

Edit Operation

* Sequence

Code — Referenced

Operation Type In-house

* Name

Description

* Work Center

Work Center Code Assembly

Work Center Description

Work Center Inactive Date

Start Date 4/10/22 8:09 PM

End Date

Count point

Automatically transact

— Serialization

Allow resequencing

Lead Time %

Attachments None +

Additional Manual Material Issue

OK Cancel

Disabled

Picture 2: Screenshot for 'Allow resequencing and Count point'

Once Count Point is enabled, the 'Allow resequencing' checkbox is available.

Edit Operation

* Sequence

Code — Referenced

Operation Type In-house

* Name

Description

* Work Center

Work Center Code Assembly

Work Center Description

Work Center Inactive Date

Start Date 4/10/22 8:09 PM

End Date

Count point

Automatically transact

— Serialization

Allow resequencing

Lead Time %

Attachments None +

Additional Manual Material Issue

Completions with Under Issues

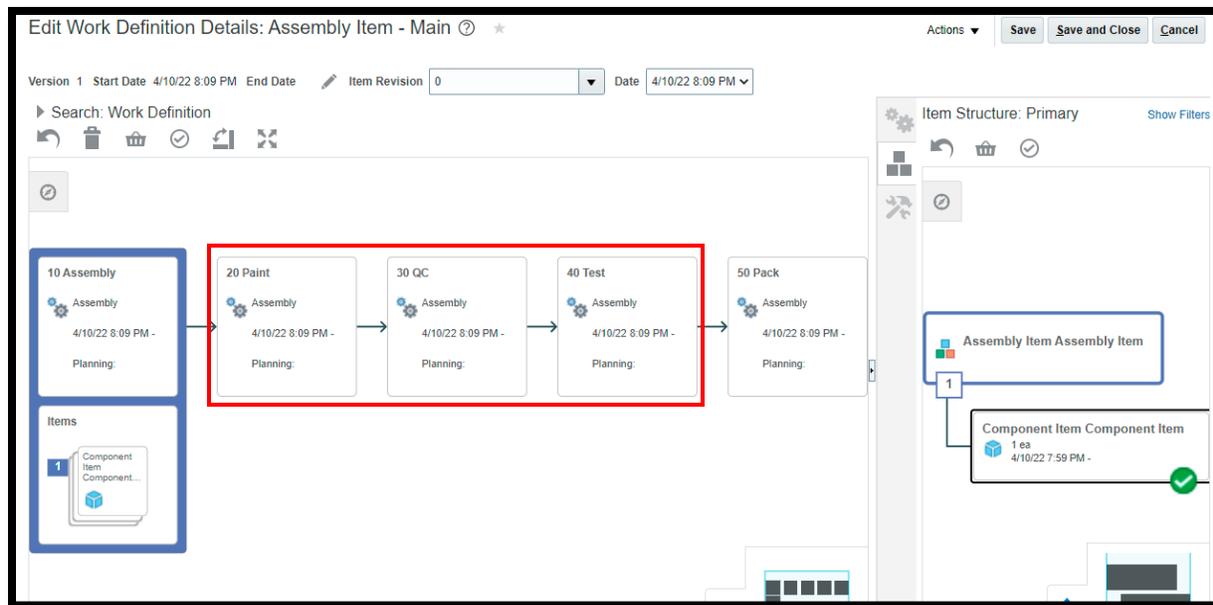
Completions with Open Exceptions

OK Cancel

Enabled

Picture 3: Screenshot for 'Allow resequencing and Count point'

In the following work definition, operation sequences 20, 30, and 40 are resequencing enabled.



Picture 4: Screenshot for 'Allow resequencing' operations on work definition

'Allow resequencing' is checked for 20, 30, and 40 operation sequences. But all 5 operations are 'Count Point' enabled as the operation before resequencing and post resequencing operation must be Count Point enabled.

* Sequence	* Operation Type	* Name	* Work Center	* Start Date	End Date	Count Point	Automatically Transact	Serialization	Allow Resequencing
10	In-house	Assembly	Assembly	4/10/22 8:09 PM		<input checked="" type="checkbox"/>	<input type="checkbox"/>	—	<input type="checkbox"/>
20	In-house	Paint	Assembly	4/10/22 8:09 PM		<input checked="" type="checkbox"/>	<input type="checkbox"/>	—	<input checked="" type="checkbox"/>
30	In-house	QC	Assembly	4/10/22 8:09 PM		<input checked="" type="checkbox"/>	<input type="checkbox"/>	—	<input checked="" type="checkbox"/>
40	In-house	Test	Assembly	4/10/22 8:09 PM		<input checked="" type="checkbox"/>	<input type="checkbox"/>	—	<input checked="" type="checkbox"/>
50	In-house	Pack	Assembly	4/10/22 8:09 PM		<input checked="" type="checkbox"/>	<input type="checkbox"/>	—	<input type="checkbox"/>

Picture 5: Screenshot for 'Allow resequencing' operations on work definition

First and last operations, i.e., 10 and 50 cannot be resequencing allowed. These are 'Toll Gate' operations. Middle operations can only be resequenced.

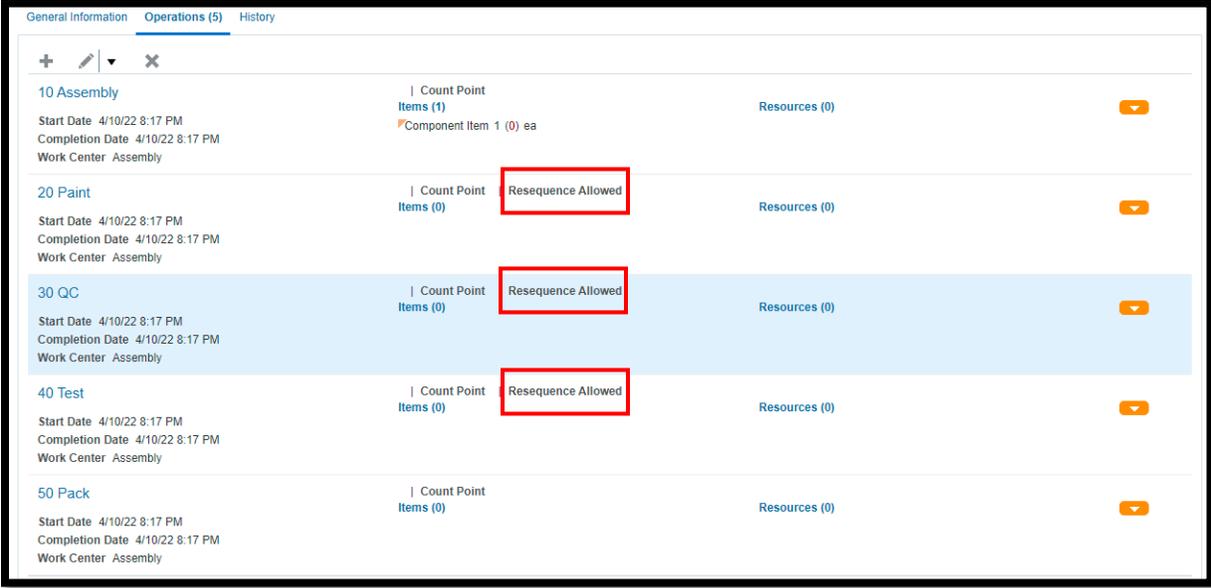
Work order:

Work orders inherit the Resequenceable sequence from Work definitions. When the work orders are released or rescheduled, the work order dates are stamped as per the resequencing operation sequence.

A released work order will not allow modifications of the resequencing operations.

Complete the count point first operation first, then the middle operations can be resequenced on the review dispatch list screen. All Resequenceable operations are displayed on the dispatch list when a preceding Toll Gate operation is completed. By performing the resequencing operations, operators can perform work in any sequence.

The resequencing action can be performed by clicking the icon next to the operation and then selecting the required operation. Once the resequencing icon is clicked, the system puts the assembly at 'Ready' status on the selected resequencing operation. A partial quantity transaction on a resequenced operation is not allowed, full quantity must pass through the same path. As shown below, 20, 30, and 40 are resequenced allowed operations. This is the by default execution sequence carried forward from the work definition.

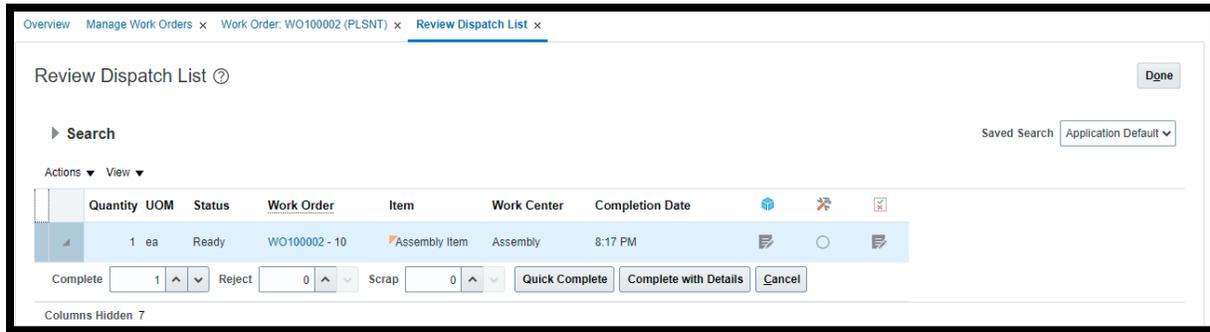


Operation	Count Point	Items	Resequence Allowed	Resources
10 Assembly	Count Point	Items (1)		Resources (0)
20 Paint	Count Point	Items (0)	Resequence Allowed	Resources (0)
30 QC	Count Point	Items (0)	Resequence Allowed	Resources (0)
40 Test	Count Point	Items (0)	Resequence Allowed	Resources (0)
50 Pack	Count Point	Items (0)		Resources (0)

Picture 6: Screenshot for 'Allow resequencing' operations on work order

Review Dispatch List:

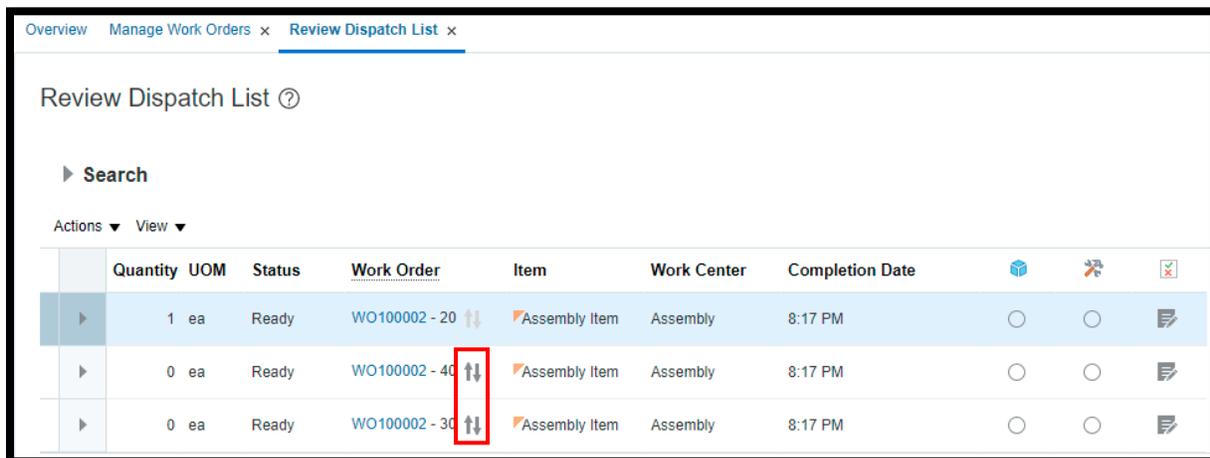
Query the work order on the Review Dispatch list screen and complete operation sequence 10.



Picture 7: Screenshot for work execution on the 'Dispatch List' form

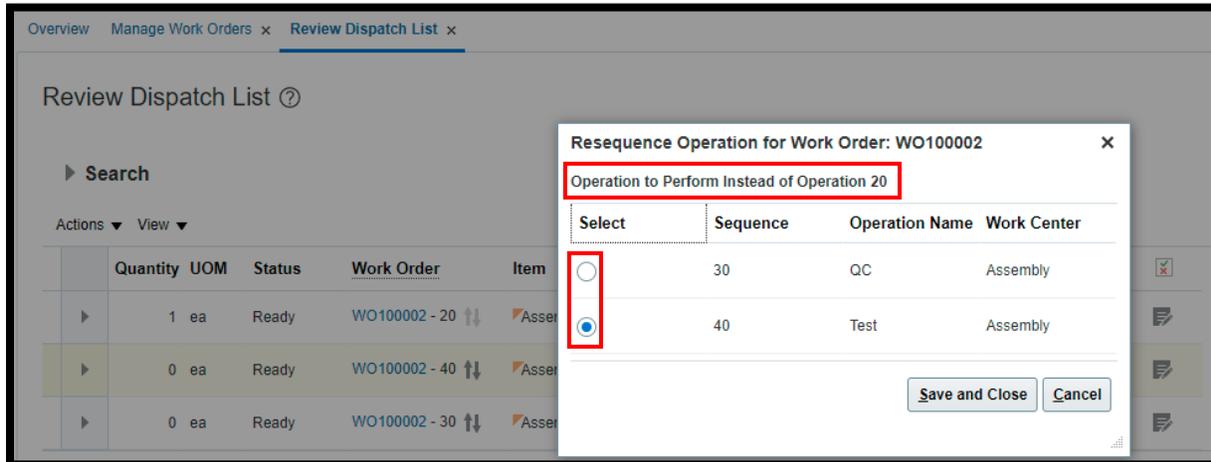
Once the first toll gate operation is complete, all resequencing allowed operations will be available on the review dispatch list screen.

The resequencing icon will be visible next to the operation sequence number. By clicking on the icon, a resequencing action can be performed.

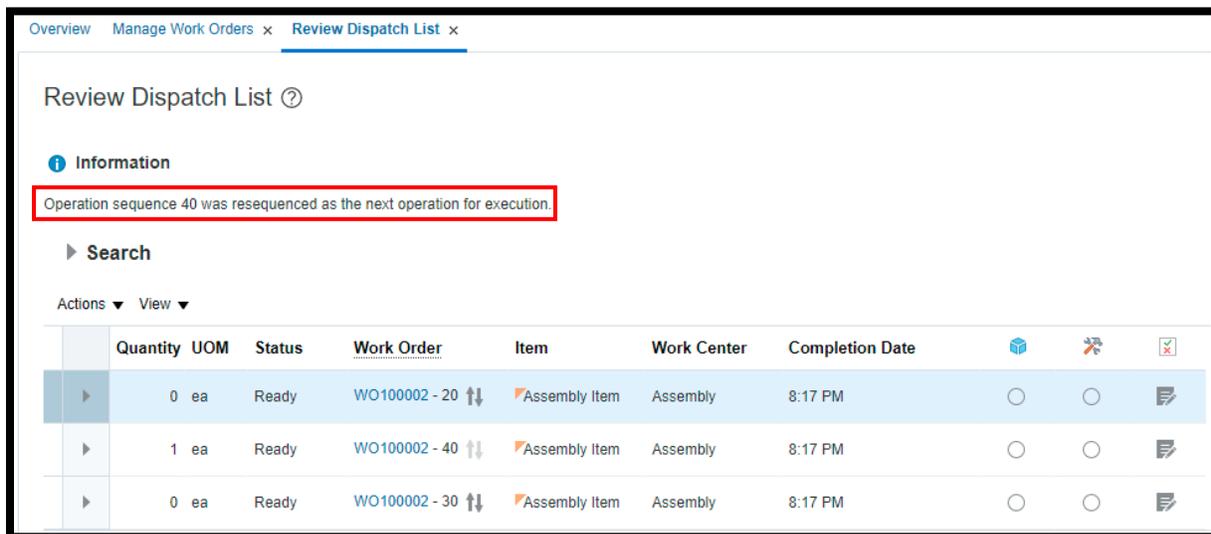


Picture 8: Screenshot for resequencing on the 'Dispatch List' form

Once the resequencing icon is clicked, the dialog box below opens. Select the operation to be performed instead of operation 20.

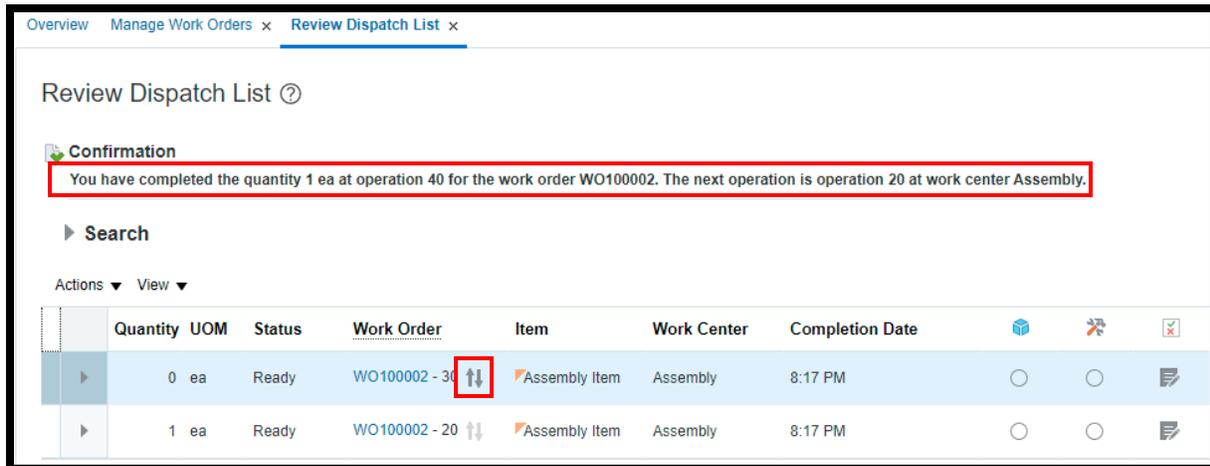


Picture 9: Screenshot for resequencing on the 'Dispatch List' form

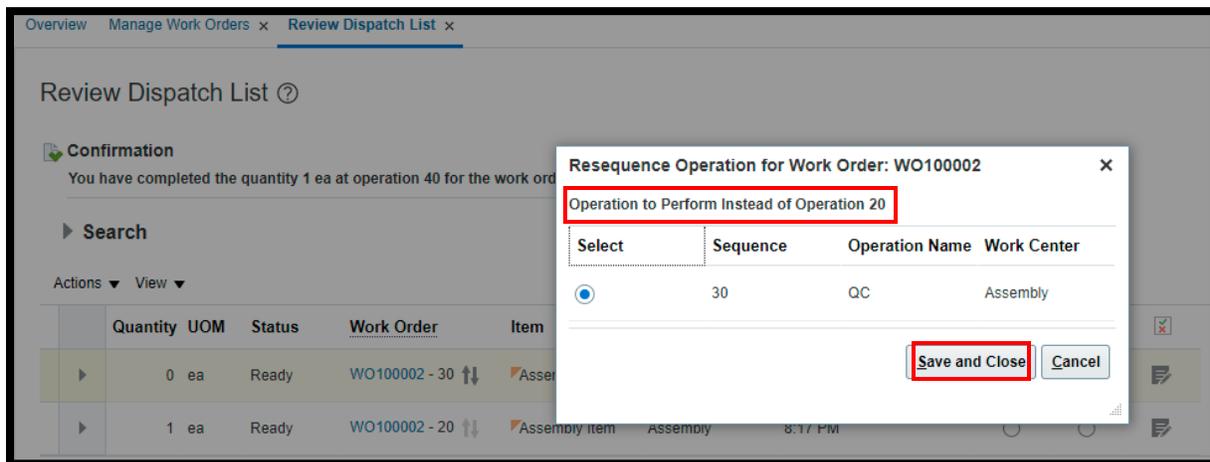


Picture 10: Screenshot for resequencing of operation on the 'Dispatch List' form

Now, instead of 20, operation sequence 40 is resequenced for execution. Once operation 40 is complete, the default operation to be completed is 20. However, operation 30 is still pending, and a resequence allowed operation. Hence, 30 can be completed before 20.



Picture 11: Screenshot for completion of resequencing operation on the 'Dispatch List' form



Picture 12: Screenshot for resequencing of operation on the 'Dispatch List' form

As operation 40 is complete and 30 has been resequenced. Hence, operation 30 is 'Ready' now.

10 Assembly <input checked="" type="checkbox"/> Start Date 4/10/22 8:17 PM Completion Date 4/10/22 8:17 PM Work Center Assembly Execution Sequence 1	Count Point Items (1) Component Item 1 (0) ea	Completed 1 UOM ea	Resources (0)	<input type="button" value="v"/>
20 Paint Start Date 4/10/22 8:17 PM Completion Date 4/10/22 8:17 PM Work Center Assembly Execution Sequence 4	Count Point Items (0)	Resequence Allowed	Resources (0)	<input type="button" value="v"/>
30 QC Start Date 4/10/22 8:17 PM Completion Date 4/10/22 8:17 PM Work Center Assembly Execution Sequence 3	Count Point Items (0)	Resequence Allowed	Ready 1 UOM ea	<input type="button" value="v"/>
40 Test <input checked="" type="checkbox"/> Start Date 4/10/22 8:17 PM Completion Date 4/10/22 8:17 PM Work Center Assembly Execution Sequence 2	Count Point Items (0)	Resequence Allowed	Completed UOM ea	<input type="button" value="v"/>
50 Pack Start Date 4/10/22 8:17 PM Completion Date 4/10/22 8:17 PM Work Center Assembly Execution Sequence 5	Count Point Items (0)		Resources (0)	<input type="button" value="v"/>

Picture 13: Screenshot for resequenced operation on work order

Once all resequencing enabled operations are complete, the assembly will stay at the last toll gate operation in 'Ready' status.

Key points:

- First and last (Tollgate) operations cannot be resequencing allowed enabled.
- Automatically transact or optional operation cannot be defined adjacent to a resequenced allowed operation.
- Supplier operations cannot be resequencing allowed.
- ADFDI cannot be used to create, update, or delete resequence allowed operations.
- FBDI cannot be used to perform resequence action during transacting operations.

References:

Resequence Work Order Operations During Execution (update 22A)

https://download.oracle.com/ocomdocs/global/apps_22A/scm/Resequence_Workorder_Operations_During_Execution/index.html

<https://www.oracle.com/webfolder/technetwork/tutorials/tutorial/readiness/offering.html?offering=mgfg-21>

About the Author:



Shantanu is experienced ERP professional. He has experience working with diverse domains from Industrial to Medical Device Manufacturing across the globe. His area of expertise is supply chain execution, supply chain planning and costing. Shantanu is a PMP certified professional. His educational background is Engineering and MBA in operations management.



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