Oracle Manufacturing Execution Systems (MES) For Discrete Manufacturing

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ORACLE MANUFACTURING EXECUTION SYSTEM (MES) FOR DISCRETE MANUFACTURING

Executive Overview

Lower your cost and improve your shop floor visibility through a single integrated ERP/ MES solution. The barriers surrounding Enterprise Resource Planning Systems and MES Systems have been eliminated through new product offering by Oracle. This paper will introduce to you the new functionality that Oracle's MES solution offers to discrete manufacturers, providing them the tools to lower costs, through real time shop floor management.

This document focuses on how the Oracle MES solution functions and how those functions will provide a more productive and efficient manufacturing environment.

The target audience for this document is primarily subject matter experts who are implementing or upgrading to the R12 E-Business Suite, and consultants who are implementing the R12 E-Business Suite on behalf of external customers.

Introduction

The Need

Manufacturers are looking to standardize their shop floor systems across the world to promote collaboration, as they strive for better shop floor visibility, tighter controls of their operations, while achieving a reduction in cost of ownership. Globalization has put pressure on discrete manufacturers to carry fewer inventories while maintaining high service levels. This demand has forced manufacturers to rethink their IT strategy surrounding their production environment.

The Solution

Additional burden has been placed on MES and ERP systems in the recent past, as manufacturers are trying to standardize the systems used across the organization to help fill the communication gaps within their supply chain. Manufacturers alike have found it very difficult to collect and share shop floor data without and integrated system. This makes the ERP based MES solution more compelling to customers as there isn't a need to integrate with a 3rd party or homegrown solution. Oracle has introduced a one-stop-shop, where Oracle has introduced deeper shop floor execution capabilities. This solution will make it easier for Oracle users to deploy MES directly to the shop floor enabling supervisors and operators to share information throughout the organization. MES will help shop floor personnel to execute, record, and monitor shop floor activities in a highly efficient and effective manner, while allowing supervisors to see this information to make operational decisions. Key features include:

I. MES Administrator (Flexibility and Configurability)
- Control UI layout, content, system behavior and security through 27 parameters
- Configure at several levels (Site, Role, Org, Dept) [1]

II. MES Workstation
- Configurable dispatch list driven execution
- Configurable work content and sequential display of work instructions
- Clock In/Clock Out for actual time capture
- Enhanced shop floor transaction reporting
- Streamlined material transactions with lot and serial entry
- Shop floor exception reporting

III. MES Supervisor Workbench
- Exceptions summary with drill down capabilities
- Exception resolution
- Anticipated Capacity or Resource Shortages
- Current Shop Floor View
- Expedite Jobs
- Reorder Dispatch Lists
- Report Resource Usage
- View Historical Transactions
- Access Gantt Charts
- Review Performance Metrics Through DBI

Related Products

The MES is an additional product offering, although set ups for this application are completed in the MES Administrator companies will also need several of the Oracle manufacturing products such as; Work In Process, Bill of Materials, Inventory, Cost Management and MRP or ASCP in order for MES to work properly. There are several other applications that enhance the functionality of MES but are not required such as: Quality Management, Project Manufacturing, Configure to Order and Daily Business Intelligence.

I.   MES Administrator Set Up

The first Key feature of Oracle's MES is the MES Administrator. The MES Administrator is a tool, with 27 different parameters, that is used to configure the MES Workbench. The parameters control the behavior of the application at the organization or department level, and actions at the user level based upon roles. When you access the Administrator Workbench page, definition of each parameter is specified for or inherited from the site, role, organization or department. The twenty seven parameters are used to

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[1] Oracle R12 Users Guide

customize the display of information, security and actions that can be accessed on the MES Workbench.

Illustration 1: MES Parameters

Illustration 2: MES Parameters

Illustration 3: MES Parameters Update

II. Improve Operator Productivity and Efficiency through the MES Workstation

The second key feature of Oracle's MES is The MES Workstation. The MES Workstation, an integral part of the MES for the Discrete Manufacturing module, is meant for shop floor operators to perform their daily activities. Through a simplified user interface, this workstation provides all the information needed for operators to execute their work. Operators are able to perform shop floor activities easily with simultaneous access to relevant information that minimizes the system interaction time and significantly improves Operators' productivity and efficiency. [2]

Configurable Dispatch List Driven Execution

The MES Workstation is dispatch list driven, allowing shop floor operators to execute the work in the desired order of priority.

Illustration 4: Dispatch lists that are highly configurable

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[2] Oracle Data Sheet

Dispatch lists, a listing of all job operations in the work queue, provides an operator with a visual guide to see what jobs are in his queue and their status. It will notify the user if the job is currently being worked on or if the job has been expedited by a manager. The information displayed in this list is highly configurable and the presentation can be modified by filtering, ordering, and grouping to improve production efficiencies. You have the flexibility to view dispatch lists for one resource or multiple resources within one department or across many departments within an organization.[3] Columns in the list display information about each job operation, such as scheduled start and end time, assembly being built, customer, setup required, as well as various indicators of job readiness, and component and resource availability. The columns can be either displayed or hidden based on preferences, allowing organizations to configure their lists to show only the information pertinent to their business policies and practices.

There are a variety of actions and data drilldowns that can be performed in the context of any job operation in a dispatch list. Recording work start and stop, reporting move, completion and scrap transactions, viewing work requirements and reporting exceptions are some of the actions that can be initiated from the dispatch list. The dispatch list thus serves as a starting point on any day in the life of an operator. The operator normally selects and starts working on the first job operation with access to all the information necessary to perform the work. [4]

Configurable Work Content and Sequential Display of Work Instructions

The detailed work content page displays information, which is highly configurable, needed to complete the current operation. Examples of this information includes work instructions, information on components and resources required to perform the operation, drawings, engineering change order notes and standard operation procedures. You can also, from the work content page, navigate to action pages and view current employees working on the job. The actions available and the page layout all can be controlled by the parameter settings.

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[3] Oracle R12 MES Users Guide
[4] Oracle Data Sheet

Source Discrete Operation
Name   2

Attach Seq   10
Description VANTD

Illustration 5: Work Instruction can be displayed to help operators complete current operation

This online presentation of work instructions guides the operators to perform their work efficiently and enables companies to go "paperless" on the shop floor. Once finished with a specific job, operators are automatically taken to the detailed work instructions of the next job, without the need to navigate back to the Dispatch List.[5]

Clock In/Clock Out for Actual Time Capture.

The Oracle MES Workstation now has the ability to record and report the actual time spent on a job. This new process now eliminates the need to manually report resource transactions, thus maximizing shop floor productivity by capturing all resource transactions in one integrated system.

Shop floor time entry captures resource times using time entry pages, which simplifies reporting actual times spent through the use of Clock In and Clock Out buttons. An Operator Clocks In to indicate work start on a specific job operation and Clocks Out to report work stop. The differential between start and end times reported on Job Operations can be automatically recorded as resource transactions in the backend.

Several parameters control time entry behavior:

- Charge Resource at Report Time specifies if resource transactions are created at the time the job operation transaction time is reported.
- Time Entry Mode enables clock in and clock out functionality.
- Combine Job On and Clock In Buttons enables you to combine the actions of Job On and Off, and Clock In and Out Time Entry

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[6] Oracle Data Sheet

Job On is an action when multiple employees are working on a single job operation, locking the job to one worker. When an operator selects Job On the job is assigned to that employee and the employees name is displayed on the dispatch list. Clock in signifies that an operator is working on the job and Clock Out signals that the work has stopped.

In an event time is not reported during the move transactions, Oracle's MES, also offers a report time page as a manual method to report resource time. The report time page can be used to report time on several resources at one time or on a specific job.
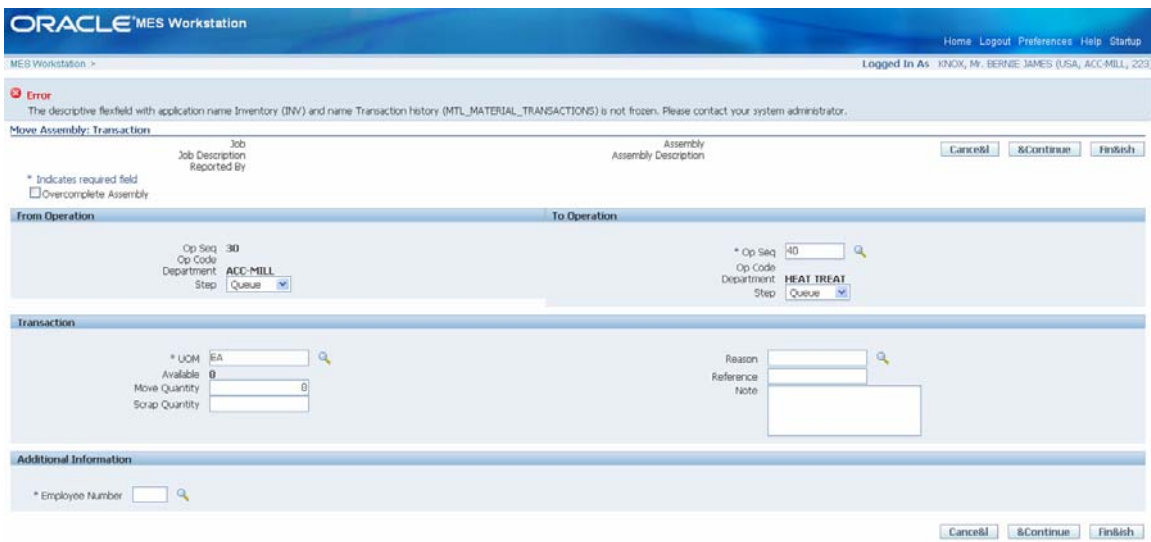

Illustration 6: Clock In and Clock Out buttons can be used to record actual start and end times on a job operation

Streamlined Shop Floor Transaction Reporting

Assemblies can be moved from one operation and intra-operation step to another, and backwards and forwards within a routing. The MES Workstation also provides the ability to combine transactions performing multiple transactions in one pass, to reduce the amount of time an operator spends performing transactions, such as, move and scrap and move and reject. Operators also now have the ability to submit quality results by simply clicking a button from the move transaction screen. Collection plan information displays and you can select the plan you would like to update and add quality results for that operation. You also can enter backflush component details (e.g. lot & and serial information) while performing a move transaction on a job operation – all through a single screen. Additionally, the system provides an option to automatically default push components thus eliminating the tedious task of manual entry.

Illustration 7: Operators have the ability to report hours worked, quality results, and component backflush details all through a single screen

This capability significantly improves an operator's efficiency in reporting shop floor transactions by saving time to perform value added manufacturing activities.
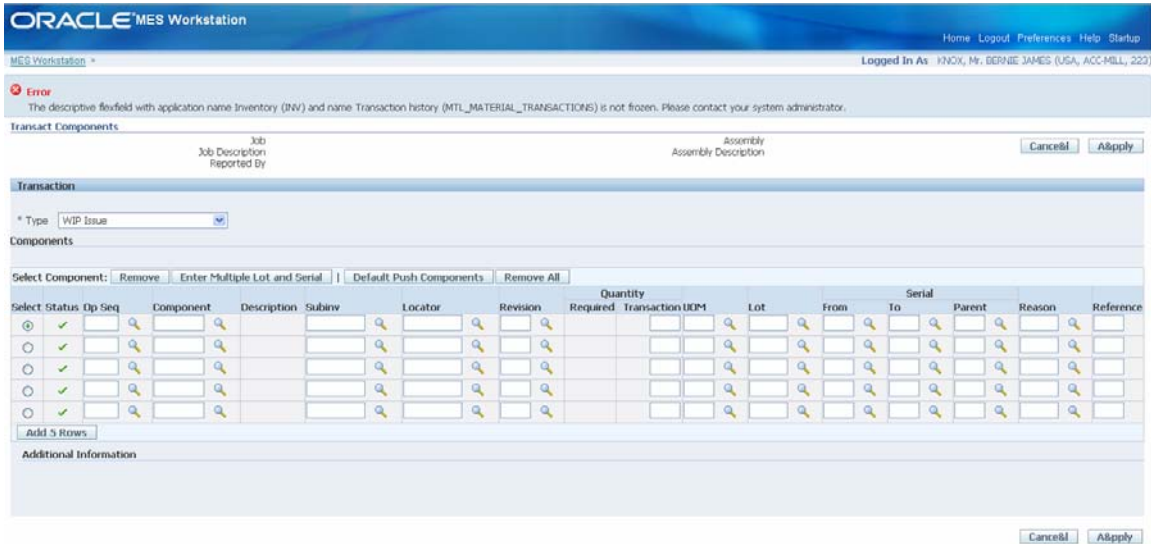

Illustration 8: Multiple component transactions along with lot serial details can be reported from a single screen

Shop Floor Exception reporting

In a discrete manufacturing setting, there are a number of reasons that may affect a job from being completed on time. With the new Oracle MES, Operators can bring attention to these events and occurrences that prevent them from performing work on a job. Through exception reporting users can inform supervisors when a machine is down; work instructions are missing, component shortages, and quality problems along with material and labor shortages. Report Exceptions are used to create a signal that notifies a manager or supervisor that there is a problem on the production floor.
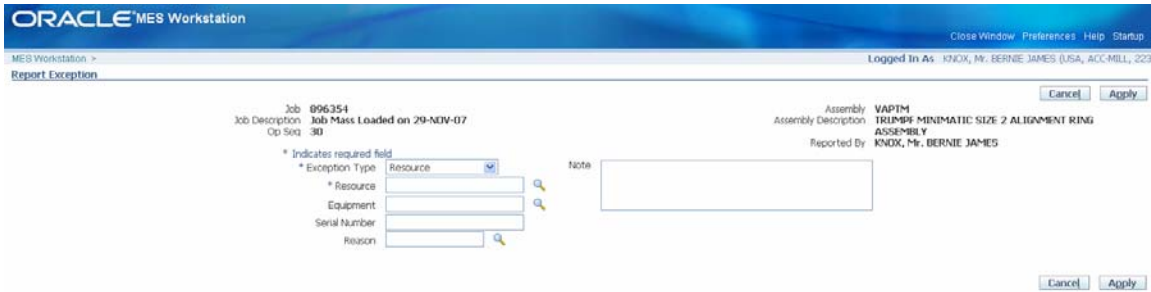

Illustration 9: Operator reported exceptions can prevent work progress

Managers are notified on the MES Supervisors Workbench that action needs to be taken in order to resolve these issues.

III. Achieve Better Visibility and Tighter Control through the MES Supervisor Workbench

The third and final key feature of Oracle's MES is the MES Supervisors Workbench, which consists of two parts; the Workstation and the Dashboard. The MES Supervisor Workbench is a starting point for supervisors to view shop floor progress and potential problems, by presenting a variety of information to reflect current shop status and issues requiring resolution. Through the support of several managerial functions in the workbench, supervisors can enforce stricter controls on manufacturing activities and resolve issues that prevent work progress.

1. Supervisor Dashboard

When logging into the Workbench, supervisors are presented with information on open and closed exceptions along with their resolution status and a snapshot of the current shop floor progress. The Supervisor's Dashboard can be used as a starting point to view shop floor progress and potential problems.

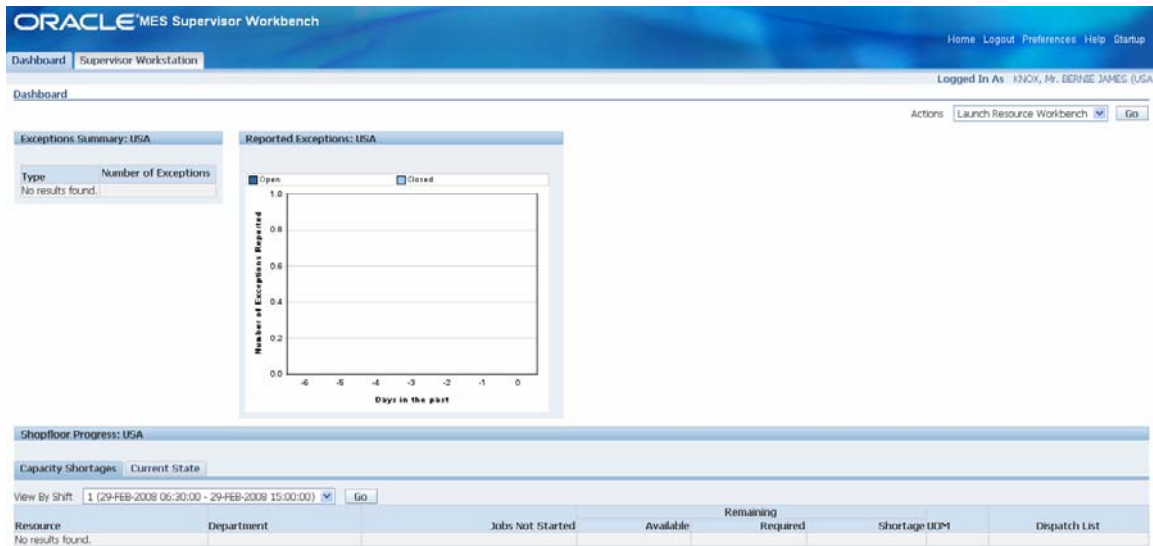**Illustration 10: Supervisor's Dashboard Start Up**

Illustration11: Supervisor's Dashboard in the MES Supervisor Workbench provides complete visibility into exceptions statuses and current shop floor progress

Exceptions Summary and Resolution Capabilities

Exception Information presented on the Supervisor's Dashboard are reported and displayed to show situations on the floor that are preventing operators from completing work. Exceptions can include material shortages, labor and resource shortages, and machine downtime and quality problems. The supervisor can drill down to the specific details of the exception and take appropriate action for resolution depending upon the type of exception logged. Some of the actions taken by the supervisor could include, assigning alternate resources, rescheduling job operations, putting problematic jobs on hold, or assigning shop floor statuses. The exceptions are also reported in graphical form where the number of open and closed exceptions display in color coded graphical view over a seven day time frame.
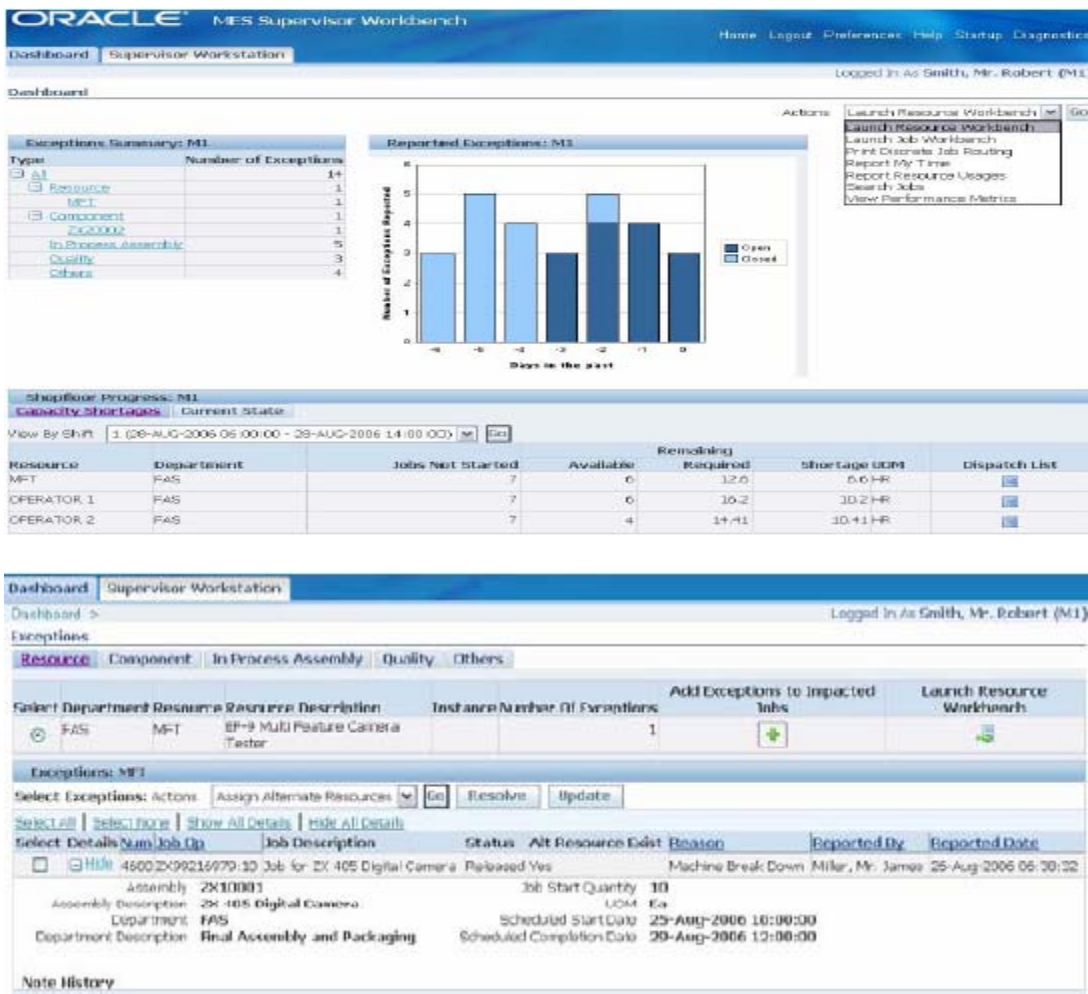

Illustration 12: Supervisors can undertake several actions while resolving shop floor exceptions

Supervisors have the ability to resolve multiple related exceptions in one pass, in addition to resolving them on a case-by-case basis. In addition, the supervisor can associate an exception with all jobs that may be impacted by the issue.

Monitoring Shop Floor Progress

The Shop floor Progress region displays a capacity view, where a supervisor can see available resource hours vs. required resource hours by machines and people. The capacity shortages view displays jobs whose projected completion time exceeds the scheduled completion time or shift end. Supervisors also have the ability to navigate to the dispatch list to review additional details of the job operations that are affected due to resource shortages. This helps the supervisor to proactively manage resource shortages by taking appropriate actions.

Illustration 13: Supervisors can monitor capacity shortages on the production floor

Current State View

The current state view provides the status of current jobs, including machines and operators. These are all current jobs running and the machines on which they are running, operator's name, and projected completion time. This provides Supervisors real time information relating to the shop floor status, which can be utilized to make the informed operational decisions.

Illustration 14: Supervisors can monitor the current state of all jobs running on the production floor

2. MES Supervisor Workstation

Logging into the MES Supervisor Workbench, supervisors can also access the Supervisor Workstation to perform activities such as reviewing and reordering dispatch lists, expediting a "hot" customer order, reporting resource usages for multiple jobs en-masse, reviewing historical transactions, etc. The Supervisor Workbench is very similar to the MES Workstation for operators, but with additional privileges for supervisor functions. [6]

Illustration 15: MES Supervisor Workstation

Expediting Jobs

Any job or operation can be expedited through a simple button action; supervisors can expedite a job operation to the top of the dispatch list to react to situations such as a hot order. The ready column on the dispatch list displays an icon indicating the job or operation is being expedited. Since expediting is performed at the job level, all operations on a job are then expedited to top priority.

Illustration 16: Release Button to Expedite Jobs

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[6] Oracle Data Sheet

Reordering Dispatch Lists

Supervisors can also change the order of operations within a dispatch list to facilitate efficiency by specifying the order in which the jobs need to be queued for manufacturing, based on several criteria such as schedule group and build sequence. This action enables you to group job operations together to save set up time, or changes due to expediting.
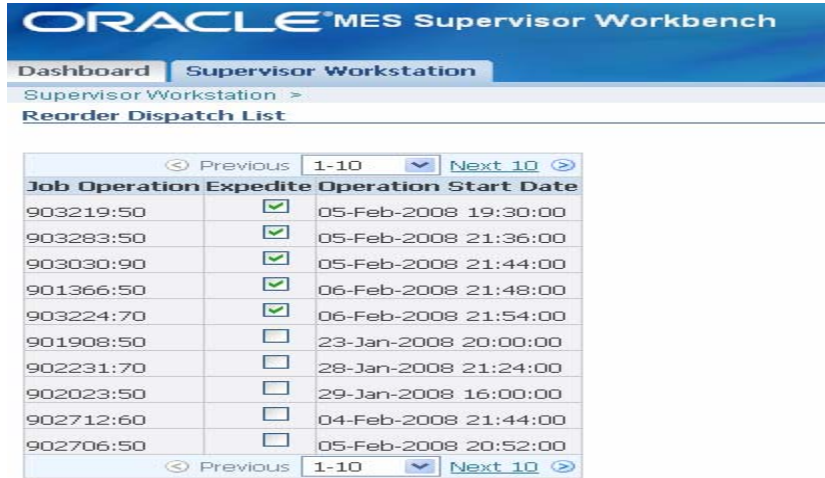

Illustration 17: Several supervisory functions such as expediting and reordering the dispatch list can be performed in the Supervisor's Workbench

Viewing Historical Transactions

Supervisors can review all job transactions performed to date, all at a single place without having the need to navigate to multiple screens. This can be used to determine when transactions took place and who made them. This will help support quality plans, as you will now have one place that holds all transactional data relating to each operation on a job.

Illustration 18: All transactions related to a job can be reviewed from a single screen

Conclusion

The Oracle MES for Discrete Manufacturing provides a tool for discrete manufacturers, which will continue to help facilitate collaboration across an organizations supply chain. Oracle's MES provides simplified shop floor execution capabilities, which will improve productivity and efficiency, while enhancing management's visibility into shop floor processes. Managers will now be able to manage exceptions proactively, which will allow them to make informed operational decisions. The Oracle solution also provides an integrated MES/ ERP System which reduces the cost of ownership by offering a one-stop-shop for managing their manufacturing operation needs.