



## USER GUIDE

# WORK ORDER SCHEDULING AND LEAD TIME

Version 1.0

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# Welcome

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Thank you for your interest in OnRamp. We at OnRamp Solutions designed the OnRamp ERP to meet and exceed your manufacturing resource planning demands. We know manufacturing and we believe that we have created an ERP system that is easy to learn, easy to use, and powerful enough to help you and your business overcome any challenge.

To help your business successfully adopt OnRamp as quickly as possible, we have designed this document to guide you through some of our most commonly used features.

## Overview

This guide was written to help you learn how to use OnRamp work order scheduling components. Some of the screens and reports may be similar to those found in other ERP systems you have used. This guide describes:

- Work Order Scheduling and lead times
- Scheduling work for the shop floor
- Set up lead times on engineering components, including parts and routing
- MRP
- Release a work order and follow the work order instructions

## Conventions

The training guide is structured to help you learn the material in class with a qualified instructor. Each chapter contains: a list of learning objectives for the chapter, an explanation of the chapter concepts, steps on how to perform the chapter actions, an exercise to help you learn the material, and, finally, a summary of the chapter.

This guide uses the following typographical conventions:

- **Bold** text - used to highlight important information in text. Used to denote click actions in procedures.
- *Italic* text - used to label tables and images. Used in notes.
- **Notes** - used to denote important notes related to the text.
- **Warnings** - used to denote warning messages. Ignored warnings can result in permanent negative consequences.

## Customer Feedback

For questions, comments, or complaints related to OnRamp Solutions documentation, training, or presentations, please contact us at: [info@onramp-solutions.com](mailto:info@onramp-solutions.com).

# Lead Time

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## Learning Objectives

This chapter will cover:

- Understanding lead times
- Adding and editing parts, bill of materials (or BOM), work centers, and routing details

## Overview

MRP generates work orders with a start date (SD) that is based on the due date (DD) minus the work order lead time and the safety lead time. However, MRP also assumes that your work centers have infinite capacity. To better understand the start time, we need to understand how the work order lead time (WOLT or WO lead time) is calculated:

- **GLT** - Gateway Lead Time. The queued time for the work center to move the work order from received to completed. Set on [Work Center Master](#). When calculating the WO lead time, OnRamp only uses the gateway lead time value for the first routing detail line.
- **PT** - Process Lead Time. The time it takes to process each routing operation. Calculated on [Routing Detail](#) as the number of days required to run the Current Time for each detail line.
- **QT** - Queue Lead Time. The time it takes to move the part to the work center and how long the work order will be in the queue awaiting action. By default, each routing detail line will use the queue lead time set on the respective work center, but this value can be changed on the routing detail.

The WO lead time calculation is: **WOLT = WC1\_GLT + SUM(PT + QT)**

The Safety Lead Time (SLT), which is set on [Part Master](#), is a buffer that dictates how many days of leeway you want to give your production team.

The work order start date calculation is: **SD = DD - SLT - WOLT**.

## Example

The final part needs to be shipped on Friday, March 31, 2017. It has to go through 3 work centers to get there. The plant is working Monday to Friday. There is a safety lead time of 2 on the part.

- WC 1 has a lead time of 3 days:
  - GLT = 2 days
  - PT = 0.3 days
  - QT = 0.7 days
- WC 2 has a lead time of 0.4 days:
  - PT = 0.1 days
  - QT = 0.3 days
- WC 3 has a lead time of 0.6 days:
  - PT = 0.3 days
  - QT = 0.3 days

Based on these values, the work order lead time will be calculated as:

- $WOLT = WC1\_GLT + (WC1\_PT + WC1\_QT + WC2\_PT + WC2\_QT + WC3\_PT + WC3\_QT)$
- $WOLT = 2 + (0.3 + 0.7 + 0.3 + 0.1 + 0.3 + 0.3)$
- $WOLT = 4$

OnRamp will skip days where the plant is closed, like weekends and holidays. Because WOLT is 4 and SLT is 2, we know there will be at least a weekend between the start date and the due date. With these values, we know that MRP will generate the start date as:

- $SD = DD - SLT - WOLT$
- $SD = 2017/3/31 - 2 \text{ days} - 4 \text{ days}$
- $SD = 2017/3/23$

## Notes

- Based on the listed equation, OnRamp generates a calculated Work Order lead time that displays on the Part Master and Routing Detail screens. However, the lead time value used in MRP to calculate the start date of the work order is the manually entered as the part lead time on the Part Master screen.
- The Safety Lead Time is the number of safety days you want on the part. For example: The part will be shipped on Friday, but one of the work centers that the work order must go through has been erratic lately. You could set the Safety Lead Time to 3. This way, the work order start date will be 3 days earlier. If there is an issue during production, you now have an extra 3 days to resolve it before the order needs to be shipped.
- We recommend that the **Safety Lead Time be at least 1**. This is because the value is measured in days. For example: If the due date is March 31, but the customer

wants it ready by 9 AM in the morning, it is better to have everything done by 5 PM on March 30 instead of 12 PM on the day of.

- Because lead time is measured in days, your QT or GLT of 1 day may seem more like two days. This is because something that is due tomorrow, is due at the end of business tomorrow, allowing you to count today and tomorrow as production time.

### Gateway time



A work order that is due tomorrow counts today and all of tomorrow, making a gateway lead time of 1 day seem like 2 days of work

## Adjusted Lead Time

Another important field, this time on the Routing Detail, is the Adjusted Lead Time. Here, OnRamp takes the **Part Lead Time** and the **Calculated Lead Time** and calculates the allowable lead time to each routing detail operation, based on the operations own lead time totals. Taking the values from the example above, if the Part Lead Time was changed from 4 days to 2, OnRamp would print the adjusted lead times for each operation as:



Calculated adjusted lead time for routing detail operations, based on the part lead time

## Lead Time Offset

On the BOM for a part, you can set the **Lead Time Offset** for each part, which is used to offset when in the lead time the part is required on the bill of material. For example: If the **BOM** included a label, you may want this created last, or near last, since the longer the label is around, the higher the chance that it can get damaged. For a part with a lead time of 5, you can place the lead time offset for the label at 4.5, thus making it one of the last items on the bill.

## Adding parts

**Part Master [S1009]**

Part Number:	PL1000	Revision:	None	Status:	A	Active									
Part Description:	400mm x 600mm x 3.175mm Wooden Plate			UM:	SCM	SQUARE CM									
			Archive:												
<input checked="" type="radio"/> Engineering <input type="radio"/> Sales <input type="radio"/> Manufacturing <input type="radio"/> Inventory <input type="radio"/> Planning <input type="radio"/> Quality <input type="radio"/> Shipping <input type="radio"/> Shortcut <input type="radio"/> Costing <input type="radio"/> Part View															
Purch/Mfg Code:	P	Purchased	Date Added:	06/13/2017											
Color Code:			Date Changed:	11/14/2018											
Commodity Code:	RM-WP	RAW MATERIAL WOODEN PLA	Changed By:	purchasing											
THICKNESS	3.18	CAD Transfer Template:	No												
WIDTH	400.00	Suggested Vendor:													
LENGTH	600.00	Sugg.Vendor URL:													
	0.00	Ordering Notes:													
Weight (Lbs):	0.0002	Alias:													
Volume:	0.00	Working Folder:	<input type="button" value="Create Working Folder"/> <input type="button" value="Set Routing Flag"/> <input type="button" value="Run Gen. Updates"/>												
Surface Area (Sq. Inches):	0.00														
Gross Mfg. Weight:	0.0000														
CUM Current Time:															
Current Drawing:		<input type="button" value="Email Drawing to User"/>													
3D File:	PL1000.PDF					<input type="button" value="Edit"/>									
DXF File:						<input type="button" value="Edit"/>									
Model Path:	Z:\UserFolders\Andy\Onramp Customer Model					<input type="button" value="Upload Model"/>									
<input type="button" value="Browse"/> <input type="button" value="Edit"/> <input type="button" value="Add"/> <input type="button" value="Copy"/> <input type="button" value="Delete"/> <input type="button" value="OK"/> <input type="button" value="Cancel"/> <input type="button" value="Print"/> <input type="button" value="Exit"/>															
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Filename	<input type="text"/>	<input type="button" value="Q"/>													
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Part Master screen

### To add a part record to the parts inventory:

1. Navigate to the **Part Master [S1009]** screen.
2. On the screen task bar, click **Add**.
3. Enter the desired information.
4. If required, select the different tabs to enter more information related to the part.
5. Click **OK**.

### Result

You have created a part record.

### Notes

- Parts that will no longer be used can be archived by changing *Archive* to **D** and the *Status* to **Inactive**.



# Adding a routing operation

**Routing Detail [S1014]**

Part:		Part Lead Time:	
Revision:		Std Run Qty:	
Customer:		12 Month Req:	
		Calculated Lead Time:	
		Total LOH Cost:	
		Working Folder:	

OPERATIONS (Filtered)									
Operation	Work Center	WC Description	Type	Setup Time	Run Time	Current Time	Current Cost	Std Time	Std Cost

Gateway Lead Time:	S/C Part Number:	Cycles per Hr:	Total Pcs per Hr:
Queue Lead Time:	Revision:	Pcs per Cycle:	Calc. Min:
Process Lead Time:	Total Sub Cost:	Schedule Run Time:	Calc. Second:
Total Lead Time:	Subcontract PO:	Schedule Setup Time:	Additional OH Cost:
Adjusted Lead Time:	Subcontract PO Line:	Additional OH Cost Reason:	Fixtures:
Lead Time Offset:	WO Reporting Lines:	Machine ID:	Tools:
Cycle Time:	WO Operation Instructions:	Program ID:	
<span style="background-color: orange; color: white; padding: 2px;">Calc Times</span>	WO Operations Reporting:	Device Link ID:	
Capability Required:	WO Quality Steps Reporting:	Work Instruction:	
Lock to WC:	Obtain Serial:	Work Instruction PDF:	
Vision RS232 Out:	No		

## *Routing Detail screen*

## To add a routing operation:

1. Navigate to the **Routing Detail** [S1014] screen.
2. On the **Part** menu, select the desired part.
3. On the screen task bar, click **Add**.
4. Enter the desired information.
5. If required, select the different detail instructions tabs to enter more information.
6. Click **OK**.

## Result

You have created a routing detail record.

## Notes

- The value in the **Operation** field is the sequential routing step number. We recommend entering them in base 10 (10, 20, 30, etc.) to allow room for error. For example, if you add 3 instructions, but the third one added should be the second, if you use a base 10 numbering system, you can add the last instruction with a number of 15, so it is correctly displayed between 10 and 20.
- Operations are carried out in ascending order based on the number listed in the **Operation** field.

## Manage work centers

Use the **Work Center Master** [S1019] screen to add, edit, copy, or delete work centers and associated details.

### To add a work center:

1. Navigate to the **Work Center Master** [S1019] screen.
2. On the screen task bar, click **Add**.
3. Enter the desired information.
4. If required, select the different tabs to enter more information related to the work center.
5. Click **OK**.

## Result

You have created a work center.

## Adding parts to a bill of material

**Bill of Material Master [S1000]**

Bill of Material Master																																																		
Parent Part:	A10001 ▾ 3mm Isometric Triangle With 30mm Spacers																																																	
Revision:	A																																																	
<table border="1"> <thead> <tr> <th>Component Part Number ▾</th> <th>Component Part Desc:</th> <th>Qty Per</th> <th>UM</th> <th>PM</th> <th>BF at Operation</th> <th>Q</th> </tr> </thead> <tbody> <tr> <td>H2000</td> <td>1/4" x 2" Carriage Bolt</td> <td>3.0000</td> <td>EA</td> <td>P</td> <td>0</td> <td>▴ ▾</td> </tr> <tr> <td>H3000</td> <td>1/4" Hex Nut</td> <td>3.0000</td> <td>EA</td> <td>P</td> <td>0</td> <td>▴ ▾</td> </tr> <tr> <td>H4000</td> <td>8mm x 2mm Flat Washer</td> <td>3.0000</td> <td>EA</td> <td>P</td> <td>0</td> <td>▴ ▾</td> </tr> <tr> <td>PC1001</td> <td>3.175mm Isometric Triangle With Circular Holes</td> <td>1.0000</td> <td>EA</td> <td>M</td> <td>0</td> <td>▴ ▾</td> </tr> <tr> <td>PC1002</td> <td>3.175mm Isometric Triangle With Square Holes</td> <td>1.0000</td> <td>EA</td> <td>M</td> <td>0</td> <td>▴ ▾</td> </tr> <tr> <td>SP1000</td> <td>8mm x 30.8mm Spacer</td> <td>3.0000</td> <td>EA</td> <td>M</td> <td>0</td> <td>▴ ▾</td> </tr> </tbody> </table>		Component Part Number ▾	Component Part Desc:	Qty Per	UM	PM	BF at Operation	Q	H2000	1/4" x 2" Carriage Bolt	3.0000	EA	P	0	▴ ▾	H3000	1/4" Hex Nut	3.0000	EA	P	0	▴ ▾	H4000	8mm x 2mm Flat Washer	3.0000	EA	P	0	▴ ▾	PC1001	3.175mm Isometric Triangle With Circular Holes	1.0000	EA	M	0	▴ ▾	PC1002	3.175mm Isometric Triangle With Square Holes	1.0000	EA	M	0	▴ ▾	SP1000	8mm x 30.8mm Spacer	3.0000	EA	M	0	▴ ▾
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PC1002	3.175mm Isometric Triangle With Square Holes	1.0000	EA	M	0	▴ ▾																																												
SP1000	8mm x 30.8mm Spacer	3.0000	EA	M	0	▴ ▾																																												

Component Revision:	None	Cut In Date:	01/01/1999 <input type="button" value="Calendar"/>
Lead Time Offset:	0	Cut Out Date:	12/31/2100 <input type="button" value="Calendar"/>
Phantom Override:	No	Lot Tracking Required:	No
BF Location Override:	<input type="button" value="▼"/>	Assy. Code:	<input type="button" value="▼"/>
Free Issue Override:	<input type="button" value="▼"/>	Assy. Sequence:	

<input type="button" value="Browse"/>	<input type="button" value="Edit"/>	<input type="button" value="Add"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	<input type="button" value="OK"/>	<input type="button" value="Cancel"/>	<input type="button" value="Print"/>	<input type="button" value="Exit"/>
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Bill of Material Master screen

### To add a part to a bill of material:

1. Navigate to the **Bill of Material Master [S1000]** screen.
2. Select the desired **Parent Part**.
3. On the screen task bar, click **Add**.
4. Enter the desired information.
5. Click **OK**.

### Result

You have added a part to the bill of material.

# Work Orders in OnRamp

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## Learning Objectives

This chapter will cover:

- Releasing work orders
- Work order form

## Overview

A Work Order is a task or a job for a customer that can be assigned to a person or work center. Work orders describe what parts and what work is required to manufacture, build or engineer the customer-requested product. In OnRamp, the work order is released to production and received and processed by the production staff.

## Release Work Order

There are two ways to release the work orders in OnRamp:

- [Release Manual Work Orders \[S1264\]](#) - used by the scheduling department to release **specific** work orders to production.
- [Release Work Order by Planner \[S1282\]](#) - used by the scheduling department to release **multiple** work orders to production.

The release work order screens can be accessed:

- By navigating to it in the **Menu** under **Production > Work Orders / Nesting / Work Orders**,
- Or by searching for **Work Order** or the screen number, **[S1264]** or **[S1282]**

Release work orders can be viewed on the **Work Order Inquiry [S1100]** screen.

## The OnRamp Work Order Form

Your OnRamp ERP comes with a built-in work order form. Every work order created automatically populates with this information if it is in the system. The work order displays all the information that production staff need to manufacture a part, such as:



Figure 2.1: Example Work Order Form

- What part is being made?
- When is it due?
- How many are needed?
- Where is the order going?
- What component parts or materials are needed and how many?
- How and where to make it in the shop?
- What quality control checks are there?
- What else do you need to know?

## Work Order Schedule and Boxes

### Learning Objectives

This chapter will cover:

- Understanding the difference between work order scheduling and work order gateway boxes
- Adding and editing parts, bill of materials (or BOM), work centers, and routing details
- Releasing work orders
- Viewing released work orders

### Overview

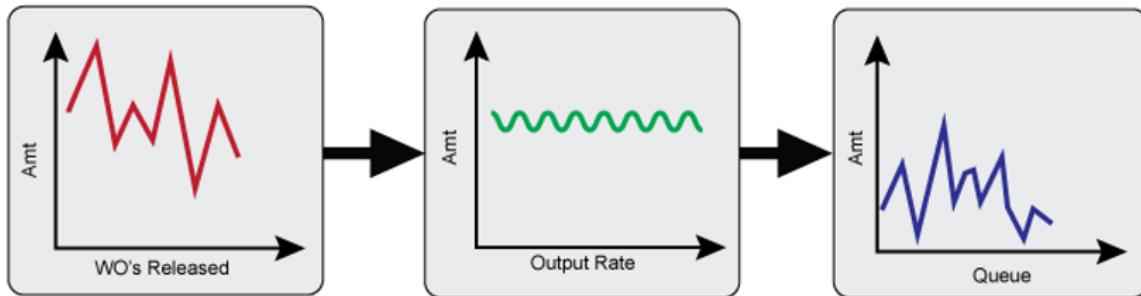
Whether it's your customers happy with an on-time delivery, or your shop floor workers happy in knowing what work they need to get done today and tomorrow, everyone is happier when they know what to expect. OnRamp wants to help your team set up a more efficient scheduling and lead time calculation system that allows you to know what's coming up, what's past due, and where the issue with the flow is.

MRP can leave you with a stack of 20 work orders for a work center on one day and none the next. Properly set lead times allow you to understand that of those 20 orders, you can complete 12 today with the rest done tomorrow, making your output smooth. But you still need to be able to track what has done and what needs doing. There are two ways to do this. Schedule the work order output to the work centers or add work order boxes at the work center.

### Work Order Scheduling

Once the MRP is done, preview all the work orders on the [Release Work Order by Planner](#) screen. Here, you can select to only release a certain amount of work orders, thus taking charge of the work order flow.

Because of the infinite capacity nature of MRP, this can lead to a lumpy work order release cycle, whereas your work order processing capabilities are usually much smoother. If you were to graph the work order release, it would look like this:



*Graph showing the difference between the amount of work orders released, the part output of the work center, and the work order queue of the next work center queue*

## Work Order Boxes

Another option is to implement work order boxes. This is a hands-on visual management system that is implemented at each work center and provides information about the work order status.

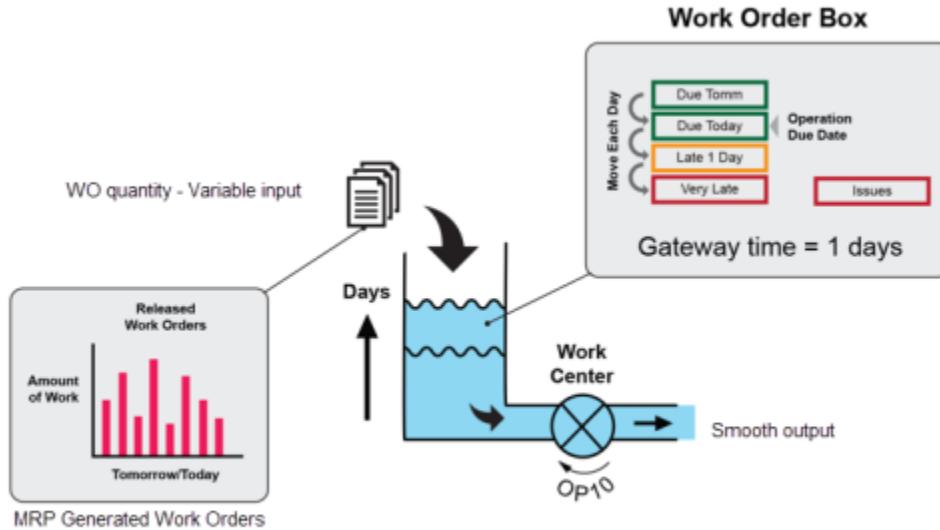
Work order boxes help you and your operators:

- **Organize the workload** - Keep track of what orders are where, when they are due, and where they go next.
- **Group orders** - Run more than one order at a time in a way that saves time and material.
- **View order priority** - You can implement a First In - First Out system easily or run orders that are due first.
- **View capacity issues** - Does the work center has too many orders or not enough?
- **View operational issues** - Are there any work orders that have an issue reported? Is there a material shortage or a tooling issue?



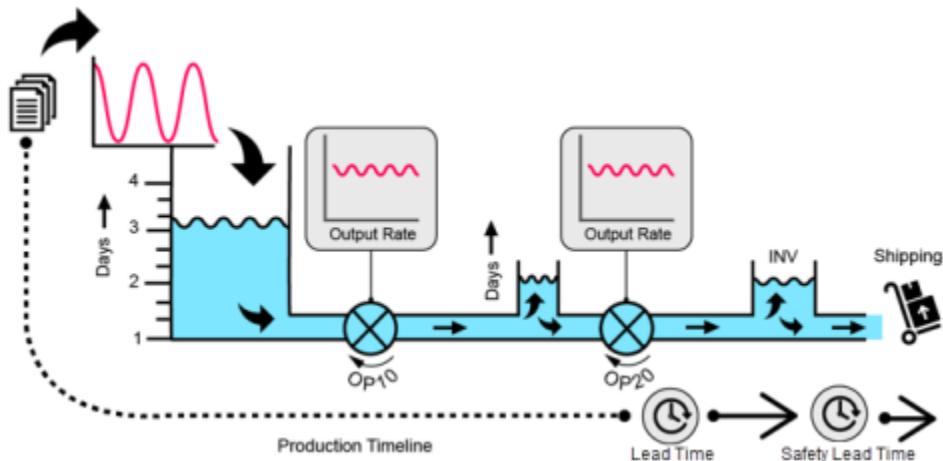
Example of a work order box

Work order boxes work like a dam on a river, or a rotary pump on a tank. It helps to ensure that the flow out from the source is smooth, no matter how variable the input may be:



*Visual example of work order variable input with the smooth output*

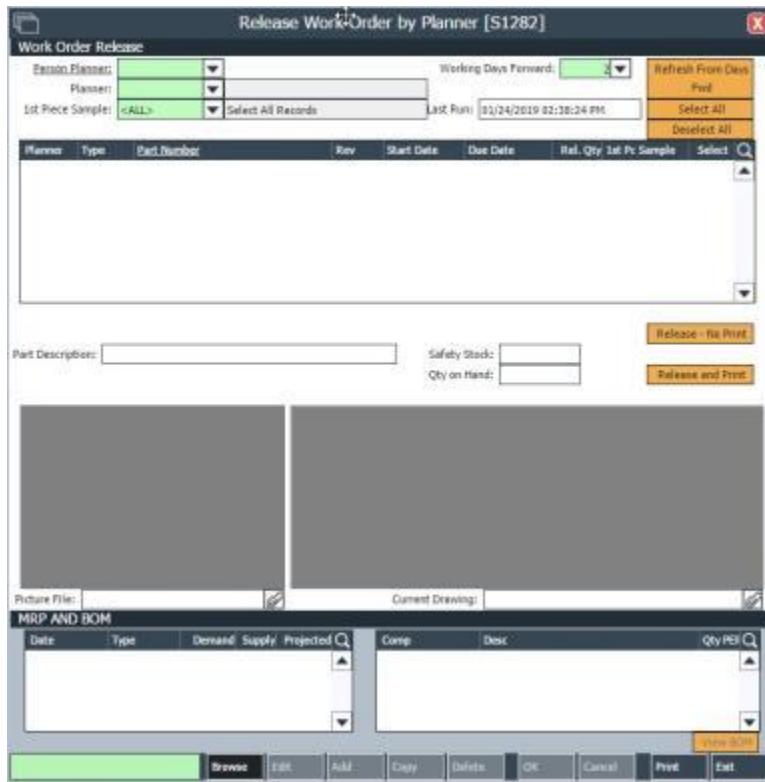
Applying work center boxes to all your work centers will help you generate a steady output that will be easier to schedule:



*Visual example of work order variable input with smooth output to multiple sequential work centers*

In the example above, you can see that the first work center receives the variable input and generates a smooth output for the next work center. Because the received input is smoother than the first work center, it has a smaller queue. The size of the queue impacts the work order lead time, which influences the work order start date. For more information, see "Lead Time" on page 4.

## Releasing work orders



Release Work Order by Planner screen

### To release work orders:

1. Navigate to the **Release Work Order by Planner [S1282]** screen.
  2. On the **Person Planner** and **Planner** menus, select the desired planner.
  3. Set the **Working Days Forward** and click **Refresh From Days Fwd**.
  4. In the **Select** column, toggle the field to **Yes** to mark the work orders for release.
- Tip:** To release all listed parts, click **Select All**.
5. If required, click **Edit** to modify the **Due Date** and **Release Quantity**.
  6. Click:
    - **Release and Print** to release and print the selected work orders.
    - **Release - No Print** to release the work order without printing the work order form.

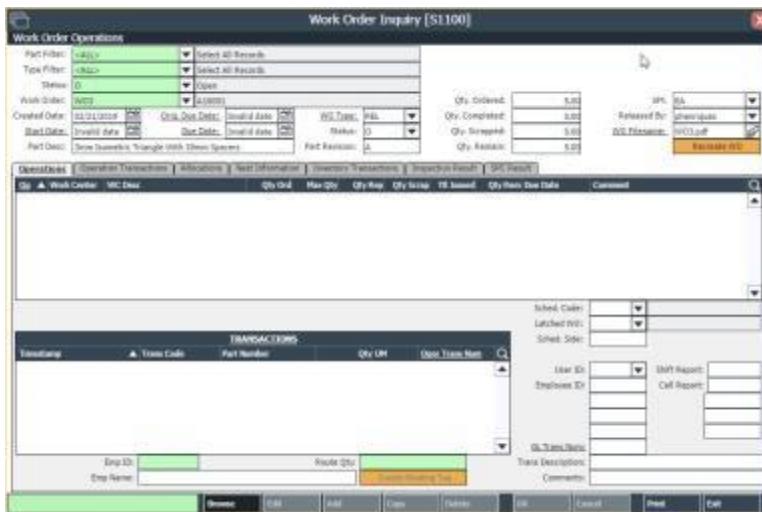
### Result

You have released the selected part work orders to production.

## Notes

- The **Refresh From Days Fwd** button refreshes the grid to reflect the number of days forward you have selected. This also reviews all MRP suggestions from all sources, like Kanban release or Finite Scheduling.
- The **MRP Last Run** field displays a time stamp of the last run MRP. OnRamp Solutions suggests running the MRP before releasing work orders.
- After selecting the planner information, the grid displays all the work orders that have yet to be released.
- The Suggested Schedule frame displays a suggested schedule for the selected work order.
- The second grid in this frame displays the MRP detail for the selected work order including: date, demand quantity, supply quantity, and projected quantity.
- Once the work order is released, it will no longer display on this screen.
- If you attempt to release a work order and it is not released, navigate to **Work Order Release Errors [S2073]** for information on why the work order could not be released.

## Viewing released work orders



Work Order Inquiry screen

### To view released work orders:

1. Navigate to the **Work Order Inquiry [S1100]** screen.
2. Select the desired filters.
3. Select the **Work Order**.

## Result

You are viewing the released work order.

## Glossary

### B

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#### **BOM**

A bill of material, or BOM, is a list of parts required to build another part.

### E

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#### **ERP**

ERP or Enterprise Resource Planner is a software suite used to help you better manage your enterprise resources.

### L

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#### **Lead Time**

A lead time is the latency between the initiation and execution of a process. For example, the lead time between the placement of an order and delivery of a new car from a manufacturer may be anywhere from 2 weeks to 6 months.

### M

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#### **MRP**

Material requirements planning (MRP) is a production planning, scheduling, and inventory control system used to manage manufacturing processes.