

Work Order-less Completion as an Alternative to Outside Processing

By Eric Guether

Editor's Note: This is Eric Guether's second contribution to ORAtips and we are delighted to have him back. This featured article turns a real-life business problem into a thought provoking, easy to implement solution for capitalizing on the best of Oracle 11i product functionality without compromising business requirements, licensing additional modules, developing cumbersome customizations, or purchasing third-party COTS. Not only does he discuss pre-requisites for application set-up but also includes a detailed lessons learned, Q&A based, that should be required reading for anyone thinking of a work order-less, solution-driven approach.

Introduction

Suppose you were supporting an Oracle E-Business Suite (EBS) 11i operating unit intended for sales & distribution and financials – but not manufacturing. Instead, manufacturing and procurement within your single global instance are supported overseas where your factories are located.

But then your operating unit's sales team initiates a new business process where inventory items, ordered internally from the overseas factory, are shipped on a consignment basis to a third-party contract manufacturer (CM) in your country for outside processing to produce new finished good items for sale to customers in your sales & distribution operating unit.

How can you track the serialized items, consigned to the CM as components, and then remove these components from your inventory as they are consumed upon completion

of the outside processing activities? Simultaneously, how can you add the serialized finished goods to your inventory and record an accrual for the outside processing charges?

This article explains how Opnext implemented a solution around the Work Order-less Completion transaction in the 11i Work in Process (WIP) for such outside processing in a sales & distribution operating unit that had no user experience with the WIP or Bill of Materials (BOM) modules. This solution only applies to organizations that already license and use the WIP, BOM, Inventory, and Cost Management modules somewhere in their 11i instance and desire to use work order-less completion transactions. This solution is not cost-effective for organizations that would need to purchase the WIP and BOM modules.

This solution only applies to organizations that already have WIP, BOM, Inventory and Cost Management modules.

Business Case

Nine months after the "Go Live" of its initial Oracle EBS 11i implementation, Opnext began its first manufacturing activities in the U.S. in the form of outside processing for a small number of items. The U.S. sales team developed a plan to purchase some assemblies from the Japan manufacturing operating unit for the purpose of consigning those items to a third-party CM in the U.S. for outside processing. The CM would use the Opnext-owned items as components in new products that the CM would build for Opnext. Opnext would be liable to the CM for outside processing charges to make the new products. The cost of the consigned components would always remain on Opnext's balance sheet until they were consumed; the value of these components would never appear on the CM's books.

Opnext needed to configure the U.S. organization to simultaneously record three transactions:

1. Consumption of the component item
2. Completion of the final product
3. Its financial obligation to the CM

This new business process presented a challenge for Opnext. No one on the U.S. IT staff had any experience implementing the 11i Manufacturing or Purchasing modules. Furthermore, none of the users in the U.S. had direct experience maintaining purchasing or manufacturing systems.

Alternative Considered

Opnext first considered Oracle's Outside Processing solution for EBS 11i. Oracle's solution involves using discrete WIP jobs with an outside processing step that creates a purchase order (PO) to the CM for the outside processing services.

The routing for the final product would consist of two operations:

1. Issuing the component to WIP, and
2. Sending the component out for outside processing.

When the job is moved to this "outside processing" step, a requisition for the outside processing services is automatically created in the Purchasing module. A standard PO can then be auto-created from this requisition. As final products are received from the CM, a receipt against the PO for outside processing services triggers the receipt of the final product into inventory.

Oracle devotes an entire chapter to its Outside Processing solution in the WIP User Guide. Another excellent resource is the MetaLink white paper, "Oracle Outside Processing – Release 11i Workshop (May 2001)" [MetaLink doc ID 130231.1]. Oracle's solution did not require Opnext to buy any additional modules, because it had already purchased BOM, WIP, and Purchasing for its single global instance, although none were implemented in the U.S.

Opnext identified several deficiencies with Oracle's Outside Processing solution in regard to serialization. Oracle's solution only accommodates final products under serial control if their serialization is set to Dynamic Entry at Sales Order Issue, since the Receipts form does not allow serial numbers to be entered. Opnext's

products, however, are serialized at receipt. Oracle's solution, additionally, is unable to backflush serial-controlled components at an operation with a PO Move resource, since the WIP Move Transaction window does not allow for entry of component serial numbers. But Opnext's consigned components were serialized at receipt.

Implemented Solution: Work Order-less Completion

Opnext implemented a solution built around the WIP module's work order-less completion transaction with transaction type of "WIP Assy Completion". One work order-less completion transaction could record three distinct actions using standard costs (refer to Figure 1):

- Receipt of the final products, or completed assemblies, into inventory
- Backflushing, or consumption, of consigned components out of inventory
- Creating an outside processing charge due to the CM (included in the final product's cost)

Opnext's bill of material for each product would be very simple: a single component with a quantity of one. Yields for the outside processing were estimated to be near 100% due to the CM's expertise. If the actual component parts used, however, differed from expected, the work order-less completion could account for such material variances.

The outside processing charge due to the CM would accumulate in an accrued expenses liability account. Each work order-less completion transaction would increase, or credit, this accrued expenses account in the General Ledger (G/L) for the amount payable to the CM. Subsequently, this same G/L account balance would be reduced, or debited, when the accounting department entered the CM's invoice into the Payables module.

Under Opnext's solution, employees of the third-party CM entered the work order-less completions, in addition to component receipts and final product shipments, directly in Opnext's EBS 11i system. The CM connected to Opnext's EBS 11i system at various times via remote VPN access to perform the following three processes:

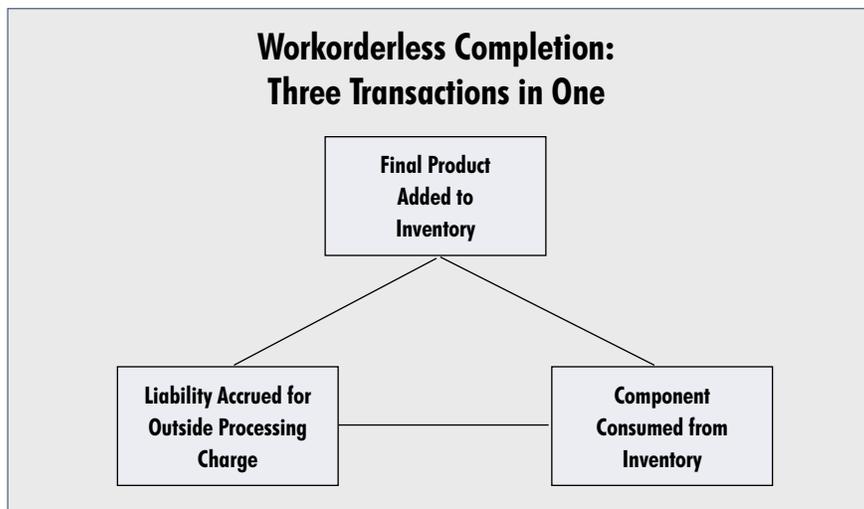


Figure 1: Work Order-less Completion Transactions

- Receipt of the Opnext-owned consigned components at the CM's location when components were physically received
- Work Order-less completion when final products were completed
- Shipment of final products from the CM directly to an Opnext customer in fulfillment of an Opnext sales order to its customer. This occurred at the time of shipment, which might be on the same day as the work order-less completion or on some future date.

Other Uses of Work Order-less Completions

Work order-less completions are not limited to simple BOMs with a single component or to discrete manufacturing environments. Work order-less completions can be used in flow manufacturing environments and for assemble-to-order (ATO) solutions. While this article only addresses the "WIP Assy Completion" transaction type of work order-less completions, other transaction types include:

- "WIP Assembly Return"
- "WIP Assembly Scrap"
- "WIP Return from Scrap"

To correct mistakes on a "WIP Assy Completion" transaction, record a "WIP Assembly Return" transaction to reverse the original transaction; then enter a new "WIP Assy Completion" transaction to redo the original transaction correctly.

Limitations of Work Order-less Completions

Opnext's solution would not be appropriate for outside processing business processes with large transaction volumes nor for organizations, which require the Purchasing module for the procurement of outside pro-

cessing activities. This is due to the limitations of work order-less completions.

Work order-less completion transactions will not:

- Create purchase orders (POs) in the Purchasing module.
- Create Payables invoices in the Payables module.
- Utilize standard Receiving Inspection functionality.
- Appear on WIP Job reports.
- Reserve component quantities during production.
- Allow for corrections to the transaction itself after saving. (Note: Entering a separate "WIP Assembly Return" work order-less completion transaction as noted previously can make corrections.)
- Reverse easily after the final product has been shipped from inventory. For example, an RMA return of final product that requires the component to be returned to inventory for reuse.

Work Order-less completions can be used in flow manufacturing environments and ATO solutions.

Transaction Walkthrough

A work order-less completion will be entered in the Work in Process (WIP) module to complete 10 units of item TRANSMITTER using 10 units of component LASER_DIODE. The expected results for this transaction are:

- Total cost of final products: $\$4,000 \times 10 = \$40,000$
- Total cost of consumed components: $\$1,000 \times 10 = \$10,000$
- Total accrued outside processing expense: $\$3,000 \times 10 = \$30,000$

The navigation path in the WIP module is: Material Transactions > Work Order-less Completions.

Step # 1: Enter the Final Product

In the main Work Order-less Completions screen shown in Figure 2, the following information is entered:

- Assembly: Item number for the final product to be completed.
- Schedule Num.: Enter a schedule number or tab through this field to have the WIP module auto-assign a number.
- Quantity: The final product quantity completed.
- Completion Subinv.: The subinventory in which the transaction will place the completed quantities. This value defaults from the final product's Routing Details.
- Accounting Class: This value should default if your organization only has one active WIP accounting class.
- Comment: Enter any desired comment for reference only (optional).

Step # 2: Enter Serial Numbers for the Final Product (Optional)

If the final assembly product is under serial control in this organization, click the Lot/Serial button to open the Serial Entry form (refer to Figure 3). Item TRANSMITTER is serialized using predefined numbers, so ten serial numbers must be selected from a list of values (LOV).

Click the Done button when all of the final product serial numbers have been selected or entered.

Step # 3: Record the Components Consumed

From the main Work Order-less Completions screen, click the Components button to open the form in which to record the consumed components. In the Components screen shown in Figure 4, the following information will be entered:

- **Component Item:** The item consumed should default from the final product's bill of material.
- **Supply Subinventory:** The subinventory from which the transaction will pull, or consume, the component quantities. This value should default from the "Material Control" tab on the final product's bill of material.
- **Quantity Used:** The expected number of component pieces consumed. This value should default from the component quantity on the BOM multiplied by the final product quantity on the work order-less completion transaction. Enter a different value if the actual component quantity does not match the expected quantity, which would cause a material variance.

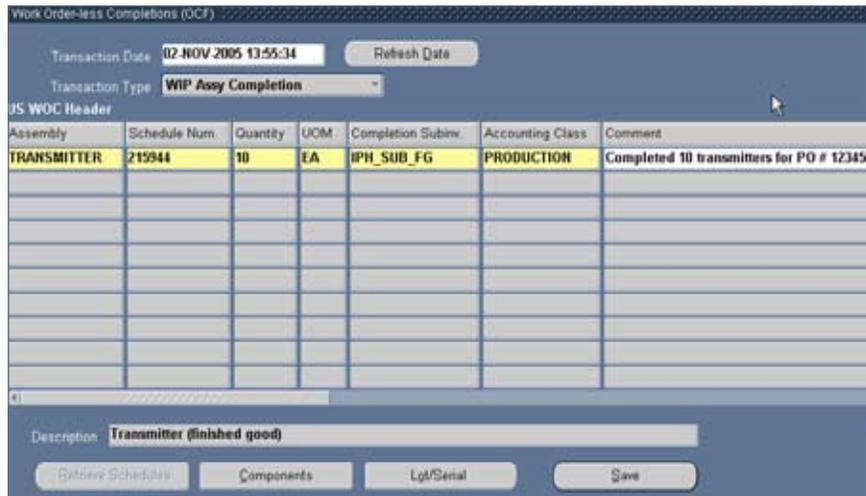


Figure 2: Work Order-less Completions

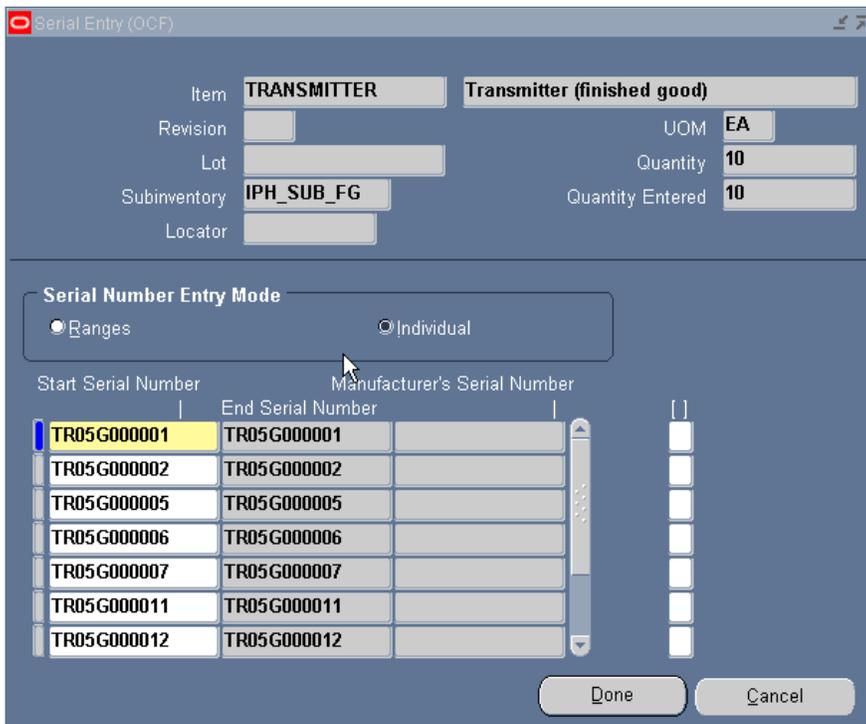


Figure 3: Final Assembly Serial Entry

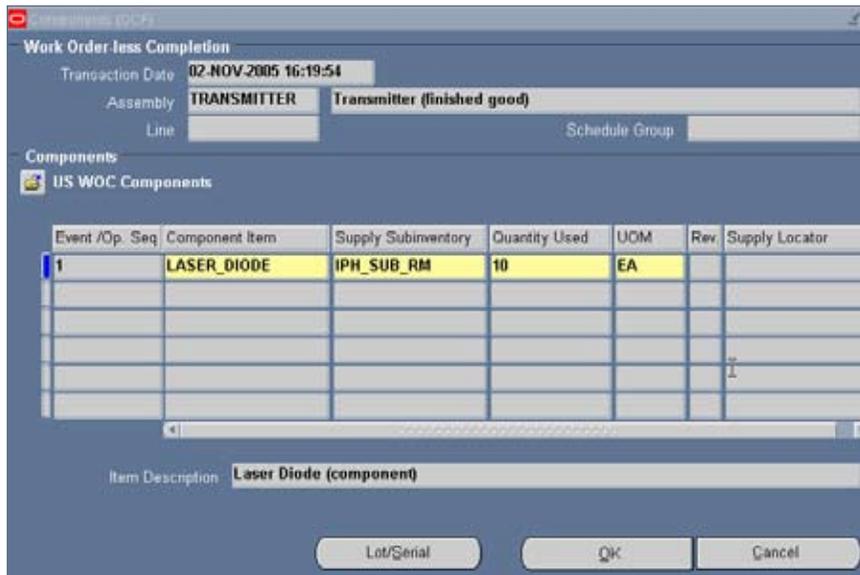


Figure 4: Components Sub Menu

Step # 4: Enter Component Serial Numbers (Optional)

If the component is under serial control, click on the Lot/Serial button on the Components form to open the Serial Entry screen (refer to Figure 5). Our component is serialized “At Receipt” in this organization. Since the final product is serialized using Predefined numbers, each component serial number can be linked to a final product serial number to capture serial genealogy. The serial entry mode must be changed to Individual in order to record such genealogy.

Click the Done button to close the Serial Entry screen. Then, from the Components screen, click the OK button to close and return to the main Work Order-less Completions form.

Step # 5: Save the Transaction

Click the Save button on the main Work Order-less Completions form.

Warning: Once the Save button is clicked, this transaction will be saved and cannot be modified. The transaction cannot even be queried from this screen after saving.

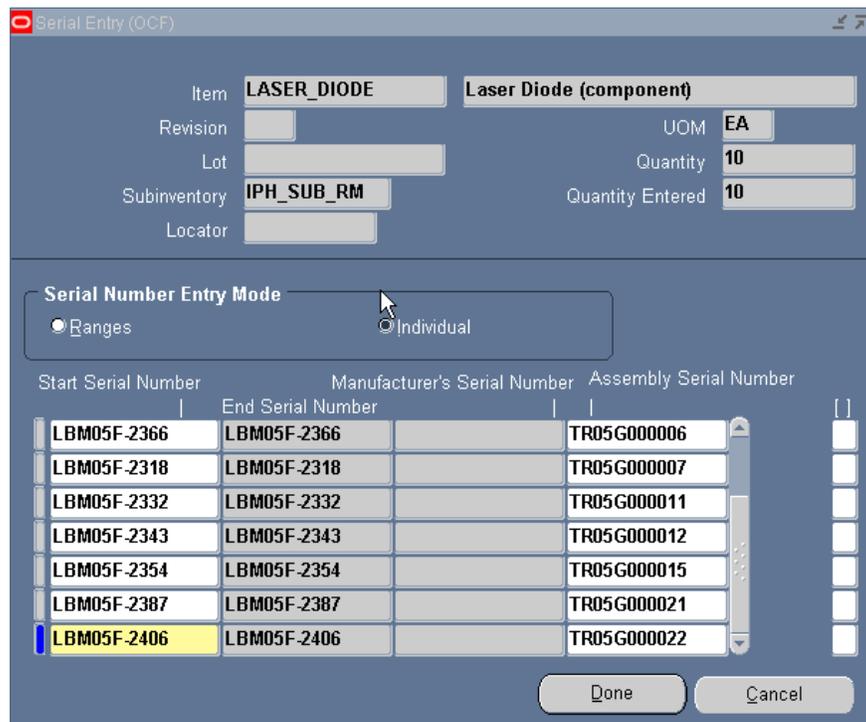


Figure 5: Component Serial Entry

Transaction Reports

The material transactions for the final product and component will appear in the Inventory module standard report, “Material account distribution detail”. Opnext, however, extended this standard report by copying it to a new custom report,

shown in Figure 6, to include the outside processing resource charge:

If the work order-less completion transaction has no component cost variance or resource charge variance, then the subtotal for the schedule number will be zero on this custom report.

OCF 3rd Party CM Org for Outside Processing Report Date: 02-MOV-2005
 Sorted by Schedule Number Workorderless Completion Transactions From 02-MOV-2005 to 02-MOV-2005 (USD) Page: 2
 Ten Date : 02-MOV-05 Schedule No: 215944

Item	Action	Transaction Type	Subinventory	Quantity	Unit Cost	Value
TRANSMITTER	Item Produced	WIP Assy Completion	IPH_SUB_FG	10.00	4,000.00	40,000.00
Comment : Completed 10 transmitters for IO # 123456						
Serial Num:	TR0SG00001	TR0SG00002	TR0SG00005			
	TR0SG00006	TR0SG00007	TR0SG00011			
	TR0SG00012	TR0SG00015	TR0SG00021			
	TR0SG00022					
LASEP_PIC02	Item Consumed	WIP component Issue	IPH_SUB_RM	-10.00	1,000.00	(10,000.00)
Serial Num:	LRM05F-2308	LRM05F-2310	LRM05F-2313			
	LRM05F-2318	LRM05F-2332	LRM05F-2343			
	LRM05F-2354	LRM05F-2366	LRM05F-2187			
	LRM05F-2406					
Resource Charge						(30,000.00)
Expected Variance for Schedule No. 215944						0.00
**** End of Report ****						

Figure 6: Custom Work Order-less Completion Transactions Report

Accounting Reports

Two standard Oracle accounting reports must be combined to see all accounting entries created by one work order-less completion: the “Material account distribution detail” report and the “WIP Account Distribution Report”.

The “Material account distribution detail” report in the Inventory mod-

ule shows the accounting for the final product added to inventory and the component consumed.

In our example, completion of the final product is recorded with a debit to Finished Goods Inventory asset account # 12651 for \$40,000 (\$4,000.00 * 10) and two offsetting credits to WIP asset account # 12351: a \$10,000 credit for component con-

sumption and a \$30,000 credit for the OSP resource charge.

The component consumption is recorded in the Inventory module with a credit to the Raw Materials Inventory asset account # 12302 for \$10,000 (\$1,000 * 10) and an offsetting debit to WIP asset account # 12351.

The “WIP Account Distribution Report” in the WIP module accounts for the Outside Processing charge as well as material or outside processing variances, if any.

This example shows a credit to account # 25042 – Accrued Expenses Due to CM for \$30,000 (\$3,000 * 10) with a debit to WIP account # 12351.

Serial Genealogy

The Serial Genealogy form in the Inventory module shows the link between the “parent” final product serial number and any “child” component serial numbers used. Figure 7

Module	Debit or Credit	Natural Account	Natural Account Description	Transaction Value	Subinventory Addition or Subtraction
INV	Debit	12651	Finished Goods Inventory at Standard	40,000.00 dr	Add to IPH_SUB_SG + 10
INV	Credit	12351	Work in Process	10,000.00 cr	--
INV	Credit	12351	Work in Process	30,000.00 cr	--

Module	Debit or Credit	Natural Account	Natural Account Description	Transaction Value	Subinventory Addition or Subtraction
INV	Debit	12351	Work in Process	10,000.00 dr	--
INV	Credit	12302	Raw Materials Inventory at Standard	10,000.00 cr	Subtract from IPH_SUB_RM - 10

Module	Debit or Credit	Natural Account	Natural Account Description	Transaction Value	Subinventory Addition or Subtraction
WIP	Debit	12351	Work in Process	30,000.00 dr	--
WIP	Credit	25042	Accrued Expenses Due to CM	30,000.00 cr	--

shows the serial details and material transactions for the highlighted final product serial number in the walk-through example.

Application Prerequisites

This section highlights the most significant (but not all) prerequisites for setting up an organization to record work order-less completion transactions.

Prerequisite # 1: One-Time Inventory Setups

The inventory organization used for the work order-less completion transactions must be created if it does not already exist. Additionally, the organization will need one or more subinventories. Each subinventory used by the work order-less completion transaction will need the Qty Tracked and Asset Subinventory flags checked on.

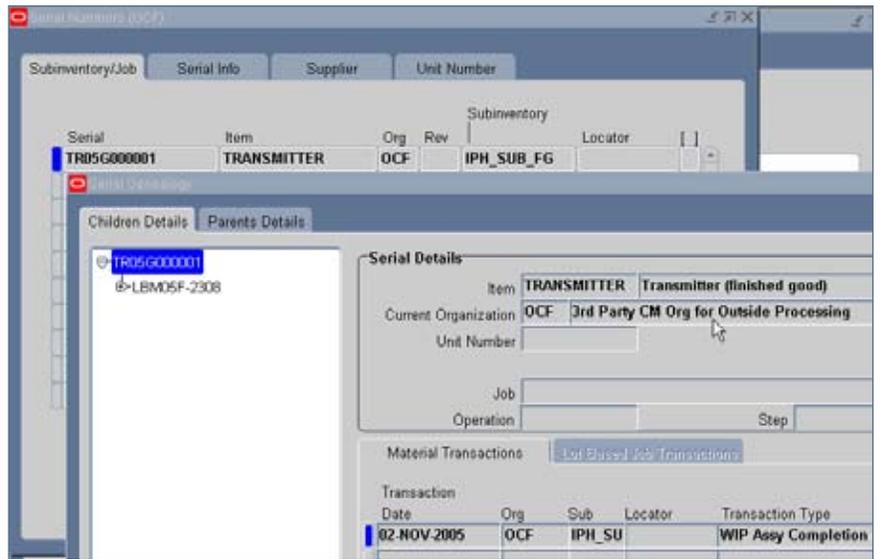


Figure 7: Serial Genealogy (Parent / Child Relationship)

Opnext created a new inventory organization for its outside processing solution in order to restrict the access of its CM's users within Opnext's Inventory module. Two subinventories were created for use by the work order-less completion transactions:

- A Finished Goods subinventory to which the completed final products are added to on-hand inventory
- A Raw Materials subinventory from which the component parts are consumed from inventory

Prerequisite # 2: One-Time WIP Setups

WIP parameters need to be set for the organization in which work order-less completions will be entered if this organization was not used previously for manufacturing. The following WIP parameters can be accessed by navigating to the Setup > Parameters menu:

- On the Discrete tab, set the Default Discrete Class to the appropriate accounting class, which is a collection of default

G/L accounts for WIP transactions. If no values exist in the list of values (LOV), leave blank and return to the Discrete tab after creating a WIP accounting class later in this section.

- On the Backflush Defaults tab, select the Supply Subinventory. The selected value should be the subinventory from which component items are typically consumed.
- On the Outside Processing tab, the Requisition Creation Time should be set to At Operation.

A WIP Accounting Class must be created if none exists in the organization. The navigation path is Setup > WIP Accounting Classes. The G/L account in the Outside Processing / Valuation field will be used for the debit entry of the outside processing charge created by the work order-less completion transaction. Once a WIP Accounting Class has been created for the organization, this class can be selected as the Default Discrete Class on the WIP Parameters.

Work Order-less transactions require the creation of Inventory organizations

Prerequisite # 3: One-Time BOM Setups

The following BOM parameters should be set, if the organization was not used previously for manufacturing, by navigating to the Setup > Parameters menu:

- Enter a Max Bill Levels value of 1 or higher.
- Set the Numbering Method to Append With Sequence.

Opnext needed to create an outside processing resource and department under the organization for the work order-less completion to generate a charge on a “per unit” basis. The resource was linked to the department as a one-time setup. Then the department was added to the routing of each final product. The “per unit” amount was entered as a resource rate on the routing as shown in a later section. This structure allowed Opnext to use a common resource and department on many items’ routings, even where the CM’s “per unit” rate varied by product (refer to Figure 8).

Navigate to the Routings > Resources menu to create the new resource. Opnext created a resource with the following attributes (refer to Figure 9):

- Type = Currency
- Unit of Measure (UOM) = USD
- Charge Type = WIP Move
- Basis = Item

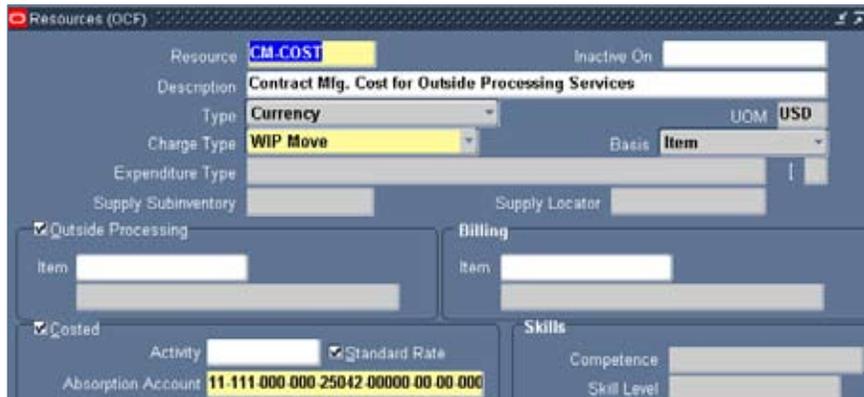


Figure 9: Resource for Outside Processing Service

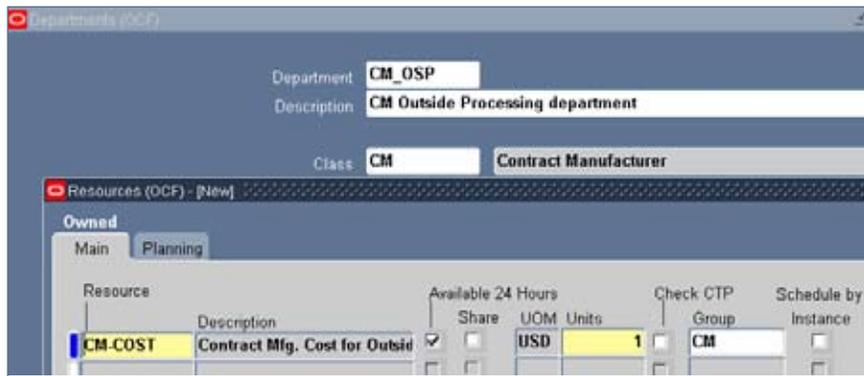


Figure 10: Linking the Resource to the Department

- The Outside Processing flag is checked.
- The Costed flag is checked.
- The Standard Rate flag is checked.
- Select an Absorption Account. The work order-less completion transaction will credit the Absorption Account code for the outside processing charge amount.

For this case study, the selected Absorption Account is a G/L code combination whose natural account is 25042 – Accrued Expenses Due to CM.

Navigate to the Setup > Department Classes menu to create a new department class. In this example, a department class “CM” was created.

Next, to create a new department, navigate to the Routings > Departments menu. Click the Resources button on the Departments form to add the outside processing resource, CM-COST, to the department, CM-OSP (refer to Figure 10). Enter 1 in the Units field of the resource.



Figure 8: Relationship of Resource, Department & Routing

Prerequisite # 4: Item-Specific Inventory Setups

The final product must be activated in the inventory organization with the following flags checked on at the organization level:

- Inventory Item
- Stockable
- Transactable
- BOM Allowed
- Costing Enabled
- Inventory Asset Value
- Include in Rollup
- Build in WIP

The component item must be activated in the inventory organization with the following flags checked on:

- Inventory Item
- Stockable
- Transactable
- Costing Enabled

- Inventory Asset Value
- Include in Rollup

On the component's Work in Process tab, set the Supply Type to Push.

Prerequisite # 5: Item-Specific BOM Setups

The final product must have an active bill of material under the organization in the BOM module. For this example, the simple BOM for TRANSMITTER has one component, LASER_DIODE, with quantity of one, as shown in Figure 11.

On the BOM's Material Control tab, select a Subinventory for each component. The selected subinventory will default on the Components form of each work order-less completion; it represents the default subinventory from which the component will be consumed. This default value, however, can be overwritten on each work order-less completion transaction.

A routing for the final product is also required. The routing must include the department with the outside processing resource. For this example, Department CM_OSP has

been added to operation sequence 10 on the routing.

The final product must have an active bill of material under the organization in the BOM module.

The following flags on WIP tab must be checked on:

- Count Point
- Autocharge
- Backflush

Next, highlight the operation sequence line on the routing and click the Operations Resources button (refer to Figure 12).

- On the Main tab, enter the "per unit" rate in the Rate or Amount Usage Column.

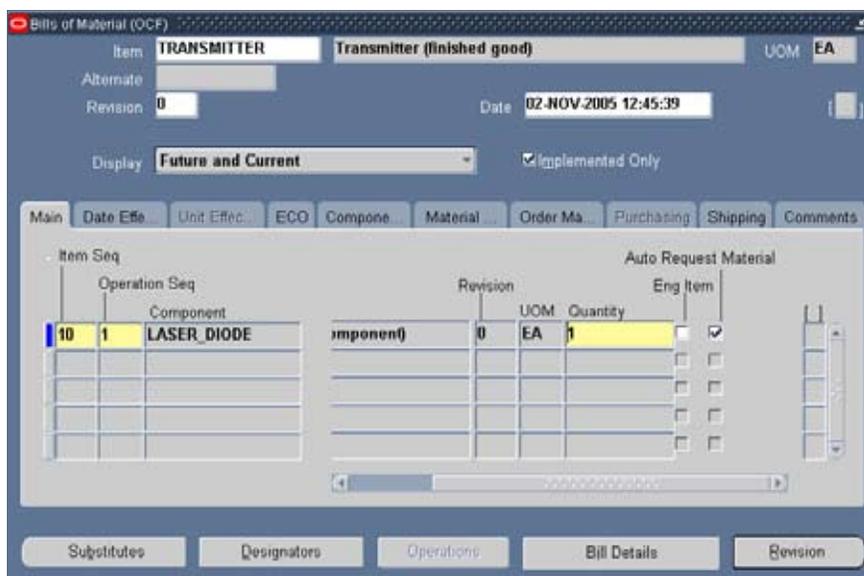


Figure 11: Bills of Material

- On the Costing tab, verify that the Charge Type is set to WIP Move.

For item TRANSMITTER, the CM-COST resource is assigned a “per unit” rate of \$3,000 in the Rate or Amount Usage column. When work passes through this routing, the resource CM-COST (linked to department CM_OSP previously as a one-time setup) will trigger the recording of an outside processing charge calculated as \$3,000 multiplied by the quantity of TRANSMITTER completed.

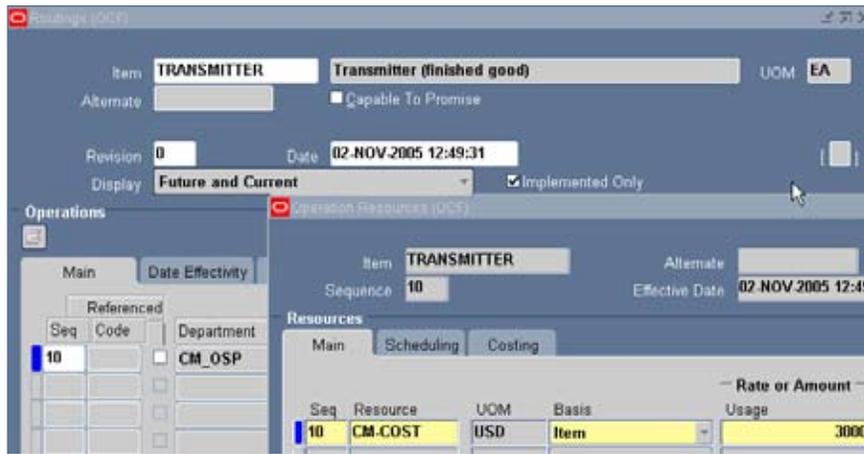


Figure 12: Routings

Click on the Routing Details button to select a default subinventory into which the work order-less completion will add completed quantities for this product. This subinventory value will appear as the Completion Subinventory on the main form of each work order-less completion for this product. However, this default value can be overwritten on the transaction.

Prerequisite # 6: Item-Specific Cost Management Setups

The component item must have a pending and frozen cost in the organization. A cost rollup must be run on the final product based on the item’s bill of material and routing. After a successful cost rollup, a standard cost update must be performed to set the final product’s frozen cost equal to its rolled-up pending cost.

Lessons Learned

The lessons Opnext learned when implementing this work order-less completion solution include pre-determining ownership for bills of material, routings, and cost rollups, addressing how often standard costs should be updated, and developing a method for reconciling accrued outside processing expenses to actual CM invoices.

Ownership of Bills of Material and Routings

Who will enter and maintain the bills of material and routings?

Before Opnext implemented this solution in the U.S. organization, U.S. users did not enter bills of material into the EBS 11i system for any purpose. While Opnext Japan users maintained BOMs in the Japan man-

ufacturing organization, it was not appropriate to have the Japan users maintain BOMs for U.S. outside processing. In order for this solution to be successful, a business area in the U.S. needed to assume responsibility for maintaining U.S. BOMs and routings.

Ownership of Cost Rollups

Who will be responsible for rolling up the standard costs for the final products based on their bills of material and routings?

No Opnext user in the U.S. had rolled up a standard cost from a BOM and routing prior to the introduction of work order-less completions. Previously, the U.S. organization had only sold items manufactured in the Japan manufacturing organization, so all U.S. standard costs were manually entered under the Material cost element as “user defined costs.” No rollups, therefore, were ever needed in the past. With the introduction of work order-less completions, a business area in the U.S. needed to perform cost rollups.

Formalize Cost Accounting Policies

How often should standard costs be routinely updated?

With the introduction of work order-less completions, cost rollups are required.

How should variances created by a work order-less completion be accounted for?

What conditions might justify a non-routine standard cost update if Opnext typically updated standard costs annually?

Such questions might be quite easy for an experienced cost accountant to answer. But organizations set up only for sales and distribution might not have a local cost accountant or cost accounting policies for new business processes.

These questions first became relevant when the outside processing charge per item was renegotiated in the middle of Opnext's six-month cost period. The actual resource rate on the routing needed to be updated, so that subsequent work order-less completions credited the correct amount for accrued OSP expenses. But an accountant needed to address whether the final product's standard cost should be rolled up every time the actual resource rate changed, which was not a frequent event.

If the standard cost were not updated until the end of Opnext's six-month cost period, then any new work order-less completions between the rate change and the end of the period would create outside processing variances. These variances would account for the difference between the new (actual) resource rate on the routing and the old rate still in the standard cost.

Another issue was whether to update the standard cost if components on a bill of material changed.

Reconciliation of Accrued OSP Expenses and CM Invoices

Who is responsible for reconciling the balance of the General Ledger account for accrued OSP expenses payable to the CM (from the work

order-less completions) with the actual CM invoice amounts (entered into the Payables module by the Accounting department)?

Opnext decided that this responsibility belonged to the Product Manager who authorized the CM to perform each outside processing job. But regardless of which area is assigned responsibility, active reconciliation of the accrued expenses payables balance is essential to the success of this solution.

Opnext's solution does not use the Purchasing module and, therefore, offers no automated 2-way or 3-way matching of purchase orders, inventory receipts, and payables invoices. One way to make such reconciliation easier is to request that each line on the CM's invoice reference an Opnext schedule number for a work order-less completion. Another way is to capture a unique, manually issued work order number in two places: the Comment field of the work order-less completion and the line on the CM's invoice.

Conclusion

Work order-less completion transactions provide a way for recording simple outside processing when companies do not need visibility into work in process nor extensive purchasing controls. Through one work order-less completion transaction, a company can record three distinct actions: Receipt of final products, consumption of consigned components, and accrual of outside processing liabilities. Work order-less completions can capture the genealogy of a final product's serial number and its components' serial numbers if the final product uses predefined serial numbers. This work order-less completion solution is better suited for lower transaction volumes, since reconciliation of the accrued liabilities to the CM's invoices may be harder to manage as volumes increase.

Eric Guether, Opnext, Inc. - Eric has served as the IT Director for Opnext, Inc. at their headquarters in Eatontown, NJ since 2001. His primary responsibility is to manage the resources for Opnext's single global ERP instance, Oracle E-Business Suite (EBS) 11i. Eric shares direct functional support with his staff for the Inventory, Cost Management, Purchasing, Payables, Receivables, and General Ledger modules and writes SQL scripts for custom Oracle Alerts and Discoverer workbooks. Opnext is a global leader in the design and manufacture of high-performance optical components for telecom and datacom optical networking systems and industrial devices. Opnext was formed through the transfer of two Hitachi optics businesses based in Japan and used its implementation of Oracle EBS 11i in 2001 to unify business processes globally. Eric may be contacted at Eric.Guether@ERPtips.com.



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