BellHawk®
Real-Time Operations Tracking and Management Software
www.BellHawk.com

Advanced Production Tracking User Manual
for BellHawk Real-Time Operations Tracking Software

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Introduction

This manual covers the advanced production tracking features available in the BellHawk Real-Time Operations Tracking Software (RT-OPS). RT-OPS is designed to track the flow of materials through a sequence of operations as they are transformed from raw materials into finished products or are repaired or tested.

RT-OPS incorporates all the features of the BellHawk Simple Production Tracking Software (SPTS) plus the features of the BellHawk License-Plate Materials Tracking Software (LP-MTS), which are subsets of RT-OPS.

This manual assumes that the user has read the BellHawk Work Order and Labor Tracking and the BellHawk Materials Tracking System User Manuals.

The features added by RT-OPS to those described in these manuals include:

- Creating work orders from stored routes and BOMs to make products

- Tracking the transformation of materials in a sequence of operations

- Tracking work orders status and work-in-process materials in real-time

- Preventing using the wrong materials for making a product

- Tracking the labor and materials consumed at each work order step

- Computing the cost of each work order based on labor and materials consumed

Work Orders
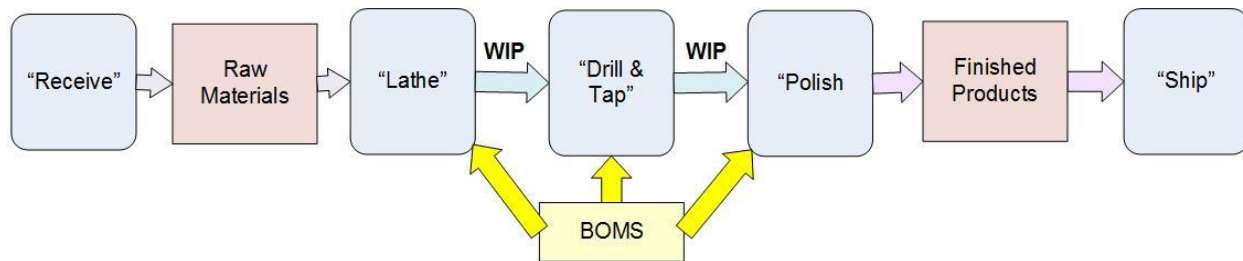
RT-OPS tracks the receipt and put-away of raw materials. It then tracks the transformation of the raw materials into a finished products through a series of operations and finally tracks the shipping of the finished products to a customer.

As part of this tracking RT-OPS tracks Work-in-Process (WIP) materials as they flow from operation to operation. RT-OPS also uses Bills of Materials (BOMs) to warn operators when they are using the wrong materials for an operation and also to compare expected with actual costs.

Work Orders are normally organized into a route of operations to be carried out in a specified sequence but operations can also be performed that are not on the route for a Work Order. In their simplest form, Work Orders do not need to have a prescribed route and users can simply record transactions against operations chosen dynamically.

There are two types of work orders:

1. Batch work orders, which simply track the progress of the work order through a series of operations and record the labor expended on each operation plus a piecework quantity that is a measure of employee productivity. These are described in the Simple Production Tracking System (SPTS) User Manual.

2. Process Work Orders, which are the main focus of RT-OPS. Here the work orders are based on an Item Master part number, which in its simplest form is the part to be manufactured, assembled, repaired, or tested. In a more complex form the Item Master part number can be the reference for multiple parts (such as a left and right pair of eyeglass lenses) being produced by a single work order.

The structure of a Process Work Order record is shown here, with multiple Route Step Operations, each with Part-in, Part-Out, Labor and Equipment (if ETO is licensed) resource records.

Work orders can be created, using template routes, as described in the Simple Production Tracking (SPTS) User Manual. Alternately, with RT-OPS, they can be created based on stored Item Master records for the part being made or
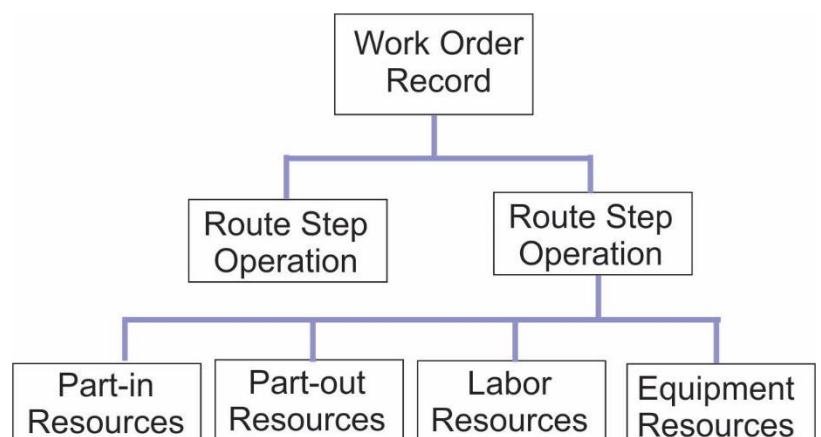
they can be imported from another system, using one of the many interface mechanisms available with BellHawk.
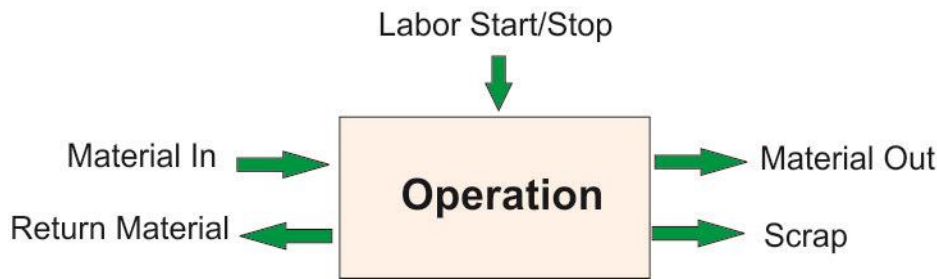
With SPTS, the only data that can be captured for a work order route step or operation is when work started and finished on an operation and the amount of labor required plus, optionally, a piece work quantity.

With RT-OPS, we expand on the transactions to be able to capture the materials input to each operation and the materials output, as shown below.

RT-OPS recognizes two types of Operation:

1. A Processing Operation in which all the materials recorded as material-in are consumed by the operation and are no longer tracked in inventory. Material-out is then regarded as new materials that are created by the operation and entered into inventory, either as finished product or as Work-in-Process (WIP) materials.

2. A Test, Assembly, and Repair (TAR) operation in which the product being tested, assembled or repaired is not consumed but is moved to the location of the work-center where the operation is located, when recorded as material-in. When this material is recorded out then it is moved to the specified destination in the transaction.

With TAR operations the part being tested, assembled, or repaired is that part with the same part number as the Item Master record for the work order. TAR operations can only be performed on Individually Barcoded items. All other materials recorded into a TAR operation are consumed and any other materials recorded out are considered to be created by the operation.

Processing operations have transactions for returned material. This occur, for instance, when a roll of material is mounted on a machine or a container of chemicals is poured into a machine. Then, when the work order operation is complete the remaining material are returned to stock. In this case the quantity of returned material is often measured by a secondary unit of measure, such as weight, to determine how much materials were returned.

An operation may be referred to as a work order route step when it is part of a route. It may also be designated as a rework operation for rework tracking purposes. Operations take place in Work Centers. In this way the same operation, such as "Test" may be recorded as taking place in different named work centers.

Each operation within a plant database, however, must have a unique operations code but may reuse the same description, which is what appears on reports and screens, prefixed by the work center.

Material Out from an operation will have a designated part number. This may be a finished product or intermediate materials that will be used to make finished products in other work orders. Material Out may also be designated as Work-in-Process (WIP) between operations. In this case, the finished product part number is used but the parts are marked with a WIP flag to designate that they are not yet a finished product. This avoids the problem of creating many part numbers for the WIP materials.

Material out may also be designated as either inventoried or non-inventoried scrap. This gives the ability to record the quantity of scrap materials, such as plastic or steel, which can be recycled.

In many cases the scrap has value as a recyclable material, such as scrap metal, plastic or paper. Sometimes it is beneficial to record the quantity of this scrap and to give it a special part number so it can be tracked in inventory.

If it is not recycled, normal wastage in an operation is not typically recorded as scrap material out from an operation but is simply included in the quantity of input materials required to make a specified quantity of products.
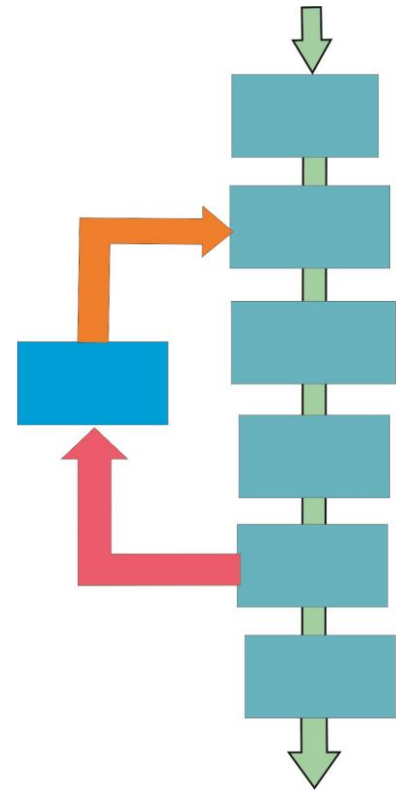
Tracking Work-in-Process Materials

A processing work order consists of a route of operation steps. Raw material is scanned into the first and maybe subsequent operation steps. WIP is scanned as material-out from the first step and into the second, and so forth, until we have a finished product, which is scanned out of the last step. Somewhere along the way we may have scrap and need to record the labor and possibly machine time in processing the materials.

At its simplest, we can create a new part number, for each WIP material. This material is produced as WIP by one step and consumed as WIP in the next. For some products, this works very well, as the intermediate product may be very different from the finished product.

For example we may mix up a vat of energy drink and give it one part number and then give a different part number to the finished bottles of energy drink. In fact, these two operations are often split into completely separate work orders, with one work order producing an intermediate material, which appears in regular inventory, and another work order that consumes all or part of the intermediate material.

But if the organization has a large number of products and many steps in the build process then this can quickly leads to an unmanageable proliferation of part numbers, with the need to create a new part number for each intermediate material in a multi-step process.

Typically, in this case, the first step creates a product that looks similar to the finished product and then subsequent steps are testing or modifying the product. In BellHawk, the finished goods part number can be used for the WIP part number but the intermediate materials are tagged as WIP when they are recorded out from a work order step. A record of the work order and operation they came from is also tracked. In BellHawk these materials are excluded from the inventory of finished products but are visible as WIP inventory.

This avoids the problem of creating many part numbers for WIP, as only an item master part number for each finished product need be assigned.

Normally WIP is recorded out of one operation into a reusable barcoded tote and becomes part of WIP inventory. It is then is consumed as material-in to the next step from the tote. In this way production supervisors can see the flow of WIP material in real-time between work order steps and make sure that all the WIP for a work order has been processed. This method does not require the whole batch to be processed lock-step between work order steps, as the incremental flow of material can be recorded and monitored.

There are two special cases:

1. Assembled products, where a serial number and tracking barcode is assigned at the beginning of the process and items or parts are steadily added to the finished assembly in a sequence of operations.

2. Testing and repairing of products that have serial numbers and tracking barcodes.

In both these cases, the WIP is not consumed on input to a TAR work order step nor is a new WIP product entered into inventory as it is recorded out from a TAR work order step.

BellHawk recognizes these two special cases by capturing the tracking barcode at the beginning of the process and then simply tracking the movement of the item being assembled or tested into and out of each operation. Along the way raw materials may be consumed in the work order step and components may be recorded as scrapped and replaced.

Intermediate forms of an assembled, repaired, or tested product are still tagged as WIP inventory, so they don't get confused with finished goods inventory. The big difference from regular WIP is that the tracking barcode on the WIP container stays the same from start to finish rather than the WIP being in a different barcoded tote at each stage of production.

With a system like BellHawk tracking WIP can be very straight forward provided that the method and item or part numbering scheme is appropriate to the processing, assembly, test, or repair process being used. Also, by keeping WIP inventory separate from regular inventory, a proliferation of part numbers can be avoided.

Routes Step Resources

Work Order routes consist of a sequence of operations, with each operation have part-in, part-out, labor, and equipment (with ETO option) resources specified. These resources specify the expected quantities of materials, in and out, as well as the expected labor times (by labor class) and machine time (by machine class).

Routes of operations for work orders can be setup on Item Master Parts or directly for the Work Orders themselves (often by importing from another system).

When a Work Order is issued within BellHawk to make an Item Master Part, based on the Item Master route, then the Item Master Route and its resources are copied to the Work Order, with an appropriate adjustment of resource quantities based on the ratio of the quantity to be made on the Work Order to the standard route quantity specified for the Item Master route.

Resources for each Route Step Operation can be of four types:

- Part-in – a part to be consumed in the operation unless this is a TAR operation when the part-in is simply moved to the location of the operation (as the test, assembly or repair item does not disappear from inventory when it is being worked on). The part-in can also be a WIP (work-in-process) part output from a prior step on the route (or from any other operation). These parts can be recorded into the operation or automatically recorded as being withdrawn from a floor stock location or a KanBan bin every time a part-out is recorded. The part-in quantities are scaled based on the quantity of product to be made versus the standard route quantity, when a work order is created for the item.

- Part-out – a part to be produced by the operation. This is typically the same as the Item Master part number to which the route belongs, possibly with a WIP flag if the part is between intermediate operations, but does not have to be. There can also be multiple part-out records for an operation. These can be for a main product and a byproduct or for a set of parts produced in a single operation such as molding. Where there are multiple part-out records, the first/top record is assumed to be primary and is used to control the quantity of parts automatically withdrawn in an auto-reduce action. The part-out

quantities are scaled based on the quantity of product to be made versus the standard route quantity, when a work order is created for the item.

- Labor – enables setting the expected labor to be used for the operation. This is typically used to compare the actual with the expected labor hours and cost for each operation. The labor hours are scaled according to the ratio of product to be produced versus the standard route quantity. Note that if the labor hours are associated with running a piece of equipment (using the Equipment Tracking Option) then this scaling is only done for the Run phase and not the Setup or Cleanup/Teardown phase.

- Equipment – enables setting the expected equipment time to be used for the setup, run, and cleanup/teardown phases of the operation. This is typically used to compare the actual with the expected equipment hours and cost for each operation. The equipment are scaled according to the ratio of product to be produced versus the standard route quantity for the Run phase only. Please note that tracking equipment times requires the BellHawk Equipment Tracking Option.

If there are no part-out records for a work-order step then the part-out is assumed to be the Item Master part for the route, with a WIP flag if this is not the last step on the route.

Please note that the item master route part number and the part being made on the route of the work order do not have to correspond to the part-out resources for the final operation on the route. We can have an item master part number with a route to make a pair of left and right lenses. The final step of the route may have part-out resources with separate part numbers for the left and right lenses, for example.

Normally the item master part number, the part being made in the work order, and the part-out from the final step are the same. But they do not have to be. Also, normally the work-in-process (WIP) materials that flow between route steps have the same part number as the finished product with the WIP flag set. But again they do not have to.

It is generally beneficial to setup part-in and part-out resources for each route step so as to simplify the selection of the items being consumed and produced. This enables selection of these parts from drop-down lists rather than selecting the part numbers from generalized lists of all components.

Please note that work orders and their routes can be directly imported from another system without setting up routes for the item master parts being made.

While not essential, it is beneficial to setup Part-in and Part-out resources for each Item Master and Work Order Route Step, as this makes the capture of data, when recording materials into and out of a work order step much easier by restricting the choice of materials to just those specified as route step resources, as opposed to having to select these from a general list of all materials.

It also enables BellHawk to check that the selected part being scanned in corresponds to one of the specified part-in records for the work order.

System Admin Setup

Before using the Production features of the RT-OPS system, it is important to select the features that it is planned to use on the System Administrators System Parameters screen. Overall information about how to use the System Administrator's screens is provided in the Systems Administrators User Manual.

On the Production tab (1) of the systems administration screen, the Administrator can select the types of work order (2), as described previously, users of the system will be capable of accessing.

The availability of run-group processing is grayed out (3) unless you have licensed the Equipment Tracking Option (ETO), which is not included in a base RT-OPS edition. Run groups allow the allocation of labor, materials and equipment time across multiple work orders running through the same operation at the same time on a common piece of equipment or production line.

BellHawk can permit the labor of whole teams (4) to be recorded in and out as labor on a work order, instead of having to record each member of the team in and out individually.

Piecework data capture (5) can be allowed or turned off when performing a Stop Work or End Work operation. Note that this is a piecework quantity, to measure productivity, and does not relate to materials recorded end from a work order step. This is normally only used with SPTS but is allowed with RT-OPS.

Normally, in RT-OPS, this is supplanted by the recording of material-out, which can be done incrementally, multiple times during an operation. If the material is normally recorded out at the end of the operation, then transactional data entry can be simplified by specifying (6) that this material-out quantity will be captured as part of a Stop-Work or End-Work transaction. In RT-OPS this is what is normally done in place of recording a piecework quantity.

Please note that the combined stop-work/material-out function only works for simple situations where there are no part-out records and the part-out is assumed to be the Item Master part for the route.

On this screen the number of days a work order stays in the list of active work orders (7) can be selected. Experience indicates that it can be very disconcerting if a work order that a supervisor has been tracking suddenly disappears from the list of active work orders, because it just was marked as completed. Instead we keep the work order on the active list, with a status of "Completed" for the number of days indicated here.

The system can be setup to automatically generate work order numbers, if this option (8) is selected. In this case a prefix (9) should be specified for the work order (such as WO) and then the previous/starting number (10). The WO number is generated by automatically indexing the displayed number and pre-pending the specified pre-fix. Once work orders are being generated this number should not be adjusted as the work order numbers must be unique. This does not get indexed if work orders are imported from another system.

The administrator can also select what actions (11) to take when a user does something that could be an error but may not be. The choices are to allow the transaction without warning, warn the user but allow an override by the user, or to prevent the transaction from proceeding.

When the user records material into a work order, the standard default is to suggest recording-in the smaller of the container contents or the material needed for the work order (12). But some organizations mostly consume whole containers of material on the work order and then return whatever materials are left over by default.

Please remember to select the [Apply] button (13) after the parameters are setup on this tab as the [Apply] button applies only to the currently selected tab and the settings will be lost if you go to another tab without selecting [Apply] first.

If you want to track WIP materials then the System Administrator needs to check the Enable WIP tracking checkbox on the Materials tab

Setting up Work Centers and Operations

The first step in setting up Operations is to setup the Work Centers in which the Operations occur. This is done using an Excel import, into the Excel Setup Data Screen, as was described in the SPTS manual.

For this import:

1. The High Level Data Element (HLDO) keyword (1) is WORKCENTER

2. Each Work Center Code (2) must be unique

3. As must the Work Center Name, which will appear on reports.

4. When selected from a drop-down list, the sequence number (4) will set the order in the list.

Operations within each work center can then be setup using the Operations button from the Setup switchboard, which brings up the following screen, listing all the operations:

From this screen users can Edit an existing entry (1) or Add a new entry (2).

The Add New button brings up the Add Operation screen. On this screen:

1. Enter the Operation Code (1) which must be unique across all work orders.

2. Enter the Operation Description (2) which should be unique within the Work Center, as it is used to identify the operation on screens and reports.

3. Select the Work Center (4) from a drop-down list of previously entered work center codes.

4. Select (5) if this is a TAR operation and whether this is a rework operation.

5. Select Add Operation (6) to add the operation to the list of operations.

When an Edit button is used from the list of operations, the following screen appears:

From here, the previous entries (1) can be edited and then saved using the [Update Operation] button (2) or the Operation Can be deleted (3).

Finally, the Return button can be used to return to the list of Operations.

EDIT OPERATION

Type Code:	Rework
Operation Description:	Rework
Work Center:	Production
Location Code:	Production
	Production (1)
Test/Assembly/Repair:	☐
Is Rework:	☑

(2) Update Operation   Return

(3) Delete Operation

Alternately the Operations can be setup as an Excel spreadsheet import as shown below:

	A	B	C	D	E	F	G	H
1	OPERATIONS	OperationCode	Description	WcCode	LocationCode	IsTAR	IsQC	IsRework
2		DrillTap	Drill and Tap	Production	Production	N	N	N
3		Lathe	Lathe	Production	Production	N	N	N
4		Polish	Polish and Inspect	Production	Production	N	N	N
5		Rework	Rework	Production	Production	N	N	Y
6		Ship	Ship	Shipping	Shipping	N	N	N
7								
8								

The HLDO keyword is "OPERATIONS" and the other columns mirror the data entry screen on the Operations detail screen. Note that the entries in the IsTAR, IsQC, and IsRework columns should be a Y for Yes or N for No. The IsQC flag is ignored unless the QC option has been licensed, as is described in the Quality Control User Manual.

Please note that operations must have a location specified. This is so as to provide a location to which input parts will be moved after a material-in transaction.

Setting up Labor Classes

BellHawk has the capability for comparing the projected labor cost for a work order versus that actually achieved. To do this, we setup the expected labor in terms of a labor class rather than the specific person who is expected to do the activity.

|	A	B	C	D	E
1	LABORCLASS	ClassCode	ClassName	LaborRate	SeqNo
2		Machinist	Machinist	18.50	1
3		Inspector	Inspector	22.00	2
4	(1)	(2)	(3)	(4)	(5)
5					

This is done by the System Administrator using his DEXEL screen to import a LABORCLASS HLDO (1) in the form of an Excel spreadsheet as shown above.

On this sheet, you need to specify a unique labor Class Code (2) and Class Name (3) which will be used to identify a class of operators. For each class, we will then specify a loaded labor rate, which is typically the average for the labor class. The last column (5) sets the sequence in which the entries appear in a drop-down list. The SeqNo must be unique.

Note that Labor Rates for class of operator and individual operators is set on the System Administrator's screen and not the more generally available Setup screen.

Creating an Item Master Part for a Work Order

This is best done by entering the data interactively through the Item Master setup screens provided by BellHawk. This starts by selecting the Add/Edit Item Masters button on the Setup Switchboard in BellHawk, as shown at right.
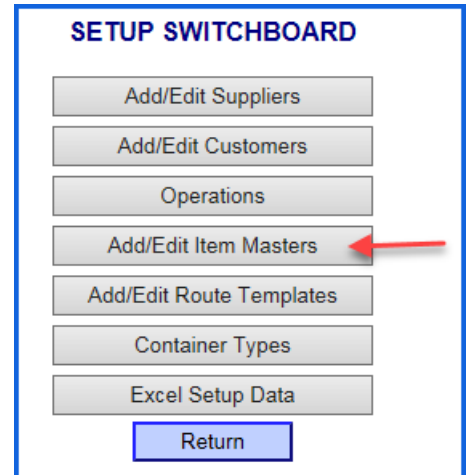
This brings up the list of Item Master records, as shown below, from which existing records can be Edited (1) or new records Added (2), as is described in the Simple Materials Tracking (SMTS) User Manual.

SETUP SWITCHBOARD

- Add/Edit Suppliers
- Add/Edit Customers
- Operations
- Add/Edit Item Masters ←
- Add/Edit Route Templates
- Container Types
- Excel Setup Data
- Return

List of Item Master Part Records

Item Number	Item Description	Item Category	Material Type	
KB150	Stainless Steel Knob	Finished Goods	Draw Pulls	Edit ①
SBS100	One inch diameter stainless bar stock	Raw Materials	Stainless Steel	Edit
SSScrap	Stainless Steel Scrap	Scrap	Stainless Steel	Edit
②		--Show All-- ✔	--Show All-- ✔	

Filter   Add New   Return

The entry and editing of Item Master records for products to be manufactured (and therefore have routes and resources) is the same as for Purchased items, as described in the SMTS User Manual except as follows:

1. The Item Number and Description (1) are for an intermediate or finished product.

2. The Item Category, Material Type, Measure Type, and Unit of Measure (2) are for the finished product

3. The Item Type should be selected as "Made Here" (3) instead of purchased.

4. The Standard Unit Cost and Price are those that will be used by default. These are discussed in a later section on costing.

5. The minimum inventory quantity (5) is used by the Demand Driven Resource Planning option to determine whether to make some more of this product.

6. The Route Quantity (6) is requested in the primary unit of measure for the product being made. All resource quantities are specified in terms of this route quantity.

7. The minimum build quantity (7) and incremental build quantity(8) are used to adjust production quantities when work orders are created based on Item Master records to ensure that the quantity being made is compatible with the manufacturing process.

As with SMTS, the [Add] button (9) then creates a new Item Master record.

ADD NEW ITEM MASTER

Field	Value
Item Number:	MB100
UPC/GTIN:	
Item Description:	Metal Blank
Is Inventoried:	✔
Is Individually Barcoded:	☐
Is Serialized:	☐
Item Category:	Finished Goods
Material Type:	Stainless Steel
Measure Type:	Count
Unit of Measure:	Each
Secondary Measure Type:	
Secondary Unit of Measure:	
Item Type:	Made Here
Standard Unit Cost:	0.5
Standard Unit Price:	1.75
Min Inventory Qty:	1
Route Qty (ea):	1
Minimum Build Qty (ea):	1
Build Qty Increment (ea):	1
Lot Control:	Ignored
Est. Prod. Life (days):	0
Default Location Code:	
Replenishment Time:	0
Comments:	

[Add] [Copy] [Return]

Delete Item Master

Creating a Work Order

Once the product part number has been created in BellHawk then work orders to make this product part can be created by selecting the Work Orders button from the Production Switchboard.
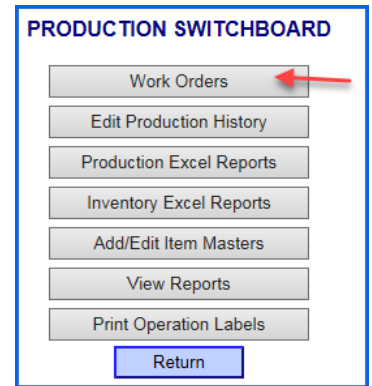
This brings up a list of active work orders and their status. From this screen users can Edit (1) existing work orders or Add Work Orders (2)

List of Work Orders

When the [Work Orders] button is selected from the Production Switchboard, BellHawk displays a list of the active work orders:

For each active work order (and those closed or cancelled within the past 2 days) this shows:

- The Work Order Number (1) – each work order must be assigned a unique number.

- The Work Order Type (2) as described previously

- The Item Master Part number for Processing Work Orders or the Work Order Instructions for Batch/Service Work Orders(3).

- The Quantity to be made of the Item Master Part on the Work Order (4).

- The Quantity recorded as already having been made of the Item Master Part on the Work Order (5). Please note that this does not show the "piecework" quantity recorded on Batch/Service work orders or the quantity of parts other than the Item Master part produced or the quantity of WIP parts produced.

- Date of last action (7) is when the production manager last made some change to the work order (such as releasing it for production or declaring it complete or cancelled) or a device user has recorded transactional data on the work order.

- Date Wanted (8) is when the work order is wanted by.

- Importance (such as Standard, Rush, Low) is how important the work order is.

- The tick mark (10) indicates that the current/last operation has been designated as complete by a device user.

- Status (11) may be a management status such as Not Released, Released, Completed, or Cancelled. It can also be the Work Center; Operation for which a device user last recorded a transaction on.

- The [Edit] button (12) enables the Production Manager to View/Edit the Work Order detail screen, its route of operations, and the resources for each operation.

This screen is equipped with Filter boxes (13) that permit filtering of the list if there are a large number of active work orders.

Finally there is the [Add Work Order] button (14), which is used to add new work orders.

Work Order Detail Screen

The [Add Work Order] button brings up the Add New Work Order Screen, as shown here:

On this screen you can enter the Work Order number (1), which must be unique, or use the one generated automatically by BellHawk if this has been specified on the System Administrators Production settings tab.

Then select the Work Order Type (2). If a Batch/Service work order is selected then this Work Order entry screen behaves exactly the same as is described in the Simple Production Tracking System (SPTS) User Manual.

If the Processing Work Order is selected the screen changes to that shown here. On this screen:

1. Enter or select the item number to be made (3). This is usually selected using the ellipses to see a list of made-here part numbers.

2. Enter the quantity to be made (4).

3. Enter the instructions (5) to appear on the header of the traveler.

4. Enter the date wanted and the scheduled start date (6) to appear on the traveler and for use by the Work Center Scheduling Option.

5. Select the customer for whom this work order is being produced (7). This may be for the MYCOMPANY customer, which means that it is being produced for stock.

6. Select the Importance (standard, rush, or low) (8) to appear on the traveler and for use by the Work Center Scheduling Option.

7. Select whether the manufactured product is owned by a customer (9).

8. Then select the [Create Work Order] button (10) to create the new work orders.

This then brings up the Work Order Detail Screen, as shown below:

From this screen, the user can:

1. Create or Edit the Route for the Work Order (1)

2. Release the Work Order (2) so production transactions can be recorded against this work order.

3. Print a copy of the barcoded traveler (3) to assist in data collection

4. Edit the above data fields and then update the work order (4). Please note that the work order number and type cannot be changed.

5. Copy the current work order structure (including routes and resources) (5) into a new work order with a new work order number.

6. Mark the work order as complete (6) and Cancelled (7) so that is will no longer be visible in the list of work orders after 2 days (or whatever is set by the System Administrator).

7. Reopen (8) a work order if accidentally closed or cancelled while it is still visible in the list of work orders.

Work Order Route

When the [Edit Route] button is selected then the system displays a list of Route steps for the Work Order (initially empty) as shown below:

From this screen, we can change the order of route steps (1) using the up and down arrows, edit an existing route step (2), add a template route (3), as described in the SPTS User Manual, or add a new route step using the [Add Step] button (4).

Work Order Route Step Setup

When the Add Step button is selected, the Route Step Setup screen for the work order is shown with the Step sequence number.

On this screen:

1. Select the work center and operation (1).

2. Enter Instructions (2) to appear on the traveler.

3. Enter a step code (3) that is a unique identifier, within this work order, for the route step.

4. Select the [Add Step] button (4) to create the work order.

After the work order is created, the Resources button (5) is no longer grayed out and can be selected to get a list of the resources for this step (initially empty):

This screen shows the finished part, the quantity to be made and the standard route quantity (1). From this screen Resources can be edited (2) or a new Resource Added (3).

Please note that the following example was produced with the WIP flag turned off on the System Administrator's Materials Tab. When this is turned on then the Part-in and Part-out resources can have a WIP flag specified as shown in the example screens for creating a Work Order based on routes and resources stored as part of the Item Master record.

Specifying Work Order Route Step Part-in Records

When the [Add New] button is selected then this brings up a Work Order Route Resource Setup screen with details of the route step (1). On this screen:

1. Select the Resource Type (Part-in, Part-out, Labor or Equipment (if ETO is licensed) being specified (2). The screen will change according to the type selected.

2. For a Part-in record select the Item Number to be used as part of the BOM (Bill of Materials) for this route step. This is typically selected using the ellipses (3).

3. Specify the quantity of the input part to be used to make the standard route quantity (4). These quantities are in the primary unit of measure for the Part-in item.

4. If the part is to be automatically withdrawn from stock every time a standard route quantity of the finished item is recorded as output from the work order step then check the check box and provide the location code or select it from a list of generic locations using the ellipses (5).

5. Add the resource to the route step by selecting the [Add] button (6).

Specifying Work Order Route Step Part Out Resources

The screen for Part-out resources is essentially the same but please note that:

1. The Item Number is for the Part Being Made (1). If there is only one step in the route and there is no part-out resource specified then BellHawk will assume that the part-out is the same as the Item Master part number.

2. The quantity out is specified (2) in terms of the Route Quantity not the quantity to be made on the work order.

Specifying Work Order Route Step Labor Resources

When a resource type of Labor is selected (1) then the user needs to select the previously setup Labor Class (2) and the number of minutes for that labor class per Route Quantity.

Creating Work Orders from Item Master Records

While work orders can be created as needed, it takes a lot of time to setup a work order. This process can be simplified by storing the route steps and resources as part of an Item Master record. Then, work orders can be simply created based on the stored Item Master record, as described previously, except that the stored route and resources are copied to the new Work Order record.
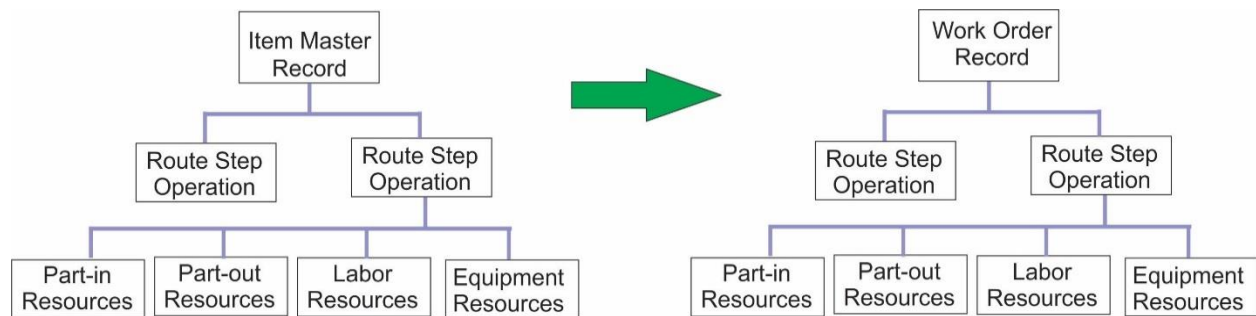
As it does this, BellHawk adjusts the quantity of resources based on the ratio of the quantity to be produced by the work order to the standard route quantity on which the Item Master resource quantities were based.
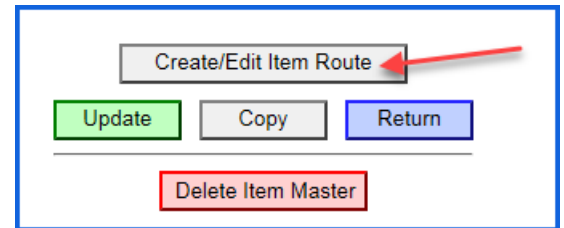
The advantage of setting up a route for a commonly made part is that you don't have setup the route every time a work order is created to make that part. Instead the part route is copied from the Item Master Parts route to the work order Route, including any resources specified for the Item Master route. This work order route and its resources can then be modified for the actual work order to be performed rather than modifying the stored item master route.

Creating an Item Master Record Structure for Making a Product

Setting up Route Steps/Operations

When a Made Here Item Master record is created then a [Create/Edit Item Route] button becomes visible.

Clicking on the [Create/Edit Item Route] button on the Item Master screen brings up a list of Item Route Steps as shown below.

On this screen, users can Edit (1) existing route steps or Add new steps (2). They can also use the up and down arrows to adjust the order in which the steps appear in the route. The Step #(4) is the order in which they will appear. The Step Code (5) is a unique identifier within the Item for the Item Step. It can be any unique (within an Item Master) alphanumeric code.

The Route Step detail screen has the following features:

1. Selection of the Work Center (1) within which the operation will take place.

2. Selection of the Operation (2) that will be performed in the Step.

3. Description of the work to be performed (3). Defaults to the Operation description.

4. Step Code (4) - a user supplied alphanumeric string that uniquely identifies the step within the route. This is primarily used for import and export purposes, such as saving all the item routes in an Excel spreadsheet and then reimporting these again.

5. A Resources button (5) that enables the user to Add or Edit resources.

The route step can also be deleted from this screen using the [Delete Step] button.

A similar screen appears when adding a new route step. When entering an item route step, we first select the Work Center (1) and then the Operation (2) within the Work Center. We can then enter special instructions (3), which will ultimately end up on the traveler for the work order, plus the step code.

Once these data items have been entered then clicking on [Add Step] or [Update] will save the entered data in the BellHawk database.

It is not necessary to setup the resources (5) for an Item route step but these can be setup as described in the following section.

Setting up Item Route Step Resources

Clicking on the Resources button (5 above) on the Item Route Step Setup screen brings up a list of resources for the route step. From here we can [Add New] resources (1) or [Edit] (2) an existing resource. Please note that the quantity of each resource (3) is scaled when a work order is created from the Item Master route according to the ratio of the quantity being made on the work order relative to the Route Step Quantity (4). We can also use the up and down arrow buttons (5) to adjust the order in which resources are shown in the drop-down from which they can be selected, when recording materials into or out of an operation.

If we click on the [Add New] button on the Route Step Resources scan then we can select the type of resource that we are entering data for.

Each of the different resource types needs to have different data specified for its setup as described below.

Specifying Part-in Resources for an Item Route Step

After selecting "Part in" as the resource type (1), the Item Number of the part to be recorded into the step is typed in or selected using the ellipses (2) from a subsidiary screen.

The quantity (3) is entered for the quantity of the item needed to make the Route Quantity (4). These quantities are in the primary unit of measure for the Part-in item.

If the input material is expected to be WIP materials from the prior operation in the route then the Is WIP checkbox is checked.

Rather than scanning materials into a work order step, BellHawk has the capability to specify an Auto-Reduce Location (6) for a Part-in. If this is so, then the Is Auto-Reduced checkbox needs to be checked and an Auto-Reduce location specified. The specified Part-in parts are automatically withdrawn from this location when the primary part-out is recorded out from the operation. This is done in a ratio to the quantity of the part-in quantity specified for the route step to the quantity of the primary route step part-out quantity. The primary part-out is the first one specified (i.e. with the lowest sequence number in the database).

The screen shown here was produced by selecting the [Edit] button for an existing Part-in entry. An identical screen is used when a new part-in record is added. When entry or editing is complete then select the Update/Add New button (7) to save away the data.

Specifying Part-out Resources for an Item Route Step

After selecting "Part Out" as the resource type, the Item Number of the part to be recorded in is typed in or selected using the ellipses (2) from a subsidiary screen.

The Unit of Measure (3) and Quantity (4) are entered for the quantity of the item produced to make the Route Quantity (5).

If the finished product part number is to be used for the work-in-process but this is not the last step in its processing then the Is WIP checkbox (6) should be checked so that the output materials from the route step will not be confused with intermediate

or finished products which are ready to be used or shipped.

The screen shown here was produced by selecting the [Edit] button for an existing Part-Out entry. An identical screen is used when a new part-in record is added. When entry or editing is complete then select the Update/Add New button (7) to save away the data.

Specifying Labor Resources for an Item Route Step

After selecting the Labor Resource Type (1) then select the Labor Class (2), which sets the loaded hourly cost for this labor class (including fringes and overhead).

The Quantity (3) is then the amount of minutes required to produce the Route Quantity of output. When a work order is created from the route the labor hours will be scaled according to the quantity to be produced.

Specifying the Equipment Resources for an Item Route Step

This requires the Equipment Tracking Option and is described in the Equipment Tracking and Run Groups User Manual.

Template Routes

With SPTS, template routes are restricted to only have a sequence of route step operations. With RT-OPS these template route steps can have labor and part-in resources specified. These template routes and their resources are setup the same way as for Item Master records. They can be added to work order or to Item Master routes.

Please note that there is no scaling of resources when adding a template route to a work order.

When creating Item Masters for a similar set of parts, with RT-OPS, it is often beneficial to use the [Copy] button from the Item Master detail screen, rather than Template Routes. This copies the whole of the record structure, including routes and their part-in and part-out resources, and assigns a new part number to the copy, which can then be edited.

Setting Up Routes for Assembly Items/Work Orders

For assemblies, the Item Master part number used for the work orders is that for the completed assembly.

The first route step is typically a regular processing step (not IsTAR) with the part-in records being the BOM for making the assembly. Its output is the part number for the assembly, with the WIP flag set.

Subsequent operations, such as welding and inspection, have the IsTAR step set and have the item master part number for the assembly as WIP-flagged part-in and part-out records. In this way the assembly is visible in BellHawk at the location of the work center, rather than being consumed when input to the operation and not reappearing in WIP inventory until it is recorded out.

In the last operation the part-in record is for the assembly with the WIP flag set and the part-out is for the finished assembly with no WIP flag. In this way, the assembly appears in WIP inventory from the time it is initially assembled until it is recorded out as a finished part, when it appears in regular inventory.

Note that subassemblies should have separate item master part records from which work orders for their manufacture can be created. These sub-assemblies can then be setup as part-in records to larger assemblies, resulting in a nested BOM representation, but with the ability to track the sub-assemblies in inventory.

Setting Up Test and Repair Operations

For individually barcoded parts being manufactured, the test and repair operations normally have the IsTAR flag set on. In this way the location of parts being tested and repaired are visible on the shop floor, even if operations in which they are being tested or repaired take a long time.

If the whole of the "manufacturing" process is to repair an existing part that is individually barcoded then all the operations, including the first have the IsTAR flag set, with the WIP flag being used to distinguish parts in the process of repair from those that have been repaired. Throughout the process, all the part-in and part-out records use the item master part numbers for the part being repaired.

Using the Production Switchboard

If you have production manager privileges, you will see a Production button on The Main Switchboard after you have logged in to BellHawk. Selecting this button leads to the Production Switchboard screen below right:
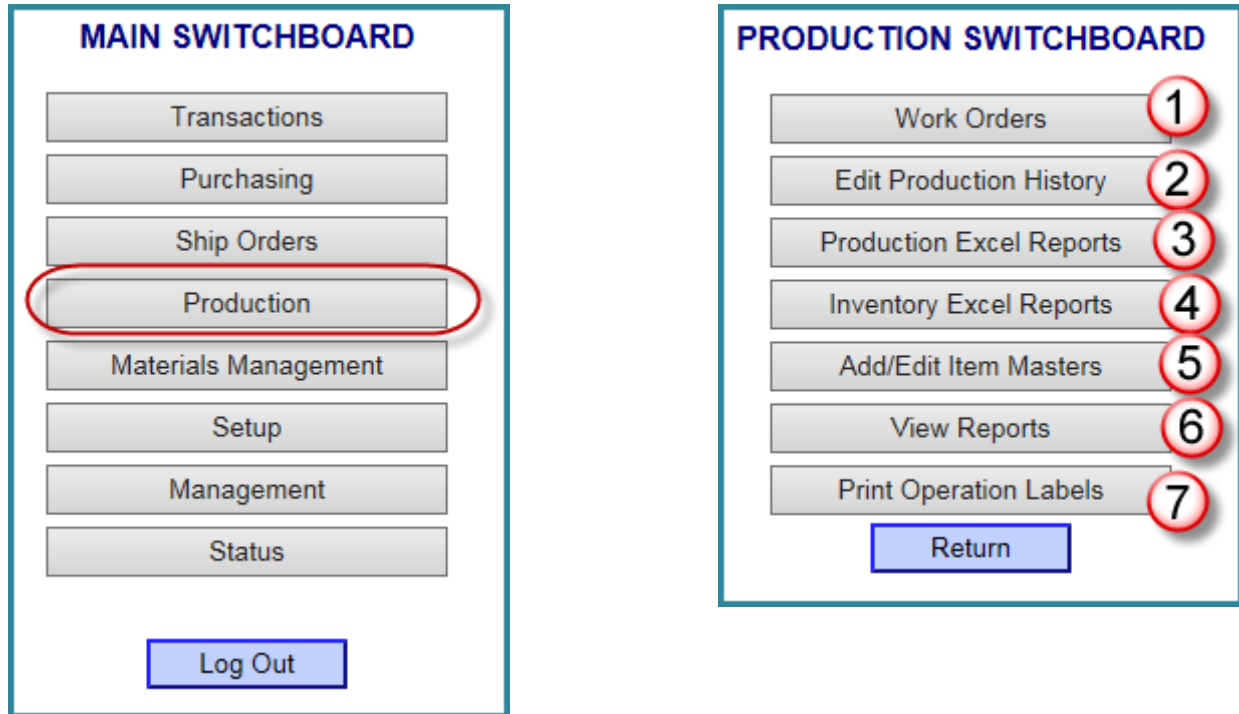
On the Production Switchboard screen the buttons are as follows:

- Work Orders (1) - used to setup and manage work orders. Can be used to get an overview of the status of each active work orders, edit details of each work order, including the route of operations and resources for each operation. Can also be used to declare the work order completed or cancelled.

- Edit Production History (2) – used to view and edit (if needed) materials recorded in and out and labor hours recorded for each operation on active work orders. Can also be used to close work orders after they are complete so no more transactional data entry can take place.

- Production and Inventory Excel Reports (3) and (4) – for use in analyzing production and inventory data.

- Add/Edit Item Masters (5) – provides capability for production manager to enter new item master records and edit them. This includes specifying routes of operations and resources used and produced by each operation on the route.

- View Reports (6) – produce printed Inventory and Production reports or PDF files to Email to other people.

- Print Operation Labels (7) - print operation barcodes on a plain sheet of paper or on a sheet of labels so they can be used to scan operation codes which do not appear on a traveler.

Preparing a Work Order for Release and other Work Order Management Tasks

Once a work order is ready for release to production, we can select the [Release Work Order] button (1) and also print out the Traveler (2) as shown below. Please note that transactional data entry cannot take place against the work order until it is released by the Production Manager. This is so that device users do not start recording data against an incomplete or incorrect work order.

On this screen the Production Manager can also:

- Copy the work order (3) and give it a new number. This is useful if changes have taken place and it is necessary to close an existing work order and replace it with a new one. This avoids the need to create new work orders from scratch.

- Marking the work order Complete (4) or Cancelled (5), in which case a cancellation reason is requested and saved.

- Reopen the work order (6). Sometimes a work order is marked closed only to discover that more work needs to be done. This additional work cannot be recorded until the work order is reopened by the Production Manager.

Barcode Work Order Traveler

For transactional data entry most users find that it is much easier to scan the traveler barcodes rather than lookup the work order and step electronically on the screen of whatever data entry device they are using. Shown below is a typical processing work order traveler.

On this work order traveler:

- There is a barcode containing the work order number (1).

- There is a header (2) with all the information entered when the work order was created including the quantity to be made (3) and the instructions (4).

- There are barcodes for each work order step (5). By default, these contain the letter T followed by the work order number, a period and then the step number, as in TWO0003.1. This ensures that the step barcode is unique across all travelers. Note that the step number rather than this barcode number is shown on the traveler.

- The step number and operation (6) is shown next to the step barcode.

- Input materials are listed below the step barcode (7) along with the step instructions (8) and any user defined parameters for the work order step.

- A place for user initials is provided (9) for regulatory compliance, if required.

Work Order Transactions

These transaction screens are only available to device users and staff users with scanning privileges.

### *Using the Transaction Switchboard*

When device users is using a shared device, such as a mobile computer, they will see a Main Switchboard with only two buttons, as shown here. The Transaction button (1) is used for transactional data entry and the Status (2) switchboard shows the limited reports that an operator may need to carry out their work order data entry.

When the Transactions button is selected, this leads to a Roles switchboard as shown here. While BellHawk assumes that any device user can perform any role, it groups the available transactions into groups that are appropriate to the role, to simplify selection for device users.

These role switchboards are:

- Receiving materials from suppliers (1)

- Shipping materials to customers (2)

- Performing inventory operations such as moving, checking and adjusting inventory (3)

- Production operations, which we will cover in detail in this section. (4)

When a device user selects the Production button they will be presented with a set of transactions they can perform, as shown below.
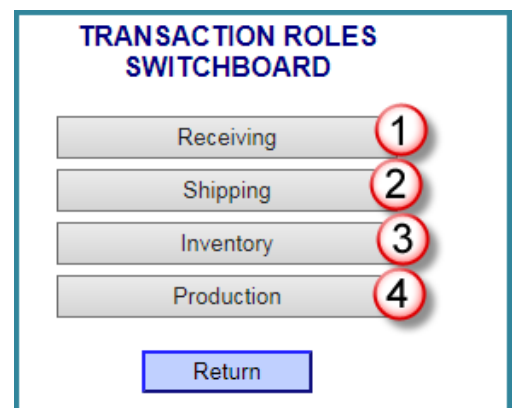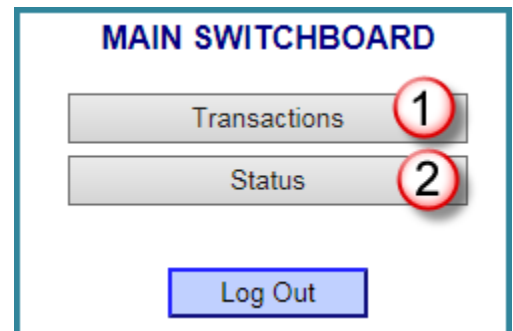
These Production Transactions are:

1. User Start Work (1) and Stop Work (2) – records when a device user starts and ends work on a step or operation. Can also record end of step or operation.

2. Record Material Into (3) and Out of Operation (4). Used to record the consumption and production of raw materials, WIP, intermediate materials, finished products and scrap.

3. Return Material from Operation (5). Used to record the return of unused materials, previously recorded as consumed on the step or operation back to stock.

4. End Work Order Step (6). A step or operation is considered to start the first time a transaction is recorded for that step. This is usually when a device user scans into the operation or material is scanned into the operation but they can also be started by recording the start of setup of a machine, if the ETO option is being used. If the device users are scanning in and out of steps then they can indicate that the step or operation is complete at the time they scan out. If this method is not being used then the step can be indicated as being finished using the End Work Order Step (6) transaction.
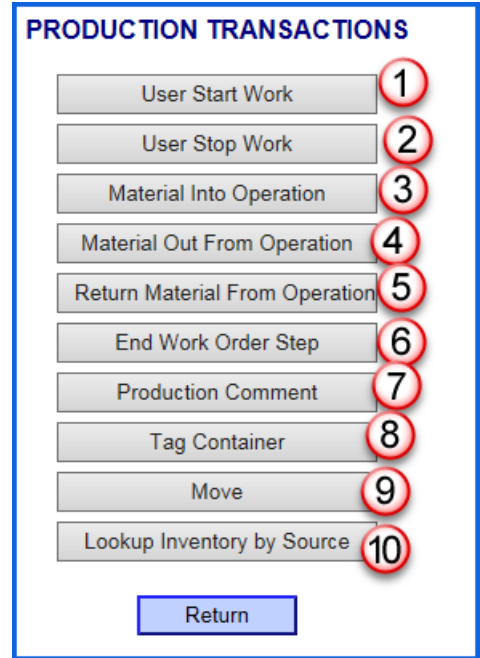
   Please note that the purpose of the device user ending the step is to indicate to the production manager that they have finished work on the operation or step. It is the responsibility of the production manager or other staff member to review and close the step or operation.

5. Production Comment (7) –this is a "notes" section area where production workers can record notes about the work order such as "Cutting tool was starting to get blunt – parts may need extra finishing". This is the electronic alternative to putting a yellow "sticky notes" on materials or writing notes on the traveler.

6. Three inventory transactions (8) (9) and (10) are also provided on this role switchboard for the convenience of the device user. These are described in detail in the Simple Materials Tracking User Manual. Their uses are:

   a. Tag Container (8) – create a new barcoded pallet to receive output from the step or operation. Typically finished products are boxed in cartons, each of which has a tracking barcode. These are stacked onto a pallet, which has its own tracking barcode. This transaction enables the scanning/recording/ or printing (with TAG option) of the tracking barcode attached to the pallet before the cartons are recorded as being stacked on the pallet.

   b. Move (9). Enables production workers to record the movement of raw materials to their work stations and the movement of finished product into a storage location.

   c. Lookup Inventory by Source (1o). Enables a quick lookup of the materials currently at any specific location, such as a work station or floor stock location.

Recording Users In to Work Order Steps

In the User Start Work transaction, the device user:

1. Scans the barcode (1) from their badge to identify who they are. Note that if this is a staff user with scan privileges then this is automatically filled in based on the staff user login.

2. Scans the work order number (2) from the traveler or uses the ellipses […] to select the work order number from a list of active work orders.

3. Scans the Step Barcode (3) from the traveler or uses the ellipses […] to select the step from a list of steps for the active work order.

4. Or scans an operation code or selects the operation from the ellipses (4)

5. Selects [Submit] button to record when they started work on the work order step/operation into the system.

If the step barcode is scanned, the Operation box disappears and vice versa. In the example shown at right, the work order Step Barcode was scanned from the traveler.

Recording Materials In to Work Order Steps

Please note that the boxes that are shown steadily expand as you enter data into this transaction. The specific data entry boxes shown will depend on the prior selection, so it is important to do the data entry sequentially in a top-down order and not select entries randomly to fill in.

In this transaction, the device user:

1. Scans their badge barcode (1) to identify which device user is doing this transaction.

2. Scans or selects the work order number (2). Initially this starts with [v] being shown, enabling the work
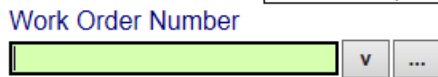
   Work Order Number

   order number to be scanned from the traveler. Clicking on this button enables the user to select from a list of their active work orders, as shown at right. In this case the [||||] button appears, which can be selected to go back to scanning/text entry mode for the work order.

   Note that the triple bars button [||||] is used in this and other transactions to switch the mode of the input between a text box into which data can be directly entered or scanned and the use of a drop-down list.

3. Scans or selects the Work Order Step Barcode (3) from the traveler or alternately selects an operation (4) not on the route (from a drop-down list).

4. Can show or hide the input materials list for the operation (5). This shows the part-in records for the Work Order step with the part-in quantity (11), the quantity still needed (12), whether this material should have the WIP flag set (13) and if this is Auto-Reduced (14).

Show/Hide Materials List		Quantity	Needed	WIP	Auto-Reduced
Item	**Description**				
SBS100	One inch diameter stainless bar stock	0.72	0		

5. Scans the license-plate tracking barcode on the item, container, or location holding the input parts (6) or alternately selects a location from a list of generic locations using the ellipses. If this is a type 2 container or location holding more than one part, then the user will be requested to select the part being input from amongst the non-tagged materials at the location or in the type 2 container.

   The details of the selected materials will then appear in the box (7).

The selected part will be checked against the part-in records for the step and the user will be warned, by default, if the material is not specified as a part-in resource for the work order step. The selected part will Also the input material will be checked and the users will be warned if the input material has not passed its expiration date and, if the QC option is licensed, that it has not passed QC inspection, unless this is input to a QC test operation.

Note that, while users will be warned and allowed to continue with inputting parts that are not specified as part of the BOM for the work order step or are possibly defective, they can also be prohibited from continuing or not warned at all, depending on settings on the System Administrators Production tracking tab.

If a type 1 container is selected then a checkbox for while containers is made visible. If this is checked then the fields for Unit of Measure and quantity become invisible.

6. Selects a unit of measure (9) and then enters the quantity (10) recorded into the step.

7. Finally selects Submit (10) to record the transaction.

The device user can then record in additional materials by scanning the barcode on the containers of the materials, Source Barcode (6).

Record Material Out of Work Order Step

Please note that the boxes that are shown on the device screen steadily expand as you enter data into this transaction.

In this transaction, the device user:

1. Scans their badge barcode (1) to identify who is doing this transaction.

2. Scans or selects the Work Order number (2).

3. Scans the Work Order Step Barcode (3) or alternately selects an Operation (4) not on the route.

4. Can select the Item Number (5) for the material out from a drop-down list of part-out resources or use the ellipses to select any part out. Alternately [>] can select from a page showing details of the part out records.

5. The details of the item are then shown, including the quantity left to record out from the step. (6)

6. Selects the Unit of Measure and enters the Quantity (7).

7. Can specify a New Container is being used (8). If a new container is specified then the Destination Barcode (10) will be the location of the container, such as "Stock Room Bin #01506". Alternately you can select locations from the generic location listing through the ellipses, manually type in the location or scan a location barcode.

8. The system will ask for the tracking barcode (10) for the new container. In this case, it will also ask for the container type (8).

9. If the part-out record is designated as WIP then the container or item recorded as output will be flagged as WIP.

10. Will click on the [Submit] button to record this material out transaction.

If the materials are being placed in a pre-existing container then the New Container checkbox is left unchecked and the Destination (9) is the barcode on the existing Type 1 or Type 2 container. In this case the New Tracking Barcode is not requested.

Return Material from Work Order Step

In this example, we recorded 10 feet of one inch diameter stainless bar stock into the work order step. We then used enough to make 5 knobs. Now we are going to record the quantity of the returned, unused stainless bar stock as follows.

In this transaction, the device user:

1. Scans their badge barcode (1) to identify who is doing this transaction.

2. Scans or selects the Work Order number (2).

3. Scans the Step Barcode (3) and auto populates the operation based on the route (4).

4. Selects the return method (5) from:

    a. Return in same container

    b. Return in new container

    c. Return in different container

5. In this case (a) the device user will scan the container barcode (6). The item number is automatically selected (7) **one inch diameter stainless bar stock**. If this were a new container then the user would select the Item from a list of input materials and scan the destination container barcode. If this is a new container, the user would also be required to enter the container type and its location.

6. The user can select the optional units of measure (8) and can enter the quantity returned. Note that BellHawk computes the default quantity remaining but this may be changed if needed.

7. Finally the transaction is completed with the [Submit] button.

Recording Users Out of Work Order Steps

Here the device user scans their badge (1). If the user is only working on one step then the Work Order (2) and Step (3) are automatically filled in. If the user is working on multiple work orders and steps at the same time, then these need to be selected or scanned.

If the step is complete then the box (4) is checked and then the Submit button (5) selected.

If the work order is not complete but the device user is not working on it (such as taking a break) then leave the checkbox (4) unchecked.

The benefit of having the user scan into and out of steps is that you record how much labor time was needed for each step as well as the elapsed time for the step.
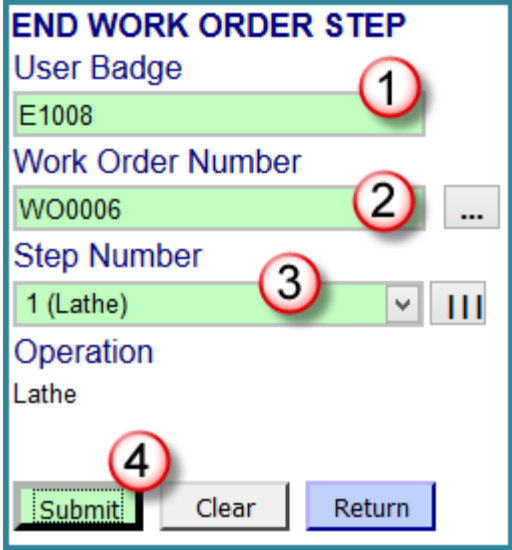
If the device user was working on an operation then this will be shown instead of the step.

End Work Order Step

Some users of BellHawk are only interested in tracking materials. In that case a step begins when materials are recorded into the step.

In this case, to record when the step ends, use the End Work Order Step transaction. We still scan the device user badge (1) to record who performed the transaction. The device user is then required to scan the Work Order (2) and select the step number (3) or scan the Step barcodes to record the end of the Work Order Step.

Alternately, if an operation is active, then this can be selected instead of the Work Order Step barcode.

Teams

Setting Up Teams

When you have a team of people performing a work order step, such as packing, it can be inconvenient to have each member of the team scan in and out individually to each work order performed by the team.

To simplify the process, a production manager can specify a team, using an Excel spreadsheet, as shown below, and import the team through the Excel Setup screen.

The team has its own barcode (1), typically with its own badge, which is used to scan the team in and out of work orders. The team also has a name (2) and a description (3).

Team functionality is turned off by default. It can be turned on from the Production tab of the systems administrator's System Parameters screen. Once this is done, two transactions are added to the Production Transactions switchboard, to enable the device users to Join a Team (1) and to Leave a Team (2).
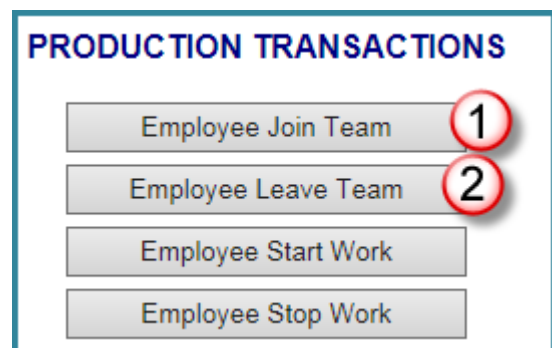
The Join Team transaction is shown below. Here the team leader scans the barcode on the user's badge (1) followed by the barcode on the team badge (3) and selects the submit button (3) to add the device user to the team leader's team.

The corresponding transaction to leave a team is shown at right.

Here the team leader scans the barcode on the user's badge (1)

and selects the Submit button (2). Note that the device users can only belong to one team at a time and must leave one team before they join another. For this reason, it is only necessary to scan the device user's badge and not the badge for the team they are leaving.

Scanning Teams in and out of Work Order Steps or Operations

To scan a team into a work order step or operation, the User Start Work transaction is used, just the same as for individual device users.

You will note that a Team Barcode option (2) has been added to this transaction by turning on the Team option.

If an individual device user is scanning into a work order step then they scan their badge (1) and then proceed to scan or select the Work Order Number (3).

If this is a team, then the team leader will scan his or her badge (1) to record who entered the data. Then the team leader will scan the team badge (2).

This will scan all the members of the team into the work order step and report how many team members were scanned in.

The team leader can then proceed to scan the work order number (3) and step barcode (4) or, in this example, select an operation using the ellipses. Then the team leader will select the Submit button (5) to record the team into the work order step.

The User Stop Work proceeds in a similar manner with the scanning of the team leader's badge (1) followed by the team badge (2).

Then the work order is scanned or selected (3) followed by the scanning of the work order step barcode or the selection of the operation being completed (4).

Then there is a checkbox (5) to indicate that the operation is completed, followed by using the Submit button (6).

Device users can be scanned into individual work orders as well as into teams that work on other work orders. When this happens the device user's time is allocated between all the work orders that the device user is working on.

Production Management

From the Production Switchboard a production manager can view and the Edit Production History.
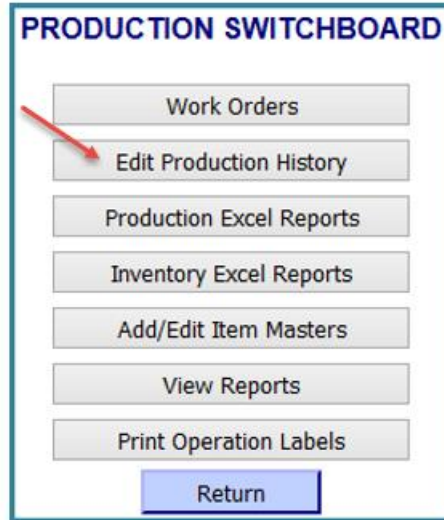
When the Edit Production History button is selected, the screen shown below appears:

The status of each work order is shown in column (1) with the work-center: operation shown for the latest operation being worked on. If a tick mark is shown in column (2) then the operator has designated the operation as complete.

Selecting a work order number (3) brings up the View/Edit Production History screen.

This screen has two tabs, one for Labor (1) and the other for Materials (2). The tab for labor is shown above.

The list shows the start and end time for each person working on the work order and the allocated time in hours and minutes to that work order (3). If the production manager determines that a user has made a mistake, such as by forgetting to scan out of a work order step before going home, then the production manager can edit the time record for a device user by using the edit button (4).

This brings up the Edit Labor Transaction screen shown here:

In this screen, the production manager can edit the Start Time and End Time (1) for the user working on the work order. This is in case the user forgets to clock out on time, the manager can change it to the correct time.

The production manager can also assign an allocated time for a particular operation (2) including the number of hours and number of minutes. The "#" changes the allocated time based on the difference between the start and end time (1). If the user is working on multiple orders at the same time, then the time allocated to this step/operation can be manually entered.

If piecework quantities are being collected then the piecework quantity for the labor time segment is displayed and can be edited.

If appropriate a comment (6) can be entered for the audit trail. Please note that the original records for people are not deleted in the data base and so a complete audit trail is maintained. Submit (4) button saves the transaction. The Delete button deletes the transaction.

When the Materials Tab is selected you will see a list of all the materials consumed and produced on the work order steps:

VIEW / EDIT PRODUCTION HISTORY
For Work Order Number: WO3456

LABOR | MATERIALS ①

②

Operation	Step #	Action	Item Number	Container Tag	Description	WIP	Quantity	Time Stamp	
Lathe	1	Material In	SBS100	#02423	One inch diameter stainless bar stock		0.84 ft	12/27/2018 10:52:53 AM	Edit
Lathe	1	Material Out	KB150	#01500	Stainless Steel Knob	✔	7 ea	12/27/2018 10:53:58 AM	Edit
Drill and Tap	2	Material In	KB150	#01500	Stainless Steel Knob	✔	7 ea	12/27/2018 11:02:34 AM	Edit
Drill and Tap	2	Material Out	KB150	#01500	Stainless Steel Knob		7 ea	12/27/2018 11:22:19 AM	Edit
Polish and Inspect	3	Material In	KB150	#01500	Stainless Steel Knob		7 ea	12/27/2018 11:23:33 AM	Edit
Polish and Inspect	3	Material Out	KB150	#02424	Stainless Steel Knob		6 ea	12/27/2018 11:30:35 AM	Edit
Polish and Inspect	3	Material Out	SSScrap	#01513>1	Stainless Steel Scrap		0.1 lbs	12/27/2018 11:31:53 AM	Edit

Filter | Complete Work Order | Return

If the production manager believes that the quantities (1) recorded are wrong then they can be changed using the Edit button (2) for the material in each operation or step.

Finally when the production manager believes that the data record is correct and complete, the Complete Work Order button can be selected. This is a signal to carry out end-of work order actions, such as computing the cost of the work order. It is also, often the point in time when cost data can be sent to an ERP system.

Selecting the Edit button for a material brings up the Edit Material Transaction screen. On this screen the production manager can change the quantity (1) and add a comment (2) before submitting the change (3). The production manager can also delete the material transaction record .

To add a different type of material into or out of a work order step use a Record Material In or Out transaction to record the consumption or production of additional materials before closing the work order.

Note that changes made here only affect the Work Order record and not the inventory. So, there may need to be a corresponding change made to the contents of a container.

All changes to the work order transaction history, made through these edit screens are logged in the database and a copy of the original history record retained so there is an audit trail.

Edit Material Transaction

Work Order Number: WO3456
Operation: **Polish and Inspect**

Transaction: **Material Out**
Item Number: **KB150**
Item Description: **Stainless Steel Knob**
Work In Process: ☐
Container Tag: **#02424**

Quantity: 6 ①
Unit of Measure: Each

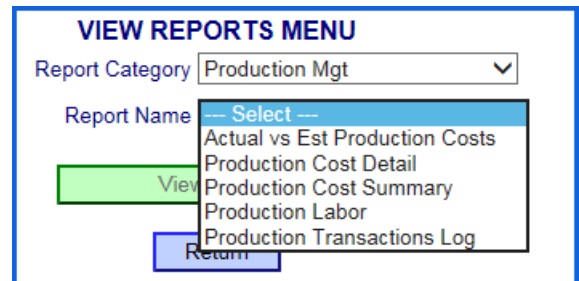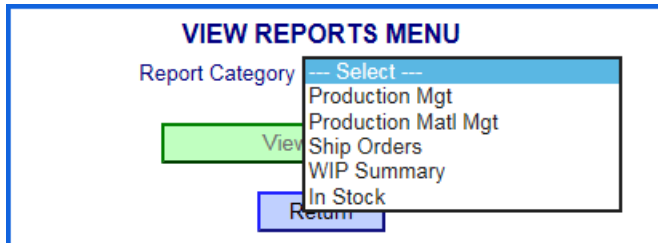Comment: ②

③
Submit | Return

Delete

Reports

In addition to the standard inventory reports, which are described in the Materials Tracking User Manual, special production tracking reports are available, from the View Reports Button on the Production Switchboard.
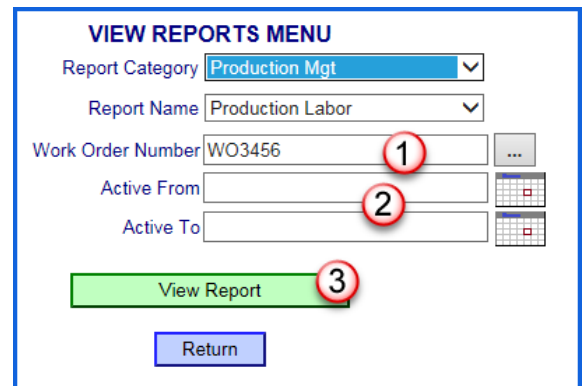
PRODUCTION SWITCHBOARD

- Work Orders
- Edit Production History
- Production Excel Reports
- Inventory Excel Reports
- Add/Edit Item Masters
- View Reports
- Print Operation Labels
- Return

This brings up the View Reports Menu category screen. From here the user can select the Report Category from a drop-down list. Within a category then select the report that you want to see or print out:

VIEW REPORTS MENU

Report Category
--- Select ---
Production Mgt
Production Matl Mgt
Ship Orders
WIP Summary
In Stock

View
Return

VIEW REPORTS MENU

Report Category | Production Mgt

Report Name
--- Select ---
Actual vs Est Production Costs
Production Cost Detail
Production Cost Summary
Production Labor
Production Transactions Log

View
Return

Once the Report Name has been selected then selectors may appear. These may be entered or selected from ellipses (1) or left blank (2) when "ALL" is implied.

Finally select the [View Report] button (3) to see the report in a new Browser tab.

VIEW REPORTS MENU

Report Category | Production Mgt
Report Name | Production Labor
Work Order Number | WO3456 ① [...]
Active From | ②
Active To |

View Report ③

Return

From this screen, users can view the report and then print out the report, using the "print" symbol (1) or save it as a PDF file (2).

Please note that there is no Blue return button on the report page, as it appears in a different tab. To close the report, simply close the Browser tab.
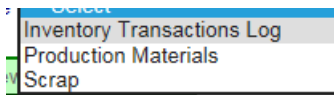
Also note that the report page from which the report was generated stays open, so you can have multiple reports open at the same time, in different tabs, or you can continue with other actions while still viewing the reports.

The available standard reports are:

Production Management

Production Materials Management

In addition, the following are available

> Ship Order History
> WIP Inventory
> Materials in stock

Excel Reports

In addition there are a number of production specific Excel exports available through the Production Excel Exports button on the Production Switchboard. This bring up the Excel Reports Menu screen shown here.

Here the user can select the Report (1), the format (2) and select the action button, Export Report (3) to export the file, which they will be given the option to open or to save.
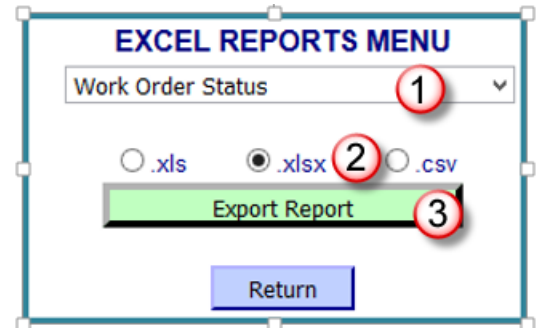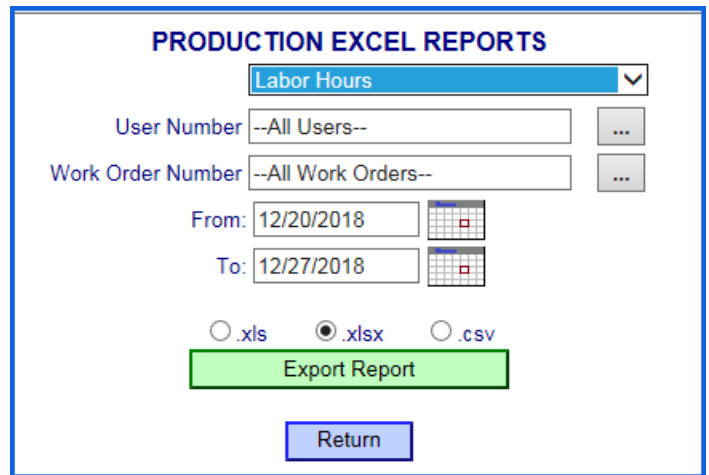

The available Excel reports are:
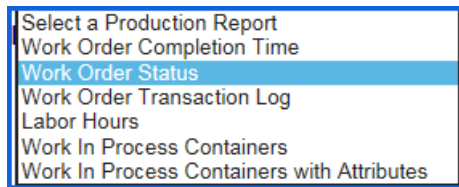
Some Excel reports have selectors as shown at right

The export for Work Order Status is shown below. In this export the Wait Time (1) is the number of whole days that the work order has been hung up waiting for the next operation.

Work Order Number	Step Number	Work Order Instructions	Customer Name	Work Order Status	Operation Last Performed	Operation Started	Operation Completed	Wait Time (days)
WO0006	2	Knobs	ABC Company	In Progress	Drill and Tap	2/18/16 11:27 AM	2/18/16 11:30 AM	0
WO0019	2	10 Knobs	CDE Furniture Manufacturers	In Progress	Drill and Tap	2/18/16 11:23 AM	2/18/16 11:25 AM	0
WO0020	3	Test 1	ABC Company	In Progress	Polish and Inspect	2/18/16 11:07 AM		1

Commentary on Reports and Excel Exports

BellHawk Systems can provide custom reports and Excel exports, as needed to meet the needs of individual clients. Those clients renting BellHawk for installation on their own Windows Server can use SSRS to add Custom reports to BellHawk. Custom reports can also be created using DEXBox exports from BellHawk. For more details, please see the BellHawk Reports User Manual.