PERCEPTION®

Getting Started

PER-UM-001

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VERSION 9

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Category "A" Data
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Trade Secrets and Proprietary Properties
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Changes to This Manual

5 May 2005

- New option: *File/Save As Excel Worksheet*, Chapter 4 & Chapter 9
- Parts Catalog – New Part Type (Obsolete), Appendix VI, Internal Database Codes
- Vendor ID & Vendor Detail ID, Appendix III, Size of Data Fields

2 June 2005

- Explain changing record key error, Chapter 2.

14 July 2005

- New paper size options for printing reports, Chapter 5.

14 March 2006

- Added "Abbreviations" at end of manual.

30 May 2013

- Upgraded to Version 9

Table of Contents

Chapter 1: Introduction

PERCEPTION® is a system designed specially for planning, estimating, and managing labor, material and subcontractors in the processes of building and repairing ships.

PERCEPTION is comprised of proven application software modules that can operate either independently or on an integrated basis for maximum benefit to your operations:

- *PERCEPTION ESTI-MATE*™ - cost estimating for new construction and ship repair, commercial and government contracts.
- *PERCEPTION PERT-PAC*™ - integrated planning and scheduling of design, engineering, purchasing, production, vendors and subcontractors.
- *PERCEPTION WORK-PAC*™ - work order earned value system; work progressing, manpower planning and contract labor job costing and performance reporting.
- *PERCEPTION MAT-PAC*™ - material control from engineering bills of material and requisitions to purchase orders, deliveries, warehousing and pick lists with comprehensive quantity and contract job cost controls.

Cost Estimating

ESTI-MATE provides the power and flexibility to develop complete, accurate contract cost and pricing information to reduce risk and successfully win contracts. It can develop both new construction and repair/modernization project estimates, and has features that support modular construction and out-sourced subcontracting pricing options. *ESTI-MATE* organizes costs by work breakdown structures that can be cross-related to construction zones and product modules. Libraries are available to use standardized work packages and parametric functions that reflect actual manufacturing and construction rates. The system accommodates multiple project contracts with the ability to time-phase pricing and rates across planned construction schedules.

Planning and Scheduling

PERT-PAC uses the critical path method to develop integrated engineering; purchasing and production/construction schedules that reflect necessary work sequences as well as available constraints on resources, facilities and time. With *PERT-PAC*, you can define time-phased resource limits so that resources can be automatically rescheduled during periods of short supply. You also can develop templates of normal work sequences to expedite the planning process. The system measures and analyzes the impact of actual schedule performance and material deliveries using real-time data provided by the *WORK-PAC* and *MAT-PAC* modules.

Manpower and Work Order Management

WORK-PAC plans and tracks labor costs and schedule performance at the work order level and summarizes performance by work breakdown structure. The system is tied directly to time charges, automatically measures work progress, and forecasts final costs continuously in man-hours and labor dollars. Trade manpower requirements can be generated as *planned* and as *forecast to complete* for single contracts, or across the entire company operations.

Purchasing and Material Control

MAT-PAC accommodates the special needs of purchasing material directly for contracts and replenishing supplies of general stock. *MAT-PAC* effectively handles real-world purchasing problems such as use of foreign funds, federal/state sales taxes, and escalation clauses for long-term contracts. With *MAT-PAC* you can engineer bills of material requirements and utilize full featured purchasing functions including requests for quotations and purchase order issues, printing and amending. The system tracks receiving and quality control inspections, manages quantities, costs and multiple storage locations to support production pick lists.

Hardware and Software Technology

PERCEPTION has been developed using a state-of-the-art object-oriented graphical programming language and open relational database (Sybase, Oracle or Microsoft). The system operates on Windows-based PC client/server networks (Version 8 operates only under Windows XP and Vista) and has features for importing and exporting information to/from popular PC software products such as spreadsheets, word processors, and other desktop office applications. These features also support systems integration with a variety of financial and accounting software and with popular computer-aided design, engineering and manufacturing systems.

As a client/server product, *PERCEPTION* is scaleable so that it can be used by both the small shipyard and by the largest. The system is modular. The shipyard may use only those modules it chooses, or the system can be installed in phases to suit almost any desired implementation schedule.

PERCEPTION requires a system with the following specifications:

Computer:
Personal Computer (PC).

Operating System:
Clients: Windows XP or Vista.
Server: Novell Netware, Windows/NT, 2000, XP, Vista or UNIX.

Memory:
Clients: Pentium Processor with 300 MHz processor speed, or more.
Minimum: 128 megabytes of RAM
Server: Pentium Processor with 500 MHz processor speed, or more.
Minimum: 128 megabytes of RAM.

Display Monitor:
VGA display or above.

Disk Drives:
Clients: 500 megabytes of free hard disk space for client software, temporary files, etc. (Note: lesser PC may provide acceptable performance).

Server: 500 megabytes of free hard disk for database (database size depends upon size of shipyard, and extent of active and historical information maintained).

Note: A PC of lesser specifications may provide acceptable performance.

At least one CD ROM drive to install the software.

Printer:
Any Windows compatible printer.

Other:
Mouse or comparable device.
System (database) backup hardware.
System electrical power protection hardware recommended for server and clients.

If *PERCEPTION* Internet and EMAIL features are desired, access to the Web also is required.

A typical client/server network configuration is illustrated in Figure 1-1.

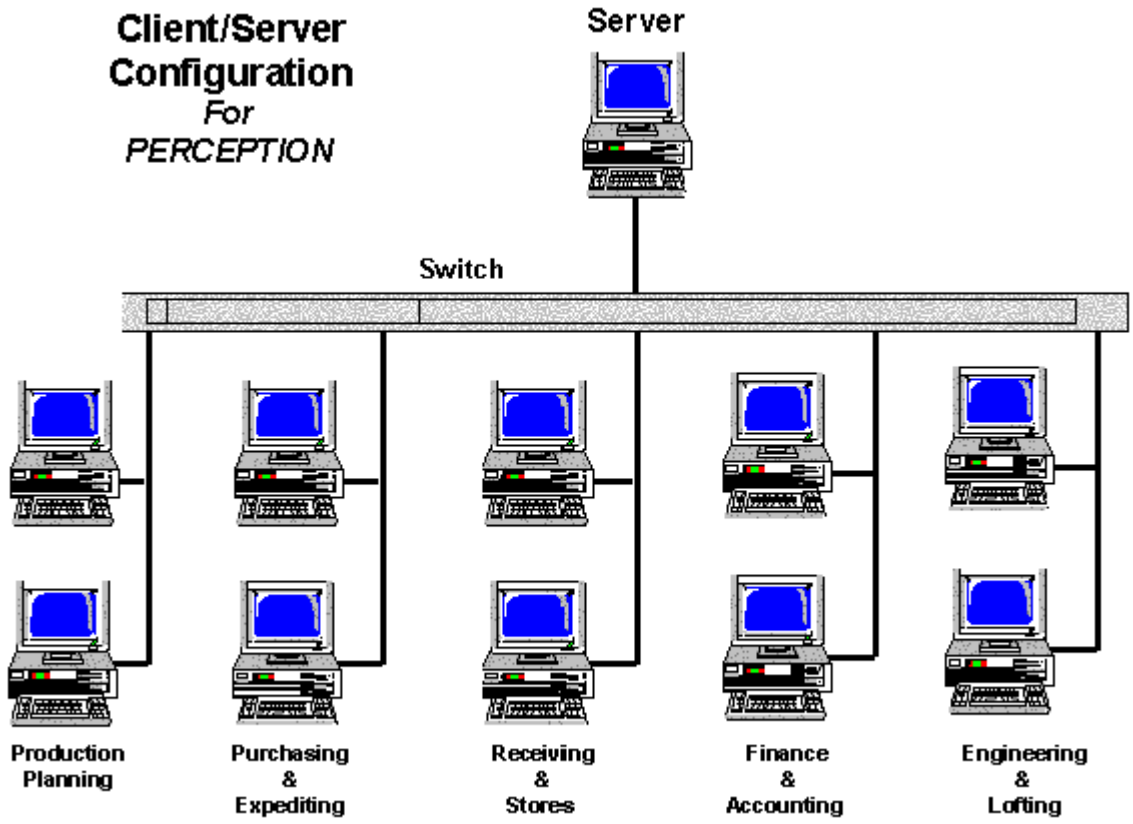


Figure 1-1: Example of a Client/ Server Installation Of The PERCEPTION System

Integrating Shipyard Information

PERCEPTION operates with a centralized relational database. All system application modules access this database; so all users are kept updated with current information. Status information can be accessed from virtually all accounts (Figure 1-2), subject of course, to permitted security measures that can be implemented onto the system.

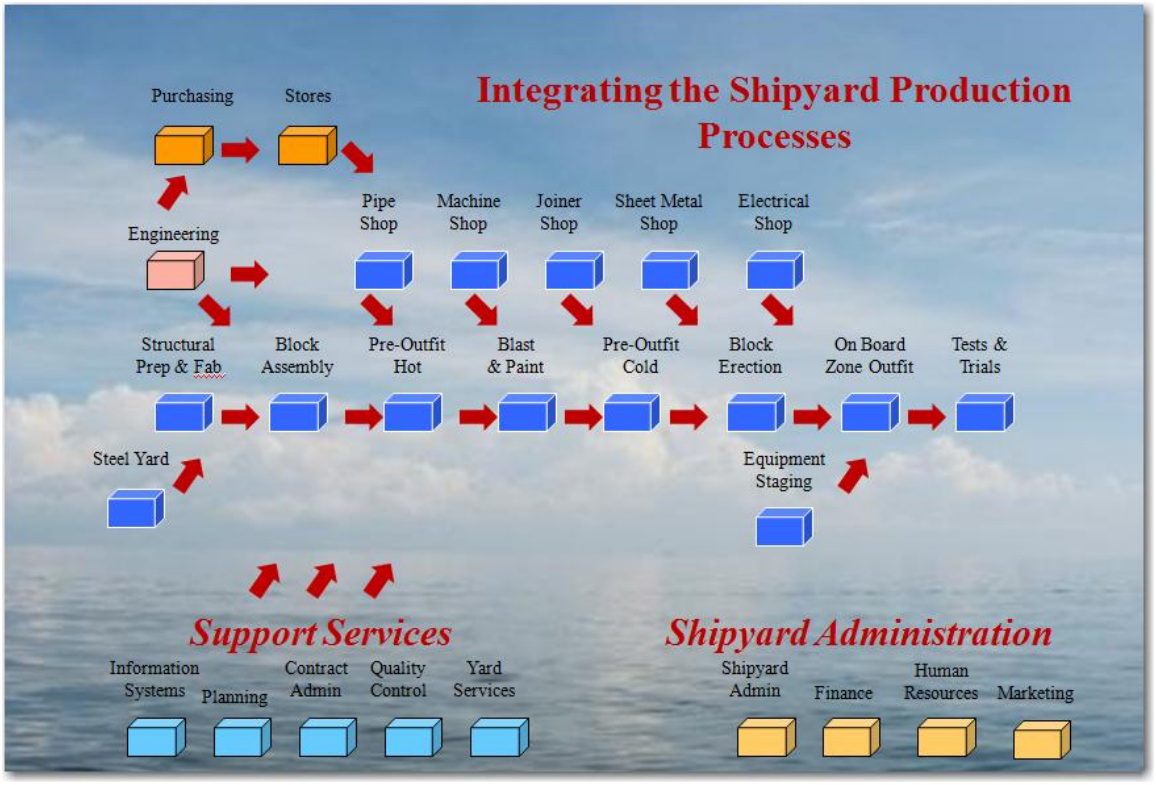


Figure 1-2: Integrating Shipyard Production Processes

Chapter 2: Database Structure

The database consolidates information specific to projects. It also has common use libraries of information that can be used and applied for various purposes across all projects on the database.

Project-Oriented Database

The database generally is hierarchical, so that information can be viewed at different levels of detail. All project-oriented information is cataloged according to a Work Breakdown Structure, or WBS. The system supports several such structures simultaneously, depending upon the needs of the project:

- SWBS (Group Schemes)
- PWBS
- COA (COA Level Names)

The following chapters describe these different hierarchies, their merits and limitations.

At the very top of these structures are summary information levels:

- Contract
- Project (Project Options)
- CLINs

The "Contract" is the grand summary level of a project. For a single project contract, the contract level is a simple duplication of the project level. However, the contract has its value when it contains multiple projects, such as ship series programs and non-recurring design and engineering, each to be managed separately.

The "Project" is the summary level of all costs and performance information of a major scope of work. All details required to build a ship, for example, can be summarized at this project level.

"CLINs" (Contract Line Items) are used mostly for government contracts. CLINs usually have no bearing upon any other means for breaking down the scope of work for a contract. CLINs may simply differentiate between labor costs and material costs, or they may identify specific sources of government funds. CLINs may be used to identify the ship owner's own work breakdown structure, such as may be required for ship repair.

At the detail levels, information is cataloged depending upon the type of information.

The following is an overview of these details:

Estimating Cost Items are the details of a cost estimate. The following four (4) identifiers catalog Estimating Cost Items; Contract Number, Project Number, Work Center, and Cost Item Number[1]. Estimate cost items are cataloged by work center so that cost rates can be made different depending upon the work center. This requirement allows separate rate tables to apply to different cost items. Cost items have indirect references to the project WBS. They also may reference part numbers in the system's Standard Parts Catalog.

Schedule Planning Activities are the basis for scheduling project work using the automated scheduling tools provided by the system. The following three (3) identifiers catalog Schedule Planning Activities; Network Number, Work Center and Activity ID. The Network Number allows different schedule networks to be developed for the same contract/project. This capability enables planners to develop schedule networks at different levels of detail. Activities may have indirect references to the project WBS. They also may be associated directly with series of Work Orders.

Drawings are cataloged by project, and drawing number. Items in drawing bills of materials are cataloged by project, drawing and item "find" number in the drawing. They also may reference standard part numbers in the system's Standard Parts Catalog.

Material Requisitions are the basis for defining material requirements. The following three (3) identifiers catalog requisitions: Contract Number, Project Number and Requisition Number[2]. The Requisition Item Number further identifies items in the Requisition[3]. Requisition Items have indirect references to the project WBS. They also may reference drawing bill of material "find numbers" as well as part numbers in the system's Standard Parts Catalog.

Purchase Orders (POs) are the means for ordering all project-oriented materials as well as replenishment of stock and general consumables. A sequential Purchase Order Number catalogs POs on the database. PO items have the following two (2) catalog identifiers: Purchase Order Number and a sequential PO Item Number[4] within the PO. PO Items also may have indirect references to Schedule Planning Activities. PO Items have indirect references to their supporting Requisitions. These references may extend to part numbers in the system's Standard Parts Catalog.

Work Orders are the means for identifying and authorizing all shipyard work. The following four (4) identifiers catalog work orders: Contract Number, Project Number, Work Order Number, and Work Center. The Work Center Number must identify work orders. This allows the same work order number to be used to identify interim products of

[1] Cost Item Numbers can be automatically incremented.
[2] There is a special "Stock Project" for stock items and consumables
[3] Requisition Item Number can be automatically incremented.
[4] PO Item Numbers can be automatically incremented

manufacturing as they move through different stages of construction. Work orders have indirect references to the project WBS. They also may have indirect references to planning activities.

Pallets (optional) are available to expedite the marshalling of material for work orders. The following five (3) identifiers catalog Material Pallets: Contract Number, Project Number and Pallet Number. Pallet items are furthered cataloged by a sequential Pallet Item Number. Pallet items have indirect references to their supporting requisitions or drawing bill of material. These references may extend to part numbers in the system's Standard Parts Catalog that may include manufactured parts and standard interim products.

Time Charges are the transactions of actual labor costs required by the system to evaluate cost and schedule performance against budgets and planned schedules. Time charges are cataloged by a unique data entry Time Stamp (date and time). An option may be used to eliminate the need for the Contract Number key. For this option, the system requires that the Project Number is unique. Since time charges reference a work order directly, they are associated with whatever WBS has been defined for the work orders.

Vendor Invoices from purchase orders are cataloged by the vendor invoice number. Items in the invoices are sequentially numbered. However, they must reference items in a purchase order.

Customer Billing Invoices may be generated for projects. Formal billing invoices can be produced for labor charges and material item details within user-specified billing periods.

Appendix III provides sizes and characteristics of the library and catalog identifiers.

Common Use Libraries

The *PERCEPTION* database provides the following libraries that can be used across many different system applications:

- Work Centers (used for estimating cost items, scheduling planning activities, scheduling work orders, work order pallets).
- Standard Parts and Interim Product Catalog (used for estimating cost items, purchase orders, and work order pallets).
- Standard Parts Catalog Material Classes and Class Attributes.
- Unit of Measure.
- Vendor Catalog.
- Type of Work with mapping to a Generic Product Work Breakdown Structure (GPWBS).
- Stage of Construction.
- Block Type.

- Ship Type.

Other libraries are available for specific applications. These libraries have been implemented to help expedite the various business processes of the shipyard.

Cost Estimating Libraries:

- Standard Cost Estimating Relationships (CERs).
- Standard Interim Product Packages.
- Material Cost Escalation Table.

Work Order Management Libraries:

- Trade/Resource Categories.

Purchasing Libraries:

- PO Clauses for Terms & Conditions.
- PO Clauses for Headers & Footers.
- Currency Exchange Rate Table.

Material Control Libraries:

- Standard Material Storage Locations.

Database Record Keys

All tables in the system database contain records that are uniquely identified by keys. These keys must be unique for each record so that the system can recognize (find and retrieve) any record from the entire set of records on the particular table.

Some records have only a single key, such as the employee file having only the employee ID for a record key. Other records have multiple keys, such as the work order, which requires the contract, project and work order number and work center ID (the work order also can be uniquely identified by the system generated work order sequence number).

Appendix VII provides a table that lists the keys for various database table records. All of these keys may be alphanumeric, and the length of characters for each is provided in Appendix III.

Duplicate Keys Error

Whenever a new record is entered and the user tries to save the record to the database, the system will check to ensure that its keys are unique. If the keys are not unique (i.e.,

another record already has the same keys defined), the system will display an error message to the user (Figure 2-1).

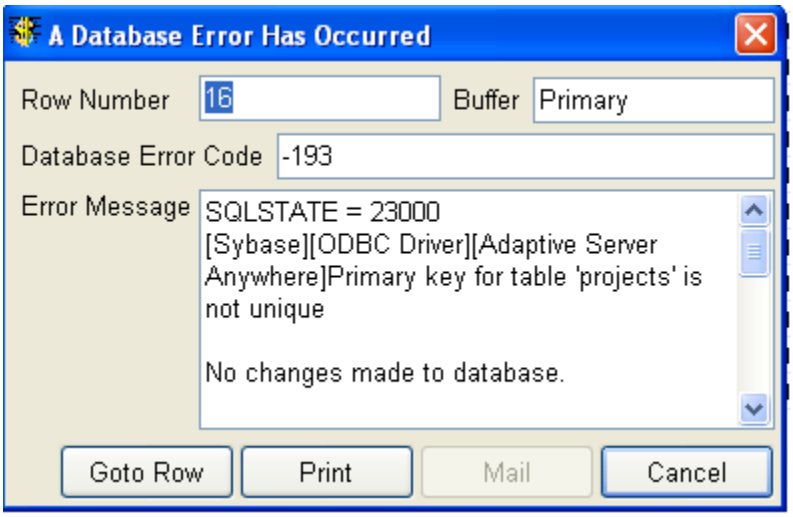


Figure 2-1: Error Message for Duplicating Record Keys

In the above figure, the "Projects" table already has a project number defined the same as what the user has tried to enter as a new record. The "Goto Row" button will identify which project record in the user's worksheet contains this error. The user may change the project number and save again, or delete the project record already defined on the database so that the new record will be accepted.

When all data entries are successfully cross-checked by the system and saved to the database, the system will display the following pop-up message (Figure 2-2).

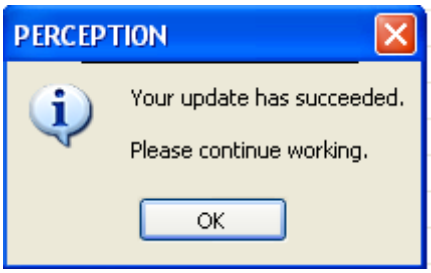


Figure 2-2: System Confirmation of All Data Saved to the Database

Missing Key Record Error

Database records that have multiple keys, belong under a hierarchy of related records. For example, work order records require that they belong under a specific contract and under a specific project under that contract. This means that before the lower level record (in this case the work order) can be defined and saved to the database, the higher level

records (contract and project records) must be defined and stored on the database beforehand. It is not sufficient just to identify the higher level records on the work order if they are not yet defined as records on the database.

When a lower level record is saved to the database, the system will check to ensure that the required higher level records are available so that the system can link the lower level record to the higher level records. When no link can be performed, the system will display an error message to the user (Figure 2-3).

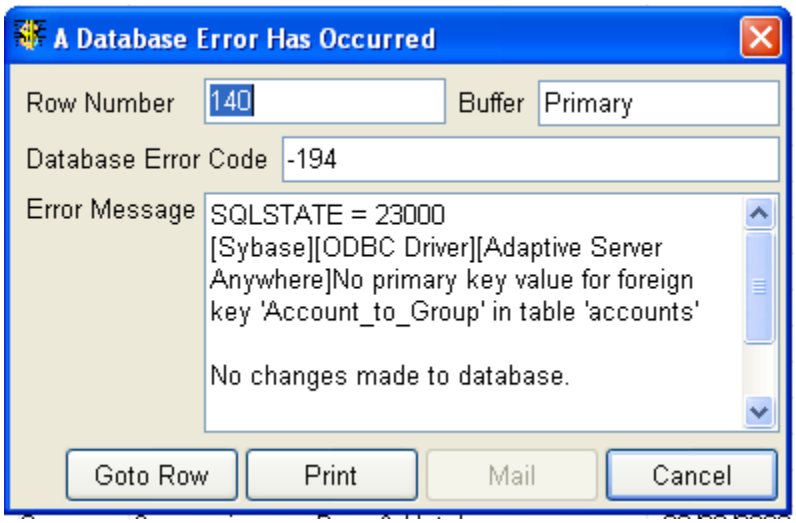


Figure 2-3: System Error Message for Missing Higher Level Records

In the above figure, the user has tried to save a new SWBS Account record. However, SWBS is a hierarchical work breakdown structure and requires first that the SWBS Group for that account be defined and stored on the database beforehand.

The "Goto Row" button will identify which record in the user's worksheet contains this error. The user may open the appropriate worksheet to define and save the missing records (without closing the worksheet in question) so that the new record then will be accepted.

Chapter 4, "General System Operation" describes opening multiple system windows. This is useful when managing data at different levels of a work breakdown structure.

Changing Record Keys Error

Record keys are used by the database to uniquely identify and retrieve records. The user may change a record key provided that there are no other records sharing the same key. For example, a time card record relates directly to a specific work order record. If the user changes the work order record, the time card no longer has a link to a work order. The system will then display an error message (Figure 2-4) for the user when the change is attempted to be saved to the database.

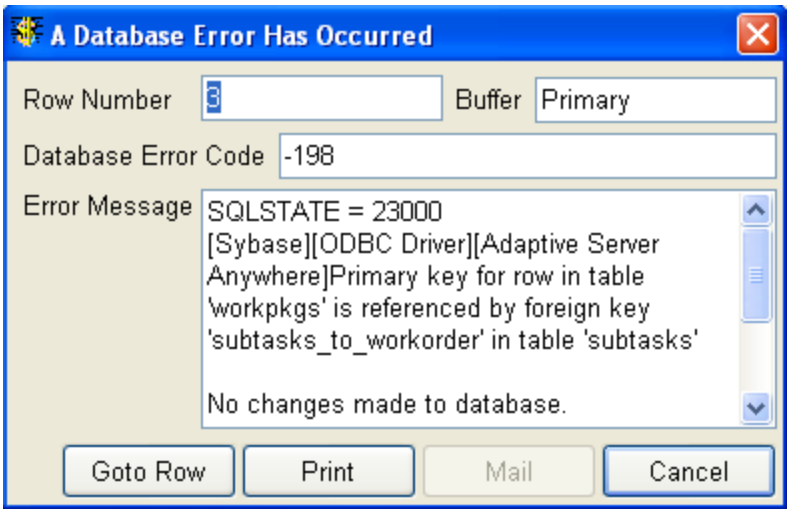


Figure 2-4: System Error Message for Changing a Linked Record Key

If there is no related record, the changing of any given record's key is acceptable.

Chapter 3: The Grand Tour

The following is a brief outline of the *PERCEPTION* system.

The system operates in the Microsoft Windows environment. Those new users not familiar with Windows should review their Windows manual, which describes the basics for working in this environment. Appendix I of this manual also provides general instructions.

Start-Up

Microsoft Windows must be running before you can start *PERCEPTION*. To run *PERCEPTION*:

1. Run Windows.
2. Double click on the *PERCEPTION* icon in the Program Manager to start the program.

Sign-On

When *PERCEPTION* begins its execution, the user is required to enter his/her name and password. If entered incorrectly, the system halts and will proceed no further.

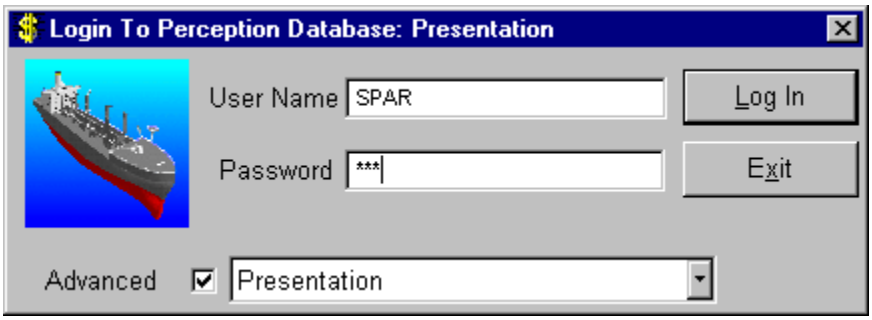


Figure 3-1: Sign-On Screen

This sign-on allows the user to choose the database that has all active, on-going project information or a database that maintains data for training purposes. The PRESENTATION database (pictured above) is an example, the actual DATABASE you select will be dependent upon the user and/or the type of software you are using. Once the user has successfully signed onto the system, the Main Menu (Figure 3-2) is displayed for the user.

Main Window

The Main Window is organized in the following major processing areas:

The Menu Bar for system functions.
The Toolbar for system processes.
Work space.
Task Bar.

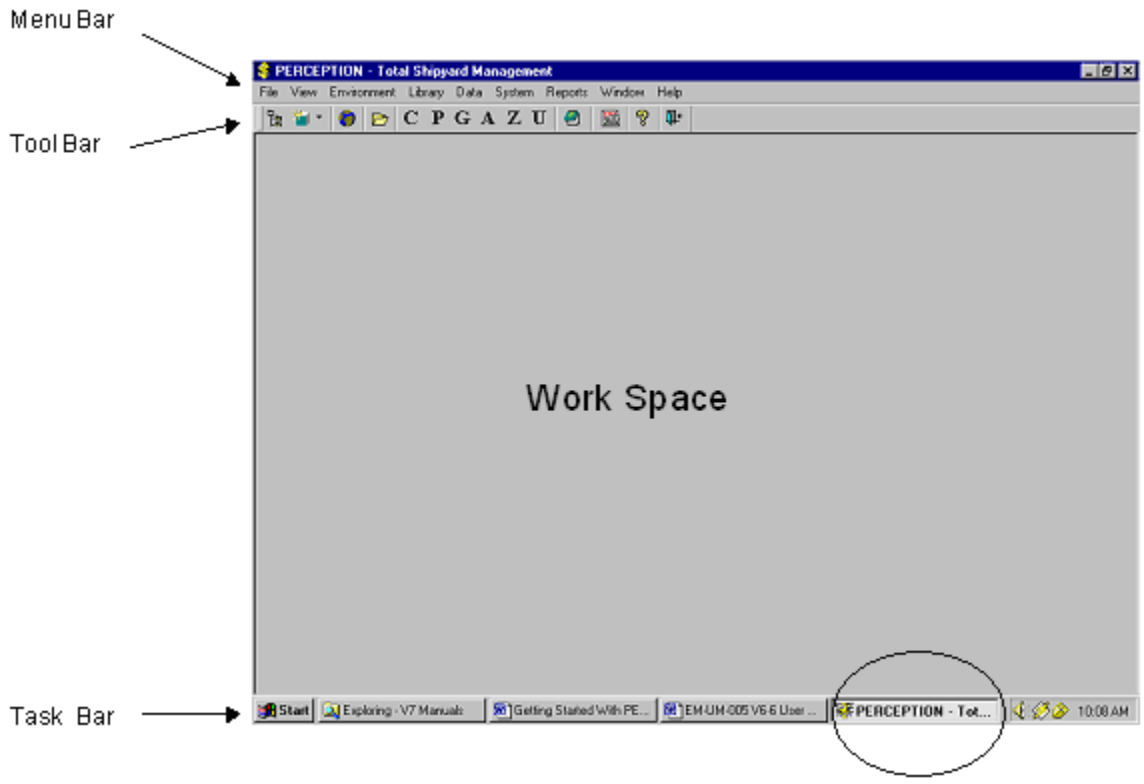


Figure 3-2: Main System Menu Screen

The task bar at the bottom of your screen may differ from the one shown in the example above. However, you must see an application entitled ***PERCEPTION* – Total Shipyard Management** (encircled in figure) on your task bar. This represents your connection to the database. This application is loaded automatically when *PERCEPTION* is loaded.

Menu Bar

The Menu Bar of the Main Menu Screen provides the following supporting functions:

File
Edit
View
Environment
Library
Data
Reports
Window
Help

<u>Note:</u> Some of the features (for example, Edit) that are described on the following pages may be not be active at this time, but will become visible be as data is retrieved, added and changed.

FILE

File provides the following:

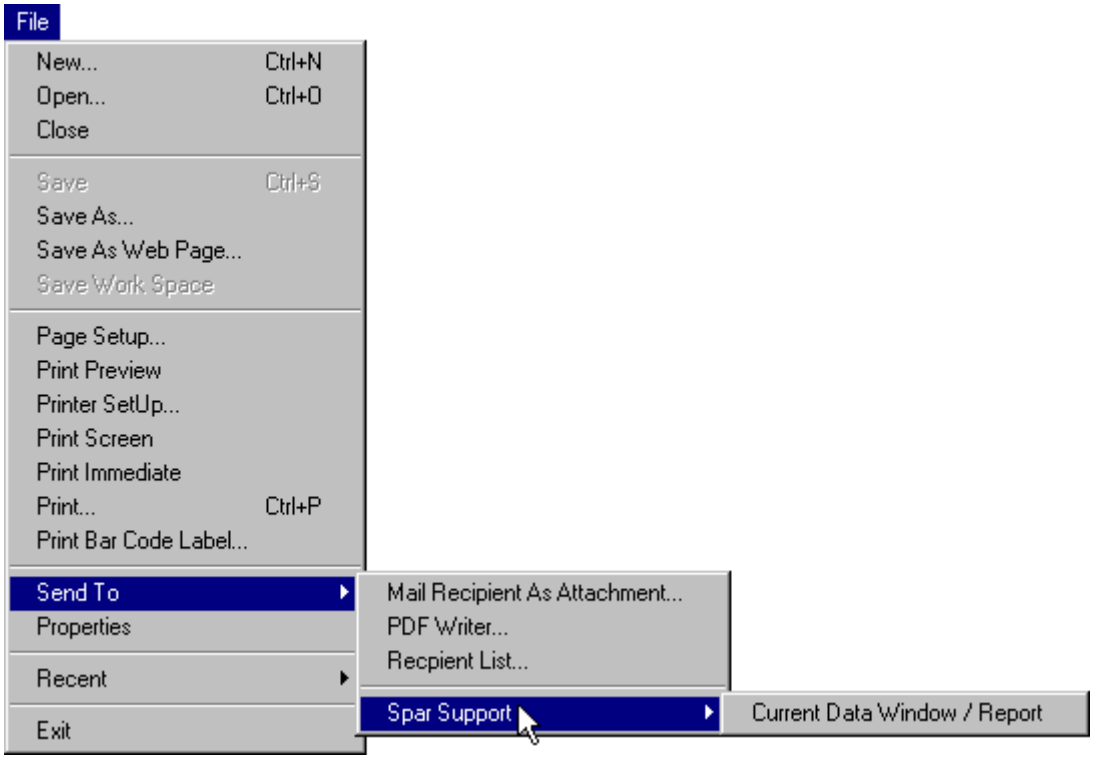


Figure 3-3: File Menu Selections

- **New** provides user-convenient wizards for starting new contracts and projects. For details refer to the chapter "*Starting A New Project*," in this manual.
- Open.
- **Close** the active window.
- **Save** returns all of the current window's information for storage onto the system database.
- **Save As** copies the full contents of the window information to a file. The user is given the option to specify the format for this file: Microsoft *EXCEL*®, SQL, text, etc.
- **Save As Web Page** copies the full contents of the window information to a file. The format of this file is HTML.
- **Save Work Space** freezes all open windows and their contents so that the user may exit the system and later return to these same windows.
- **Page Setup** specifies which pages to be printed.
- **Print Preview** displays the contents of a report window, as it will be printed. To return the window back to its non-preview form, click off the *File/Print Preview*.

- **Printer SetUp** specifies the printer selection, print options, etc.
- **Print Screen** prints only the information visible in the window to the user's default printer.
- **Print Immediate** performs the same function as *File/Print* except that the user has no option for selecting the printer device. The system chooses the default printer available to the user.
- **Print** prints the full contents of the window information, or as modified by the specification of the *File/Page Setup*. The user is given the option for selecting the printer device, etc.
- **Print Bar Code Label** allows the user to print a bar code label from any column of data on any window in the system. Placing the cursor in the column to be printed and making this selection will open the print options window. Use the Help button on this window for more information.
- **Send To** allows the user to designate the destination of reports besides the printer. Note that before you send to PDF file, you should make sure the Acrobat PDF writer (on LPT1) is selected in the printer setup.
- **Reports** can be emailed. Refer to the chapter "Using Email With *PERCEPTION*" in this manual.
- **Reports** can be sent to the Adobe Acrobat software to generate a PDF file. Adobe Acrobat Version 4.0 or greater is required for this feature to work.
- **Reports** can be sent to a distribution list that can identify any number of different destinations, formats, etc. Refer to the chapter "Distribution Lists For Reports" in this manual.
- **Reports** and worksheets can be emailed directly to SPAR support.
- **Properties** outline the operating of the system as installed for the user. This is important information for reporting to SPAR problems regarding connecting to the database and the windows environment.
- **Recent** allows the user to go directly to the 5-most recent report formats or to the 5-most recent windows that were in use.
- **Exit** from system.

EDIT

Edit provides functions that operate on specific data records, which are selected and highlighted. Records can be selected individually by clicking on the left-most row indicator column, or by choosing Select All from the Edit menu. In addition, there is an empty cell in the upper-most left hand column of the worksheet windows. Clicking on this cell will select all rows that have been retrieved. If a record has been selected, clicking on it again will deselect it. Most of the functions on the Edit menu are also available by clicking on the appropriate button on the toolbar, and by using a *Ctrl+key* combination on the keyboard.

Note: Each module in *PERCEPTION* (Drawing, Requisitions, Pallets, Purchase Orders, etc.) has its own Edit menu with functions that are specific to that module.

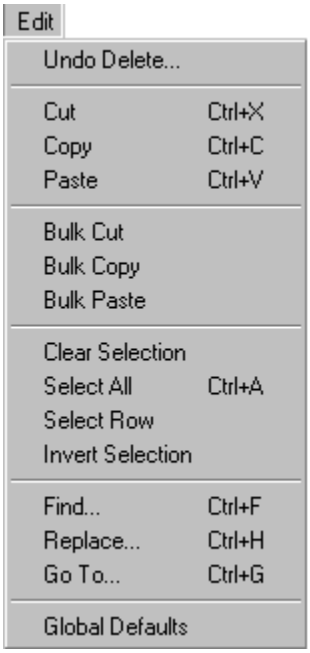


Figure 3-4: Edit Menu Editing Selections

- **Undo Delete** negates the prior record delete from the worksheet.
- **Cut** removes selected record(s) or data to the Windows clipboard.
- **Copy** copies either selected record(s) or data to the Windows clipboard.
- **Paste** inserts either data in a column or row(s) from the Windows clipboard.[5]
- **Bulk Cut** is a special cut process useful for transferring to and from spreadsheets.

[5] After exercising the paste or replace function, the data should be validated. See the discussion on Validate in the Data Menu Section.

- **Bulk Copy** is a special copy process useful for transferring to and from spreadsheets.
- **Bulk Paste** is a special paste process useful for transferring to and from spreadsheets.
- **Clear Selection** deselects the selected row(s).
- **Select All** selects and highlights all rows that have been retrieved – this can also be accomplished by clicking on the upper left blank heading box.
- **Select Row** selects the entire current row and high lights the row.
- **Invert Selection** will deselect all rows that are selected and select all rows that are not selected.
- **Find** searches for a string in a specific column in the rows that have been retrieved.
- **Replace** searches and replaces a string with another string in a specific column in the rows that have been retrieved or imported.[5]
- **Go To** allows the user to specify the row number to which the cursor will move. This is useful when the window contains many rows.
- **Global Defaults** allows the user to specify global default values (Figure 3-5) of contract, project number, SWBS, PWBS, etc. These defaults will be used by the system when adding new rows into the worksheet. They also can be used for retrieving new records from the database.

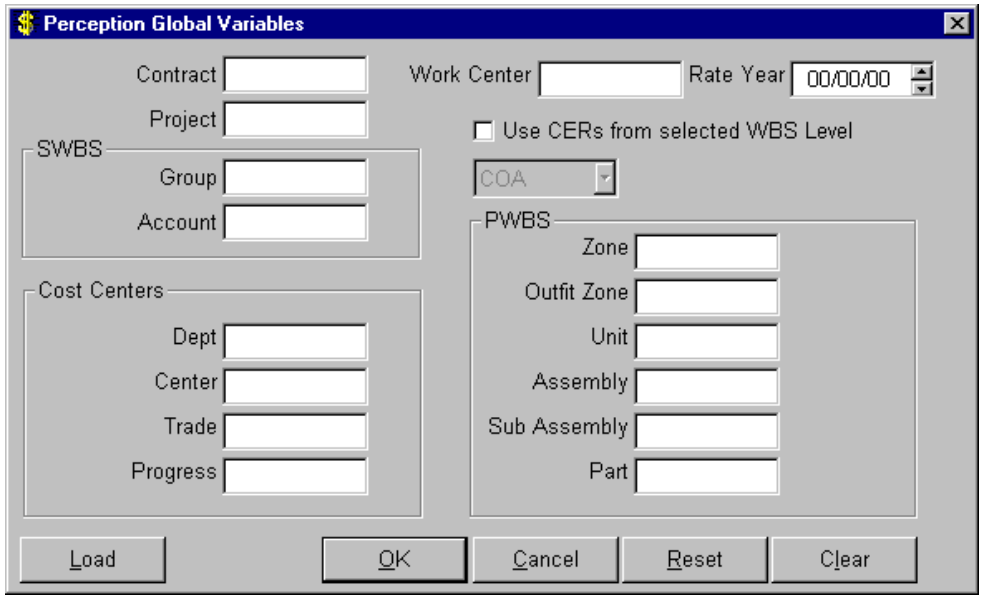


Figure 3-5: Global Default Selections

Editing Data Fields

To change data within any record displayed in a data entry window, click on the field to be modified and edit or re-enter the data. Any number of data fields across any number of records displayed on the screen can be modified in similar ways by using the mouse cursor to move from field to field.

The following are frequently used operations for editing any given data field:

- To insert one or more characters into a data field, click on the space to the right of the character where the insertion is to begin. Note that the cursor becomes a vertical line (|). Then, type in the inserted characters.
- To delete one or more characters from a data field, click on the left of the character string to be deleted. Then press the *Delete* key repeatedly for each character to be deleted.
- To delete a long string of characters from a data field, click on the space before the left end of the string. Then, drag the cursor to the right end of the string. Note that the system will highlight the string during this dragging process. Then, press the *Delete* key.
- To replace a string of characters within a data field, click on the space before the left end of the string. Then, drag the cursor to the right end of the string. Then, enter the replacement string of characters from the keyboard.
- To replace the entire contents of the data field, click on the data field until the system fully highlights the contents of the field. Then, enter the replacement string of characters from the keyboard.

If a data field has been changed, but the user wishes to reset the field back to the original value, the record can be re-retrieved without saving this change. Click on the Reselect Row button  on the toolbar.

Once all data entry has been completed, the user should click on the *Save Button*  on the toolbar. No changes to the permanent database will be made until the user formally initiates this save operation.

Cut, Copy & Paste

The following outlines some of the options for cut, copy and paste operations.

- To CUT *one or more rows* of data and place in the Windows clipboard, select the row(s) and select *Edit/Bulk Cut* from the main menu. A message box will ask whether you wish to copy the column headings to the Windows clipboard with the data. If you are planning to use the data within *PERCEPTION*, do not copy the column headings.
- To CUT *data from a field* and place in the Windows clipboard, highlight the data and either select *Edit/Cut* from the main menu, or press the *Cut* button on the toolbar, or press Ctrl+X on the keyboard.
- To COPY *one or more rows* of data and place in the Windows clipboard, select the row(s) and select *Edit/Bulk Copy* from the main menu. A message box will ask whether you wish to copy the column headings to the Windows clipboard with the data. If you are planning to use the data within *PERCEPTION*, do not copy the column headings.
- To COPY *data from a field* and place in the Windows clipboard, highlight the data and either select *Edit/Copy* from the main menu, or press the *Copy* button on the toolbar, or press Ctrl+C on the keyboard.
- To PASTE *one or more rows* of data from the Windows clipboard into an active worksheet window, either highlight a row to be replaced or add a blank row using the Add button  on the toolbar, then select *Edit/Bulk Paste* from the main menu. An option window (Figure 3-6) will open. Select whether or not the data includes column headings and whether or not to delete (replace) selected rows. Data can be pasted into a worksheet window from any Windows application, but if the columns of data do not match what is expected in the current window, the system will display an error message for each column of each row that is incorrect. For example, if you attempt to paste a character string into a column that is formatted for date or numeric, an error will result.
- To PASTE *data into a field* either select *Edit/Paste* from the main menu, or press the *Paste* button on the toolbar, or press Ctrl+V on the keyboard.

Bulk Cut, Bulk Copy & Bulk Paste

The bulk cut, copy and paste operates in a similar way to the normal cut, copy and paste operation.

The bulk copy will copy the entire data contents of selected rows in the worksheet. The system provides an option for column headings to be included. This is often helpful when copying data from *PERCEPTION* and pasting it into *EXCEL* . The bulk copy process, however, does not necessarily copy columns in the order that appears in the *PERCEPTION* worksheet, particularly if the user has re-arranged the columns (Refer to Appendix I, "Operating Windows").

The bulk paste is the complimentary process to the bulk copy. Special care must be exercised to ensure that the column order of the data in the bulk paste buffer agrees with the same order that would apply for the bulk copy for the given *PERCEPTION* worksheet.

Before the bulk paste can be performed, the system displays a pop up window of bulk pasting options (Figure 3-6).

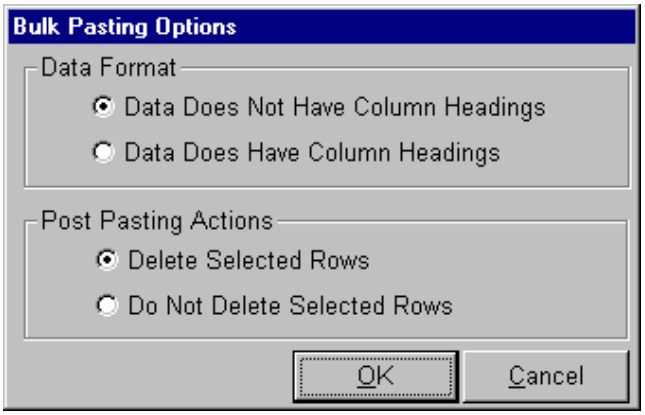


Figure 3-6: Bulk Pasting Options

The Data Format options allow the user to state whether or not the buffer contains column headings that the system should ignore in the pasting operation.

The Post Pasting Actions allow the user to either delete selected (i.e., highlighted) rows in the worksheet or not.

Find & Replace

In order to edit any given data field in a worksheet, the user must click on the data field so that the system can tag it for editing. If the line item is located off the visible window, the user must use the down or up scroll bars at the right side of the window until the desired data field is visible in the window. If the window contains a large number of items, this process of locating an item can be tedious.

The system provides a speed search feature to find a specific record quickly. By clicking on *Edit/Find* in the main menu, the system will open the find and replace pop up window (Figure 3-7). Enter the data field expression that you want to find with this pop up window. The find process can be limited in the following ways:

- **Find Next**: Find the next occurrence of the expression beginning at the current position of the cursor.
- **Search Direction**: Search either forward from the current position of the cursor or backwards.
- **Search Where**: Search everywhere (All) in the worksheet; or within the Current Row; or within the Current Column, or only within the current highlighted (Current Selection) rows.

A "Match Case Exactly" option allows the search to locate only those instances where case (i.e., capital letters) is an important criterion.

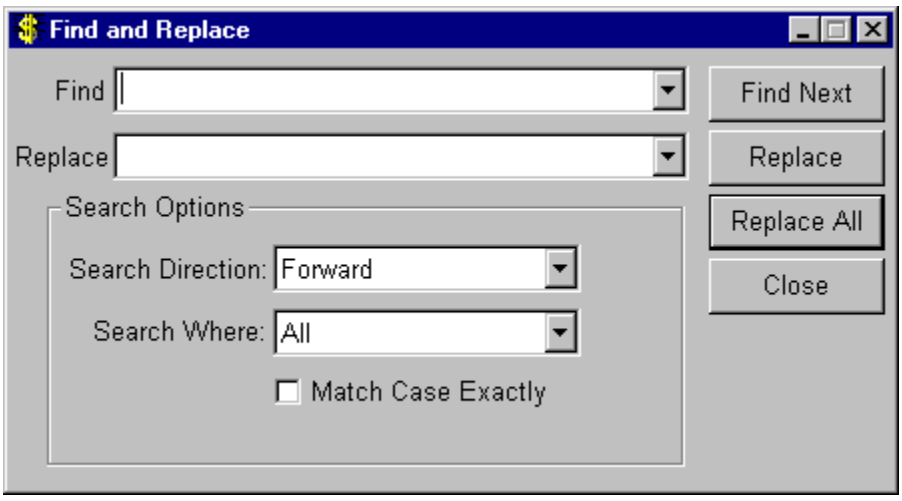


Figure 3-7: The Find And Replace Pop Up Window

The *Edit/Replace* from the main menu operates in a similar fashion as the find option, but with the added feature of replacing the designated expression with another. The replacing operation can be performed incrementally or across the designated search directions.

Go To

The Go To function takes the user directly to a row number.

Special Edit Functions For Different Environments

The system is organized by basic shipyard department responsibilities. Each of these sections, called "environments" is given special sets of editing functions.

For Cost Estimating, the following special edit functions are available from the main *Edit* menu:

- **Copy Project** creates a new project by copying all or part of one project to another.
- **Copy CERs** copies selected types of CERs from one ship type to another.
- **Copy Interim Products (Packages)** copies a specific IP package and all of its items and creates a new package.
- **Copy Rate Tables** copies a specific rate table from one Contract/Project/Center to another.
- **Add Interim Product Package(s)** to an open cost items worksheet.
- **Add CERs and Equations** as cost items to an open cost items worksheet.
- **Add Parts** from the Parts Catalog to an open cost items worksheet.
- **Import Data** from another data source.
- **Global Deletes** to delete multiple WBS levels at one time.

Modify Selected Records performs the following functions on cost items that have been retrieved and selected:

- **Modify Rate Tables** changes the rates.
- **Modify Indirect Formulas** changes the indirect formulas.
- **Modify Hours/Cost** factors labor hours and/or material.
- **Modify Assignment**s re-assign selected cost items to different work breakdowns structures, work centers, etc.

- **Cost Estimate Rollup** provides options for re-computing data summaries throughout the project WBS.

For Engineering, the following special edit functions are available from the main *Edit* menu:

- **Attach/Detach Planning Activity** to multiple selected drawings at one time.
- **Define Requisition from BOMs** generates new requisitions from drawing bills of material.
- **Define Pallet from BOM** generates new pallets from drawing bills of material.
- **Approve/Un-Approve** multiple selected drawings at one time.
- **Copy BOMs** from existing drawings.

For Production Engineering, the following special edit functions are available from the *Edit* main menu.

Define/Copy/Delete:

- **Copy Work Orders** to create new work orders.
- **Import Data** from another data source.

Modify Selected Records performs the following functions on work orders that have been retrieved and selected:

- **Authorize/Un-Authorize** work orders for time charging.
- **Issue/Un-Issue** work order tickets.
- **Close/Open** work orders.
- Attach/Detach Planning Activities to work orders.
- Apply Labor Rates to work orders.
- Reschedule Work Orders.
- Modify Work Order Assignments.
- Change Labor Budgets (factoring).

Labor Rollup provides options for re-computing data summaries throughout the project WBS. Specifically, the user may perform rollups on actual labor cost and schedule data including progress and final cost forecasts and trends.

Add Clause inserts work order clauses into a work order description.

For Material Control, the following special edit functions are available from the main *Edit* menu.

Define/Copy/Delete:

- **Copy Requisition(s)** also copies BOMs and/or pallets if desired.
- **Import Data** from another data source.
- **Define Pallet from Requisition** generates a new pallet and items from requisition items.
- **Define Purchase Order from Requisition(s)** generates a new purchase order from the items attached to selected requisitions.

Modify Selected Records performs the following functions on requisitions that have been retrieved and selected:

- **Authorize/Un-Authorize** requisitions for purchasing.
- Complete/Un-Complete.
- Attach/Detach Planning Activity.
- Attach/Detach Work Order.
- **Reschedule Requisition(s)** changes the need dates, required in yard dates, etc.

Generate RFQ of Selected Req creates a Request for Quote document that can then be sent to prospective vendors.

Material Rollup provides options for re-computing data summaries throughout the project WBS.

For Purchasing, the following special edit functions are available from the main *Edit* menu:

- Edit/Create PO Header Text.
- Edit/Create PO Footer Text.
- Amend Selected PO.
- Generate Draft of Selected PO(s).
- Issue Selected PO(s).
- Print Copy of Selected PO(s) with Bar Code.

For Stores Management, the following special edit functions are available from the main *Edit* menu when receiving purchased materials:

- **Stub Out Purchase Order Receipts** copies the items of the purchase order into the receiving worksheet to record receiving information.
- **Back Out Selected Receive Transactions** reverses selected receiving transactions.
- Post Selected Receive Transactions posts receiving transactions.

For Stores Management, the following special edit functions are available from the main *Edit* menu when returning purchased materials to the vendor:

- **Back Out Return Transactions** reverses selected return transactions.
- **Post Return Transactions** posts return transactions.

For Stores Management, the following special edit functions are available from the main *Edit* menu when issuing materials to production:

- **Stub Out Requisition Withdraws** copies requisition items into the production issue worksheet to record what is to be issued.
- **Stub Out Pallet Withdraws** copies pallet items into the production issue worksheet to record what is to be issued.
- Back Out Selected Withdraw Transactions reverses selected issue transactions.
- Post Selected Withdraw Transactions posts issue transactions.
- **Add Stock Parts(s)** adds stock parts for issue to production.

For Stores Management, the following special edit functions are available from the main *Edit* menu when adjusting stock inventory information:

- **Post Selected Adjust Transactions** posts stock adjustment transactions.

VIEW

View (Figure 3-8) provides options to quickly move from one application to another to access application-specific features, reports, etc. View also provides various options for adjusting visual parameters of the system.

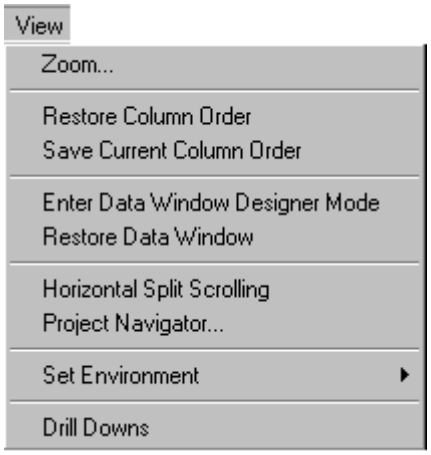


Figure 3-8: View Menu Options

- **Zoom** allows the user to adjust the visual distance between the user and the window.
- **Restore Column Order** restores the default column order of the active worksheet window.
- **Save Current Column Order** saves the current column order for the active worksheet window.
- **Enter Worksheet Designer Mode** allows the user to customize the appearance of any window in the *PERCEPTION* system. Refer to *PERCEPTION's* "System Administration Manual," "Worksheet Designer" for more information.
- **Restore Worksheet** returns a customized window to the original default format as purchased.
- **Horizontal Split Scrolling** allows the user to set a second horizontal scroll bar at the bottom of the worksheet (Figure 3-9).

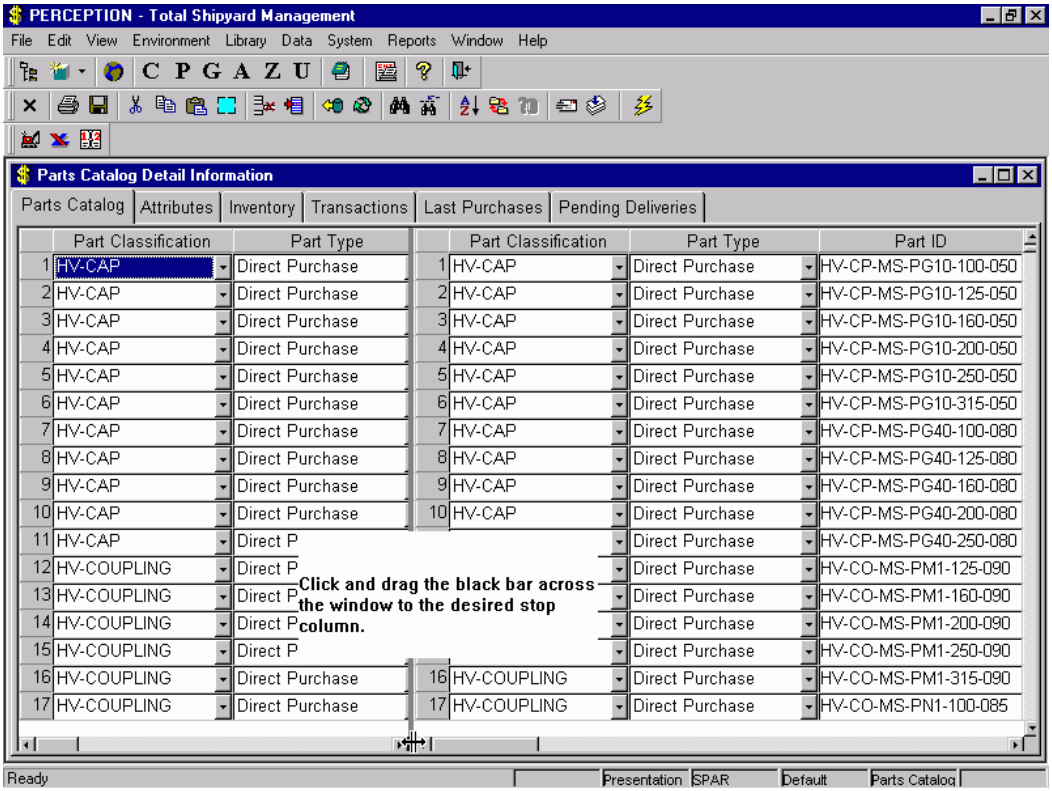


Figure 3-9: Horizontal Split Scrolling

- **Project Navigator** enables the user to quickly Drill-Down through projects from high-levels to the details. *Project Navigator* provides details.
- **Set Environment** allows the user to easily change environment in which the current window will be viewed, i.e., the Estimating view of Project Details may be different than the Production Engineering view of the same window.

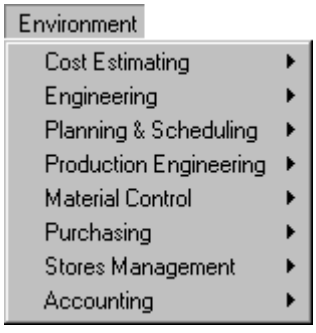


Figure 3-10: Environment

- **Drill-Downs** will open a window with the Drill-Down options appropriate to the current window available for selection. Each window has its own set of Drill-Down options.

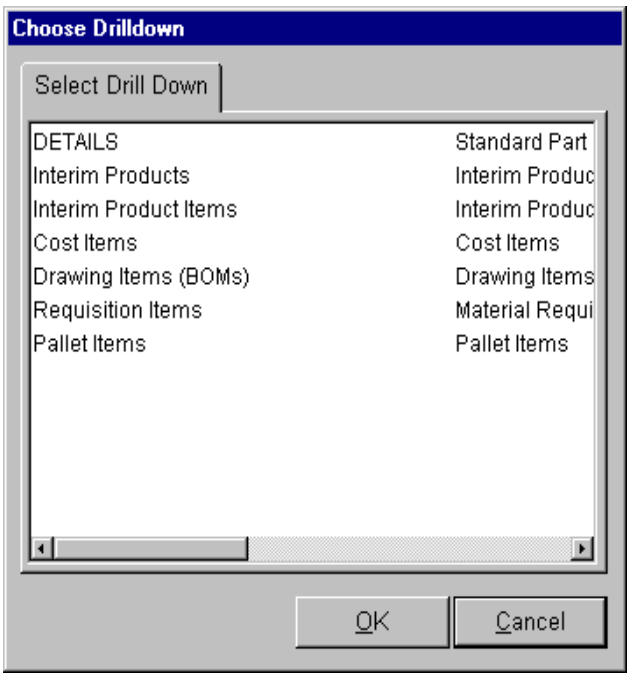


Figure 3-11: Drill-Down Selector

ENVIRONMENT

Environment (Figure 3-12) provides direct access to the various basic system applications grouped in typical shipyard levels of interest:

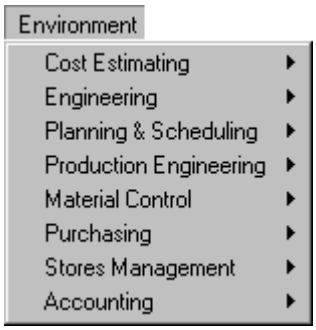


Figure 3-12: Environment Menu Selections

- **Cost Estimating**.
- **Engineering** (drawings and drawing bills of material).
- **Planning & Scheduling** (planning activities).
- Production Engineering (work orders).
- **Material Control** (requisitions & pallets).
- **Purchasing** (purchase orders & amendments).
- **Stores Management** (inventory, receiving, QA inspections, issues to production).
- **Accounting** (time charging, accounting transactions, vendor invoice processing & customer billings).

Cost Estimating Environment has the following choices (Figure 3-13):

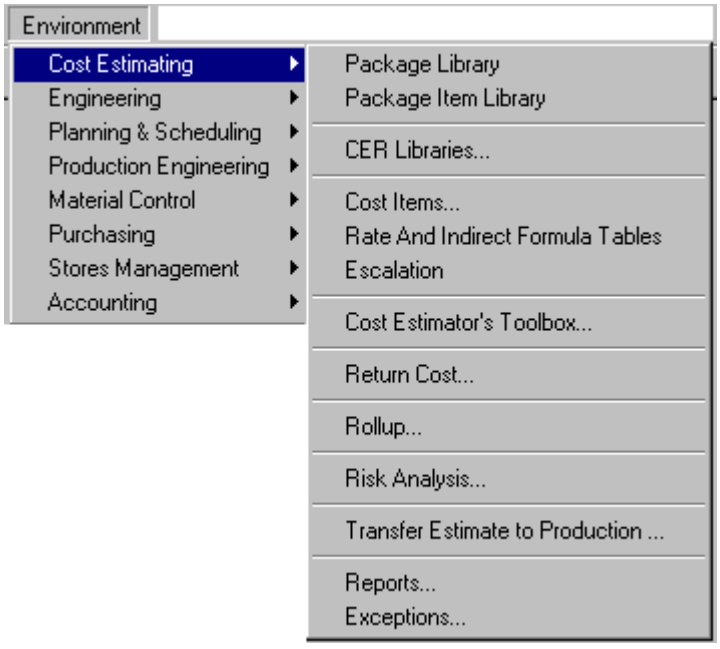


Figure 3-13: Environment/Cost Estimating Menu Selections

- **Package Library** gives full access to the Standard Interim Product Packages.
- **Package Item Library** provides access to Interim Product Package Items.
- **CER Libraries** gives the user direct access to all types of CERs in the library.
- **Cost Items** gives the user direct access to the individual cost items for an estimate.
- **Rate & Indirect Formula Tables** gives the user direct access to project-related rates (labor, overhead, profit, etc.) and indirect formulas.
- **Escalation** gives the user direct access to the material cost escalation table.
- **Cost Estimator's Tool Box** provides a variety of functions for editing and manipulating cost estimating information.
- **Return Costs** gives the user access to return costs information.

- **Rollup** provides the user with options for re-computing data summaries throughout the contract/project work breakdown structures. Specifically, the user may perform rollups on cost estimate data.
- **Risk Analysis** provides a Monte Carlo risk assessment of the cost estimate.
- **Transfer Estimate to Production** exports cost estimate data directly to the Production Engineering and Material Control environments. Cost Estimate Items are gathered into preliminary work orders and material requisitions.
- **Reports** provide access to all of the reports related to cost estimating.
- **Exceptions** provide access to all of the special exception reports related to cost estimating.

Engineering Environment has the following choices (Figure 3-14):

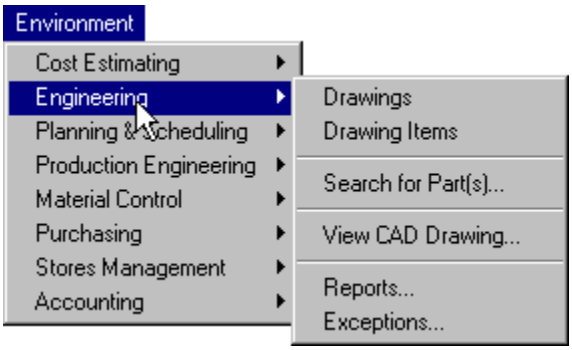


Figure 3-14: Environment/Engineering Menu Selections

- **Drawings** provide access to drawings information.
- **Drawing Items** provides access to drawing bills of material information.
- **Search for Part(s)** allows the users to search the Parts Catalog using specific selection criteria.
- **View CAD Drawing** allows user to directly open a DWG file using AutoCAD's *VoloView* software embedded in the system. Refer to "Viewing AutoCAD Drawings" in the Appendix for additional information.
- **Reports** provide access to all drawing-related reports.
- **Exceptions** provide access to all drawing-related exception reports.

Planning & Scheduling Environment has the following choices (Figure 3-15):

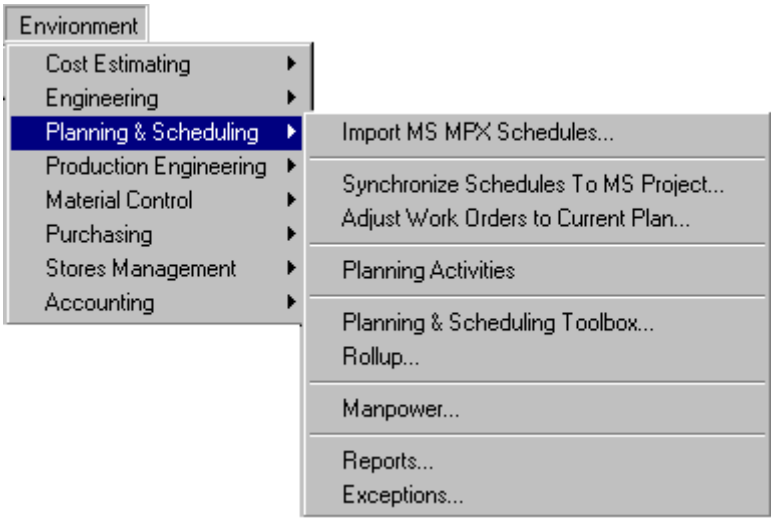


Figure 3-15: Environment/Planning & Scheduling Menu Selections

- **Import MS MPX Schedules** allows schedule activities developed in Microsoft Project to be imported into the *PERCEPTION* database.
- **Synchronize Schedules To MS Project** provides options for obtaining schedules for planning activities directly from the *MS Project 2000* database, or to update the *Project 2000* database with current schedule status of *PERCEPTION* planning activities.
- **Adjust Work Orders to Current Plan** provides an option to re-schedule project work orders to current planning activities schedules.
- **Planning Activities** provides direct access to *PERCEPTION* schedule planning activities.
- **Planning and Scheduling Toolbox** provides a variety of functions for editing and manipulating planning information.
- **Rollup** provides the user with options for re-computing data summaries throughout the contract/project work breakdown structures. Specifically, the user may perform rollups on baseline schedule data.
- **Manpowe**r provides a manpower analysis based upon planned/actual/forecast requirements.
- **Reports** provide access to all schedule planning-related reports.
- **Exceptions** provide access to all schedule planning-related exception reports.

Production Engineering Environment has the following choices (Figure 3-16):

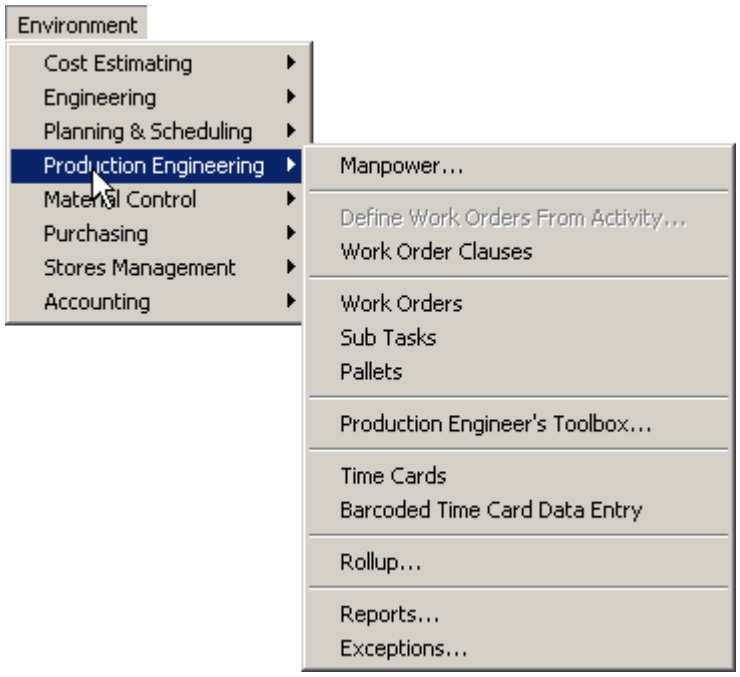


Figure 3-16: Environment/Production Engineering Menu Selections

- **Manpower** provides a manpower analysis based upon planned/actual/forecast requirements.
- **Define Work Orders From Activity** allows project work orders to be developed directly under schedule activities.
- **Work Orders** opens the work order window for viewing, editing, adding, and deleting records.
- **Sub Tasks** opens the work order sub-task window for viewing, editing, adding, and deleting records. Sub-tasks apply to the special work orders: distributed, time-phased and incremental process work orders.
- **Pallets** opens the material and work order pallet window for viewing, editing, adding, and deleting records.
- **Production Engineer's Toolbox** provides a variety of functions for editing and manipulating work order information.
- **Timecards** provides functions for entering and managing work order time charges.
- **Bar Coded Timecard Data Entry** is an alternate data entry window for entering time charges using bar code identification and data collection devises.

- **Rollup** provides the user with options for re-computing data summaries throughout the contract/project work breakdown structures. Specifically, the user may perform rollups on actual labor cost and schedule data, including progress and final cost forecasts and trends.
- **Reports** provide access to all labor cost and schedule-related reports.
- **Exceptions** provide access to all labor cost and schedule -related exception reports.

Material Control Environment has the following choices (Figure 3-17):

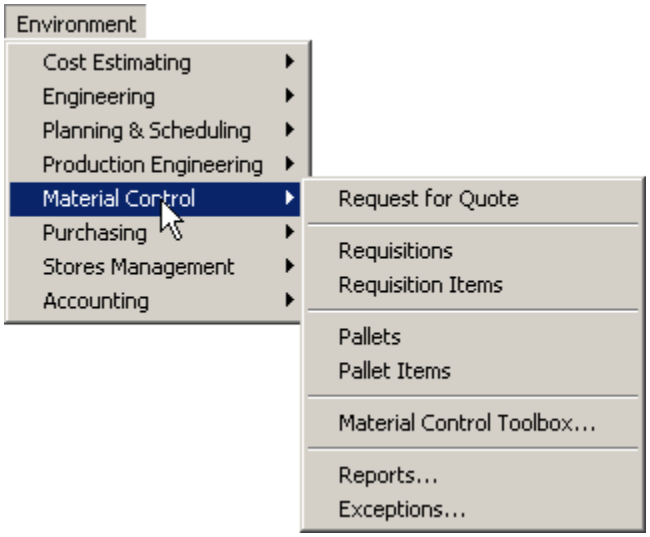


Figure 3-17: Environment/Material Control Menu Selections

- **Request for Quote** provides the means for developing an RFQ to prospective vendors.
- **Requisitions** opens the material requisition window for viewing, editing, adding, and deleting records.
- **Requisitions Items** opens the material requisition items window for viewing, editing, adding, and deleting records.
- **Pallets** opens the material and work order pallet window for viewing, editing, adding, and deleting records.
- **Pallet Items** opens the material and work order pallet items window for viewing, editing, adding, and deleting records.
- **Material Control Toolbox** provides a variety of functions for editing and manipulating material control information.
- **Rollup** provides the user with options for re-computing material cost data summaries throughout the contract/project work breakdown structures.
- **Reports** provide access to all material control-related reports.
- **Exceptions** provide access to all material control-related exception reports.

Purchasing Environment has the following choices (Figure 3-18):

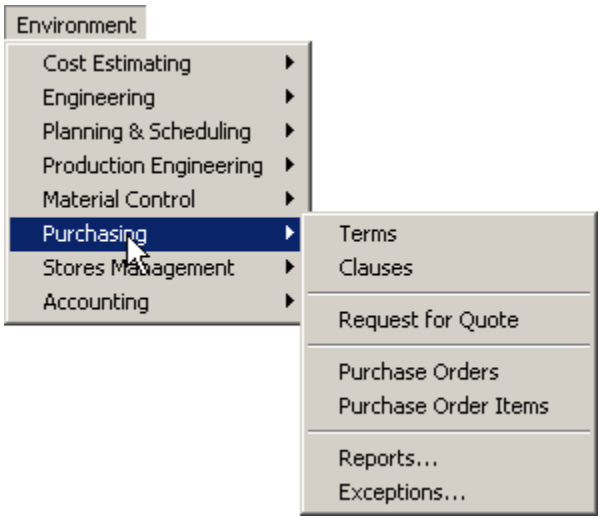


Figure 3-18: Environment/Purchasing Menu Selections

- **Terms** opens the library of standard purchase order terms and conditions for viewing, editing, adding, and deleting records.
- **Clauses** opens the library of standard clauses for purchase order headers and footers for viewing, editing, adding, and deleting records.
- **Request for Quote** provides the means for developing an RFQ to prospective vendors.
- **Purchase Orders** opens the purchase order window for viewing, editing, adding, and deleting records.
- **Purchase Order Items** opens the purchase order items window for viewing, editing, adding, and deleting records.
- **Reports** provide access to all purchasing-related reports.
- **Exceptions** provide access to all purchasing-related exception reports.

Stores Management Environment has the following choices (Figure 3-19):

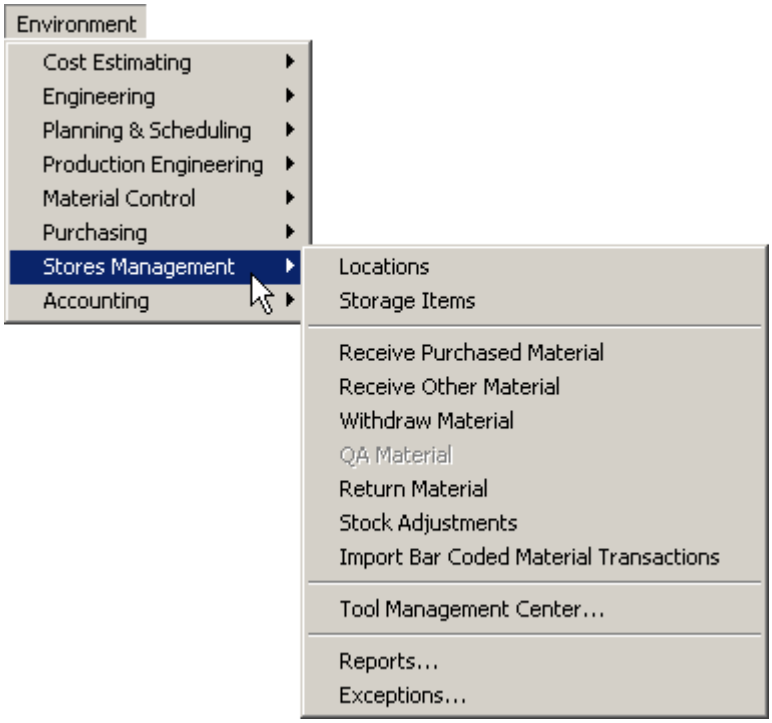


Figure 3-19: Environment/Stores Management Menu Selections

- **Locations** provide access to all defined material storage locations, and to the material stored in these locations.
- **Storage Items** provides access to all the material stored in these locations.
- **Receive Purchased Material** is the window used to receive purchased material deliveries.
- **Receive Other Material** is the window used to receive other non-purchased material such as owner furnished material and manufactured parts.
- **Withdraw Material** is the window used to issue material to production work orders, either by requisition, by pallet, or by Quick Stock Withdraw.
- **QA Material** provides access to QA inspection functions for delivered material being received.
- **Return Material** provides access to the function for formally identifying material rejected that is to be sent back to vendor.
- **Stock Adjustments** provides access to functions for taking physical inventory and initiating adjustments to the database records.
- **Import Bar Coded Material Transactions** provides the means for importing data files collected by bar code data collection devises.
- **Tool Management Center** provides functions for managing the issuing of tools to production.
- **Reports** provide access to all stores-related reports.
- **Exceptions** provide access to all stores-related exception reports.

Accounting Environment has the following choices (Figure 3-20):

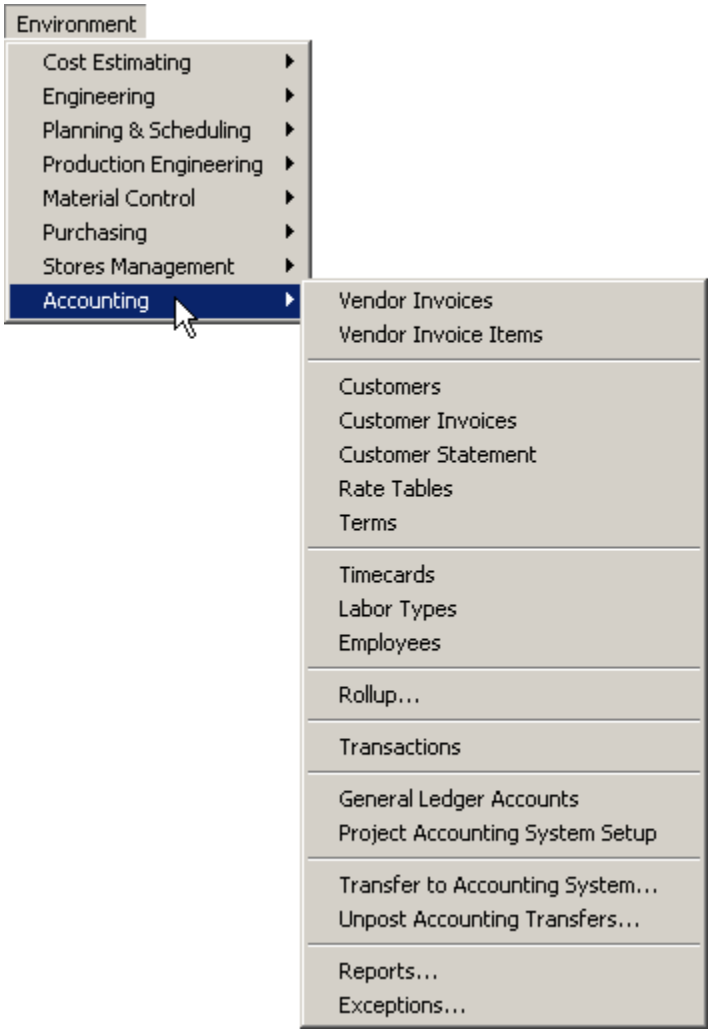


Figure 3-20: Environment/Accounting Menu Selections

- **Vendor Invoices** provides access to the functions for entering vendor invoices for the system's cross-checking features with purchase orders.
- **Vendor Invoice Items** provide access to vendor invoice items level of detail.
- **Customers** provide access to customer worksheet necessary for creating customer billing invoices.
- **Customer Billing** provides access to the customer billing worksheet.
- **Customer Statement** provides access to customer billing statement window.
- **Rate Tables** provides access to the project rate tables (by work center) for generating customer billing invoices.
- **Terms** provide access to billing and purchasing terms library table.

- **Timecards** to view, edit, add and delete work order time charges.
- **Labor Types** to view, edit, add and delete types of labor charges (regular, over time, etc.).
- **Employees** allows access to view, edit, add or delete employee data for timecard processing. Valid employee entries also are required for buyers to issue purchase orders from *PERCEPTION*.
- **Rollup** provides the user with options for re-computing data summaries throughout the contract/project work breakdown structures. Specifically, the user may perform rollups on actual labor cost and schedule data, including progress and final cost forecasts and trends. Similar rollups of material costs also can be performed.
- **Transactions** allows viewing of all system transactions that can be processed by financial and accounting systems.
- **General Ledger Accounts** allows the definition of the accounting transaction codes.
- **Project Accounting System Setup** defines the general ledger accounts for a new project.
- **Transfer To Accounting System** exports various transactions from *PERCEPTION* for importing into the accounting system General Ledger, Payroll, Accounts Payable and Accounts Receivable systems.
- **Unpost Accounting Transfers** resets transactions on the *PERCEPTION* database to the un-posted status.
- **Reports** provide access to all accounting-related reports.
- **Exceptions** provide access to all accounting-related exception reports.

LIBRARY

Library provides access to all the modules of *PERCEPTION* including those that are on the toolbar as well as many that are not (Figure 3-21).

Figure 3-21: Library Menu Selections

- **Company Parameters** enables special user options and defaults.
- **Units of Measure** allows the user to define the different units of measure and their conversion factors that will be used for, among other things, purchasing cost estimating CERs and the Parts Catalog.
- **Work Centers** allows the user to define different areas of work.
- **Trades/Resources** identifies the shipyard trade categories for budgeting, manpower analysis, and performance measurement reporting.
- **Vendor Catalog** provides an address book for all your vendors.
- **Standard Parts Catalog** provides a place for compiling a list of commonly used parts or normal stock items.
- **Currency** table enables purchase orders to be issued in foreign currencies. The system will apply exchange rates as defined in this table for domestic currency budget performance reporting.
- **Calendar** sets list of holidays.
- **Customers** provides an address book for all the company customers.
- **Stages of Construction** allows the user to define shipbuilding process by sequence.

- **Types of Work** allows the user to define shipbuilding process by work type.
- **Block Types** allows the user to define structural interim products made from assemblies, sub-assemblies and parts.
- **Ship Characteristics** is used to record the primary and secondary characteristics specific to the ship.
- **Ship Types** provides a window for retrieving, adding and editing ship types.
- **WBS** provides access to the work breakdown structures defined for all projects on the database. Refer to the topic L*inkage and Drill-Downs*.
- **WBS History** provides access to snap shots of project performance indicators (for example, budgets, expended costs, earned values, estimates at completion, etc.) at every level of a project's WBS. Refer to the topic L*inkage and Drill-Downs*.

Several of the items on the Library menu have a second level. An arrow pointing to the right indicates this. For example;

- **Standard Parts Catalog** (Figure 3-22) provides access to material type classifications and sub classifications; part class attributes (physical, material, performance) and default class attributes; and to the catalog of parts and interim products (assemblies, sub-assemblies, etc.).

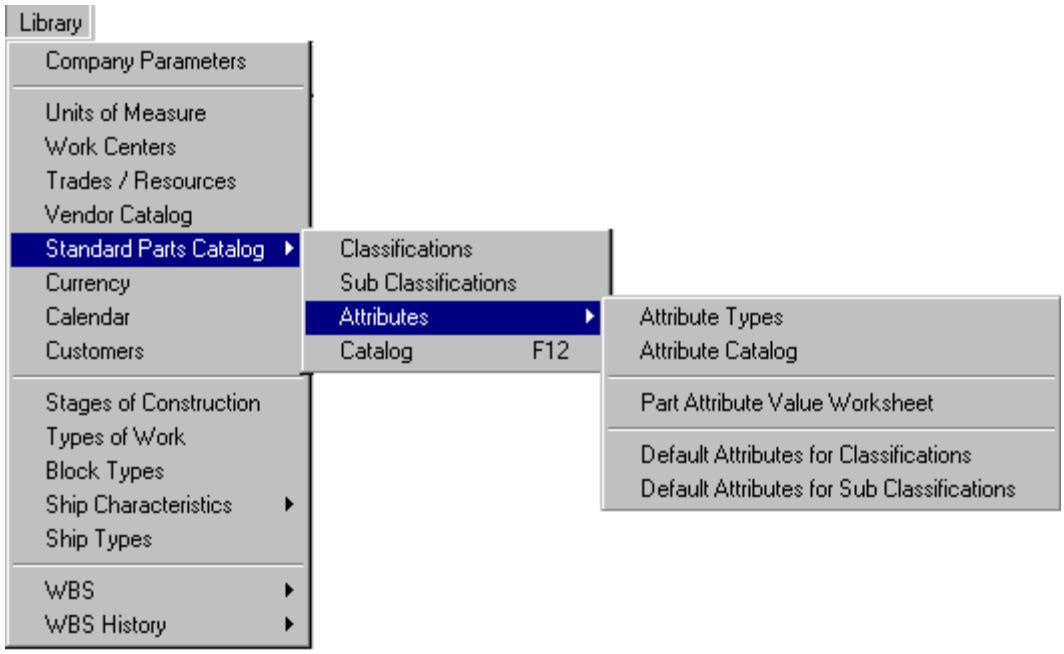


Figure 3-22: Standard Parts Catalog Menu

- **Ship Characteristics** (Figure 3-23) provides access to the types of characteristics, the characteristics library, the list of standard characteristics (for example, LOA, displacement, etc.), and groups of characteristics germane to specific ship types.

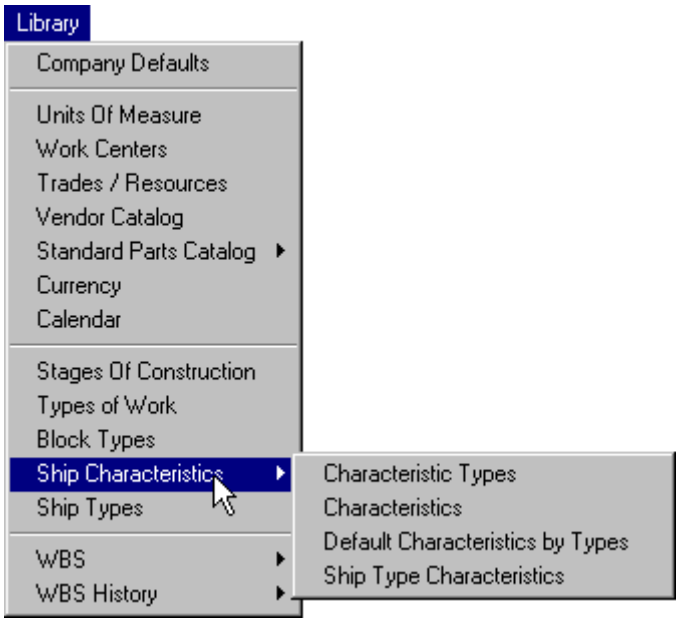


Figure 3-23: Ship Characteristics Menu

- **Characteristic Types** allows the user to identify basic types of characteristics, such as operational, hull, cargo, etc.
- **Characteristic**s allows the user to develop a master list of ship design characteristics, each cataloged by type.
- **Default Characteristics** allows the user to assign selected characteristics from the master list as a default set of characteristics when a new project is defined. The user then should define the specific values of these characteristics for the project.
- **Ship Type Characteristics** allows the user to develop another list of characteristics specific to each ship type. These characteristics are in addition to the default characteristics. These ship type characteristics also will be loaded under a project when a new project is defined with a specific ship type designation.

DATA

Data provides options for manipulating data (Figure 3-24).

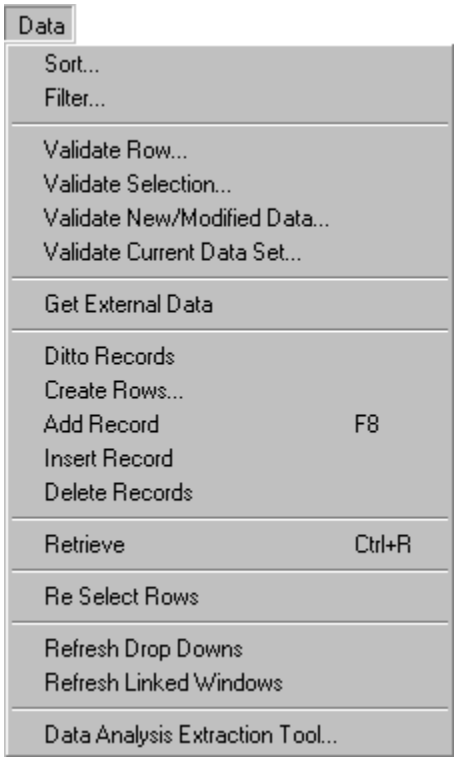


Figure 3-24: **Data** ***Menu Options***

- **Sort** opens an option window that contains the column headings of the active worksheet. The displayed rows of data can be sorted either in ascending or descending order by any single designated column.[6]
- **Filter** opens an additional selection window and allows the user to refine a selection of data that has been loaded into a worksheet from the database.
- **Validate Row** selection results in the system validating the data in the current row to ensure necessary assignments (work breakdown structure, etc.) have been properly defined.
- **Validate Selection** results in the system validating the data entered in all records that have been selected (highlighted) in a worksheet window.
- **Validate New/Modified Data** will validate every record in the current data set that has been added or modified.

[6] Any column in a worksheet also can be sorted automatically with a double click on the column heading.

- **Validate Current Data Set** will validate every row in the current data set whether it has been modified or not. This would be valuable for records that have been previously created (possibly by using the import or paste function) and saved without validating.
- **Get External Data** imports records that have been created elsewhere.
- **Ditto Records** creates an exact copy of one or more selected record(s). The unique key fields will have to be modified before the record can be saved. This is a very fast way to duplicate rows. Ditto records is only available for records that have not yet been saved to the database.
- **Create Rows** quickly creates a specified number of rows.
- **Add Record** opens a new record at the bottom of the active worksheet. If global defaults have been set, the new record will automatically have these values. If the current window was opened by drilling down from another window, these new records will have the key values of its parent.
- **Insert Record** inserts a new record above the current row. If global defaults have been set, the new record will automatically have these values. If drilling down from another window opened the current window, these new records will have the key values of its parent record. Other data columns will need to be provided manually by the user.
- **Delete Records** will delete the current row, or multiple rows if more than one is selected (highlighted). These records will be deleted permanently in the database only when the user initiates a *SAVE* operation.
- **Retrieve** enables the user to retrieve a range of records from the database into the active worksheet.
- **Re-Select Rows** refreshes the current row, or multiple rows if more than one is selected (highlighted) with the data that has been saved on the database. This is useful when changes have been made on a record that the user does not wish to save, but there are other modifications in the current data set and closing the window without saving would lose those other changes. Another use for this feature will apply when a record is changed by another action, or by another user, while it was displayed in your session. Re-selecting this row will reflect the changes that have been previously saved.
- **Refresh Drop-Downs** refreshes the data in a drop-down worksheet with any changes that have been made since the window using the drop-down was opened. Refer to *Types of Data Fields* in Appendix I for more information.
- **Refresh Linked Windows** refreshes the windows in the current linkage chain. Refer to *Linkage and Drill-Downs* for more information.
- **Data Analysis Extraction Tool** provides a statistical data analysis tool.

REPORTS

Reports provides a variety of different reports that summarize cost data for the contract, by separate project SWBS, by PWBS, by BOM, by Cost Item, and by work center. By clicking on the menu (Figure 3-25), the following pop up menu (Figure 3-26) provides a selection of available reports grouped by report category.

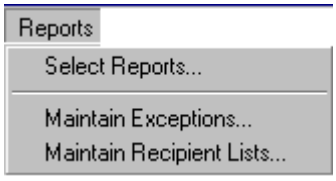


Figure 3-25: Reports Menu

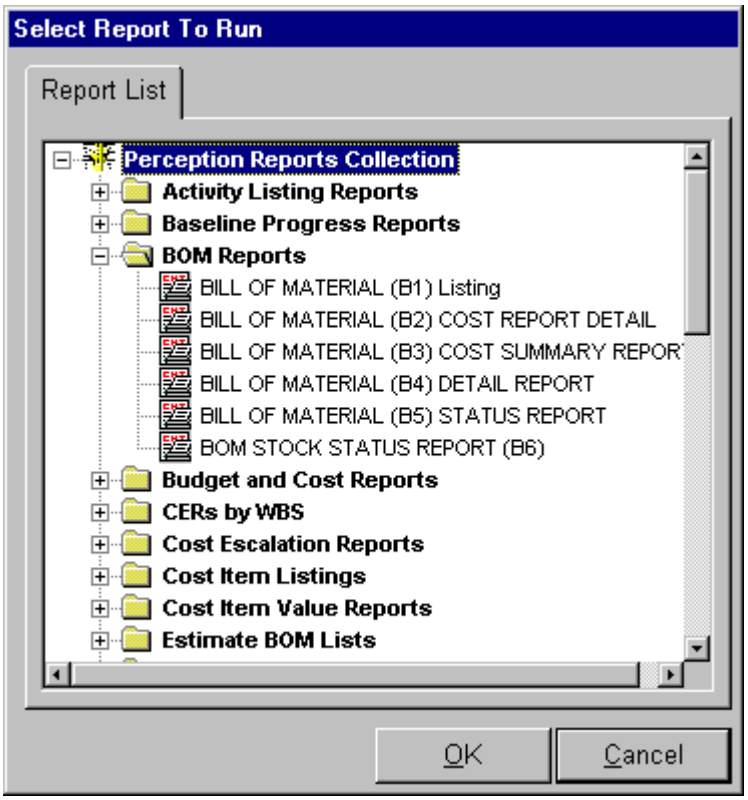


Figure 3-26: Report Selection Window

WINDOW

Window allows the user to arrange window positions and other related functions (Figure 3-27).

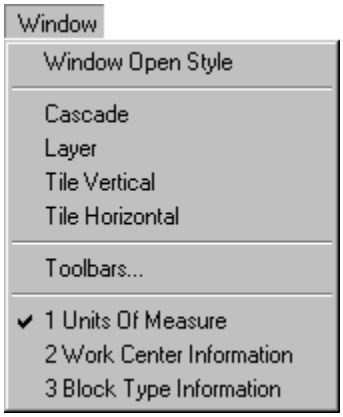


Figure 3-27: **Window** ***Menu Selections***

When multiple worksheets are open, the user has the following options for arranging them in the workspace.

Cascade is shown in Figure 3-28. By clicking on the worksheet title bar activates that window.

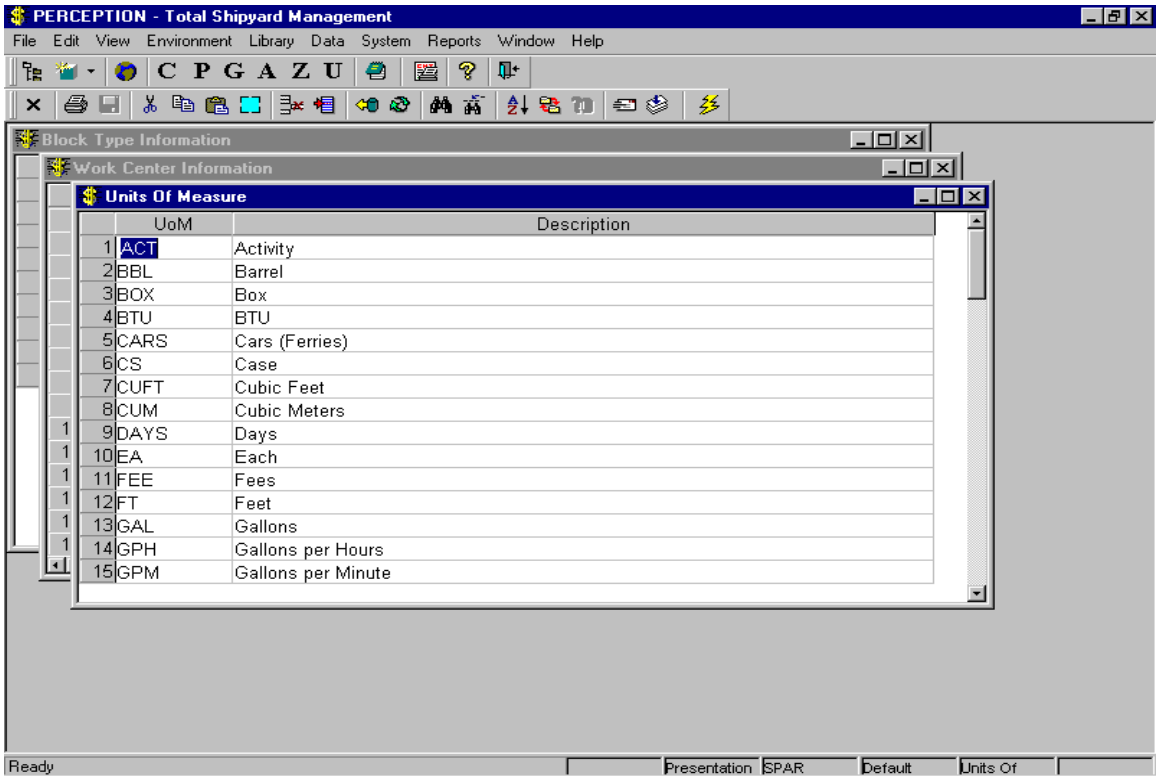


Figure 3-28: Cascading Multiple Worksheets

Layer will fill the workspace with only the active window (default).

Tile Vertical arranges the worksheets vertically (Figure 3-29).

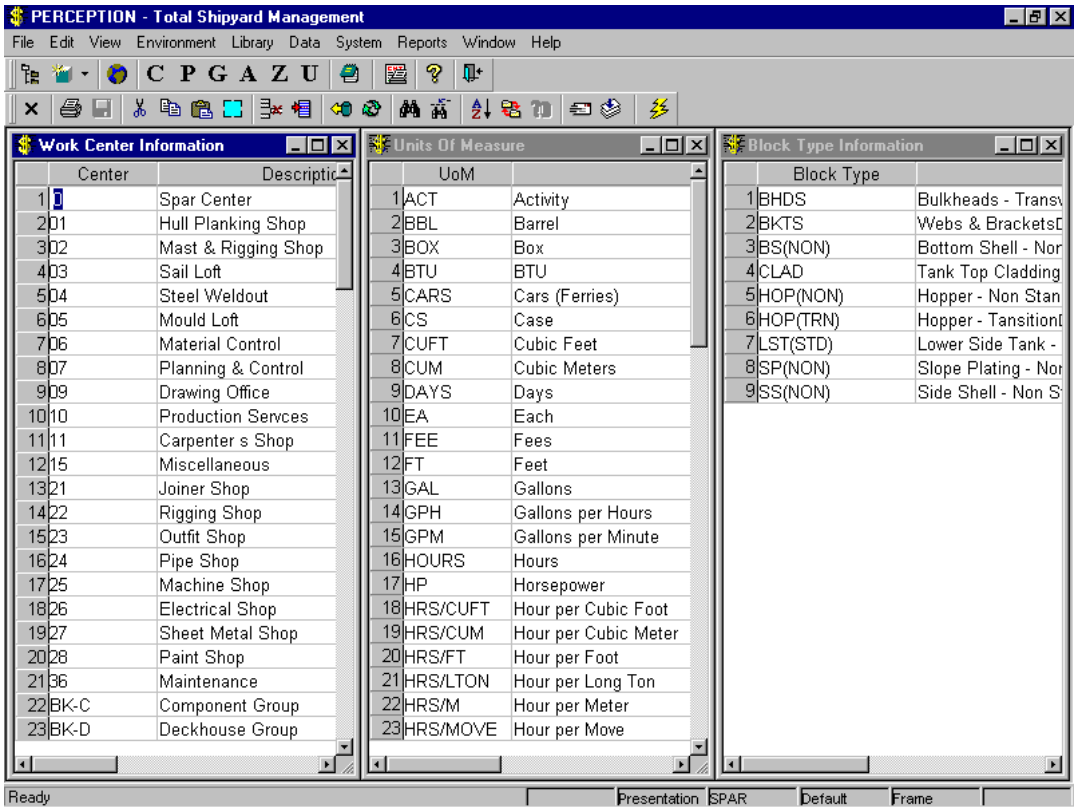


Figure 3-29: Vertical Tile Arrangement

Tile Horizontal arranges the worksheets horizontally (Figure 3-30).

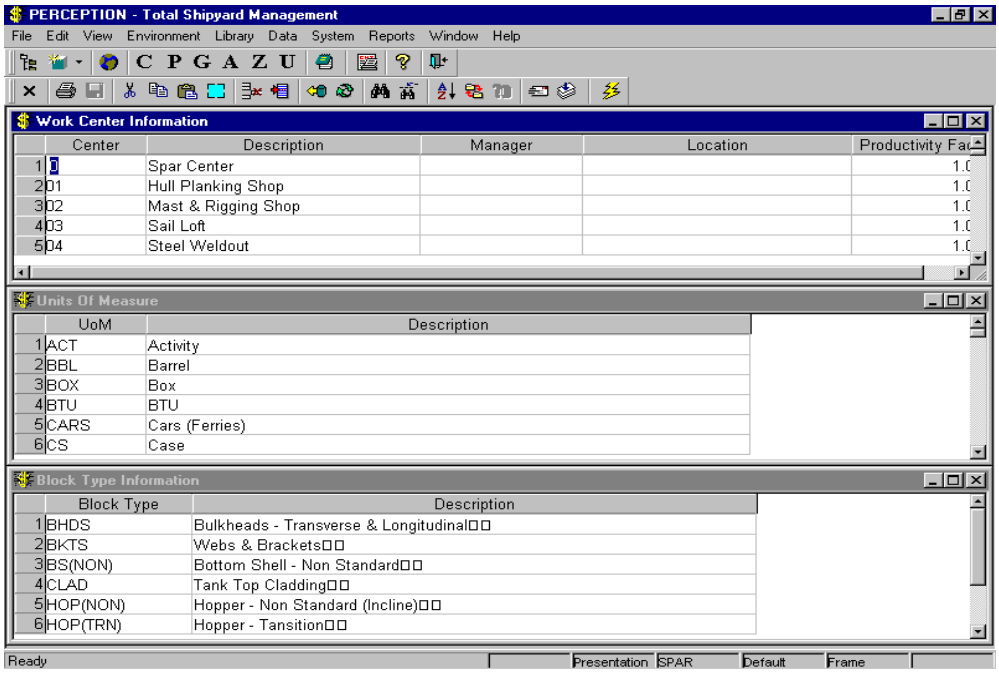


Figure 3-30: Horizontal Tile Arrangement

The *Window* menu also allows the user to customize the toolbars. When clicking on *Windows/Toolbars*, a window (Figure 3-31) appears with various options for the user. The user can customize the position, the button size, and whether or not to display the button text of these toolbars. Throughout the software, the *Worksheet Menu* bar (or third toolbar) changes depending on which window is open. This third toolbar provides functions that are applicable only to the current window.

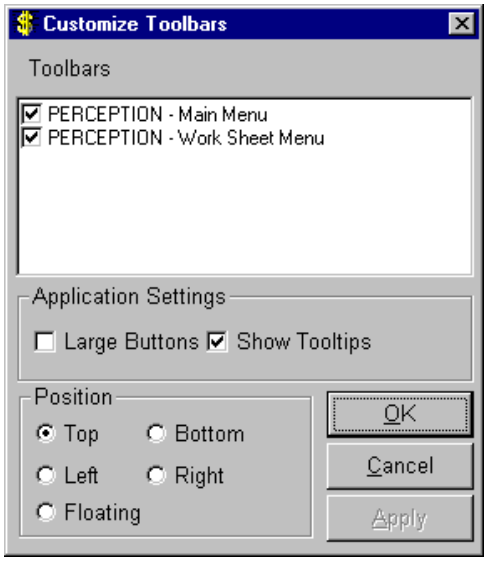


Figure 3-31: Window/Toolbar Options

If more than one window is open, the *Window* menu also lists them. The name that is preceded by a check mark is the current active worksheet (Figure 3-32). The user can move to any of these windows directly by clicking on the desired one.

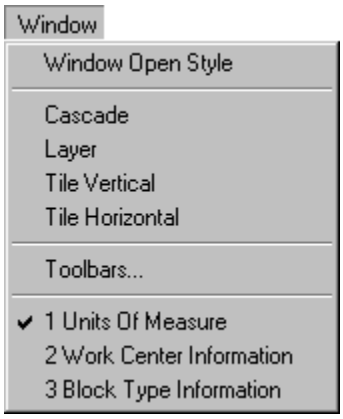


Figure 3-32: **Window** ***Menu Displaying Open Worksheets***

HELP

Help provides various user on-line aids, including the contents of the user manual by chapters, index of key words and search function for user-specified topics (Figure 3-33).

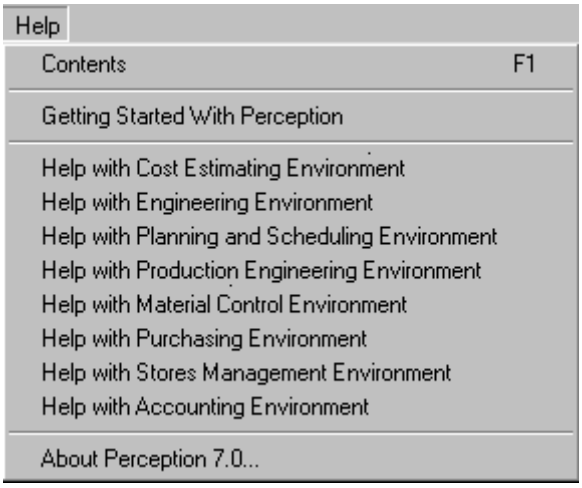


Figure 3-33: **Help** ***Menu Options***

- **Help Contents** gives access to *PERCEPTION* user manuals, and opens the help manual topic that relates to the window that is currently open.
- **Getting Started With *Perception*** gives access to this User Manual. This manual provides basic "How To" instructions for navigating the *PERCEPTION* system and performing the basic functions for data entry, database retrieval, and reporting.
- **Help With Environments** provides access to the user manuals that have been broken out by subject matter.
- **About *PERCEPTION* 7.0** displays the current version of the software.

TOOLBAR

Many of the supporting functions that are in the main menu system can also be executed by clicking a button on the toolbar (Figure 3-34). Many of these functions are standard Windows functions. The user can customize the position, the button size, and whether or not to display the button text of these toolbars. By right clicking on a toolbar, the changes can be made to that toolbar. The second toolbar is only visible while in one of the modules, and several of the buttons on this toolbar are only active when an appropriate action has been taken to make them active. There is also a third toolbar that is window specific. It provides functions that are exclusive to the active window.

Figure 3-34: Toolbar Functions

The first toolbar provides direct access to define, view, or modify the following:

- **New** opens a wizard fro creating a new contract or project.
- **Project Navigator** opens the tree view navigation through the projects.
- **Environment Selector** allows the user to easily change environment in which the current window will be viewed, i.e., the Estimating view of Project Details may be different than the Production Engineering view of the same window.
- **Global Defaults** allows the user to enter default values that the system will use for entry of new records and for the range retrieval selection windows.
- **C, P, G, A, Z, U** opens either the WBS Contract, Project, Group, Account, Zone, or Unit windows.
- **Parts Catalog** opens the window to view or enter standard parts.
- **Run Reports** opens the report selector window.

- **Help** loads the user manual.
- **Exit** ends the session.

The second toolbar provides the following:

- **Close** the active window workspace.
- **Print** the data as displayed.
- **Save** changes to all records in the active window workspace.
- **Cut** removes selected record(s) or data to the Windows clipboard.
- **Copy** copies either selected record(s) or data to the Windows clipboard.
- **Paste** inserts either data in a column or row(s) from the Windows clipboard.
- **Select All** selects and highlights all of the rows that have been retrieved – this can also be accomplished by clicking on the upper left blank heading box.
- **Delete** will delete selected records.
- **Add** allows the user to add a new record.
- **Retrieve** provides the option to view a different set of records.
- **Reselect Rows** will re-retrieve the selected records to reflect the data as it is currently saved on the database.
- **Find** searches for a string in a specific column in the rows, which have been retrieved.
- **Replace** searches and replaces a string with another string in a specific column in the rows that have been retrieved or imported.

NOTE: Care should be exercised when using replace. Replace is intended for a situation where new records have been imported and a global change is required in these records. The error checking that takes place after a replace is not as complete as when new data is typed into a column.

- **Sort** opens an option window that contains the column headings. The displayed data can be sorted either in ascending or descending order by any single or multiple columns.
- **Filter** opens an option window that allows the user to further fine-tune the selection of rows displayed.

NOTE: See General System Operation for further discussion of filter functionality.

- **Validate** will check the data for the entire dataset in the window that is active.
- **Run Associated Reports** opens a window that displays all reports that are relevant to the selected records. The report will run using the selected records for the retrieval argument.
- **Mail** will create an *EXCEL* file of the complete dataset in the window that is active and attach it to an email that can be sent to anyone in the user's email address book.

- **PDF Writer** will create an Adobe Acrobat PDF file containing the data in the current data set. The Adobe Acrobat software must be properly installed. Adobe Acrobat Version 4.0 or greater is needed for this capacity to work. The PDF Distiller that is installed and the path to the PDF ini file must be entered in the company defaults table. To do this, select *Library/Company Parameters* from the main menu.
- **Drill-Downs** opens a window with the Drill-Down options appropriate to the current window available for selection.

The following buttons are available only when the free-form worksheets are open:

- **First** moves to the first record of selection.
- **Prior** moves to the previous record of selection.
- **Next** moves to the next record of selection.
- **Last** moves to the last record of selection

Chapter 4: General System Operation

Generally, all data entry windows (tables, forms, etc.) allow the user to add, change, cut, copy, paste, sort, filter and delete information using the same procedures. The following describes these fundamental procedures for operating the system.

The instructions for operating the mouse are provided in Appendix I.

Worksheets

Worksheets are the various displays of information by the system. Worksheets are used to enter data, to process data, to view data, and to generate reports.

Opening Worksheets

Worksheets are displayed in the workspace. The various menu options provide the user with direct access to the worksheets desired. Clicking on the menu selection will cause the system to open that window into the workspace.

However, once a worksheet has been opened, additional worksheets are generally available, typically for details and lower level information. These lower level windows can be accessed by clicking on the *Drill-Down* button  on the toolbar, or by clicking the right mouse button. This causes a sub-menu to appear listing these lower level windows for the user. Drag the cursor down the sub-menu and select the desired menu item.

Closing Worksheets

Worksheets can be closed simply by clicking on the **X** icon, either in the upper right corner of the worksheet or the **X** button  on the toolbar. If information in the worksheet has been altered in any way, the system will always ask the user if the changes should be saved onto the database.

Opening Multiple Worksheets

The system allows any number of worksheets to be open at any time. Any of these windows can be activated by clicking anywhere inside that window or by clicking on its title bar, which when made active becomes highlighted. The other open worksheets will have title bars that are not highlighted.

Multiple worksheets can be displayed differently at the option of the user. Refer to the chapter "*Windows"* in the main menu bar, in this user manual.

Worksheet Worksheets

Many of the worksheets of the system are worksheets (Figure 4-1) that list multiple rows of records. This type of worksheet looks like a spreadsheet and is a convenient means for the user to visually see a range of records and their information.

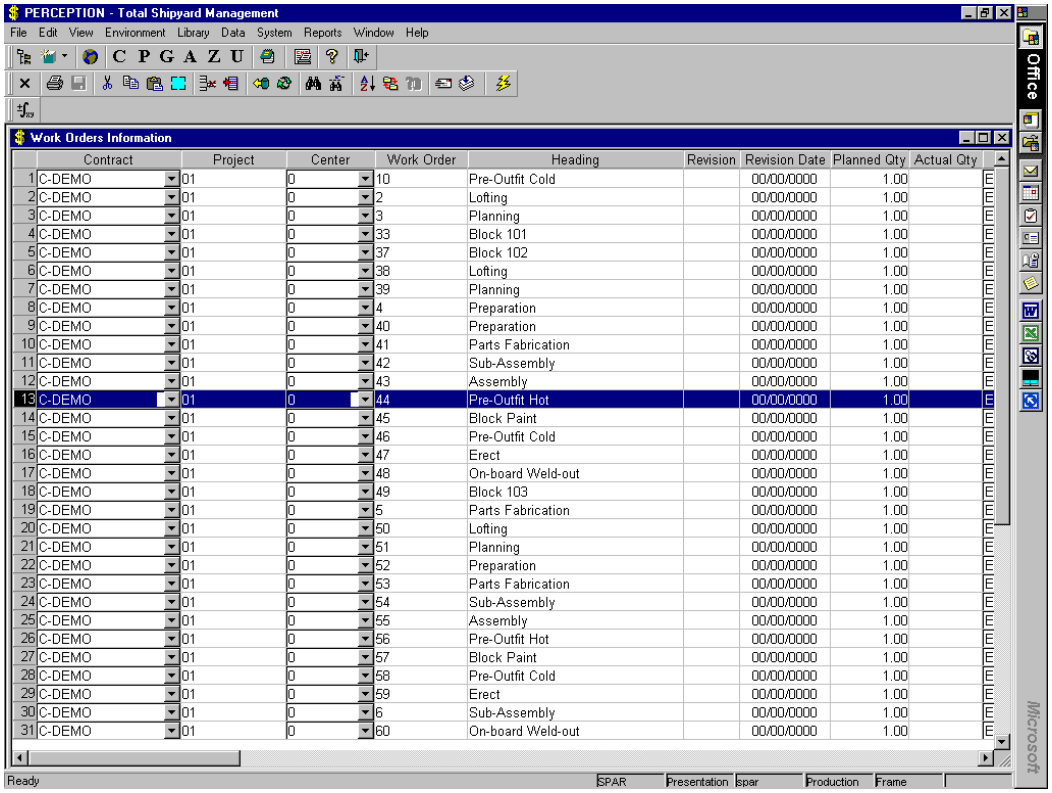


Figure 4-1: Sample Worksheet Window

Detail Worksheets

Rows of records in any given worksheet usually have details that are not easily displayed on the worksheet window. A double click (left mouse button) on a row will bring up a detail data entry window presentation of the row's data (Figure 4-2). Alternative methods for opening a detail worksheet are to highlight the record row by giving it a single click, then clicking on the *Drill-Down* button  on the toolbar, or by right clicking with the mouse on the record to open the pop up sub-menu that provides *Detail* as one of its selections.

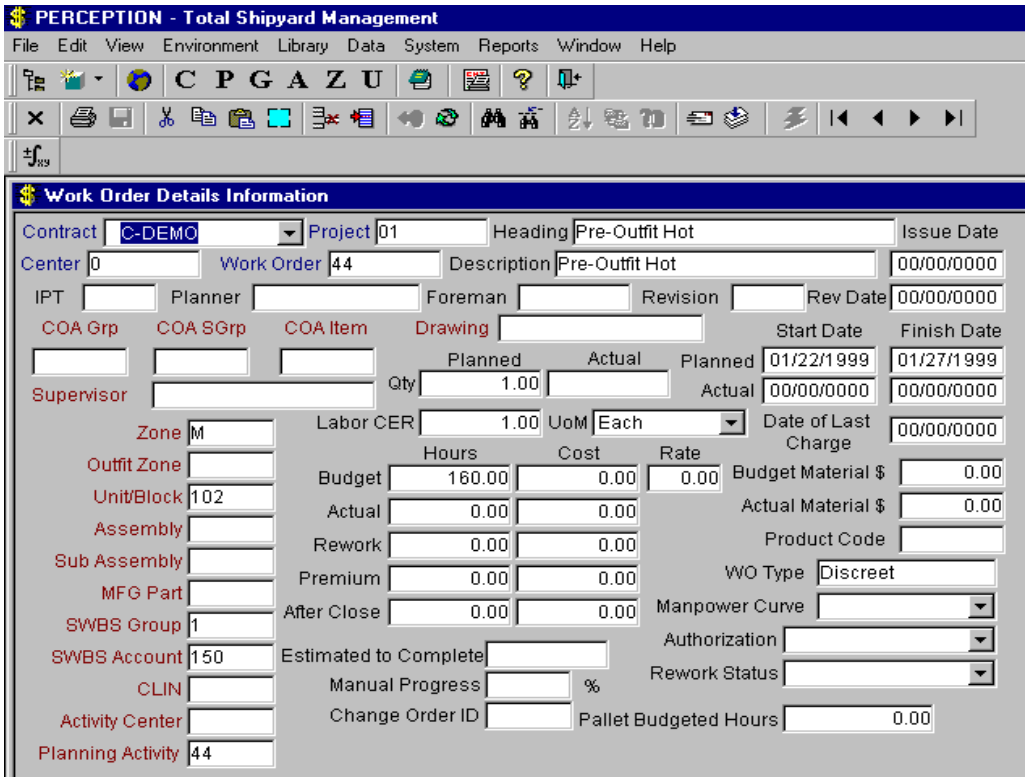


Figure 4-2: Sample Detail Worksheet

When a detail worksheet is open, the scroll buttons on the toolbar (First, Prior, Next, Last) will move through all the records that are on the worksheet window that is behind the detail window.

Note also that if you click on the *Print* button on the toolbar when a detail window is open, or select *File/Print* from the main menu, the system will print all of the records that are on the worksheet window, not just the record in the detail window that is currently visible.

Tab Style Worksheets

Some of the information on the database can be more conveniently presented to the user in what is called a tab worksheet (Figure 4-3). The controlling worksheet is a worksheet window. But after highlighting a particular record in the worksheet window, the user can then click on the different tabs to open different detail windows for that record.

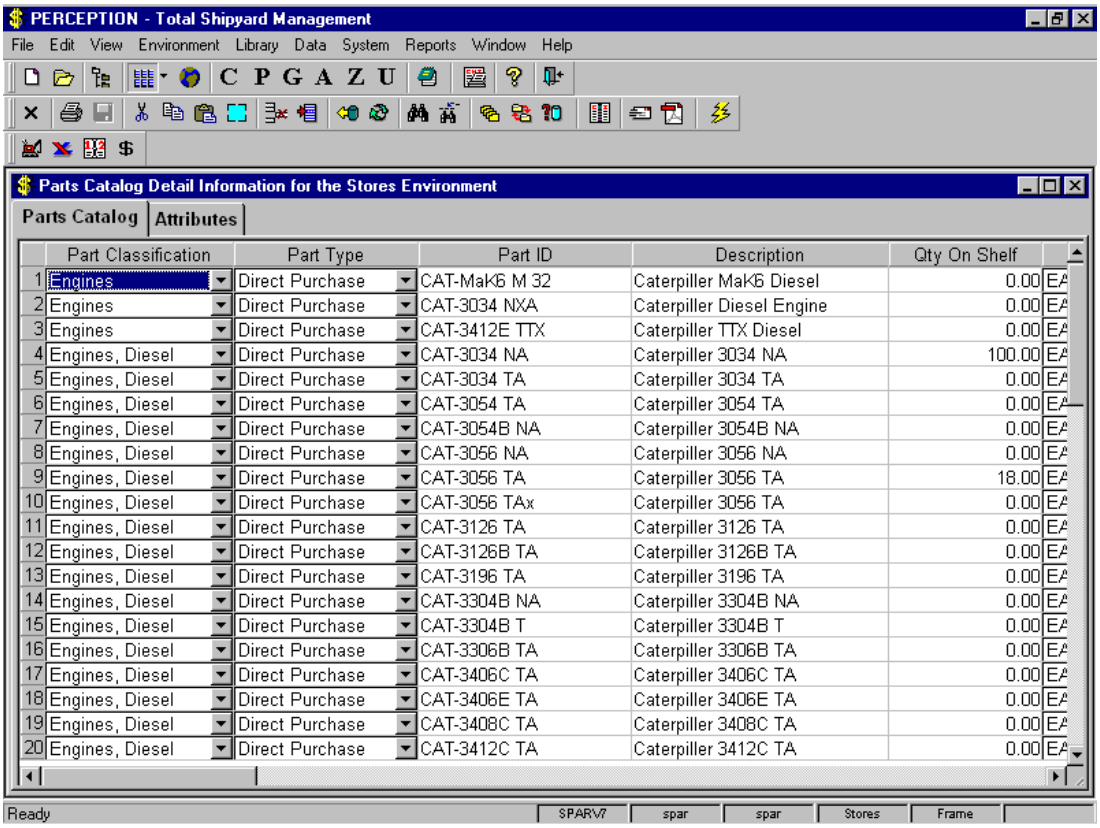


Figure 4-3: Sample Tab Worksheet

Linked Windows

Another useful feature of the system is its ability to link windows of information. This linking allows the user to change the focus of the system from one displayed record to another. The system then will automatically reload linked windows with information relating to the new focused record.

To link windows, open the first desired window of information. Then, using the Drill-Down, open lower level windows that the system links automatically to a record in the first window.

For example, open the project worksheet ("P" button) and retrieve the projects from the database. Highlight one of the projects and click on the Drill-Down button and open the work order worksheet. The system will fill the work order worksheet with all work orders for that project. Next, select *Windows/Vertical Tiles.* The system will respond by placing the first window (projects worksheet) over the second window (work order worksheet). Click on any project row in the upper tiled worksheet, and the system will fill the lower worksheet with the work orders for that project.

Linking can be done to multiple windows of Drill-Down. For example, after the projects worksheet is opened, the Drill-Down can open not only the work order worksheet, but also the material requisitions worksheet. The window tiling will place all three worksheets on display. When the user clicks on another project row in the first worksheet, the system will fill the work order worksheet with the new project 's work orders and will fill in the requisitions worksheet with the new project's requisitions.

Database Processing

When dealing with records on the database (WBS, cost items, rate tables, etc.), data entry windows provide options for adding new records, updating existing records, and deleting unwanted records. The following are general rules for performing these different transactions.

First, open the desired data entry window from a selection menu or the toolbar. Most data entry windows initially open with no information displayed. The user is required to either retrieve desired information from the database or begin adding new information directly.

Retrieving Database Records

To retrieve existing records into the data entry window, click on the *Retrieve* button  on the toolbar or select *Retrieve* from the *Data* menu. The system will provide an opportunity for the user to narrow this retrieval operation to only the selection that the user specifies. The Parts Catalog retrieval window (Figure 4-4) is an example.

The record retrieval selection process is one whereby the user can specify a range (minimum and maximum) of values for a particular set of information. The user may use any or all of the criteria available on the selection window to narrow the search and retrieval process.

Most data fields that identify various records (for example, part number, work order number, purchase order number, etc.) are alphanumeric, even if the user has set up numeric identifiers; the system still treats these identifiers as alphanumeric. The system’s sorting order for characters is as follows:

0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ. Small letters and capital letters are treated equally.

The lowest possible value for an identifier is the numeric character zero ("0") and the highest possible value for an identifier is the maximum length of characters for the identifier filled with the character "Z." If the default values of 0 and ZZZZZZZZ are left unchanged for any field(s) on the retrieval window, then the system will not use that field when building the query from the database. For example, on the figure below, if the Part ID range is changed to 101200 to 101300, and the Asset Account range is not changed from the default of 0 – ZZZZZZZZ, then all records with a Part ID between 101200 and 101300 will be retrieved regardless of what Asset Account the part is assigned to.

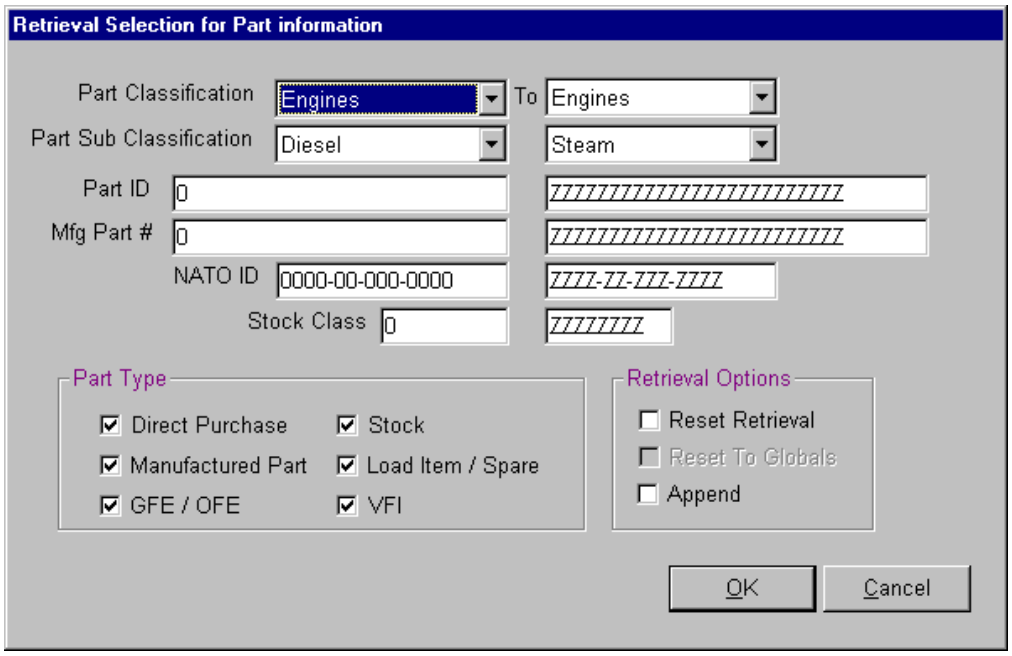


Figure 4-4: Parts Catalog Retrieval Window

Adding New Database Records

To add new records, the user must click on the *Add* button  on the toolbar or the *Add Record* or *Insert Record* options from the *Data* menu.

More records can be added by clicking *Add* each time; however, using the keyboard *down-arrow* key also will open a new record for data entry.

Modifying Database Records

Moving from one field to another can be done by with the mouse or the tab key. Then, the user must click on the *Save* button  to make these changes permanent on the database. The user also can *Close* the data screen window without clicking on the *Save* button, and the system will respond by instructing the user that changes have been made to the record and that the user can either save or discard them.

Additional details are given below for a variety of data editing features.

Selecting Multiple Records

On the worksheet windows, multiple rows can be selected. There are two methods for highlighting multiple records (i.e., rows of data).

For a series of records that are together row-wise, hold down the keyboard Shift key and a click at the top-most record to select. Keep holding the Shift key down and move the cursor down to the lowest record to select and click on it. All rows in this series will then become highlighted, or selected.

For rows that are not all together in a series, but are interspersed in various rows, hold down the keyboard Ctrl key and then click on each row to be selected.

Deleting Database Records

Generally, there are two types of data entry screens that have slightly different methods for deleting records. For screens that display only a single record (most detail windows), a click on the *Delete* button  or selecting *Data/Delete Records* from the main menu will command the system to delete just that record which is on display.

On the worksheet windows, multiple records can be deleted at one time by selecting the rows to be deleted and then clicking on the *Delete* button.

Saving Database Records

When finished adding, changing and/or deleting database records, click on the *Save* button  on the toolbar to write the changes to the database. This *Save* transaction will also permanently delete any records that have been deleted in the worksheet. The system will then inform the user if the update is successful.

The user also can *Close* the worksheet (**X** button) without clicking on the *Save* button, and the system will prompt the user to either save the changes or discard them.

If, for some reason, the program aborts before the *Save* button has been clicked, the current changes will not be saved on the database and must be re-entered.

Printing Database Records

To print a copy of the window as displayed, select *Print Screen* from the *File* menu.

Clicking on the *Print* button  on the toolbar will print all of the data that is displayed in the current data set.

Editing Data Fields

To change data within any record displayed in the data entry window, click on the field to be modified and edit or re-enter the data. Any number of data fields across any number of records displayed on the screen can be modified in similar ways by using the mouse cursor or the [Tab] key to move from field to field.

The following are frequently used operations for editing any given data field:

To insert one or more characters into a data field, click on the space to the right of the character where the insertion is to begin. Note that the cursor becomes a vertical line (|). Then, type in the characters to insert.
To delete one or more characters from a data field, click on the left of the character string to be deleted. Then, press the [Delete] key, repeatedly for each character to be deleted.
To delete a long string of characters from a data field, click on the space before the left end of the string. Then, drag the cursor to the right end of the string. Note that the system will highlight the string during this dragging process. Then, press the [Delete] key.
To replace a string of characters within a data field, click on the space before the left end of the string. Then, drag the cursor to the right end of the string. Then, enter the replacement string of characters from the keyboard.
To replace the entire contents of the data field, click on the data field until the system fully highlights the contents of the field. Then, enter the replacement string of characters from the keyboard.

Once all data entry has been completed, the user should click on the *Save* button  on the toolbar. No changes to the database will be made until the user formally initiates this save operation.

Cut, Copy & Paste Options

Other data editing operations include cut, copy and paste. Each of the cut, copy and paste operations can be accomplished several different ways:

- From *Edit* on the main menu.
- From the pop up menu on the worksheet windows.
- By clicking the appropriate icon on the toolbar.
- By using the standard Windows key combinations, i.e., *Ctrl+X* = Cut, *Ctrl+C* = Copy, and *Ctrl+V* = Paste.

Refer to Chapter 9, "Importing & Exporting Data" for more details on cut, copy and paste with *EXCEL* and other desktop software.

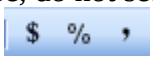
Copy & Paste with *EXCEL*

Data can be copied from *PERCEPTION* to *EXCEL* and/or from *EXCEL* to *PERCEPTION*. Similar operations can be performed with other desktop software products.

Restrictions on *EXCEL* Data

PERCEPTION cannot import *EXCEL* data fields that are expressions or equations. Therefore, any such fields must be copied to the clip board, then reset using *Edit/Paste Special Values*.

PERCEPTION uses several types of data fields: numeric, alphanumeric, and calendar dates.

Data pertaining to quantities, cost, and labor hours, etc. are treated as numeric. These data fields in *EXCEL* also must be formatted as numbers. *PERCEPTION* cannot import data fields that are formatted as "currency", "percentages." or as "accounting." Therefore, do not set *EXCEL* numeric data fields using the following *EXCEL* toolbar buttons: 

unless these formats are changed to "Numbers."

When copying the percentages from *EXCEL*, the value in *EXCEL* should not be formatted as a percentage. For example, if you want an estimate cost item in *EXCEL* to have 10% risk, then the value in the *EXCEL* column should be 10. If you want 12.5%, then the number in the *EXCEL* column should be 12.5. The *PERCEPTION* software converts the number to a percentage.

Identifying labels, such as part numbers, cost accounts, project numbers, work order numbers, work centers, etc. all are treated as alphanumeric text fields. The *EXCEL* data corresponding to these alphanumeric fields must be formatted as "text" data, or the importing of this particular column into *PERCEPTION* may not work. Also, *PERCEPTION* does not allow certain special characters. Refer to Appendix I, "Allowable Characters," for the list of accepted ones.

Calendar dates must be set with the "slash or dash" format options (e.g., 09/15/2001). If these data fields (cells) have been copied and reset using the *Edit/Paste Special/Values*,

these fields will be converted by *EXCEL* to a numeric value. These data fields must then be reformatted as "dates."

Finally, a row of *EXCEL* data must be in the same order as that of the *PERCEPTION* row order. *PERCEPTION* row order can be changed using the procedure described below, "Rearranging Columns on the Screen."

Copying and Pasting *EXCEL* Data into *PERCEPTION*

Any permissible block of *EXCEL* rows and columns can be copied and pasted directly into any *PERCEPTION* data window.

- First, highlight in the *EXCEL* worksheet the block of rows and columns to be copied, and then click on the Copy button .
- Second, click on the place in the *PERCEPTION* worksheet where the data pasting should start, and then click on the Paste button .
- If the pasted data is a row of data, the paste process will add the data into the *PERCEPTION* worksheet row beginning at this start location, left to right.
- If the pasted data is a column of data, the paste process will add the data down the *PERCEPTION* worksheet column beginning at this start location.
- *EXCEL* data that is not compatible with *PERCEPTION* (see Restrictions on *EXCEL* Data above) will be flagged by *PERCEPTION* as it attempts to paste in the data. Figure 4-5 displays the two pop-up error windows generated by *PERCEPTION* when an incompatibility has been detected.

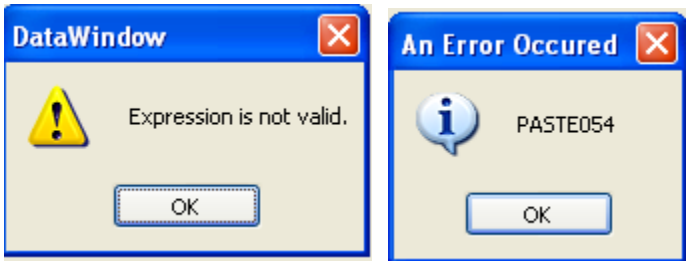


Figure 4-5: Pop-Up Error Messages for Incompatible EXCEL Data

Pasting *EXCEL* Description Fields into *PERCEPTION*

Special precautions should be taken when pasting text description fields into *PERCEPTION* (for example, cost item descriptions). If more than one data field is

attempted to be pasted into *PERCEPTION*, and if the pasting operation is set to begin at a description field, *PERCEPTION* will paste all data fields into that first description field in the *PERCEPTION* worksheet. To avoid this problem, always start the paste operation with a non-description data field (for example, work center, a date field, or cost values).

Pasting *EXCEL* Data into *PERCEPTION* Drop-Down Data Fields

Most of the *PERCEPTION* drop-down data fields will accept pasting of data directly from *EXCEL*. However, some drop-downs use internal database codes and do not use the text data that is displayed from them. The following are the drop-downs that will require the *EXCEL* data to provide the codes as described in Appendix VI:

- Parts Catalog Worksheet:
  - Part Type
  - Part Class
- Estimating Standard Package Worksheet:
  - Package Class
- Estimating Package Item Worksheet:
  - CER Equation Type
  - CER Type
- Estimating Equation CER Worksheet:
  - CER Equation Labor/Material Flag
- Tool Room Tool Item Worksheet:
  - Tool Status Indicator

Bulk Cut, Bulk Copy and Bulk Paste Options

Besides the standard *Cut*, *Copy* and *Paste* operations, the system provides a variation called *Bulk Cut*, *Bulk Copy* and *Bulk Paste*. These operations are available under *Edit* on the main menu.

The standard *Cut*, *Copy* and *Paste* processes operate on rows of data or on individual data fields in a worksheet. The *Bulk Cut*, *Bulk Copy* and *Bulk Paste* processes, however, only operate on entire rows of data.

Unlike the standard *Cut*, *Copy* and *Paste* operations that deal only with data visible in the worksheet, the bulk variations operate on both the visible and non-visible data that defines the entire data record on the database. This is often necessary when copying rows of data from *PERCEPTION* to a spreadsheet like *EXCEL*.

The following are four frequently used applications for these bulk-editing features:

- Copying to *EXCEL*.
- Pasting from *EXCEL*.
- Copying worksheet columns of data.
- Copying worksheet rows of data.

Bulk Copying Rows of Data to *EXCEL*

The standard *Copy* of worksheet rows to *EXCEL* will only copy the row data that is visible in the worksheet. There may be additional information in the row as stored on the database that is not visible, but also needed for the copy.

The *Bulk Copy* of selected rows will copy all data related to the worksheet records. In addition, the *Bulk Copy* operation will ask the user if column names are to be included in the copy process. The standard *Copy* does not provide this option. The column names are very useful when performing editing in *EXCEL*. However, these column names are the column names as defined on the database, which are not always easily identified with the column names appearing on the worksheet. See *File/Save As Excel Worksheet* option below that saves only the visible data on the worksheet with the column names as appearing on the worksheet.

Bulk Pasting Rows of Data from *EXCEL*

The *Bulk Paste* of rows of data from *EXCEL* reverses the *Bulk Copy* process described above. The system responds with the options shown in Figure 4-6.

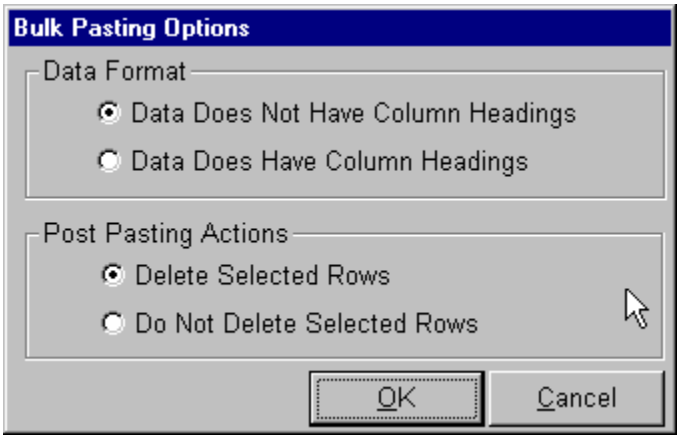


Figure 4-6: Bulk Pasting Options

The first set of options allows the user to indicate whether or not the *Bulk Paste* includes a row of column headings. If there are column headings, the system will not paste them in as a row of worksheet data.

The second set of options allows the user to indicate whether or not selected rows are to be deleted after the *Bulk Paste* has been complete. If the user specifies the delete option, a second set of options (Figure 4-7) are presented.

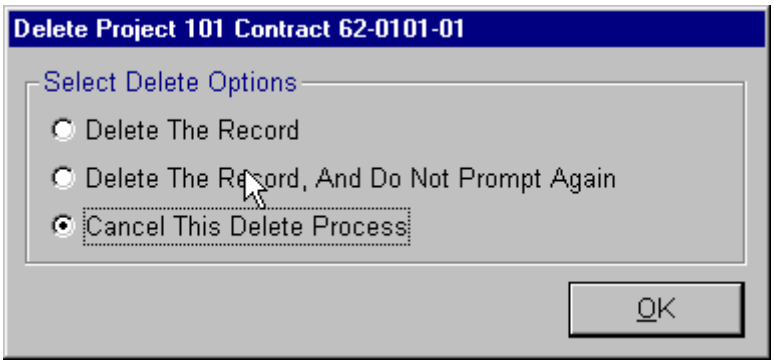


Figure 4-7: Select Delete Options

This delete options window is presented for each row identified (highlighted) in the worksheet unless the user selects "Do Not Prompt Again."

Note: The actual deleting process, if specified, will only be initiated when the user *Saves*  the worksheet.

Worksheet Column Copy and Paste

Unlike spreadsheets like *EXCEL*, *PERCEPTION* does not allow copying columns of data for pasting to columns elsewhere in the worksheet. In fact, if the user clicks on the column heading in the worksheet, the system will automatically sort the records in ascending order of the data in the column. The standard *Copy* function will not copy the contents of the column.

The following outlines a procedure using the *Bulk Copy* and *Bulk Paste* options in conjunction with *EXCEL* to effect a column copy operation:

- Highlight selected rows in the *PERCEPTION* worksheet and click on *Bulk Copy* (not standard *Copy*) with preferred option to include column headings.
- Open *EXCEL*, focus the cursor on row/column A1 and click *Paste* into *EXCEL*.
- In *EXCEL*, *Copy* selected column and *Paste* into column to receive this data.
- In *EXCEL*, highlight the rows of data (including the columns headings is optional) and *Copy*.
- Re-open *PERCEPTION* worksheet and click on *Bulk Paste* (not standard *Paste*).

Worksheet Row Copy and Paste

The standard *Copy* and *Paste* operation will work with entire rows of data in the worksheet. However, it will only work (pass system validation) if the user has the cursor on a new record, at the first column position of that row prior to *Paste*. If the cursor is not in this first column position, the Paste operation will attempt to begin pasting the rows of data in the cursor column position, and this will cause the system to abort the process.

The *Bulk Copy* and *Bulk Paste* operation, however, ensures that entire rows can be successfully copied and pasted into the worksheet regardless of cursor position.

File/Save As Excel Worksheet

This option is available under the *File* main menu and copies the entire contents of the worksheet, highlighted or not, into a user-designated *EXCEL* file. This option copies only the visible columns of data displayed in the worksheet and also provides the column heading names as they appear on the worksheet.

The resulting data can be modified and copied back (using standard Windows *PASTE*) to the *PERCEPTION* worksheet, provided that the column order remains the same. This data, however, cannot be pasted back to *PERCEPTION* using the Bulk Paste option described above.

This option will operate on either a grid screen worksheet or a formatted data window.

Sorting Records

Data displayed in any worksheet can be sorted by any column of information. Click on the column header and the rows of data will be sorted immediately in ascending order of the contents of that column. Clicking on the column heading again will result in the data being sorted by that column in descending order.

Another method for sorting is selecting *Data/Sort* or clicking on the sort button  on the toolbar, which displays a pop up window listing all of the column headings that can be selected for sort operations (Figure 4-8).

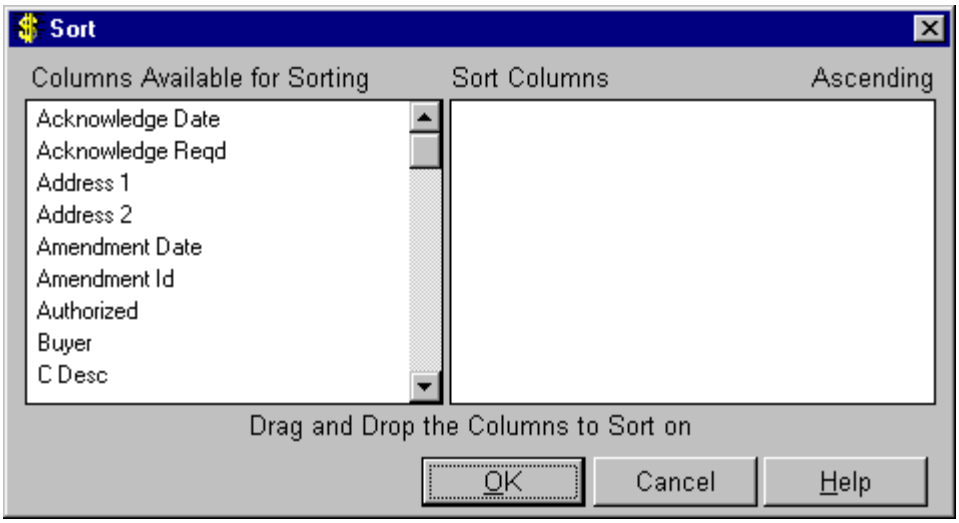


Figure 4-8: Selecting Sort Columns

In the section that describes Data/Sort, the user is presented with two boxes: On the left is the selection of data fields (columns) of information in the worksheet to be sorted. In the right box are the columns selected by the user that are to be the basis for the sort. To select a column, the user highlights the column name from the list in the left-side box and drags it to the right-side box. Multiple columns can be selected using this same procedure. The column identified at the top of the right-side box is the column to be the major sort column. Columns listed below are the minor sort columns in descending order of priority. The check boxes, if turned on, will cause the system to sort that column in ascending order. If turned off (no check), the column will be sorted in descending order.

A column can be deselected from the right-side box by highlighting it and dragging it back to the left-side box.

Filtering Records

Once a worksheet has been loaded with records of data, the filter option allows the user to make global changes without affecting other records in the worksheet.

To use the filter, select *Data/Filter* or click on the Filter button  on the toolbar, and the system will display a filter wizard (Figure 4-9).

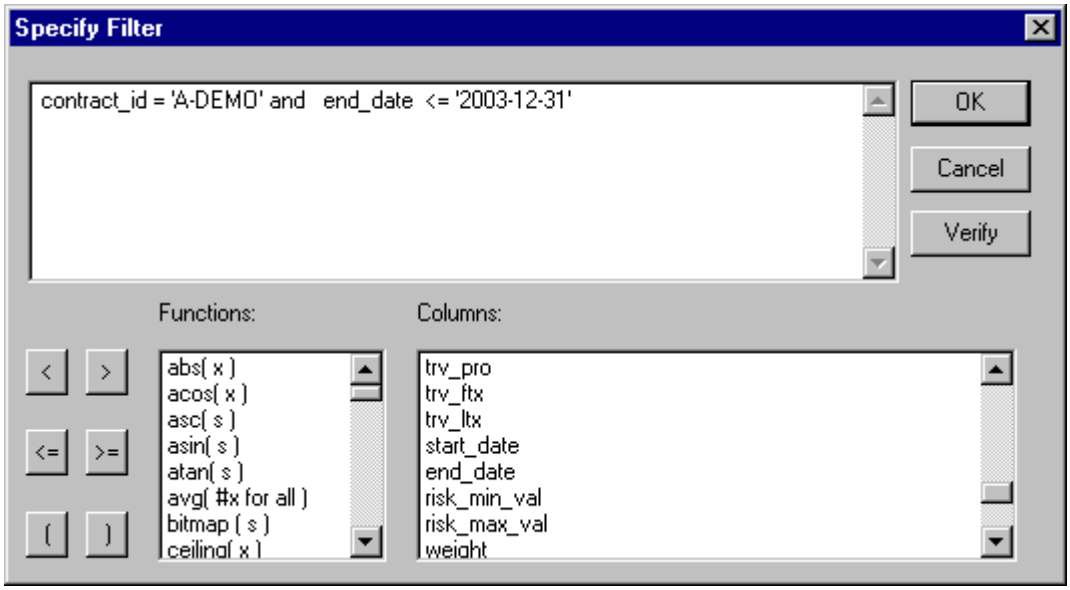


Figure 4-9: Using the Filter Wizard

All of the columns in the table are available for selection in the right window, and the filter clause can also be developed using the Advanced SQL functions provided in the left window.

Find Option

In order to edit any given row of data in a data entry window, the user must click on the row so that the system can tag it for editing. If the row is located off the visible window, the user must use the down or up scroll bar at the right side of the window until the desired row is visible in the window. If a data entry window contains a large number of items, this process of locating a row can be tedious.

The system provides a speed search (*Find*) feature to find a specific record quickly.

Selecting *Edit*/*Find* from the main menu or clicking on the Find button  on the toolbar opens the Find window (Figure 4-10). The characters to search for must be typed into the *Find What* box. The *Find* process can either match the data in the "Find" window either exactly (matching the case of all characters), or not. The search can be directed as follows:

- Forward across the worksheet, starting from the current cursor position.
- Backward across the worksheet, starting from the current cursor position.
- All across the worksheet where matches are found.
- Only in the Current Row of the cursor position.
- Only in the Current Column of the current cursor position.
- Only in the Current Selection, or data field of the current cursor position (of value for long text or description fields).

The *Find* process will operate on either text characters or numeric data fields.

Clicking on the *Find Next* button will move directly to the first record that matches the character string in that column. This feature is most useful when many records have been retrieved. The system will remember previous searches and they can be selected by using the drop-down arrow in the *Find What* box.

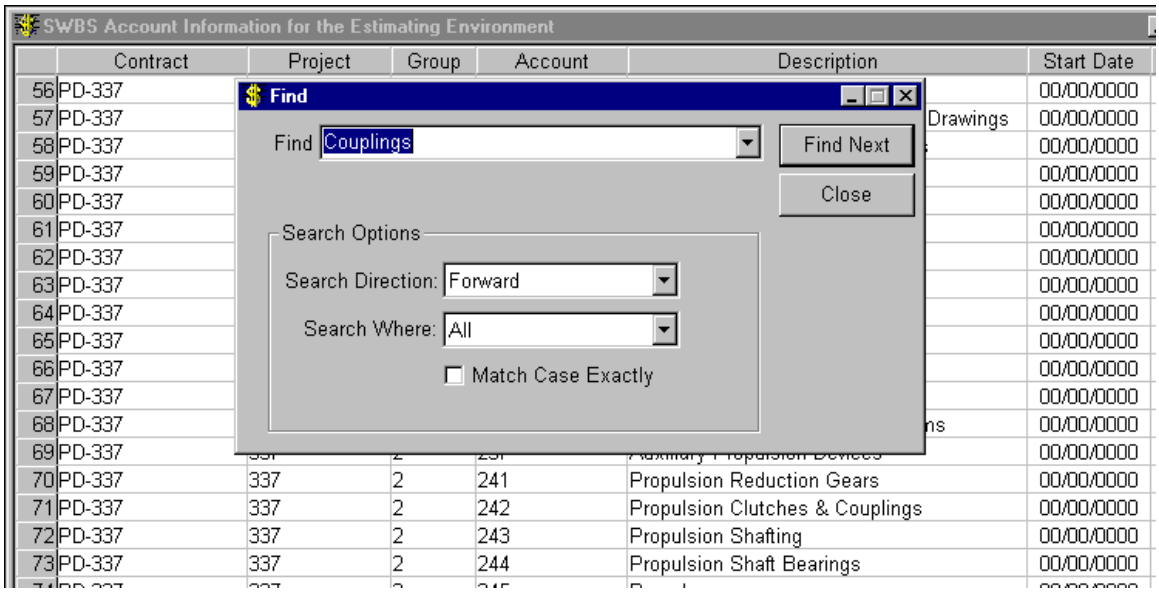


Figure 4-10: Find Window

Replace Option

The system provides a speed search and replace feature. Selecting *Edit*/*Replace* from the main menu or clicking on the Replace button  on the toolbar opens the *Replace* window (Figure 4-11). The characters that need to be replaced must be typed into the *Find* box. The replacing characters must be typed into the *Replace* box. The find and replace process can either match the text data in the "Find" window either exactly (matching the case of all characters), or not. The search can be directed as follows:

- All across the worksheet where matches are found.
- Only in the Current Row of the current cursor position.
- Only in the Current Column of the current cursor position.
- Only in the Current Selection, or data field of the current cursor position (of value for long text or description fields).

The *Replace* process will operate on either text characters or numeric data fields.

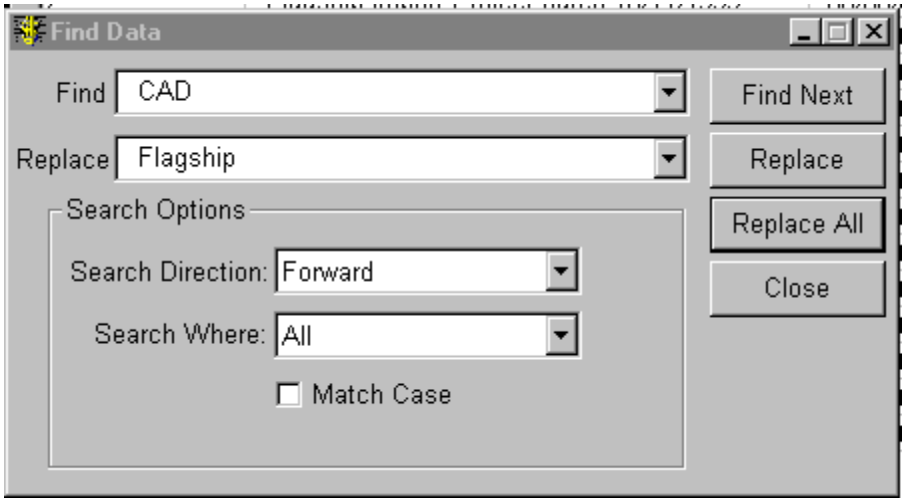


Figure 4-11: Find & Replace Window

Global Defaults

Oftentimes, when making multiple entries of new records, certain data (for example, project number) are repeated entry after entry. In order to have the system make these specific data field entries automatically, click on the *Global* button  on the toolbar. The system will present a Global Defaults window for the user to fill in as necessary (Figure 4-12). Thereafter, when a new record is added, the system will automatically insert the values of these defaults into the appropriate data fields. Global defaults will not apply to any existing records.

Also, when retrieving records into a worksheet, the user has the option to use these global defaults for the retrieval argument.

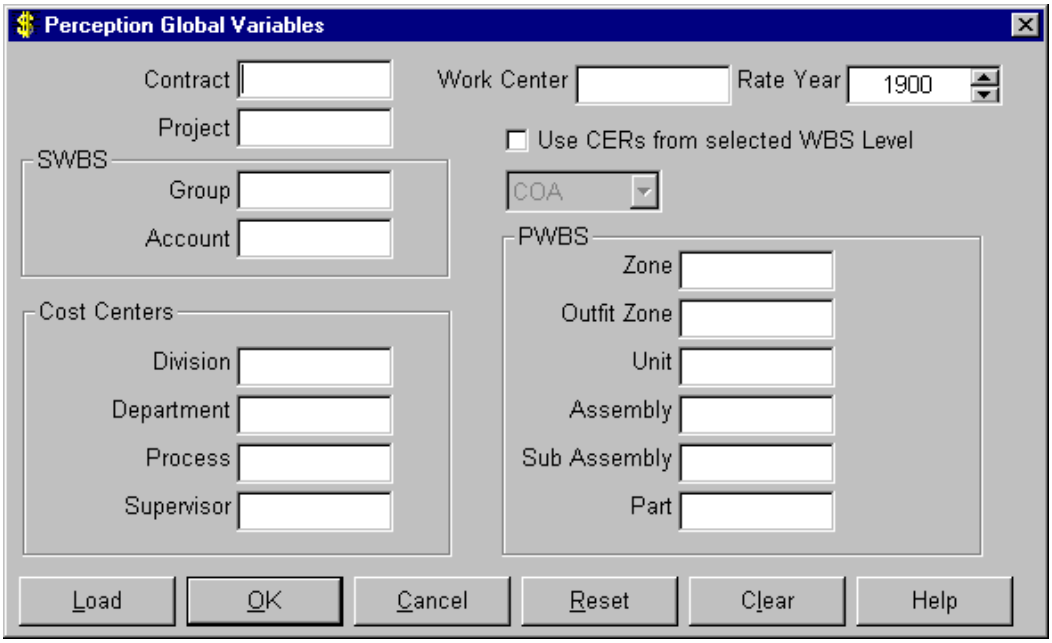


Figure 4-12: Setting Global Defaults

Once global defaults have been set (by clicking on the *OK* button), they will be saved by the system into the user's personal registry. The next time the default window is opened, the saved values will be presented and can be used in the current session by clicking on the *OK* button. The defaults can be removed from the registry by clicking on the *Clear* button. Values on the window, that have not yet been saved, can be removed from the window by clicking on the *Reset* button.

Linkage and Drill-Downs

Many windows in the *PERCEPTION* system have an option to Drill-Down from the currently selected row to get a more detailed view of the data that is presented. Drill-Down can also be used to view records in another window that are in some way related to the current row. This navigation can be to view either:

- Additional information about the current record (identified as Details).
- Records that are lower in a hierarchy (i.e., in the WBS, such as from Zone to Unit).
- Records that are related to the current record (i.e., from a Zone record to all cost items, work orders, etc. that are assigned to that contract, project and zone).

Drilling down to a level is useful in the analysis of data as well as serving to eliminate some data entry by automatically initializing any new rows that are added from the Drill-Down view. When used in conjunction with the system Global Defaults, the

initialization will result in shortened data entry times, as many of the fields will be filled in automatically.

To open the Drill-Down selector (Figure 4-13), click on a row and then either:

- Click on the Drill-Down button  on the toolbar.
- Right click to open a pop up menu that has the Drill-Downs option on it.
- Select *View/Drill-Downs* from the main menu.

The system will open the Drill-Down Selector window and give the user a number of selections. Selecting the desired Drill-Down option and clicking on the *OK* button will open the new window and automatically retrieve its related details.

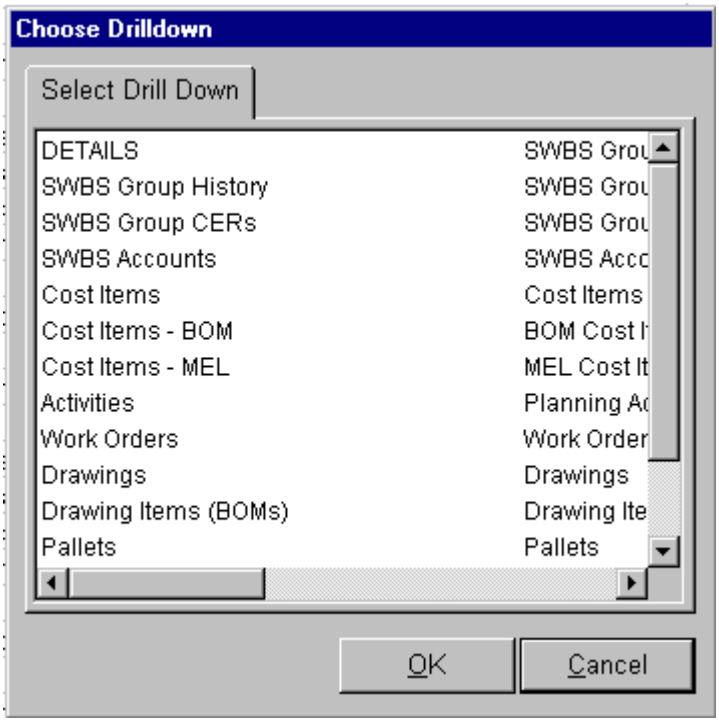


Figure 4-13: Drill-Down Selector

When a window is opened by means of drilling down, that window is now the ***child*** and is ***linked*** to its ***parent***, which is the window from which it was opened. If the Drill-Down feature is used from a child window, that window will then become both a child and a parent window.

Any new records that are added to a child level will automatically have the key values from its parent.

Once a Drill-Down has been completed, changing the currently selected row in the parent window will cause the system to go out to the database and retrieve the information for

all of its children in windows that are currently open. The system will, at this point, discard any modifications to the children's data that have not been saved to the database.

If a parent window is closed, all of its children will also be closed. If any of the windows in the linkage chain have updates pending at this point, the system will prompt to either save the changes or discard them before closing the windows.

The number of linked windows that can be open at one time is limited only to the amount of memory available on the user's PC. Multiple copies of the same window can be opened at one time.

If changes have been made to any of the records in a linkage chain, either by the current user or another user, its own parent and children windows can be updated without closing and re-retrieving all the windows in the chain. To do this, select *Data/Refresh Linked Windows* from the main menu.

Rearranging Columns on the Screen

Columns in a worksheet window can be arranged in any order you wish for ease of data entry[7].

In general, you may want to move empty columns (or columns not needed by the user) to the right, or conversely, you may want to move full columns to the left.

To rearrange the columns, point at the top of a column (the gray heading box) that is to be moved and depress the left mouse button, holding it down. The entire column of data will be highlighted and a vertical bar will appear. The column can then be dragged (keep the mouse button depressed) either to the right or to the left. When the edge of the screen is reached, it doesn't appear that the column can be dragged any farther. At this point, release the mouse button, and this will temporarily insert the column at that point. Then use the horizontal scroll bar to shift the display further, so that moving the column can be resumed. Return to the column being moved, click on it and keep the button depressed and continue dragging the column to the desired location.

When the columns are rearranged, the new column order can be saved so that they will be displayed this way the next time this window is opened, either in the current session, or future sessions. Do this by selecting *View/Save Current Column Order* from the main menu. To restore the column order to the original default order, select *View/Restore Column Order*.

[7] Rearranged column orders are automatically saved by the system and will appear in that same rearranged order when the worksheet is reopened any other time until changed again. The column order is maintained on each client PC, and is not a global setting for all users.

Other Helpful Features

As the user enters information within various worksheets, there are often times that the user cannot remember all the details necessary to complete a worksheet. In many instances, the system provides convenient drop-down data fields that will display the available list of specific information that the user may select. In other cases, where no drop-downs are available, the user may enter a question mark (?). The system will respond with a pop up window that lists the available selections.

Figure 4-14 illustrates the use of the question mark. The user is entering a new work order, but cannot remember which project number belongs under the contract. By entering the question mark in the project field, the system displays the pop up window of available project numbers available under the identified contract.

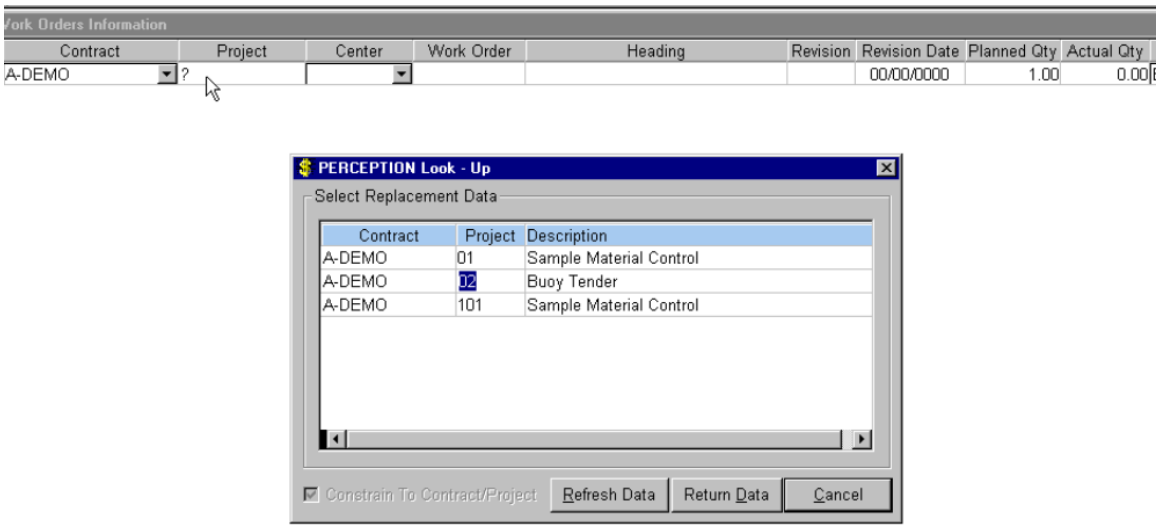


Figure 4-14: Using a Question Mark Entry to Display Available Data Field Selections

By highlighting the correct project number and then clicking on the *Return Data* button, the system will fill in the project number for the work order.

Special Sorts for Reports

There are many reports available in the system. The user can generate these reports across ranges of selection criteria and for various reporting options.

However, the system also allows the user to sort information within many of these reports. Once the report has been displayed, click on the Sort button  on the toolbar. The system will display a pop up window that lists the titles of all of the columns in the report (Figure 4-15).

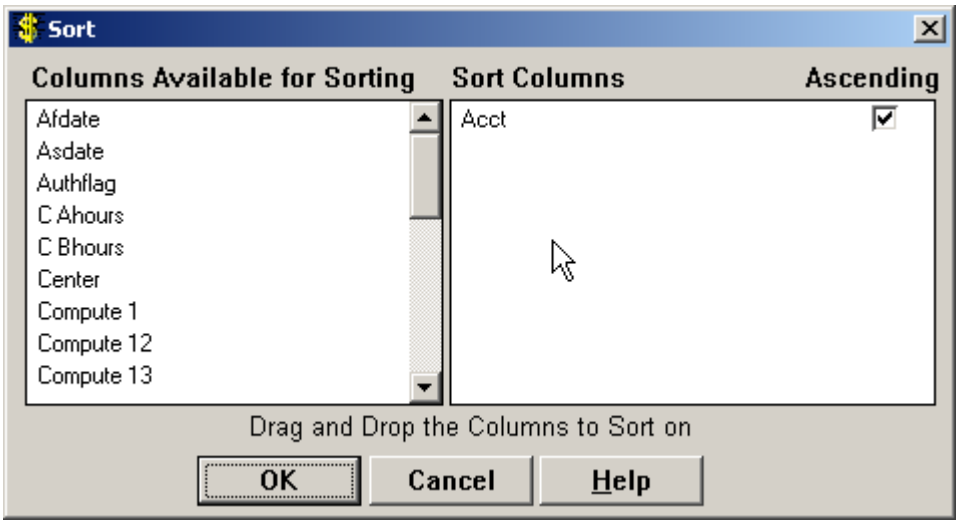


Figure 4-15: Report Sort Selections Window

Choose only those column headings important for the sort by dragging them over to the right side box. Multiple columns can be sorted in any mix of ascending or descending order. Then, click on the OK button, and the report will be re-displayed in the order specified.

Figure 4-16 displays a sample work order listing report sorted in SWBS account order. Figure 4-17 displays the same report, but in planned start date order.

05/08/2002 10:56:41 (Date format: MM

Chesapeake Marine Industries

Work Order List (WO01)

Page 1 of 1

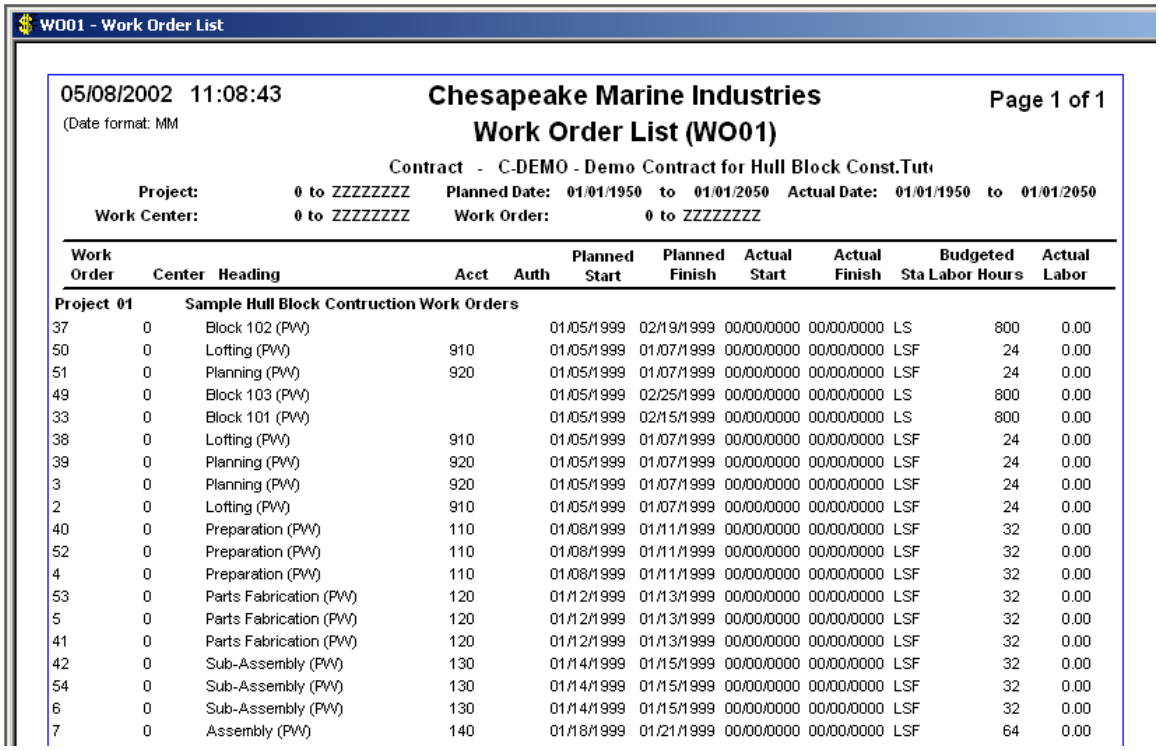
Contract - C-DEMO - Demo Contract for Hull Block Const.Tut

Project: 0 to ZZZZZZZZ **Planned Date:** 01/01/1950 to 01/01/2050 **Actual Date:** 01/01/1950 to 01/01/2050

Work Center: 0 to ZZZZZZZZ **Work Order:** 0 to ZZZZZZZZ

Work Order	Center	Heading	Acct	Auth	Planned Start	Planned Finish	Actual Start	Actual Finish	Sta	Budgeted Labor Hours	Actual Labor
Project 01		**Sample Hull Block Contruction Work Orders**									
77	0	Berth Trials (PW)			03/30/1999	04/05/1999	00/00/0000	00/00/0000	*	1,800	0.00
79	0	Delivery (PW)			04/20/1999	04/22/1999	00/00/0000	00/00/0000	*	500	0.00
76	0	Tests & Trials (PW)			03/30/1999	04/22/1999	00/00/0000	00/00/0000	*	5,000	0.00
49	0	Block 103 (PW)			01/05/1999	02/25/1999	00/00/0000	00/00/0000	LS	800	0.00
37	0	Block 102 (PW)			01/05/1999	02/19/1999	00/00/0000	00/00/0000	LS	800	0.00
78	0	Sea Trials (PW)			04/13/1999	04/19/1999	00/00/0000	00/00/0000	*	1,800	0.00
33	0	Block 101 (PW)			01/05/1999	02/15/1999	00/00/0000	00/00/0000	LS	800	0.00
80	0	Pick Lists (PW)			04/06/1999	04/12/1999	00/00/0000	00/00/0000	*	900	0.00
68	0	Zone M On Board Outfit (PW)			02/26/1999	03/31/1999	00/00/0000	00/00/0000	*	855	0.00
4	0	Preparation (PW)	110		01/08/1999	01/11/1999	00/00/0000	00/00/0000	LSF	32	0.00
52	0	Preparation (PW)	110		01/08/1999	01/11/1999	00/00/0000	00/00/0000	LSF	32	0.00
40	0	Preparation (PW)	110		01/08/1999	01/11/1999	00/00/0000	00/00/0000	LSF	32	0.00
41	0	Parts Fabrication (PW)	120		01/12/1999	01/13/1999	00/00/0000	00/00/0000	LSF	32	0.00
5	0	Parts Fabrication (PW)	120		01/12/1999	01/13/1999	00/00/0000	00/00/0000	LSF	32	0.00
53	0	Parts Fabrication (PW)	120		01/12/1999	01/13/1999	00/00/0000	00/00/0000	LSF	32	0.00
6	0	Sub-Assembly (PW)	130		01/14/1999	01/15/1999	00/00/0000	00/00/0000	LSF	32	0.00
54	0	Sub-Assembly (PW)	130		01/14/1999	01/15/1999	00/00/0000	00/00/0000	LSF	32	0.00
42	0	Sub-Assembly (PW)	130		01/14/1999	01/15/1999	00/00/0000	00/00/0000	LSF	32	0.00
43	0	Assembly (PW)	140		01/18/1999	01/21/1999	00/00/0000	00/00/0000	LSF	64	0.00
55	0	Assembly (PW)	140		01/18/1999	01/21/1999	00/00/0000	00/00/0000	LSF	64	0.00
7	0	Assembly (PW)	140		01/18/1999	01/21/1999	00/00/0000	00/00/0000	LSF	64	0.00
44	0	Pre-Outfit Hot (PW)	150		01/22/1999	01/27/1999	00/00/0000	00/00/0000	LSF	160	0.00
56	0	Pre-Outfit Hot (PW)	150		01/22/1999	01/27/1999	00/00/0000	00/00/0000	LSF	160	0.00

Figure 4-16: Report Sorted In SWBS Account Order



WO01 - Work Order List

05/08/2002 11:08:43 (Date format: MM)

Chesapeake Marine Industries

Work Order List (WO01)

Page 1 of 1

Contract - C-DEMO - Demo Contract for Hull Block Const.Tut

Project: 0 to ZZZZZZZZ Planned Date: 01/01/1950 to 01/01/2050 Actual Date: 01/01/1950 to 01/01/2050

Work Center: 0 to ZZZZZZZZ Work Order: 0 to ZZZZZZZZ

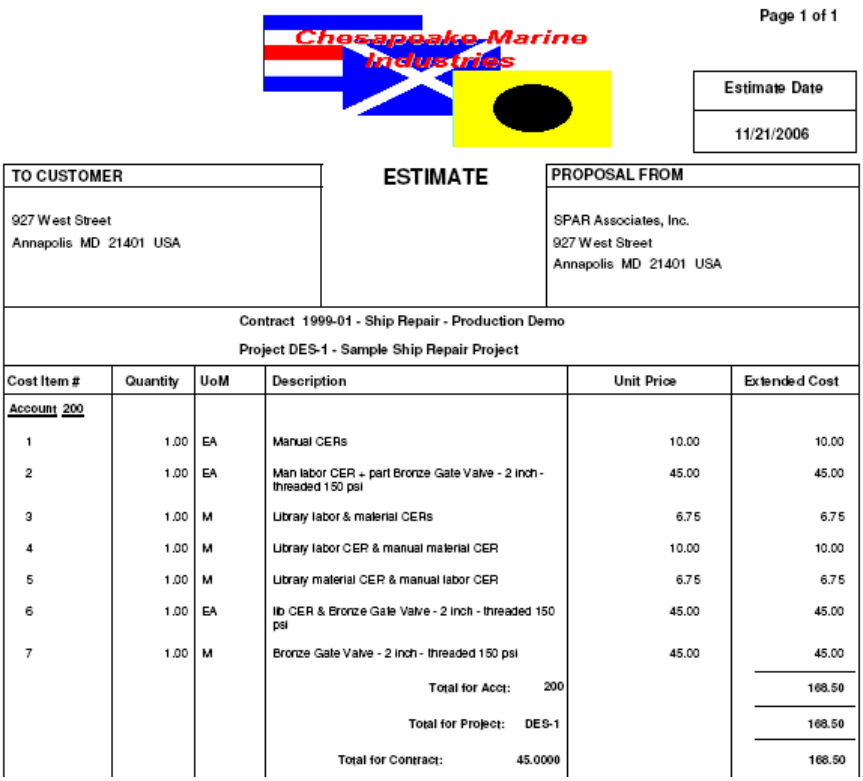
Work Order	Center	Heading	Acct	Auth	Planned Start	Planned Finish	Actual Start	Actual Finish	Sta	Budgeted Labor Hours	Actual Labor
Project 01		Sample Hull Block Contruction Work Orders									
37	0	Block 102 (PW)			01/05/1999	02/19/1999	00/00/0000	00/00/0000	LS	800	0.00
50	0	Lofting (PW)	910		01/05/1999	01/07/1999	00/00/0000	00/00/0000	LSF	24	0.00
51	0	Planning (PW)	920		01/05/1999	01/07/1999	00/00/0000	00/00/0000	LSF	24	0.00
49	0	Block 103 (PW)			01/05/1999	02/25/1999	00/00/0000	00/00/0000	LS	800	0.00
33	0	Block 101 (PW)			01/05/1999	02/15/1999	00/00/0000	00/00/0000	LS	800	0.00
38	0	Lofting (PW)	910		01/05/1999	01/07/1999	00/00/0000	00/00/0000	LSF	24	0.00
39	0	Planning (PW)	920		01/05/1999	01/07/1999	00/00/0000	00/00/0000	LSF	24	0.00
3	0	Planning (PW)	920		01/05/1999	01/07/1999	00/00/0000	00/00/0000	LSF	24	0.00
2	0	Lofting (PW)	910		01/05/1999	01/07/1999	00/00/0000	00/00/0000	LSF	24	0.00
40	0	Preparation (PW)	110		01/08/1999	01/11/1999	00/00/0000	00/00/0000	LSF	32	0.00
52	0	Preparation (PW)	110		01/08/1999	01/11/1999	00/00/0000	00/00/0000	LSF	32	0.00
4	0	Preparation (PW)	110		01/08/1999	01/11/1999	00/00/0000	00/00/0000	LSF	32	0.00
53	0	Parts Fabrication (PW)	120		01/12/1999	01/13/1999	00/00/0000	00/00/0000	LSF	32	0.00
5	0	Parts Fabrication (PW)	120		01/12/1999	01/13/1999	00/00/0000	00/00/0000	LSF	32	0.00
41	0	Parts Fabrication (PW)	120		01/12/1999	01/13/1999	00/00/0000	00/00/0000	LSF	32	0.00
42	0	Sub-Assembly (PW)	130		01/14/1999	01/15/1999	00/00/0000	00/00/0000	LSF	32	0.00
54	0	Sub-Assembly (PW)	130		01/14/1999	01/15/1999	00/00/0000	00/00/0000	LSF	32	0.00
6	0	Sub-Assembly (PW)	130		01/14/1999	01/15/1999	00/00/0000	00/00/0000	LSF	32	0.00
7	0	Assembly (PW)	140		01/18/1999	01/21/1999	00/00/0000	00/00/0000	LSF	64	0.00

Figure 4-17: Report Sorted In Planned Start Date Order

Modifying & Editing Reports and Worksheets

PERCEPTION allows the user to customize most worksheets in the system: worksheets, free-form worksheets and system reports. In every worksheet, the user can rearrange and hide unwanted data columns and re-label all column headers. Similarly, in free-form worksheets and reports, the user can rearrange and hide un-wanted data blocks and modify the text labels. This means that the user can replace English text with native language text. This new feature will support different alphabets as well, provided the alphabet is supported by the local Windows operating system.

The operation of these editing features is described in detail in the "Systems Administration User Manual" under Chapter 17, "Datawindow Designer." Figure 4-18 provides a sample standard format of a cost estimate report. Figure 4-19 provides the same report modified to eliminate the Unit Price and detailed price extensions from the report. The user can reset the report back to the original format using *View/Reset Data Window* from the main me nu of the system.



Page 1 of 1

Chesapeake Marine Industries

Estimate Date
11/21/2006

ESTIMATE

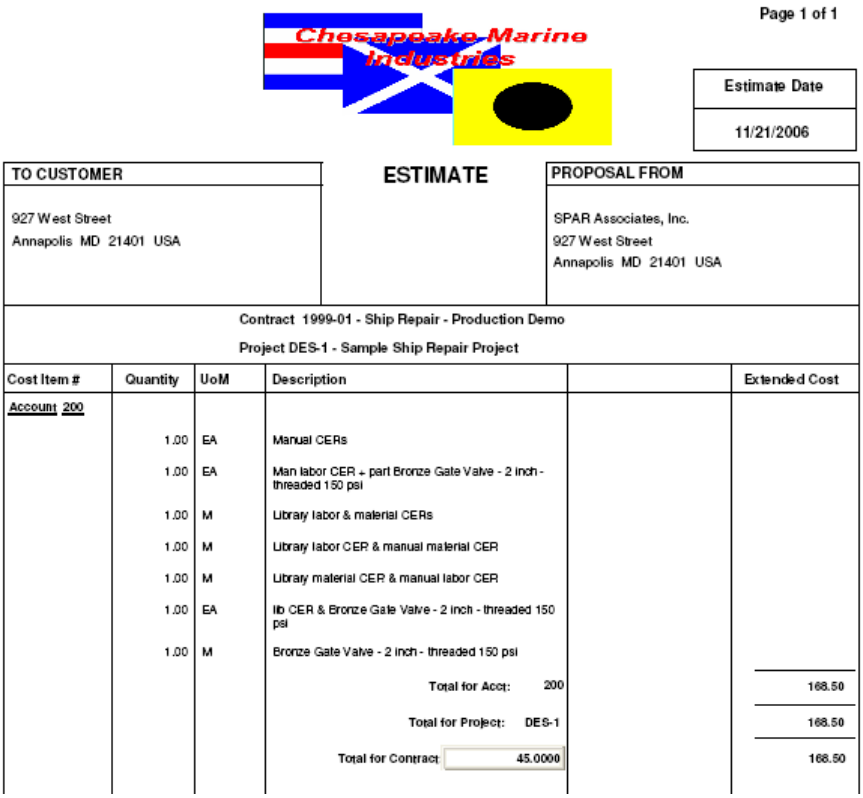
TO CUSTOMER	PROPOSAL FROM
927 West Street Annapolis MD 21401 USA	SPAR Associates, Inc. 927 West Street Annapolis MD 21401 USA

Contract 1999-01 - Ship Repair - Production Demo

Project DES-1 - Sample Ship Repair Project

Cost Item #	Quantity	UoM	Description	Unit Price	Extended Cost
Account 200					
1	1.00	EA	Manual CERs	10.00	10.00
2	1.00	EA	Man labor CER + part Bronze Gate Valve - 2 inch - threaded 150 psi	45.00	45.00
3	1.00	M	Library labor & material CERs	6.75	6.75
4	1.00	M	Library labor CER & manual material CER	10.00	10.00
5	1.00	M	Library material CER & manual labor CER	6.75	6.75
6	1.00	EA	lib CER & Bronze Gate Valve - 2 inch - threaded 150 psi	45.00	45.00
7	1.00	M	Bronze Gate Valve - 2 inch - threaded 150 psi	45.00	45.00
			Total for Acct: 200		168.50
			Total for Project: DES-1		168.50
			Total for Contract: 45.0000		168.50

Figure 4-18: Sample Cost Estimate Report before Datawindows Designer Modifications



Page 1 of 1

Chesapeake Marine Industries

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Cost Item #	Quantity	UoM	Description		Extended Cost
Account 200					
	1.00	EA	Manual CERs		
	1.00	EA	Man labor CER + part Bronze Gate Valve - 2 inch - threaded 150 psi		
	1.00	M	Library labor & material CERs		
	1.00	M	Library labor CER & manual material CER		
	1.00	M	Library material CER & manual labor CER		
	1.00	EA	lib CER & Bronze Gate Valve - 2 inch - threaded 150 psi		
	1.00	M	Bronze Gate Valve - 2 inch - threaded 150 psi		
			Total for Acct: 200		168.50
			Total for Project: DES-1		168.50
			Total for Contract: 45.0000		168.50

Figure 4-18: Sample Cost Estimate Report before Datawindows Designer Modifications

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Halting a *PERCEPTION* Process

Occasionally, a particular process that requires a relatively long time to execute needs to be terminated before it is complete. Some *PERCEPTION* processes, like database retrievals, offer the halt button  on the toolbar. However, the universal halt feature of Windows, use of the escape key on the keyboard, always will interrupt any process being executed by the system.

Chapter 5: Starting a New System & Database

The database is comprised of two basic types of data:

Common-use libraries (parts catalog, vendor catalog, list of work centers, etc.).
Project-oriented information (cost estimates, work orders, requisitions, etc.).

Project-oriented information requires use of the information obtained from the common-use libraries. For example, purchase orders cannot be generated without use of information found on the vendor catalog. Therefore, in order to get underway using *PERCEPTION*, the common use libraries must be loaded first, before project data can be developed.

Libraries can be developed manually using *PERCEPTION*. Start at the main menu *Library* and select the particular library you wish to develop or modify. This selection will open the appropriate worksheet for entering the information relevant to the library file. Follow the instructions for adding, changing, deleting and saving data provided in the chapter, "*General System Operation.*"

However, data from legacy systems, spread sheets, etc. also can be imported into the *PERCEPTION* database. Refer to the chapter "Importing & Exporting Data" which provides instructions on how to perform these imports.

For additional information on setting up libraries and general methods for managing shipyard information, the reader is referred to the following SPAR documents:

Planning New Construction & Major Ship Conversions.
Guide for Shipyard Material Control.
Guide for Cost Estimating New Construction.

These documents also have relevance to the business of ship repair and plant maintenance activities.

Common Libraries Used By All Environments

The libraries included in the main menu *Libraries* drop-down menu are the libraries common and available to all applications. Of those, the following libraries are independent and do not require any other library and should be completed first. All libraries can be edited later to add, delete or correct entries.

- Company Parameters (defines a number of shipyard specific parameters and processing functions).
- Units of Measure (used to standardize units of measure, a mandatory field for many of the other libraries).
- Work Centers (a mandatory field for many of the project orientated data).
- Trades/Resources (required for time charging and optional work order budgeting; trades and resources are used in scheduling functions).
- Vendor Catalog (used for purchasing and access for cost estimating).
- Currency (an exchange rate table for purchasing).
- Standard Parts Catalog (used for cost estimating, engineering, purchasing, material control functions).
- Stage of Construction (used to identify and track different phases of the manufacturing process).
- Types of Work with mapping to a Generic Product Work Breakdown Structure, or GPWBS (can be used to summarize the shipyard's PWBS by an industry standard PWBS).
- Block Types (used for specifying what manufacturing processes are required to produce a particular hull block or unit assembly).
- Ship Characteristics (used for project identification and for parametric cost estimating).
- Ship Types (optionally used to catalog the project).

Several of the above libraries make use of other libraries or they have their own subsets of libraries.

- Vendor Catalog can use Terms and Currency Libraries.
- Standard Parts Catalog makes use of the subset libraries, Classifications, Sub Classifications and Part Attributes Types. A third subset library, Part Type, is defined in the system but cannot be edited by the user. It also makes use of Unit of Measure Library and can reference the Vendor Libraries.
- Ship Characteristics Library has two subset libraries, Characteristic Categories and Master List of Characteristics. It also uses the Unit of Measure Library.

Setting Up Company Parameters

These parameters are defined at the time the system is first installed and will rarely need to be changed. To display the current operations parameters, select *Library/Company Parameters* from the main menu. The system will respond with the *System Parameters and Company Defaults* worksheet (Figure 5-1).

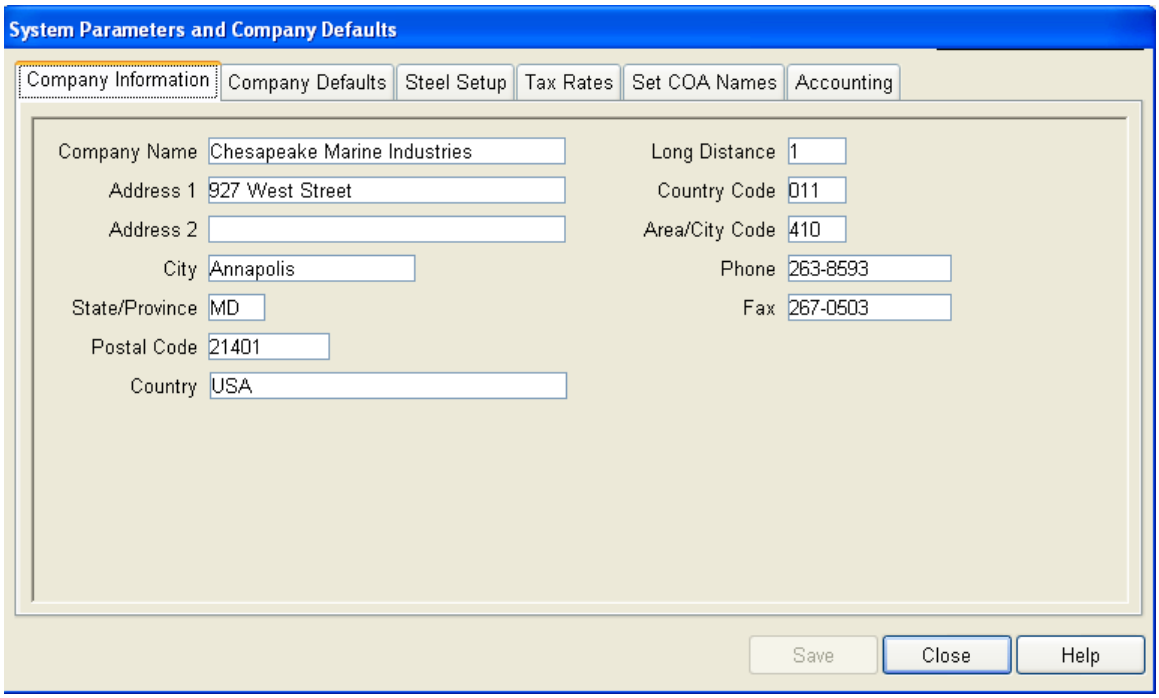


Figure 5-1: Company Information

The name and address information found on the company information tab is used throughout the system as needed, in particular for report headings and on purchase orders.

The information displayed under the *Company Defaults* tab (Figure 5-2) is used primarily for purchasing in calculating the amount of lead-time needed for placing orders, the currency used and the method for calculating stock costs. Details of these options are described in the "*MAT-PAC™ Purchasing & Material Control User Manual.*"

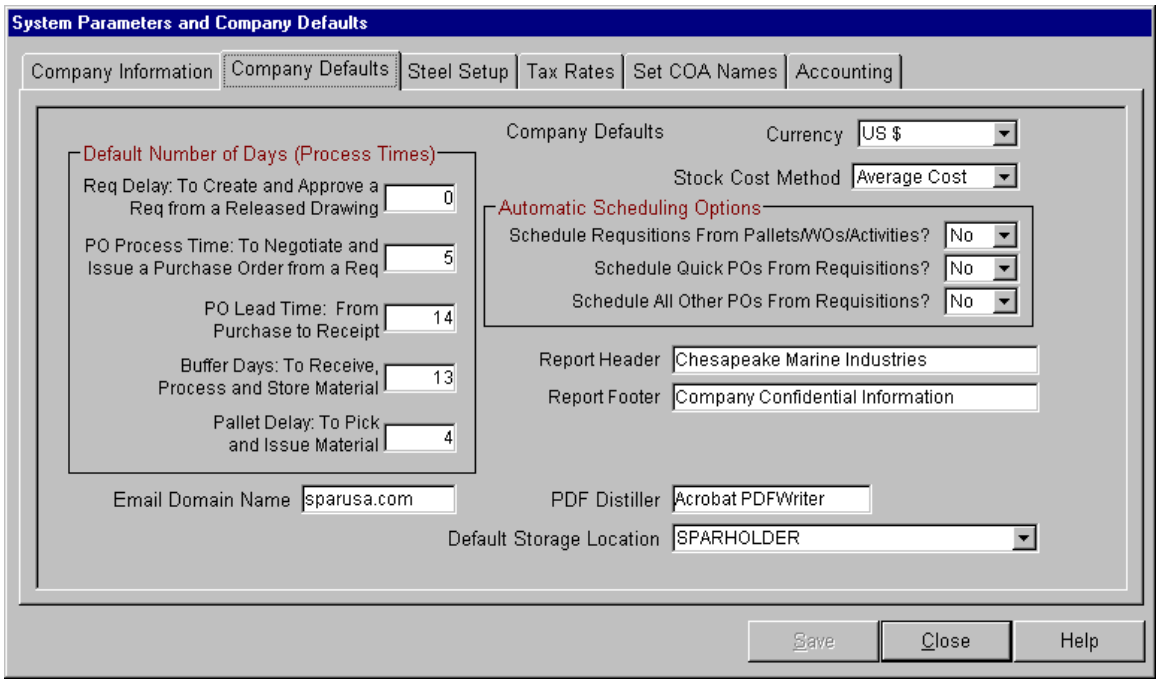


Figure 5-2: Company Defaults

PERCEPTION provides a set of reports to analyze and forecast steel production by stage of construction. These reports include the ability to group steel labor by zone, unit/block, and block type for the stages of construction defined by the shipyard.

The steel reports use the proven *PERCEPTION* statistical process forecasting methods to generate production rates for planned work and work in progress. It presents this information to the user for each level of the PWBS in the selected report.

Before the reports can be run, the user must define the Steel SWBS Accounts or Steel Manufacturing Work Centers (Figure 5-3) for each stage of construction (fabrication, sub-assembly, assembly, erection and on-ship weld-out). Only one of these two methods for identifying these stages can be used at any time.

At the same time, the user has the option to select the unit of measure for each stage. There are three different units of measure from which to select: Weight, Joint Weld Length, and Area. Each unit of measure has it's own corresponding quantity stored on the unit/block table. With this information defined, the report then uses the defined stages and units of measure to generate the production rates.

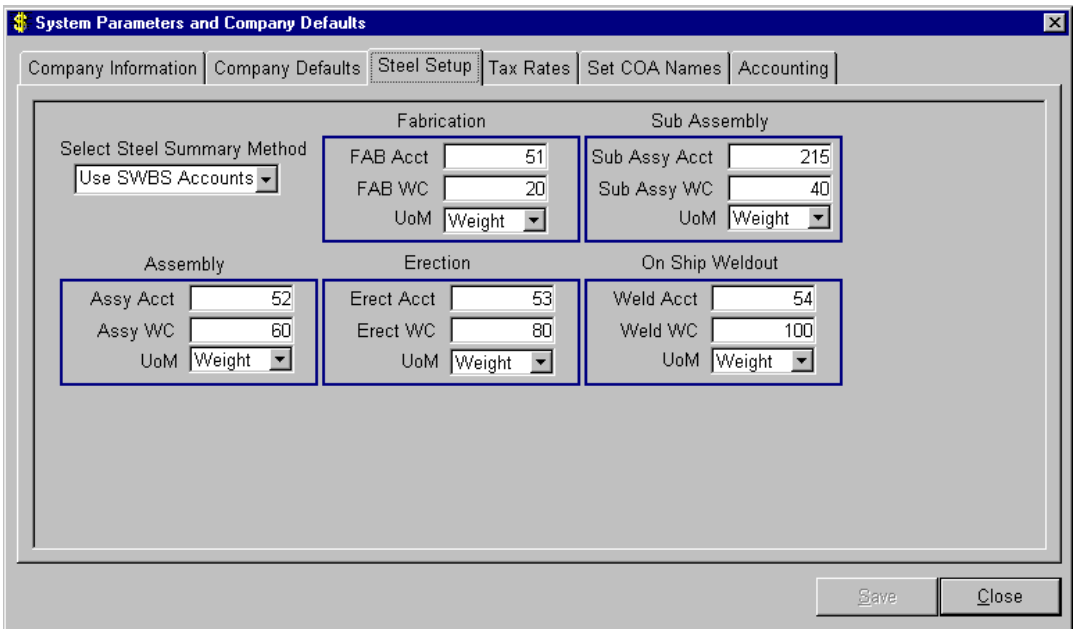


Figure 5-3: Steel Production Setup

The *Tax Rate* tab (Figure 5-4) is used for default values for purchase orders and invoices.

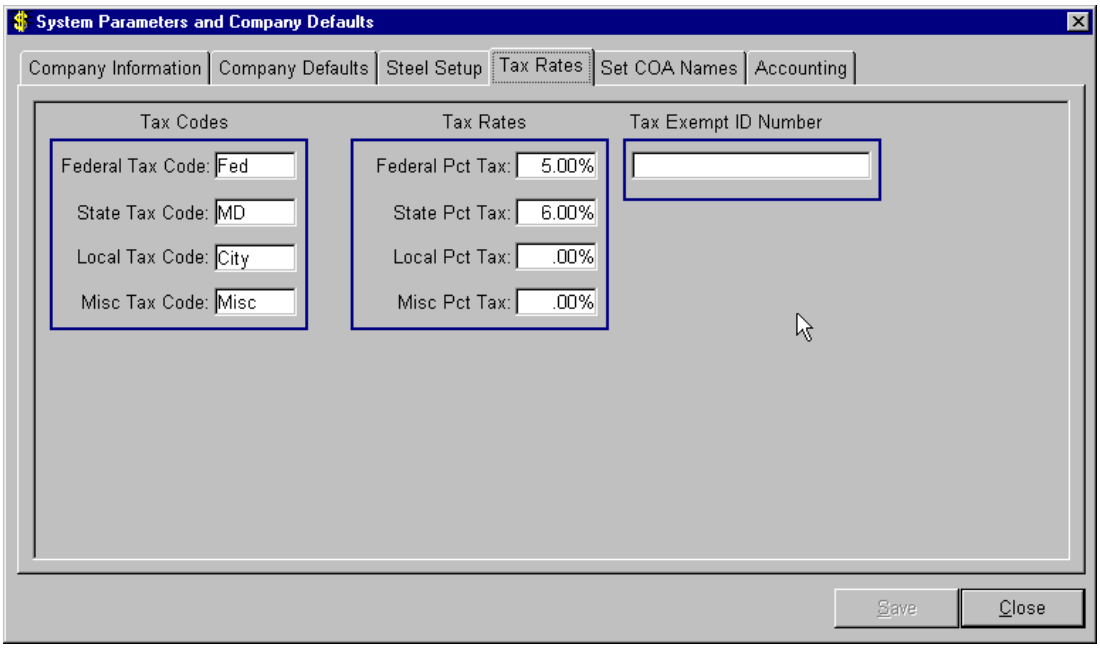


Figure 5-4: Tax Rate Specifications

The *Set COA Names* tab (Figure 5-5) is used to define names of the shipyard's organization structure for Chart of Accounts (COA) performance reporting.

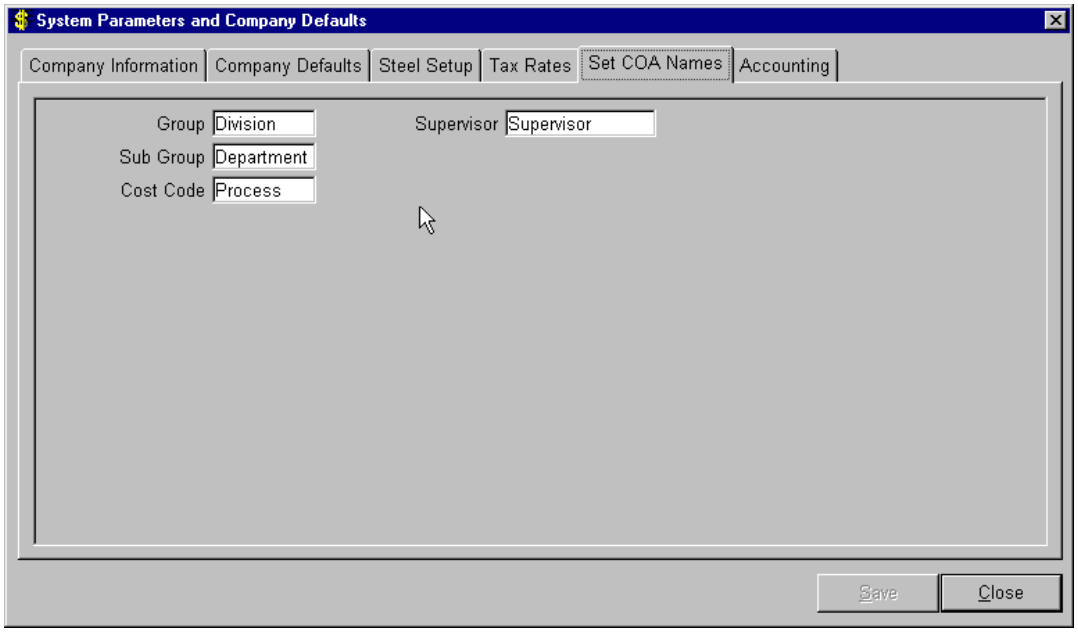


Figure 5-5: Defining Company Organization COA Names

The *Accounting* tab (Figure 5-6) identifies the accounting system to be interfaced with *PERCEPTION*. The chapter "Interfacing With Accounting Systems" in this manual provides additional details.

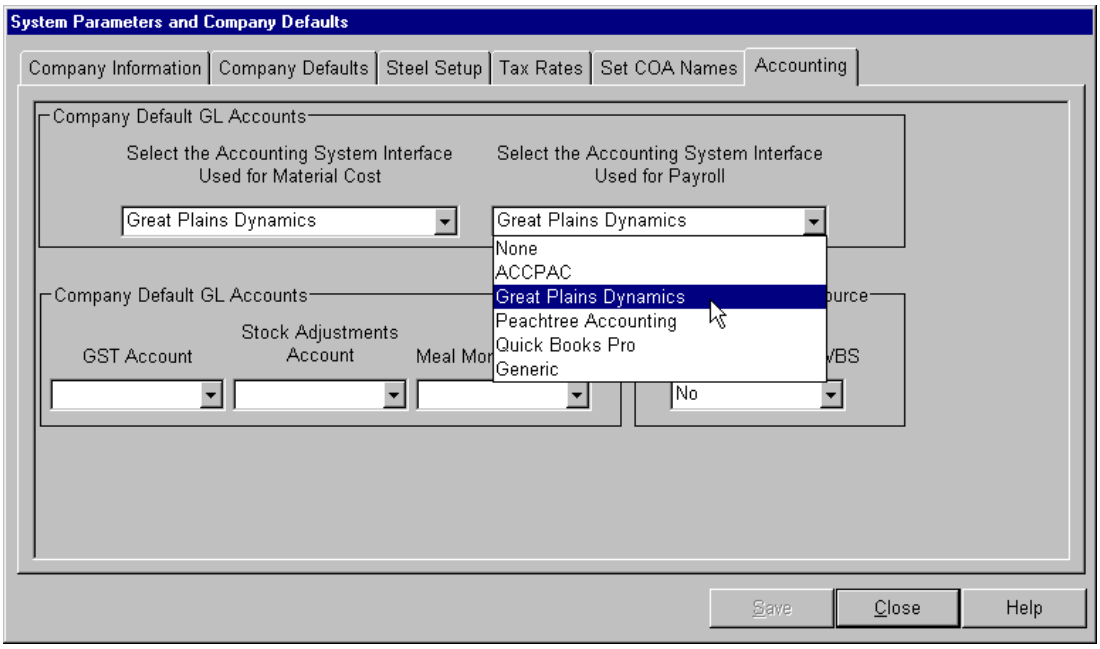
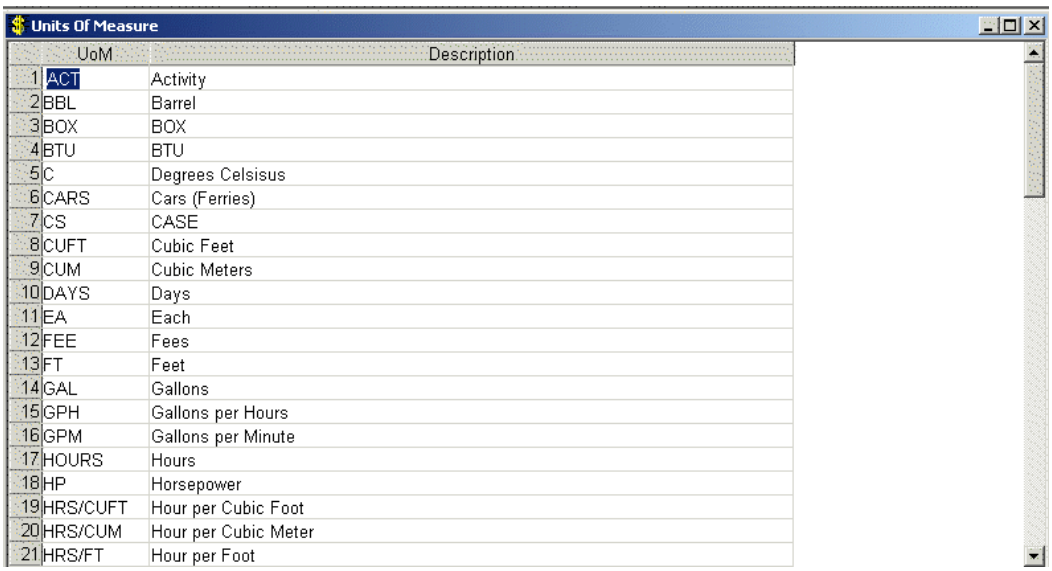


Figure 5-6: Identifying Accounting Systems To Interface With PERCEPTION

Defining Units Of Measure Library

Unit of Measure is required on many of the tables in the system. Select *Library/Units of Measure* from the main menu. The Units of Measure window (Figure 5-7) will display. The procedures for adding, changing and deleting units of measure are the same as those outlined in *General System Operation*.



	UoM	Description
1	ACT	Activity
2	BBL	Barrel
3	BOX	BOX
4	BTU	BTU
5	C	Degrees Celsisus
6	CARS	Cars (Ferries)
7	CS	CASE
8	CUFT	Cubic Feet
9	CUM	Cubic Meters
10	DAYS	Days
11	EA	Each
12	FEE	Fees
13	FT	Feet
14	GAL	Gallons
15	GPH	Gallons per Hours
16	GPM	Gallons per Minute
17	HOURS	Hours
18	HP	Horsepower
19	HRS/CUFT	Hour per Cubic Foot
20	HRS/CUM	Hour per Cubic Meter
21	HRS/FT	Hour per Foot

Figure 5-7: Units Of Measure

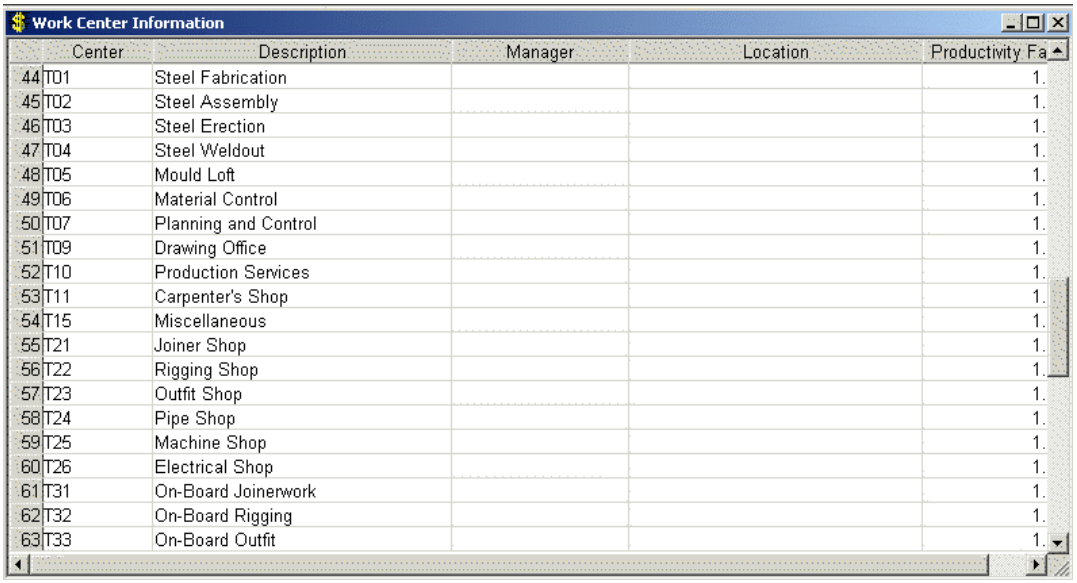
Right clicking on any row in the unit of measure window will pop up a menu. Select *Drill-Downs* and then *Details* (or double click with the left mouse button on the unite of measure record). The Units of Measure Conversion Factor window will open (Figure 5-8). The conversion table can be used on purchase orders when the unit of measure by which you must order is different from the normal unit of measure that is requisitioned and issued to production. The conversion factor number is the number by which the *UoM* must be multiplied by to obtain the *Convert To* unit of measure.

	UoM	Convert To	Conversion Factor	Description
1	FT	IN	12.00000	Feet to Inches
2	FT	M	0.30480	

Figure 5-8: Units Of Measure And Conversion Factors

Defining Work Centers

To access the Work Centers Definition Window (Figure 5-9), select *Library/Work Centers* from the main menu.



	Center	Description	Manager	Location	Productivity Fa
44	T01	Steel Fabrication			1.
45	T02	Steel Assembly			1.
46	T03	Steel Erection			1.
47	T04	Steel Weldout			1.
48	T05	Mould Loft			1.
49	T06	Material Control			1.
50	T07	Planning and Control			1.
51	T09	Drawing Office			1.
52	T10	Production Services			1.
53	T11	Carpenter's Shop			1.
54	T15	Miscellaneous			1.
55	T21	Joiner Shop			1.
56	T22	Rigging Shop			1.
57	T23	Outfit Shop			1.
58	T24	Pipe Shop			1.
59	T25	Machine Shop			1.
60	T26	Electrical Shop			1.
61	T31	On-Board Joinerwork			1.
62	T32	On-Board Rigging			1.
63	T33	On-Board Outfit			1.

Figure 5-9: Work Centers

Work Centers are areas of responsibility, and can be equivalent to departments, although they may be specific functional areas of departments or process stages of manufacturing. The system provides for a brief description of the work center. The work center also can be assigned to a specific manager, location and productivity factor.

The procedures for adding, changing and deleting work centers are the same as those outlined in *General System Operation*.

Defining Trades/Resources

To access the Trades/Resource Definition Window (Figure 5-10), select *Library/Trades/Resources* from the main menu.

Trades are labor resource categories used by the system to catalog both budgets and actual return costs. Trades are designated with the letter "H" from the drop-down in the *Type* column. A given trade can be used across any number of different work centers. A work order can accommodate any number of different trades, although good scheduling practices would probably limit the trade selections for a given work order so that the work can be scheduled as a single task of controllable budget and work duration.

Other resources, designated by the letter "R," can be assigned to activities for schedule management but they cannot be assigned to work orders.

The procedures for adding, changing and deleting trades are the same as those outlined in *General System Operation*.

Trade Information for the Estimating Environment

	Trade ID	Type	Description
1	1	H	Carpenter Class I
2	2	H	Carpenter Class II
3	3	H	Carpenter Apprentice
4	4	H	Concrete Worker
5	5	H	Electricians
6	6	H	Electrician Apprentice
7	7	H	Plumber Class I
8	8	H	Plumber Class II
9	9	H	Painter
10	10	H	Painter Apprentice
11	11	H	Excavator
12	12	H	Carpet Layer
13	13	H	Iron Worker
14	14	H	Tile Setter
15	15	H	Heating/AC Worker
16	16	H	Drape Hanger
17	17	H	Cabinet Maker
18	18	H	Cabinet Maker Apprentice
19	19	H	Laborer
20	20	H	Center Manager
21	21	H	Pipe Worker
22	22	H	Pipe Worker Apprentice
23	51	H	Marine Steel Fitter

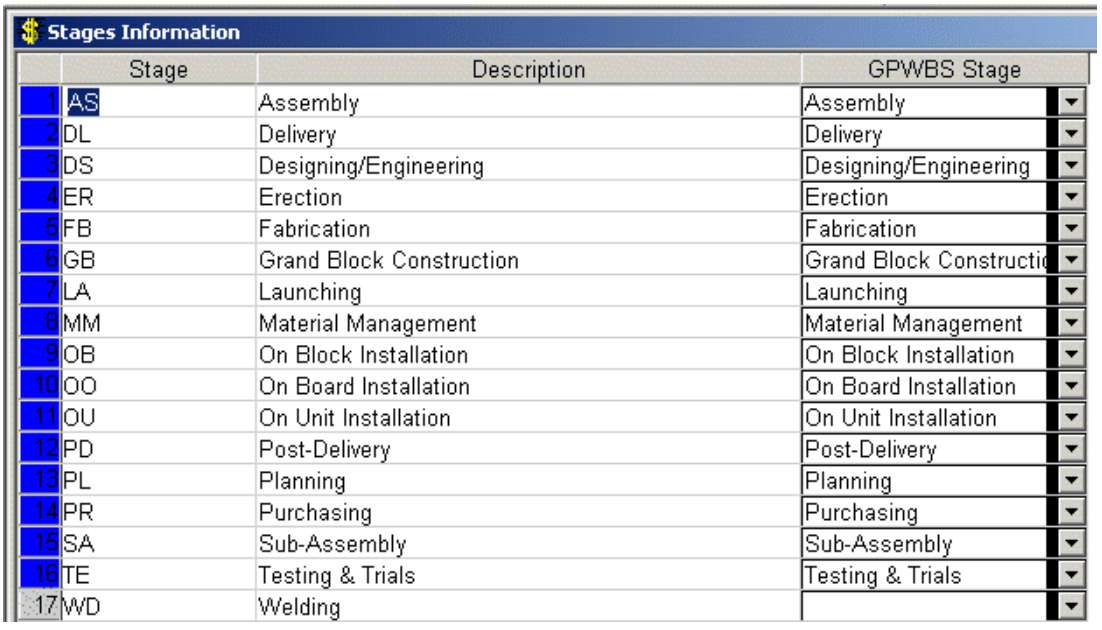
Figure 5-10: Trade/Resources

Defining Stage of Construction

When a cost item is created, it can be assigned to one of the pre-defined stages of construction or work types. In addition to the many summary and cost reports that can be run for the traditional PWBS, both the Summary reports and the Cost Item Value reports can be run and will group and total by the GPWBS stage or work type.
The stage level includes the divisions of the shipbuilding process, classified into non-construction and construction processes by sequence. The stages are not assigned to a specific contract and project but rather are generic to all construction. Stages of construction as well as work types can be mapped to a generic category or GPWBS. The GPWBS structure allows you to further define each PWBS level with a set of generic attributes that describe that product structure in terms that can be used across types of ships or even different shipyards.

Typical non-construction stages are designing, planning, procurement, material management, launching, testing delivery, etc. Typical construction stages are fabrication, sub-assembly, assembly, on block installation, on board installation, block erection, etc.

To define stages, select *Library/Stages of Construction* from the main menu. The Stages window (Figure 5-11) will open. The procedures for retrieving, adding, changing and deleting stage records are the same as those outlined in *General System Operation.*


Stages Information

	Stage	Description	GPWBS Stage
1	AS	Assembly	Assembly
2	DL	Delivery	Delivery
3	DS	Designing/Engineering	Designing/Engineering
4	ER	Erection	Erection
5	FB	Fabrication	Fabrication
6	GB	Grand Block Construction	Grand Block Constructi
7	LA	Launching	Launching
8	MM	Material Management	Material Management
9	OB	On Block Installation	On Block Installation
10	OO	On Board Installation	On Board Installation
11	OU	On Unit Installation	On Unit Installation
12	PD	Post-Delivery	Post-Delivery
13	PL	Planning	Planning
14	PR	Purchasing	Purchasing
15	SA	Sub-Assembly	Sub-Assembly
16	TE	Testing & Trials	Testing & Trials
17	WD	Welding	

Figure 5-11: Stages Of Construction

Defining Work Types

Work type distinguishes the work by skill, facility and tooling requirements, special conditions and/or organizational entities. The scope or pallet of work associated with an interim product for a stage of shipbuilding is attached to the work type. For example, an interim product **block** at stage **design** with the work type **engineering** has a scope of work to produce the drawing of the block.

The non-construction work types are typically administration, engineering, material handling, operations control, production service, quality assurance, testing/trials, etc.

The construction work types are typically electrical, hull outfit, HVAC, joinery, machinery, paint, pipe, structure, etc.

To define work types, select *Library/Work Types* from the main menu. The Work Types window (Figure 5-12) will open. The procedures for retrieving, adding, changing and deleting work type records are the same as those outlined in *General System Operation.*

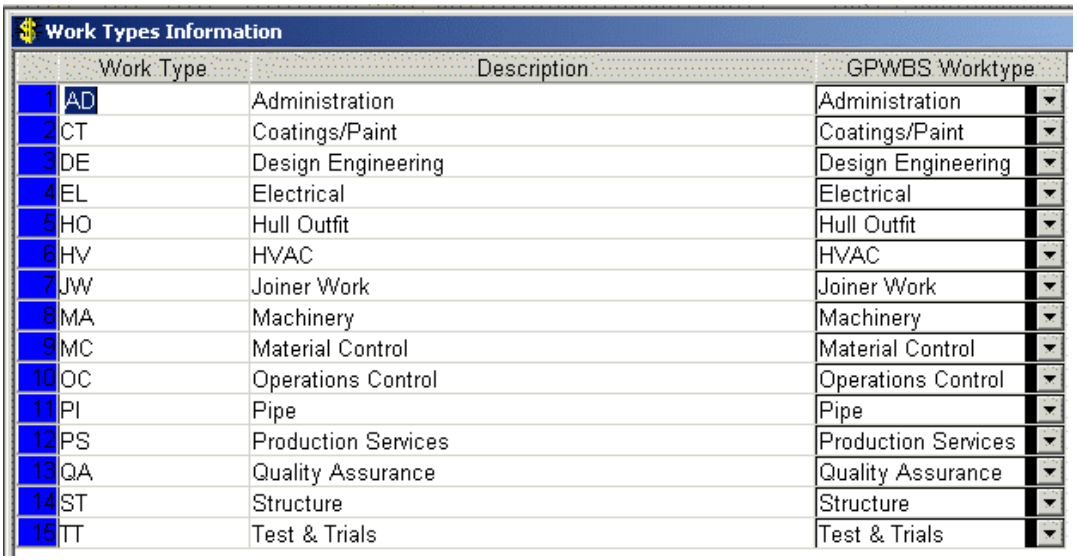


Figure 5-12: Work Types Information

Defining Block Types

The block type library is used in the PWBS to assign the Unit/Block record with a block type. When the Unit/Block record has been assigned a block type, steel reports can be generated to track the costs of the different stages of the manufacturing process for the different types of blocks.

To define block types, select *Library/Block Types* from the main menu. The Block Types window (Figure 5-13) will open. The procedures for retrieving, adding, changing and deleting block type records are the same as those outlined in *General System Operation*.

Block Type Information for the Estimating Environment

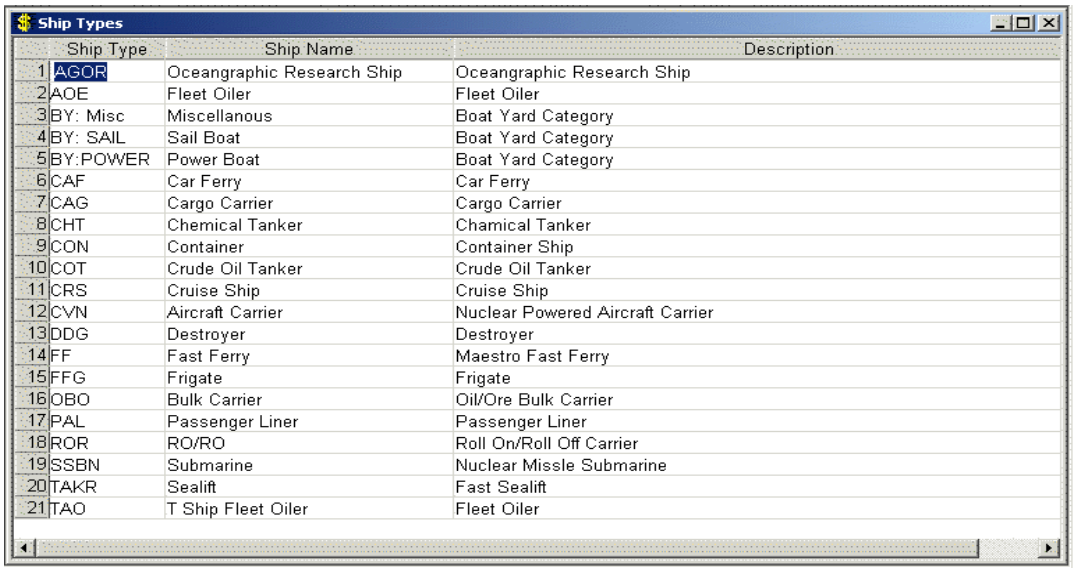
	Block Type	Description
1	AFT-SHL	Aft Shell Units
2	AFTPEAK	Aft Peak Units
3	CROSS	Cross Tanks
4	DK-MACHY	Machinery Deck & Elevator Casing
5	DK-MAIN	Main Deck
6	DK-SPAR	Spar Deck Tween Hatches
7	FOREPK	Fore Peak Units
8	HOPPER	Hoppers
9	HOUSE	House, Funnel, Focsle & Poop Decks
10	LOOP	Loop Belt Unit
11	LST-FWD	Lower Side Tanks - Fwd
12	LST-MID	Lower Side Tanks - Midship
13	SCREEN	Screen Bulkheads
14	SHRED	Shredder Plates
15	TT-ER	Engine Room Tank Tops
16	TT-F/A	Tank Tops - Fwd/Aft
17	TT-MID	Tank tops - Midship
18	UST-FWD	Upper Side Tanks - Fwd
19	UST-MID	Upper Side Tanks - Midship

Figure 5-13: Block Type Information

Defining Ship Types

Cost Estimating Relationships (CERs) also can be tracked for any ship type by any of the WBS levels. To define ship types, select *Library/Ship Types* from the main menu. The Ship Types window (Figure 5-14) will open. The ship type can be assigned at the project level of the WBS. The procedures for retrieving, adding, changing and deleting ship type records are the same as those outlined in *General System Operation*.

The upper level WBS CER records are created and updated for the appropriate **ship type** by the project refresh, if the user chooses to do so. Budgets, EAC, or "actuals" can be chosen for this calculation. The labor rate per unit of measure is calculated from the work orders using the predominate unit of measure. This measures actual costs. Refer to *PERCEPTION's ESTI-MATE* user manual, "Beginning the Cost Estimate" for more information.



	Ship Type	Ship Name	Description
1	AGOR	Oceangraphic Research Ship	Oceangraphic Research Ship
2	AOE	Fleet Oiler	Fleet Oiler
3	BY: Misc	Miscellanous	Boat Yard Category
4	BY: SAIL	Sail Boat	Boat Yard Category
5	BY:POWER	Power Boat	Boat Yard Category
6	CAF	Car Ferry	Car Ferry
7	CAG	Cargo Carrier	Cargo Carrier
8	CHT	Chemical Tanker	Chamical Tanker
9	CON	Container	Container Ship
10	COT	Crude Oil Tanker	Crude Oil Tanker
11	CRS	Cruise Ship	Cruise Ship
12	CVN	Aircraft Carrier	Nuclear Powered Aircraft Carrier
13	DDG	Destroyer	Destroyer
14	FF	Fast Ferry	Maestro Fast Ferry
15	FFG	Frigate	Frigate
16	OBO	Bulk Carrier	Oil/Ore Bulk Carrier
17	PAL	Passenger Liner	Passenger Liner
18	ROR	RO/RO	Roll On/Roll Off Carrier
19	SSBN	Submarine	Nuclear Missle Submarine
20	TAKR	Sealift	Fast Sealift
21	TAO	T Ship Fleet Oiler	Fleet Oiler

Figure 5-14: Ship Types

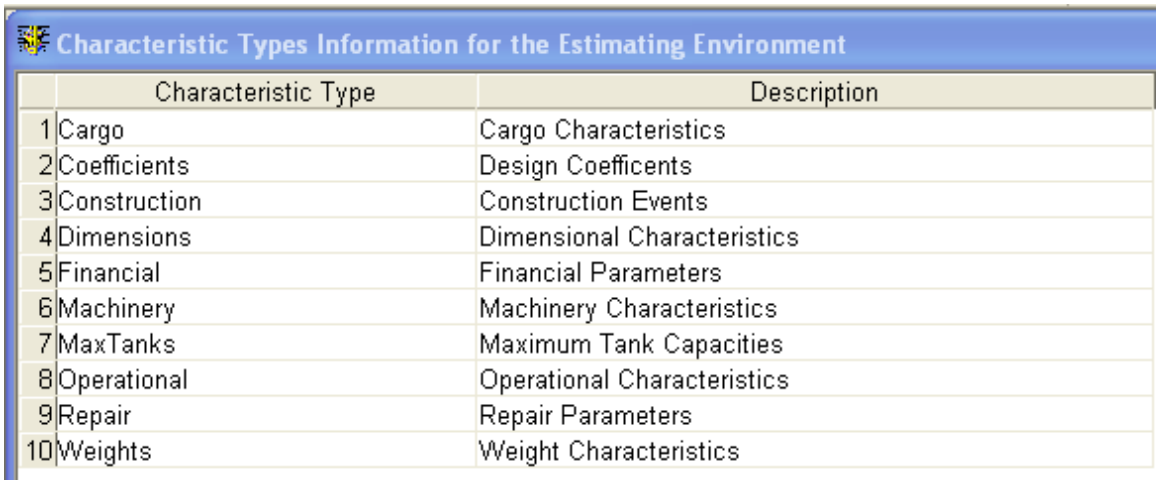
Defining Ship Characteristics

Ship characteristics identify the ship design, its physical and operational attributes. The Ship Characteristics library consists of four inter-related tables:

Characteristic Types identify basic types of characteristics, such as operational, physical hull, physical cargo, etc.
Characteristics is the master list of ship design characteristics, each cataloged by type.
Default Characteristics are characteristics selected from the master list to be used as a default set of characteristics when a new project is defined. The user then should define the specific values of these characteristics for the project.
Ship Type Characteristics allows the user to develop another list of characteristics specific to each ship type. These characteristics are in addition to the default characteristics. These ship type characteristics also will be loaded under a project when a new project is defined with a specific ship type designation.

Type of Ship Characteristics

To set up the types of ship characteristics, select *Library/Ship Characteristics/Characteristic Types*. The system will display Figure 5-15. The procedures for retrieving, adding, changing and deleting Characteristic Type records are the same as those outlined in *General System Operation*.



	Characteristic Type	Description
1	Cargo	Cargo Characteristics
2	Coefficients	Design Coefficents
3	Construction	Construction Events
4	Dimensions	Dimensional Characteristics
5	Financial	Financial Parameters
6	Machinery	Machinery Characteristics
7	MaxTanks	Maximum Tank Capacities
8	Operational	Operational Characteristics
9	Repair	Repair Parameters
10	Weights	Weight Characteristics

Figure 5-15: Types of Ship Characteristics

Master List of Ship Characteristics

To define the master list of ship characteristics, select *Library/Ship Characteristics/Characteristics*. The system will display Figure 5-16. The procedures for retrieving, adding, changing and deleting master list of ship characteristic records are the same as those outlined in *General System Operation*.

Note that each characteristic should be assigned to a specific type and that type must first be defined.

Characteristics Information for the Estimating Environment

	Characteristic Type	Characteristic	Description	UoM
1	Cargo	BBL	Liquid barrels	BBL
2	Cargo	PAX	Number of passengers	PERS
3	Cargo	TEU-20	20ft containers	EA
4	Cargo	TEU-40	40ft containers	EA
5	Cargo	TEU-Reefers	Reefer containers	EA
6	Cargo	Vehicles	Number of Vehicles	EA
7	Coefficients	Cb	Block coefficient	FACTOR
8	Coefficients	CuNo	Cubic number	FACTOR
9	Construction	Months	Months of Construction	MONTHS
10	Dimensions	Beam	Beam	M
11	Dimensions	BeamMax	Beam, Maximum	M
12	Dimensions	Depth	Depth, Molded	M
13	Dimensions	Draft	Draft	M
14	Dimensions	FRSP	Frame Spacing	M
15	Dimensions	Ht	Height of Highest Projection (above DWL)	M
16	Dimensions	LOA	Length overall	M
17	Dimensions	LWL	Length waterline	M
18	Dimensions	MinBerth	Minimum Berth Depth	M
19	Financial	Bond $	Cost Amount Covered by Bond	$
20	Financial	Mortgage $	Mortgage Principle $ Amount	$
21	Financial	Mortgage Interest	Mortgage Annual % Interest	%
22	Financial	Mortgage Years	Mortgage Years Term	YRS
23	Financial	Title XII $	MARAD Title XII $ Guarantee	$
24	Machinery	KW-EGEN	Emergency Electric Generation	KW
25	Machinery	KW-GEN	Electric Generation	KW
26	Machinery	KW-ME	Main Engine(s)	KW
27	Machinery	KW-TGEN	Total Electric Generation	KW
28	Machinery	KW-THRSTR	Bow & Stern Thrusters	KW
29	MaxTanks	DO	Diesel Oil	GAL
30	MaxTanks	FW	Fresh Water	GAL
31	MaxTanks	JP-5	JP-5 Fuel	GAL

Figure 5-16: Master List of Ship Characteristics

Default List of Ship Characteristics

A list of Default Ship Characteristics may be defined so that each new project using *PERCEPTION's* "New Contract/Project Wizard" will have these default characteristics automatically assigned to it. Refer to the chapter "Starting a New Project," "Using the New Contract/Project Wizard" for more information.

To define the default list of ship characteristics, select *Library/Ship Characteristics/Default Characteristics*. The system will display Figure 5-17. The procedures for retrieving, adding, changing and deleting default ship characteristic records are the same as those outlined in *General System Operation*.

Note that each default characteristic is assigned to a specific characteristic and to a specific type. Both of these must first be defined.

Default Characteristics Information for the Estimating Environment

	Characteristic Type	Characteristic	Description	UoM
1	Coefficients	CuNo	Cubic number	CUNO
2	Coefficients	Cb	Block coefficient	FACTOR
3	Construction	Months	Months of Construction	MONTHS
4	Dimensions	LOA	Length overall	M
5	Dimensions	Beam	Beam	M
6	Dimensions	BeamMax	Beam, Maximum	M
7	Dimensions	LWL	Length waterline	M
8	Dimensions	Draft	Draft	M
9	Dimensions	Depth	Depth, Molded	M
10	Financial	Bond $	Cost Amount Covered by Bond	$
11	Financial	Mortgage Years	Mortgage Years Term	YRS
12	Financial	Mortgage Interest	Mortgage Annual % Interest	%
13	Financial	Title XII $	MARAD Title XII $ Guarantee	$
14	Financial	Mortgage $	Mortgage Principle $ Amount	$
15	Machinery	KW-ME	Main Engine(s)	KW
16	Machinery	KW-GEN	Electric Generator	KW
17	Machinery	KW-EGEN	Emergency Electric Generation	KW
18	Machinery	KW-THRSTR	Bow & Stern Thrusters	KW
19	Machinery	KW-TGEN	Total Electric Generation	KW
20	Operational	Range	Range	NM
21	Operational	Crew	Number of crew	PERS
22	Operational	Speed	Speed	KTS
23	Weights	LtShip	Light Ship Displacement	MTON
24	Weights	GRT	Gross tons	MTON
25	Weights	DWT	Deadweight metric tons	MTON
26	Weights	FL Displ	Full Load Displacement	MTON

Figure 5-17: Default Ship Characteristics

Ship Type List of Ship Characteristics

A list of Ship Type Characteristics may be defined that are unique to a specific ship type. When each new project is added to the database using *PERCEPTION's* "New Contract/Project Wizard" the project, and when the project is identified by a specific ship type, the ship type characteristics will be added automatically to the list of default characteristics described above. Refer to the chapter "Starting a New Project," "Using the New Contract/Project Wizard" for more information.

To define the list of ship type characteristics, select *Library/Ship Characteristics/Ship Type Characteristics*. The system will display Figure 5-18. The procedures for retrieving, adding, changing and deleting work type records are the same as those outlined in *General System Operation*.

Note that each default ship type characteristic is assigned to a specific ship type, a specific characteristic and a specific characteristic type. All of these must first be defined.

Ship Type Characteristics Information for the Estimating Environment

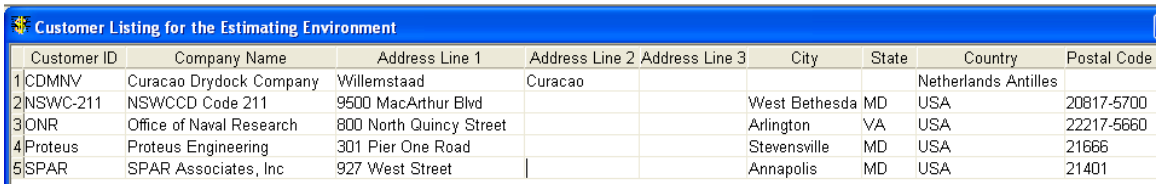
	Ship Type	Characteristic Type	Characteristic	Description	UoM
1	CON	Dimensions	LOA	Length overall	M
2	CON	Cargo	TEU-20	20ft containers	EACH
3	CON	Cargo	TEU-40	40ft containers	EACH
4	CON	Cargo	TEU-Reefers	Reefer containers	EACH
5	FASTCAT	Cargo	PAX	Number of Passengers	PERS
6	FASTCAT	Cargo	Vehicles	Number of Vehicles	PERS
7	Repair	Repair	AnchorCalib	Length of anchor chain to calibrate	M
8	Repair	Repair	AnchorChain	Length of anchor chain & cable	M
9	Repair	Repair	AnchorShift	Length of anchor chain to shift	M
10	Repair	Repair	AnchorStuds	Legnth of anchor chain to reweld studs	M
11	Repair	Repair	AnchorWash	Length of anchor chain to clean	M
12	Repair	Repair	Bottom-GritBlast	Bottom Grit Blasting Area	SQM
13	Repair	Repair	MudCuM	Cubic Meters to remive mud	CUM
14	Repair	Repair	MudDrum	Drums to remove mud	EACH
15	Repair	Repair	ShaftDiam	Shaft Diam	MM
16	Repair	Repair	Sides-GritBlast	Sides Grit Blasting Area	SQM
17	Repair	Repair	SidesBTHosingDow	SidesBT Hosing down with fresh water	SQM
18	Repair	Repair	SidesBTHPwaterjet	SidesBT Cleaning by HP waterjet with fresh	SQM
19	Repair	Repair	SidesBTOilySpots	SidesBT - Remove oily spots	SQM
20	Repair	Repair	SidesBTPaint	SidesBT Paint - Flat	SQM
21	Repair	Repair	SidesBTPaintMicro	SidesBT Paint microns	EACH
22	Repair	Repair	SidesBTScraping	SidesBT Scraping - marine growth	SQM
23	Repair	Repair	SidesBTTouch-up	SidesBT Paint touch-up	SQM
24	Repair	Repair	SidesBTTouchMicro	SidesBT Paint touch-up microns	EACH
25	Repair	Repair	TopSides-GritBlast	Topsides Grit Blasting Area	SQM
26	Repair	Repair	TopSidesHosingDo	TopSides Hosing down with fresh water	SQM
27	Repair	Repair	TopSidesHPwaterje	TopSides Cleaning by HP waterjet with fres	SQM
28	Repair	Repair	TopSidesOilySpots	TopSides - Remove oily spots	SQM
29	Repair	Repair	TopSidesPaint	TopSides Paint - Flat	SQM
30	Repair	Repair	TopSidesPaintMicro	TopSides Paint microns	EACH

Figure 5-18: Ship Type Characteristics

Defining Customers

A customer table is used for generating cost estimates and customer invoices.

To set up the customer table, select *Library/Customers*. The system will display Figure 5-19. The procedures for retrieving, adding, changing and deleting customer records are the same as those outlined in *General System Operation*.



Customer Listing for the Estimating Environment

	Customer ID	Company Name	Address Line 1	Address Line 2	Address Line 3	City	State	Country	Postal Code
1	CDMNV	Curacao Drydock Company	Willemstaad	Curacao				Netherlands Antilles	
2	NSWC-211	NSWCCD Code 211	9500 MacArthur Blvd			West Bethesda	MD	USA	20817-5700
3	ONR	Office of Naval Research	800 North Quincy Street			Arlington	VA	USA	22217-5660
4	Proteus	Proteus Engineering	301 Pier One Road			Stevensville	MD	USA	21666
5	SPAR	SPAR Associates, Inc	927 West Street			Annapolis	MD	USA	21401

Figure 5-19: Customer List Table

Customer information includes the following:

- Customer ID (must be unique for each customer entry)
- Customer Name (this is what is printed on cost estimates and invoices)
- Address
- Contact person
- Phone & FAX numbers
- Email address
- Billing terms

Libraries Used By Specific Environments

Each application environment uses libraries often unique to that application. The following outlines these applications-specific libraries, the details of which are covered in the four basic application user manuals:

"*PERCEPTION ESTI-MATE*™, Cost Estimating New Construction & Ship Repair."
"*PERCEPTION PERT-PAC*™, Planning & Scheduling Shipyard Operations."
"*PERCEPTION MAT-PAC*™, Material Planning, Purchasing & Inventory Control."
"*PERCEPTION WORK-PAC*™, Labor/Manpower Planning & Management."

Libraries Used By Cost Estimating

The cost item is the basic building block of an estimate and requires both of the data types mentioned at the beginning of the chapter: common-use libraries and project-oriented information. The system requires each cost item to have the following fields completed before it can be saved to the database:

- Contract ID (project WBS information).
- Project ID (project WBS information).
- Units of Measure (from the common libraries)
- Work Center (from the common libraries).
- Cost Item Number (manually entered by user)
- Customer information

If cost estimating is to benefit from centrally managed information, then the following additional libraries need to be made available to users in addition to the complete project WBS:

- CER Libraries (Cost Estimating Relations, standard labor and/or material rates per unit of measure. For example, so many hours per ton of steel fabrication).
- Package Catalog (a collection of standard parts and/or manufacturing processes that make up Standard Interim Products for use throughout the shipyard).
- Escalation (used to calculate the value of materials to the material base year defined on the project option tab).
- Standard Parts Catalog with Classifications and Attributes.
- Ship Characteristics (a table defined in the project characteristics tab. The quantities defined here can be linked to the quantities of the cost items).
- Stage of Construction.
- Work Type.

Libraries Used By Engineering

The bill of materials for the drawings can be created manually or by using parts from the Standard Parts Catalog.

Libraries Used By Planning and Scheduling

Planning Activities can be created manually or imported from Microsoft Project. Since the system requires that each activity be tagged to a work center, the work centers must be defined before the activities can be defined.

Libraries Used By Production Engineering

Work orders are cataloged by contract, project and work center. Work order budgets may be broken down by trade.

Time charges are cataloged by contract, project, work order, work center and detailed by time-date, employee badge, trade and by charge type (i.e., regular, time-and-one-half, dirty time, etc.). Therefore, before work orders can be developed for a project, the following libraries are required to be established:

- Work Centers.
- Trade/Resources.
- Employee Badge file.
- Time Charge Types.

Libraries Used By Material Control

Material control can issue project material (direct purchase, stock, and manufactured). However, material typically is stored in specific locations within the shipyard (and out). In order to provide material management by stores location, these locations must be defined on the database. Requisitions can use both bills of material from the drawing files or parts from the Standard Parts Catalog.

Libraries Used By Purchasing

Purchase orders can be generated directly for projects but only after the vendor has been defined on the system.

A list of vendors, complete with address information is a required library for purchasing.

Other libraries used for purchase orders are the following:

- Currency.
- Standard Terms.
- Standard Clauses.

If purchase orders are to be developed for stock items and standard parts, the Parts Catalog also must be installed onto the database. The Parts Catalog also allows parts to be classified by Part Class and Sub-Class, so these tables need to be defined as well.

Libraries Used By Stores Management

Stores management focuses on the following basic functions:

- Delivery receiving.
- QA inspections.
- Material location and distribution management.
- Stock inventory replenishment.
- Material issues to production.
- Pallet fitting.

Therefore, all libraries required for purchasing also are required for stores management.

Libraries Used By Accounting

PERCEPTION provides electronic interfaces with accounting systems that eliminate costly and time-consuming duplicate data entry operations with Payroll, General Ledger, Accounts Receivable and Accounts Payable systems. Several libraries are required before interfacing with these accounting systems:

- General ledger accounts.
- Employees.
- Labor Types.
- Customer names and addresses.

Interfacing With Financial/Accounting Systems

PERCEPTION provides electronic interfaces with accounting systems that eliminate costly and time-consuming duplicate data entry operations with Payroll, General Ledger, Accounts Receivable and Accounts Payable systems.

PERCEPTION provides job costing at various levels of detail and for different points of view. Job cost reports are generated:

- By the shipyards own internal chart of accounts.
- By specific contract work breakdown structure.
- By production interim product and manufacturing process.
- By shipyard work center.

- By trade skill.

Job cost details are available by the work order, by individual work order time charge transaction, by material item, and by purchased subcontracted service. This job cost visibility relieves the accounting systems from having to produce similar reports and to focus mostly on the other accounting responsibilities.

In order to establish the electronic interface between *PERCEPTION* and the accounting systems, the accounting systems must have a means for importing the information from *PERCEPTION*: time charges, purchases and purchase order amendments, stock issues and physical inventory adjustments, customer billing invoices, and vendor payment authorizations. These imported transactions can be provided by *PERCEPTION* in a variety of different data formats.

- Spread sheet format (for example, Microsoft *EXCEL*).
- dBASE®.
- Delimited ASCII text files.
- Non-delimited ASCII text files.
- SQL Database transactions.

Refer to the chapter "Interfacing with Accounting Systems" in this manual for details.

For details on these *PERCEPTION* transactions, the reader is referred to the following user manuals:

"PERCEPTION Material Planning, Purchasing & Inventory Control" for processing purchases, stock transactions, journal adjustments, and vendor invoices.
"PERCEPTION Labor/Manpower Planning & Management" for time charge transaction processing.

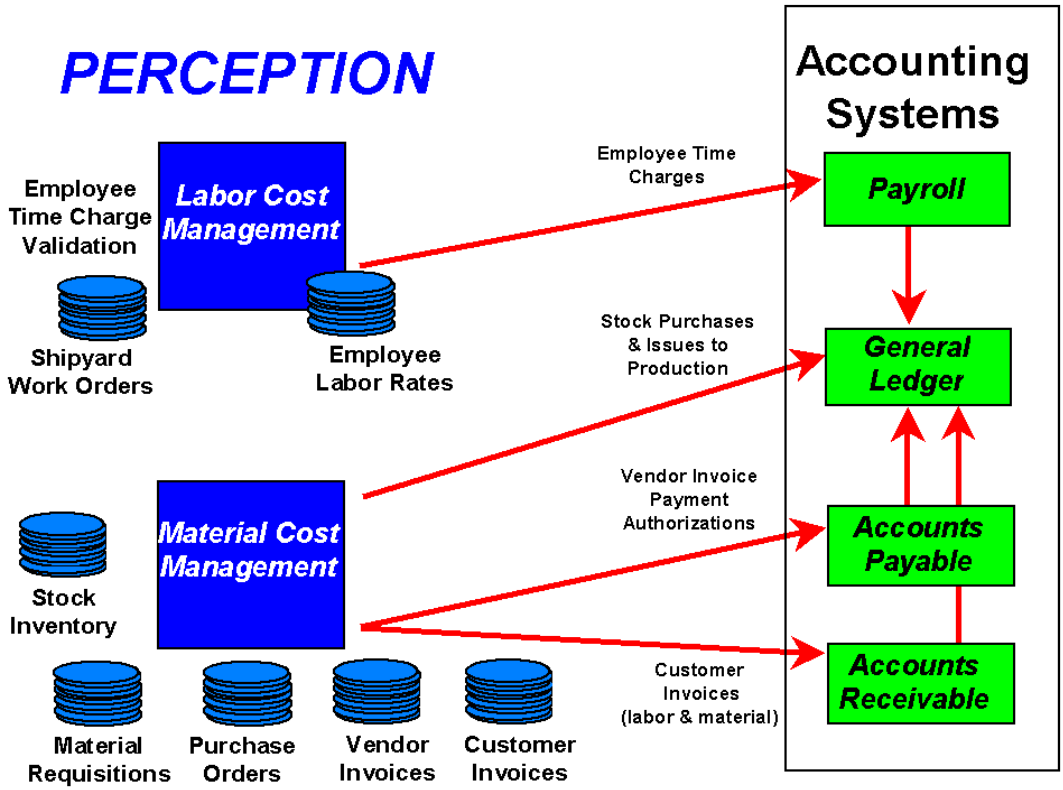


Figure 5-19: PERCEPTION Transactions for Accounting

Defining Business Rules

PERCEPTION provides considerable flexibility in how the shipyard wishes to establish procedures for operating the system. Refer to the chapter "Configuring Business Rules" in this user manual for additional details.

Defining Company Logo

PERCEPTION displays a company logo on a number of standard reports. These reports include the following:

- Customer Cost Estimate Proposal.
- Customer Billing Invoice.
- Request for Quote from Vendors.

Purchase Order Document.

In addition, a logo is displayed on the user login window.

In order to install a company logo, the user must open the system's *"PERCEPTION"* Configuration Settings File. This file can be found **in the same directory as the one where the *PERCEPTION*.exe file** has been installed. The full name for the configuration file is **perception.ini**.

The *"PERCEPTION"* Configurations Settings file can be opened using *Notepad*. Figure 5-20 presents a partial listing of this file, in which the company logo file can be referenced.

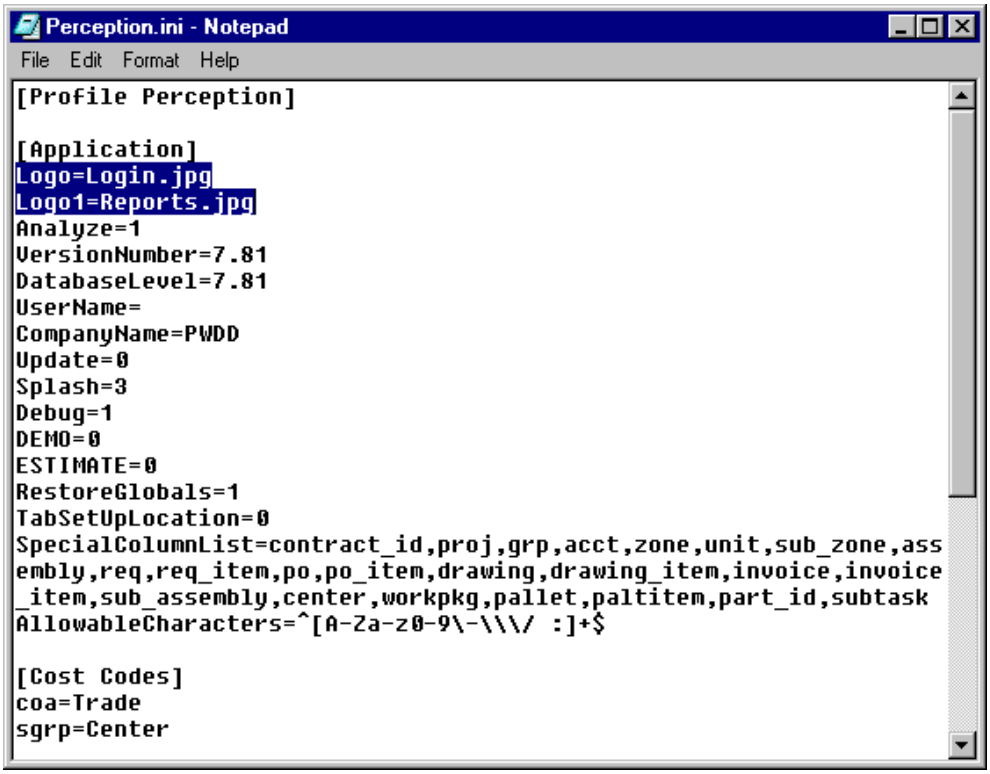


Figure 5-20: "PERCEPTION" Configuration Settings File

From the above figure, the two lines that are highlighted, "Logo" and "Logo1," identify the two logo picture files (they may also be the same picture file). The first line, "Logo=login.jpg," references the logo that will be used on the login window, and the second line, "Logo1=reports.jpg," will be used on the reports wherever a logo is displayed/printed.

The company logo can be either a "jpg" or "gif" file and must be stored in the same directory as this *"PERCEPTION"* Configuration Settings file. While the logo will be adjusted automatically by the system to fit within its allocated space of the window and reports, it is best that the logo be developed within the following dimensions:

Width:	8.1 cm (3.2 inches) or 307 pixels
Height:	3.1 cm (1.2 inches) or 118 pixels

Note: The logo picture files can be stored in any folder as long as its full address is included in the *"PERCEPTION"* Configurations Settings file.

Setting Printer Paper Size

PERCEPTION allows the user to choose between Metric and English units of measure for the printer paper size. The default is English units.

The selection for which units to use is found on the *Company Parameters* window. Select *Library/Company Parameters* on the *PERCEPTION* main menu and click on the *Company Defaults* tab (Figure 5-21).

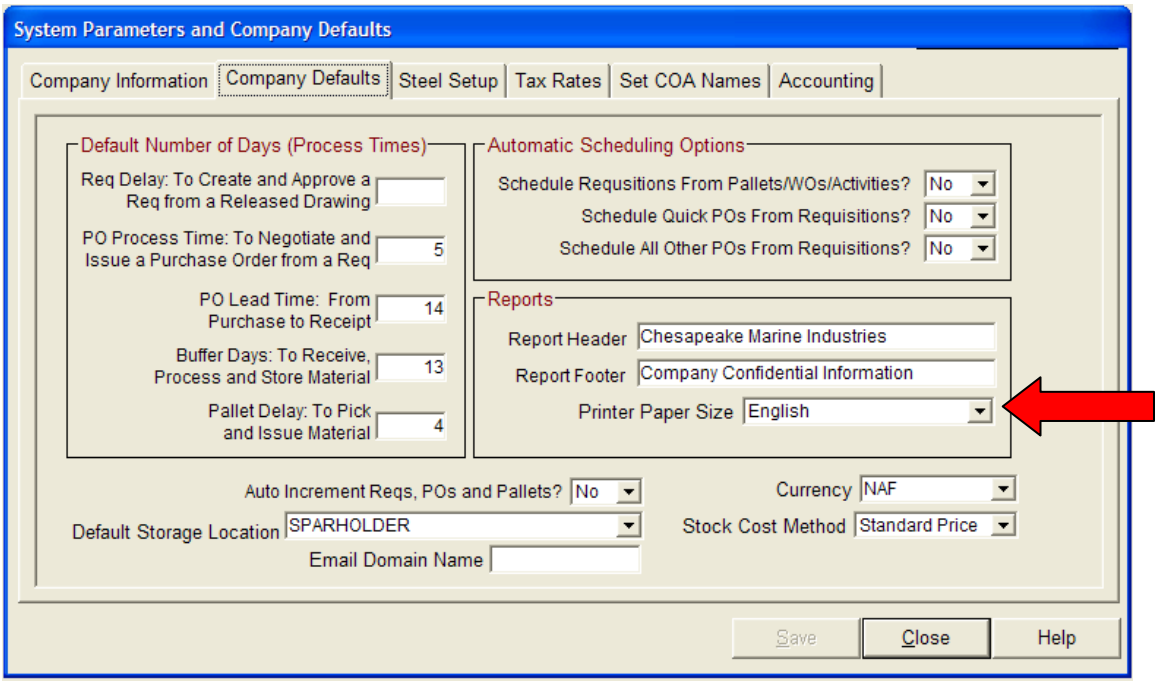


Figure 5-21: Company Parameters

In the Reports group box use the drop down list to select your preferred *Printer Paper Size*. Then click on the *Save* button at the bottom of this window to update the database with the selection.

PERCEPTION reports use 2 different paper sizes:

- For **English** units, it uses Letter (8.5x11 in) and Legal (8.5x14 in) paper.
- For **Metric** units, it uses A4 (210x297 mm) and B4 (250 x 354mm).

Depending on the specific report to be generated by the system, the software automatically selects the paper size based on this setting.

Chapter 6: Starting a New Project

To begin a new project, the following steps need to be performed:

- Determine the project work breakdown structure that will allow a convenient, yet informative means to summarize costs and schedule performance.
- Determine the various work centers that will be engaged in the work activities, both within the shipyard and outside. The system can summarize costs and schedule performance by these different areas of responsibility, i.e., work centers. Manpower requirements, planned, actual and as forecasted, can be calculated for each work center.
- Enter the details of the project.
- For cost estimates, the details are the cost items.
- For schedule planning, the details are the planning activities and their relationships to each other and time and resource constraints.
- For material control, the details are the drawing bills of material (optional), production material requisitions, purchase orders, parts catalog, and pallets (optional).
- For labor cost management, the details are the project work orders and time charges.

Before You Begin a New Project

The user must first understand how to organize the contract/project. This entails defining the following:

- The overall contract proposal, which may include multiple projects (such as for a series ship proposal) and any contract line items (CLINs[8]) if they are needed.
- The project work breakdown structure (WBS) that will be used for the project(s). The WBS may include a ship system-oriented WBS (SWBS); a product-oriented WBS (PWBS); a shipyard organization WBS (COA); or any combination of these distinct hierarchies. CLINs also are an additional WBS structure. Project costs, therefore, can be assigned to any one or more of these individual work breakdown structures.

[8] CLINs can be used to summarize costs and contract performance by an owner's own work breakdown structure.

Contract & Project(s)

All projects developed on the system must be assigned to an overall contract. This requirement enables multiple projects to be developed for any given contract proposal or cost management plan. Some examples are: series ship construction and other projects for class ship design and engineering, training programs; integrated logistics support; and other major elements of a large procurement program (Table 6-1). For ship repair, phased maintenance contracts allow multiple ships to be processed with an ability to manage overall contract performance. Smaller repair facilities may use the contract as the means to identify a particular customer; this allows each customer's workload to be tracked and performance and level of profitability assessed.

Project No.	Project Description
2001	Ship Design Development
2002	Ship #1
2003	Ship #2
2004	Ship #3
2005	Ship #4
2100	Integrated Logistics Support Program
2101	Financial & Operational Costs
2102	Scrap Value

Table 6-1: Example of Multi-Project Contract for Life Cycle Cost Estimate

If summarizing costs by CLIN is also a requirement, these CLINs must be defined under the contract.

Project WBS

All projects managed by the system require a Work Breakdown Structure. The WBS provides a convenient means for summarizing costs and performance status at various levels of detail and for varying points of view. The WBS can be a traditional hierarchy of project work categories, but the system also permits additional parallel WBS structures. For example, the traditional SWBS may identify engineered ship systems (plus shipyard engineering and support services), while a parallel PWBS of products (ship zones hull blocks, assemblies, etc.) is often more suitable for organizing and executing manufacturing and construction work. The PWBS can be broken down to whatever level of detail the shipyard believes is necessary to efficiently track and manage performance. Additionally, if the shipyard organization Chart of Accounts (COA) is defined, a third WBS also can operate at the same time to summarize performance by areas of responsibility and discrete manufacturing process. *PERCEPTION* allows all three (plus CLINs, if required for the contract) WBS structures to operate simultaneously. Figure 6-

1 illustrates how these WBS hierarchies can operate for collecting costs from labor work orders. Similar relationships operate for estimating cost items, and project material requirements.

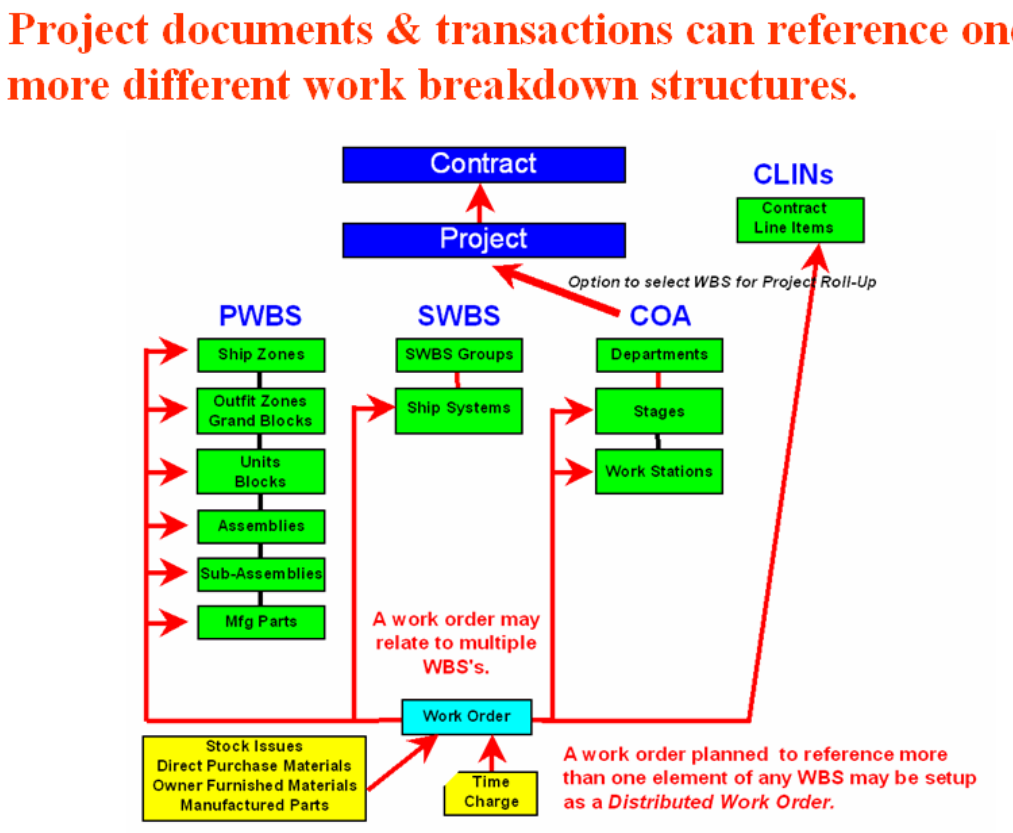


Figure 6-1: Parallel Project WBS

Labor and material costs are summarized at any of the WBS levels. Manpower analysis is also done at every defined level of WBS. Note that the details, such as estimate cost items, work orders, material requirements items, etc. are at the bottom of the project WBS. Each of these details can reference all WBS hierarchies.

Figure 6-2 illustrates a multi-project contract.

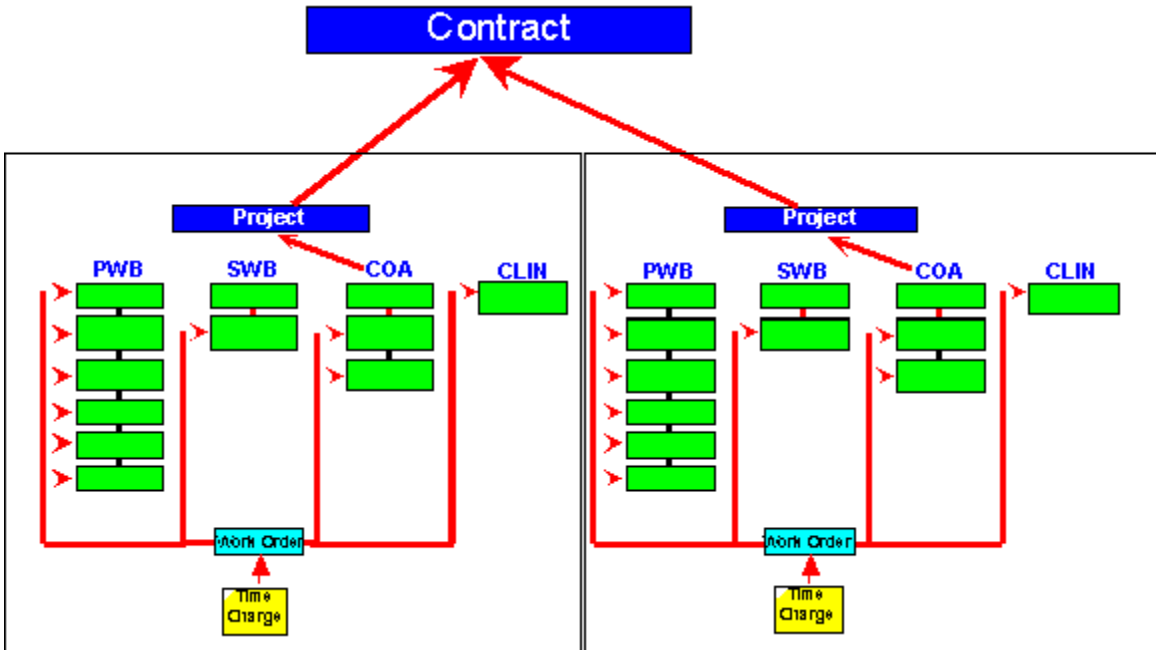


Figure 6-2: WBS for Multi-Project Contract

The shipyard is free to define its own WBS requirements, and these may be customized for every contract and for each and every project within a contract. Use of more than one of the WBS hierarchies is strictly optional. The following generally describes each.

Project SWBS

Ship Systems Work Breakdown Structure (SWBS) is a two-tier hierarchy of work categories that typically identify various ship systems as well as work categories of shipyard engineering and support services. The top tier of SWBS is called SWBS Groups. These usually identify ship systems that belong to a particular set of work, like structural. The second levels of SWBS are the individual ship systems and are called accounts.

The following provides examples of SWBS Groups for both new construction and ship repair. The U.S. Navy's Ship Work Breakdown Structure is an example, although *PERCEPTION* is capable of handling any user-defined SWBS. The SWBS definition may vary from project to project.

SWBS Group	US Navy SWBS	Commercial SWBS	Repair SWBS
100	Hull Structure	Hull Structure	Design & General
200	Propulsion Plant	Machinery	Structural
300	Electric Plant	Piping Systems	Equipment & Outfit
400	Command & Surveillance	Electrical Systems	Hull Engineering Systems
500	Auxiliary Systems	HVAC Systems	Propulsion System
600	Outfit & Furnishings	Outfit & Furnishings	General Ship Services
700	Armament	Special Purpose Systems	Cargo Systems
800	Integration & Engineering	Integration & Engineering	Electrical & Electronics
900	Shipyard Support Services	Shipyard Support Services	Shipyard Services & Dry Dock

Table 6-2: Examples of SWBS for Production

PERCEPTION has no limit to the number of SWBS groups, and they may be alphanumeric.

PERCEPTION also is useful for managing the costs of plant maintenance and overhead activities. The following table illustrates this capability when these efforts are developed on an annual basis, such as under a project 2001 for the year 2001. The shipyard is free to develop whatever SWBS categories best suit its purpose.

SWBS Group	Plant Maintenance	Overhead
100	Buildings	Production Overhead
200	Roads	Indirect Support
300	Bulkheads & Warf	Management
400	Dry Dock	Human Resources
500	Cranes	Research & Development
600	Machinery	Marketing
700	Barge	
800	Vehicles	
900	Janitorial	

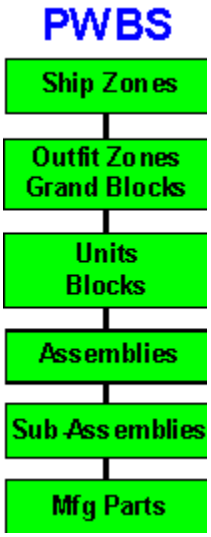
Table 6-3: Examples of SWBS for Maintenance & Overhead

For more information about the use of SWBS, the user should refer to SPAR's publication *Planning New Construction & Major Ship Conversions*.

Project PWBS

The Product Work Breakdown Structure, or PWBS, is a hierarchical list of interim products (basic building blocks of the total ship) definable during the construction stages of a contract. At the top of the PWBS are the physical ship zones. A ship-wide zone usually designates work that is not zone-specific. Further down the hierarchy of PWBS are the lower levels of interim products at earlier stages of construction from construction units and hull blocks, to assemblies, sub-assemblies, etc.

The PWBS includes all work defined under the SWBS, but grouped in ways that better reflect the general build strategy of production phases as particularly effective with modular construction. The PWBS can be defined down to six (6) levels of detail, although the extent that the shipyard wishes to use depends entirely upon their preferences. *PERCEPTION* is capable of handling any user-defined PWBS and the PWBS may vary from project to project.



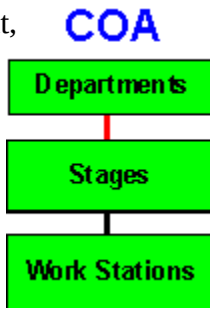
The PWBS may not be as important for ship repair contracts as they are for new construction. However, PWBS can be important for ship modernization programs that have significant elements of new construction. On the other hand, PWBS ship zones can be very helpful in planning and managing on-board work to minimize work crew conflicts, etc.

For more information about the use of PWBS, the user should refer to SPAR's *Planning New Construction & Major Ship Conversions*.

Project Code of Accounts (COA)

The Code of Accounts work breakdown structure is the shipyard's specific work breakdown structure or set of cost codes. Typically, COA identifies the shipyard organization and areas of responsibility. These areas also can identify various manufacturing processes. This structure can be completely separate from any of the other work breakdown structures in the system and can complement them. It is an optional structure that can be used to catalog and collect costs.

The COA is a three (3) level hierarchy of cost codes consisting of Department, Work Stage, and Process. Example: Production Outfit, Pipe Fabrication (Shop), Pipe Bending. Not all levels of COA need to be used. An abbreviated use might be using only two levels: Building and Shop. Each Shop may have a supervisor's name for the description, so that the shipyard can use the COA summary reports to evaluate the work by supervisor. Some shipyards may choose to use the following COA structure: Departments, Cost Centers, and Trades.



Since each project contains its own COA, each project can have a different COA. The default COA structure labels are Groups, Sub-Groups, and Items. The user can define any label structure. By setting the labels, all menus, reports and windows will reflect the shipyard's name for each of these levels.

The Work Centers

The system requires that many cost details (estimate cost items and work orders, for example) be assigned to specific work centers. These work centers may identify separate departments or manufacturing processes within the shipyard. For cost estimating purposes, major subcontractors and vendors providing major equipment and perhaps turnkey services also should be identified as separate work centers.

For cost estimating, the system automatically computes labor costs by applying work center labor rates to user-defined labor-hour estimates. The system further computes indirect costs and profit by applying work center rates for these costs to labor and material estimates developed by the user. These rates are stored in tables for each work center, which the user must develop[9].

Work centers can be a duplication of what the COA can provide for managing departmental resource requirements and performance, but without the hierarchy of COA. *PERCEPTION* can summarize costs and performance by both structures. However, a historical tracking of performance can only be achieved using COAs.

Shipyard Trade Resources

For the shipyard that also needs to track costs and performance by a production trade, *PERCEPTION* provides a table for these to be defined. There are features for budgeting work orders by trade, developing manpower requirements (planned, actual and forecast) by trade, and assigning production time charges to trade categories.

Trades can be a duplication of what the COA can provide for managing departmental resource requirements and performance, but without the hierarchy of COA. *PERCEPTION* can summarize costs and performance by both structures. However, a historical tracking of performance can only be achieved using COA.

[9] The work centers enable the estimator to identify different labor, indirect and/or profit rates for different areas of work to be performed. If rates change for any given area, the estimator can simply change the work center rates, and the system will automatically update all cost items assigned to that work center. If the change is due to a change in a manufacturing process (for example, replacing manual with automated equipment), the system provides functions to apply global factors to the cost items assigned to that work center. If the change is due to an alternate provider of labor, (for example, out-sourcing the work to subcontractors), the system provides functions for directly replacing cost items of one work center with another, and then automatically applies the new center rates.

Contract CLINs

Contract Line Items (CLINs) is a breakdown of work as specified by the ship owner. This is an independent work breakdown structure that can be used in both new construction and ship repair. CLINs belong strictly to the contract and typically vary from contract to contract. Projects under a contract can reference one or more CLINs by means of the details of a project, such as cost estimate items, work orders material requisitions, etc.

PERCEPTION can summarize costs and performance by CLIN.

Creating a New Contract & Project(s)

To create a new contract and/or project on the database, always start at the top of the contract/project hierarchy. If a new contract is required, click on the **C** button  on the toolbar. This opens the contracts worksheet. Enter the information as needed and save it to the database using the instructions provided in the chapter, "*General System Operation"* in this user manual.

The Contracts data entry window allows the following general information to be defined by the user:

- Contract ID (maximum 20-characters).
- Contract Description (unlimited characters).
- Customer Name (maximum 30-characters).
- Contract Manager (maximum 30-characters).
- The Billing Method (maximum 20-characters).

If a selection of contracts have been added and/or retrieved, further information about each contract is available. To see these details, click on a contract row, then either click on the Drill-Down button  on the toolbar, or click the right mouse button to display the pop up menu. In either case, select *Details*. A third method of seeing the detail information is to just double-click on the contract row. This also will open the Details window.

Details will display the Summary Contract Information window (Figure 6-3) that contains details of the contract. Most of the information displayed in this detail worksheet is the result of other functions within the system and cannot be modified by the user.

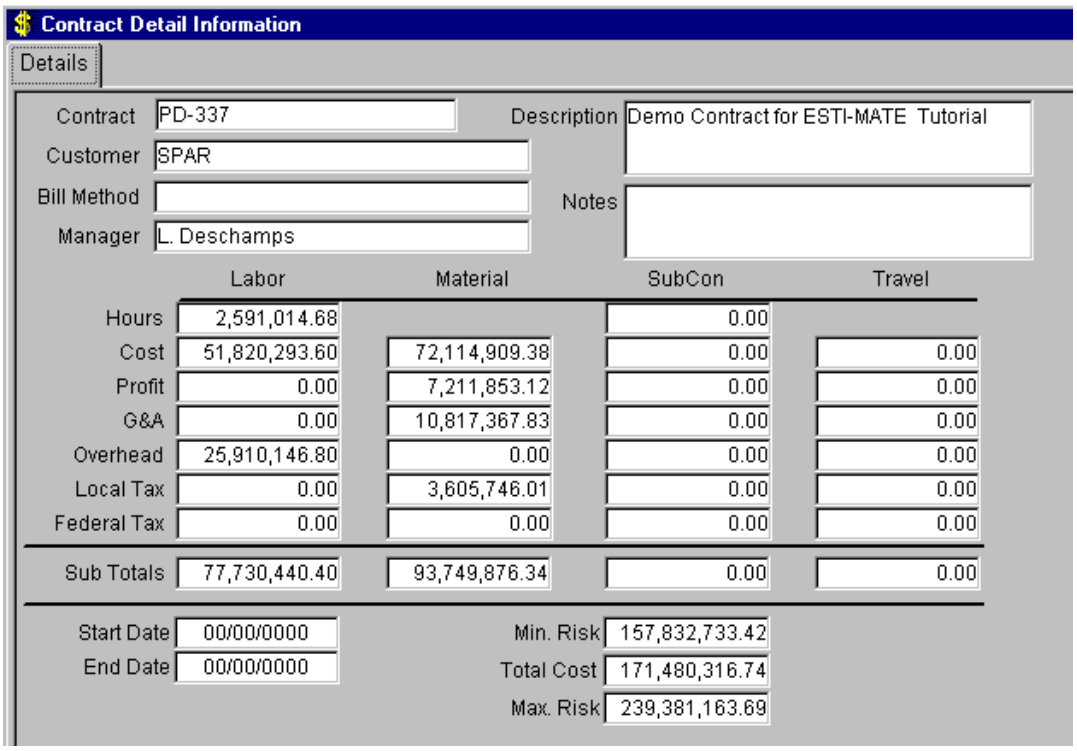


Figure 6-3: Summary Contract Information Display (Cost Estimate Environment)

To create the project(s) for the new contract, click on the *Drill-Down* button on the toolbar, or click on the right mouse button on the new contract to display the pop up menu that provides the *Drill-Down* (Figure 6-4) option.

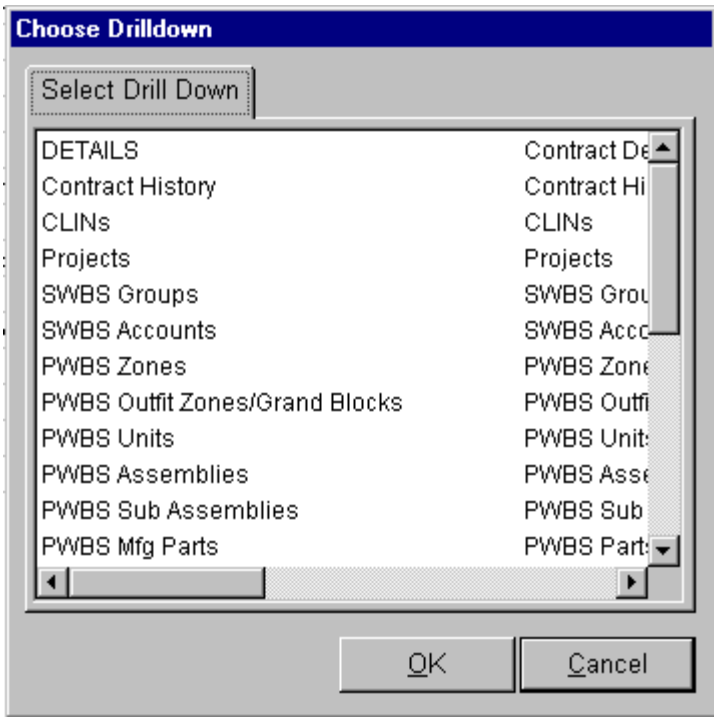


Figure 6-4: Drill-Down Selections

The advantage to using this Drill-Down approach is that as lower levels of details (in this case the project being a lower level of the contract, or the child), automatically inherit the identification of the level above (in this case, the contract, or the parent). Using this scenario of creating a project record by drilling down from the contract record, if a global default (*Edit/Global Defaults*) has been set for the contract level that is different from the parent contract, it will not apply. Any global defaults other than contract will be applied to the new record. Refer to the topic "*Linkage and Drill-Downs"* in this manual for more information.

In lieu of drilling down, a new project record can be created by clicking on the **P** button **P** on the toolbar. But the record that is added will not have the contract automatically filled in.

The following sections describe the process of adding a new project.

Creating a Project

To create a new project under a new contract, refer to directions for adding a new project record in the above section and enter the information using the instructions provided in Chapter 4, *General System Operation*.

Project Numbers

An important issue is the project numbering scheme for the shipyard. *PERCEPTION* allows the same project number to be used under different contracts. While projects are formally identified with a specific contract number in the system, there are applications, like time charges, that the shipyard may not want to be associated with a contract. This may be true if time charges are imported into *PERCEPTION* from another application and that application does not carry a contract identifier. In this case, all project numbers must be unique. Therefore, if project numbers for the shipyard are not unique, then the timecards must also carry a contract identifier.

After the project numbering scheme has been decided, the remaining information about the overall project should be entered, such as budget.

SWBS Group Schemes

If the project is not to use SWBS as one of its WBS levels, then this section can be ignored.

One of the data fields on the project record is labeled "Group Scheme" (Figure 6-5). The SWBS Group number can be automated such that once the SWBS account is entered; the system can determine what SWBS group it belongs to. The drop-down worksheet allows the user to identify the SWBS account number as a numeric field where the group number can be derived as a leading digit or digits of this account number. For example, if a 3-digit account scheme is specified, the system will assume that the group number is the leading digit in the 100 series. An account number 314 under a 3-digit scheme belongs under group 3. The account number 1314 also may be a 3-digit scheme and therefore will belong to group 13. However, if the account number 1314 is identified as a 4-digit scheme, that account will then belong to group 1.

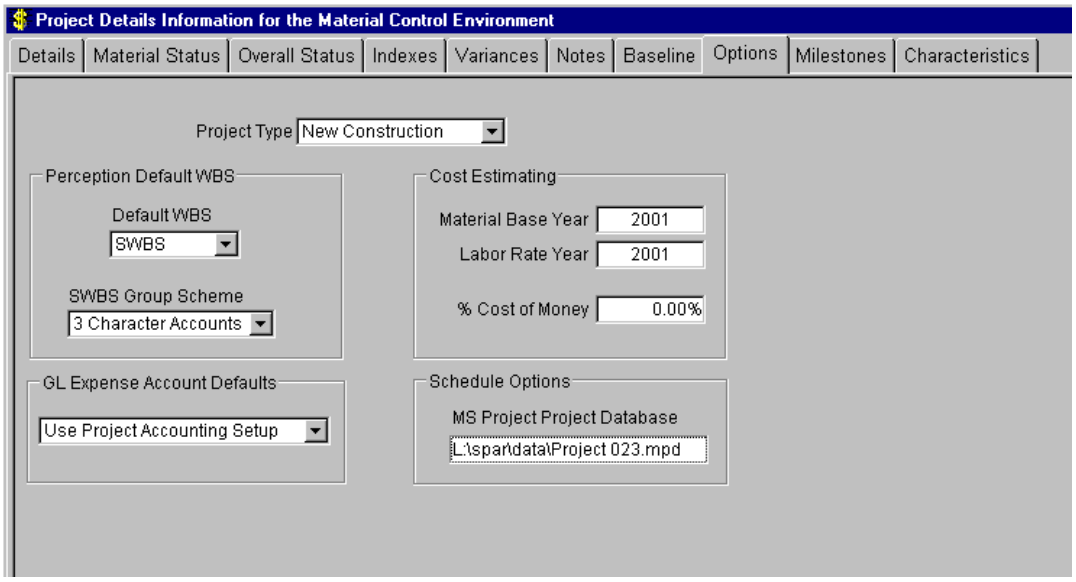


Figure 6-5: SWBS Group Scheme Options

The "Manual" selection for group scheme requires that each account number, numeric or alphanumeric, be individually identified to a specific group number (numeric or alphanumeric).

Default Project WBS

The shipyard must identify which WBS scheme the system will use to catalog all project hours and costs (from estimate cost items, work orders, material requisitions, etc.) up to the contract and project levels: SWBS, PWBS or COA. This selection identifies the one WBS hierarchy that must be defined and must be used. The other WBS hierarchies may also be used, but they are optional and are not requirements for cataloging the project costs[10].

When the new project record is defined, designate the default WBS by opening the *Details* window and clicking on the *Options* tab.

[10] The system does require that when costs are cataloged against any WBS hierarchy, predominant or not, that WBS level must have been defined on the database for the project beforehand.

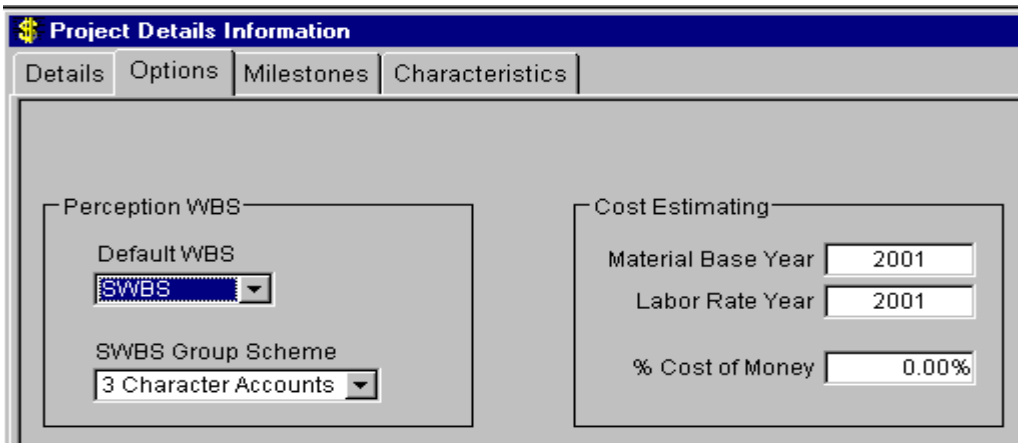


Figure 6-6: Selecting the Project Default WBS

When a WBS level is assigned to another entity (cost item, work order, pallet, etc.), the costs and hours from that entity will be totaled to that WBS level for a variety of analyses at each level and produce valuable conclusions about their overall costs and schedule, including trends and forecasts.

When using multiple WBS hierarchies, somewhat different statistical conclusions can be made by the system, depending upon the hierarchy (and its particular point of view: ship system, interim product or shipyard organization). Since only the default WBS is required, the totals in other WBS hierarchies may be incomplete. For an overall assessment of project performance, the Default, or predominant WBS, will be used by the system.

Cost of Money (Cost Estimating)

For cost estimating, the cost of money is a factor that is computed manually by multiplying the book value of assets times interest rates and divided by direct labor dollars. This factor is then multiplied by the estimated direct labor dollars to determine the Cost of Money rate. Refer to SPAR's publication "*Guide for Estimating New Ship Construction*" for more information on cost of money.

Base Year (Cost Estimating)

For cost estimating, the base year identifies the year for which the cost estimate is to be provided. It is used by material cost escalation formulas. Refer to SPAR's publication "*Guide for Estimating New Ship Construction*" for more information on cost escalation.

Labor Rate Year (Cost Estimating)

For cost estimating, Labor Rate Year is the year used to determine what labor rate applies for the cost estimate from the work centers' sets of yearly rates.

Accounting Information Requirements (For Active Projects)

In order to properly support the accounting systems that interface with *PERCEPTION* refer to the *PERCEPTION* manual, "Accounting Functions and Interfaces" for details, each project also requires additional information:

- Project General Ledger Accounts (*Environment/Accounting/Project Accounting System Setup*)
- Billing labor rates (*Environment/Accounting/Rate Tables*)
- Customer name and address (*Environment/Accounting/Customers*)

The project General Ledger Accounts define what GL accounts the various revenue and expense accounts will be applicable for the project. Refer to the *PERCEPTION* manual, "Accounting Functions and Interfaces" for additional details.

The billing labor rates will define what labor rates (discernable by work center) will be applied to any time and materials labor charges for the project. Refer to the *PERCEPTION* manual, "Accounting Functions and Interfaces" for additional details.

The Customer name and address is required for generating the billing invoices for the project.

Creating A Project WBS

Once the overall project record has been created and saved onto the database, the WBS hierarchy then must be defined. At a minimum, the default WBS as described above must be defined. Alternate WBS hierarchies also need to be developed before being referenced by any of the project cost details.

The project does not require a full definition of the alternate WBS hierarchies. For example, it may only use the PWBS ship zones and no lower PWBS levels.

The best method for creating the WBS levels is to Drill-Down to the next level. Once again, the advantage to using this Drill-Down approach is that as the user proceeds to move down the various levels of the WBS, each level automatically inherits the identification of the level above.

If global defaults are set (*Edit/Global Defaults*) for levels that are above the level being added, the values inherited from the parent levels will be used, not the global defaults. Any other global defaults will be applied to the new record.

For each WBS level, enter the information as needed and save it to the database using the instructions provided in the chapter "*General System Operation"* in this user manual.

Copying Data from an Existing Contract/Project

Further information about the advanced features offered by *PERCEPTION* software can be found in the user manuals for each of the *PERCEPTION* application modules.

However, existing projects can be copied in whole or in part to whatever level of detail is appropriate for the new contract/project. This copying capability can extend down to the basic details of work orders, cost estimate items, material requisitions, etc.

It may be useful to create a "project template" that contains the typical WBS assignments. This template can then be copied and used to create new projects.

Using the New Contract/Project Wizard

Click on *File/New* from the main menu, and the system will present a wizard for creating a new contract with one or more projects. It is an easy alternative to the steps outlined above. The wizard takes the user through a series of windows to develop the following: contract, project or multiple projects, SWBS, PWBS, and/or COA copied from an existing project or projects.

For cost estimating, the wizard enables the user to declare what rate tables to use and identify the ship characteristics that may be used for parametrically estimating costs and list a set of standard interim product packages that may be used to automate large areas of the cost estimate.

Figure 6-7: New Contract/Project Wizard

Other features are available from within the system to copy existing work orders, drawings and drawing bills of material, requisitions, and pallets. For details on these options, refer to "*PERCEPTION Labor/Manpower Planning & Cost/Schedule Management*" and "*PERCEPTION Material Planning, Purchasing & Inventory Control"* user manuals.

New Contract Wizard

By clicking on the *New Contract Wizard*, the system displays the following pop up window (Figure 6-8) for identifying the new contract.

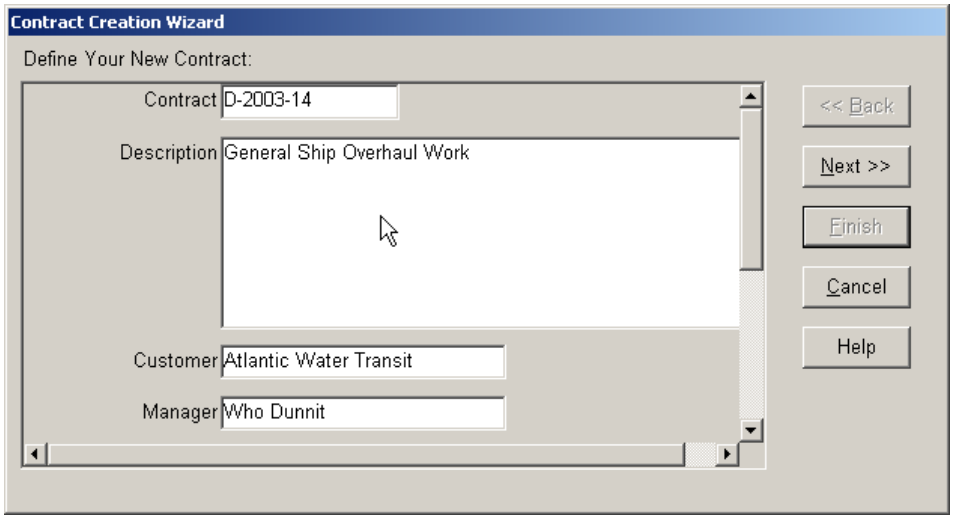


Figure 6-8: New Contract Wizard, Defining New Contract

Enter the information as required. The contract ID is limited to a maximum of 20 alphanumeric characters.

Defining Contract Projects

When the information for this window is complete, click on the *Next* button. The system will proceed to the next step by opening the next worksheet (Figure 6-9) for identifying one or more projects under the contract.

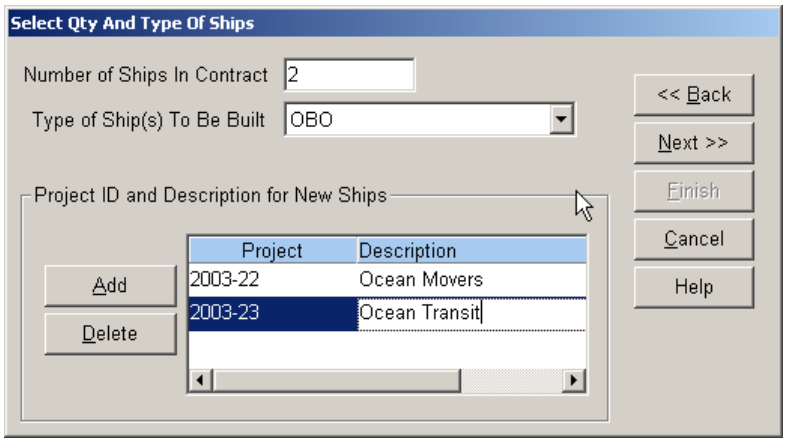


Figure 6-9: Defining the Contract Project(s)

Enter the number of projects (ships) for the contract (projects do not necessarily have to be ships; they may be non-ship projects as well). Identify the type of ship(s); this is optional information. Then enter the project identifiers and descriptions using the Add button. The project ID is limited to a maximum of 8 alphanumeric characters.

Selecting Project WBS

When the information for this window is complete, click on the *Next* button. The system will proceed to the next step by opening the next worksheet (Figure 6-10) for copying project WBS information.

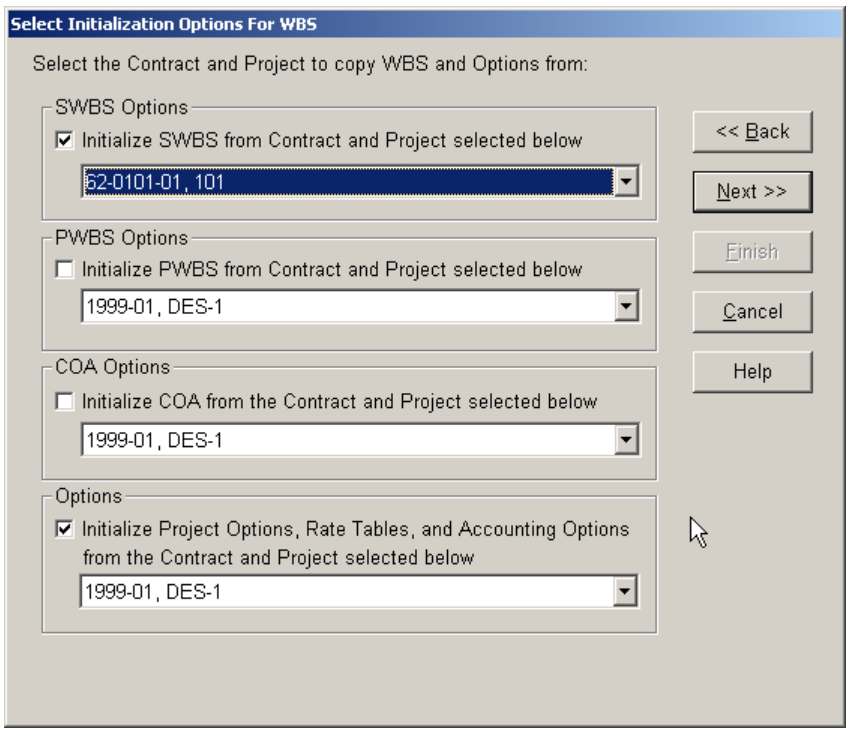


Figure 6-10: Copying WBS From Another Project

This window allows the user to select one or more types of work breakdown structures copied from other projects on the database. First, click on the desired WBS (SWBS, PWBS, or COA) check boxes. Then, from the drop-down listed, select the projects from which these WBS will be copied. Different projects can be specified for different types of WBS.

The *Options* selection allows the user to also copy other project-related information, such as the rate tables, project options, and accounting specifications.

With the exception of rate tables, this information can be viewed from the *Project Details* window. Open the *Projects* worksheet, retrieve the project holding the desired information and Drill-Down to its *Details* window. Figure 6-11 presents an example of the *Project Details* tab window showing the project options.

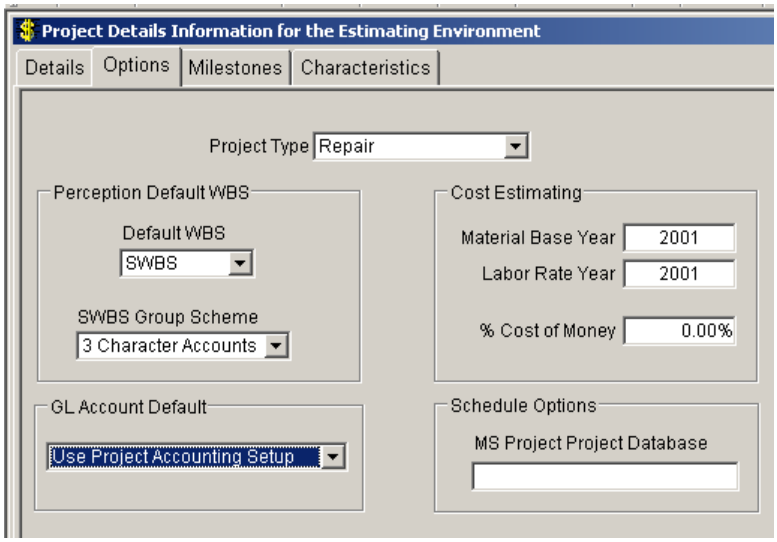


Figure 6-11: Project Details Tab Window Showing Project Options

Special Note: The set of WBS identified in this window will be copied to all projects defined for the contract in the previous wizard window. If a multiple project contract has projects of different WBS, then the user should use the *New Contract* wizard to create only those projects that use the same WBS. The other projects under the contract can be set up with a different WBS from copies of another WBS from another project using the *New Project* wizard procedure that is described below.

Ship Characteristics

When the information for this window is complete, click on the *Next* button. The system will proceed to the next step by opening the next worksheet (Figure 6-12) for defining the ship characteristics for the project(s).

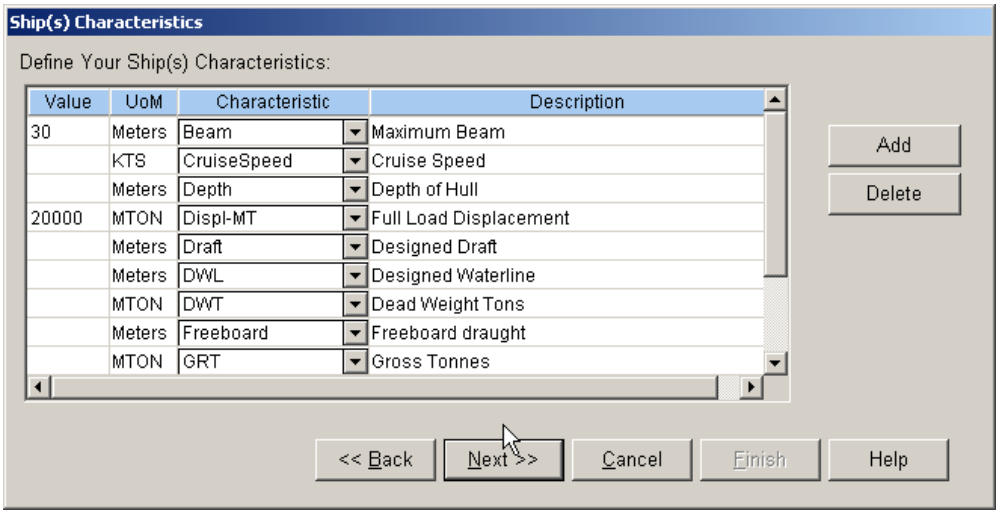


Figure 6-12: Defining the Project Ship Characteristics

The values of ship characteristics can be used in various cost estimating process functions. They also can be used to help users develop high-level cost estimating relations. Finally, the characteristics provide a good historical record of the project.

Special Note: The set of ship characteristics identified in this window will be copied to all projects defined for the projects being created by this wizard. If a multiple project contract has projects of different ship characteristics, then the user will need to modify the results as necessary. Open the *Projects* worksheet, retrieve the project holding the desired information and Drill-Down to its *Details* window. Open the *Characteristics* tab and modify the values as necessary.

Configure Interim Products

When the information for this window is complete, click on the *Next* button. The system will proceed to the next step by opening the next worksheet (Figure 6-13) for defining any standard interim product packages for the project(s).

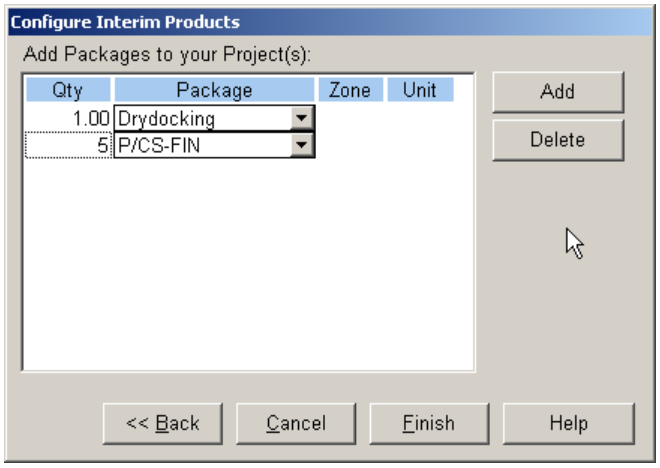


Figure 6-13: Defining Project Standard Packages

The use of standard interim products is only for the cost estimating process. When the wizard is complete, the system will copy all package items into the projects as estimate cost items.

If standard packages are not required, click on the *Finish* button.

Special Note: The set of standard packages identified in this window will be copied to all projects defined for the projects being created by this wizard. If a multiple project contract has projects of different standard packages, then the user should use the *New Contract* wizard to create only those projects that use the same standard packages. The other projects under the contract can be set up with different standard packages using the *New Project* wizard procedure that is described below.

When the information for this window is complete, click on the *Finish* button. The system will proceed to install the new contract information. When it has finished, it will display the following figure (Figure 6-14).

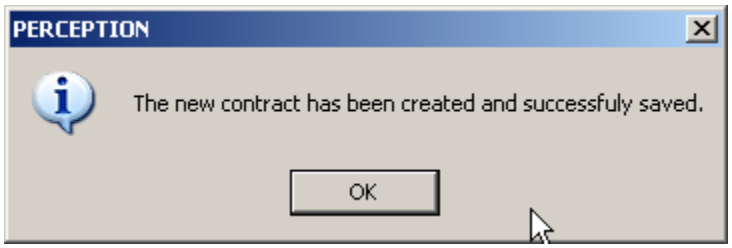


Figure 6-14: A New Contract Successfully Created

New Project Wizard

By clicking on the *New Project Wizard*, the system displays the following pop up window (Figure 6-15) to identify the contract under which new project(s) are to be defined.

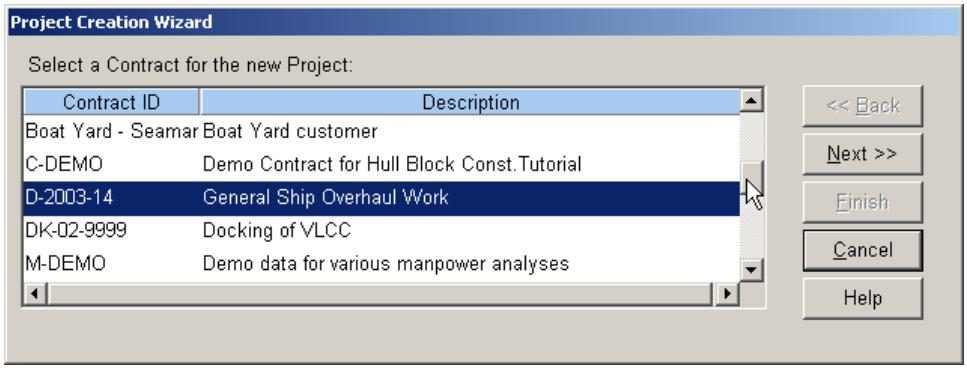


Figure 6-15: Selecting Contract for New Project(s)

Select the contract, and then click the *Next* button. The system will proceed to the next step by opening the next worksheet (Figure 6-16) for identifying one or more new projects under the contract.

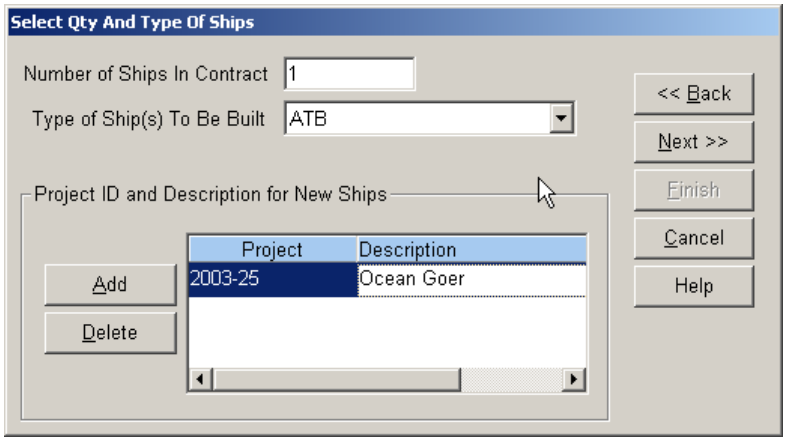


Figure 6-16: Defining New Project(s)

The *New Project Wizard* from this point to the end of the wizard's process is the same as for defining projects using the *New Contract Wizard* described above.

Chapter 7: Project Navigator

The Project Navigator is a convenient means for displaying all WBS levels of a contract/project (CLINS, SWBS, PWBS, and COA) plus defined ship characteristics for the project and any design packages defined for a cost estimate. Tab window options also allow the user to view common use libraries, such as the list of work centers and the parts catalog.

Select *View/Project Navigator* from the main menu or click on the *Project Navigator* button  on the toolbar. The "+" sign beside a level indicates that lower levels are available. By clicking on this, the next list of lower levels will be displayed (Figure 7-1). By this process, the user can Drill-Down into the various levels of the project.

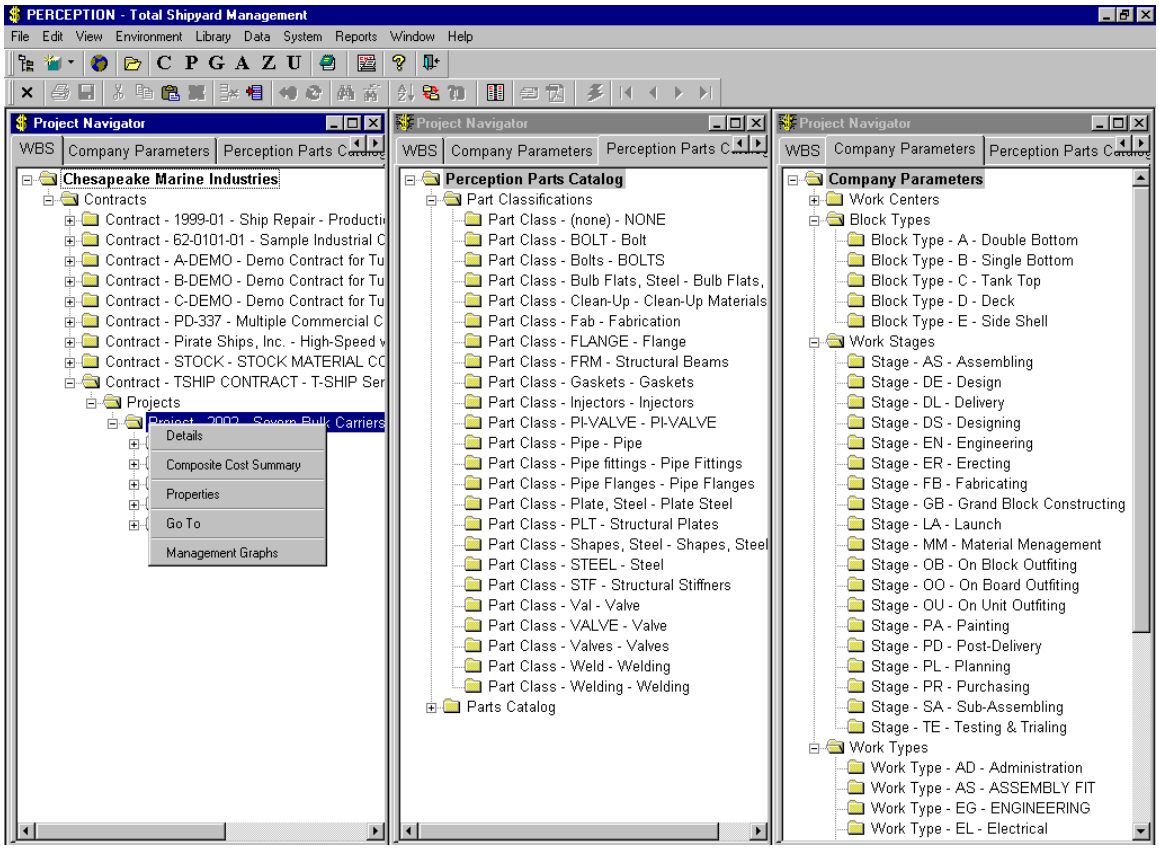


Figure 7-1: Project Navigator

By clicking on a specific level of interest, and then clicking on the right mouse button, a pop up menu, as is shown in Figure 7-1, with options will appear. The following describes each of the options currently available:

Details, provide a summary of detail information for that level of the project. Figure 7-2 is a sample of a detail worksheet for a project summarizing cost estimate information.

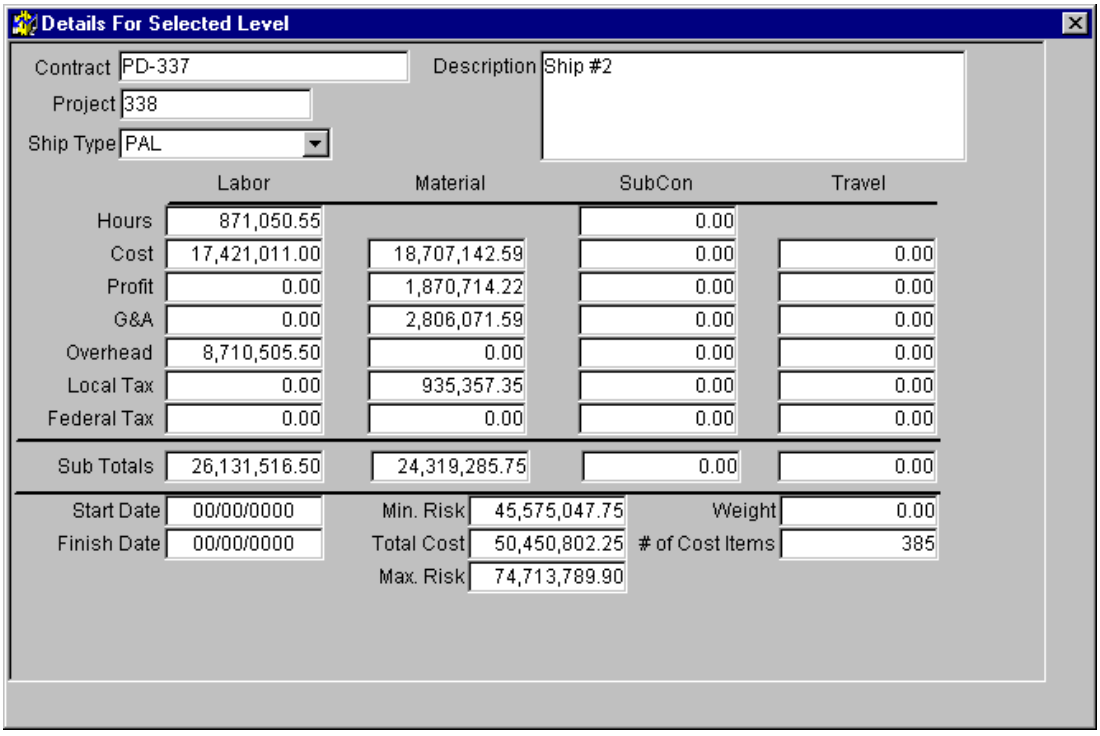


Figure 7-2: Detail Worksheet Summarizing Cost Estimate Information (Project Level)

Composite Cost Summary, summarizes cost and schedule information for all major applications of the system: the cost estimate (*ESTI-MATE*); the planned schedule; labor cost and schedule performance (*WORK-PAC*); material cost and schedule performance (*MAT-PAC*™); and miscellaneous notes that can be entered by the user. Use the down-scroll to view the entire display of information (Figure 7-3).

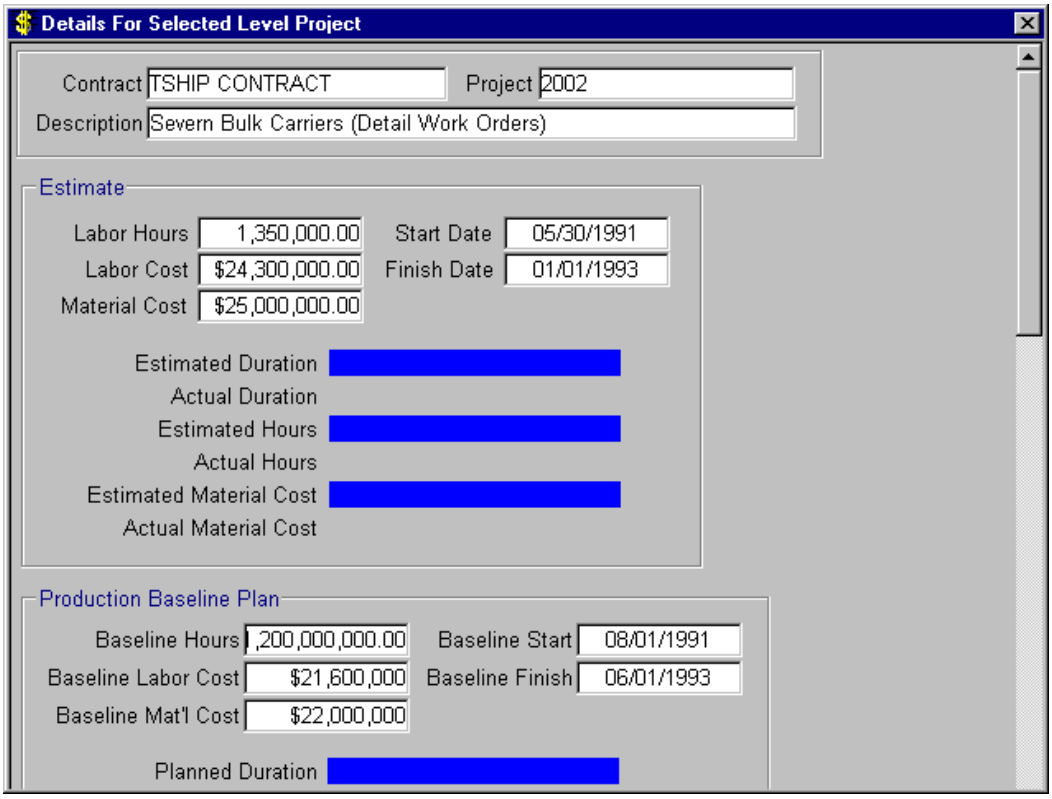


Figure 7-3: Each Project Level Is Summarized For Each PERCEPTION Module Installed

Properties, displays general information (Properties) of the level that is selected.

Go To, opens up the standard worksheet window for the level of the project selected. From there, the user may add/change/delete as described in the chapter "*General System Operation*" and "*Starting A New Project*" in this user manual.

Management Graphs, provide a series of graphical reports that track historical summary information of production data (labor and material costs) at each level of the project. See the section on Management Graph Reports for details of these graphic reports.

Management Graph Reports

From the Project Navigator, the following management graph reports can be generated at any level of a project WBS:

- **Planned versus Actual Progress** tracks planned and actual percent progress.
- **Cost 1% Progress** tracks labor hours planned versus actual per one (1) percent of recorded progress.
- **Forecast Over/Under Run** tracks the forecast over/under run (EAC-BAC). A trend of over/under run at 100% completion also is tracked.
- **Ahead/Behind Schedule** tracks measured weeks ahead/behind schedule. A trend of schedule variance at 100% completion also is tracked.
- **Labor Performance** tracks labor hours as scheduled (planned), earned value, actually charged, total budget (which may vary in time), and the estimate at completion (EAC).
- **Performance Indices** are tracked for labor hour performance.
- **Material Cost** tracks material cost budgets, purchases, commitments, etc.
- **Combined Graphs** display all of the above graphs, except for the Material Cost graph (Figure 7-4).

Snap shots of the historical data presented in these graphical reports is generated automatically by the system whenever the user initiates a project "rollup" by selecting *Environment/Production Engineering/Rollup* from the main menu. When time charges are entered into the system (*Environment/Accounting/Timecards*), the system provides the user with an option to perform the same rollup after the time charges have been posted to the work orders.

The historical data can be viewed project by project, WBS level by level, by selecting *Library/WBS History* from the main menu. This data then is displayed in a worksheet window.

Figure 7-4 provides a sample of the combined graphics option from the Project Navigator pop up menu. The individual graphs can be expanded to full window by clicking on the maximize border button at the upper right corner of the desired graph.

These graphs can be sent to the printer by clicking on the printer button  (or *File/Print* on the main menu). Use the landscape option setting for the printer.

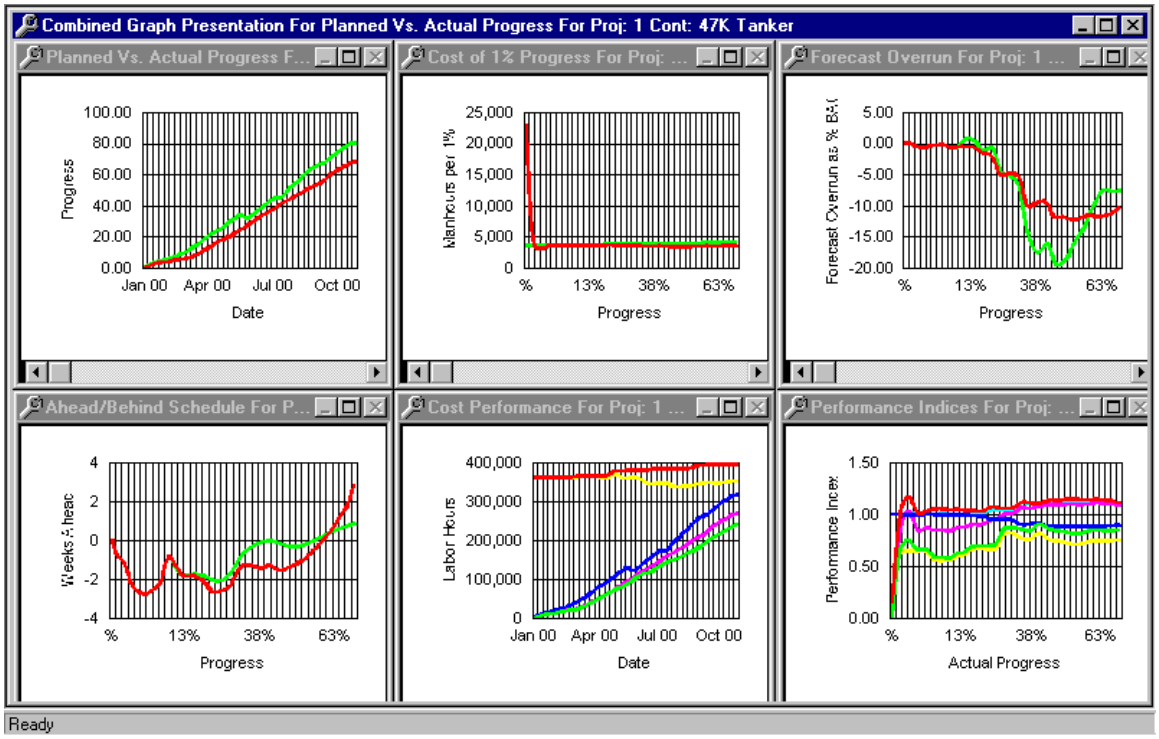


Figure 7-4: Sample Project Navigator Combined Graphs Display

Chapter 8: Using Email With *PERCEPTION*

PERCEPTION allows the user to send data and reports, including purchase orders, over the Internet as email attached documents.

To perform this, the user needs to retrieve the appropriate data into any window or generate the report in the usual manner for on-line display. Once the data or report is displayed, click on *File/Send To/Mail Recipient As Attachment.* Refer to Figure 8-1.

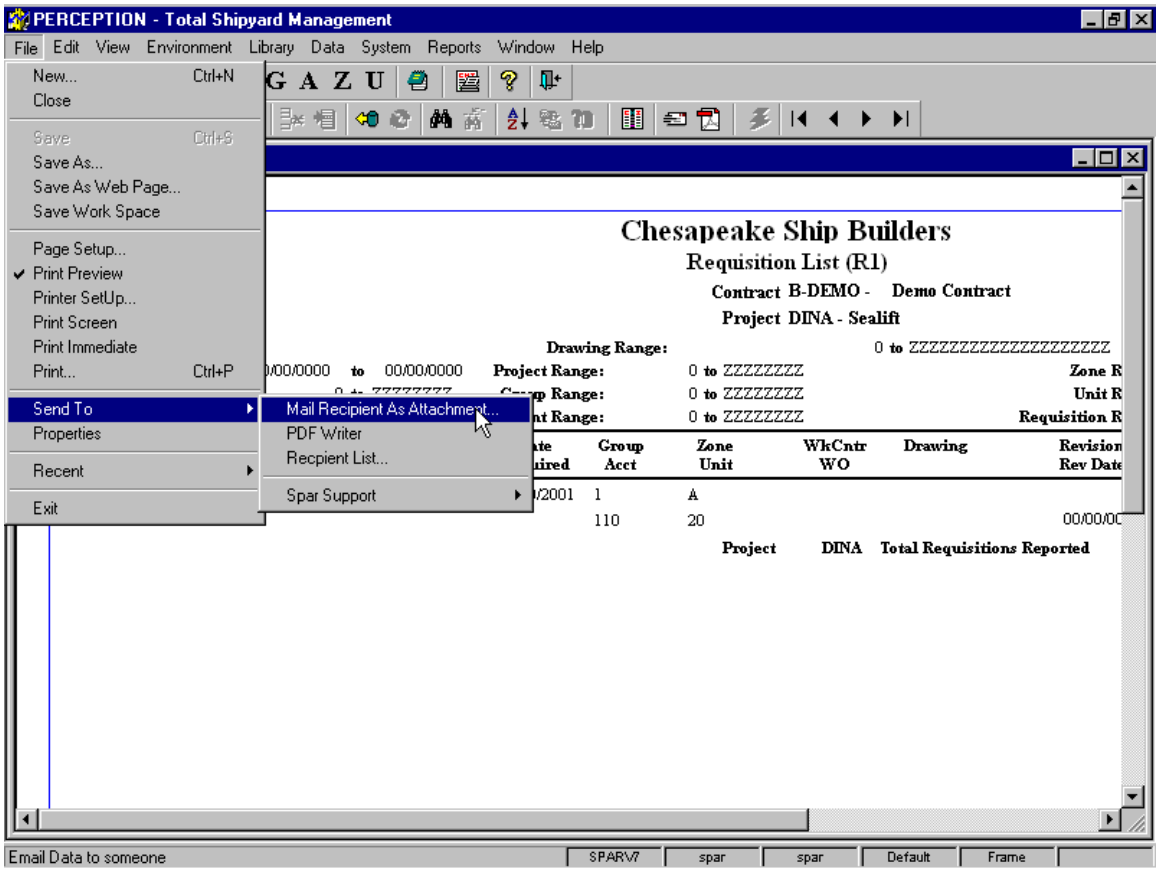


Figure 8-1: Selecting the Email

The system will respond with an email window display showing the attached report (Figure 8-2). The email can then be embellished with whatever communications or remarks are necessary to complete the message before sending to the recipient.

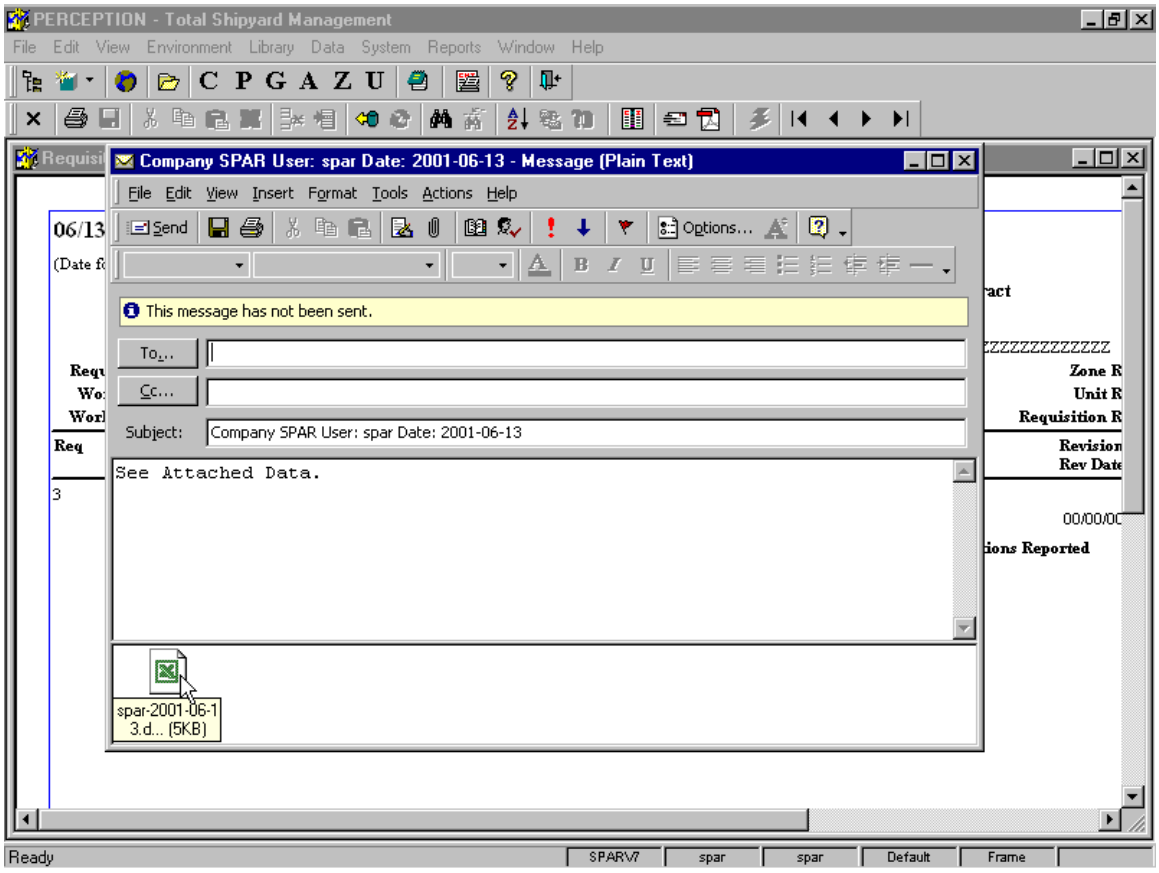


Figure 8-2: Completing the Email & Sending

Chapter 9: Importing & Exporting Data

The system provides import and export data to and from external data sources.

External Data Source File Types

The following data types can be imported into *PERCEPTION*:

.XLS -*EXCEL* Workbooks.
.MDB -*ACCESS* databases.
.DBF -*dBase* version 3.
.DB -*Paradox*™ databases.
.CSV -Comma Separated text.
.MPD -MS Project Files.

Importing Data

Prior to importing any data the user might want to set the global defaults for the data being imported. To set the global defaults, click on the *Global Defaults* button  on the toolbar. This feature will automatically set those values for each row imported, providing the user has NOT selected that column to be transferred. If the column is selected to be transferred the value from the imported file will be added, not the global default.

To begin the import process, open the window for the module into which you will be importing the data. Select *Data/Get External Data* from the main menu. The system responds by displaying the import window. Choose the type of file to import in the Files of Type drop-down list. Files of the selected type will be displayed (Figure 9-1). Select the file to import and click on the *OPEN* button.

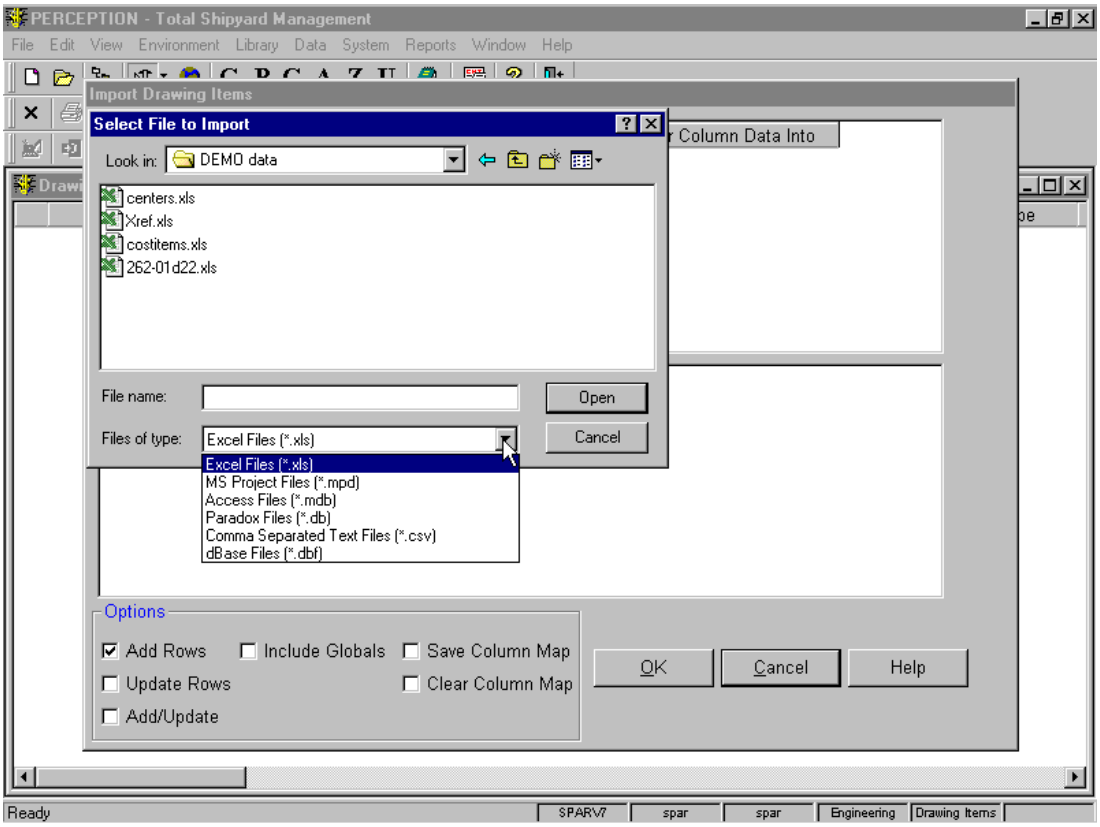


Figure 9-1: Import File Selection Window

If the file to be imported is an *ACCESS* database, you will be required to select the database table to be imported. Once you have selected the file (and table if required) to import, the system will show you the columns in the file (the lower half of the window) and allow you to select the columns to import (the upper half of the window). See Figure 9-2. It is not necessary to import all of the columns from the file.

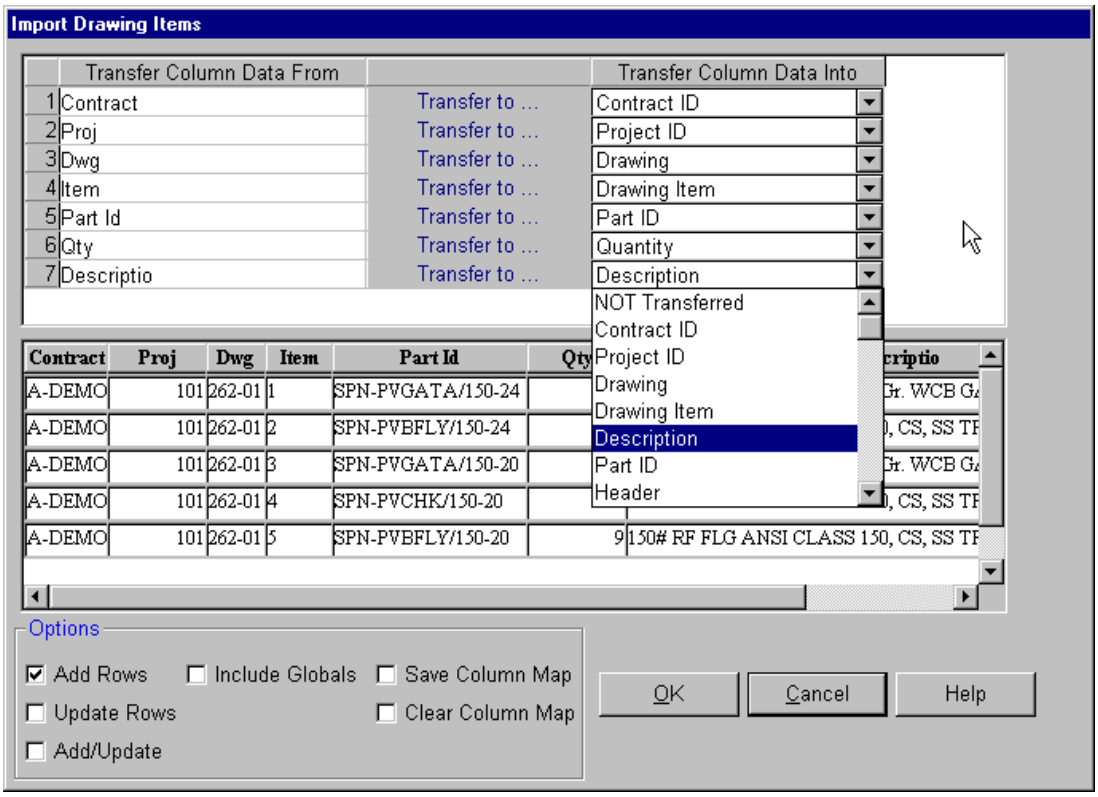


Figure 9-2: Import Window

You must tell the system which columns of the file to import and to which column these columns will be transferred in your window. On the left side of the upper part of the window is a list of the columns from your file, on the right side is where you tell the system what column in your window to transfer the data to.

When importing from *EXCEL* or a comma separated text file (.CSV), the upper half of the import window retrieves the column names from the first row of the file. When you define the column names in your spreadsheet or text file you should refrain from using special characters, such as any of the characters above the number keys, because they may not always be imported properly. The system will not import the first row of the spreadsheet or file because it assumes that this row is your column heading.

After you have mapped each column of your file, you may save this column mapping by clicking on the Save Column Map box. If you chose to do this, the next time the import is performed, the transfer into column will be completed.

The options for import are:

- Add Rows – if a row exists with the same key values as the import data, the import row will be ignored.
- Update Rows - existing rows will be updated with the data being imported. New rows will be ignored.
- Add/Update Rows – new rows will be added and existing rows will be updated.

After all the options have been selected, click on the OK button to begin the import process.

Once all columns have been transferred, you are returned to the window with the data imported. This data may now be edited prior to updating the database. You may also opt to delete rows from the new items prior to updating the imported information.

After all data transfers and modifications have been completed, the user should click on the *Save* button.

Importing *EXCEL* Data

EXCEL data can be imported directly into *PERCEPTION* using either of two methods:

1. Copy and Paste
2. Import Workbook Data

Chapter 4, "General System Operation," describes the copy and paste operations. This section describes the importing of workbook data.

Importing *EXCEL* Workbook Data

Most of the *PERCEPTION* worksheet windows allow the user to import data directly from Microsoft *EXCEL* workbook files (click on *Data/Get External Data* from the main menu).

As described in the beginning of this chapter, the system provides an easy-to-use mapping procedure where the user can identify what *EXCEL* columns of data relate to a corresponding data column in *PERCEPTION*.

Preparing *EXCEL* Workbook Data for Exporting

There are, however, important steps that must be taken within the *EXCEL* workbook before its data can be imported into *PERCEPTION*.

An *EXCEL* worksheet can contain almost any organization of information, including rows of data that cross above and below specific columns of data. The process for importing data into *PERCEPTION* needs to know exactly what column areas on the worksheet is appropriate and what areas should be screened out from the process. To mark the areas for importing, the user must perform the following:

- Highlight the columns and rows for importing (the column headings must be limited to only one (1) row).
- Click on *Insert/Name/Define* on the *EXCEL* main menu bar.
- Enter the name for the highlight area data space as **EXPORT** (use all capital letters) in the *Names in Workbook* window field. This will provide the specific name that *PERCEPTION* will look to use for the importing process.
- Click on *Add.*
- Click on *Close.*

EXCEL **Importing**

Once the *EXCEL* workbook file has been properly prepared as described above, it is ready for importing into *PERCEPTION*. *The user must open the specific window <u>prior</u> to making the import from EXCEL.*

Once the *PERCEPTION* worksheet window is open, the user can begin the importing process:

- Select *Data/Get External Data* from the main menu
- If necessary, change the Look In directory to the directory where the *EXCEL* file resides
- Select the File Type as *EXCEL* files
- Select the *EXCEL* workbook file to be used for importing its data

Once the *EXCEL* file has been opened, *PERCEPTION* will present a split screen to the user. This split screen allows the user to map the headings of the *EXCEL* worksheet columns against the equivalent headings of data for the *PERCEPTION* worksheet. The descriptions that appear in the "Transfer Column Data From" are the column headings that the system found in the *EXCEL* file (first row of the highlighted data space). Across from these *EXCEL* headings on the split screen are the corresponding headings for *PERCEPTION* (Figure 9-2). To select the correct heading in *PERCEPTION:*

- Click on the drop-down arrow.
- Click on the correct *PERCEPTION* heading that agrees with the heading from the *EXCEL* file.

When the mapping has been completed for all desired columns from the *EXCEL* file (headings not mapped to *PERCEPTION* will not be imported), click on ***OK***. *PERCEPTION* will then proceed with the importing of the data and fill up the

PERCEPTION worksheet with the imported rows and columns of data from the *EXCEL* file.

***PERCEPTION* Global Defaults**

The importing process honors any *PERCEPTION* global default specifications (*Global* button  on the *PERCEPTION* toolbar) that may be in effect at the time of importing if the column has NOT been mapped for importing. For example, if the *PERCEPTION* worksheet requires that a project be identified for each row of data, and the *EXCEL* file has not identified a column for project, *PERCEPTION* will apply the global default for project for each row of *EXCEL* data imported. If the user had not defined the project as a global default, then the rows of new data will have this project column left blank, undefined. If the *EXCEL* file provides the project column and it has been mapped for importing, *PERCEPTION* will use the *EXCEL* data and not use the global default value.

Export to *EXCEL* and Other Formats

PERCEPTION can export data directly to a file that can be loaded directly into Microsoft *EXCEL* spreadsheet.

When in any worksheet, select *File/Save As* from the main menu. The system will display the Save As window. Click on the *Save as Type* down arrow and select the appropriate file type.

If exporting to *EXCEL*, choose the ***EXCEL*** option. Enter the file name for the exported data, and then click ***OK***.

File/Save As Excel Worksheet

A special option available on the main menu is *File/Save As Excel Worksheet*. This option copies to a user-selected *EXCEL* worksheet file all records of a *PERCEPTION* worksheet, including all headers of the *PERCEPTION* worksheet.

Export to *ACCESS* or Any SQL Database

PERCEPTION can export data directly to a file that can be loaded directly into *ACCESS* or any SQL compliant database.

When in any worksheet, select *File/Save As* from the main menu. The system will display the Save As window. Click on the *Save as Type* down arrow and select the SQL option. Enter the file name for the exported data, and then click ***OK***.

This same file now can be imported directly into *ACCESS* using the *ACCESS File Open* option.

Chapter 10: Linking To Web Pages

A feature of *PERCEPTION* software allows URL addresses to be saved on the vendor catalog and the parts catalog worksheet windows. From these columns, the user can navigate directly to an Internet web site for that vendor or part using his default browser.

Before this feature can be used, the user must be properly set up for Internet access.

Using the URL Feature

The column "URL" can be found on the Parts Catalog and Vendor Catalog worksheet windows as shown in Figure 10-1.

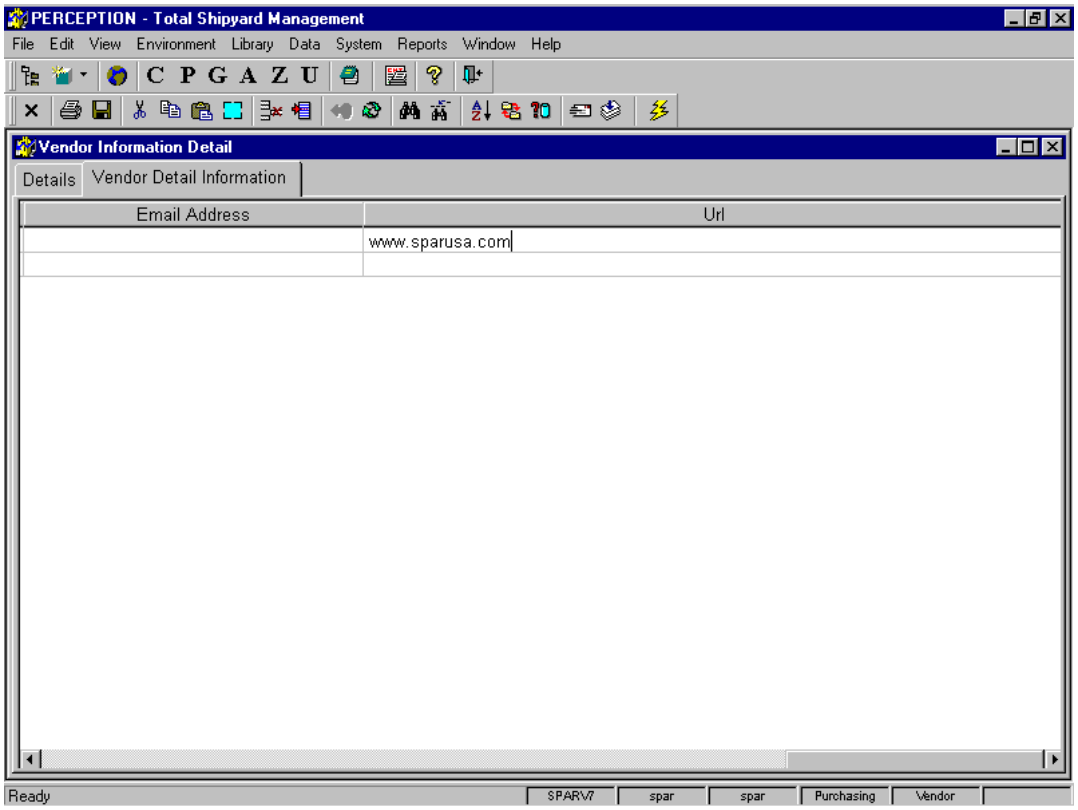


Figure 10-1: URL Column

The format for the URL name must be valid for your installation. Save the record by clicking on the *Save* button on the toolbar.

To use this feature, select the row and right-click in the URL column to display the pop up menu (Figure 10-2).

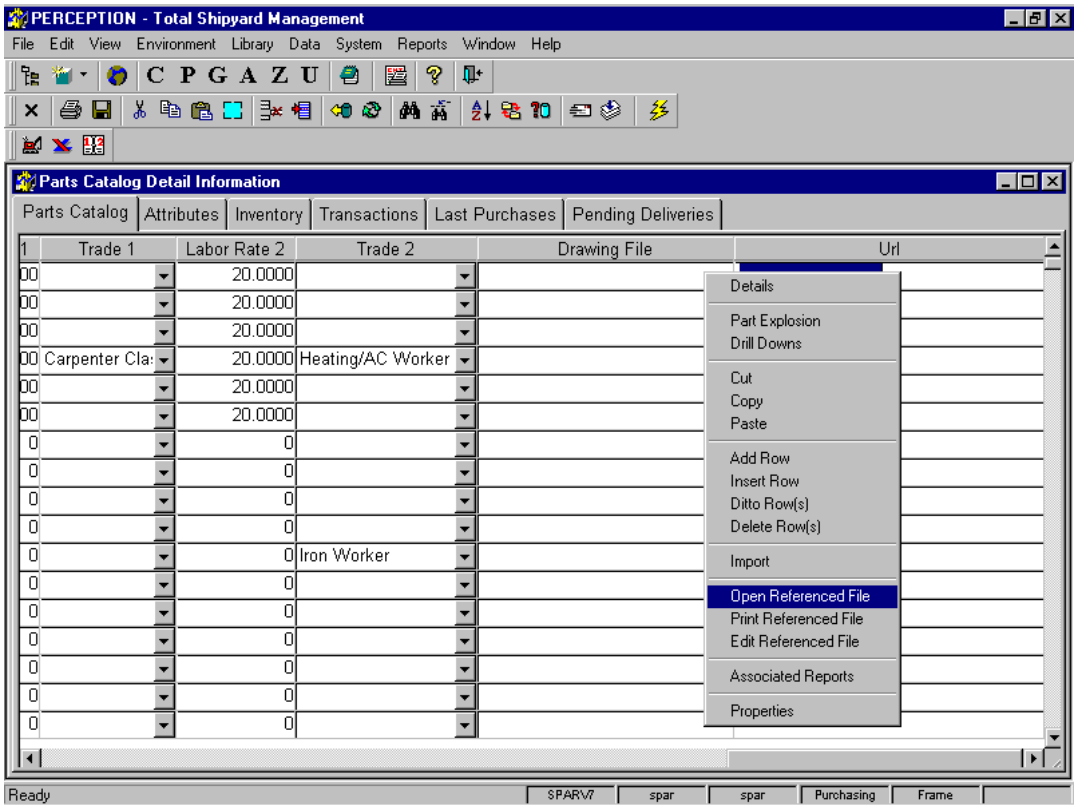


Figure 10-2: Vendor Catalog Pop Up Menu

Select *Open Reference File*. This will launch the Internet browser with the selected web site active. The "Drawing File Name" column operates basically the same as the URL column. Enter the directory path that the Drawing File is located, and Save the path.

Chapter 11: Distribution Lists For Reports

PERCEPTION provides many features for generating system reports. Reports can be viewed on-line, they can be printed, they can be saved to files and they can be emailed Refer to the chapter "Using Email With *PERCEPTION."*

PERCEPTION also allows reports to be distributed in multiple copies to various destinations called recipients.

Recipient Distribution List

The user can set up recipient distribution lists by clicking on *Reports/Maintain Recipient Lists* from the main menu.

The system will pop up a tab window (Figure 11-1) that defines names for any number of recipient distribution lists.

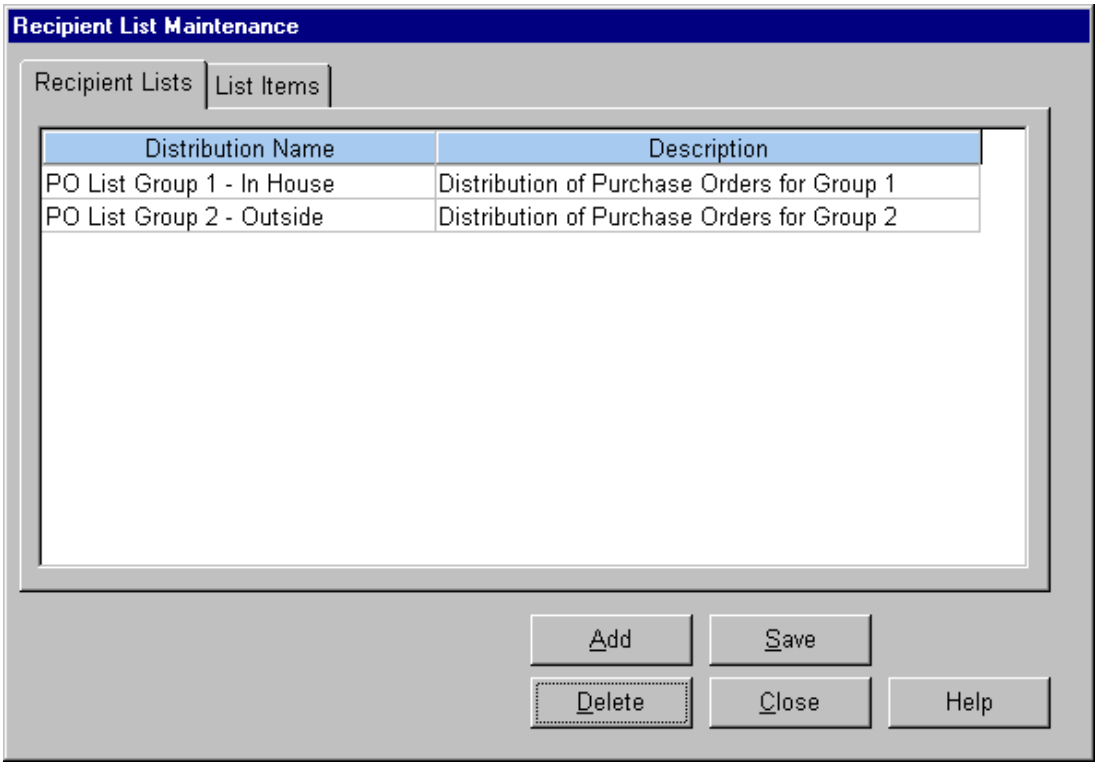


Figure 11-1: Report Distribution Lists

Additional lists can be added by clicking on the *Add* button. Lists can be deleted by highlighting them and clicking on the *Delete* button. Adds, changes and deletes all can be saved on the database by clicking on the *Save* button.

For any of the defined distribution list names, a list of individual recipients can be defined by clicking on the *List Items* tab (Figure 11-2).

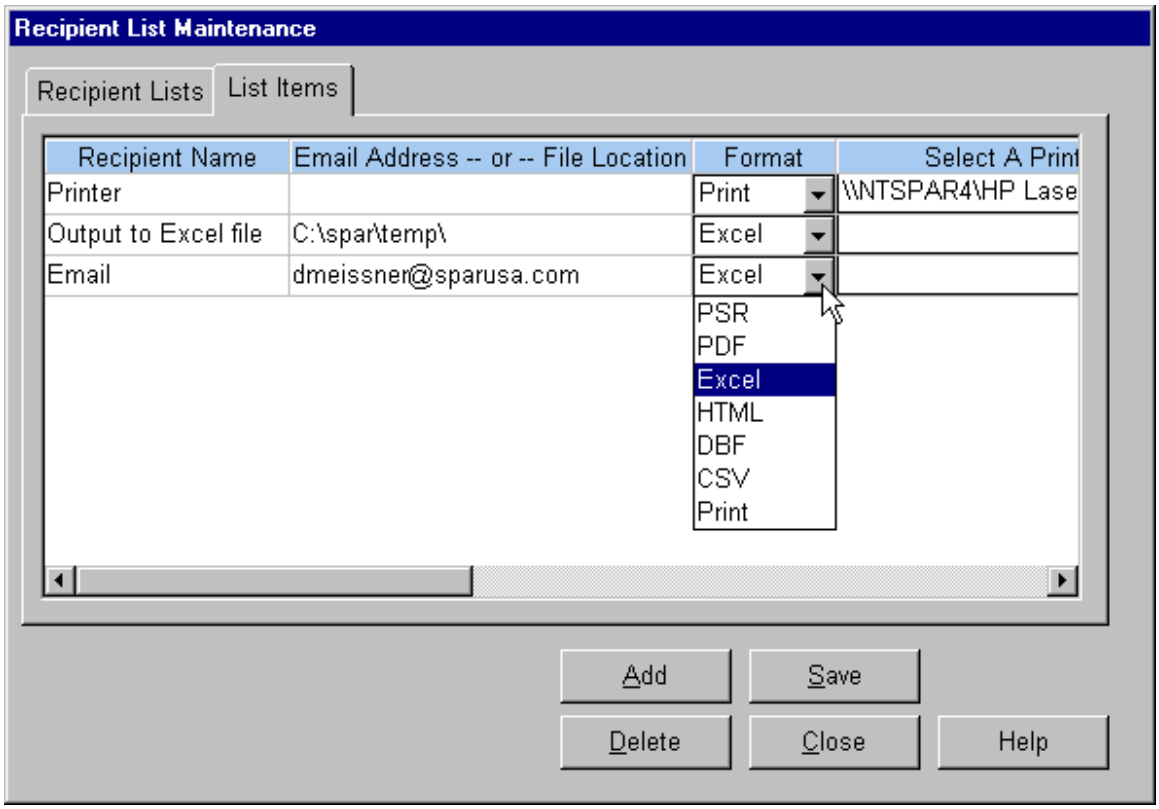


Figure 11-2: Distribution List Recipients

Individual recipients can be added by clicking on the *Add* button. Highlighting them and clicking on the Delete button can delete recipients. Adds, changes and deletes all can be saved on the database by clicking on the *Save* button.

The *Recipient's Name* is a text field to identify for the user where the report is to be delivered. If the format is a file that is to be saved, the recipient's name is used for the file name.

The *Recipient's Location* can be a directory path if the report is to be stored as a file. The location also can be an email address. If the file is to be sent as an email attachment, there must be a folder called "Temp" below the folder from which the software is run.

The *Format* for any given recipient indicates the type of format by which the report will be delivered to the recipient. Several different formats are available from the drop-down menu. The PDF format is the most secure, because the recipient is not able to modify the report when it is received.

The available formats are:

- The **Powersoft®**, **Sybase Report** option creates a PSR file showing the formatted report. This option is suggested primarily for sending a copy of a report to an individual within the organization who is not a user of *PERCEPTION* software. The file can be opened with the Internet browser if the plug-ins have been installed. The plug-ins can be found on the Sybase web site, http://www.sybase.com/.

- The **Adobe PDF** option transforms the active worksheet (retrieved data or report) into a format that the recipient can read and print but cannot modify. This format requires the recipient to have a copy of the Adobe reader, which can be downloaded at no charge from the Adobe web site, http://www.adobe.com/. The Adobe Acrobat software must be installed to create the PDF file. Adobe Acrobat Version 4.0 or greater is needed for this capacity to work. This can be purchased for a nominal cost from the same Adobe web site. The PDF format is widely used by many organizations and since the reader is easily available, SPAR suggests this option for sending documents to customers or vendors.

- The **Microsoft *EXCEL*** option creates an XLS file that contains the data. If this option is used with a report, the data comprising the report will be sent. Any spreadsheet program can then read the file.

- The **HTML** option creates an HTML file that is opened with the Internet browser. This option is most effective with the worksheet-type windows in *PERCEPTION* software. If using with the report writer, the formatting approximates the report layout.

- The ***dBase*** option creates a DBF file that contains the data in *dBase*3 format. If this option is used with a report, the data comprising the report will be sent. This file can then be opened by a variety of software programs including Microsoft *Access* and Microsoft *EXCEL* as well as many other database and spreadsheet programs.

- The **CSV** option creates a comma-delimited file that contains the data. If this option is used with a report, the data comprising the report will be sent. Database, spreadsheet and text programs can read CSV files.

- The **Print** option will send the data to any one of the printers defined in Windows for the user. The format for the printed output will be as displayed.

The *Select A Printer* option is only a valid option if the format selected is "Print." However, if the user has the Adobe Acrobat PDF Writer defined as a printer, then this is a valid printer choice for the Print format. When sending a report to the PDF Writer, the user will be prompted to give the file a name and file location.

The *Print PO Costs* option provides for the standard purchase order to be printed (or saved to any of the available formats) without any of the associated costs.

The *Modstring* is available to customize the output of the report. This is an advanced feature. The most common use would be to make columns such as costs invisible (extended_cost.visible="0"). The user would need to know the syntax and the column names.

Chapter 12: Interfacing with Accounting Systems

PERCEPTION provides a comprehensive job costing capability; from detail cost transactions to summaries at all levels of the project WBS. However, this information also needs to be reflected in the company's accounting systems: payroll, general ledger (G/L), accounts payable (A/P) and accounts receivable (A/R).

For details on these interfaces, please refer to the manual "Accounting Functions and Interfaces."

Chapter 13: Customer Billing Invoices

PERCEPTION provides a means for generating customer billings. These billings are made on the basis of time and materials over a user-prescribed date range.

For details on these interfaces, please refer to the manual "Accounting Functions and Interfaces."

Chapter 14: Configuring Business Rules

Each shipyard has a preferred way of doing business. For example, larger yards may require that material requisitions be formally approved before they can be processed for purchase orders. Smaller companies, on the other hand may not want such strict procedures.

PERCEPTION provides a series of operating rules that can be tailored specifically to the way the shipyard wishes to do business. These are available to users who have been defined to the system as having Database Administrator authority. By clicking on *System/System Administration/Manage Business Rules*, the system will display the various rules that can be turned on or off (Figure 14-1). Each of the business rules can be turned on or off by clicking on the *Yes* or *No* options. Once the rules has been determined, click on the *Save* button to stored them onto the database and to make them active for subsequent use of the system.

Refer to the "System Administration Manual" for additional details.

Figure 14-1: PERCEPTION Business Rules

Chapter 15: Data Validation

It is important that any system use valid information. The old saying "garbage in, garbage out" still applies, even for the most sophisticated of systems. This means that data going into the system must be accurate, and that for certain areas, the information must be complete. Incomplete data can create problems when the system attempts to summarize status information. However, the responsibility for maintaining accurate and complete data can be shared between the users and the system.

PERCEPTION has many features that help minimize data errors and omissions. These validation features generally are initiated at different points of the system:

1. Some validations are made on the spot as the user enters data into a worksheet.
2. Other automated validation features restrict the user to only previously defined data using drop-down windows that access tables developed elsewhere on the database.
3. Many validations are made by the system when the user attempts to save data onto the database.
4. There is a special data validation button on the toolbar. This validation checks for data discrepancies that may not be in error, but nevertheless may warrant user attention.
5. The system manages a list of business rules, many of which the user's systems administrator can turn on or off. Many of these business rules instruct the system on how to treat various transactions as being valid or not. Refer to the chapter "Configuring Business Rules" for more information.
6. The system finally offers a wide range of exception reports. These reports allow the users to scan information on the database according to specified criteria. Those items on the database that meet or fail the criteria will be reported as directed by the user. Refer to the chapter "Exception Reports" for more information.

There are several methods available for initiating data validation:

- Click on the data validation button  on the toolbar, and the system will run validation tests on all records currently retrieved in the worksheet.
- Click on *Data/Validate Row* on the main menu to validate only that record currently in focus.
- Click on *Data/Validate Selection* on the main menu to validate only those records highlighted.
- Click on *Data/Validate New/Modified Data* on the main menu to validate only those records that are new or modified in the worksheet.
- Click on *Data/Validate Current Data Set* on the main menu to validate all records in the worksheet. This is the same function as provided by the data validation button on the toolbar.

Data validation tests also can be automated via a business rule whenever a user saves any data to the database. To turn on this "Windows-Validate Before Save" rule, refer to the Chapter "Managing Business Rules" in the *System Administration User Manual*.

Chapter 16: Exception Reports

An exception-reporting tool has been added to *PERCEPTION* and is available from the *PERCEPTION* module. This new tool is fully programmable by the customer system administrator and can be utilized by all users of the system.

The exception reporting can be very valuable for identifying bad or missing data in the database.

For example, requisition or pallet items with missing or invalid WBS identifiers will not properly roll dollars to the upper levels. Stock items without unit prices cannot be properly charged to a contract when withdrawn. Any standard part with a negative quantity needs to have an inventory adjustment performed. If a purchase order item does not have a valid term ID, transfer of received or withdrawn dollars to general ledger will not be correct.

Each environment has its own set of exception reports that are relevant to that environment. Many of the reports are available to more than one environment.

There are an infinite number of exception reports that can be useful to the organization. SPAR has provided many of these reports, but the system administrator can add others.

The following is a sampling of the reports provided:

Accounts Table

SWBS Acct Budgets <> Sum of WO Budgets - Checks the SWBS Account Budget Hours and compares to the rolled up sum of all Work Order budgets assigned to that account.

COA Group Table

COA Group Budgets <> Sum of WO Budgets - Checks the COA Group Budget Hours and compares to the rolled up sum of all Work Order budgets assigned to that COA Group.

COA Sub Group

COA Sub Grp Budgets <> Sum of WO Budgets - Checks the COA Sub Group Budget Hours and compares to the rolled up sum of all Work Order budgets assigned to that COA Sub Group.

Parts Catalog Table

- Parts with Negative Qty On Hand - If the Parts Catalog quantity on hand is negative, an inventory adjustment must be done.
- Parts with Negative Total Value - If the Parts Catalog total value is negative, corrections must be made in the database.
- Stock Items Missing Hi/Lo Quantities - The Parts Catalog high and low quantities on stock items are used for the stock reorder report (STK03).
- Stock Items Without Unit Price - Verifies that all stock items have a unit price.

BOM Table

- COA Group Is Invalid On BOM Item - When a BOM item has an invalid COA Group, requisitions created from the BOM will not be correct
- PWBS Zone Is Invalid On BOM Item - When a BOM item has an invalid PWBS Zone, requisitions created from the BOM will not be correct
- SWBS Account Is Invalid On BOM Item - When a BOM item has an invalid SWBS Account, requisitions created from the BOM will not be correct
- Activity/Center Is Invalid ON BOM – When a BOM has an invalid Activity and Center attached, requisitions created from the BOM will not be correct

Pallet Item

- COA Group Is Invalid On Pallet Item - When a pallet item has an invalid COA Group, material withdrawn from the pallet item will not be charged correctly.
- PWBS Zone Is Invalid On Pallet Item - When a pallet item has an invalid PWBS Zone, material withdrawn from the pallet item will not be charged correctly.
- SWBS Account Is Invalid On Pallet Item - When a pallet item has an invalid SWBS Account, material withdrawn from the pallet item will not be charged correctly.
- Drawing/BOM Are Invalid On Pallet Item – If a Pallet Item is associated with a Drawing and Drawing Item, that Drawing and item should be valid.

Purchase Order (PO) Table

- PO Terms Not on Terms Table - Verifies that all Purchase Order Terms exist in the Terms Table.
- PO Vendor Not on Vendor Table - Verifies that all Purchase Order Vendors exist in the Vendor Table.
- PO Item without Unit Price – Verify that all PO items have a unit price.
- PO Schedule Exceptions – Current PO Item ETA is within 7 days of current Need Date.
- Requisition Items Missing/Invalid On PO Items – Requisition Items referenced on the PO Item must be valid.

Requisition Item Table

- COA Group Is Invalid On Reqn Item - When a requisition item has an invalid COA Group, *PERCEPTION's* internal Material Costs will not be correct.
- COA Group Missing From Reqn Item - When a requisition item has no COA Group specified, *PERCEPTION's* own Material Cost tabulations will be wrong.
- Material Over Usage - This exception checks for items that have been over withdrawn in excess of its reservation.
- Material Over Ordered – Checks for items that have a quantity ordered in excess of requirement.
- PWBS Zone Is Invalid On Reqn Item - When a requisition item has an invalid PWBS Zone, *PERCEPTION*'s internal Material Costs will not be correct.
- PWBS Zone Missing From Reqn Item - When a requisition item has no PWBS Zone specified, *PERCEPTION's* own Material Cost tabulations will be wrong.
- Reqn Item Need Date Vs. Work Order Start - Checks to see if a requisition item's need date is out of sync with its Work Order Schedule as specified by Production Engineering.
- Stock Usage Without Cost - When a stock item is withdrawn to a project, cost is transferred with it. This exception checks that the cost has been recorded on the transactions that *PERCEPTION* tracks.
- SWBS Account Is Invalid On Reqn Item - When a requisition item has an invalid SWBS Account, material costs will not be exported to the General Ledger System. *PERCEPTION's* internal Material Costs will not be correct.
- SWBS Account Missing From Reqn Item - When a requisition item has no SWBS Account specified, material costs will not be exported to the General Ledger System, and *PERCEPTION's* own Material Cost tabulations will be wrong.
- Unscheduled Requisition Items - Retrieves requisition items that have not been scheduled (The item need date is null). This exception will cause the material to not show on certain material schedule reports.
- UoM Is Invalid On Req Item – The UoM on all Requisitions Items should exist in the Unit of Measure Library.

Running Exception Reports

To run an exception report, select *Environment/Environment Name/Exceptions* from the main *PERCEPTION* menu. The data exception selection window (Figure 16-1) will open.

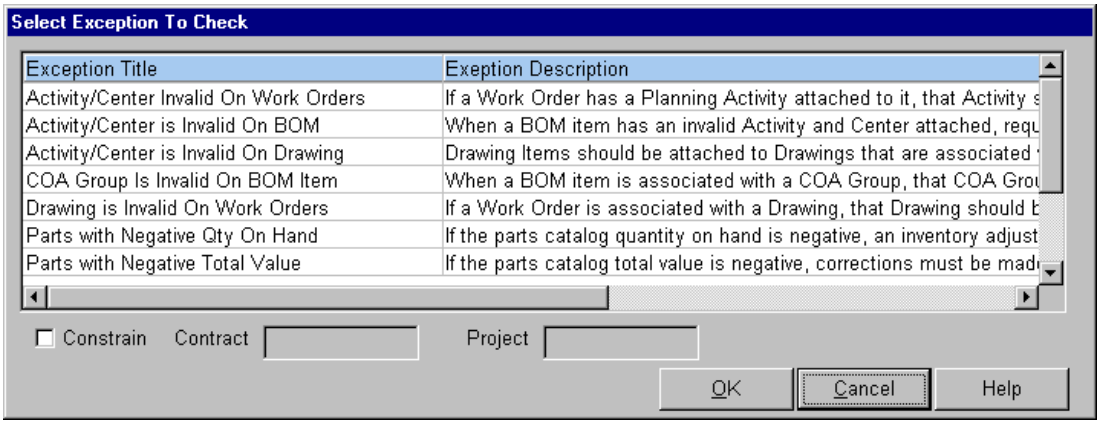


Figure 16-1: Selection Of Exception Reports

The Exception Title is a brief description of the report and will appear on the top of the printed report. The Exception Description is a longer, more detailed description of the report and possibly the reason for running that specific report. Highlight the desired report. The report data can be constrained to a specific contract and project if desired. Click on the *Constrain* box to enable the contract and project columns for typing. Click on *OK* to run the report.

All exception reports will print on legal size paper, so this must be available in the user's printer of choice. Figure 16-2 provides a sample exception report of a PO item ETA with 7 days or later of its Need Date:

Figure 16-2: Sample Exception Report

Report Formats

Report formats and some reports are supplied. The system administrator can maintain this table by adding, changing or deleting the records that actually run the reports. In order to add a report for users to run, the system administrator must know the table names and the data object supplied to report on each of the tables. All data objects in *PERCEPTION* (including reports) are available. The following Figure lists the table and data object names to be used for the basic listings that SPAR has provided.

Item	Table Name	Data Object Name
SWBS Accounts	accounts	dw_exception_acct
COA Groups	coagrp	dw_exception_coagrp
COA Sub Groups	coasgrp	dw_exception_coasgrp
Cost Items	Costitm	dw.exception_costitem
Parts Catalog	partscatalog	dw_exception_parts
Drawings	drawing	dw_exception_drawing
Bills of Material	bom	dw_exception_bom
Requisitions	requisition	dw_exception_req
Requisition Items	reqn_item	dw_exception_reqitems
Pallets	pallet	dw_exception_pallet
Pallet Items	paltitem	dw_exception_reqitems
Purchase Orders	po	dw_exception_po
Purchase Order Items	poitem	dw_exception_poitems
PO Item Details	poitemdetail	dw_exception_poitemdetails
Work Orders	workpkgs	dw_exception_workorder
Customer Bills	billdetail	dw_exception_billitem
Invoices	invoiceitem	dw_exception_invoiceitem

Figure 16-3: Database Tables & Data Objects

Adding Exception Reports

The reports are run using a "where" clause that is stored in the data exceptions table. This table has the following columns that should all contain data when the system administrator adds a record.

Testing is important because when new data exception records are added to the data exception table, they will be displayed in the software and can be run by any *PERCEPTION* user

The System Administration manual has detailed instructions for adding new exception reports.

Appendix I: Operating Windows

PERCEPTION has been developed using Microsoft Windows Graphical User Interface (GUI) technology. The following basic conventions have been used within the system:

- **Clicking** refers to the action of moving the pointer to a desired location and quickly pressing and releasing the left mouse button.
- **Double Clicking** refers to the action of moving the pointer to a desired location and quickly pressing and releasing the left mouse button twice.
- **Pressing & holding** refers to holding a mouse button for a slightly extended period of time until another action is performed, the cursor changes, and some other specified change occurs.
- **Dragging** refers to pressing and holding the left mouse button while moving the pointer to the new desired location.
- **Right Mouse Button Actions** will usually specify a position (for example, "Click on the object" or "Hold down the right mouse button. Move to the option you wish to select and left click on it").
- **Selecting** refers to clicking on a toolbar icon, a menu item, or on the left most column of a worksheet window that causes the record to be highlighted.

Parts of a Window

Each application or window that you choose to work will open as a separate *window*. Every window has some common elements; however, not all windows use all the elements.

The elements in Figure I-1 are your tools for working with the window and the application or document within the window. More information is provided throughout this chapter in reference to the use of elements.

- The **Control-menu** box is located in the upper right corner of each window. With the options in this box, you can re-size, move, maximize, minimize, and close windows, (If you use a mouse, you can move and re-size windows simply by clicking and dragging).
- The **title bar** shows the name of the application or document. If more than one window is open, the title bar for the **active** window (the one in which you are working) is a different color or intensity than other title bars.
- The **window title**, depending on the type of window it appears in, can be the name of an application and the name of a document, or the name of a group, a directory, or other data file. For documents, until the document is saved, a placeholder such as "untitled" usually appears.

- The **menu bar** lists the available menus. Most applications have a File menu, an Edit menu, and a Help menu as well as menus unique to the application.
- The **Scroll bars** let you move parts of a document into view when the entire document won't fit in the window. They also let you view unseen portions of lists and other information that is too long to fit in the allotted space.
- The **maximize** and **minimize buttons** (chosen with the mouse) enlarge the active application window to fill the entire desktop or shrink the window to an icon. Document windows enlarge to fill the application workspace only, not the entire desktop. After you enlarge a window, the maximize button changes to a Restore button. You can use the Restore button to return the window to its previous size.
- The **window border** is the outside edge of a window. You can lengthen or shorten each side of a border.
- The **window corner** can be used to shorten or lengthen two sides of a border at the same time.
- The **workspace** is where you do most of your work with an application. For example, if you start a word processor, the contents of your document appear in the workspace. Some applications allow you to open more than one document window within this workspace.
- The **selection cursor** shows where you are in an individual document. It marks the place text or graphics appears when you begin typing or drawing.

The arrow-shaped **mouse pointer** is used to indicate items you want to select or choose with the mouse.

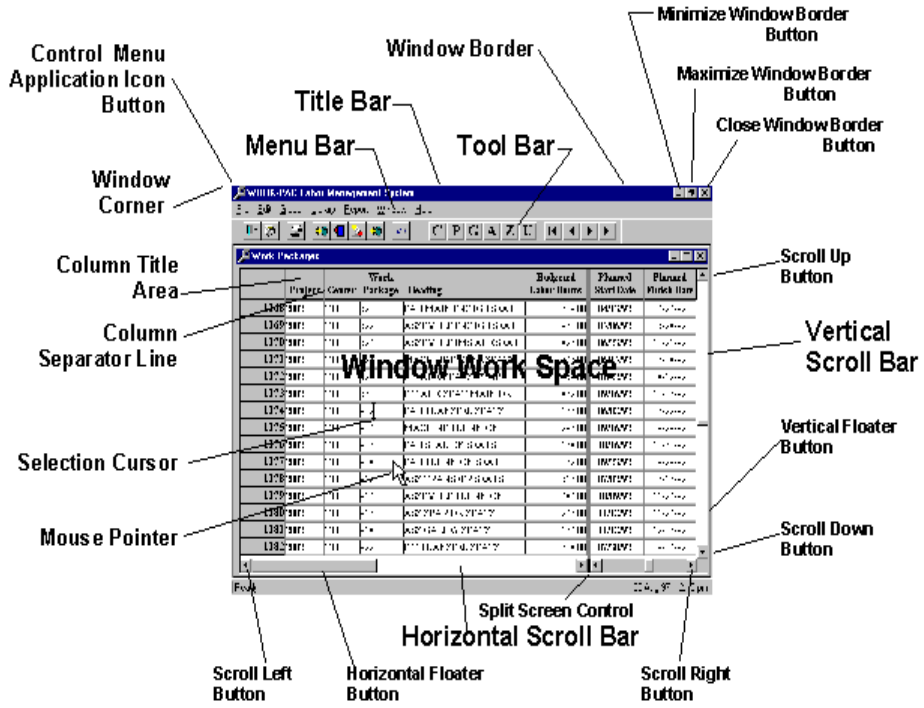


Figure I-1: Window Elements

NOTE: Some applications might use different types of cursors and pointers than the ones shown in the previous illustration.

Special Window Buttons

Each window often displays buttons that perform special functions. The following are examples:

The **OK** button, when clicked with the mouse, normally directs the system to execute the given function, such as generate a specific report.

The **CANCEL** button allows the user to exit from the given function window and return to the prior window.

The **CLOSE** button allows the user to exit from a given data entry screen and return to the prior window.

The **ADD** button allows the user to add new records to the database.

The **SAVE** button allows the user to update the database after modifications have been entered.

The **DELETE** button allows the user to delete specific records from the database.

Type of Windows

There are several basic types of worksheets in *PERCEPTION*:

Worksheet windows display multiple lines or rows of data records. Worksheet windows have the same appearance as spreadsheets.
Detail worksheets display only the contents of one row of data but allow for the viewing of more fields on a single screen. They are arranged in a logical order for data entry.
Tab windows allow multiple views and lists of various types and details of information that are easily displayed by using the tabs provided at the top of the worksheet.
Reports also are worksheets, but they are presented in formats specific to the type and style of the desired report.

Working with Windows

The following describes a few of the features inherent within a windows application system like *PERCEPTION*. Use of these features is strictly optional, but there are occasions when they make use of the system much more convenient.

Split Scrolling: Some of the worksheet windows have the ability to split the screen so that horizontal scrolling can be separately controlled on the left and on the right side of the window. For example, if the user wishes to scroll to the right to see other line item fields, the split scroll will allow the left-most columns, including the item description, to remain on the screen. To activate the split scrolling, select *View/Horizontal Split Scrolling* from the main menu. The screen will indicate a black vertical bar to the left of the left scroll button at the bottom left corner of the window. Place the pointer on this bar and drag it to the right. A left-hand scroll system appears that controls the left section of the window. The original scroll system will move with the dragging and allow a separate scrolling of the right side of the window.

Changing Column Widths: Some worksheet windows will have columns that do not appear wide enough to display the complete data field. The user can increase the size of the column by placing the pointer on the column separator line within the column title area. The pointer will change to a double arrow symbol. Drag the column line in either direction to increase or decrease the column width.

Moving Columns: There may be situations whereby the user wishes to re-arrange the columns of a window to better suit the visual display. Place the pointer in the middle of the column header and drag it to the desired location.

> ***Note:*** Re-arranged columns are not saved by the system unless the user elects to save them. Select *View/Save Current Column Order* from the main menu. To reset to the original column order, select *View/Restore Column Order* from the main menu.

Moving The Window: As windows are opened and layered, a newly opened window may appear somewhat off the screen. This window can be re-positioned by placing the pointer in the Title Bar and dragging the window to the desired position.

Opening Supplemental Windows: There may be situations whereby the user wishes to open another window to perform some function that permits the processing of the current window. For example, if the user wishes to approve a requisition to be able to continue creating a purchase order using that requisition, the requisition can be opened, approved and saved without closing the purchase order window. The requisition can then be used to complete the purchase order.

There is no limit to the number of windows, other than available PC memory, that can be opened at any time. However, sometimes with too many windows opened, "Windows" catches a cold and aborts the session.

With multiple windows open, the user may wish to jump from one to another without having to close windows and re-open them later. Moving from one open window to another can be done by selecting *Window* from the main menu. A menu displays all open windows. A check mark flags the window that is currently active. Clicking on another window in the list will cause the system to bring that window into active status.

Moving About Data Fields

Most of the system is involved with entering data. Each data entry window provides a series of data fields where the user can enter information.

Clicking on it with the mouse can access any data field. The click turns on the **data field focus**, which displays as the special data entry positioning cursor within the data field.

This focus character moves within the field as the user types data characters. Within a given data field, most alphanumeric character keys are operational.

Some data fields, however, permit only numeric data, such as for quantities and costs, (Numeric data must be entered **without commas**).

Field editing can be done using the backspace, and the **insert** and **delete** keys. The cursor also can be positioned among input characters within the data field using the left-arrow and right-arrow keys.

To move from field to field, the **tab** key moves the user from left to right and **shift + tab** moves from right to left. The mouse pointer can be used to position the cursor on any field. The up-arrow moves the cursor to a previous line item in a worksheet window, while the down-arrow moves to the next line item. In a worksheet window, the *ENTER* key operates the same way as the down-arrow, moving the focus to the next line item.

Types of Data Fields

There are various types of data fields that can be displayed in a worksheet:

- **Fixed Data Field** is simply a box into which the user can enter or update data.
- **Drop-down List Box** is a box with an arrow at its side. If the user clicks on the arrow, a list of options or selections drops down. By clicking on the desired option or selection, the user sets that value in the box. The selections in the List Box are set by the system and these selections cannot be added to, or removed from, by the user.
- **Drop-down Worksheet** is also a box with an arrow at its side. If the user clicks on the arrow, a list of options or selections drops down. By clicking on the desired option or selection, the user sets that value in the box. The selections in the Drop-down Worksheet are items that are present in another table, i.e., the Unit of Measure table. Users can modify, add or delete records in the Unit of Measure table. Doing so, will result in these changes being reflected in the Drop-down Worksheet the next time a window that uses this table in a drop-down worksheet is opened. If a user makes a change to the table while a window using this table is open, selecting *Data/Refresh Drop-Downs* from the main menu will cause the changed data to display in the drop-down.
- **Multi-Line Edit Data Field** is a box for text that expands downward as multiple lines of information is entered.
- **Spin Control Data Field** is a box that has a set of arrows on the right side for changing the value incrementally. The user can also type directly into most fields with the spin control.
- **Radio Button** is a way to make a selection by either turning it on or off by clicking on the radio button. When the radio button has a black dot in its center, the option is turned on; when the center of the button is clear, the option is turned

off. When radio buttons are used, only one of the selections can be chosen. Choosing one selection unselects the other(s).

Check Box is another way to make a selection by either turning it on or off by clicking on the check box. When the check mark is displayed, the option is turned on; when there is no check mark, the option is turned off. Multiple check boxes can be selected.

Protected Data Fields

Most data fields displayed on the system window screens will allow the user to enter appropriate information for storage and processing by the system. However, there are other fields that are protected by the system, since they represent information that either has been compiled from other related data or is calculated using data on the current record.

On the WBS levels, the system assigns the color blue to all data fields designated for display only. Examples of these fields include rolled-up item costs to WBS or fields of indirect costs computed by the system from rate tables, etc.

On the data detail and worksheet windows, some fields are protected because they are calculated or derived from another source. In some cases, tabbing will bypass the field. In other cases, the user can tab to the field but cannot change the data.

Allowable Characters

The system will accept virtually any characters available in the PC Windows world. However, there are exceptions. The database manages data as records in various database tables. Each record must have a unique identifier or key. The system restricts all ID fields to the following characters:

A through Z
a through z
0 through 9
special characters - \ / :

Due to internal operating requirements of database functions, the system will not accept the following special characters in ID fields:

+ & * ^ % # @ ! ? < > ; . , “ ‘

Associated Reports

The chapter "*The Grand Tour*" in this manual describes the various reports available from *Reports* on the main menu. However, most worksheets (estimating cost items, requisitions, purchase orders, work orders, etc.) offer the associated reports button  on the toolbar. By clicking on this button the system will display a pop up window (Figure I-2) that lists the various system reports available for the information displayed in the worksheet. By clicking on one of these report selections, the system will generate that report directly, but only for those items selected (highlighted) in the worksheet.

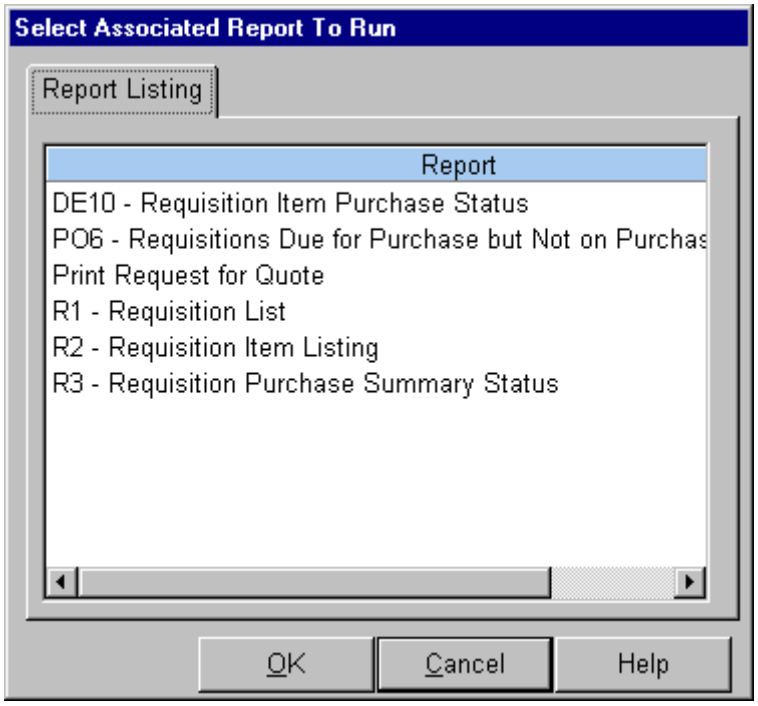


Figure I-2: Associated Reports Selector

Appendix II: Viewing AutoCAD® Drawings

A feature of *PERCEPTION* allows the viewing and printing of AutoCAD® drawing files.

Before this feature can be used, the *Volo ™View* software must be installed. This software is installed by SPAR's installation program or it can be downloaded from the Autodesk web site, www.autodesk.com, and installed on desktop.

The Volo™ View provides a quick, easy tool to review drawings for accuracy and correctness, and to print without risking changes to the original AutoCAD drawing. Volo View will open DWG, DWF, and DXF files as well as more than 225 different document types, including raster image and business formats.

Using the View Feature

The column "Drawing File Name" has been added to the following worksheet windows:

- All PWBS levels.
- Parts Catalog.
- Work Orders.
- Drawings.

The drawing file name (with directory path) can be added to a record on the above worksheet windows by browsing the libraries for it. Right click on the drawing file name column and select *Browse For Files* from the pop up menu (Figure II-1).

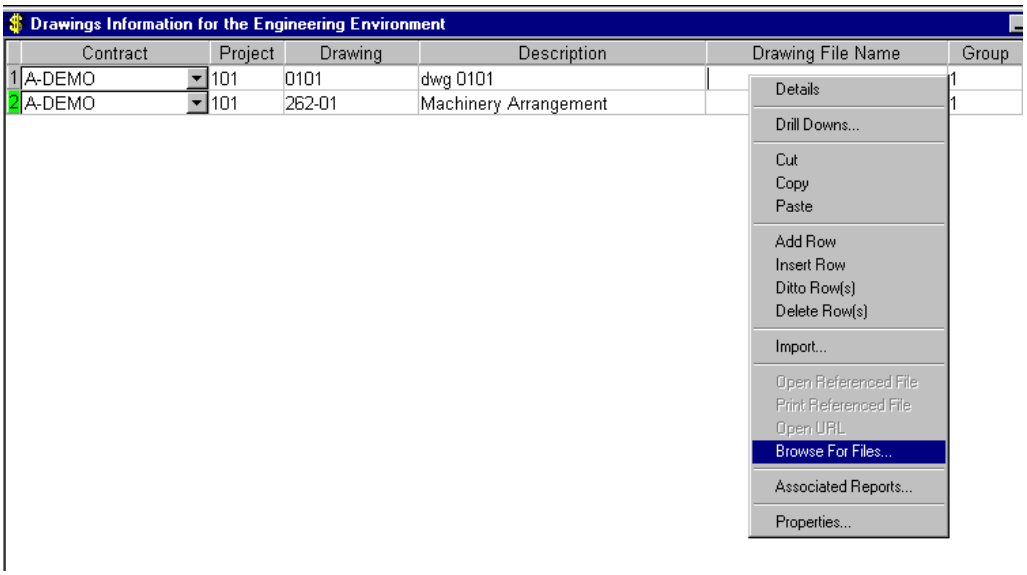


Figure II-1: Drawing Pop Up Menu

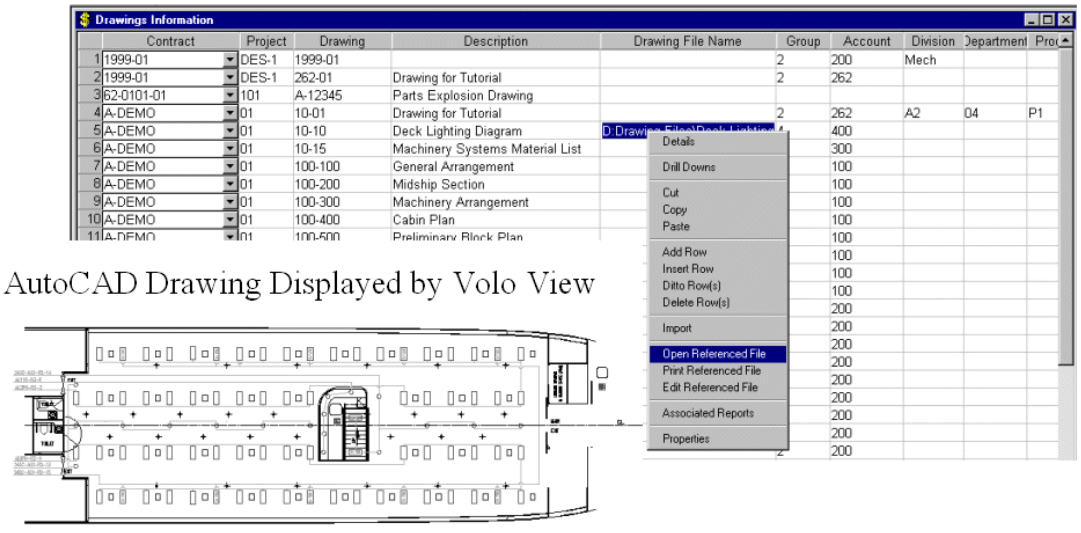


Figure II-2: Browse For Files

To view it the drawing, right click on the drawing name and select "*Open Referenced File"* (Figure II-2). The Volo View software will open with the selected drawing displayed.

Volo View has its own menu system and help files. Among other things, the user can print, pan, zoom, orbit, and layer. The drawing can be saved in a variety of other formats, but the original AutoCAD drawing file cannot be overwritten.

Appendix III: Size of Data Fields

PERCEPTION: Primary Data Fields

Data Field	Size	Header Short Description Size	Full Description Size
Contract Number	20		Unlimited
Project Number	8		Unlimited
Schedule Planning Activity	8		Unlimited
Schedule Planning Activity Center	8		Unlimited
SWBS Group	8		Unlimited
SWBS Account	8		Unlimited
PWBS Zone	8		Unlimited
PWBS Outfit Zone/Grand Block	8		Unlimited
PWBS Block/Unit	8		Unlimited
PWBS Assembly	8		Unlimited
PWBS Sub-Assembly	8		Unlimited
PWBS Part	8		Unlimited
COA Groups	8		Unlimited
COA Sub-Groups	8		Unlimited
COA Items	8		Unlimited
COA Item Supervisor	8		Unlimited
COA Item Team Number	8		Unlimited
CLIN (Contract Line Item)	8		Unlimited
Contract Paragraph	25		Unlimited
Estimating Cost Item Number	8	40 A/N	Unlimited
CER Name ID	25		Unlimited
CER equation field	Unlimited		Unlimited
Standard Package Name ID	25		Unlimited
Standard Package Items	8		Unlimited
Standard Package Classification	25		Unlimited
Standard Package Sub Classification	25		Unlimited
Ship Types	8		Unlimited
Ship Characteristic Types	50		Unlimited
Ship Characteristics (Incl. Type Char., Default Char.)	50		Unlimited
Cost Escalation		5-decimal escalation factor	none

Drawing Number	20	40 A/N	Unlimited
Drawing BOM Item Number	8	40 A/N	Unlimited

Requisition Number	8	40 A/N	none
Requisition Item	8		Unlimited
Requisition Item Tag Number	25		none

Purchase Order Number	8	40 A/N	none
PO Item Number	8		Unlimited
PO Header	8		Unlimited
PO Footer	8		Unlimited
PO Terms & Conditions	8		Unlimited
PO Reference Number	40		none
Currency Rate Table	8	4-decimal exchange rate	none

Part Classification	25		Unlimited
Part Sub Classification	25		Unlimited
Part ID	25		Unlimited
Part QA Flag	8		none
Part Manufacturer ID	25		none
Part NATO Number	16		none
Part Attribute	50		Unlimited
Part Attribute Type	50		Unlimited
Part Location	8		Unlimited
Unit of Measure	8		none

Work Order Serial Number			none
Work Order Number	8	40 A/N	Unlimited
Work Center	8		Unlimited
Work Order Change Order Number	8		none
Work Order Product Code	10		none
Work Order Clauses	8		Unlimited

Work Order Pallet ID	8	40 A/N	none
Pallet Item Number	8		Unlimited

Tool Type	50	50 A/N	none
Tool Class	50		none
Tool ID	50	40 A/N	none
Tool Part ID	25		none
Tool Serial Number	25		none
Tool Manufacturer's ID	25		none

General Ledger Accounts	255		Unlimited

Customer	40		none
Customer Invoice Number	20		none
Vendor ID	8	40 A/N	Unlimited
Vendor Detail ID	60		Unlimited
Vendor Packing List Number	15		none
Vendor Invoice Voucher Number	15		none
Vendor Invoice Number	18		none
Vendor Invoice Item Number	8		Unlimited

Trade Number	8		Unlimited
Employee ID	8		none
Employee Name	40		none
Employee Badge Number	25		none
Employee Department	8		none
Labor Type	2		Unlimited

Work Type	8	40 A/N	none
Stage of Construction	8	40 A/N	none
Calendar	Integer	40 A/N	none
Block Type	8		Unlimited

Appendix IV: Color Codes

For user convenience, *PERCEPTION* color-codes various transactions.

Engineering Drawing Bills Of Materials Color Codes

The system provides no color-coding for drawing bills of material.

Requisition Color Codes

The system color codes requisitions in the requisition worksheet:

- Green: Requisition is approved.

Requisition Items Color Codes

The system color codes requisition items in the requisition item worksheet:

- Gray: Non-stock requisition item not yet linked to a purchase order.
- Red: Requisition item successfully linked to a purchase order.
- Blue: Requisition item linked to a stock item.

Purchase Order Color Codes

The purchase order worksheet provides a color-coding of the rows of purchase orders on display:

- Green: PO has been issued.
- Red: PO has been amended, but not yet re-issued.
- Light Blue: PO is complete.

In addition, the PO item worksheet also provides the following color codes. PO items are flagged red under the following conditions:

- PO item has been received, but for a quantity greater than ordered.
- PO item has been invoiced for a quantity greater than what was ordered.
- Current ETA is later than the need date.

Receiving Transactions Color Codes

When the system has completed the posting process, it will color code the receiving transactions as follows:

- Gray: Transaction has not yet been processed for posting.
- Green: Transaction has been successfully posted.
  The user cannot modify posted transactions.
- Red: The posting process detects errors in the transaction in either the purchase order item assignment or an invalid storage location.

Withdraw Transactions Color Codes

When posting withdrawal transactions, the system performs a validation check:

- The contract, project and the rest of the WBS must be defined on the database.
- The Work Order must be valid, with a valid contract, project and WBS.
- The requisition and requisition item must be defined on the database.
- The part ID and part type must match the requisition item.
- The specified quantity to withdraw cannot exceed the requisition item's quantity available.
- If the part is stored in more than one location, the withdraw location must be specified.
- A valid location must be entered unless the company's business rules allow for locations to be created upon withdraw.

And additional checks for the Quick Stock Withdraw transactions are:

- The part ID must exist in the Parts Catalog.
- The part ID in the Parts Catalog must have a unit price.

The color codes for withdraw transactions are as follows:

- Gray: Transaction has not yet been processed for posting
- Green: Transactions that have successfully passed the validation. The user cannot modify posted transactions.
- Red: The posting process detects errors in the transaction. The specific *errors detected by the system will be given placed on the transaction in the Error* Message column. Transactions with errors can be corrected any time by retrieving them from the database, making the appropriate corrections, and re-posting.

Stock Adjustment Transactions Color Codes

The system color-codes transactions entered in the Stock Adjustment worksheet:

- Gray: All un-posted adjustments.
- Green: All posted adjustments.

Pallet Items Color Codes

The system provides no color-coding for pallet items.

Tool Room Transactions Color Codes

The system requires formal posting of tool room transactions, both direct and imported. The posting process performs a data validation of the transactions to help ensure correct information is being entered.

The system color-codes each transaction as follows:

- Gray: Transaction has not yet been processed for posting.
- Red: The posting process detects errors in the transaction.
- Green: Posted and successfully validated transaction.

Work Order Color Codes

The system color-codes work orders by type:

- Gray: Discrete Work Order.
- Dark Blue: Distributed Work Order.
- Light Blue: Time Phased Work Order.
- Yellow: Incremental Work Order.

Time Charge Transactions Color Codes

Time charge transaction must be posted before their charges are formally accepted into the system and charged against project work orders. The posting process performs a validation test for errors and exceptions.

The system will consider the following conditions as time charge errors:

- Work Order does not exist on the database.
- Work Order has not been authorized for time charging.
- The time charge trade ID has not been defined on the database.
- The employee clock number has not been defined on the database.
- Charge date on timephased or incremental work orders is outside the subtask date range.

Errors cannot be posted to the work orders without correction.

The system will consider the following conditions as time charge exceptions:

- Time charges have been made for trade ID that has not been planned for the work order.
- Time charges are late for the work order planned schedule.
- Time charges are early for the work order planned schedule.
- Time charges have been made against a work order that has been closed.

Exceptions will be posted to the work order, although relatively minor problems have been detected by the system.

The color codes for time charge transactions are as follows:

- Red: The posting process detects errors in the transaction.
- Yellow: Un-posted transactions noted with exceptions.
- Green: Posted transactions, including those noted with exceptions.
- Gray: Transaction has not yet been processed for posting.

All non-posted transactions can be edited, correcting errors and exceptions, if necessary. *Posted transactions cannot be edited. To make any modifications to these, the user must enter additional adjustment transactions and post them*.

Customer Bill Color Codes

The system provides no color-coding for customer bills.

Vendor Invoice Color Codes

The system provides no color-coding for vendor invoices.

Schedule Planning Activities Color Codes

The system color-codes records in the Planning Activities worksheet:

- Gray: Non-critical path activities.
- Red: Activity has been flagged as being on the critical path.

Appendix V: Function Keys

The system supports a variety of "function" keys as short cuts to a number of different operations. Some short cuts use the function "F" keys at the top of the keyboard. Others use a combination of "Ctrl" key held down then pressing another key on the keyboard.

The following table lists all available function keys supported by the *PERCEPTION* system:

Function	F-Key	Ctrl-Key +
New Contract/Project Wizard		Ctrl+N
Retrieve records		Ctrl+R
Add records	F8	
Save records		Ctrl+S
Close window	F4	
Print		Ctrl+P
Access Parts Catalog	F12	
Vendor Invoice Items - Add Parts	F5	
Vendor Invoice Items - Receive Items	F6	
Vendor Invoice Items - Stub-out PO for invoice	F7	
Cut		Ctrl+X
Copy		Ctrl+C
Paste		Ctrl+V
Select All		Ctrl+A
Find		Ctrl+F
Replace		Ctrl+H
Go To		Ctrl+G

Appendix VI: Internal Database Codes

PERCEPTION selectively uses various coding schemes for managing information on the database. These codes are often used for data fields that are used in drop-down data selection boxes. The following outlines the various data fields that employ internal codes.

If information is imported from other third party products, such as *EXCEL* or *ACCESS*, the internal codes must be used where these drop-down data fields are included.

Parts Catalog - Part Type

Internal Code	Description
0	Obsolete
1	Direct Purchase (Standard Part)
2	Manufactured (Standard Part/Component)
3	GFE/OFE Part
4	Stock Part
5	Load Items & Spares
6	Vendor Furnished Information (VFI)
7	Milestone Payment
8	Economic Price Adjustment (EPA)
9	Sub-Contractor

Parts Catalog/Package Library

Classification Flag

Internal Code	Description
1	For Parts Catalog Only
2	For Package Library Only
3	For Both

IP (Interim Product) Type

Internal Code	Description
0	N/A
1	Structure
2	Machinery
3	Piping
4	Electrical
5	HVAC
6	Accommodations
7	Paint
8	Miscellaneous

IP (Interim Product) Indicator

Internal Code	Description
0	N/A (ZERO)
S	Sub Zone
G	Grand Block
B	Block
U	Unit
A	Assembly
P	Sub-Assembly
C	Part

S/O (Structure/Outfit) Indicator

Internal Code	Description
0	N/A (ZERO)
S	Structure
Z	Outfit
M	Material
V	Services
L	Labor

CER Equation Type

Internal Code	Description
1	Structure
2	Machinery
3	Pipe
4	Electrical
5	HVAC
6	Outfit
7	Paint
8	Miscellaneous

CER Equation Labor/Material Flag

Internal Code	Description
0	Material CER
1	Labor CER

CER Type for IP Packages

Internal Code	Description
1	Manual CER
21	Structure CER Table
22	Machinery CER Table
23	Pipe CER Table
24	Electrical CER Table
25	HVAC CER Table
26	Outfit CER Table
27	Paint CER Table
28	Miscellaneous CER Table
41	Structure EQUATION CER Table
42	Machinery EQUATION CER Table
43	Pipe EQUATION CER Table
44	Electrical EQUATION CER Table
45	HVAC EQUATION CER Table
46	Paint EQUATION CER Table
47	Outfit EQUATION CER Table
48	Miscellaneous EQUATION CER Table
10	PWBS CER Table
11	SWBS CER Table
12	COA CER Table

Tool Status Indicator

Internal Code	Description
1	In
2	Out
3	Lost
4	Damaged
5	Inactive

Appendix VII: Record Keys

All tables in the system database contain records that are uniquely identified by keys. These keys must be unique for each record so that the system can recognize (find and retrieve) any record from the entire set of records on the particular table.

Some records have only a single key, such as the employee file having only the employee ID for a record key. Other records have multiple keys, such as the work order, which requires the contract, project and work order number and work center ID (the work order also can be uniquely identified by the system generated work order sequence number).

The following table lists the keys for various database table records. All of these keys may be alphanumeric, and the length of characters for each is provided in Appendix III.

TABLE VII: Database Record Keys:

	Key #1	Key #2	Key #3	Key #4	Key #5	Key #6	Key #7
Work Breakdown Structures							
Contract	Contract ID						
Contract CLIN	Contract ID	CLIN ID					
Project	Contract ID	Project ID					
SWBS Group	Contract ID	Project ID	SWBS Group				
SWBS Account	Contract ID	Project ID	SWBS Group	SWBS Account			
PWBS Zone	Contract ID	Project ID	PWBS Zone				
PWBS Outfit Zone	Contract ID	Project ID	PWBS Zone	Outfit Zones & Grand Blocks			
PWBS Unit or Block	Contract ID	Project ID	PWBS Zone	Units & Blocks			
PWBS Assembly	Contract ID	Project ID	PWBS Zone	Units & Blocks	Assemblies		
PWBS Subassembly	Contract ID	Project ID	PWBS Zone	Units & Blocks	Assemblies	Subassemblies	
PWBS Mfg Part	Contract ID	Project ID	PWBS Zone	Units & Blocks	Assemblies	Subassemblies	Mfg Parts
COA Department	Contract ID	Project ID	COA Department				
COA Stage of Construction	Contract ID	Project ID	COA Department	Stage ID			
COA Work Station	Contract ID	Project ID	COA Department	Stage ID	Work Station		
General Ledger Accounts							
GL Account	General Ledger Account ID						
WBS Detail Data							
Estimate Cost Item	Contract ID	Project ID	Cost Item No.	Work Center			
Planning Activity	Contract ID	Project ID	Activity No.	Work Center			
Work Order	Contract ID	Project ID	Work Order No.	Work Center			

Engineering Drawings

Drawing Number	Contract ID	Project ID	Drawing No.	
Drawing BOM Item Number	Contract ID	Project ID	Drawing No.	Dwg BOM Item No

Material Requisition

Requisition Number	Contract ID	Project ID	Requisition No.	
Requisition Item	Contract ID	Project ID	Requisition No.	Requisition Item No.

Purchase Order

Purchase Order	Purchase Order No.	
PO Item Number	Purchase Order No.	PO Item No.

Work Order Pallet

Work Order Pallet ID	Contract ID	Project ID	Work Order Pallet ID	
Pallet Item Number	Contract ID	Project ID	Work Order Pallet ID	Pallet Item No.

Customer Bill	Contract ID	Project ID	Customer ID	Bill ID

Other

Customer	Customer ID
Vendor	Vendor ID
Employee	Employee ID
Tool Room ID	Tool ID

LIBRARIES:

Part Catalog

Part	Part Number	
Part Classification	Part Classification	
Part Sub Classification	Part Classification	Part Sub Classification

Estimating CERs	CER ID	

Estimating Standard Packages

Package	Package ID	
Package Item	Package ID	Package Item
Package Class	Package Class	
Package Subclass	Package Class	Package Subclass

Ship Characteristics

Ship Characteristics	Ship Characteristic	
Characteristic Class	Characteristic Class	
Characteristic Subclass	Characteristic Class	Characteristic Subclass

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Glossary

Account
A SWBS cost category to which estimated cost items can be assigned. Normally, the account resides at the third level of the SWBS (project-group-account).

An account ID is limited to a maximum of 8 alpha-numeric characters. The combination of Contract/Project/Group/Account must be unique.

Activity
See Planning Activity

Activity Center
A work center identified with a planning activity. See Work Center.

Actual Cost
The costs incurred to date as collected by *PERCEPTION* through work order time charges, material purchases and usage of stock inventory items.

Actual Schedule
Actual schedules are determined by *PERCEPTION* from the dates of collected time charges to work orders. The actual start date is the earliest date recorded on the system to the work order(s). The actual finish date is the latest date recorded after the work order(s) has been formally closed. The closing date is not necessarily the latest finish date, as the closing process can be done after the last time charge has been entered. Time charges made to closed work orders will result in updated actual finish dates by the system.

Actual Use Date
The date an item is actually taken from the warehouse and used in production. *PERCEPTION* maintains only the most recent use date for any given item.

ACWP
Actual Cost of Work Performed: costs (labor and material) actually incurred and apportioned or distributed in accomplishing the work performed within a given time period.

The ACWP is calculated by the system when either a Production Labor Rollup or a Production Material Rollup is performed and can be viewed on any of the WBS level records.

Assembly
A level of PWBS (project-zone-unit-assembly) that may be made from parts and components, including sub-assemblies.

An assembly ID is limited to a maximum of 8 alpha-numeric characters. The combination of Contract/Project/Zone/Unit/Assembly must be unique.

Baseline Budget
Baseline Budget is typically the initial budget set at the on-set of a contract. *PERCEPTION* manages baseline budget on the project Planning Activity.

Baseline Schedule
Baseline Schedule is typically the initial schedule, starts and finishes, set at the on-set of a contract. *PERCEPTION* manages baseline schedules on the project Planning Activity.

BAC
Budget At Completion: same as Budget.

BCWP
Budgeted Cost of Work Performed: the sum of budgets for completed work packages and completed portions of open work packages, plus the appropriate portion of the budgets for level of effort. For material, BCWP is the sum of the budgeted costs planned for the relevant time period's actual proportion of overall expenditure.

The BCWP is calculated by the system when either a Production Labor Rollup or a Production Material Rollup is performed and can be viewed on any of the WBS level records.

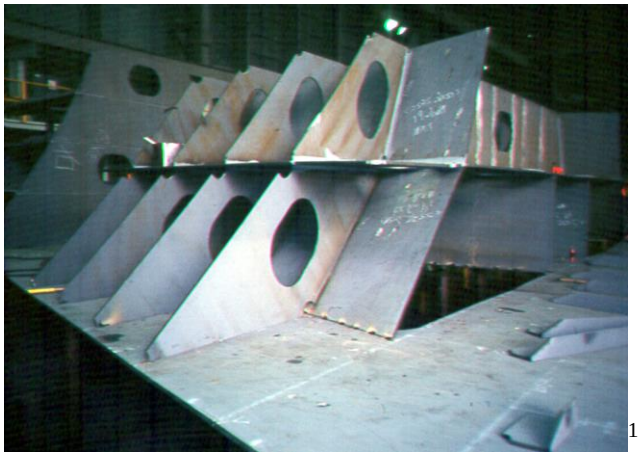
BCWS
Budgeted Cost of Work Scheduled: the sum of the budgets for completed work packages and completed portions of open work packages, plus the appropriate portion of the budgets for level of effort of work scheduled to be accomplished for the relevant time period. For material, BCWS is the sum of the budgets scheduled for the relevant time period.

The BCWS is calculated by the system when either a Production Labor Rollup or a Production Material Rollup is performed and can be viewed on any of the WBS level records.

Bid Cost
The cost of a ship as quoted by a shipyard competing for the contract.

Block
A level of PWBS (project-zone-unit/block) made from assemblies, sub-assemblies and parts, which can be joined with other blocks to form a Grand Block or can be erected individually.

A block ID is limited to a maximum of 8 alpha-numeric characters. The combination of Contract/Project/Zone/Block must be unique.

 [11]

BOM
Bill Of Material as provided within an engineering drawing. *PERCEPTION* enables the user to tag specific estimate cost items as BOM items. The system also provides a BOM worksheet.

A BOM ID is limited to a maximum of 8 alpha-numeric characters.

Bottom 5 Navy Numbers
The last 5 digits of the Navy Spec Item Number. See Navy Spec Item.

[11] Selected photographs obtained from www.nsnet.com.

Budget
Portion of the bid estimate formally assigned to production and against which cost and schedule performance and job progress can be measured. *PERCEPTION* tracks several budgets:

Baseline Budget (see Baseline Budget)
Revised Baseline Budget
Production Budget

The Revised Baseline Budget, tracked on project Planning Activities, is an update of the Baseline Budget. The value of this revised baseline budget is managed for informational purposes only, although the Baseline Budget may be manually replaced by this revised value.

The Production Budget is what *PERCEPTION* uses to manage production work orders and material commitments. The Production Budgets may or may not be the same as the Baseline Budgets. Production Budgets evolve as project planning advances and the scope of work becomes more clearly in focus. Production Budgets also may be modified to accommodate contract change orders.

The total budgets are calculated by the system when each of the rollups is performed and can be viewed on any of the WBS level records.

Buyer Name
Name of the person responsible for the purchase order. The buyer's name is selected from a list of employees who are designated as buyers in the employee table.

CAD/CAM
Computer Aided Design and Manufacturing encompasses systems that automate engineering design, drawing development, and the manufacturing processes. CAD/CAM can link with MRP by automating material requirements.

CAIV
CAIV is a formalized process for undertaking trade-off studies to arrive at an affordable balance between cost, performance, and schedule. This process is aimed at developing a best-value solution and provides opportunities to explore new technologies and approaches to meet mission needs at an affordable cost.

Calculated CERs
Direct (production-based) CERs determined from a single selected shipset of return cost data based on an actual man-hour expenditure and it's associated measurable parameter (e.g., square feet of painted area). (See also Direct CERs, Predictive CERs, and Manual CERs).

Center
See Work Center

CER
A Cost Estimate Relationship (CER) is a formula relating the cost of an item to the item's physical or functional characteristics or relating the item's cost to the cost of another item or group of items. Examples: a) for steel block assembly, 25 labor hours/ton, b) for pipe material, $25/meter; and c) for shipyard support service, 10% production hours.

A CER is limited to a maximum of 25 alpha-numeric characters and must be unique.

CIM
Computer Integrated Manufacturing encompasses systems that automate and link all of the company's operations: planning, engineering, production, accounting and finance.

CLIN
Contract Line Item Number is usually a series of government contract requirements for either new construction or ship repair. CLINs also may be used to identify a ship owner's own project WBS, such a ship repair specification line items or paragraphs.

CLINs are usually independent of the shipyard's project work breakdown structures and represent an alternate structure for summarizing and reporting the cost estimate. A series of CLINs may identify requirements across all projects under the contract.

The hierarchical levels comprising the CLINs are the contract and CLINs. The CLINs identifiers are limited to a maximum of 8 alpha-numeric characters. The combination of Contract/CLIN must be unique.

PERCEPTION does not require CLINs to be defined, but can be used only to the extent that is necessary for contract reporting purposes. System reports can summarize the cost estimate by CLIN, as well as by SWBS and PWBS.

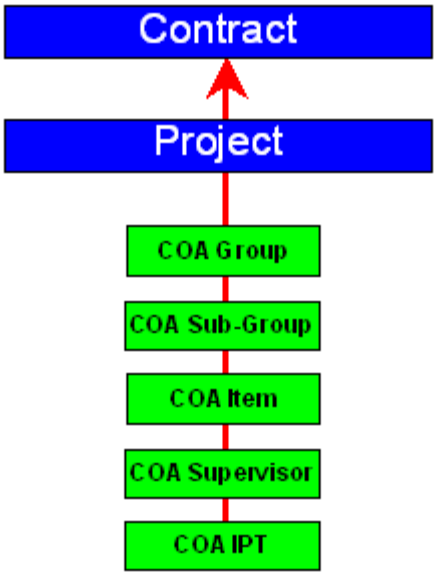
COA

The Chart of Accounts, or COA, identifies the shipyard as a functional organization. The organization may be broken down to levels that identify the individual workshops, stages of construction, and manufacturing and assembly processes. The COA is one of several types of project work breakdown structures, or WBS.

The purpose of the COA is to provide a basis for collecting project data and for generating performance reports of the shipyard organization.

The hierarchical levels comprising the COA are the contract, project, COA group, COA sub-group, COA item, COA supervisor, and COA IPT. These level names can be customized for each shipyard and the customized names will appear on all windows and reports in the system.

Each level's identifier is limited to a maximum of 8 alpha-numeric characters.



Using COA is optional for any project. When used, *PERCEPTION* does not require the COA to be completely defined, but only to the extent that is necessary for planning and production control purposes.

Comments

PERCEPTION offers user comments to be entered and displayed throughout various functions of the system. This allows users to either enter comments for their own references, or to enter comments that communicate status information to other users.

The Purchase Order Comment, may be defined when the purchase order is first put together or at any time that the purchase order is edited. This comment, if needed by the user, should apply to some overall condition or status of the purchase order, rather than to some specific comment about one of the purchase order items.

The Invoice Comment, like the purchase order comment, should apply to some overall condition or status of the invoice, rather than to some specific comment about one of the items.

Both the purchase order and the invoice items also have comment columns.

Several of the transaction tables have a comments column.

The purchase order comment will print on the document when the purchase order is issued to the vendor. The other comments are only visible on the individual records as a means of reference or communication between users and are not included on any reports.

The number of characters that can be entered in the comments column is unlimited.

Committed Cost
The current total material cost committed to a project: sum of all purchase orders issued, of all stock inventory items withdrawn and used on the project, and all stock inventory items not-yet-used, but held in reserve.

The committed cost is calculated by the system when a Production Material Rollup is performed and can be viewed on any of the WBS level records.

Commodity
Raw material, such as steel, pipe, insulation, etc.

Complete
The following entities can be set to Complete:

Requisition
Requisition Item
Pallet
Pallet Item
Purchase Order
Purchase Order Item
All WBS levels

When a project is completed, it should be closed. Closing a project is necessary in order for the system to calculate final value information. It also is the best way to inhibit time charges to completed projects.

Closing a project performs the following functions:

All Work Orders are closed. Their actual finish date is set to the current date and their progress is set to 100%.
All Pallets marked as complete. If the Pallet was not fully issued, the database will update the Parts Catalog with the proper quantities.
All Requisitions are marked as completed. If the Requisition was not fully purchased and received, or issued, the database will update the Parts Catalog for the proper quantities.

After closing a project, a rollup must be done for that project. Rollup options for time cards should be checked for each WBS used by the project. The rollup will update each WBS as being complete and calculate their final values.

For the various modules (purchase orders, requisitions, pallets) when all items are complete, the system will set the header record to complete. Likewise, if the user sets a header record to complete, the system will set all of its associated items to complete.

Complete Requisition Item
A requisition item is considered complete when no more material will be withdrawn to that item. When a requisition item is set to complete, if the quantity used is not equal to the quantity required, the system will update the quantity required to be equal to the quantity used. The reservation on the parts catalog will also be updated. Requisition items must be set to complete by the user. The only time the system will automatically set an item to complete is when the associated project is closed.

When all requisition items have been set to complete, the system will automatically set the requisition to complete. If the user sets the requisition to complete, the system will automatically set all of its items to complete.

Complete Pallet Item
A pallet item is considered complete when no more material will be withdrawn to that item. When a pallet item is set to complete, if the quantity used is not equal to the quantity pallet, the system will update the quantity pallet to be equal to the quantity used. The pallet reservation on the parts catalog will also be updated. Pallet items must be set to complete by the user. The only time the system will automatically set an item to complete is when the associated project is closed.

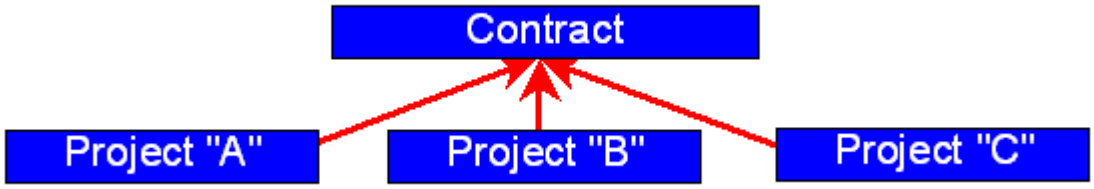
When all pallet items have been set to complete, the system will automatically set the pallet to complete. If the user sets the pallet to complete, the system will automatically set all of its items to complete.

Complete Purchase Order Item
When a purchase order item quantity received is equal to or greater than the quantity ordered, the system will set that item to complete automatically. If the received quantity is less than the ordered quantity but no more material is expected to be received to that item, it must then be manually closed by the user. The system will then update the parts catalog and requisition items.

When all purchase order items have been set to complete, the system will automatically set the purchase order to complete. If the user sets the purchase order to complete, the system will automatically set all of its items to complete.

Concept Design Estimate
The cost estimating possible during concept design is at a very high level and makes rather broad assumptions about the ship design, its general mission, and its physical and operational characteristics. Concept design may also make broad assumptions about the general methods and organization of the design, engineering and construction processes.

Contract
A contract describes an overall scope of work to be performed. One or more projects may be developed under a contract. Cost and schedules can be summarized across projects within a contract.



A contract ID is limited to a maximum of 20 alpha-numeric characters and must be unique.

Contract Design Estimate
Cost estimating at this phase of design describes costs on the basis of production interim products (hull blocks, outfit modules, and ship zones) and manufacturing processes (preparation, fabrication, assembly, installation, testing, etc.). Cost estimating can be integrated with detail engineering trade off studies, that include not only alternatives in design, but alternatives in production engineering and manufacturing processes. The cost estimating at this stage can be used as a successful strategy for managing the detail design process and will help ensure that the final design stays within prescribed cost objectives. The costing information provides the fundamental basis for establishing production budgets.

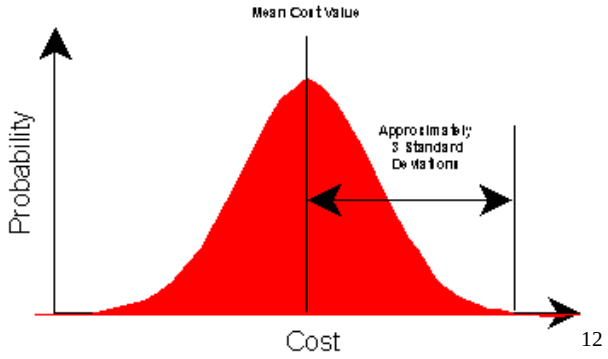
Cost Driver
A controllable design characteristic or manufacturing process that has a dominant effect on cost.

Cost Item
A *PERCEPTION* component of ship cost which includes either labor, material, or both. A cost item can be an entire ship, the smallest piece included in the ship (such as a nut or bolt), or anything between these two extremes. In addition to the direct material and labor costs each cost item also has indirect cost elements such as overhead, G&A, and taxes. A cost item can include the methodology used to estimate cost, schedule information in terms of start/complete dates, and the risk associated with it in terms of maximum/minimum percentage increase/decrease.

A cost item ID is limited to a maximum of 8 alpha-numeric characters. The combination of Contract/Project/Cost Item/Work Center must be unique.

Cost Risk
Cost Risk is the degree of cost uncertainty within an area of a project. It can be measured simply by relating the cost estimate against potential minimum and maximum cost values. Cost Risk can be impacted by Schedule Risk, Technical Risk, Performance Risk and Economic Risk. A statistical analysis may provide an additional measure of risk by estimating the probability that the actual return cost will equal the cost estimate in question. Refer to Risk Management, Schedule Risk, Technical Risk, Performance Risk and Economic Risk.

The Minimum and Maximum risk values are calculated by the system when a Cost Estimate Rollup is performed and can be viewed on any of the Estimate WBS level records.



[12]

Cost Variance
The difference between BCWP and ACWP. At any point in time it shows whether the work actually performed has cost more or less than that budgeted.

The cost variance is calculated by the system when either a Production Labor Rollup or a Production Material Rollup is performed and can be viewed on any of the WBS level records.

CPM
Critical Path Method; a procedure for determining activity schedules based upon their individual durations and lead times and upon the organization of activity sequences within the project network.

[12] Selected photographs obtained from www.nsnet.com.

Critical Path
That particular sequence of activities in a flow chart that comprise the most rigorous time constraint in the accomplishment of the end event.

Current Year Dollars
Level of costs in the year that the actual costs have been or will be incurred. Refer to Then-Year Dollars.

Deflation
A reduction in the level of costs over time. The opposite of inflation. Refer to Escalation.

Design-To-Cost
Design-To-Cost is similar to CAIV by prescribing strict cost objectives and constraints for the development of the detail design. However, Design-To-Cost places more emphasizes upon design producibility and manufacturing efficiencies and less upon innovations in design technologies and new ship systems.

Destination
Destination of requisition items. This field is in addition to warehouse storage locations.

The destination is limited to a maximum of 20 alpha-numeric characters.

Domestic PO
A purchase order is a domestic PO when the currency used by the vendor is the same as that used by the shipyard.

Direct CERs
CERs developed directly from a measurement of a single physical attribute (quantity and unit of measure) for a shipbuilding activity, and the cost of performing the activity. If the shipyard uses the same attribute for the same activities for each ship it builds, it can compile a database of cost-per-unit of measure for each of its different activities.

Three types of Direct CERs are used and are defined separately, as follows:

Calculated
Manual override
Predictive

Refer also to Calculated CERs, Manual CERs, and Predictive CERs.

Direct Cost
Any costs which are identified specifically with a particular final cost objective. Direct costs are not limited to items, which are incorporated in an end product. For example, support services that can be specifically allocated toward a given project may be direct costs.

Duration
The number of workdays required finishing a planning activity after it has started.

Drawing Number
Engineering drawing number. Any given requisition can be cataloged with a single engineering drawing number.

A drawing ID is limited to a maximum of 20 alpha-numeric characters. The combination of Contract/Project/Drawing must be unique.

EAC
Estimate-At-Completion is an estimate of the final costs when all work is completed. *PERCEPTION* develops an automated labor and material EAC (hours and cost) based upon work performance to budgets.

The EAC is calculated by the system when either a Production Labor Rollup or a Production Material Rollup is performed and can be viewed on any of the WBS level records.

Earned Value
Earned Value is the portion of the total budget earned or accomplished from the actual costs expended.

Early Finish
Early Finish is the earliest possible finish date for an activity.

Early Start
Early Start is the earliest possible start date for an activity.

EPA Item
Economic Price Adjustment items are special items for reimbursing the vendor for inflation.

Economic Risk
Economic Risk is the degree of uncertainty that general economic factors (for example, inflation, foreign exchange rates, etc.) can impact costs. It can be measured simply by estimating the possible spread of costs under best and worst case scenarios. A statistical analysis may provide an additional measure of Economic Risk by estimating the probability that the actual cost will equal that of the estimate in question. Refer to Cost Risk.

Empirical CERs
CERs developed by collecting a number of physical attributes (parameters) for a shipbuilding activity, such as ship type and size, part weight, part area, part perimeter, joint weld length, number of processes applied, number of parts involved, etc., as well as the cost of performing the activity. If this data is collected for a number of ships in the same shipyard, statistical analysis can be used to determine the statistical "significance" of the parameters and the equations with coefficients and exponent values for the activity CER. Empirical CERs can be used for all stages of design from conceptual through contract. They are more useful for "what-if" and tradeoff studies than direct CERs, which are described above. To determine general statistical significance, data from different shipyards can be used as this provides a better sample size for statistical analysis. However, the equation coefficients and exponent values for labor CERs are shipyard-dependent and will reflect the productivity levels of the different yards. If facility parameters are included the impact of facilities on productivity will also be evident.

Equation
A user-define formula stored on the equation library that can be used to compute costs and develop a cost item on the project.

An equation ID is limited to a maximum of 25 alpha-numeric characters and must be unique.

Escalation
An increase in the level of costs and prices over time. Escalation can be measured from indices from such sources as Consumer Price Index (CPI), Wholesale Price Index, Producer Price Index, Bureau of Labor Statistics, and others. These indices typically apply to specific cost items or commodities and can be used to adjust costs from one time period to another for comparison purposes. Refer to Current Year Dollars and Then-Year Dollars.

Estimate
Original cost figure developed to anticipate the cost for executing proposed work. The estimate normally becomes the production budget less any management reserves withheld from the estimate.

Estimating CERs
CERs used by estimators for relating cost to ship parameters available at the time of preparing the estimate.

ETA
Estimated time of arrival, or vendor promised delivery date. See "Promised Delivery Date."

Event
Specific point in time within a project when activities begin and/or finish. Events correspond to node points within a CPM network.

Exchange Date
Date on which foreign currency exchange rate has been quoted.

Exchange Rate
Ratio of home or domestic currency value to the foreign currency value.

Federal / State Tax Codes
Federal/State Codes indicating what tax (if any) are included on a material item.

FIFO
First In First Out. The unit cost based upon the earliest purchase price of items on shelf.

Float Time
This is the scheduled leeway that allows flexibility in the duration of an activity without adversely affecting any other activity or the overall project. Same as slack time. See also Free Float.

Flow Chart
The sequenced diagrammatic representation of events and activities.

FOB Instructions
Instructions on the purchase order for delivery/shipping of the purchased goods. This would include the freight company name, insurance requirements, special packing requirements, and any other specifics the buyer wants the delivery company to be aware of. Based on these instructions the vendor can make specific delivery arrangements according to the buyer's preference.

Free Float
Amount of time any given activity can slip its schedule before impacting the total float of other activities.

Functional Characteristic
Based on a system or operational characteristic of a ship. Functional has no physical boundary.

G&A
General administrative costs that can be isolated from general overhead. G&A (determined more typically for government contracts) identify administrative costs supporting the given work facility, such as legal and accounting, cost of money, marketing, etc.

Grand Block
An optional level of the PWBS (project-zone-sub zone/grand block) made from units, assemblies, sub-assemblies and parts.

A grand block ID is limited to a maximum of 8 alpha-numeric characters. The combination of Contract/Project/Zone/Grand Block must be unique.

Group
Group of similar or related SWBS cost accounts. For example, costs on separate piping systems like fire and wash, and fresh water, could be catalogued under the Piping Group. *PERCEPTION* provides algorithms for automatically determining the SWBS Group when the SWBS Account is given.

A SWBS Group ID is limited to a maximum of 8 alpha-numeric characters. The combination of Contract/Project/Group must be unique.

Group Technology
A method for grouping like or similar work together in order to gain the benefits possible from batch manufacturing, including elimination of multiple set-up process steps, etc. Group technology can be applied to many different kinds of work. The more classical example is the fabrication of a large group of same-size pipe spools. However, the concept evokes similar time and cost savings with zone sequencing of trade work (scheduling a given trade to work uninterrupted and unencumbered in specified ship spaces or zones or on a specific structural unit's pre-outfitting). Structural panels and sub-assemblies also can be scheduled in ways to maximize the productivity objectives of group technology.

Imposed Start
Imposed Start is a schedule constraint applied to either a planning activity or project milestone.

In-Care-Of Vendor
A material broker or distributor to whom the purchase order is issued.

Indirect Cost
Costs which are incurred for common or joint objectives and which are not readily subject to treatment as direct costs. Indirect costs include overhead, G&A, and any material burden.

Inflation
An increase in the level of costs over time. The opposite of deflation. Refer to Escalation.

Interim Product
Standard Manufactured Items (Interim Products) are those components and assemblies that can exploit the cost savings benefits from bulk manufacturing methods. Both overall costs and schedules can be reduced where ship designs can apply these standard interim products across different ships, even different ship types.

Any part on the Parts Catalog can be developed into an interim product (IP) package**.** This enables the cost estimating data for manufacturing the part to be standardized.

IP Indicator
Interim Product Indicator identifies where work is performed:

Internal Code	Description
0	N/A (ZERO)
S	Sub Zone
G	Grand Block
B	Block
U	Unit
A	Assembly
P	Sub-Assembly
C	Part

IP Type
Interim Product Type identifies type of work performed:

Code	Description
0	N/A
1	Structure
2	Machinery
3	Piping
4	HVAC
5	Electrical
6	Accommodations
7	Unit

Indirect Cost
Costs which are incurred for common or joint objectives and which are not readily subject to treatment as direct costs. Indirect costs include overhead, G&A, and any material burden.

IPT
Interim Product Team is an optional level of the COA hierarchy. It is an organization structure of multiple skills and expertise engaged in planning and managing the labor and material requirements for manufacturing an interim product, such as an outfitted hull block.

An IPT ID is limited to a maximum of 8 alpha-numeric characters. The combination of Contract/Project/COA Group/COA Sub Group/Supervisor/IPT must be unique.

JIT
Just-In-Time manufacturing philosophy designed to bring inventory balances down to zero without jeopardizing production schedule requirements. An extension of MRP ensures that all the correct material is available at the correct place at the correct time.

In contrast to MRP, JIT has been usually applied to industries featuring batch, repetitive process manufacturing where costs are collected and controlled by time period or process. JIT zero inventory concepts, however, have equal application to job shop or prototype manufacturing supported by MRP.

Last Rec'd Date
The date PO items are actually received by the yard. Both the purchase order item and the requisition item are updated with this date. If an item is received in partial quantity shipments, *PERCEPTION* maintains only the most recent receiving date for the item.

Late Finish
Latest possible finish date for an activity after all float time has been used. Any further slippage in the finishing of the activity will slip the overall project completion date.

Late PO Item
A purchased item for which its full quantity has not been/will not be received in time to meet the item's Required-In-Yard date.

To measure a late item, the Required-In-Yard date must be defined. There are several conditions for lateness:

- If the item is complete, lateness is the number of calendar days the last quantity was received relative to the Required-In-Yard date.
- If the last quantity was received prior to, or on the same day as, the Required-In-Yard date, then the item is not regarded as late.
- If the item is incomplete, lateness is the number of calendar days today's date is after the Required-In-Yard date.
- If the vendor's current ETA is later than today, the measure of lateness is extended to that ETA date.
- If both today's date and the vendor's current ETA are earlier than, or the same day as, the Required-In-Yard date, the item is not regarded as late.

Late Purchase
A purchase order for which deliveries of all its Order items have not been/will not be received in time to meet Required-In-Yard date schedules.

To measure a late purchase order, the system scans all purchase order items and measures individual items for lateness. The overall measure of lateness for the purchase order is the measure of lateness for the item that exhibits the largest calendar days of being late. The measure of lateness makes no consideration for relative item size or purchase value.

Some system reports allow lateness to be measured by screening out completed items and measuring the purchase order only on the basis of incomplete items.

Some system reports allow other means to break down the purchase order for lateness analysis. If the purchase order report is to be generated on the basis of the project accounts, and a purchase order includes items for more than one account, the purchase order lateness will be measured separately for each account based upon the collection of items cataloged for each account in the purchase order.

Late Requisition
A requisition for which deliveries of all its items have not been/will not be received in time to meet Required-In-Yard date schedules.

To measure a late requisition, the system scans all requisition items and measures individual items for lateness. The overall measure of lateness for the requisition is the measure of lateness for the item that exhibits the largest calendar days of being late.

The measure of lateness makes no consideration for relative item size or purchase value. Some system reports allow lateness to be measured by screening out completed items and measuring the requisition only on the basis of incomplete items.

Late Start
Latest possible start date for an activity after all float time has been used. Any further slippage in starting the activity will slip the overall project completion date, unless the activity duration time can be compressed in direct proportion to the additional amount of slippage.

LCC
Life cycle costs (LCC) include design and acquisition (production) costs as well as operations and supports costs. Life cycle costs have often been a major consideration for commercial ship owners who must look at "the bottom line" for profit and a return on their investment. If the cost of design and construction, including the cost of money, cannot be recouped within a reasonable amount of time, the ship will not be built. If the operating and maintenance costs (plus amortized construction costs) exceed operating revenues, again the ship will not be built.

When viewing the life cycle cost breakdown, only about 25% of the costs may be directly related to acquisition [1]. That means 75% of the total cost is operation and support and is made up of personnel, maintenance, and modernization. For naval ships, the largest of these (37%) is personnel cost, followed by maintenance (21%) and modernization (13%).

Therefore, in order to obtain a more complete picture of the overall cost of a ship, its life cycle costs may need to be estimated and evaluated. The life cycle of a ship or a piece of equipment is divided into essentially four stages:

- Conception Stage: All activities necessary to develop and define a means for meeting a stated requirement. For ships and equipment, this normally includes research and development, design, contract specifications, identification of all support necessary for introduction into service, and identification of funding required and managerial structure for the acquisition.
- Acquisition Stage: All activities necessary to acquire the ship and provide support for the ship and equipment identified in the conception stage.
- In-Service Stage: All activities necessary for operation, maintenance, support and modification of the ship or equipment throughout its operational life. The in-service stage is normally the longest stage.
- Disposal Stage: All activities necessary to remove the ship or equipment and its supporting materials from service.

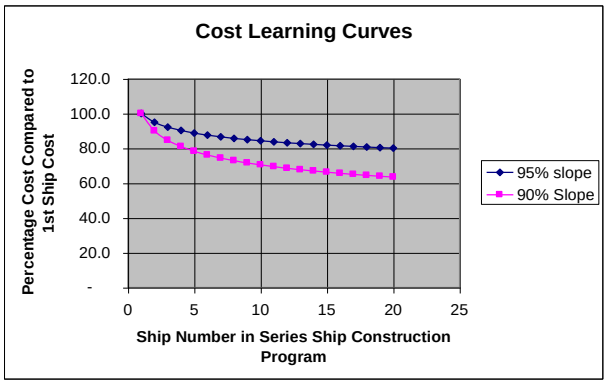
In order to determine the overall life cycle cost for a ship, costs must be estimated for each of the above stages.

Lead Time
For Work Orders: The extra amount of time expected to be required after a preceding activity, or set of activities, has been completed before a succeeding activity can begin. A negative lead time, called lag, represents a succeeding activity that can start before a preceding activity has been totally completed.

For Requisition Items: The number of days planned to process a purchase order from requisition to delivery.

Lead Work Center
Completes identification of lead work package.

Learning Factor
Cataloged CERs usually establish costs under a certain prescribed set of production circumstances. Traditionally, the CER relates to costs for a prototype or the first of a series construction program. However, it is normally anticipated that for a series of ships each ship labor cost should decrease from continued improvements introduced over time in the build strategy and manufacturing processes and refinements in production engineering.



While the above learning curves indicate a gradual cost reduction per ship of the series, examining cost reductions for standard interim products and manufacturing processes across all ship types can realize a similar experience. As shipyards introduce standard interim products as the primary means for designing and building ships, learning becomes a less important consideration. This is a good indication that the cost reductions are gained not by an actual learning experience, but more by a diminishing of expensive rework that should not have occurred in the first place.

Level-of-Effort
Support type effort (e.g., vendor liaison) that does not readily lend itself to measurement of discrete accomplishment. It is generally characterized by a uniform rate of activity over a specific period of time.

LIFO
Last In First Out. The unit cost based upon the most recent purchase price of items on shelf.

Lot Number
A manufacturer-supplied identifier for material items manufactured at a specific point in time and having common design and manufactured characteristics.

The lot number is limited to a maximum of 8 alpha-numeric characters.

Manual CERs
Direct (production-based) CERs determined by a user from external data, which are then entered into the system library to replace any CERs stored in the database. (Also see Calculated CERs, Direct CERs, and Predictive CERs.)

Management Reserve
Management Reserve is a portion of a bid estimate that is withheld and not allocated as production budget to cover contingencies, and unplanned production costs. Reserves may also be withheld to provide cost incentives for production to enable cost performance to be lower than what was estimated.

MAP
Manufacturing Automation Protocol describes a standardization of communications amongst various CIM systems modules.

Margin
An added percentage placed upon unit cost (Average or LIFO) of items on shelf that will be charged to contracts.

MEL
Major Equipment List. *PERCEPTION* enables the user to tag specific estimate cost items as MEL items. The system also provides an MEL worksheet.

Microsoft Project Task
A *Microsoft Project* task is a scheduling activity developed in *Microsoft Project*. When linked to *PERCEPTION*, the task develops project Planning Activities in *PERCEPTION*.

To be consistent with *PERCEPTION*, the user should identify the *Microsoft Project* task:

Planning Activity
Planning Activity Center

Microsoft Project further identifies a task with the following unique identification:

Microsoft Project Project ID
Microsoft Project Unique ID for the task

These two *Microsoft Project* identifiers are stored on the *PERCEPTION* planning activity when it is created from the *Microsoft Project* transfer process and the user should not modify them. They are the only means for *PERCEPTION* to re-locate the task on *Microsoft Project* should the task be updated with performance information available in *PERCEPTION*.

Milestone Item
A pseudo item carrying a purchase order milestone payment. This milestone item provides a means to plan and schedule cash flow requirements outside the normal delivery schedule parameters of the system.

Modular Construction
In the past, shipyards used to build ships ship system by ship system. The collecting of costs by ship system was a relatively straightforward procedure. However, better methods for more productive organization of work have come into play. The packaging of work now focuses not on the specific ship systems, but upon the nature of the work to be performed. The objective is to do the work when the working conditions are most productive and to eliminate or minimize any efforts that do not add value to the activity. This means that work done in shops are typically more productive than if the work were scheduled for on board. To complement this concept, modular construction techniques, including on block construction and pre-outfitting have become the preferred methods for maximizing production efficiencies. These methods, however, do require more advanced product engineering in order to gain the full potential of efficiencies and cost savings.

> *What was once a ship systems-oriented way of organizing work and collecting costs has now given way to organizing work and collecting costs by interim products (sub-assemblies, assemblies, hull blocks, ship zones) and manufacturing processes (cutting, welding, assembling, etc.). The interim products can be standardized and identified within a PWBS.*

Module
The placement of equipment and its related systems together on a machine foundation (seat) prior to its installation on-unit or on-board.

Monte Carlo Techniques
A simulation methodology based on the general idea of using sampling to estimate the desired result. The sampling process requires describing the problem under study with appropriate probability distributions from which samples are drawn.

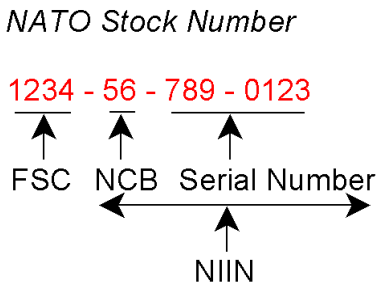
Most Likely Time
The time (duration) that would occur most often if the activity was repeated under EXACTLY the same conditions many times. If many knowledgeable people were asked for the most likely time, the value given most often would form the most likely time estimate.

MRP
Material Requirements Planning is a set of planning techniques to help better determine what to order, how much to order, and when to schedule delivery. MRP helps set priorities for inventory planning and control, capacity requirements and shop floor control functions.

MRP II
Manufacturing Resource Planning II is all of MRP plus the integration of accounting and financial systems.

NATO Stock Number
For warship projects, each material item may need to be cataloged with the appropriate NATO Stock Number for the following reasons:

Insure the Government that equipment to be installed upon the ship meets required Government quality and functional specifications.
Insure equipment is standardized within the NATO support and maintenance program.



The Federal Supply Classification (FSC) number is a 4-digit code which groups similar-type items into classes:

10xx Weapons
20xx Ships and Marine Equipment
30xx Mechanical Power Transmission Equipment

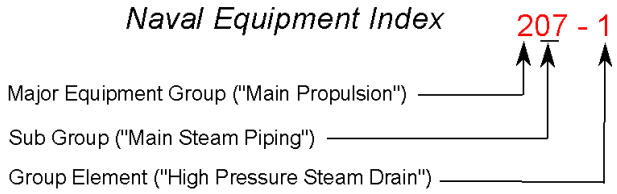
The National Codification Bureau (NCB) number is a 2-digit (alphanumeric) number designating the NATO country that cataloged the item.

The National Item Identification Number (NIIN) is a composite code including the NCB and a 7-digit alphanumeric material item serial number. The NATO Stock Number MUST BE ASSIGNED to requisition items PRIOR to purchasing.

The use of the NATO Stock Number for material items in *PERCEPTION* is optional.

Naval Equipment Index (NEI)
The Naval Equipment Index is a 4-digit number that Index Number identifies ship's material by weight group:

100-x Hull Structure
200-x Propulsion systems
300-x Electric Plant
400-x Communications & Surveillance
500-x Auxiliary systems
600-x Outfit & Furnishings
700-x Armament
800-x Load Items



The NEI number is broken down into the following elements:

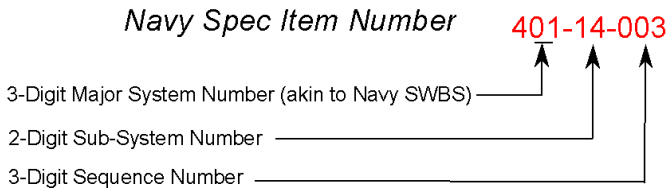
The Major Group identifies one of eight major functional material groups on board ship.

The Sub Group identifies the major function of the equipment within the group. When a component serves multiple functions, it is included with the group that best describes its primary function. All accessory items are included with the components they serve.

The Group Element identifies a particular function described within a particular SUB Group.

The use of the NEI Number for material items in *PERCEPTION* is optional.

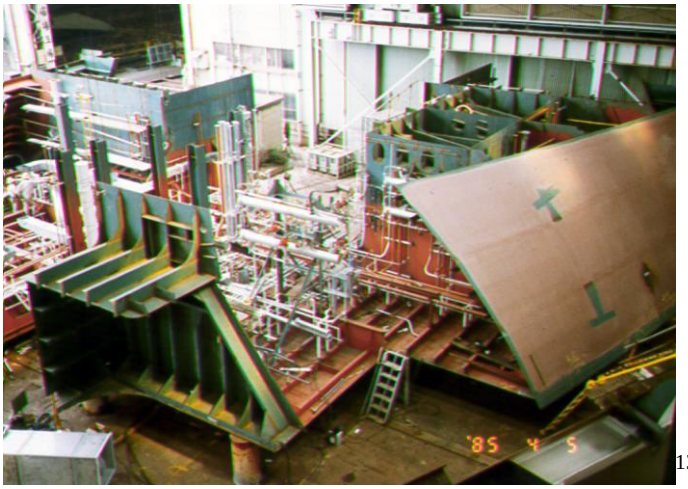
Navy Spec Item
The US Navy uses what is called the "Navy Spec Number Item" coding for all repair and overhaul work. The format for this coding is as follows:



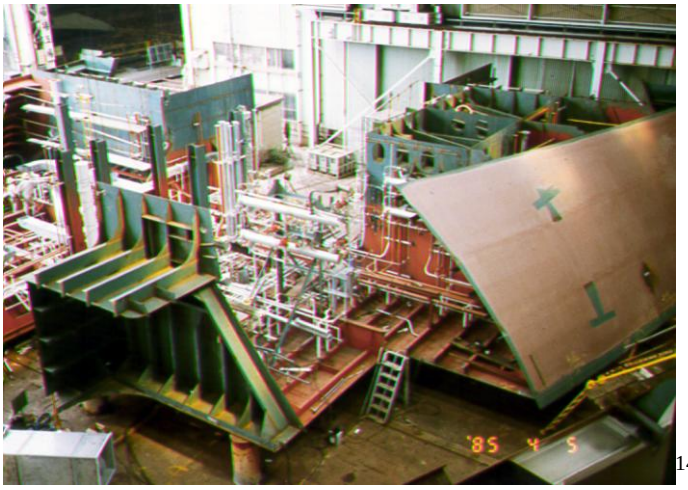
The Navy Spec Item is also called the "SWLIN." It is limited to a maximum of 10 alpha-numeric characters and is recorded on the cost item record.

Need Date
The Need Date is the date that material is planned to be withdrawn to the work site or marshaled for a pallet. The Need Date can be scheduled manually or by way of Planning Activities or Work Orders.

On-Block Outfit
A method of installing outfit system components and equipment items onto an assembled structural block before it is erected. This work is often called "Pre-outfitting." Pre-outfitting often is performed in two distinct phases: Pre-outfitting hot refers to work that must be performed on the block before the block can be painted (steel outfit items, seats, pipe, etc.); Pre-outfitting cold refers to work that can be performed after the block has been painted (value fitting, HVAC, electrical cabling, equipment, etc.).

 [13]

On-Board Outfit
A method of installing outfit system components and equipment items on board, after blocks have been erected, fitted and welded. This is typically the least productive stage of construction for outfit installation.

 [14]

On-Unit Outfit
A method of installing outfit system components and equipment items as an outfit module. Since units often can be assembled in a shop environment, under mostly ideal working conditions, they are generally considered the most productive stage of construction. Units may be installed either on-block or on-board.

[13] Selected photographs obtained from www.nsnet.com.
[14] Selected photographs obtained from www.nsnet.com.

 [15]

Optimistic Time
The shortest time (duration) that is considered possible for an activity. There is virtually no hope of completing the activity in less than the optimistic time.

Order Quantity
Quantity on order of a requisition item.

Original Promised
The vendor's original estimated time of arrival on a purchase order item.

Overhead
An indirect cost that is normally related to direct labor costs. Overhead includes such general costs as employee fringe benefits, plant maintenance and utilities, rents and leases, equipment depreciation, etc.

Package
A group of cost items (package items) catalogued on the system interim product package library. A package can be used any number of times within a given project or across any number of different projects. Packages may be added to projects by specifying a quantity that applies to all items of the package.

Quantity may also be defined as a size parameter (for example, cargo space volume). In this case, each package item of the package should have its costs (labor and/or material) normalized in terms of the size parameter.

[15] Selected photographs obtained from www.nsnet.com.

When a package is added to a project, each package item becomes additional cost items for the project.

A package ID is limited to a maximum of 25 alpha-numeric characters and must be unique.

Package Item
A package item defines a cost item within a package on the interim product package library. When a package is added to a project, the user supplies a value of quantity, which applies to all of the package items. Quantity may also be defined as a size parameter (for example, cargo space volume). In this case, each package item of the package should have its costs (labor and/or material) normalized in terms of the size parameter.

When a package is added to a project, each package item becomes additional cost items for the project.

A package item ID is limited to a maximum of 8 alpha-numeric characters.

Packing Slip
A document from the vendor that itemizes the material items included in a particular delivery.

The packing slip number is limited to 15 alpha-numeric characters.

Pallet
A pallet is a list of material specifically identified for a work order. The pallet items are linked to requisition items and/or drawing BOM. The use of pallets for issues to production work orders is optional.

A pallet ID is limited to a maximum of 20 alpha-numeric characters. The combination of Contract/Project/Pallet must be unique.

Panel
Sub-assemblies that typically have unidirectional stiffening members.

Paragraph
A paragraph identifies each item of work to be performed for a ship repair project. The paragraph column on the cost item is for informational use only.

A paragraph number is limited to a maximum of 25 alpha-numeric characters.

Part
The lowest level of the PWBS (project-zone-unit-assembly-sub assembly-part) shipyard manufactured interim product.

A part ID is limited to a maximum of 8 alpha-numeric characters. The combination of Contract/Project/Zone/Unit/Assembly/Sub Assembly/Part must be unique.

Part Attribute
The user can catalog parts in the Parts Catalog with any number of different attributes, such as size, color, material specifications, etc. There are functions in the system where the user can search the catalog for parts according the user-defined criteria that are applied to these attributes in the selection process.

The part attribute is limited to 50 alpha-numeric characters.

Part Attribute Type
Part attributes can be cataloged by type categories, such as physical, performance, etc. Part attribute types provide a means for focusing on certain identifiers to make the search and selection processes easier. Part attribute types must be defined before they can be used.

The part attribute type is limited to 50 alpha-numeric characters and must be unique.

Part Classification
The user can catalog parts in the Parts Catalog under user-defined Part Classifications. Part classifications provide a means for focusing on certain identifiers to make the search and selection processes.

The part classification is limited to 25 alpha-numeric characters and must be unique.

Part Number
The unique identifier for any part in the Parts Catalog.

The part number ID is limited to a maximum of 25alpha-numeric characters. The combination of Part ID/Part Type must be unique.

Parts Catalog
A listing of all standard purchased parts, stock items and standard interim products (manufactured) for each stage in the construction of a complete ship.

Part Sub Classification
The user can catalog parts in the Parts Catalog under user-defined Part Classifications. These classifications can be further broken down into Sub Classifications. Part classifications and sub classifications provide a means for focusing on certain identifiers make the search and selection processes easier.

The part sub classification is limited to 25 alpha-numeric characters. The combination of Classification/Sub Classification must be unique.

Part Type
A broad category of material:

Internal Code	Description
1	Direct Purchase (Standard Part)
2	Manufactured (Standard Part/Component)
3	GFE/OFE Part
4	Stock Part
5	Load Items & Spares
6	Vendor Furnished Information (VFI)
7	Milestone Payment
8	Economic Price Adjustment (EPA)
9	Sub-Contractor

Performance Measurement System
In order to identify what changes will provide the most significant levels of benefit; the shipyard must be able to evaluate its operations in quantitative terms. This means that the shipyard must have implemented a reasonably accurate means for measuring cost and schedule performance at appropriate levels of detail. Performance measurement systems should provide the visibility of performance that will indicate whether or not changes are warranted and ultimately if the changes are proving to be effective. Return cost information from such systems form the information needed to develop high quality predictive CERs that reflect not only past cost performance, but also anticipated performance on new work.

Performance Risk
Performance Risk is the degree of uncertainty that the engineering, manufacturing and management resources can perform for the estimated cost and schedule. It can be measured simply by estimating a possible spread of costs under a best and worst case scenario. A statistical analysis may provide an additional measure of Performance Risk by estimating the probability that the actual cost will equal that of the estimate in question. Refer to Cost Risk.

Person To Contact
See Responsible.

PERT
Program Evaluation and Review Technique is a scheduling method that utilizes CPM procedures for computing activity schedules. PERT also calculates odds actually happening on any given date using a very simple statistical computation upon three (3) separate manually derived estimates of duration for each network activity: most likely, most optimistic, and most pessimistic

Pessimistic Time: The longest time (duration) that is considered possible for an activity. There is virtually no expectation of completing the activity in more than the pessimistic time.

Optimistic Time: The shortest time (duration) that is considered possible for an activity. There is virtually no hope of completing the activity in less than the optimistic time.

Most Likely Time: The time (duration) that would occur most often if the activity were repeated under EXACTLY the same conditions many times. If many knowledgeable people were asked for the most likely time, the value given most often would form the most likely time estimate.

PERCEPTION (and *PERT-PAC,* contrary to its name) does not perform this probable odds analysis.

Pessimistic Time
The longest time (duration) that is considered possible for an activity. There is virtually no expectation of completing the activity in more than the pessimistic time.

Planning Activity
A Planning Activity is a means to develop a set of project baseline budgets and schedules from which detail planning of work orders and material requirements can proceed.

An activity ID is limited to a maximum of 8 alpha-numeric characters. The combination of Contract/Project/Planning Activity/Activity Center must be unique.

PO Action Date
Date prior to material delivery upon which the purchase order must be issued in order to meet required production schedules. The PO Action Date is computed by the system by subtracting a user-defined PO Lead-Time from the Required-In-Yard Date. Therefore, the Required-In-Yard Date must be defined before the system can determine the PO Action Date.

PO Lead-Time
The number of calendar days needed before the Required-In-Yard Date for the vendor to process a purchase order. The PO Action Date will be calculated by the system in appropriate calendar days from the Required-In-Yard Date and the Lead Time.

PO Planned Start Date
Planned date to begin the purchasing process. This should be the latest date that the requisition should have been completed by production engineering. The time between the PO Planned Date and the PO Action Date is the PO Process Time.

Pre-outfitting
See On-Unit and On-Block Outfit.

Predictive CER
A single Direct (production-based) CER determined from analysis of several selected shipsets of return cost data based on actual man-hour expenditures and their associated measurable parameters (e.g., square feet of painted area). The analysis can be a regression or simple averaging. (Also see Calculated CERs, Direct CERs, and Manual CERs.)

Preliminary Design Estimate
The cost estimating during preliminary design remains at a relatively high level, but there is more detail information about the ship design with regard to the hull structure, the equipment and outfit systems. During preliminary design, cost estimating can be successfully integrated with the design-engineering process to produce high-level trade off studies useful for developing an appropriate direction for the ship design. These studies set the basic design parameters for meeting mission requirements within general cost and schedule constraints. Preliminary design cost estimating may begin to reflect the effects of alternate build strategies.

Product-Oriented Work Breakdown Structure
The PWBS is a combination of a number of breakdown structures that form a hierarchical representation of the products, stage and work type associated with the shipbuilding process. The components of the PWBS hierarchy are Zone - Outfit Zone/Grand Block (optional) – Unit – Assembly – Sub Assembly – Manufactured Part.

Product Structure
A hierarchical framework that identifies interim products and their related parts and components.

Productivity Factor
A productivity factor is a cost multiplier that adjusts an estimated cost for an anticipated increase or decrease in work productivity. Different productivity can be expected for different manufacturing work centers, skill groups, stages of construction, work orientation, design complexity, learning, etc.

Progress
Progress is a measure work accomplishment. *PERCEPTION* measures progress essentially as the percent of earned value to the total budget. The system adjusts the earned value over the course of the project's execution based upon the project's actual cost performance to its budgets.

PERCEPTION also tracks a manual progress that is rolled up from work orders. The progress is calculated by the system when either a Production Labor Rollup or a Production Material Rollup is performed and can be viewed on any of the WBS level records.

Project
A project defines the major work and cost elements to be estimated. Each project must have a work breakdown structure to summarize costs at various levels, from the detail cost items up to the overall project. Each project may have a product work breakdown structure against which cost items may be catalogued for summary purposes.

Projects usually are developed for each ship to be built or ship to be repaired. Each project may be all-inclusive with respect to work requirements such as design, construction and management support costs. However, additional projects may be developed for class design work that applies across all ships (i.e., projects) of the contract. Separate projects also may be developed for other non-construction contract requirements, such as training programs, operational cost estimating, etc.

A project ID is limited to a maximum of 8 alpha-numeric characters. The combination of Contract/Project must be unique.

Projection
Estimated total final cost determined periodically throughout the course of a contract's execution based upon the budget, and modified to reflect actual performance on completed work and anticipated performance on remaining work. Same as EAC.

Promised Delivery Date
PERCEPTION monitors the promised delivery date (Estimated Time of Arrival or ETA) for material items, both as originally provided by the vendor and as updated by entries made by the expeditor. The various system functions process the promised delivery dates accordingly:

New Purchase Order: Installs ETA the same for all items defined on the purchase order.
Added Purchase Order Item: Installs new item with specified ETA that, if earlier from the PO's prior ETA, changes the PO's ETA to agree.
Expeditor's Entry of ETA: Updates PO ETA. Updates all items accordingly if directed to do so by the user.

Anytime the system has an entry for a new ETA and no original PO ETA has been defined, the original ETA will be set to that new ETA.

The ETA date is carried at the item level of the purchase order. However, the system will rollup the earliest item ETA for the ETA for the purchase order.

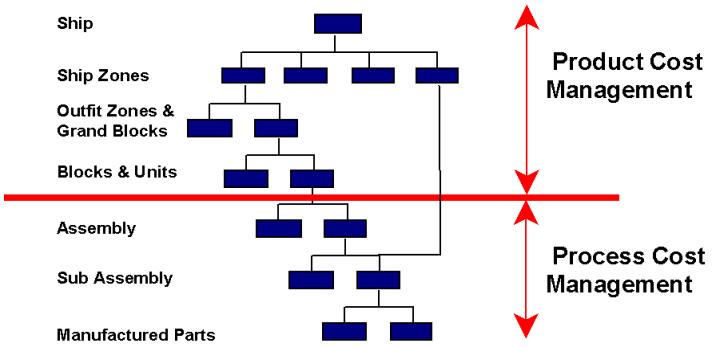
Purchase Order
Collection of requisitioned material items to be purchased from a vendor.

The purchase order ID is limited to a maximum of 8 alpha-numeric characters and must be unique. The purchase order number normally is a sequential number and can be automatically created by the system or is controlled within the purchasing department.

Purchase Order Date
The date the purchase order was created.

Purchase Order Item Number
Within a given purchase order, each individual material item must be uniquely identified with a purchase order item number (maximum of 8 characters). Purchase order items are then each assigned one or more detail records that identify the requisition item that is being used to place the order.

PWBS
Product Work Breakdown Structure, or PWBS is a hierarchical list of interim products. Once any complex product, like a ship, has been designed, planning efforts need to be applied toward maximizing production efficiencies. This effort entails organizing work and resources that promote productivity and eliminate non-value added costs. The concept of group technology, for example, supports this objective and enables engineered systems, as defined by a system Work Breakdown Structure (SWBS), to be broken down into definable interim products. These products can exploit significant cost and schedule savings because they enable the work to be performed under more convenient and more easily performed work conditions.



The elements comprising the PWBS are the contract, project, zone, outfit zone/grand block, unit/block, assembly, sub assembly, and manufactured parts.

The name for each level of the PWBS is limited to a maximum of 8 alpha-numeric characters. Using the PWBS is optional for any project. When used, *PERCEPTION* does not require the PWBS to be completely defined, but only to the extent that is necessary for planning and production control purposes.

The Generic PWBS (GPWBS) is an attempt to standardize the definition of the PWBS across the shipbuilding industry. Such a standard benefits the Navy by enabling a common basis for comparing ship designs and build strategies and evaluating their costs. Project estimate cost items may be mapped to the GPWBS, and GPWBS reports are available on the system. The GPWBS is limited to Ship Zone, Work Type and Stage of Construction.

QA Flag
For purchased parts, it is a user-defined code scheme to identify specific quality assurance (QA) inspections for delivered parts and components. The QA flag is used by *PERCEPTION* to place received material into a pending inspection status.

The QA Flag has a maximum limit of 8 alpha-numeric characters.

Quantity Available
For purchased parts, it is the net quantity remaining of quantity received less quantity used by production.

For stock parts, it is the net quantity remaining of quantity currently on hand (on shelf) less quantity reserved for projects.

Quick PO Item
A Quick PO Item is a purchase order item added to a purchase order without having a pre-existing requisition item as its source. The system instead allows the user to create the requisition item as the Quick PO Item is being created. The requisition item is required by the system, because it, rather than the purchase order item, carries the necessary information about the project WBS, etc. (A purchase order item can reference multiple requisition items across different projects if necessary.)

Quick Stock Withdraw
The Quick Stock Withdraw allows stock items to be withdrawn to production work orders without having a pre-existing requisition (or pallet) item as its means for identification. The system automatically creates requisition items in the posting process of the Quick Stock withdraw, complete with appropriate project WBS assignments. The system gets this WBS information from the work order that referenced for the material withdraw.

Receipt Date
Actual delivery date

Received Quantity
The quantity of a purchased item actually delivered and logged into the system.

Required-In-Yard
The date the material is required by the requisition to be delivered and received. Required-In-Yard date is carried at the item level of the requisition. It is also carried at the overall requisition header level as the earliest Required-In-Yard date of items on file for the requisition. It is also carried at the overall purchase order header level, again as the earliest Required-In-Yard date of the items on file for the purchase order.

Requisition
A requisition is a detail listing/bill of material requirements that define some portion of the project. *PERCEPTION* manages requisition at two levels of detail:

Requisition header that provide general overall information about the requisition
Requisition items that are the individual material item in the requisition.

For stock items, a purchase requisition is a listing of stock inventory items.

A requisition ID is limited to a maximum of 8 alpha-numeric characters. Sequential requisition IDs can be automatically generated by the system. The combination of Contract/Project/Requisition must be unique.

Requisition Date
The date the requisition was created.

Requisition Heading
Description of the material items contained within the requisition. This heading is printed on each requisition report.

A requisition heading is limited to a maximum of 40 alpha-numeric characters.

Requisition Item
Within a given requisition, each individual material item must be uniquely identified with a requisition item number.

A requisition item ID is limited to a maximum of 8 alpha-numeric characters. Sequential requisition item IDs can be automatically generated by the system. The combination of Contract/Project/Requisition/Item must be unique.

Reserve
See Management Reserve.

Responsible
Name of person placed on project requisition, pallet and/or purchase order document. Some reports show person responsible as "Foreman."

The responsible column is limited to 20 alpha-numeric characters.

Return Cost
The actual cost of a ship as computed by summing all the costs associated with completed work orders and purchase orders.

The return cost is calculated by the system when either a Production Labor Rollup or a Production Material Rollup is performed and can be viewed on any of the WBS level records.

Risk Management
Risk management is the process of isolating areas of cost, which have the greatest uncertainty, and taking appropriate action to minimize or eliminate their potential adverse impact upon a project. Refer to Cost Risk, Schedule Risk, Technical Risk, Performance Risk, & Economic Risk.

The Minimum and Maximum risk values are calculated by the system when a Cost Estimate Rollup is performed and can be viewed on any of the Estimate WBS level records.

ROI
ROI measures the estimated costs against estimated revenues. The balance or profit margin for the ship owner can make or break a design proposal. It also can form the basis for a design optimization strategy and trade-off effort that seeks to maximize the ship owner's return on investment.

Another form of ROI measurement strategy is to determine required freight rates (RFR) for the ship design proposed for service. Minimizing the RFR also can form the basis for design optimization studies.

Naval ships do not have a bottom line commercial profit consideration. These ships are put into service only to satisfy a national security commitment to its citizens. However, as limited government funds address an ever-widening array of government responsibilities, naval ships designs now must be developed with an increasing focus on getting "the biggest bang for the buck". Design and engineering trade-off studies can minimize costs without sacrificing mission capabilities. The objective for these studies is an increase in mission capabilities without an increase in cost.

Rollup
Rollup is a function that summarizes cost and performance information from the lowest level of detail under a work breakdown structure(s) to the highest level. The system provides four different rollups: Cost Estimate Rollup, Production Baseline Rollup, Production Labor Rollup, and Production Material Rollup. Rollups are initiated by the user for a specific contract and project. Multiple projects can be selected for rollup at one time. The results of these rollups can be viewed on any of the WBS level records.

Schedule Risk
Schedule Risk is the degree of schedule uncertainty within an area of a project. It can be measured simply by relating the schedule estimate against potential minimum and maximum schedules. A statistical analysis may provide an additional measure of risk by estimating the probability that the actual schedule will equal the schedule estimate in question. Costs typically have some dependency upon schedule. For example, schedule directly impacts overhead costs and effects cost escalation (Economic Risk). Schedule also can have a direct impact upon the cost to perform the work (Performance Risk) and affect the available resources and technical information. Schedule can have an effect upon Technical Risk and upon contractual items such as penalties and incentives. Refer to Cost Risk.

Schedule Variance
The difference between BCWP and BCWS. At any point in time it represents, in terms of cost, the difference between work actually performed (accomplished) and work scheduled.

The schedule variance is calculated by the system when either a Production Labor Rollup or a Production Material Rollup is performed and can be viewed on any of the WBS level records.

Serial Number
For parts catalog items: A manufacture-supplied identifier of a particular material item and is limited to a maximum of 8 alpha-numeric characters.

For tools: A manufacture-supplied identifier of a particular tool and is limited to a maximum of 25 alpha-numeric characters.

For purchase orders and for work orders: A system-generated unique number. This column is numeric and can not be edited by the user.

Ship
The highest level of interim product.

Shelf Life
Shelf life in days of a material item.

Size
Size of a material item. Maximum of 20 alpha-numeric characters.

Slack Path
Sequences of activities having excess time as opposed to the critical (or negative slack) paths. Slack may exist in varying amounts; positive slack indicates scheduling flexibility within the path.

Slack Time
Slack time is the number of workdays that a planning activity may slip its finish schedule before it impacts other activities in the project. *PERCEPTION* manages two values of slack:

Free slack is the number of workdays that a planning activity may slip its schedule before it impacts the next activity in sequence.
Total slack is the number of workdays that a planning activity may slip its schedule before it impacts the overall project completion date. When all total slack is completely used, the planning activity is on the critical path.

Slack also is called "float." The two terms are synonymous.

S/O Indicator
Structural/Outfit Indicator identifies nature of cost:

Internal Code	Description
0	N/A (ZERO)
S	Structure
Z	Outfit
M	Material
V	Services
L	Labor

Special Items
Items on a purchase order that are not requisitioned, such as freight, duty, etc.

Stage of Construction
Stage of Construction is the division of the manufacturing and assembly process by sequence.

Standard Interim Product
An interim product is any output of a production work stage that can be considered complete in and of iteself. It also can be presented as an element within any level of a product work breakdown structure (PWBS).

As shipyards adopt standard interim products as the primary basis for building ships, the interim products themselves can form the means for developing high-quality cost estimates.

The interim product "cost estimate package" consists of a set of cost items and/or cost item CERs each describing labor and/or material costs. The labor costs may be broken down into the product's sequence of manufacturing and assembly stages. They may also include indirect cost efforts such as supervision and material handling, as well as related direct costs such as testing.

The interim products can be defined at any level of the PWBS. The higher the level, the more ship type-specific they are likely to be. These interim products become, in effect, high level complex CERs because they may include any number of cost items and these cost items may be parametric to any number of different defining characteristics.

The use of the standard interim product as a vehicle for cost estimating is sometimes referred to as a "Re-use" package that can operate with a variety of applications. The important aspect of the package used repeatedly as needed in developing a project cost estimate.

Standard Part Number
For companies desiring a standardized parts coding system (often required for optional use of CAD/CAM systems), *PERCEPTION* provides a means to catalog a Standard Part Number with standard descriptions and other detailed characteristics. The Standard Part Number may be made the same as the Stock Inventory Number.

The standard part number is limited to a maximum of 20 alpha-numeric characters. The combination of Part Number/Part Type must be unique.

Standard Price
A material item charge-out unit price manually determined.

Stock Inventory
Some material may be required to be drawn from general stock inventories. To properly account for these items, the material control system must identify stock items used by project requisitions. Once these items have been recorded, their costs will be included in the project WBS cost accounting. The *PERCEPTION* system accommodates this requirement either by treating the stock department as a direct vendor or by implementing the stock inventory capabilities of the *PERCEPTION* system. This latter feature permits requisitions to be developed in the same way as for direct material purchase

Storage Location for Materials
Location identification for storing items.

The location ID is limited to a maximum of 12 alpha-numeric characters and must be unique.

Sub-Assembly
A level of PWBS (project-zone – unit – assembly – sub assembly) that is a definable unit of product that is then incorporated in a larger unit assembly.

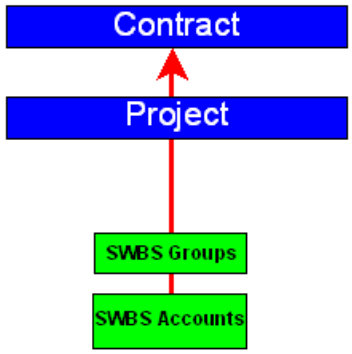
A sub assembly ID is limited to a maximum of 8 alpha-numeric characters. The combination of Contract/Project/Zone/Unit/Assembly/Sub Assembly must be unique.

Sub-Zone
An optional level of PWBS (project – zone – sub zone) that is a geographic division of the ship into "compartments" to suit documentation, planning and scheduling of the shipbuilding process.

A sub zone ID is limited to a maximum of 8 alpha-numeric characters. The combination of Contract/Project/Zone/Sub Zone must be unique.

SWBS
System Work Breakdown Structure, or SWBS, is a means for identifying work components of a project. SWBS is one of several types of project work breakdown structures, or WBS. Normally, the SWBS is oriented around engineered systems that make up the ship as a deliverable product. SWBS may also be applied to ship repair projects.

Since each project requires its own SWBS, each project can have a different SWBS. For ship repair and non-construction projects, the SWBS can be tailored to suit specific contract job orders. The hierarchies that comprise the SWBS are the contract, project, SWBS groups and SWBS accounts that are cataloged under the SWBS groups.



Both the SWBS group and SWBS account IDs are limited to a maximum of 8 alpha-numeric characters. Both the combination of Contract/Project/Group and of Contract/Project/Group/Account must be unique.

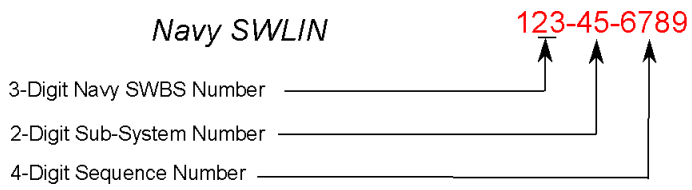
SWBS Account
A SWBS cost category to which project costs can be assigned. The SWBS account resides at the fourth level of the contract WBS (contract-project-group-account), under the SWBS group.

A SWBS account ID is limited to a maximum of 8-characters. The combination of Contract/Project/Group/Account must be unique.

SWBS Group
A SWBS cost category to which project costs can be assigned. The SWBS group resides at the third level of the contract WBS (contract-project-group).

A SWBS group ID is limited to a maximum of 8 alpha-numeric characters. The combination of Contract/Project/Group be unique.

SWLIN
Also called the Navy Spec Item Number, Ship Work Line Item Number identifies each item of work to be performed for a government ship repair project. The SWLIN is a composite number:

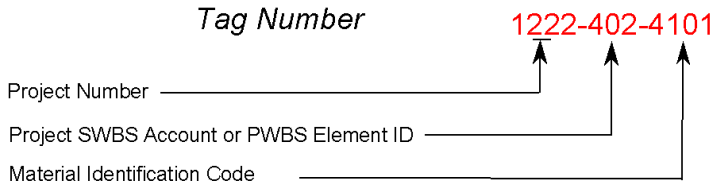


The SWLIN is limited to a maximum of 10 alpha-numeric characters and is recorded on the cost item record.

Tag Number
Each requisition item may be labeled with a tag number that is used primarily for storage and production identification purposes.

Normally, this identifier should have commodity significance and may be developed directly from a commodity index code, if available, or at least from a quasi-code index that essentially permits cataloging material items within material family groups. The universal index is preferable for developing a meaningful material coding system that helps purchasing the most; however, adherence to a rigid coding system causes problems for engineering.

Using a standard material program for all design activities can minimize these problems. For example, an 8" bronze, flanged globe valve may be designated a commodity identifier of 4101, where 41 indicates the globe valve under the family group number 4 (valves) and 01 is the sequential number for the 8" size. The composite tag number for this example would be the following:



Where the first two characters of the commodity identifier help to point out the item as a Pipe Valve.

For large ticket items, scheduling may require the identification of milestone payments as dummy requisition items.

For long-term procurement contracts, there may be special provisions for inflationary economic price adjustments to these milestone payments. The item tag number should be assigned to requisition items prior to purchasing.

If a requisition item does not have any tag ID assigned to it by the user, the system will update the tag with an ID that is the combination of the project plus the SWBS account. This tag can then used for identification purposes by material control.

A tag ID is limited to a maximum of 25 alpha-numeric characters.

Task
See *Microsoft Project* Task.

Taxes
The system provides features that will compute sales taxes chargeable as a cost to the project automatically. Both Federal and State/Provincial sales taxes can be identified.

The total taxes are calculated by the system when a Production Material Rollup is performed and can be viewed on any of the WBS level records.

Technical Risk
Technical Risk is the degree of uncertainty that a technology required for the project can be developed and implemented within estimated costs (and schedule). It can be measured simply by estimating the costs for best and worst case scenarios, including possible need to pursue alternate technologies. A statistical analysis may provide an additional measure of Technical Risk by estimating the probability that the actual cost and schedule for the technology will equal those of the estimates in question. Refer to Cost Risk.

Then-Year Dollars
Then-Year Dollars are a level of costs estimated at the time when actual costs will be incurred. When estimating then-year costs using current year costs as a basis, the latter must be adjusted using predicted escalation indices. See Current Year Dollars and Escalation.

TOC
An extension to LCC is the Navy's Total Ownership Costs (TOC). TOC covers the same cost elements of life cycle costs, but also includes the added costs for the infrastructures required to support training facilities and other activities normally treated as indirect costs to the ship and its operations.

Top 3 Navy Numbers
First three digits of the Navy Spec Item Number.

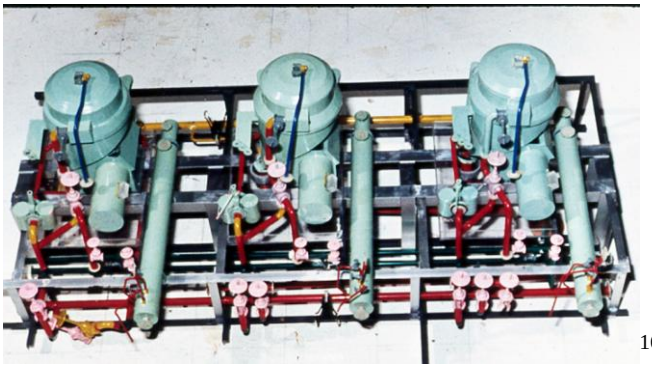
Total Risk
Refer to Cost Risk.

Transfer Project
Project that is borrowing material from another.

Transfer Quantity
Quantity of excess or borrowed material from one project to another.

Unit
A level of PWBS (project-zone-unit) that defines a structural assembly, such as hull block. A unit may also define an equipment and/or outfit module.

A unit ID is limited to a maximum of 8 alpha-numeric characters. The combination of Contract/Project/Zone/Unit must be unique.


[16]

Unit of Measure
A unit of measure is a metric by which work and cost can be measured, such as hours per ton, dollars per square foot, etc. Units of measure must be defined before they can be used.

The unit of measure ID is limited to a maximum of 8 alpha-numeric characters and must be uniqe.

Unit Price
Price per unit item quantity. When multiplied by the quantity, produces the extended price.

The method for determining the unit price for stock items is option that is set for the shipyard by the accounting department. The options are Last Purchased Price, Average Cost, or Standard Price (where the user enters the unit price).

UoM
See Unit of Measure.

[16] Selected photographs obtained from www.nsnet.com.

Used Quantity
Quantity of a requisitioned (and received item) that has already been used.

Vendor Detail ID
A means for identifying multiple vendor addresses. Maximum of 60 alpha-numeric characters.

Vendor Name
Name of the vendor supplying material from a purchase order. Maximum of 40 alpha-numeric characters.

Vendor Number
Identifies one vendor from another on the system database. Maximum of 8 alpha-numeric characters and must be unique.

Vendor Reference
The Vendor's RFQ response reference identification (maximum 40 alpha-numeric characters) is useful for expediters to communicate any problems with the purchase order to the vendor.

VFI
Vendor Furnished Information is technical data, such as drawings, manuals, etc. available from a vendor and often required either as a load item and/or as information required to complete engineering drawings, installation instructions, etc.

The parts catalog supports a part type of VFI which allows these items to be tracked in the system.

WBS
Most projects are identified by the major components that comprise the project. These components may be the major items to be designed or manufactured, or the particular services to be rendered. These components are the basis for the project System Work Breakdown Structure (SWBS), the Product Work Breakdown Structure (PWBS) and the optional Code of Accounts (COA).

WBS Mapping
The conversion of cost data from one product-oriented work breakdown structure to another (e.g., from the Generic PWBS to a shipyard-unique PWBS). The conversion is "direct" in that there is a one-to-one correspondence between the data elements in one structure and the elements in the other, so that there is no judgmental allocation required.

WBS Translation
The conversion of cost data from one product-oriented work breakdown structure to a system work breakdown structure (e.g., from the Generic PWBS to SWBS), or the reverse conversion. There is not necessarily a one-to-one correspondence between the data elements in the two structures so judgmental allocation is often required.

Work Center
A company department or stage of construction, which is assigned specific responsibility, and resources needed to perform work. Work centers may also be assigned to subcontractors.

A work center ID is limited to a maximum of 8 alpha-numeric characters and must be unique.

Work Order
A work order is a distinct and definable unit of work that can be started and completed without significant interruption under the direction of a single work center. *PERCEPTION* manages 4 types of work orders:

- Discrete work orders that can be identified to a single level of the project WBS (such as SWBS).
- Distributed work orders that can be identified across any number of levels of a project WBS.
- Time-phased work orders that can manage level-of-effort support efforts. Time-phased work orders operate with monthly budgeted sub-tasks.
- Incremental process work orders that manage manufacturing process by tracking quantities of throughput as well as costs.

A work order ID is limited to a maximum of 8 alpha-numeric characters. The combination of Contract/Project/Work Order/Work Center must be unique.

Work Order Serial Number
The work order serial number is a system-generated number that uniquely identifies a work order on the system database. The work order serial number can be used as a shortcut to retrieving and applying costs (material and time charges) to a work order.

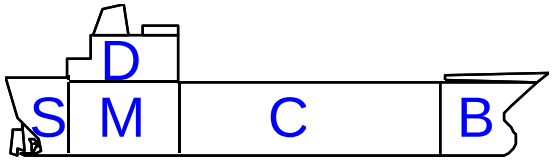
Work Type
A category of work exhibiting similar work processes. Examples, pipe work, electrical work, engineering, quality assurance, etc.

Withdraw Location
The location where material has been withdrawn. The withdraw location must be defined on the location table. If not previously defined, the system will generate the new location.

The location ID is limited to a maximum of 12 alpha-numeric characters and must be unique.

Zone
A level of PWBS (project-zone) and is a physical area of the ship: bow, stern, mid-body and superstructure. Zones can also identify structural blocks during hull construction: Bow units, mid-body bottom units, mid-body deck units, etc.

A zone ID is limited to a maximum of 8 alpha-numeric characters. The combination of Contract/Project/Zone must be unique.



Ship-Wide Construction Zone [17]

Zone Sequence
A grouping of trade or craft on-board work that eliminates trade work interference and associated costs of rework, disruptions and delays. For example, a typical zone sequence might have hot steel outfit work (ladders, grates, windows and doors) performed first, followed by pipe work, then electrical distribution, then linings and finally furniture and fixtures.

[17] Selected photographs obtained from www.nsnet.com.

Index

ABBREVIATIONS

A/P	Accounts Payables - Accounting Function
A/R	Accounts Receivables - Accounting Function
Acct	SWBS Account - a Ship System
ACWP	Actual Cost of work Performed
AP	Accounts Payables - Accounting Function
AR	Accounts Receivables - Accounting Function
BAC	Budget at Completion (Total Budget)
BCWP	Budgeted Cost of Work Performed
BCWS	Budgeted Cost of Work Scheduled
BOM	Bill (List) of Material
CER	Cost Estimating Relationship - for estimating costs
CIM	Computer Integrated Manufacturing
CLIN	Contract Line Item Number - some contract requirement for cataloging costs
COA	Chart of Account: Breakdown Structure of Shipyard Organization
CPI	Cost Performance Index
CPM	Critical Path Method for Scheduling
DWG	Drawing
EAC	Estimate At Completion
EPA	Economic Price Adjustment for Inflation
ERP	Enterprise Resource Planning
ETA	Estimated Time of Arrival
ETC	Estimate To Complete
EVMS	Earned Value Management System
FAQ	Frequently Asked Questions
FIFO	First In, First Out - Method for Costing Stock Inventories
FOB	Freight On Board - Freight cost included as specified by location
FSC	Federal (U.S. Government) Supply Classification
G&A	General & Administrative Cost - A Handling Charge
G/L	General Ledger - Accounting Function
GFE	Government Furnished Equipment
GFM	Government Furnished Materiel
GL	General Ledger - Accounting Function
GST	Government Sales Tax
HVAC	Heating, Ventilating & Air Conditioning System
ID	Identification Number
IP	Interim Product - Sub-Assembly, Asssembly, etc.
IPT	Interim Product Team
JIT	Just In time - Method for Replenishing Inventories
LCC	Life Cycle Cost - Includes cost of design, construction & operation
LIFO	Last In, First Out - Method for Costing Stock Inventories
LOE	Level Of Effort
MEL	Major Equipment List
MR	Management Reserve
MRP	Material Requirements Planning
NEI	Naval (U.S.) Equipment Index

OFE	Owner Furnished Equipment
OFM	Owner Furnished Materiel
PDF	Adobe Portable Document Format
PERT	Program Evaluation and Review Technique
PO	Purchase Order
PWBS	Product Work Breakdown Structure - sub-assembly, assembly, hull block, ship zone
QA	Quality Assurance
QTY	Quantity
RFQ	Request For Quotation
RIY	Required (Date) In Yard
ROI	Return On Investment
SPI	Schedule Performance Index
SWBS	Ship Work Breakdown Structure - Example: Bilge & Ballast system
SWILN	Navy Repair Ship Work Line Item Number
TOC	Total Ownership Costs: LCC plus infrastructure costs
UoM	Units of Measure: examples, tonnes, square meters, etc.
VFI	Vendor Furnished Information (drawings, etc.)
W/C	Work Center
W/O	Work Order
WBS	Work Breakdown Structure - may include SWBS, PWBS, and COA
WC	Work Center
WO	Work Order