

# R12 Workstation Enhancements – Flow, Discrete and OPM

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## INTRODUCTION

In release R12 Oracle has spent much of the development work enhancing the capability for management to communicate with the shop floor via the Workstations. Shop floor execution has been a weak area in Oracle Manufacturing and it is very good to see that the enhanced ability to communicate faster/better/easier both up and down the organization has been enhanced. One of the clichés in the industry is “Shop Floor to Top Floor” but it is a real need in the fast world of manufacturing. Having a systematic mechanism to make sure that the right information gets to the right people on the shop floor is crucial. Reporting back from the shop floor is necessary to let management know that the execution is going on per the plan. Operators and/or shop supervisors should have the method to communicate any problems quickly back up the chain-of-command. Changes in the plan and alternatives when problems are encountered must be brought back down quickly to minimize waste and indecision. Manufacturers can no longer let problem surface only in weekly meetings and status reports.

The R12 enhancements also give users a much better shot of really going “paperless” on the shop floor. The “Paperless Shop Floor” has long been required in many manufacturing environments, where the latest information is required to be available electronically, at the speed of light. Paper instructions traveling on the shop floor can get old, or damaged and costly mistakes can be made following out of date instructions/materials.

We will examine the R12 Workbench enhancements that have been released in the Flow Manufacturing Module that is sometimes called FLM, the Oracle Discrete Manufacturing Module or ODM and the Oracle Process Manufacturing Module or OPM. While it is unlikely that one single organization will use all of these three methods of manufacturing it is possible that it can happen especially in the medical devices industry. Since these products have been converging it is quite possible in the not too distant future that one organization may use all three modes of manufacturing execution.

## Flow Manufacturing

Flow manufacturing is also called Lean Manufacturing or Just-In-Time and uses the principles of demand flow manufacturing to produce product as required, for customer orders, quickly and to meet the demand exactly on-time. Usually, in order to use Flow a company needs to have production facilities that subscribe to the principals of Lean Manufacturing. It is necessary to design production facilities so that production lines, resources, machines, and labor are making only what is needed for immediate customer orders.

## Discrete Manufacturing

Discrete manufacturing is Oracle Applications method to handle the unique problems in manufacturing equipment, like electronics, medical devices or a complicated assembly like the space shuttle. Discrete manufacturing is based on piece parts that are assembled or machined to make larger assemblies. ODM has a great deal of functionality to manage the Bills of Materials, Routings and Engineering changes that are required to adequately track assembly and cost the finished product.

## **Process Manufacturing**

Process manufacturing is used at companies that make products that use formulas, receipts and/or have co-products or by products. Typical users of OPM are manufacturers of food products or chemicals that have complex internal processes and need a high level of control. The OPM capabilities allow for multiple units of measure because the flexibility in batch production is required in process industries.

## **Flow Manufacturing Workstation Usage and Setup**

### **Flow Workstation in 11i10**

Before we begin to look at the R12 Flow Workstation it is important to mention that in 11i10 the first Flow html workstation was released. The current version of the Workstation in R12 is an enhanced version of the 11i10 Workstation. There was a previous workstation but the 11i10 workstation was an improved and written in html. Also in 11i10 important new line sequencing functionality was released. The sequencing functionality allowed a user to setup attributes and setup literally hundreds of user defined attributes for constructing rules for scheduling the Flow Line. It is also possible to setup constraints like allowing only 50 of a particular model to run in one day. An example of using the sequencing functionality, would be to schedule an automotive line to run based on color, so by using penalties the colors in a day would be run from light to, darker throughout the day but only 50 hatch backs could run per day.

One negative aspect of using 11i10 Flow Workstation was that when you completed a Flow Schedule the system navigated the user back from the html interface to the completion form – in Oracle Forms. This navigation from the html interface back to the forms and then back again was very inconvenient and confusing. (I believe that training would be difficult if not impossible.) The new version is seamless in operation in html and the look and feel is consistent so this is an important enhancement for usability.

### **Flow Workstation in R12 – The Look and Feel**

The Workstation that was released in R12 is now a complete and a fully functional tool to use on the shop floor. One thing that is important in a Flow environment is to keep operations simple and expend labor time performing only, value added tasks. The basis of demand driven manufacturing is to perform only valued added steps in manufacturing with waste continuously being driven out. The overall look and fell of the Workstation is that everything you need is there and navigation is relatively intuitive. This makes for a high value interface that is in keeping with Lean principles. My personal view is that the R12 Workstation has all you need to run a Flow Line efficiently by any operator. The Workstation is transaction oriented and the navigation is straight-forward.

**ORACLE® Flow Manufacturing**

Home Sequencing Tasks Workstation Setup

Workstation > Work Queue (HOU)

Line/Line Operation HOU-LN1/OP10

**Flow Schedules**

Select Schedule: Express Complete Line Operation (5) Complete Line Operation (9) Complete Schedule (3) Express Complete Schedule (4) Get Event (6) Get Schedule (7) Action

Select Schedule Number	Assembly	Assembly Description	Build Seq	Action
<input checked="" type="radio"/> 957	FLM-Lot-Control1	Flow Lot Assembly 1	20	
<input type="radio"/> 958	FLM-Lot-Control1	Flow Lot Assembly 1	25	
<input type="radio"/> 960	FLM-Lot-Control1	Flow Lot Assembly 1	27	
<input type="radio"/> 961	FLM-Lot-Control1	Flow Lot Assembly 1	29	
<input type="radio"/> 962	FLM-Lot-Control1	Flow Lot Assembly 1	31	

Events: 957

Event Seq	Code	Description	Department
11	EV01	Standard Event 1	FLOW-1

[Return to Workstation \(0\)](#)

Home Sequencing Tasks Workstation Setup Home Logout Help Preferences

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Flow Workstation left half of Work Queue.

Home Logout Help Preferences

Line/Line Operation HOU-LN1/OP10

[Complete Schedule \(3\)](#) [Express Complete Schedule \(4\)](#) [Get Event \(6\)](#) [Get Schedule \(7\)](#) Action Scrap Assembly Go [Previous 5](#) [6-10](#) [Next 5](#)

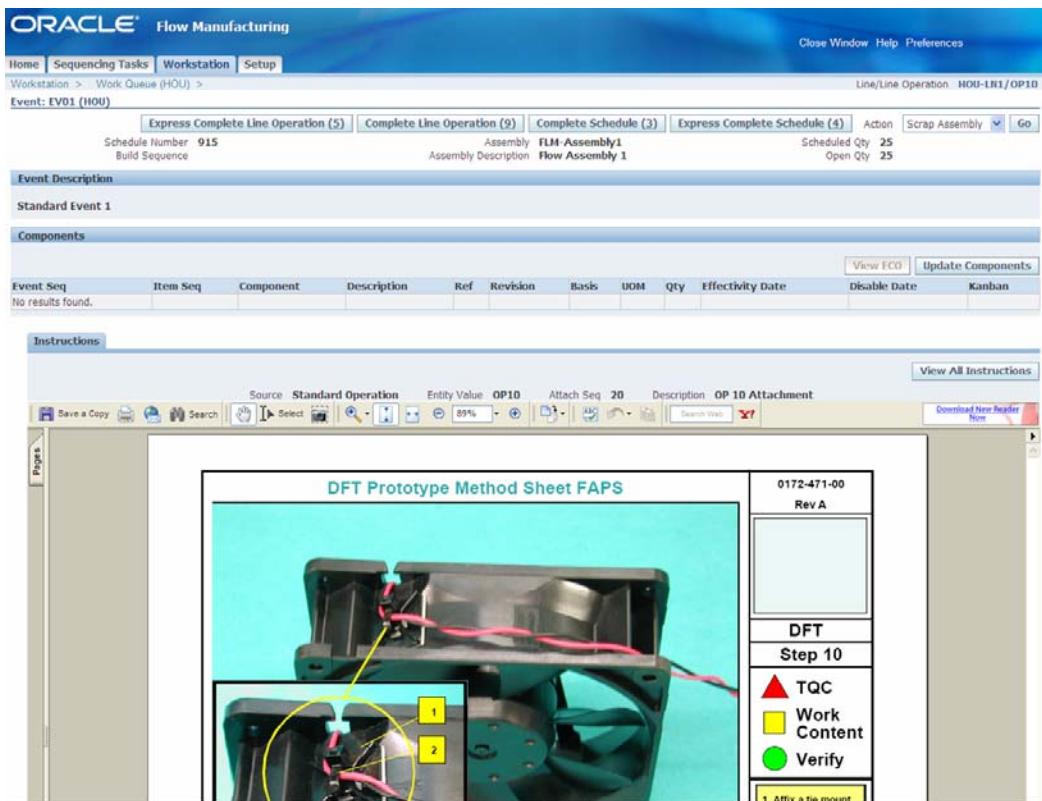
Assembly Description	Build Seq	Planned Quantity	Completion Date
Flow Lot Assembly 1	20	5	04-Feb-2008 23:59:00
Flow Lot Assembly 1	25	5	04-Feb-2008 23:59:00
Flow Lot Assembly 1	27	5	04-Feb-2008 23:59:00
Flow Lot Assembly 1	29	5	04-Feb-2008 23:59:00
Flow Lot Assembly 1	31	5	04-Feb-2008 23:59:00

Description	Department
Standard Event 1	FLOW-1

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Flow Workstation right half of Work Queue.

There are six buttons that give the shop floor personnel a way to quickly communicate progress on the shop floor or to drill-down to get more information on a particular Flow Schedule or Event.



Flow Workstation Event View with Work Instructions being viewed – top half of screen.

The screenshot continues from the previous one, showing the bottom half of the Workstation Event View:

- Resources:** A table showing Resource Seq, Type, Code, Description, UOM, Basis, Usage, Available 24 Hours, and Schedule for resources 20 and 30.
- Detail Properties:** A large section containing various properties for the work operation, such as Line, Schedule Number, Assembly, Scheduled Completion Date, BOM Revision, Alternate BOM Designator, Completion Subinventory, Project, and Unit Number. It also lists Line Operation, Build Sequence, Assembly Description, Scheduled Quantity, BOM Revision Date, Routing Revision Date, Alternate Routing Designator, Sales Order, and Completion Locator.

Flow Workstation Event View with bottom of Work Instructions showing detail properties and Resource requirements – scroll down to view the bottom of the screen.

**ORACLE® Flow Manufacturing**

Home Sequencing Tasks Workstation Setup

Workstation > Work Queue (HOU) > Event: EV01 (HOU) >

Update Schedule (HOU)

Schedule Number	957	Assembly	FLM-Lot-Control1	Scheduled Qty	5																																
Build Sequence	20	Assembly Description	Flow Lot Assembly 1	Open Qty	5																																
* Indicates required field																																					
<b>Schedule Details</b> <table border="1"> <tr> <td>* Scheduled Qty</td> <td>5</td> <td>Alternate Routing</td> <td>[Search]</td> </tr> <tr> <td>Build Sequence</td> <td>20</td> <td>Sales Order</td> <td>10000037-Standard Orde [Search]</td> </tr> <tr> <td>SubInventory</td> <td>PGI</td> <td>Order Line</td> <td>1.1 [Search]</td> </tr> <tr> <td>BOM Revision</td> <td>0</td> <td>Schedule Group</td> <td>Kanban Card [Search]</td> </tr> <tr> <td>BOM Revision Date</td> <td>04-Feb-2008 23:59:00 (example: 20-Jan-2008 19:45:00)</td> <td></td> <td></td> </tr> <tr> <td>Routing Revision</td> <td>0</td> <td></td> <td></td> </tr> <tr> <td>Routing Revision Date</td> <td>04-Feb-2008 23:59:00</td> <td></td> <td></td> </tr> <tr> <td>Alternate BOM</td> <td></td> <td></td> <td></td> </tr> </table>						* Scheduled Qty	5	Alternate Routing	[Search]	Build Sequence	20	Sales Order	10000037-Standard Orde [Search]	SubInventory	PGI	Order Line	1.1 [Search]	BOM Revision	0	Schedule Group	Kanban Card [Search]	BOM Revision Date	04-Feb-2008 23:59:00 (example: 20-Jan-2008 19:45:00)			Routing Revision	0			Routing Revision Date	04-Feb-2008 23:59:00			Alternate BOM			
* Scheduled Qty	5	Alternate Routing	[Search]																																		
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<b>Assembly Lot</b> <table border="1"> <tr> <td>Select Lot Entry:</td> <td>Generate Lot Number</td> <td>Delete</td> </tr> <tr> <td colspan="3">Lot</td> </tr> <tr> <td>Select Lot Number</td> <td>Attributes</td> <td>Qty</td> </tr> <tr> <td><input type="radio"/> FLM00004</td> <td>[Search]</td> <td>[Edit]</td> </tr> <tr> <td colspan="3"><a href="#">Add Another Row</a></td> </tr> </table>						Select Lot Entry:	Generate Lot Number	Delete	Lot			Select Lot Number	Attributes	Qty	<input type="radio"/> FLM00004	[Search]	[Edit]	<a href="#">Add Another Row</a>																			
Select Lot Entry:	Generate Lot Number	Delete																																			
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<input type="radio"/> FLM00004	[Search]	[Edit]																																			
<a href="#">Add Another Row</a>																																					
<input type="button" value="Cancel"/> <input type="button" value="Apply"/>																																					

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Flow Workstation update Flow Schedule Information.

**ORACLE® Flow Manufacturing**

Home Sequencing Tasks Workstation Setup

Workstation > Work Queue (HOU) > Schedule: 957 (HOU) >

Complete Line Operation: 957 (HOU)

Schedule Number	957	Assembly	FLM-Lot-Control1	Scheduled Qty	5
Build Sequence	20	Assembly Description	Flow Lot Assembly 1	Open Qty	5
<input type="button" value="Cancel"/> <input type="button" value="Apply"/>					

**Applicable Quality Plans**

<a href="#">Expand All</a>   <a href="#">Collapse All</a>								
Focus Plan Name	Information	Mandatory	Completed	Attachments	Duplicate	Update	Delete	Add Child Data
FLOW LINE QUALITY	Flow Line Quality Collection Plan	Yes						

**Completion Destination**

Choose Destination: <input type="radio"/> OP20(FLOW-1) - Primary(100.0%)
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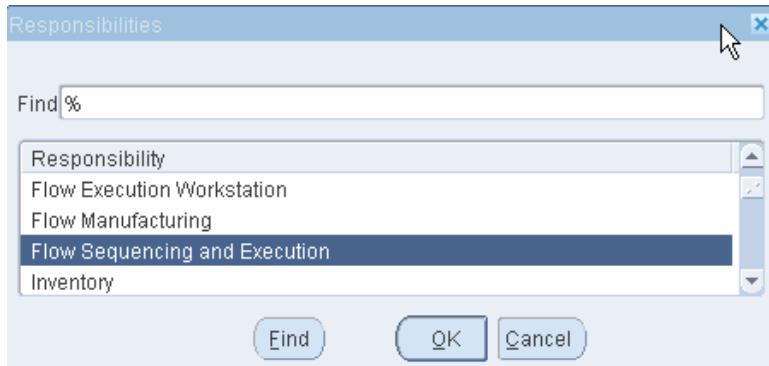
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Quality information can be input when the proper triggers have been set.

The quality information is entered as part of the process and is virtually seamless. In-line quality input means that any problems in the process are reported in a timely manner.

## Flow Workstation in R12 – The Setup

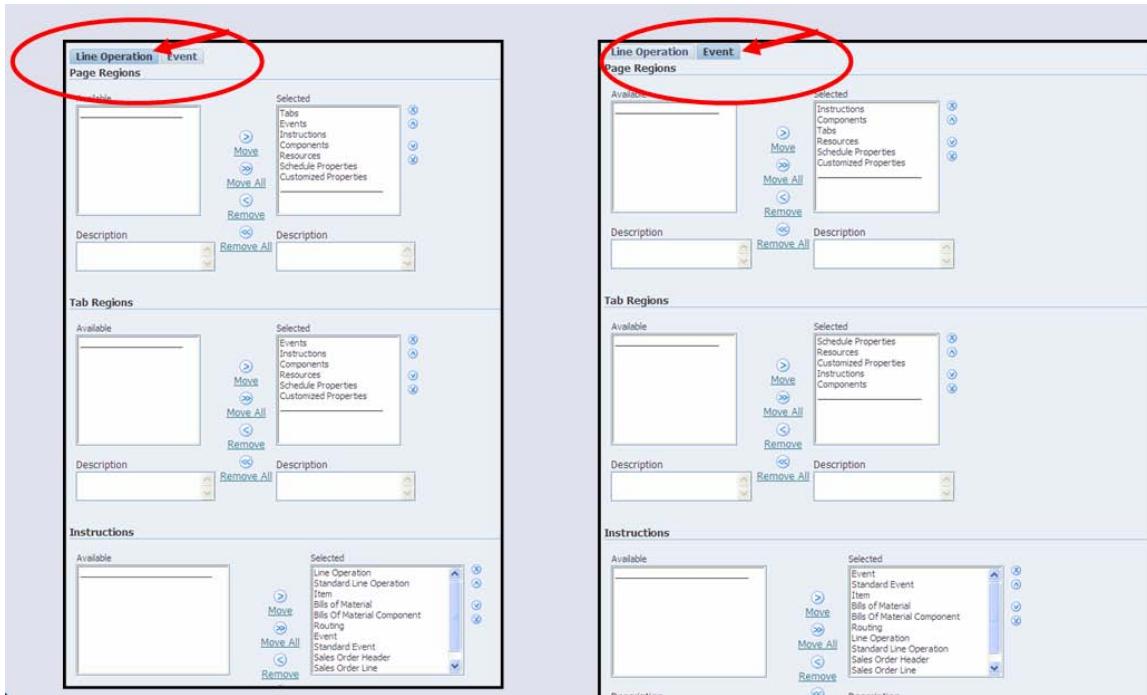
The setup of the Workstation while not complicated must be done and careful consideration should be exercised in the various setup options in for using the Workstation. Since there are many options on what displays and how the Workstation displays the setup should be thoroughly tested with your user community and accepting the defaults is probably not going to work for your organization.



The Flow Sequencing and Execution is used for setup.

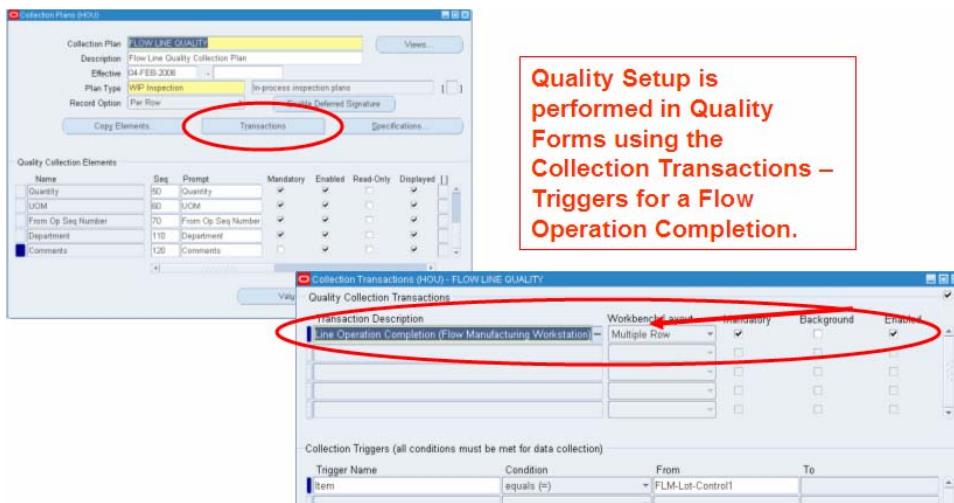
The screenshot shows the Oracle Flow Manufacturing software interface. The title bar says 'ORACLE® Flow Manufacturing'. The menu bar includes 'Home', 'Sequencing Tasks', 'Workstation', 'Setup' (which is selected), 'Sequencing Attributes', 'Sequencing Rules', 'Production Lines', and 'Workstation Parameters'. The main window has a message box: 'Information' stating 'New parameters initialized from its parent level parameters.' Below this is a section titled 'Update Workstation Parameters' with tabs for 'Organization HOU', 'Production Line', and 'Line Operation'. The 'Organization HOU' tab is active. It contains a 'Settings' group with various configuration options: 'Workstation Enabled' (checked), 'Schedule Selection Mode' (set to 'Work Queue'), 'Automatic Schedule Transition' (set to 'No'), 'View All Schedules' (set to 'No'), 'Automatic ECO Check' (set to 'No'), 'ECO Days Prior' (set to 0), 'ECO Days After' (set to 0), 'Backflush Option' (set to 'Actual / Primary Path'), and 'Instruction Frame Height' (set to 800). At the bottom of this section are buttons for 'Line Operation' (selected) and 'Event', and a 'Page Regions' link. There are also 'Cancel' and 'Apply' buttons at the top right of the 'Settings' group.

The Flow Sequencing and Execution is used for setup the Setup Tab – Workstation Parameters.



Setup of the Line Operation and Event Regions.

Once all of the setup is done in Flow it is necessary to go back into the forms and setup Quality.



Setup of Quality is accomplished in the Quality Form.

With the setup complete of all of the components it is possible to move off the 11i10 workstation with very little training and begin to experience a faster and more responsive lean manufacturing environment.

## **DISCRETE MANUFACTURING EXECUTION SYSTEM**

### **Discrete Manufacturing in Release 12**

In Release 12, Oracle introduced manufacturing execution support for Discrete Manufacturing. This support was in the form of the MES Workstation for shop floor operators and the MES Supervisor Workbench for shop supervisors. A dramatic improvement over the Oracle Forms based screens in version 11i10 and prior, this new functionality offers capabilities heretofore found only in stand-alone manufacturing execution systems. The upshot is that customers who are currently using or may be considering purchasing MES software from a best-of-breed company might now find the support they require in a module that is part of the fully integrated Oracle E-Business Suite.

Even for companies not looking to a standalone MES, Oracle's Release 12 solution has some marked improvements in interacting with the shop floor and performing the daily activities of viewing, recording and analyzing information. The first and most obvious upgrade is that the MES Workstations eliminate or greatly reduce the need to navigate to numerous screens to obtain job information and report progress. Once into the details, you can see that transaction entry flows have been streamlined for some of the traditionally cumbersome data entry tasks.

Though the improvements over prior versions are striking, the overriding assumption still holds that it is the workers who interact with the system. Oracle has not yet achieved out-of-the-box machine data capture and recording, but Release 12 MES is definitely a step in the right direction. Companies with in-house manufacturing or assembly operations that are transaction and data intensive are likely to recognize the greatest benefits from the enhanced features, but if you do any kind of in-house manufacture, a look at the new MES is warranted.

There are a few conditions which affect the functioning of the workbenches that should be mentioned before moving into the details. First is a mandatory setup: every shop worker who will be accessing the MES Workstation must be defined as an instance of a resource in a department within the organization they are to have access to. The other conditions, if present, will enable more of the features thus providing more potential benefit. If your discrete jobs are modeled with routings, the operations on those routings have resources particularly time-based ones, and move transactions are performed for all or most operations and processed online, you will be able to take fullest advantage of the Release 12 MES offering.

### **Configuration Parameters**

There are approximately two dozen parameters specific to the new MES functionality controlling user interface layouts, content, system behavior, and security. Many of these parameters will be referred to below in the applicable sections of this paper. Examples of parameters with greatest impact are those related to the dispatch list and its contents, lists of actions allowable on job operations, and the controlling mode for how workers enter their direct labor time. Parameters can be set at various levels: site, role, organization, and department.

## MES Workstation

The MES Workstation is designed for operators on the shop floor and contains the manufacturing tasks they are to perform. As are all manufacturing related screens, it is specific to a single organization. Typically the workstation will be in the context of a particular resource – labor or machine type – in a specific department though it can be utilized for an entire department or even an entire organization. The heart of the workstation, and the starting point for operators, is the dispatch list.

## Dispatch List

The dispatch list is a tabular listing of job operations in the work queue of a particular resource or department, or the entire organization if that is how shop management is structured and the number of jobs run is normally not too large. It is highly configurable as to what job operations are shown (timeframe, status, etc.), what order they displayed in, and what information is displayed vs. hidden for the listed operations.

The dispatch list would typically display the job operations that the login resource needs to work on in the current day or shift. You can choose to display this work queue in either of two different ways and the workstation calls those *Current* and *Actual*. Controlled by a workstation parameter, this setting determines which job operations to display based on either their scheduled start time or the presence of assemblies in the Queue or Run step of the context operation. The displayed operations can be grouped, filtered, and rearranged as desired to improve efficiency.

The screenshot shows the Oracle MES Workstation Dispatch List screen. At the top, there are filters for Department (ASSY), Resource (LBR-1a), and Instance (All). The Dispatch List dropdown is set to 'Current'. Below the list are 'From Date' and 'To Date' fields. The main area is titled 'Dispatch List' and contains a table with columns: Select Job Op, Ready, Action Name, Start Date, Assembly, Total Qty, Op, Prior UOM, Exception, Customer, Shift, Resource Usage, Express Move Qty, Complete, and Scrap. The 'Ready' and 'Resource Usage' columns are highlighted with red boxes. The table rows represent different job operations with their respective details.

Discrete Manufacturing dispatch list with operation readiness and resource running availability

Columns across the screen display data for each of the operations listed and for some you have a choice as to which data columns are displayed and which are hidden. In addition to the data visible in past versions such as assembly, operation quantities, and scheduled start/end times, there are new concepts in Release 12 such as operation readiness, clock-in, express move, and resource availability, that can also be displayed. Once a row in the dispatch list is chosen, any of a number of activities can be performed for the subject operation by selecting from a dropdown actions list. A hyperlink on the job operation allows you to drill down to operation details (see the Work Content section below).

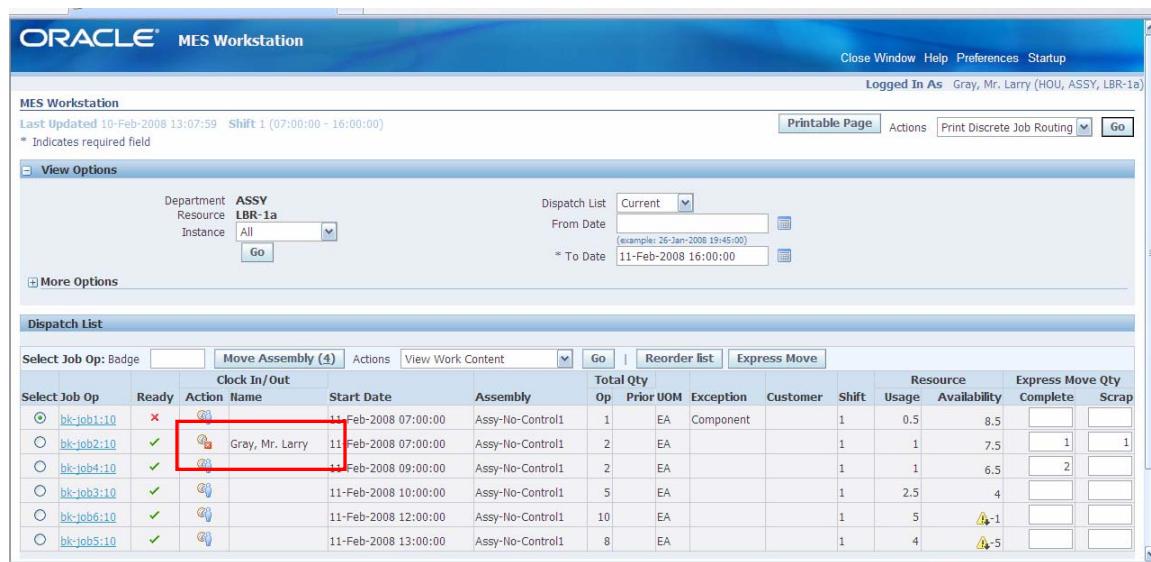
For operations that do not work from a dispatch list – certain departments or an entire organization – there is an alternative to the dispatch list. It is a job search function that is intended for work centers that work on whatever job comes to them next in line. The search allows for user entry of a job or assembly and then brings up a row just like a row in the dispatch list where the operator has all the same actions available to him as if he were using a dispatch list.

## Time Entry

There is significant new functionality in Release 12 in the area of shop employee time capture to supplement the previously available resource charging capability. Supported only in MES, these new features provide a way for direct labor employees to clock in when they are starting a job (and clock out when they are finished), or select and “reserve” a job before actually starting work on it. These features support one or multiple operators working on a single operation. A

workstation parameter controls whether you turn these features on or choose to capture time the same way you did in prior releases.

If you choose to utilize the new time charging features, two other parameters come into play. The first allows you to tell the system whether to create resource transactions from clock in/out entries or just write a record of operation and start/end time into a table for future use such as import into a time and attendance system. The other parameter controls whether job-on and clock-in are one combined function or two separate functions. Job-on is intended for use when more than one employee is working from a single dispatch list. It provides a way for one employee to indicate to the system that he or she is going to work on a job operation. Other employees will then select a different job or, if working on the same job, will see that it has already been selected and they do not need to. Combining the job-on and clock-in functions is the normal setup for operations with a single operator responsible for performing transactions in the system. In this case, there is no need to select a job until work begins and is recorded by a clock-in.



The screenshot shows the Oracle MES Workstation interface. The top menu bar includes Close Window, Help, Preferences, Startup, Logged In As: Gray, Mr. Larry (HOU, ASSY, LBR-1a), Printable Page, Actions, Print Discrete Job Routing, and Go. The main window title is MES Workstation. It displays a Dispatch List for Shift 1 (07:00:00 - 16:00:00) last updated on 10-Feb-2008 at 13:07:59. The Dispatch List dropdown is set to Current, with From Date as 11-Feb-2008 07:00:00 and To Date as 11-Feb-2008 16:00:00. The Dispatch List table has columns: Select Job Op, Ready, Action, Name, Start Date, Assembly, Total Qty, Op, Prior UOM, Exception, Customer, Shift, Resource Usage, Availability, Express Move Qty, Complete, and Scrap. An operator named "Gray, Mr. Larry" is listed under the "Action" column for multiple rows, with the second row highlighted by a red box. The table also shows various assembly details and resource usage across different shifts.

Select Job Op	Ready	Action	Name	Start Date	Assembly	Total Qty	Op	Prior UOM	Exception	Customer	Shift	Resource Usage	Availability	Express Move Qty	Complete	Scrap
<input checked="" type="radio"/> bk-job1:10	<span style="color: red;">X</span>			11-Feb-2008 07:00:00	Assy-No-Control1	1	EA	Component			1	0.5	8.5			
<input type="radio"/> bk-job2:10	<span style="color: green;">✓</span>		Gray, Mr. Larry	11-Feb-2008 07:00:00	Assy-No-Control1	2	EA				1	1	7.5	<span style="color: green;">1</span>	<span style="color: green;">1</span>	
<input type="radio"/> bk-job4:10	<span style="color: green;">✓</span>			11-Feb-2008 09:00:00	Assy-No-Control1	2	EA				1	1	6.5		<span style="color: green;">2</span>	
<input type="radio"/> bk-job3:10	<span style="color: green;">✓</span>			11-Feb-2008 10:00:00	Assy-No-Control1	5	EA				1	2.5	4			
<input type="radio"/> bk-job6:10	<span style="color: green;">✓</span>			11-Feb-2008 12:00:00	Assy-No-Control1	10	EA				1	5	<span style="color: yellow;">1</span>			
<input type="radio"/> bk-job5:10	<span style="color: green;">✓</span>			11-Feb-2008 13:00:00	Assy-No-Control1	8	EA				1	4	<span style="color: yellow;">5</span>			

Discrete Manufacturing dispatch list showing an operator clocked in to an operation

Utilizing the clock in and out features creates data records in Oracle that provide support for a number of other potentially important features. First and foremost, clocking in on an operation records the actual start time which in turn enables the system calculation of a projected completion time for the operation (visible on the supervisor Dashboard as discussed below), and provides data input for more accurate scheduling in the APS products of operations in progress. It also provides the supervisor (through the Dashboard) visibility to who is working on an operation.

## Work Content

Work content is all the information needed to perform work on a particular operation. Accessible quickly from the dispatch list, this page displays for a single operation any resource and component requirements, work instructions (loaded as attachments), sales order and customer, operators clocked in, and more, all very configurable as to content and order, controlled by desired setting of related workstation parameters. There is a configurable actions list on this page too through which operators can access windows to perform transactions, enter job notes, and access additional information related to the context operation.

Component	Description	Date Required	Basis	Per Assembly	Required	Issued	Open	Allocated	Available	On-Hand	UOM	Type	Supply	SubInv	Locator	Comments	Instructions
Comp-No-Control1	Component1	11-Feb-2008 07:00:00	Item		2	4	0	4		0 EA	Operation	Pull	STK				
Comp-Lot-Control1	Lot Component 1	11-Feb-2008 07:00:00	Item		2	4	0	4		0 EA	Push						
Comp-Serial1	Serial Component 1	11-Feb-2008 07:00:00	Item		1	2	0	2		0 EA	Push						

Work Content page displays employees currently working, component requirements, instructions

## Transactions

With Release 12 MES there is now a more efficient and enhanced way to perform transactions on discrete jobs. All the transactions you are accustomed to – move, complete, issue components, charge resources, enter lots and serials, collect quality data – are supported, along with several new features and enhancements. New features include direct labor time capture through clock in/out (as described above in the Time Entry section), compound transactions,

express move, and user stamp on moves and completions. To understand compound transactions, think of the current move-and-complete transaction, often called “easy complete”. More transactions are now combined like this into a single step allowing operators to perform move and scrap, complete and scrap, move and reject, etc. in a single pass. Express Move resides in the dispatch list (see screen shot above) and allows operators to report completion on multiple job operations in a single pass. For companies in industries subject to audit or regulation it is often important to know who performed certain manufacturing activities. The new feature requiring operator entry of a badge number during moves and completions satisfies this requirement.

On the enhancement front, when recording completions and component consumption you may find lots and serials easier to enter with inline entry or express entry. Inline entry reduces clicks and navigation by providing a lot field and/or a serial field on the same line where the item and quantity fields exist. These two fields are displayed only for the items requiring them and can be used when only a single lot or serial, or a range of serials, is involved in the component consumption or assembly completion transaction. That means this feature can be taken advantage of when a serialized item is being transacted in a quantity of 1 or a lot control item is being transacted with all quantities from the same lot.

## **Shop Floor Exceptions**

Shop floor exceptions are a new feature available only in Release 12 MES and are designed to be used to communicate information about abnormal occurrences on the shop floor that prevent physical completion of an operation. Manually initiated, exceptions log information into the system to indicate a job operation is not ready to be worked at a time when the system indicates otherwise. Some examples of such occurrences are a machine not starting up or otherwise not being ready to work, insufficient or incorrect components, assemblies not received from a prior operation, quality problems warranting a stop-work. Operators can log such an incident as an exception, classify it with a reason code, enter a text explanation, and have it routed as a notification to the supervisor. Exceptions can then be managed and resolved through the Supervisor Dashboard (further described below) or as a response to a notification.

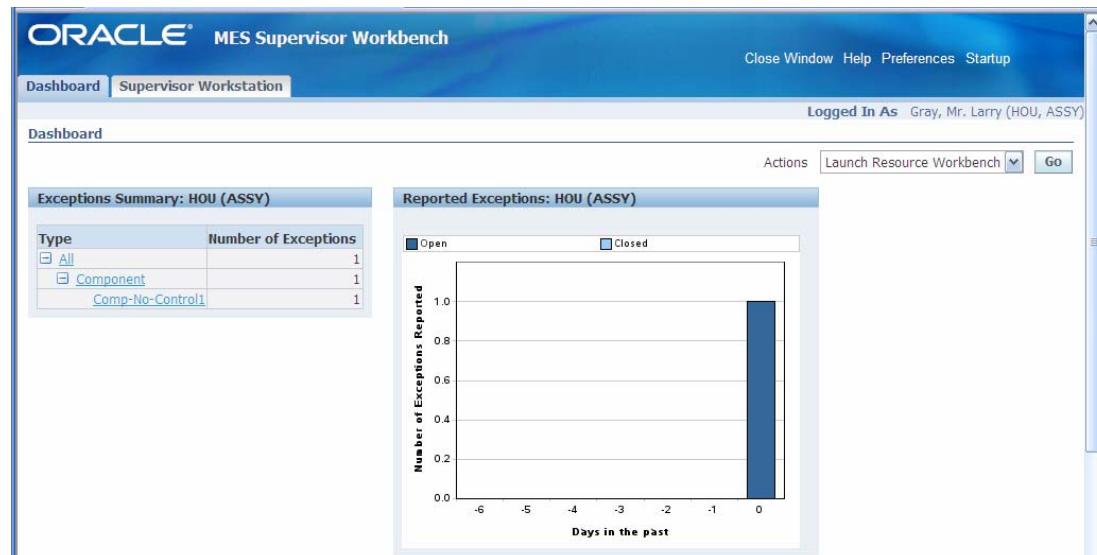
Exceptions can also be mass entered. An example occurrence warranting mass exceptions is a material planner creating an exception for all jobs impacted by a rejected component lot in inspection. Operators would see this exception on the dispatch list for any job impacted and know it was not ready to be started.

## **MES Supervisor Workbench**

The MES Supervisor Workbench is designed for the shop floor supervisor and contains access to information and activities that are typically supervisory in nature. Just as with the MES Workstation, it is specific to a single organization and the context is determined by the information entered at login. When only an organization is entered, the workbench displays information for an entire organization. When an organization and department are entered, the workbench displays information for the specified department. The same holds true if a resource is also entered. The workbench contains two tabbed pages – the Dashboard and the Supervisor Workstation. The Dashboard is intended to be the starting point for supervisors, and the Supervisor Workstation is very similar to the MES Workstation for operators with the focus being the dispatch list. Actions are available in both tabs and include those typically not available to operators such as a view of job transaction history, direct access to the Job Workbench and Resource Workbench for scheduling, and a link to directly access Manufacturing Daily Business Intelligence.

## Dashboard

The dashboard is the center of visibility to work progress and shop floor status. Views of anticipated capacity shortage for selected resources, jobs running behind schedule or beyond shift end, and which resources are working vs. idle provide information valuable for ensuring efficient shop floor operation. The dashboard is also the control point for viewing, analyzing, and resolving shop floor exceptions, and seeing other jobs that may be impacted by the situation called out in an exception. Resolution options supported include assigning work to an alternate resource, rescheduling the operation, expediting or re-directing material, placing a job on hold.



The screenshot shows a web-based MES dashboard titled "Shopfloor Progress: HOU (ASSY)". At the top, there are two tabs: "Capacity Shortages" and "Current State". Below the tabs, there is a search bar with a dropdown menu set to "All" and a "Go" button. A table displays a single row of data:

Resource	Department	Job Op	Assembly	Operator	Actual Start Date	Projected Completion Date	Qty Scrapped	Qty Rejected	Dispatch List
LBR-1a	ASSY	bk-job2:10	Assy-No-Control1	Gray, Mr. Larry	10-Feb-2008 12:47:42	11-Feb-2008 08:00:00	0	0	[grid icon]

At the bottom of the screen, there is a footer bar with links: "Privacy Statement", "Dashboard", "Supervisor Workstation", "Close Window", "Help", "Preferences", and "Startup". On the far right, it says "Copyright (c) 2008, Oracle. All rights reserved."

MES Dashboard for supervisors

## Supervisor Workstation

Very similar to the MES Workstation for operators, this screen is based on a dispatch list and is also configurable as to actions and information available to each particular supervisor. Views of current and upstream dispatch lists can assist supervisors in planning work for a following day or shift and analyzing work load for overtime planning.

## Process Manufacturing Workstation Setup and Usage

The OPM Workstation is part of Oracle R12 new functionality for Process Manufacturing and there are 5 major enhancements that have been released. We will only explore 3 of the 5 enhancements that are most involved with Workstation functionality. The documentation calls this the Operator Workbench.

- Process Instructions
- Operator Workbench
- Dispensing Pre-Weigh Functionality
- Electronic Master and Batch Control Record\*
- Non Conformance Management\*
- Labeling Device Integration\*

\* Not covered in this paper.

### Setup of the OPM Workstation

Setting up the new OPM R12 functionality maybe more complicated than the other two Workstations we have reviewed. The steps below are not necessarily all of the steps but will give you a pretty good idea of how the setup works. To get started you will need to have the System Administrator give you the -- MES for Process Manufacturing Administrator. This step is necessary because to get the Workstation functional there needs to be a concurrent process run to turn on the functionality fully.

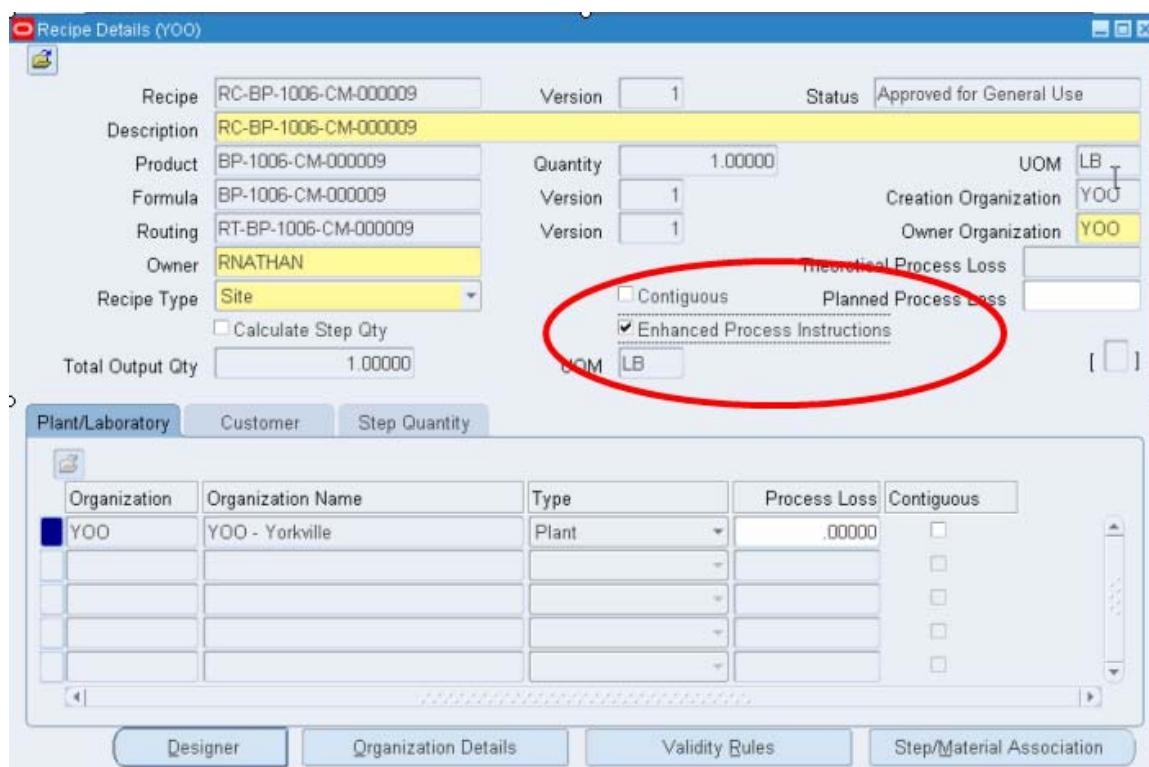


Once the responsibility has been assigned you will then be able to run a concurrent process to turn the Profile Option GMO: MES for Process Manufacturing and enable the Workstation. See the screen shot below.

Profile Option Name	Site	Application	Responsibility	User
GMO: Control Batch Recording Enabled				
GMO: Device Integration Mode	Both			
GMO: Device Measure Response Component				
GMO: Device Read Interval (MilliSeconds)				
GMO: Device Read Timeout (Seconds)	10			
GMO: Device UOM Response Component				
GMO: Label Print Mode				
GMO: MES for Process Manufacturing is	Yes			
GMO: Operator Certificate for Process M:				

The Profile Option GMO: MES for Process Manufacturing needs to be Yes.

After enabling the profile option for the OPM Workstation functionality, one very important thing happens that you need to be aware of. The Enhanced Process Instructions are now available in the Recipe Form. This allows the user to have the checked recipe display on the Workstation the process instructions.



The screenshot shows the 'Recipe Details (YOO)' window. In the main panel, there are fields for Recipe (RC-BP-1006-CM-000009), Version (1), Status (Approved for General Use), Description (RC-BP-1006-CM-000009), Product (BP-1006-CM-000009), Formula (BP-1006-CM-000009), Routing (RT-BP-1006-CM-000009), Owner (RNATHAN), Recipe Type (Site), and Total Output Qty (1.00000). On the right side, there are checkboxes for Contiguous, Planned Process Loss, and Enhanced Process Instructions. The 'Enhanced Process Instructions' checkbox is checked and highlighted with a red oval. Below the main panel is a sub-panel titled 'Plant/Laboratory' containing a table with columns for Organization, Organization Name, Type, Process Loss, and Contiguous. The table has one row with YOO and YOO - Yorkville. At the bottom of the window are tabs for Designer, Organization Details, Validity Rules, and Step/Material Association.

The screen shot below shows the completion of a setup of the instructions for Operation 10: BD-PICKLE.

The screenshot shows a software interface for Oracle MES for Process Manufacturing. At the top, there's a blue header bar with the Oracle logo and the text "MES for Process Manufacturing". Below the header, a menu bar includes "Preferences", "Help", "Close Window", and a user status "Logged In As GLAWRENCE". A confirmation message box is displayed, stating "Instruction Set updated successfully." Below this, the main content area has a title "Instruction Set: Operation-10 : BD-PICKLE". To the right of the title are buttons for "Change Context", "Operation-10 : BD-PICKLE", "Go", and "Return". Underneath the title, there are several labels with their corresponding values: "Routing RT-BP-1006-DR-000001", "Version 1", "Description RT-BP-1006-DR-000001", "Owner Organization YOO", "Step 10", and "Operation BD-PICKLE". A "Create" button is located above a table. The table has columns for "Instruction Set" (with a link to "BP-1006-DR-000001") and "Description" (containing a detailed text about safety equipment). The table also includes columns for "Instruction Type" (Process), "SOP", "Update", and "Delete". Below the table is another "Return" button. At the bottom of the screen, there's a footer bar with "Privacy Statement", "Preferences", "Help", "Close Window", and the copyright notice "Copyright (c) 2006, Oracle. All rights reserved.".

In this screen shot we can see the actual process instructions.

The enhanced process instructions are displayed and it is also possible to link in a SOP or Standard Operating Procedure. The process instructions are open text and can be linked to the Recipe or Ingredient.

## Operator Workbench

The Operator Workbench (or Workstation) is totally new in R12 and is similar to the Flow and ODM workstations in look and feel and functionality. The html display for the operator has tabs and regions like the others workstations we've reviewed. Material and resource requirements can be viewed and inform the operator of what has to be done. One slight difference is that in the OPM Workstation a dispensing function is the method used to issue material. As you would expect in heavily regulated industries in the process sector, there are more controls and it does takes much more setup.

The Operator Workbench provides a “one-stop” screen for Operator Information.

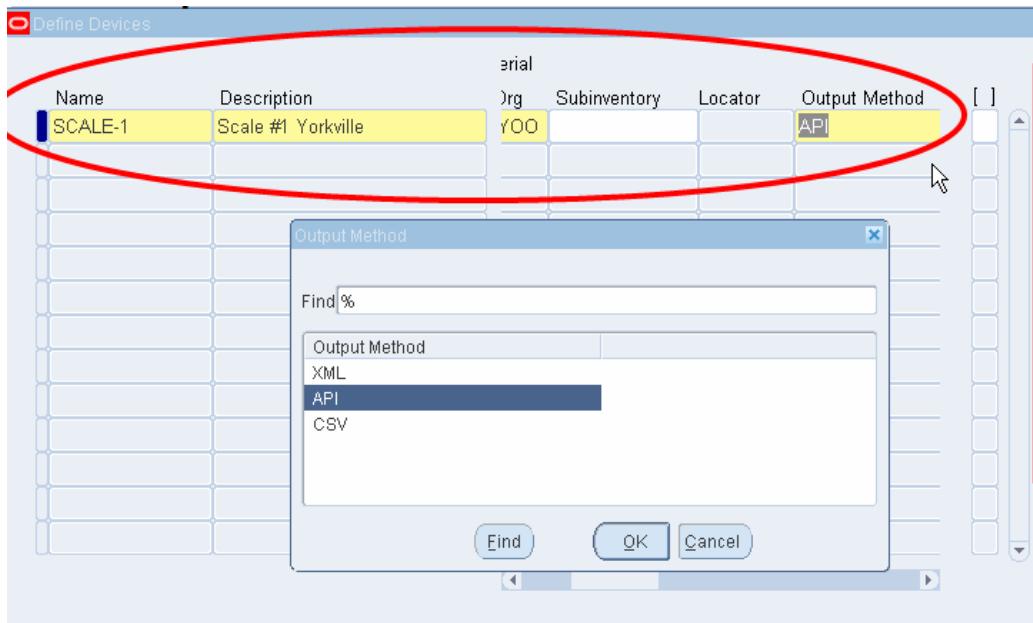
## Dispensing Functionality

Dispensing is also known as “pre-weigh” is a key requirement in the Pharmaceutical, Biotechnology, Food and Beverage and in Chemical Manufacturing. The dispensing process is used to assure that the exact quantities, weights or liquid measures are actually dispensed and can be documented. The dispensing process controls; measurement, labeling, within the specific quality requirements and the dispensing of the right materials at the right batch step and the process is document by the system. All stages of the material process are tracked from the issue from inventory to the delivery to the batch. It is also important that access to on-line to Standard Operating Procedures is part of the process and built into the Workstation. In the R12 release, weigh scale integration is also provided because integration to the measuring devices is required for data accuracy and compliance. Electronic devices can be integrated and must be assigned to a transaction.

Three modes of dispensing are supported:

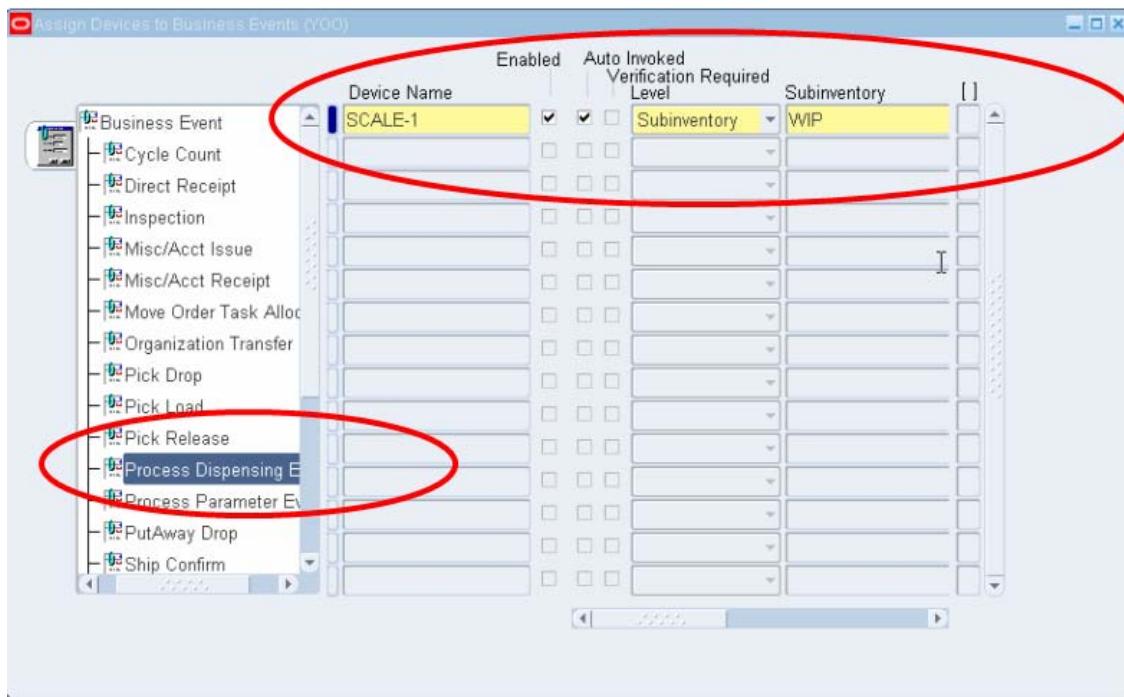
- Full Container
- Source Container
- Target Container

Materials may also be dispensed for the whole process - like filters - used not in quantity of the batch, but used only once per the process. Dispensed materials may only be used in the batch they were issued to, but there is a reverse process called reverse dispenses to handle returns or overages.



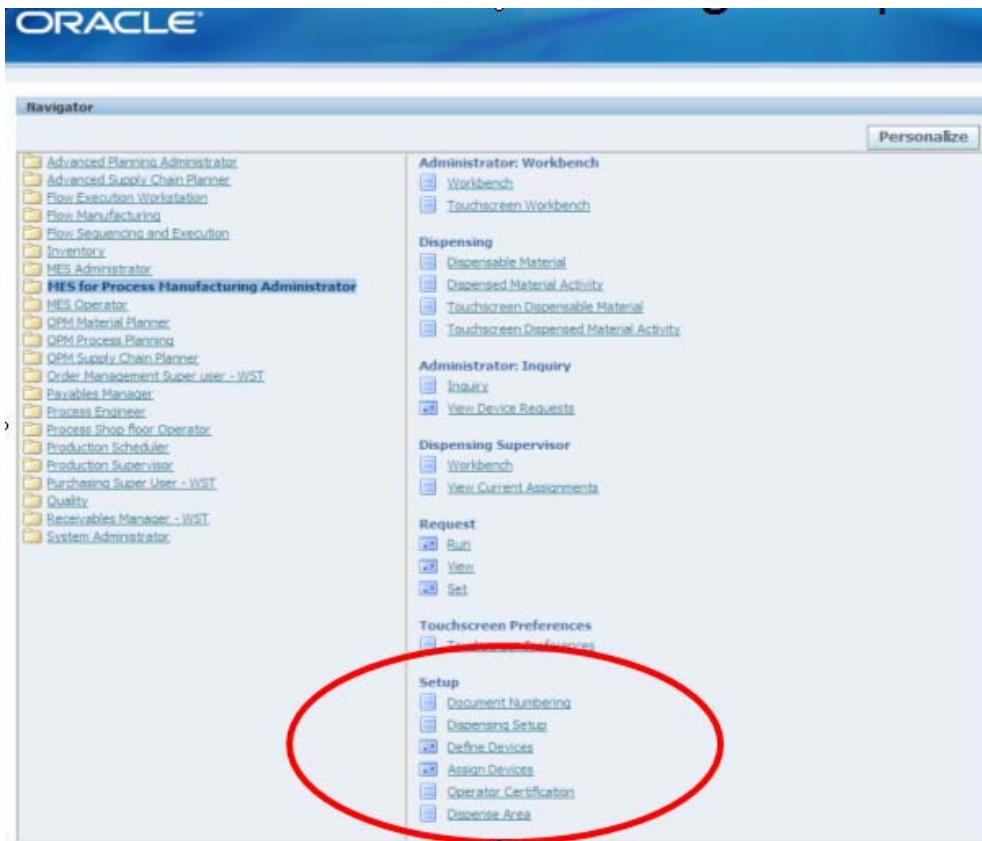
The setup of a scale and the method of output is shown in the slide above.

The device must then be associated with a transaction.



The screen shot above show the association of the transaction Dispense to the SCALE-1 and WIP Subinventory.

Once the transaction information complete the Document Numbering must be setup.



Document numbering setup is access in the Setup area of the MES for Process Manufacturing Administrator.

The setup is fairly straight forward to setup the starting document and then the increment and the length of the field.

The screenshot shows the 'Document Numbering' setup screen. The top navigation bar includes Workbench, Dispensing, Inquiry, Setup, and Dispensing Supervisor. The sub-navigation bar shows Document Numbering, Dispensing Setup, Operator Certification, and Dispense Area. The current page is 'Setup: Document Numbering > Create Document Numbering'. A note indicates that fields marked with an asterisk (\*) are required.

The setup form includes the following fields:

* Transaction	Dispense
* Organization	YOO
Organization Name	YOO - Rolling Mill Y
Assignment Type	Automatic
* Start With	1000
* Increment	1
Length	
Zero Padding	No
Prefix	DISP
Suffix	Y
Separator	-
Format Example	DISP-1000-Y

At the bottom, there is a footer with links to Workbench, Dispensing, Inquiry, Setup, Dispensing Supervisor, and a Privacy Statement link.

A fully complete setup of the Dispensing feature shows that the Item to be dispensed and the security required is defined.

## The OPM Workstation Look and Feel

The OPM Workstation is the process industry's solution for the shop floor. There are specific parts of the Workstation that would not be practical for the discrete mode but should fit well in the process industries.

View of the OPM Workstation showing the Operations and the product and ingredients.

## **SUMMARY**

We have reviewed the new functionality in the R12 Workstations and we think that Oracle has done a good job of enhancing the shop floor's access to more, better and faster information. Having the right tool to communicate the management priorities to the execution layer must be fast, electronic and appropriate to the shop floor people. The Flow, ODM and OPM Workstations in R12 are a step forward and each Workstation is functionally appropriate to their individual though different environments. Pressures in the manufacturing space have mandated these changes and we are happy to see that Oracle is reacting to very real needs in manufacturing. Oracle R12 Workstations are a move in the right direction. We look to Oracle to provide even more functionality to the shop floor in the future.