

Oracle eAM

Asset Data Model Design



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Asset Data Model

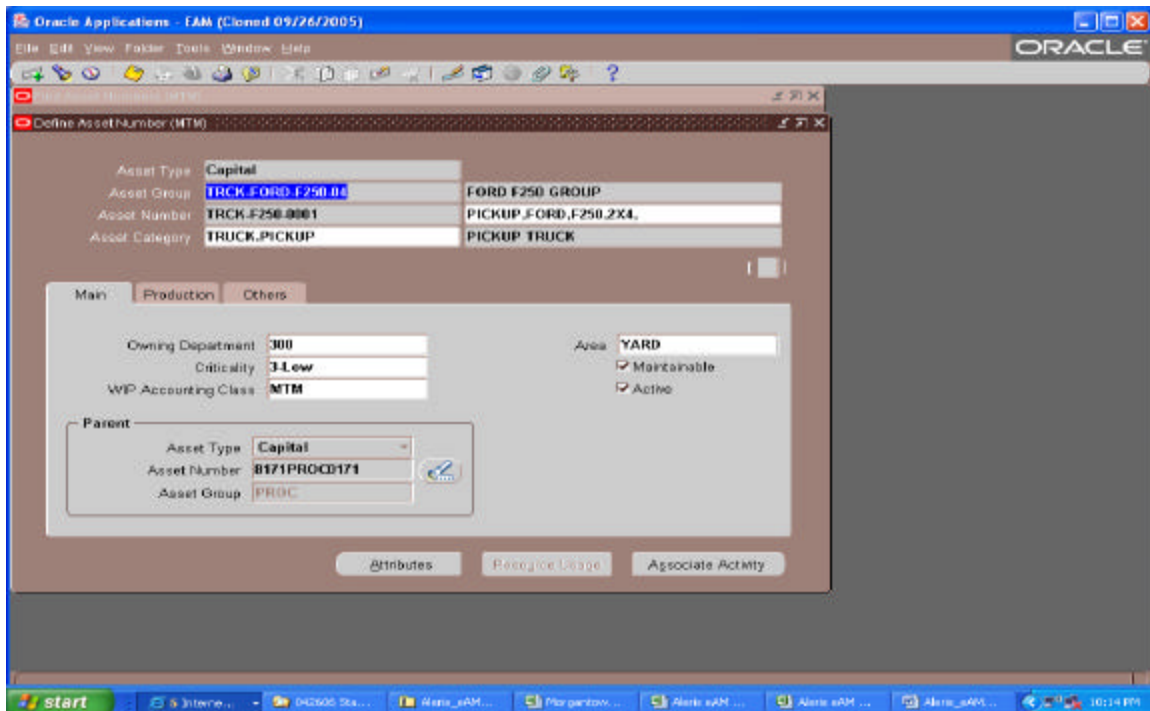
An asset data model defines the data elements and information necessary to adequately describe the physical plant & equipment, rolling stock, buildings, or other maintained assets (repaired) within the Oracle eAM Asset database.

To define a good working model, we strive to employ industry standard naming conventions, consistency in values and ease of use. To be successful the asset data loaded into the system must be:

- 1) Accepted and understood by the user community
- 2) Easy to find, sort or query using the predefined features of the Oracle system
- 3) Usable for cross plant reporting or corporate reporting

The model defined in this document was utilized in Aleris’ Morgantown recycling plant and the salt cake process facility while taking into consideration that the solution may be deployed across additional sites.

The following screen shot(s) show the important elements (header information) of an Asset Record.



The header element(s) of an asset record includes:

- 1) Asset Type: “Capital” or “Rebuildable” – (See details below)
- 2) Asset Group: alpha-numeric field controlled by item key flexfield definition - (see below)

- 3) Asset Number: a unique asset identification number (30 character alpha-numeric field-see below)
- 4) Asset Description: a free form alpha-numeric field
- 5) Asset Category: Selected from valid Categories assigned to the Asset Group
- 6) Owning Dept: for assigning the department/crew responsible for maintaining Asset
- 7) Criticality: for criticality assignment from user defined LOV
- 8) WIP account code: for labor and material g/l account code assignment
- 9) Area Code: for area assignment from user defined LOV
- 10) Parent Asset Record: for assignment in the asset hierarchy
- 11) Production Equipment Reference: Ability to reference in manufacturing org for production schedule
- 12) Fixed Asset Reference: Ability to reference applicable Fixed Asset record

Two checkboxes exist to identify “maintainable” assets and “active” assets. (Note: work orders can not be generated for assets with the “maintainable” checkbox or the “active” checkbox de-selected)

Asset Attributes

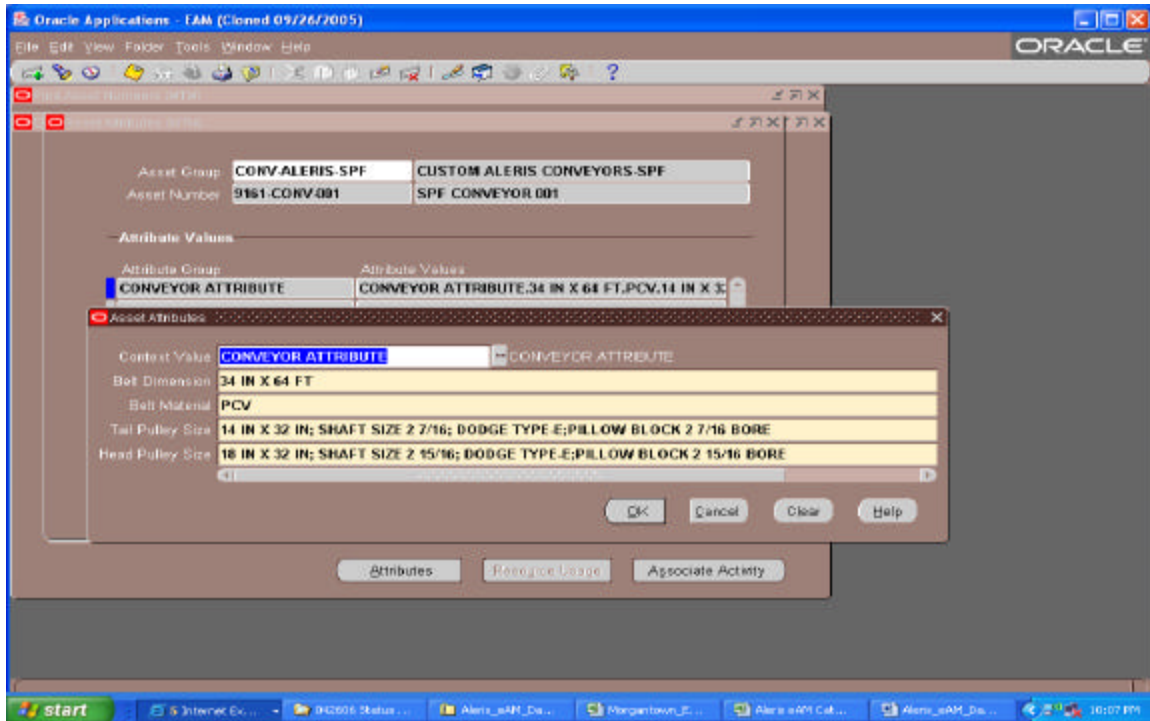
The design of Oracle eAM provides the user with a very flexible approach to capturing data about Assets. By defining a set of data that the user might want to know about an Asset (e.g. Nameplate Data: Manufacturer, Make, Model, In- service date, etc.) the user can build an unlimited number of Attribute Groups (a collection of up to 20 character based fields, 10 Numeric and 10 Date fields). All Attribute Groups can be assigned to one or more Asset Group(s) and then unique values for each Asset in the Asset Group can be entered by asset and later used in searches and reporting.

Asset Attribute Groups (nameplate data) are created at the master organization level and can be used across all site organizations.

An example asset attribute(s) for a unique conveyor assigned to the conveyor group might include:

- 1) Belt Dimension
- 2) Belt Material Type
- 3) Tail Pulley Size
- 4) Head Pulley Size

See example screen shot of a conveyor’s asset attributes:



Asset Group Identification

Oracle Asset Groups are defined at the Master organization level as Item Masters with Asset Group Item Attributes and then assigned to one or more eAM organization. This allows for the definition of asset groups that can be shared across sites for common equipment. By building a standard naming convention at this level it becomes practical to analyze repair histories and plan PM's across sites. However, because Asset Groups are the level at which Asset Bills of Materials (BOM) are stored, it becomes necessary to create unique asset groups for items that have disparate bills of material. For example, it might seem like a good idea to define an asset group called "trucks" and then have multiple makes and models as individual Assets in that Asset Group. The problem is that you then have a BOM that has Chevy, Ford, Mack, etc. parts in it. The system does provide the ability to define some components specific to a single or a range of similar assets. It is just not wise to identify an asset group BOM that has a large group of assets that have disparate components in it. The solution to this is a combination of standard nomenclature and equipment classification.

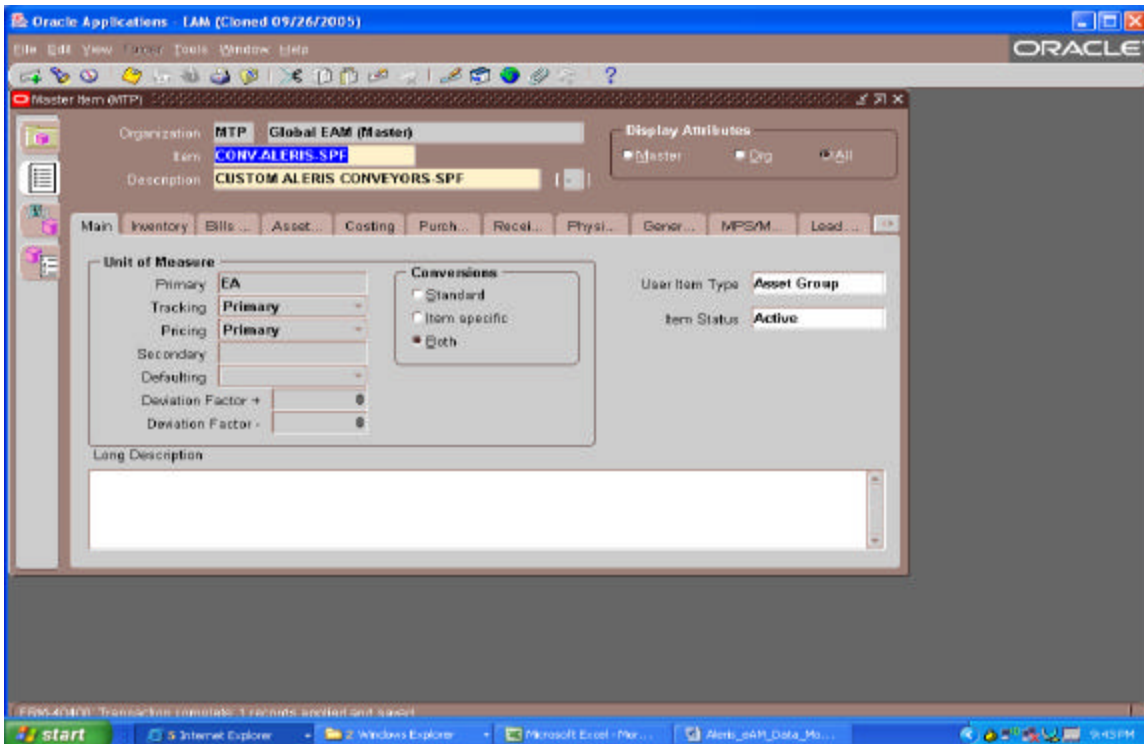
We will discuss this in more detail when we get to the definition of Asset Numbers, but the basic concept is to define a simple coding system that allows for defining unique Asset Groups that can be used across multiple sites. By defining a common set of abbreviations for equipment types and manufacturers followed by model and year of make information, similar equipment that would share a common BOM can be grouped across sites (e.g. TRCK-FORD-F250-04).

Asset Groups define the classification/grouping of equipment and are created at the master organization level for use across site organizations.

The group also controls certain system behavior and characteristics including asset attributes, and group activity templates. Asset group identification is used to query assets from various entry points within the eAM module.

Asset groups are created using the INV master item screen and are then assigned to the eAM organization. The length and characteristics of the field are controlled by the INV master key flexfield.

The following screen shot shows an example asset group.



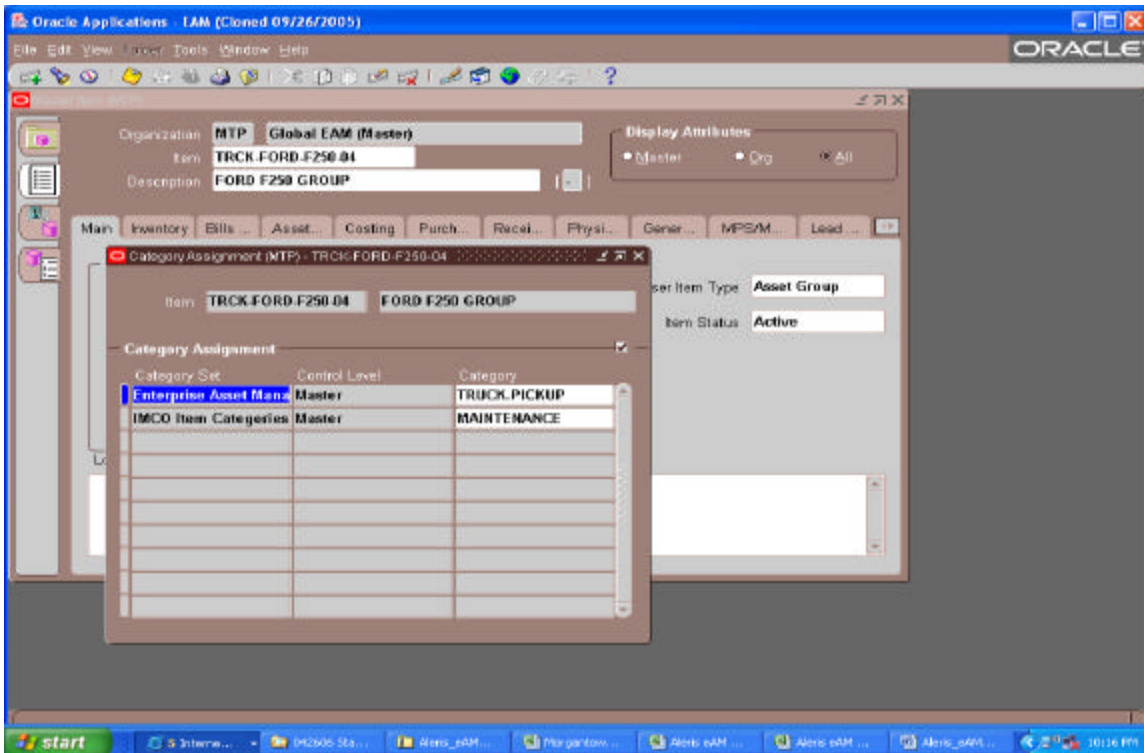
The following represents a couple of examples of the Asset Groups created and associated with the assets at Aleris' Morgantown plant. As presented above, these asset group names consist of the four character noun abbreviation from the category list, a three digit Manufacturer's abbreviation, model and year. In the case of the Aleris designed/built conveyor, we have used the noun prefix, the abbreviation for Aleris and the function/area. For Aleris created equipment the identification of the year is probably not significant and neither is it likely that other sites will share this asset group for BOM purposes. Unless there is an opportunity to share custom designed equipment across multiple sites, the group naming decision comes down to whether the site wishes to have their custom equipment grouped or separate. Note: Although we recommend all capital letters in the Asset Group Name, the description can be mixed case.

ASSET GROUP	DESCRIPTION
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TRCK-FORD-F250-04	FORD F250-04TRUCK GROUP
CONV-ALERIS-SPF	Aleris SPF Conveyor Group

Asset Categories: Oracle eAM was designed with a default category set. In standard Asset Management terminology this is a noun/qualifier for specifying equipment class and subclass. By classifying equipment by type and then function it becomes possible to locate equipment across or within sites that are performing a similar function (TRCK.PICKUP, TRCK.WATER, TRCK.DUMP, etc.) See Appendix A FOR SUGGESTED Category Codes.

Assigning Category Codes to Asset Groups:



Asset Numbers:

Since Asset Numbers are members of a unique Asset Group, but are often searched for directly, there is a compelling argument to share nomenclature with the group that they are a member of, while permitting uniqueness within the organization in which they are located. To accomplish this we set the Inventory Parameter for Serialized Items to be unique by Item within Inventory Organizations. Thus for our pickup (mobile equipment that might change locations) we would create an Asset Name/Number of TRCK-MODEL-SER# (Serial number can either be a portion of VIN# or company assigned #); for fixed equipment we would use LOC-CRAN-UNIQUE ID (e.g. 8133-CRAN-OVHD30T-01). What is most critical is that all personnel familiar with the facility should be able to quickly identify the correct asset. As we will discuss later, this means

that although Asset Groups are global and Asset Categories are global, Asset Numbers can be unique to a facility (Oracle Inventory Organization).

The asset number field (alphanumeric field of 30 characters) is used to uniquely identify asset records within an oracle defined organization. Note that organizational serial control can be applied to this field so unique records are maintained across organizations. In addition, a parameter can control auto generation of the next asset record.

At Morgantown the team is proposing an intelligent number method to uniquely identify our asset numbers (Frequently if a site currently has an asset or equipment naming convention, it is desirable to perpetuate the existing equipment numbers in eAM rather than forcing the maintenance department to learn to use a new numbering scheme. The assignment of asset groups and categories to existing asset numbers is where the major benefit of naming conventions is found.).

We propose that the “Asset Number” for physical assets will consist of three or more segments combined to make up the asset number (TRCK-F250-001 or 9161-CONV-001), as follows:

ASSET GROUP CODE	DIVISION / PROCESS	UNIQUE SEQUENTIAL NUMBER	COMPILED NUMBER
TRCK-FORD-F250-04		001	TRCK-F250-001
CONV-ALERIS-SPF	9161	001	9161-CONV-001
CONV-ALERIS-SPF	9161	001	9161-HASB-001

The division and process numbers are copied from the organizations assigned chart of accounts. “009” is the account code segment that represents the Morgantown SPF section of the plant (at this plant we have dropped the leading zeros). “161” represents the process type for unique processes or cost centers within the plant that this equipment supports.

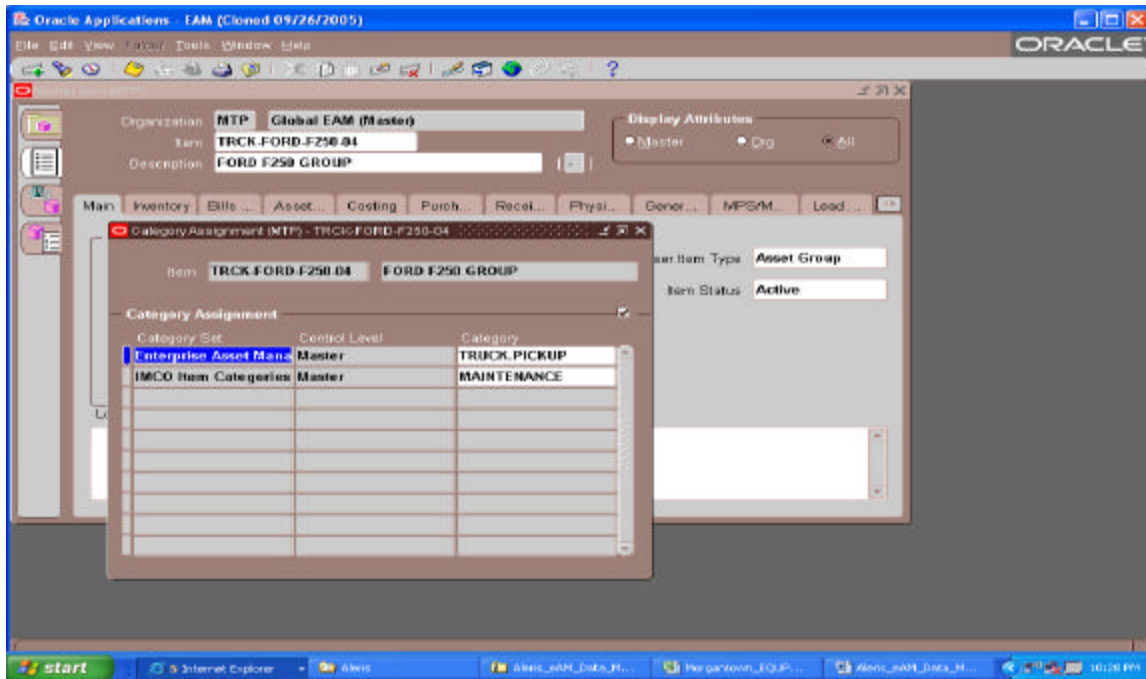
The next 4 letters (TRCK, CONV or HAS B) is the abbreviation of the category code assigned to the asset group or sub-category.

The last 3 digits or “001” indicates the serial number of the asset within its asset group for this site (organization).

Note: We have not included “Location or DIV/PROC” in the naming convention for mobile equipment because they might in the future move between departments or locations. If a particular site (like Morgantown) uses a code like “171” for mobile equipment, they can either have all the mobile equipment “roll-up” to “9171-DEPT” versus “8171-DEPT” or if it is extremely unlikely that the department will change, then the asset numbers could be similar to fixed assets. Also, in sites where existing asset

numbers have been already defined to the appropriate level, it is common practice to use the existing asset nomenclature and assign assets to the appropriate asset group (e.g. Lewisport: 571-005; CONVEYOR, TABLE ROLL; Coldwater: CONV-001 STACKING CONVEYOR) might share the same Asset Group identifier, but use different asset naming by site.

Assigning Category Codes to Assets within Group:



Asset Description

The asset description will be developed utilizing easily understandable language for the tradesperson, including location information for ease of identification (PICKUP, FORD, F250, 2X4, 2004).

Owning (Responsible) Department

The “Owning Department” indicates the department responsible for maintaining the equipment. The departments herein are independent depts. created for eAM use only. They are not associated to HR organizational departments. At the plant we have organized the utilization of the people into 6 groups or eAM departments.

- ? **100 Administration**
- ? **200 Operations**
- ? **300 Maintenance**
- ? **400 Purchasing/Warehouse**
- ? **500 Shipping and Receiving**

? **600 Environmental, Safety, and Health**

Crews of resources are assigned to the Owing Depts. In addition, a supervisor can be assigned to the “Owing Dept” for Work Request approval receipt and routing.

Criticality

Criticality levels are assigned to each asset. The criticality value indicates the level of impact on production (or schedule interruption?) when an asset is taken out of service either from a failure or for a planned maintenance evolution.

The following criticality codes for the Morgantown organization are user defined and have been proposed as follows:

- Low**
- Medium**
- High**
- Not Applicable**

WIP Account Class (Work Order Expense Accounts)

The “WIP Account Class” is linked directly to a specific account in the Aleris Chart of Accounts. The expense class will be assigned to the asset record indicating the applicable expense accounts which will be debited. The WIP account is linked to a material and a separate labor account to capture maintenance expenses (debits). Example WIP accounting classification indicates the Morgantown Plant section as “AR” for recycle plant or “SP” for salt cake processing and a second segment which is interpreted as the process dept.

WIP ACCOUNT CODE	ACCOUNT STRING	ACCOUNT DESCRIPTION
AR281	001.008.281.4XXX.000000.00000.000.0000	Aluminum Recycle, Labor Expense Account
	001.008.281.4YYY.000000.00000.000.0000	Alum, Material Expense Account
SP281	001.009.281.4XXX.000000.00000.000.0000	SPF, Labor Account
	001.009.281.4YYY.000000.00000.000.0000	SPF, Inventory Account

Area

The “Area” code defines the location within the plant where the equipment can be found. Note that the general location is defined as “DELQ” (for Delacquer Area) and the detailed location is found in the second segment or “DELQ-DCCV” (for Delacquer Discharge Conveyor System Area)

AREA CODE	AREA CODE DESCRIPTION
DELQ	DELAQ AREA
DELQ-DCNV	DELAQ CONVEYOR AREA
DELQ-DCCV	DELAQ DISCHARGE CONVEYOR SYSTEM AREA
DELQ-KCNV	DELAQ KILN CONVEYOR AREA
DELQ-KILN	DELAQ KILN AREA
ENVR	ENVIRONMENTAL AREA
FAC-BSRM	FACILITIES BIG STOREROOM AREA
FAC-BRRM	FACILITIES BREAKROOM AREA
FAC-CPRM	FACILITIES COMPRESSOR ROOM AREA
FAC-LKBA	FACILITIES LOCKER ROOM/BATH AREA
FAC-MESP	FACILITIES MECHANICAL SHOP AREA
FAC-SSRM	FACILITIES SMALL STOREROOM AREA
FAC-WDSP	FACILITIES WELDING SHOP AREA

Maintainable Checkbox

The default setting for this block is “**Yes.**” All equipment maintained through the Oracle eAM software will be set to “**Yes.**” Only those items used to define “virtual” locations within the equipment hierarchy will be set to “**No**” indicating that work orders will not be generated against them.

Active Checkbox

The default setting for this block is “**Yes.**” All equipment holding active slots within the equipment hierarchy will be set to “**Yes.**” Only equipment removed from service will be set to “**No.**”

Rebuild-able Components:

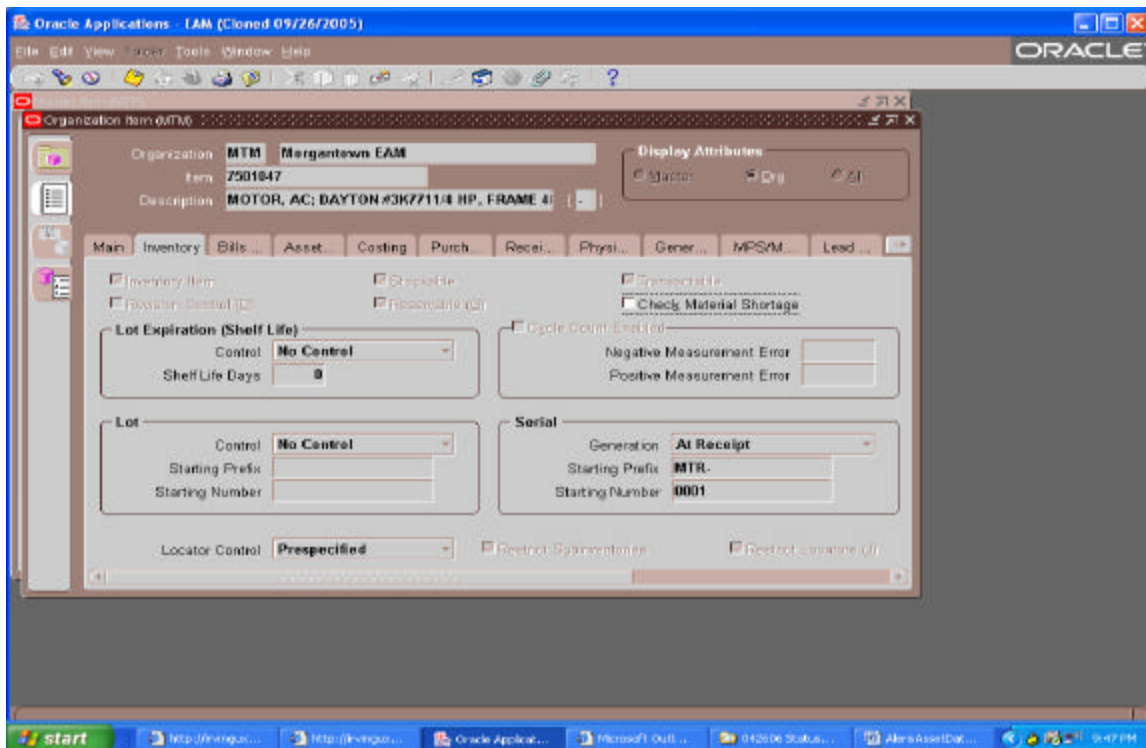
Rebuild-able components are really serialized inventory items. These items are first assigned an inventory number and a location in the storeroom where spares will be stored. Then, each instance of the item is assigned a unique serial number (sometimes the item comes serialized and marked on the nameplate by the vendor and sometimes it is necessary to stamp or mark the serial number on each instance). The system allows an as received freeform/unique serial number as received from the vendor or a combination of prefix/suffix for internally identified numbers. These items can be removed and reinstalled at various locations or processes within the plant. By assigning serial numbers

it is possible to see which instances are actively on plant equipment, which items are out for repair and which ones are available in inventory. This also supports charging of repair/replacement cost to the asset from which the defective serialized component was removed and the tracking of repair history on the serialized instance to support repair/replacement decisions. The example below is based on internally defined serial numbers:

INVENTORY ITEM NUMBER	SERIAL NUMBER	DESCRIPTION
7545017	PUMP-001	PUMP, WATER; SCOT # 55, STANDARD FITTED, 3X3 BN-CMSEAL, 5.25" IMPELLER, 1.5 H.P.ODP, 1750RPM, 460/3PH/60HZ.
7501047	MTR-001	MOTOR, AC; DAYTON #3K7711/4 HP, FRAME 48

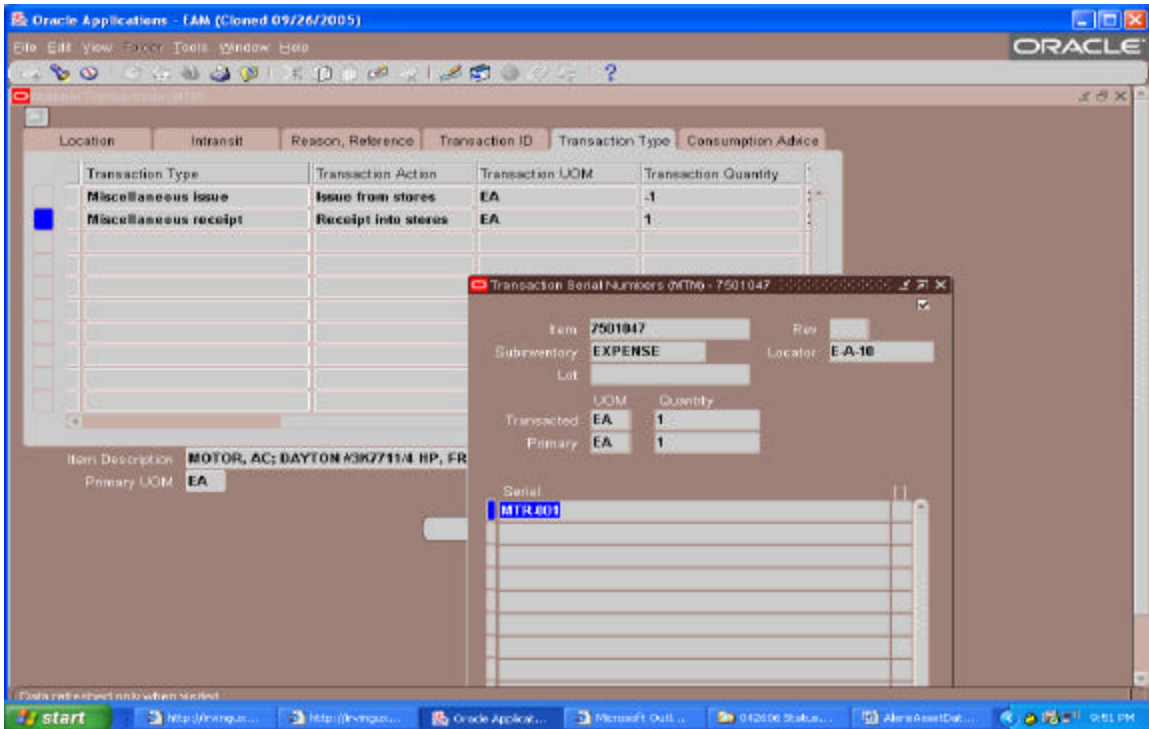
See Item data model for a description of how inventory components will be numbered and descriptions composed. Note the example above includes the manufacturer's part number, for which there is a separate lookup field and search program. There will need to be an Aleris global decision made as to whether Manufacturer's part number will be included in all catalog group definitions.

Rebuild Item Created in Inventory:

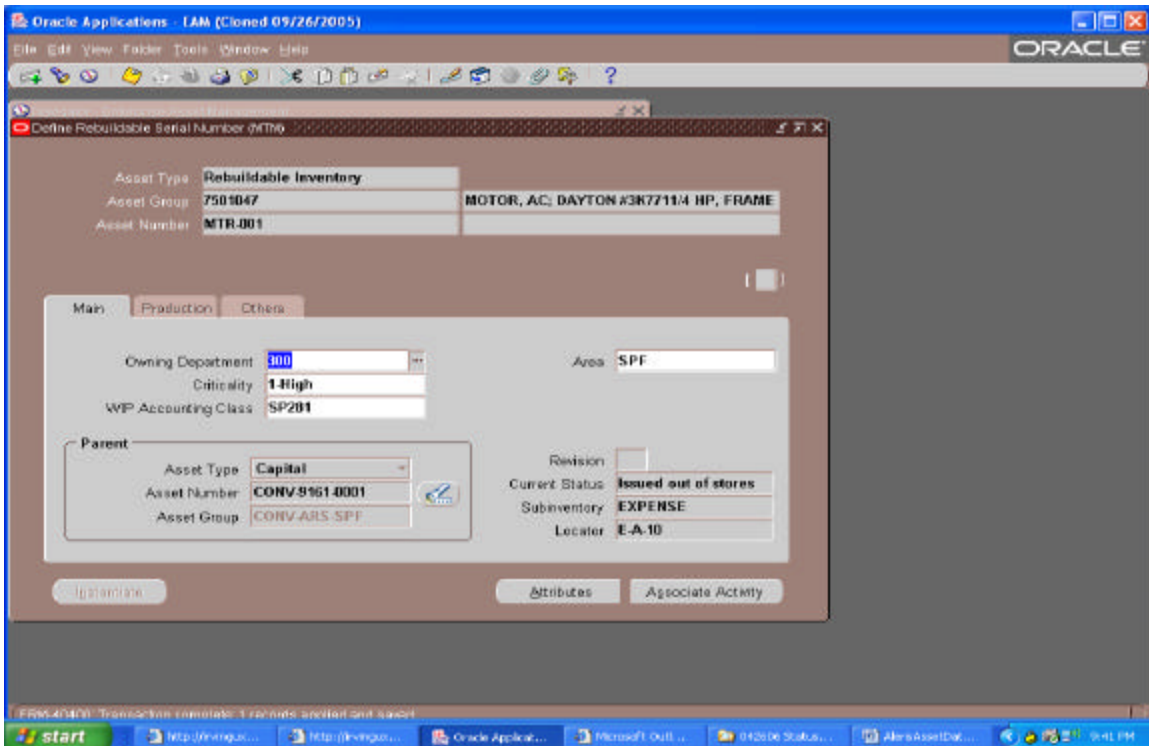


Serialized Rebuild Item Issued to Asset:

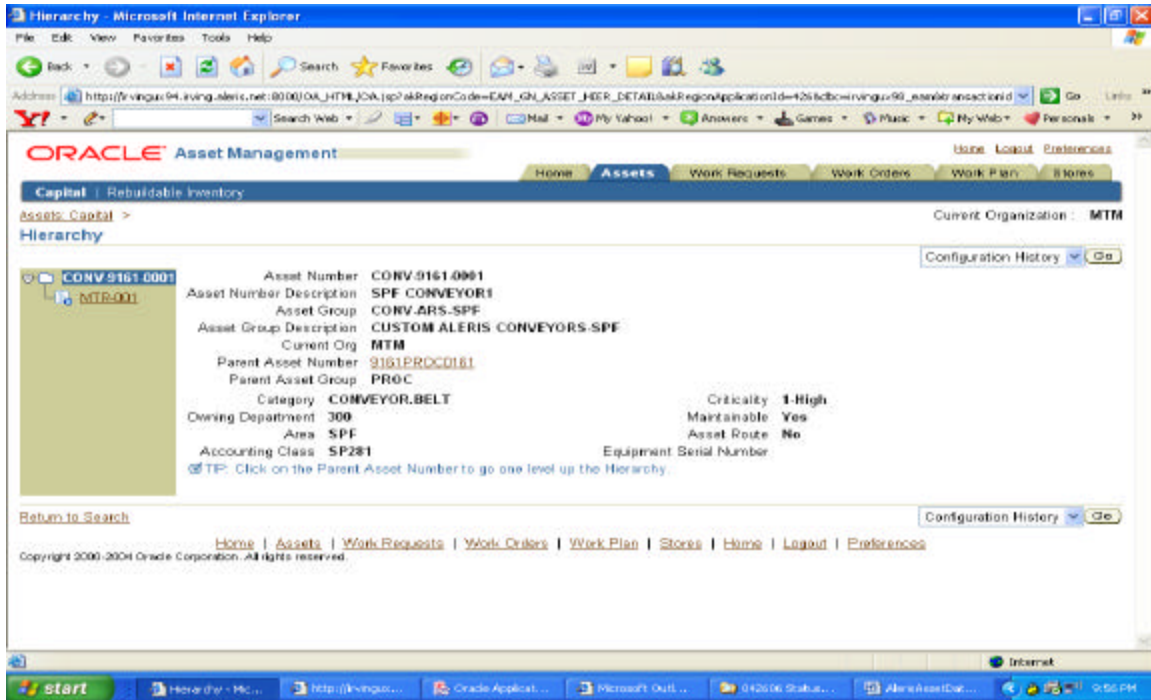
Prepared By: Don Hobbs
Global PTM Services, Inc.



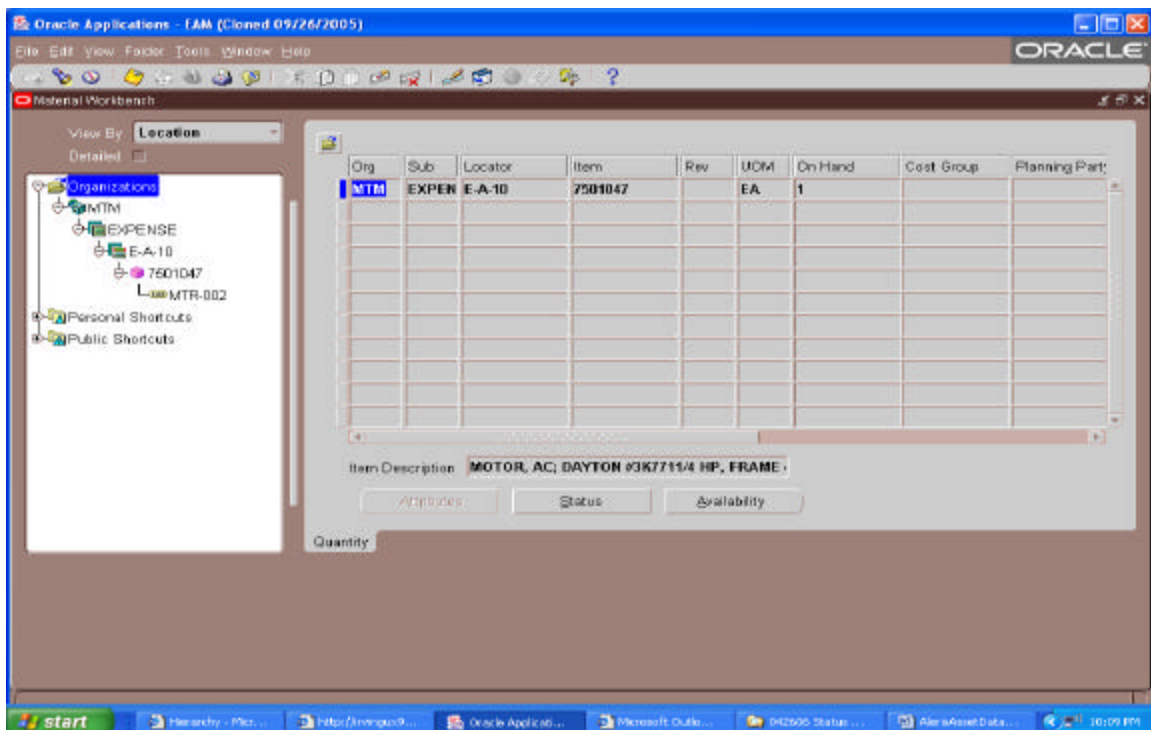
Serialized Item added to Equipment Parent:



Serialized Item in Hierarchy View:



Spare Motor in Inventory:



Parent Assignment (Hierarchy Design)

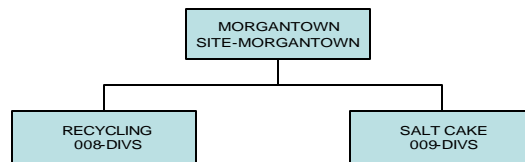
The parent field will contain the asset number of the “Parent” equipment record in the equipment hierarchy. The majority of the fixed equipment or assets will be children of the process department to which they are located. Other equipment such as rolling stock will be assigned to the vehicle maintenance dept and not assigned to a process. Rebuildable components will be assigned to an asset in the hierarchy at its installed location if they are serialized, otherwise they will be inventory items in the Asset Bill of Material.

The hierarchy we propose is set to an entity level for the plant and two major plant sections (recycle and SPF), a system level which indicates the process dept, and then the major equipment within the process.

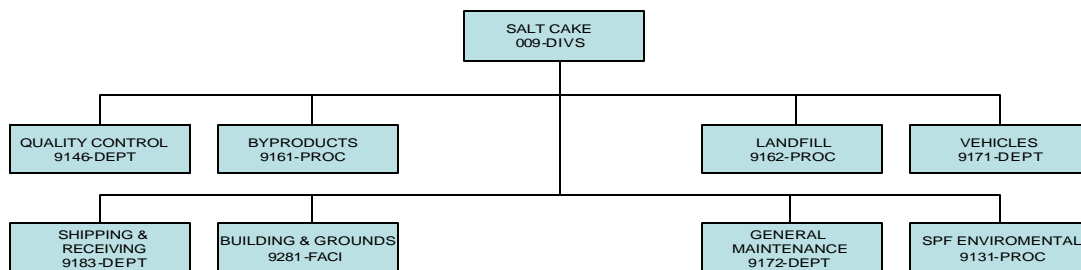
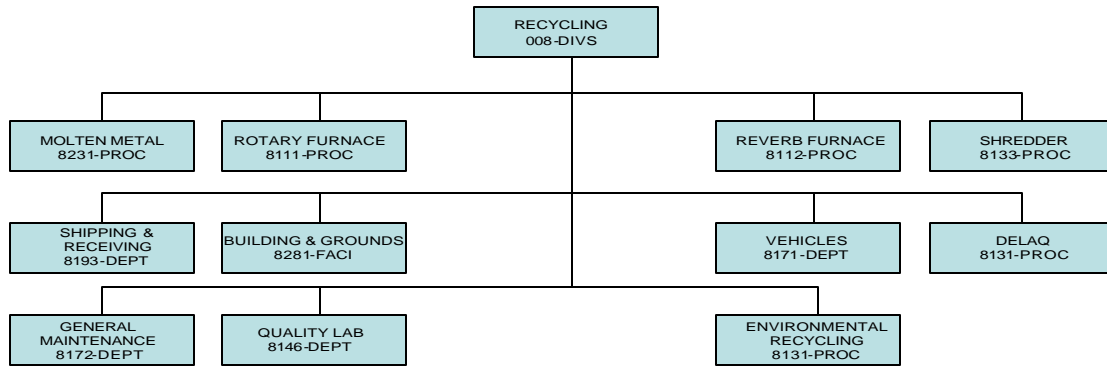
The hierarchy design enables cost analysis by plant and process for the child asset, parent or parent plus children (by period or cost category) without using sophisticated account code combinations or complex GL reporting. The hierarchy design is independent of any account code assignment for reporting in the general ledger.

A proposed hierarchy is shown below:

PLANT BREAKDOWN:



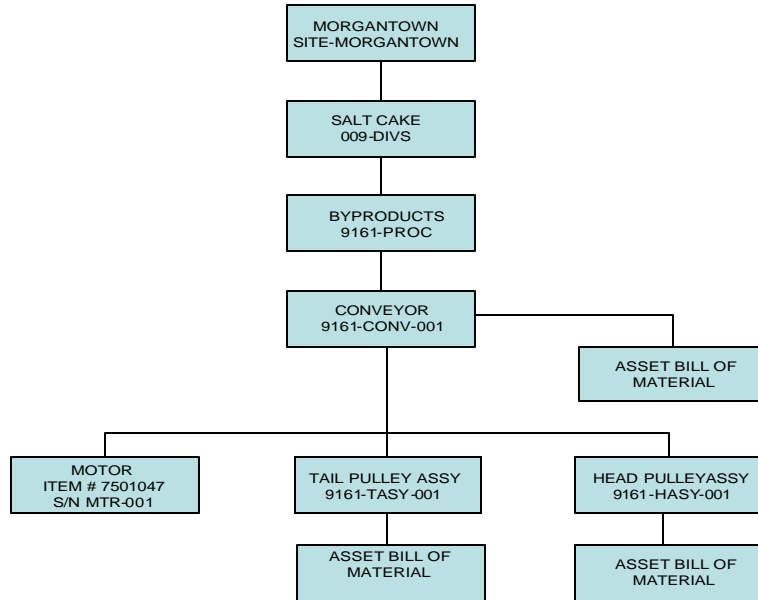
PLANT BREAKDOWN BY SYSTEM:



COMPLETE BREAKDOWN TO LOWEST LEVEL OF EQUIPMENT INCLUDING COMPONENTS:

There are no restrictions in defining assets down to the lowest level of maintainability, however one does need to decide which items will be components in the asset bill of material and which items will be serialized and therefore tracked in inventory. The diagram below reflects the decision to serialize motors for which spares are maintained in

inventory and this would represent the lowest level of the asset hierarchy. The other components would be identified as inventory components and stored in the asset bill of material.



FAILURE CODES AND ROOT CAUSE ANALYSIS:

There is a new feature in Oracle eAM released in 11.5.10 CU3+ that supports failure codes and remedies. The appropriate solution here is to be able to record a work request against the Conveyor indicating that the conveyor is down because of motor failure and create a work order to repair the Conveyor by issuing the motor. The completion of the work order would require identifying the failure cause and the remedy taken.

NOTE: The following screen shots are from Oracle Development and the availability of this feature is not until Aleris IT can fully test and apply these patches (CU3+) to the production environment. It is, however, important to understand this future capability when defining how deep an asset structure should be.

DEFINE FAILURE CODES:

ORACLE Asset Management

Home | Assets | Work Requests | Work Orders | Work Plan | Stores | Failure Analysis

Failure History | Failure Analysis | Failure Tracking Setup

Update Failure Set: Copier set 1

Name: Copier set 1 | End Date: []

Description: Copier Set 1

Failure Codes

Failure	Description	Cause	Description	Resolution	Description End Date
FDJAM	Original Paper Feed	MECH	Mechanical	ADJ	Adjust
FDJAM	Original Paper Feed	MECH	Mechanical	LUBE	Lubricate
FDJAM	Original Paper Feed	MECH	Mechanical	REPL	Replace
FDJAM	Original Paper Feed	FUSE	Fuse	REPL	Replace
FDJAM	Original Paper Feed	BELT	Belt	ADJ	Adjust
FDJAM	Original Paper Feed	BELT	Belt	REPL	Replace
FDJAM	Original Paper Feed				
FDJAM	Original Paper Feed				

UPDATE WORK ORDER:

ORACLE Asset Management

Home | Assets | Work Requests | Work Orders | Work Plan | Stores | Failure Analysis

All | Requests

Update Work Order: WOC-001

Work Order: WOC-001 | Description: Test WO Fork Lifts

Asset Type: Capital

Scheduled Start Date: 30-May-2005 02:16:40

Asset Number: Copier-001

Asset Activity: Replace toner cartridge

Department: Stationery

Request Type: Work Request

Request Number: []

Enable Material Issue Request: Yes

Duration (hours): 10

Status: Released

Shutdown Type: Required

Priority: []

Firm: Yes

Work Order Type: []

Activity Type: Replacement

Activity Cause: Normal/Wear

Activity Source: []

Failure Information

Failure: Original Paper Feed

Cause: Mechanical

Resolution: Adjust

Failure Date: 30-May-2005 02:16:40

Failure Comments: Failure during paper feeding

Failure Entry Required: Yes

PERFORM FAILURE ANALYSIS:

Asset Number	Mean Time Between Failures (Days)	Failure Frequency	Mean Time To Repair (Days)	Mean Time Between Failures (Meter Units)	Meter	Meter UOM
Copier-001	10	0.1	10	250	METER01	HR
Copier-002	50	0.02	12	300	METER02	HR
Copier-003	20	0.05	18	200	METER03	HR
Average	26.67	0.057	13.33			

Asset Bills of Material: A list of all components that might be used to repair assets within an Asset Group. Items can apply to all Assets in the Group or for specific Assets in the Group.

Maintenance Bills of Material: A list of specific components that are used to affect a specific repair (e.g. oil filter and oil for an oil change). Maintenance BOM's are identified with the same ID as the Asset Activity they are associated with.

Maintenance Routings: A list of Operations (Job Steps) that define the steps to be executed in order to affect a specific Asset Repair, Inspection, etc.; the Departments/Crews to perform the repair and specific Resources (Crafts) to perform the tasks and estimates of resource usage, duration and costs.

Asset Activities: Unique Standard Jobs performed on Specific Assets. Asset Activities are defined in the item master and like Asset Groups are differentiated using specific Item Attributes. They can be associated with a single Asset, an Asset Group or a collection of Assets. This relationship is maintained by “associating” a specific Asset Activity to one or more Assets in the Activity association table. Because Asset Activity Names need to be recognizable in order to correctly assign and schedule them, we again recommend a standard nomenclature. Thus a 3,000 mile or three month oil change for the truck would be TRCK-LU-3K-F150, where LU would be the two digit abbreviation and the 3K the Interval. Suggested Activity abbreviations are: LU-Lubrication, SR-Servicing, CA-Calibration, RB-Rebuild, OH-Overhaul, others to be added as required.