

PERCEPTION[®] ESTI-MATE

Estimating

New Construction

A Training Tutorial

This training tutorial outlines the basic features of the *PERCEPTION* system for developing cost estimates for new construction.

It is a supplement to the user manual entitled “*PERCEPTION Cost Estimating for New Construction & Ship Repair,*” which provides more details for the user.

Before using this tutorial, the user should first view the preliminary training tutorial, “*Getting Started With PERCEPTION.*”

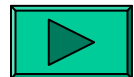
Training Directory



Continue



Create New Contract & Project(s)



Project Work Center(s) & Rates



Defining Detail Cost Items



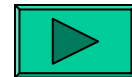
Setting Global Values



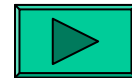
Validating Cost Data



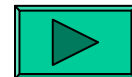
Cost Estimating Rollup



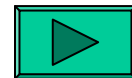
Generating Reports



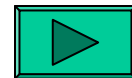
Using Ship Characteristics



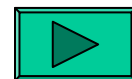
Using Parts Catalog



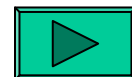
Using Library CERs



Using Standard Packages



Cost Estimate Toolbox



Cost Risk

PERCEPTION cost estimating is designed specifically for shipyards and naval engineering agencies.

It provides features that support cost estimating at any given level of detail required, from rough order of magnitude (ROM) to detail estimates.


Why Use *PERCEPTION*?

1. *PERCEPTION* has **flexible features** to address almost any estimating situation, whether for commercial or government requirements.
2. *PERCEPTION* offers a **toolbox of easy-to-use functions** to help the estimator expedite the process and ensure the estimate is both complete and accurate.
3. *PERCEPTION* allows cost data to be cataloged in convenient and easy-to-use **database libraries**.
4. *PERCEPTION* cost libraries ensure all estimators are using **consistent information**.
5. *PERCEPTION* libraries can be configured to accurately define standard shipyard production processes to ensure every **estimate is complete, nothing is missing**.

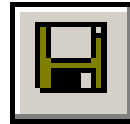
Steps To Generate An Estimate

- 1. Create the new project and its WBS.**
- 2. Define the work center(s) and labor rates.**
- 3. Define the detail cost items cataloging them to the project WBS and to the project work center(s).**
- 4. Validate the detail cost items to ensure there is no missing information that is required for a correct cost estimate calculation.**
- 5. Perform a cost estimate “rollup” that summarizes the costs of the cost items up through the project WBS.**
- 6. Generate the necessary detail and summary reports.**

Special Note:

To add new records in any worksheet, click on the *Add* button on the toolbar  or the down-arrow on your keyboard.

To save data entered into any worksheet, click on the *Save* button on the toolbar.



To delete records from any worksheet, highlight those records (rows) to be deleted, then click on the *Delete* button on the toolbar.



PERCEPTION allows the user to develop a cost estimate to any required level of detail.

Each cost item of the estimate defines a labor and/or material cost.

Create a New Cost Estimate Project

Before a cost estimate can be developed with detailed cost item data, the user must develop the project hierarchy:

1. Define an overall **Contract**
2. Define the cost estimate **Project(s)**
3. Define the project **WBS**

Detailed instructions for creating a new project are provided in the following tutorial:

PERCEPTION

Starting A New Project

Define Project Work Center(s) and Rate Tables

Project labor costs are computed by the system from labor hour estimates entered on estimate cost items.

The system uses labor cost rates stored on work centers defined for the project.

1. Any number of work centers can be used for a project estimate and each center can carry its own labor rate.
2. Each center also can have different rates for different calendar years.

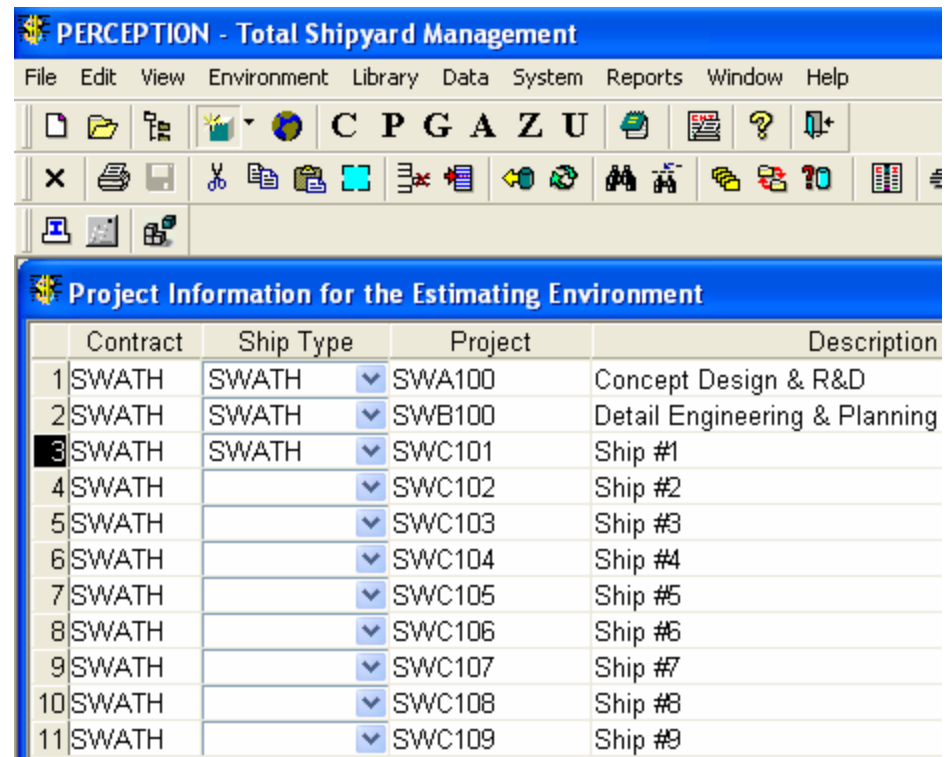
**Every cost item must be
identified with a work center.**

**Therefore, different cost items
can be assigned different labor
rates.**

Define Project Work Centers


To define these project work center rates, open the project worksheet.

If it is not already open, click on the **P** button on the toolbar and select the project.

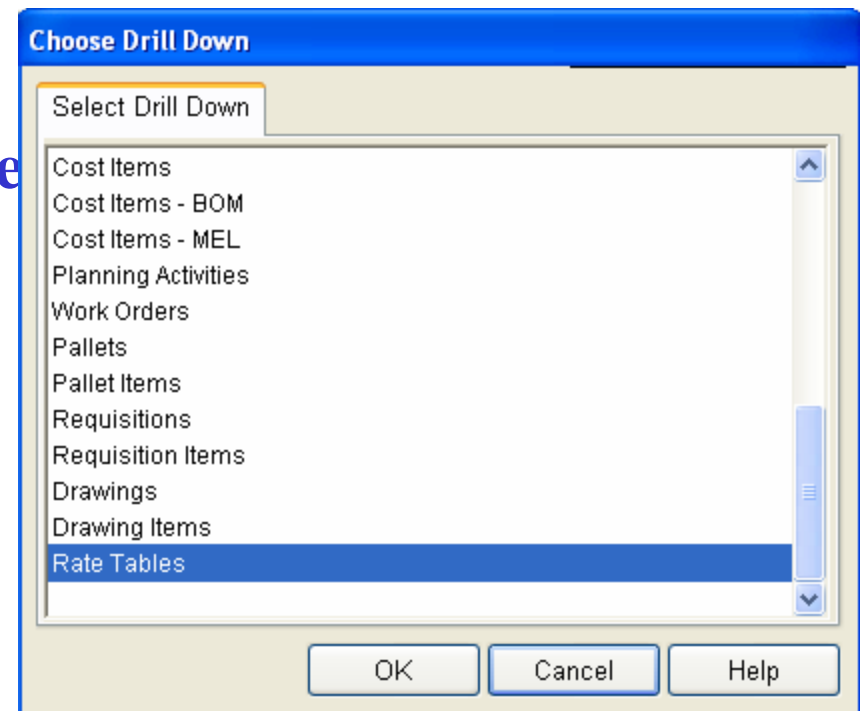



	Contract	Ship Type	Project	Description
1	SWATH	SWATH	SWA100	Concept Design & R&D
2	SWATH	SWATH	SWB100	Detail Engineering & Planning
3	SWATH	SWATH	SWC101	Ship #1
4	SWATH		SWC102	Ship #2
5	SWATH		SWC103	Ship #3
6	SWATH		SWC104	Ship #4
7	SWATH		SWC105	Ship #5
8	SWATH		SWC106	Ship #6
9	SWATH		SWC107	Ship #7
10	SWATH		SWC108	Ship #8
11	SWATH		SWC109	Ship #9

Define Project Work Centers

Highlight the project in this work sheet and then, click on the *Drill Down* button  on the toolbar.

Scroll down the drill-down selections and click on *Rate Tables*.




In the worksheet that the system displays, add  all project work centers (identify each from the drop-down selections).

Rate Tables and Indirect Formulas for the Estimating Environment				
	Contract	Project	Work Center	Description and Comments
1	SWATH	SWC101	SY	Shipyard Production Departments
2	SWATH	SWC101	SYH	Shipyard Hull Production Depts
3	SWATH	SWC101	TE	Shipyard Technical Engineering

NOTE: This drop-down list of centers identifies a master list of work centers previously defined under *Library/Work Centers* from the main menu.

Define Work Center Rate Tables

For each of these work centers, highlight it and click on the *Drill-Down* button  again and select *DETAILS*. The system will display the project center rate table

The system will display the Rate Table for the project work center:

1. Labor Cost Rate (per hour)
2. Subcontractor Labor Cost Rate
3. Percentage of applied rate (Profit, G&A, Overhead, Local & Federal Tax)

	Direct Labor Rate	Percent Profit	Percent G&A	Percent Overhead	Total Markup	Labor Price
Year	2004	Description Shipyards Production Departments				
Labor	18.55	10.00%	0.00%	150.00%	160.00%	\$48.23
Material		10.00%	12.00%	0.00%	22.00%	
Services/Subs	0.00	0.00%	0.00%	0.00%	0.00%	\$0.00
Travel		0.00%	0.00%	0.00%	0.00%	

Add  a rate table for each year that will apply to the project.

Labor Rates for the Estimating Environment						
Labor Rates		Apply Rates to...				
	Direct Labor Rate	Percent Profit	Percent G&A	Percent Overhead	Total Markup	Labor Price
Year	2004	Description Shipyard Production Departments				
Labor	18.55	10.00%	0.00%	150.00%	160.00%	\$48.23
Material		10.00%	12.00%	0.00%	22.00%	
Services/Subs	0.00	0.00%	0.00%	0.00%	0.00%	\$0.00
Travel		0.00%	0.00%	0.00%	0.00%	
Year	2005	Description Shipyard Production Departments				
Labor	19.25	10.00%	0.00%	145.00%	155.00%	\$49.09
Material		10.00%	12.00%	0.00%	22.00%	
Services/Subs	0	0.00%	0.00%	0.00%	0.00%	\$0.00
Travel		0.00%	0.00%	0.00%	0.00%	

Taxes are taxes paid to vendors and suppliers and are added costs to a project.

Overhead is a percentage applied to direct costs that account for all indirect costs of the shipyard operation: facilities depreciation, utilities, etc. When used with labor, overhead is applied to the direct labor cost estimate and includes all fringe benefits paid by the shipyard to the employees.

G&A are the indirect costs associated with general administration of projects. This cost category often is used when performing government contracts. For commercial contracts, G&A more typically is included in the overhead.

Profit is the percentage fee that is added to the estimated costs for the project.

Enter the required rates and click on the *Save* button.

Identify How Applied Costs Are Formulated

All work center rate tables are complemented by indirect cost formulas.

These formulas enable the user to specify what costs are to be included or excluded from the calculations of indirect costs and profits.

For example, if profit already has been incorporated in the labor rate, but should be applied separately to material costs, click only on the box that profit will be applied to material costs.

To open the rate formula window, click on the *Apply Rates to...tab*

Labor Rates for the Estimating Environment

Labor Rates | **Apply Rates to...**

Center Description


Apply G and A to direct cost	...of Labor <input checked="" type="checkbox"/>	...of Material <input checked="" type="checkbox"/>	...of SubCon <input checked="" type="checkbox"/>	...of Travel <input checked="" type="checkbox"/>
Apply profit to direct cost	...of Labor <input checked="" type="checkbox"/>	...of Material <input checked="" type="checkbox"/>	...of SubCon <input checked="" type="checkbox"/>	...of Travel <input checked="" type="checkbox"/>
Apply G and A to local taxes	...of Labor <input checked="" type="checkbox"/>	...of Material <input checked="" type="checkbox"/>	...of SubCon <input checked="" type="checkbox"/>	...of Travel <input checked="" type="checkbox"/>
Apply profit to local taxes	...of Labor <input checked="" type="checkbox"/>	...of Material <input checked="" type="checkbox"/>	...of SubCon <input checked="" type="checkbox"/>	...of Travel <input checked="" type="checkbox"/>
Apply G and A to federal taxes	...of Labor <input checked="" type="checkbox"/>	...of Material <input checked="" type="checkbox"/>	...of SubCon <input checked="" type="checkbox"/>	...of Travel <input checked="" type="checkbox"/>
Apply profit to federal taxes	...of Labor <input checked="" type="checkbox"/>	...of Material <input checked="" type="checkbox"/>	...of SubCon <input checked="" type="checkbox"/>	...of Travel <input checked="" type="checkbox"/>
Apply G and A to overhead	...of Labor <input checked="" type="checkbox"/>	...of Material <input checked="" type="checkbox"/>	...of SubCon <input checked="" type="checkbox"/>	...of Travel <input checked="" type="checkbox"/>
Apply profit to overhead	...of Labor <input checked="" type="checkbox"/>	...of Material <input checked="" type="checkbox"/>	...of SubCon <input checked="" type="checkbox"/>	...of Travel <input checked="" type="checkbox"/>
Apply profit to G and A	...of Labor <input checked="" type="checkbox"/>	...of Material <input checked="" type="checkbox"/>	...of SubCon <input checked="" type="checkbox"/>	...of Travel <input checked="" type="checkbox"/>

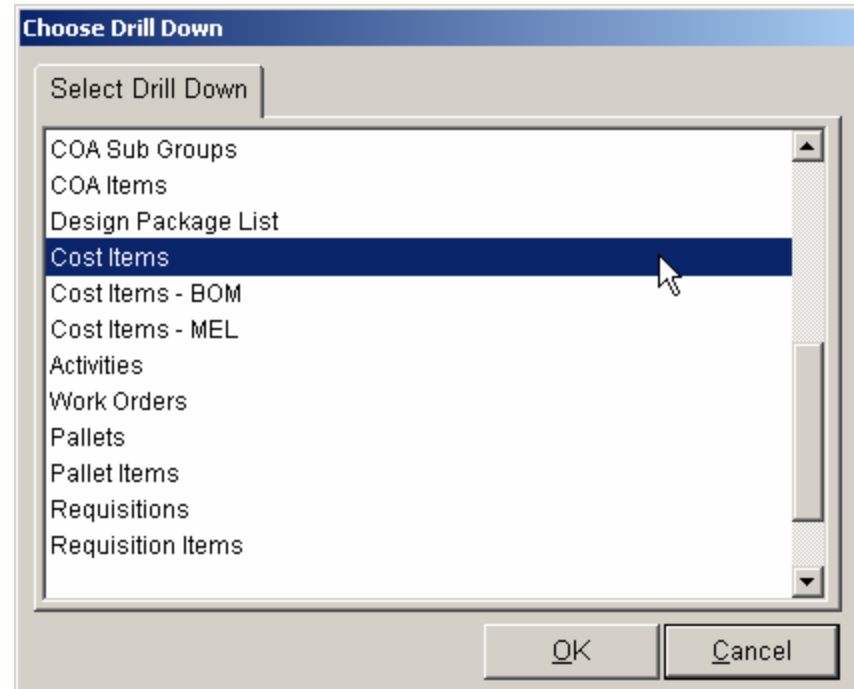
This window allows the user to define how all indirect costs and profit can be applied in the system's cost calculations.

**Now the estimate cost
items can be entered**

Define Detail Cost Items

Begin entering cost items. The Cost Item worksheet can be accessed a number of different ways:

1. Click on *Environment/Cost Estimating/Cost Items* from the main menu.
2. Or, drill-down  from the Project worksheet and select *Cost Items*.



3. Drill-down from a designated project WBS or CLIN worksheet:

PWBS Zone Level Worksheet

\$ PWBS Zone Information for the Estimating Environment					
	Contract	Project	Zone	Description	GPWBS Zone
1	PD-337	337	01	Ship Design & Engineering	W
2	PD-337	337	02	Shipyards Support Services	W
3	PD-337	337	10	Stern	Stern
4	PD-337	337	20	Engine Room	Machinery
					Cargo
					Bow
				Structure	Deckhouse
				de	W

Choose Drill Down

Select Drill Down

- COA Sub Groups
- COA Items
- Design Package List
- Cost Items**
- Cost Items - BOM
- Cost Items - MEL
- Activities
- Work Orders
- Pallets
- Pallet Items
- Requisitions
- Requisition Items

OK Cancel

and select *Cost Items*

By entering cost items under a specific WBS level, it may be easier to ensure that all costs for that level are addressed.

In addition, cost items that are entered under a WBS level automatically are assigned all references to that WBS.

Required Cost Item Data

Each cost item must include the following information besides labor and material cost:

- 1. Cost Item Number (usually sequential)**
- 2. Project work center (so that the system can use the correct labor rate)**
- 3. Project WBS references (so that the system can summarize costs by project WBS)**

Costs on an item can be entered either directly:

Total Labor Hours	Direct Material Cost
0.00	0.00

Or via Cost Estimating Relationships (CERs):

Quantity	UoM	Labor Unit Hours (CER)	Material Unit Cost (CER)
1.00	EA	0.0000	0.0000

A CER is a unit cost based on some **unit of measure**. For example, welding hours per meter of weld; paint material cost per square meter area, etc.

The **item quantity** provides the value by which the system can compute the extended costs.

Large new construction contracts often cross multiple years that have different labor rates, etc.

Each cost item will be assigned a Base Year Date, which by default will be the date set on the project's *Detail Option* tab window.

However, each cost item in the Cost Item worksheet can be edited for another base year:

Base Year Date
1998

Every base year used on cost items must be covered by a complimentary Rate Table for that cost item's work center and base year.

Refer later to *Cost Item Data Validation* to check that Rate Tables are complete for all work centers used in the estimate and for all years being applied.

Material Escalation

Material costs defined on estimate cost items are assumed by the system to be valid for the Base Year defined on the cost item.

The Base Year date on the cost item is either assigned by default by the system (equal to the current year) or manually by the user.

If material costs are being brought to the cost item via library CERs, Standard Packages and/or the Parts Catalog, these library costs may be on the database under a different base year than the Base Year for the cost item.

The system automatically will apply an escalation factor to these library material costs so that they are assumed to be valid for the cost item's Base Year using the following formula:

$$\text{Cost Item Material Cost} = \text{Library Material Cost} \times \text{Factor}$$

The “Factor” is developed by the system from the Escalation Table.

Click on *Environment/Cost Estimating/Escalation* to view this table and to keep its information up to date:

	Date Valid	Material Escalation
1	1995	0.94880
2	1996	0.96770
3	1997	0.98520
4	1998	0.99210
5	1999	1.00000
6	2000	1.01500
7	2001	1.03120
8	2002	1.04770
9	2003	1.06450
10	2004	1.08690
11	2005	1.10970
12	2006	1.13300
13	2007	1.15680
14	2008	1.18110
15	2009	1.20590
16	2010	1.23120

The “Factor” is computed as follows:

**Factor = Cost Item Cost Base Year Factor/
Library Cost Base Factor**

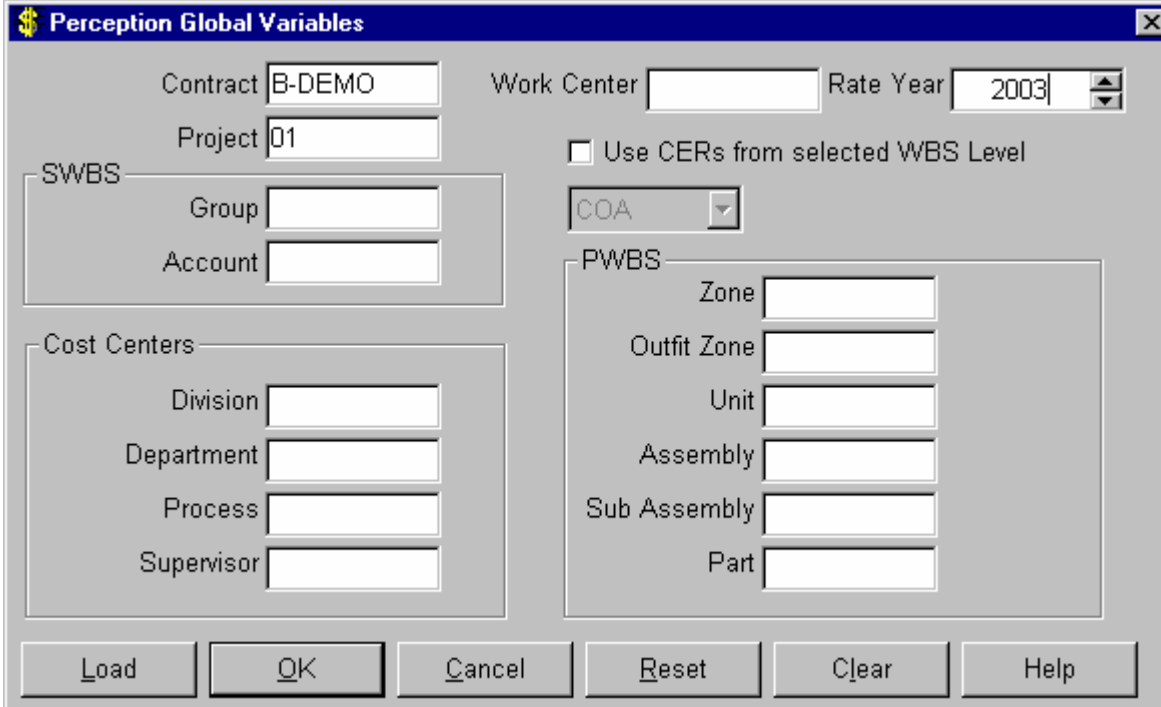
Setting Global Values

When entering large sets of cost items, it is often convenient to set global values to selected cost item data fields.

Then, the system will automatically apply these values for each cost item entered into the worksheet.

Click on the *Global Defaults* button  on the tool bar to open the global selections.

Global Variables:



The image shows a software dialog box titled "Perception Global Variables". It contains several input fields and a checkbox. The "Contract" field is set to "B-DEMO", "Project" to "01", and "Rate Year" to "2003". The "SWBS" section includes "Group" and "Account" fields. The "Cost Centers" section includes "Division", "Department", "Process", and "Supervisor" fields. The "PWBS" section includes "Zone", "Outfit Zone", "Unit", "Assembly", "Sub Assembly", and "Part" fields. A "COA" dropdown menu is also present. At the bottom, there are buttons for "Load", "OK", "Cancel", "Reset", "Clear", and "Help".


Contract	B-DEMO	Work Center		Rate Year	2003
Project	01	<input type="checkbox"/> Use CERs from selected WBS Level			
SWBS	Group	COA	PWBS		
	Account		Zone		
Cost Centers	Division		Outfit Zone		
	Department		Unit		
	Process		Assembly		
	Supervisor		Sub Assembly		
			Part		

Buttons: Load, OK, Cancel, Reset, Clear, Help

Validating the Cost Data

Once all of the project cost items have been entered, save them to the database.

Items still flagged red after the save do not have work center rate tables for the year in question defined for the project.



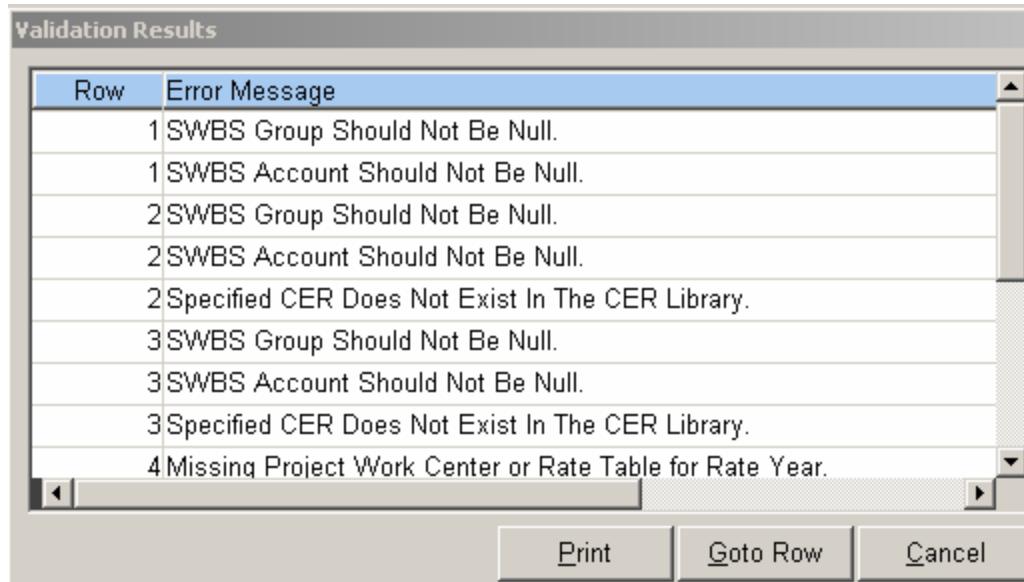
Cost Item Information for the Estimating Environment							
	Contract	Project	Work Center	Cost Item	Description	Quantity	UoM
1	C10502	5071	0	0	1/8 Garlock Blue Guard or equal gas	1.00	EA
2	C10502	5071	0	1	EX STG Butt Weld SMLS, CS, 90-d	5.00	EA
3	C10502	5071	0	2	EX STG Butt Weld SMLS, CS, 90-d	12.00	EA
4	C10502	5071	03	3	EX STG Butt Weld SMLS, CS, 45-d	3.00	EA
5	C10502	5071	0	4	Elbows & Fittings - steel - 2"	15.00	EA
6	C10502	5071	0	5	Elbows & Fittings - steel - 5"	4.00	EA

To correct this problem,

- 1. Re-open the project work centers,**
- 2. Add and save rate tables for the missing years.**
- 3. Save the cost items again, and the red flag will disappear.**

Click on the *Validate Displayed Data* button  to check for other items of information that might be missing.

The system will display any and all missing information from the cost items, like missing SWBS, work centers, etc.



The image shows a 'Validation Results' dialog box with a table of error messages. The table has two columns: 'Row' and 'Error Message'. The errors listed are:

Row	Error Message
1	SWBS Group Should Not Be Null.
1	SWBS Account Should Not Be Null.
2	SWBS Group Should Not Be Null.
2	SWBS Account Should Not Be Null.
2	Specified CER Does Not Exist In The CER Library.
3	SWBS Group Should Not Be Null.
3	SWBS Account Should Not Be Null.
3	Specified CER Does Not Exist In The CER Library.
4	Missing Project Work Center or Rate Table for Rate Year.

At the bottom of the dialog box are three buttons: 'Print', 'Goto Row', and 'Cancel'.

Correct the problems and re-validate until all cost items pass this test.

Performing A Cost Estimate “Rollup”

The rollup process summarizes the costs from the cost items to all defined WBS levels of the project.

1. Click on the *Cost Estimate Rollup* button. 

2. Select the project(s) and then click *OK*.

Rollup Cost Estimate[s]

Contract ID	Project	Description
1 023	023	Project 023
2 1999-01	DES-1	Sample Ship Repair Project
3 62-0101-01	101	Industrial Assembly
4 A-DEMO	01	Sample Material Control
5 A-DEMO	02	Buoy Tender

Options

- Rollup Cost Item Weights thru the WBS
- Refresh Cost Items Linked to CER Libraries
- Refresh Cost Items Linked to Parts Catalog
- Refresh Cost Items Linked to Ship Characteristics

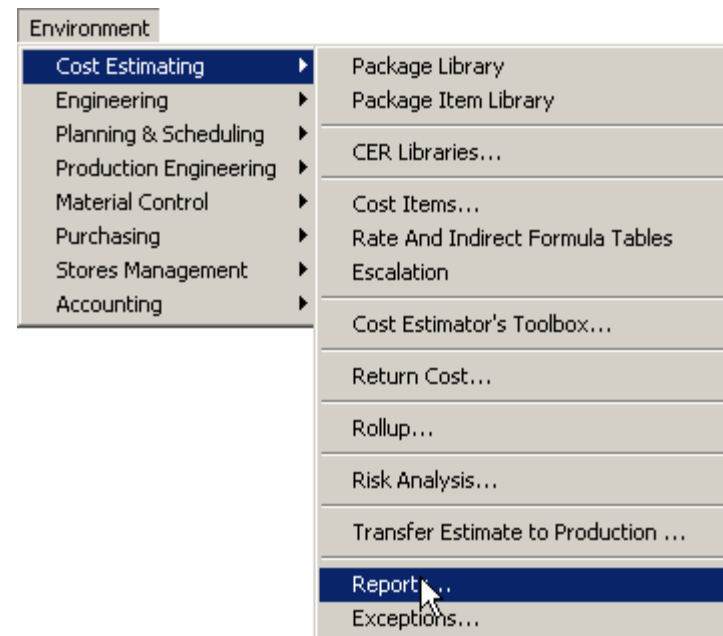
OK Cancel Help

The summary of the cost estimate can be viewed at any level of contract, project and project WBS on its respective *Detail* tab window.

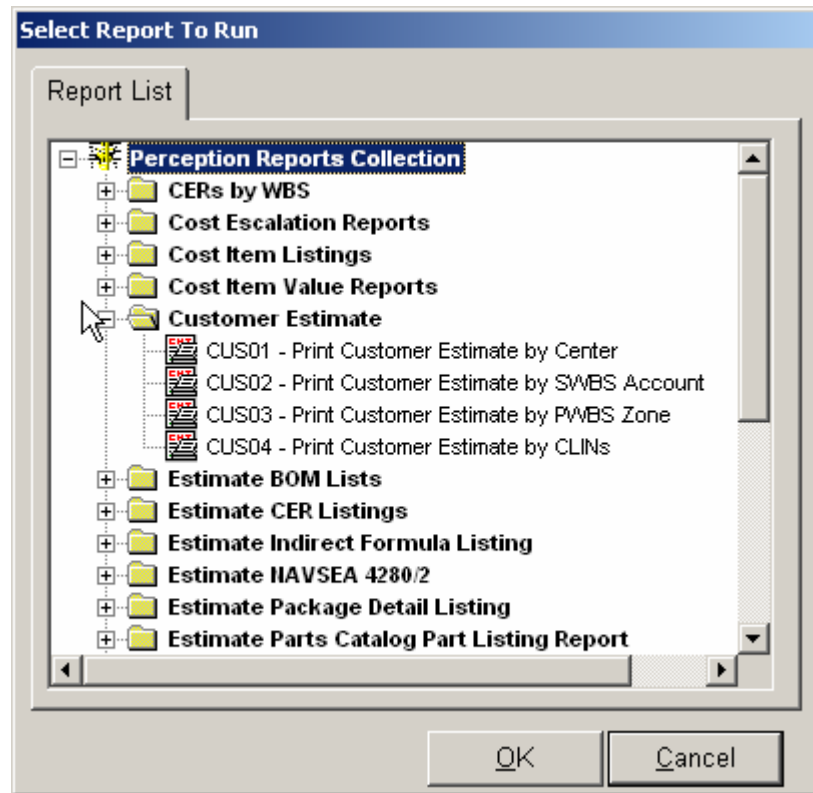
Project Details Information for the Estimating Environment					
Details Options Milestones Characteristics					
Contract	PD-337		Description Ship #1 Sample Detail Cost Estimate		
Project	337				
Ship Type	RO/RO				
	Labor	Material	SubCon	Travel	
Hours	1,815,179.09		0.00		
Cost	24,050,672.58	52,437,459.68	0.00	0.00	
Profit	4,040,512.99	3,165,912.08	0.00	0.00	
G&A	4,329,121.08	4,129,449.99	0.00	0.00	
Overhead	12,025,336.30	0.00	0.00	0.00	
Local Tax	0.00	1,310,936.50	0.00	0.00	
Federal Tax	0.00	0.00	0.00	0.00	
Sub Totals	44,445,642.95	61,043,758.25	0.00	0.00	
Start Date	00/00/0000	Min. Risk	98,119,557.30	Weight	17,826.00
Finish Date	00/00/0000	Total Cost	105,489,401.20	Volume	0
		Max. Risk	142,148,750.17	# of Cost Items	566

Generating Reports

There is a wide variety of reports for the cost estimate. From the main menu, select *Environment/Cost Estimating/Reports*.



The system will list, in various categories, all reports available on the system.



The following costs are summarized for each level of the contract:

- Labor man-hours
- Labor dollars
- Material dollars
- Subcontract labor hours
- Subcontract labor dollars
- Travel dollars
- Total direct costs (all direct and subcontracted labor, material and travel costs)
- Total sales tax costs
- Total indirect costs
- Total costs (direct costs plus taxes and indirect costs)
- Total profit
- Total price

Labor (direct and subcontracted) costs are computed by the system from project work center rate tables.

Indirect costs (overhead and G&A), sales taxes and profits are computed by the system from these tables as well in conjunction with the indirect cost application formulas developed for the project work centers.

NOTE: A project rollup (*Environment/Cost Estimating/Rollup*) must be performed to pass these calculations to the upper levels

Sample Cost Item Detail Report (#CI01)

01/09/2003 16:05:45

(Date format: MMDD/YYYY)

Chesapeake Marine Industries

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Cost Item Listing by Project(CI01)

Contract PD-337 Multiple Commercial Cargo Ship Program - Estimating Demo

Contract Range: 0 to ZZZZZZZZZZZZZZZZZZZ

Project Range: 0 to ZZZZZZZZ

Center	Cost Item	Heading	Qty	UoM	Labor CER	Mat'l CER	Labor Hours	Labor Cost	Material Cost	Extended Cost	Last Updated
Project 337 Ship #1 Sample Detail Cost Estimate											
			0.00								
0	2768	Aft Bulkheads	265.00		36.0000	1,060.0278	9,540	0	280,907	280,907	10/29/2002
01	2769	Aft Hull Decks	211.00		99.8294	1,947.8673	21,064	0	411,000	411,000	03/12/2002
01	2770	M/S Platforms and Flats	91.00		1,800.9231	20,065.9341	163,884	0	1,826,000	1,826,000	03/12/2002
01	2771	Midbody Shell Units	2,846.00		30.5000	999.6486	86,803	0	2,845,000	2,845,000	03/12/2002
01	2772	Midbody Bulkheads	929.00		48.5000	997.8471	45,057	0	927,000	927,000	03/12/2002
01	2773	Midbody Decks	1,024.00		41.1895	803.7109	42,178	0	823,000	823,000	03/12/2002
01	2774	Fab Portable Decks	1.00		1,032.0000	413,000.0000	1,032	0	413,000	413,000	03/12/2002
01	2775	Fab Stern Ramp	1.00		1,947.0000	779,000.0000	1,947	0	779,000	779,000	03/12/2002
01	2776	Misc. Outfit Foundations	1.00	PKG	450.0000	16,200.0000	450	0	16,200	16,200	03/12/2002
01	2777	Portable Decks - Fab	4.00	PKG	280.0000	113,000.0000	1,120	0	452,000	452,000	03/12/2002
01	2778	Ladders & Walkways	2.00	PKG	60.0000	2,160.0000	120	0	4,320	4,320	03/12/2002
01	2779	Rails & Stanchions	2.00	PKG	60.0000	2,160.0000	120	0	4,320	4,320	03/12/2002
01	2780	Ladders and Walkways	4.00	PKG	90.0000	3,240.0000	360	0	12,960	12,960	03/12/2002
01	2781	Rails & Stanchions	4.00	PKG	40.0000	1,440.0000	160	0	5,760	5,760	03/12/2002
01	2782	Ladders & Walkways OMS	1.00	PKG	100.0000	3,600.0000	100	0	3,600	3,600	03/12/2002
01	2783	Floor Plates & Grates (OMS)	1.00	PKG	1,500.0000	54,000.0000	1,500	0	54,000	54,000	03/12/2002
01	2784	Shell Doors	1.00	PKG	900.0000	32,400.0000	900	0	32,400	32,400	03/12/2002
01	2785	Water and Gas Tight Doors	1.00	PKG	50.0000	1,800.0000	50	0	1,800	1,800	03/12/2002
01	2786	Ladders & Walkways	1.00	PKG	2,550.0000	91,800.0000	2,550	0	91,800	91,800	03/12/2002
01	2787	Rails & Stanchions	1.00	PKG	1,000.0000	36,000.0000	1,000	0	36,000	36,000	03/12/2002
01	2788	Foundations	2.00	PKG	1,500.0000	50,000.0000	3,000	0	100,000	100,000	03/12/2002

Sample SWBS Group Summary Report (#SUM02)

01/09/2003 16:07:49

(Date format: MMDD/YYYY)

Chesapeake Marine Industries SWBS Group Summary Report (SUM02)

Page 1 of 3

Contract PD-337 - Multiple Commercial Cargo Ship Program

Project 337 - Ship #1 Sample Detail Cost Estimate

Project Range: 0 to ZZZZZZZZ Group Range: 0 to ZZZZZZZZ

Group	Description	Labor Hours	Labor Cost	Material Cost	SubCon Hours	SubCon Cost	Travel Cost	Direct Cost	Taxes	Indirect Cost	Total Cost	Profit	Total Price
1	Hull Structure	985,079	13,052,298	20,007,920	0	0	0	33,060,218	500,198	10,451,186	44,011,602	3,400,764	47,412,366
2	Propulsion Plant	53,895	714,109	14,155,900	0	0	0	14,870,009	353,898	1,600,371	16,824,277	974,633	17,798,910
3	Electric Plant	76,830	1,017,998	3,279,880	0	0	0	4,297,878	81,997	950,529	5,330,403	369,046	5,699,450
4	Command & Surveillance	11,400	151,050	390,400	0	0	0	541,450	9,760	133,458	684,668	48,947	733,615
5	Auxiliary Systems	185,456	2,457,292	8,843,680	0	0	0	11,300,972	221,092	2,367,398	13,889,462	946,762	14,836,225
6	Outfit & Furnishings	166,605	2,207,516	5,453,680	0	0	0	7,661,196	136,342	1,930,588	9,728,127	700,129	10,428,255
7	Armament	0	0	0	0	0	0	0	0	0	0	0	0
8	Integration & Engineering	44,880	594,660	0	0	0	0	594,660	0	404,369	999,029	99,903	1,098,932
9	Shipyard Support Services	291,000	3,855,750	306,000	0	0	0	4,161,750	7,650	2,646,008	6,815,408	666,241	7,481,648
Project: 337 Totals		1,815,145	24,050,673	52,437,460	0	0	0	76,488,132	1,310,937	20,483,907	98,282,976	7,206,425	105,489,401

Sample PWBS Zone Summary Report (#SUM04)

01/09/2003 16:09:26
(Date format: MM/DD/YYYY)

Chesapeake Marine Industries PWBS Zone Summary Report (SUM04)

Page 1 of 1

Contract PD-337 - Ship #1 Sample Detail Cost Estimate

Project 337 - Ship Wide

Project Range: 0 to ZZZZZZZZ Zone Range: 0 to ZZZZZZZZ

Zone	Description	Labor Hours	Labor Cost	Material Cost	SubCon Hours	SubCon Cost	Travel Cost	Direct Cost	Taxes	Indirect Cost	Total Cost	Profit	Total Price
W	Ship Wide	0	0	0	0	0	0	0	0	0	0	0	0
01	Ship Design & Engineering	0	0	0	0	0	0	0	0	0	0	0	0
02	Shipyards Support Services	329,080	4,360,310	306,000	0	0	0	4,666,310	7,650	2,989,108	7,663,068	751,007	8,414,075
10	Stern	506,823	6,715,405	8,954,664	0	0	0	15,670,069	223,867	5,271,655	21,165,590	1,668,826	22,834,416
20	Engine Room	165,797	2,196,810	19,568,308	0	0	0	21,765,118	489,208	3,034,835	25,289,161	1,550,501	26,839,662
50	Midships	446,145	5,911,423	13,367,600	0	0	0	19,279,022	334,190	5,072,466	24,685,678	1,800,188	26,485,866
70	Bow	111,214	1,473,586	2,545,832	0	0	0	4,019,418	63,646	1,202,522	5,285,586	401,267	5,686,853
90	Superstructure	256,086	3,393,140	7,695,056	0	0	0	11,088,196	192,376	2,913,321	14,193,892	1,034,637	15,228,529
Project: 337 Totals		1,815,145	24,050,673	52,437,460	0	0	0	76,488,132	1,310,937	20,483,907	98,282,976	7,206,425	105,489,401

**Cost
Estimate
report by
Ship
Owner's
CLIN:**



Estimate Date
10/29/2002

TO CUSTOMER	ESTIMATE	PROPOSAL FROM
		Chesapeake Marine Industries 927 West Street Annapolis MD 21401

Contract C10502 - Drydock & repair frigate

Cost Item #	Quantity	UoM	Description	Unit Price	Extended Cost
CLIII A-01			Docking		
62	1.00	FEE	Dry dock preparation	14,380.73	14,380.73
63	15.00	DAY	Dry docking haul day	5,280.21	79,203.21
64	3.00	DAY	Dry docking lay days	4,752.19	14,256.58
65	2.00	MOVE	Line handlers - vessels under 50,000 GRT - per move	924.00	1,848.00
66	3.00	DAY	Mooring fees pier side work	316.81	950.44
67	8.00	HRS	Pilots - per hour - minimum 2 hours per evolution	225.05	1,800.36
68	6.00	HR	Tugs - per hour per tug - minimum 2 hours	393.83	2,362.98
			Total for CLIII: A-01		114,802.30
			Total for Contract: C10502		114,802.30

Same
report,
but by
Shipyard
SWBS:



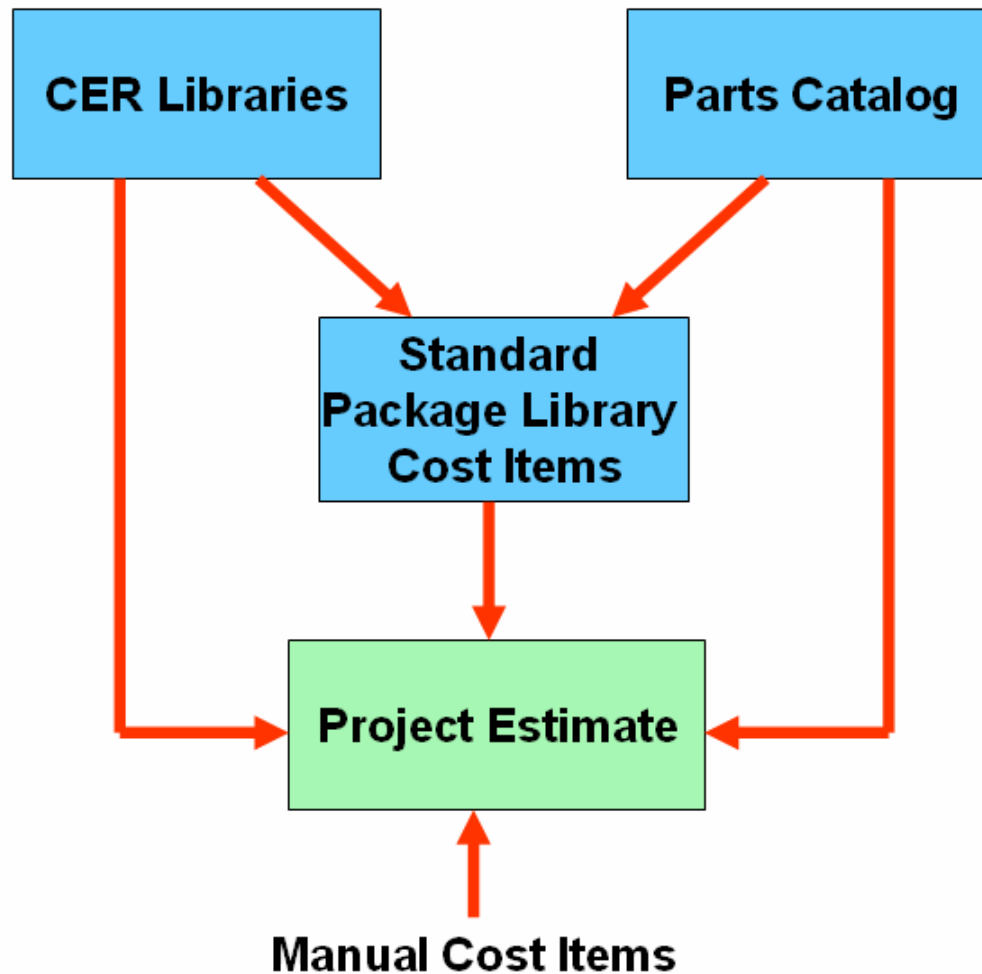
Estimate Date
10/29/2002

TO CUSTOMER		ESTIMATE		PROPOSAL FROM	
				Chesapeake Marine Industries 927 West Street Annapolis MD 21401	
Contract C10502 - Drydock & repair frigate Project 5071 - Capt. Kidd's frigate					
Cost Item #	Quantity	UoM	Description	Unit Price	Extended Cost
Account 101					
62	1.00	FEE	Dry dock preparation	14,380.73	14,380.73
63	15.00	DAY	Dry docking haul day	5,280.21	79,203.21
64	3.00	DAY	Dry docking lay days	4,752.19	14,256.58
65	2.00	MOVE	Line handlers - vessels under 50,000 GRT - per move	924.00	1,848.00
				Total for Acct: 101	109,688.52
Account 102					
Tugs & Pilots					
67	8.00	HRS	Pilots - per hour - minimum 2 hours per evolution	225.05	1,800.36
68	6.00	HR	Tugs - per hour per tug - minimum 2 hours	393.83	2,362.98
				Total for Acct: 102	4,163.34
Account 103					
Undocking					
66	3.00	DAY	Mooring fees pier side work	316.81	950.44
				Total for Acct: 103	950.44
				Total for Project: 5071	114,802.30

Advanced Features

- 1. Using Values of Ship Characteristics to Define Item Quantity**
- 2. Using a Parts Catalog for standardized material costs**
- 3. Using the CER Libraries**
- 4. Using the Standard Package Library**

Putting together an estimate from manual cost entries and from cost libraries.



Using the Value of a Ship Characteristic as a Cost Item Quantity

A cost item quantity can be entered manually.

Or, it can be related to a ship characteristic defined for the project.

To use the ship characteristic, make the selection available via the drop-down options on each cost item record:

Use Ship Char	Characteristic Name
Yes ▼	GRT ▼

Using the Parts Catalog


Material costs can be entered manually on any cost item record. However, if the material is available on the Parts Catalog, the current catalog cost can be applied.

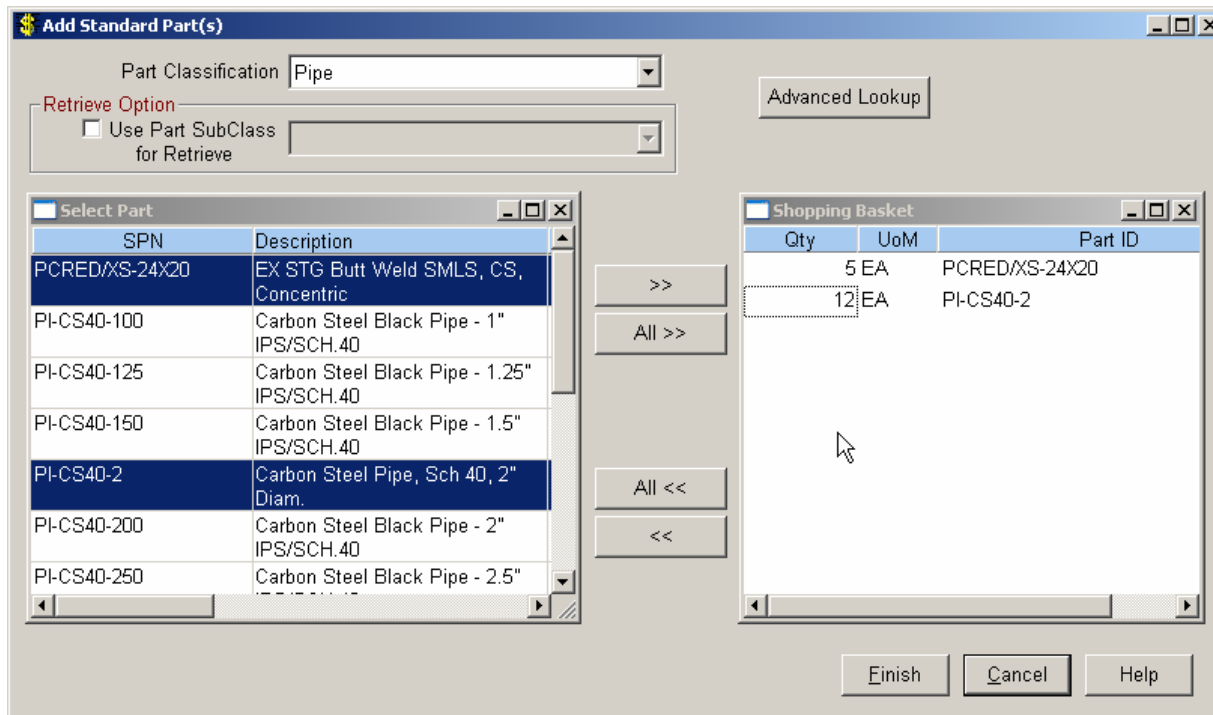
To apply a catalog cost to a cost item, enter the Part ID on the cost item record.

Part ID
GASK-10

If the user has not yet provided a cost item description, the system will apply the description from the Parts Catalog.

Catalog parts also can be entered as cost items using the system wizard.

Click on the *Add Parts* button  to open the wizard. Select all parts needed (highlight, then click on >>) and define their required quantities. Click on *Finish*.



Add Standard Part(s)

Part Classification: Pipe

Retrieve Option: Use Part SubClass for Retrieve

Advanced Lookup

SPN	Description
PCRED/XS-24X20	EX STG Butt Weld SMLS, CS, Concentric
PI-CS40-100	Carbon Steel Black Pipe - 1" IPS/SCH.40
PI-CS40-125	Carbon Steel Black Pipe - 1.25" IPS/SCH.40
PI-CS40-150	Carbon Steel Black Pipe - 1.5" IPS/SCH.40
PI-CS40-2	Carbon Steel Pipe, Sch 40, 2" Diam.
PI-CS40-200	Carbon Steel Black Pipe - 2" IPS/SCH.40
PI-CS40-250	Carbon Steel Black Pipe - 2.5" IPS/SCH.40

>> All >> All << <<

Qty	UoM	Part ID
5	EA	PCRED/XS-24X20
12	EA	PI-CS40-2

Finish Cancel Help

The system will create cost items for each part selected.

Detailed instructions for developing a Parts Catalog are provided in the following training tutorial:

***PERCEPTION MAT-PAC – Developing A
Parts Catalog***

Using the CER Library


CERs can be entered manually on each cost item, or they may be applied from the CER libraries.

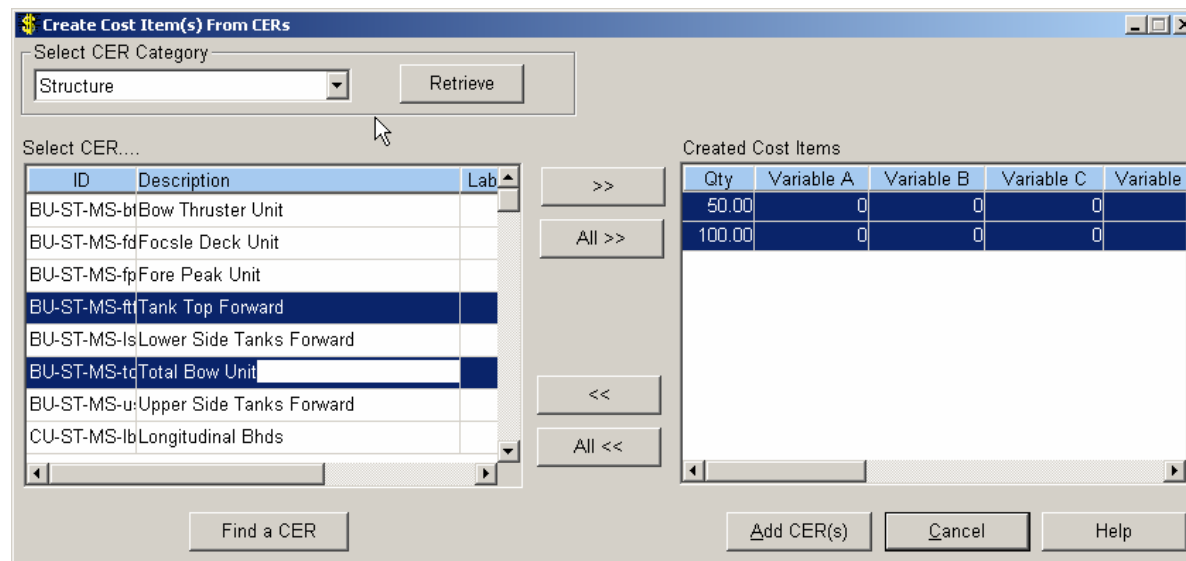
Library CERs can be centrally managed. When updated, they provide current cost information to whomever uses them.

To use a library CER, make the selection from the CERs available via the drop-down options on each cost item record:

CER Type	CER ID	CER Description	CER Form
Pipe CER Table ▼	PER-FL150GV6 ▼	Pipe Flange Renewal: Galv. Slip	HRS/EA

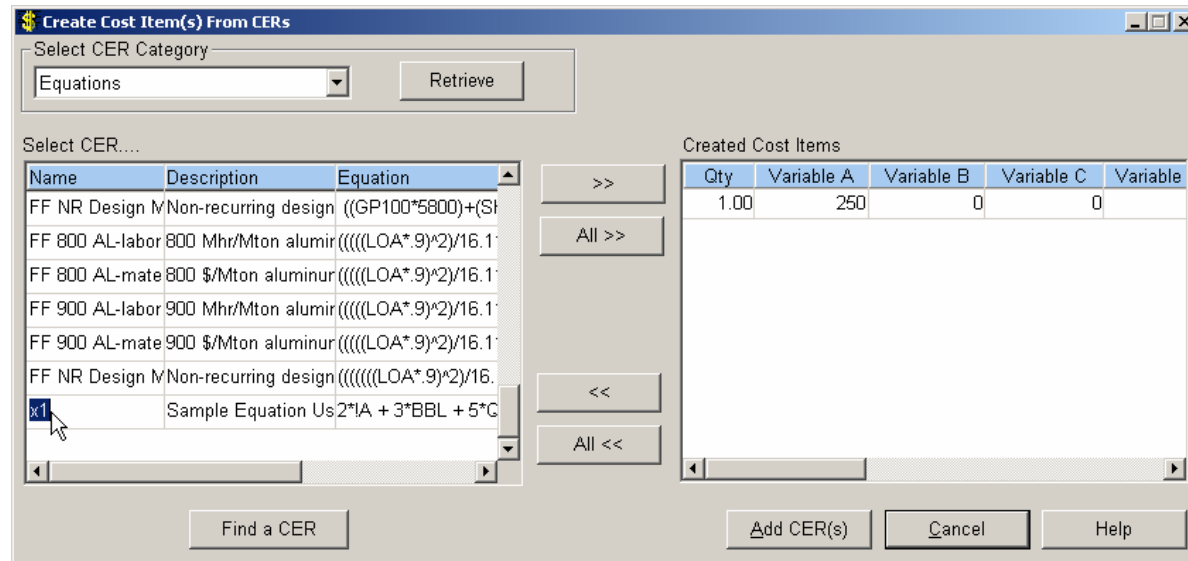
CERs also can be entered as cost items using the system wizard.

Click on the *Add Library CERs* button  to open the wizard. Select all CERs needed (highlight, then click on >>) and define their required quantities.



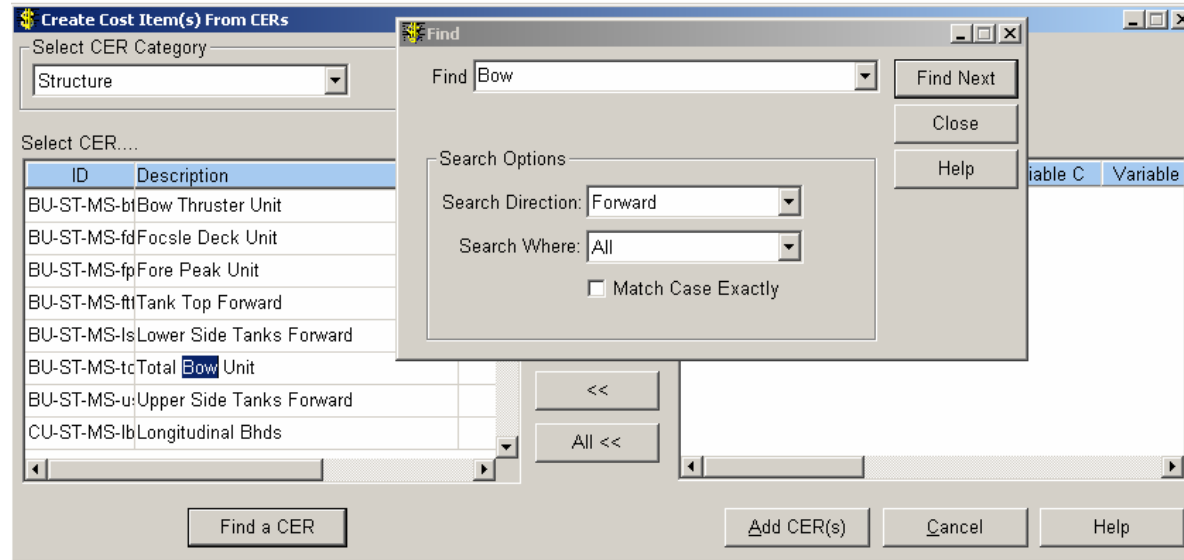
The system will create cost items for each CER selected.

If equation CERs have been retrieved, they may require the user to define specific input variables (!A, !B, !C, !D, and !E).



When all CER information is complete, click on the *Add CER(s)* button. The system will automatically generate cost items from this list.

If the retrieved list of CERs is large, the *Find a CER* button will enable to user to locate desired CERs from this retrieved list using a text-matching “find” process.



Enter the text expression for the desired CER and the system will scan down through both the CER ID and CER Description for a match. The system will highlight the CER where there is a match.

NOTE: If the Global Defaults are not set for contract, project, and work center, these fields will have to be manually entered on the new cost items.

Also note that immediately after the system has installed these CERs as project cost items, the system will not yet have applied the work center rates to compute direct labor costs. This will be done when the cost item record is saved if there is a corresponding record for the rate year in the project center rate table.

When the system applies the labor rates, it removes the red flag on the cost item. If it cannot find the rate table, the items will continue to be identified with a red flag.

NOTE: If a cost item uses a library CER and the user subsequently changes the cost item's CER value manually, the system will re-tag the cost item as no longer referencing that library CER.

The system will re-tag the cost item as a *Manual CER*.

Detailed instructions for developing a CER library are provided in the following training tutorial:

***PERCEPTION ESTI-MATE – Cost
Estimating Libraries***

Using the Standard Package Library

Standard production processes, like hull block construction, can be developed and stored on a special Standard Package library.

Each package can be as detailed as needed and can specify both labor and material requirements.

A package can be complete in and of itself, or it can be made parametric to accommodate a range of estimating requirements.

A package can use the library CERs as well as costs from the Parts Catalog.


Interim Product Packages for the Estimating Environment		
Package ID	Description	
1	AL-APEAK	Aft Peak
2	AL-BHD-CORG	Corregated Bhds
3	AL-BHD-ER	Engine Room Bulkhead
4	AL-BHD-L	Longitudinal Bhds - Av.
5	AL-BHD-SCRN	Screen Bulkheads
6	AL-BHD-T	Transverse Bhds - Av.
7	AL-BTHRST	Bow Thruster Unit - Av.
8	AL-BULWARK	Bulwarks (Average)
9	AL-CASING	Elevator Casing
10	AL-CROSTK	Aft Cross Tanks
11	AL-DBTM-10	Double Bottoms (Av. 10% Shaped)
12	AL-DBTM-25	Double Bottoms (Av. 25% Shaped)
13	AL-DBTM-50	Double Bottoms (Av. 50% Shaped)
14	AL-DBTM-75	Double Bottoms (Av. 75% Shaped)

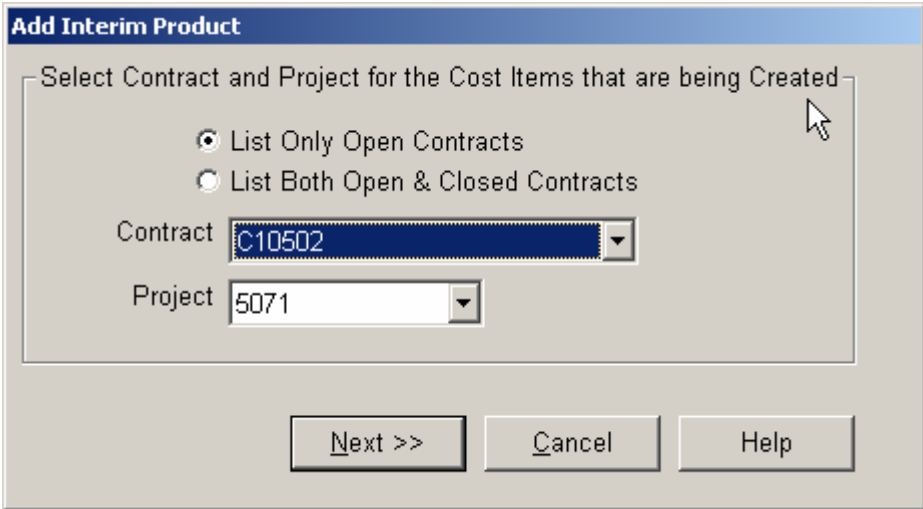
Package Listing

Package Details

Package Detail Information for the Estimating Environment									
Package	Package Items								
Package ID	Package Item ID	Description	Quantity	UoM	Work Center	SWBS Account	Labor CER	Material CER	
1	AL-BHD-ER 01	Engine Room Bulkhead Prep & Fab	1.00	MTOI	0	100	13.5506	\$0.0000	
2	AL-BHD-ER 02	Engine Room Bulkhead Assemble	1.00	MTOI	0	100	141.3417	\$0.0000	
3	AL-BHD-ER 03	Engine Room Bulkhead Erect	1.00	MTOI	0	100	69.5949	\$0.0000	
4	AL-BHD-ER 04	Engine Room Bulkhead Weldout	1.00	MTOI	0	100	373.4347	\$0.0000	
5	AL-BHD-ER 05	Mild Steel (A, B, C, CS, D, E)	1.00	MTOI	0	100	0.0000	\$1,035.6800	
	25	AL-DECK-UPROM							
	26	AL-DECK-WTHR							
	27	AL-DKHSE-AV							
	28	AL-FND-EQUIP							

To use a Standard Package,

1. Click on the *Add IP Package(s)* button  to open the wizard.
2. Identify the contract and project where the package items will be applied.



Add Interim Product

Select Contract and Project for the Cost Items that are being Created

List Only Open Contracts
 List Both Open & Closed Contracts

Contract: C10502

Project: 5071

Next >> Cancel Help

**Click on
the *Next*
button.**

Select all standard packages needed (highlight, then click on >>) and define their required quantities. Click on Finish.

Add Package

Select a Class of Packages
Classification: (none) [Retrieve]
Sub Classification: [Retrieve]

Package List

Package ID	Description
AHBP	Hull Block Painting (based on t
CAT-3034 NA	Cat diesel w/installation
CAT-3034 NA2	2nd cat diesel pkg
FF-Level 1	High level parametric, no weig
FF-level 2	SWBS group level, known dis
P/CS-FIN	Pipe, CS Coating (based on t
P/CS-Lab	Pipe, CS, Manufacturing Mar
PE1	Product-Oriented Engineering
PEP1	Shaft & Propulsor Package

>> All >> << All <<

Chosen Packages To Add

Qty	Interim Product / Package
2.00	AHBP
2.00	CAT-3034 NA2
2.00	P/CS-Lab

<< Back Find a Package Finish Cancel Help

The system will create cost items for each package selected.

In order to narrow the group of packages possible for selection, the user may use the *Package Classification* and *Sub-Classification* selection criteria buttons.

In addition, after a group of packages have been loaded into the Package List box (left side of the window), the *Find A Package* button allows the user to locate a package by description that matches a specific word or expression.

Edit the details of the package items as necessary.

Cost Item Information for the Estimating Environment								
	Contract	Project	Work Center	Cost Item	Quantity	UoM	Labor Unit Hours (CER)	Material Unit Cost (CER)
1	PD-337	337	01	2792	1.00	PKG	4,500.0000	162,000.0000
2	PD-337	337	01	2799	1.00	PKG	337.5000	30,000.0000
3	PD-337	337	02	2834	1.00	PKG	1,200.0000	0.0000
4	PD-337	337	03	2839	1.00	PKG	165.0000	0.0000
5	PD-337	337	04	2841	1.00	PKG	150.0000	0.0000
6	PD-337	337	21	2873	1.00	PKG	100.0000	3,600.0000
7	PD-337	337	21	2874	1.00	PKG	200.0000	7,200.0000
8	PD-337	337	21	2878	1.00	PKG	100.0000	3,600.0000
9	PD-337	337	21	2879	1.00	PKG	550.0000	19,800.0000
10	PD-337	337	21	2883	1.00	PKG	45.0000	1,620.0000
11	PD-337	337	24	2929	1.00	EA	0.0000	2,000.0000
12	PD-337	337	24	2930	1.00	PKG	550.0000	5,500.0000
13	PD-337	337	24	2931	1.00	PKG	1,000.0000	10,000.0000
14	PD-337	337	24	2932	1.00	PKG	250.0000	2,500.0000
15	PD-337	337	24	2933	1.00	EA	0.0000	1,500.0000
16	PD-337	337	24	2934	1.00	PKG	300.0000	3,000.0000
17	PD-337	337	24	2935	1.00	PKG	300.0000	3,000.0000
18	PD-337	337	24	2936	1.00	PKG	300.0000	3,000.0000
19	PD-337	337	24	2937	1.00	PKG	150.0000	1,500.0000
20	PD-337	337	24	2938	1.00	PKG	150.0000	0.0000
21	PD-337	337	24	2939	1.00	EA	0.0000	2,000.0000
22	PD-337	337	24	2940	1.00	EA	0.0000	2,000.0000
23	PD-337	337	24	2941	2.00	EA	0.0000	1,750.0000

Detailed instructions for developing a Standard Packages are provided in the following training tutorial:

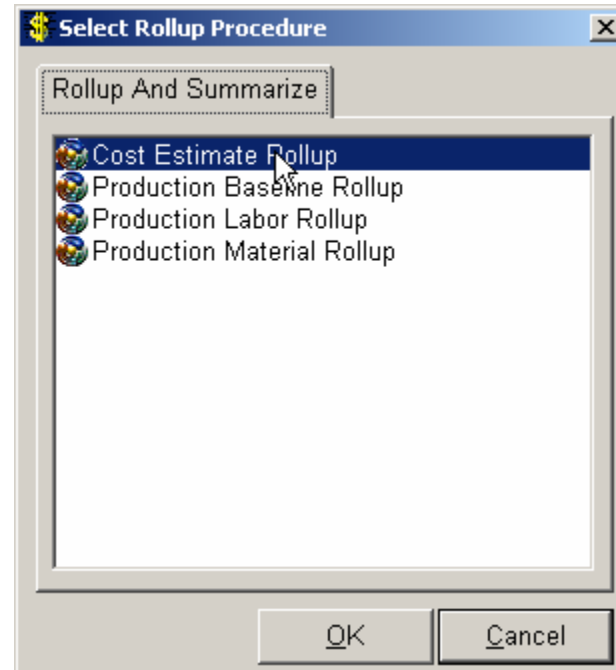
***PERCEPTION ESTI-MATE – Developing
Cost Estimating Libraries***

Updating CER Library & Standard Parts Costs

When library CERS and Standard Parts are used in a project estimate, and when their CERs are modified, the project estimate can be quickly updated with the new CER values using the **Cost Estimate Rollup**.

The rollup can be made by selecting *Environment/Cost Estimating/Rollup* from the main menu.

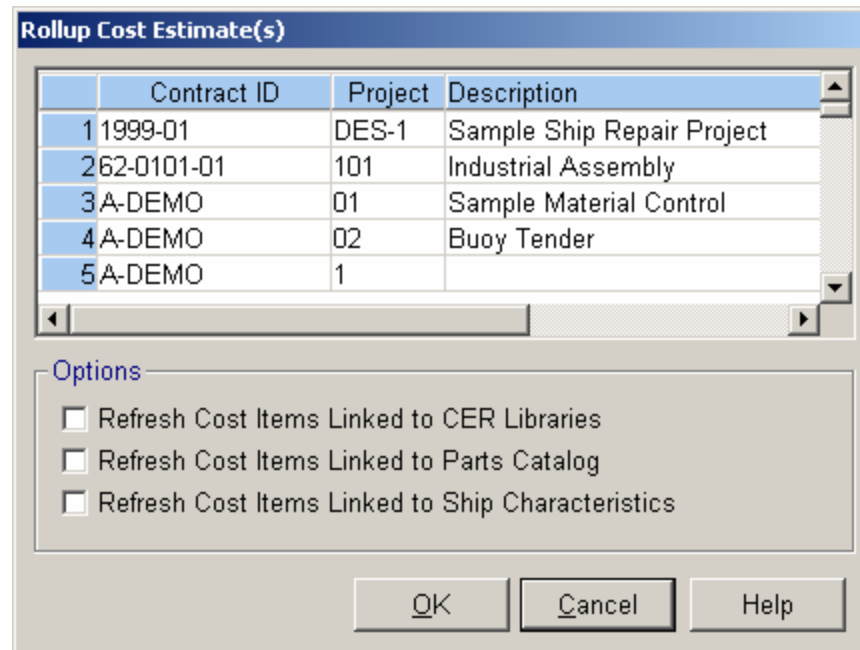
Then select the *Cost Estimate Rollup* from the pop-up window.



First highlight one or ore contract projects to be updated, and then select one or more of the “Refresh” options.

Click on the *OK* button, and the system will proceed to update all CERs on the estimate cost items as directed by the refresh options.

This rollup will summarize the updated cost estimate from the cost items through the project WBS.



Note: this updating process will not update CERs in the Standard Package Library.

However, if the project estimate uses standard packages, the cost items will be updated where the package items reference library CERs or the Parts Catalog.

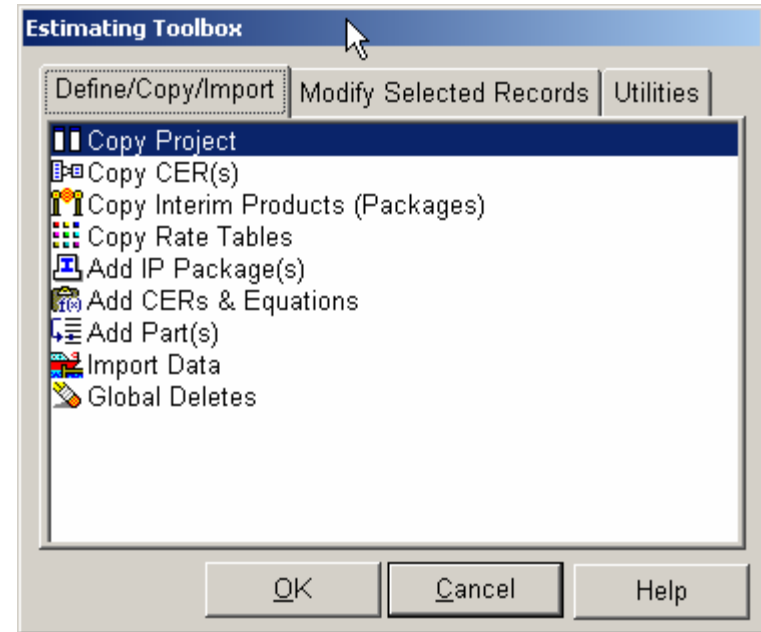
Cost Estimating Toolbox

The system provides a cost estimator's toolbox of special functions to help the estimator.

Click on the *Estimating Toolbox* button  on the tool bar to open a window of toolbox selections.

The first tab window offers various functions for

- 1. Copying projects**
- 2. Copying CERs**
- 3. Copying Standard Interim Product Packages**
- 4. Copying Rate Tables**
- 5. Adding IP Packages, CERs, & Standard Parts**

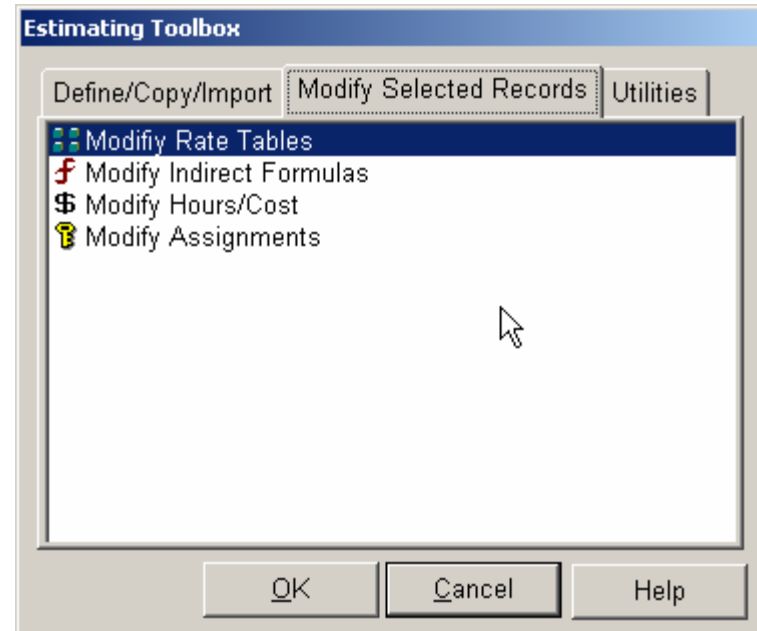


Other functions

- 6. Import data from external sources**
- 7. Globally delete sections of the project estimate.**

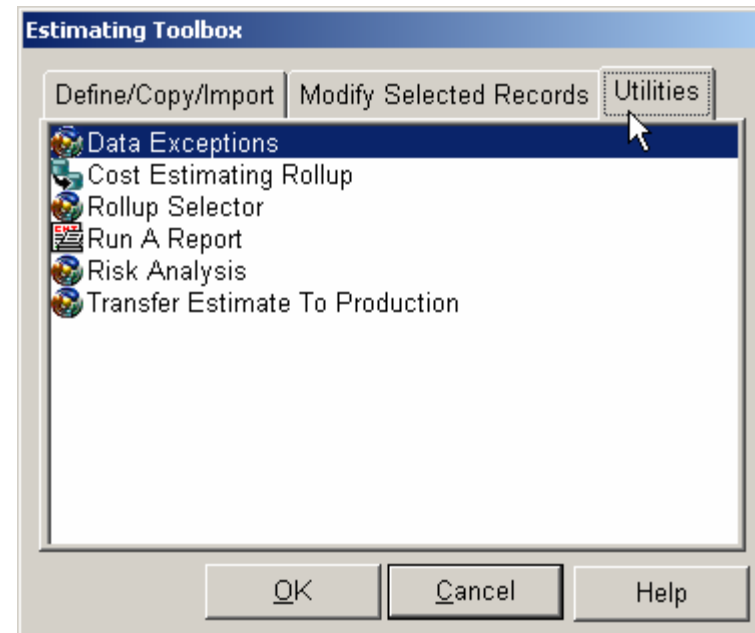
The second tab (available only when cost item records are retrieved) offers selections to:

- 1. Modify rate tables**
- 2. Modify the indirect formulas of applied costs**
- 3. Globally modify labor hours and costs using specified percentages**
- 4. Modify cost item assignments to WBS, Base Year (Start Date), and work centers**



The third tab offers the following functions:

- 1. Data validation of cost items**
- 2. Options to rollup totals to the project WBS**
- 3. Alternate route to running reports**
- 4. Perform cost risk analysis**
- 5. Transfer estimate to production to generate work orders and material requisitions.**



Cost Risk

PERCEPTION can evaluate the risk of a cost estimate and can measure the probability that the estimate will not be exceeded by actual costs.

The final “bid price” that is ultimately submitted to the ship owner would have to be based upon an examination of the competition, and that is outside the scope of the cost model.

Risk, or uncertainty, can be associated with any or all cost items included within a developing project cost estimate.

The greater the cost risk, the less likely, or probability, that the cost estimate is realistic.

The lower the risk, the greater is the probability that the cost estimate is valid.

Uncertainty can be expressed, or represented, as a distribution of cost estimates between certain values. Outside this range of expected values one would expect that other values would have very low probability (high risk).

The *PERCEPTION* Monte Carlo cost risk analysis runs through all of the cost items many times collecting its simulation information.

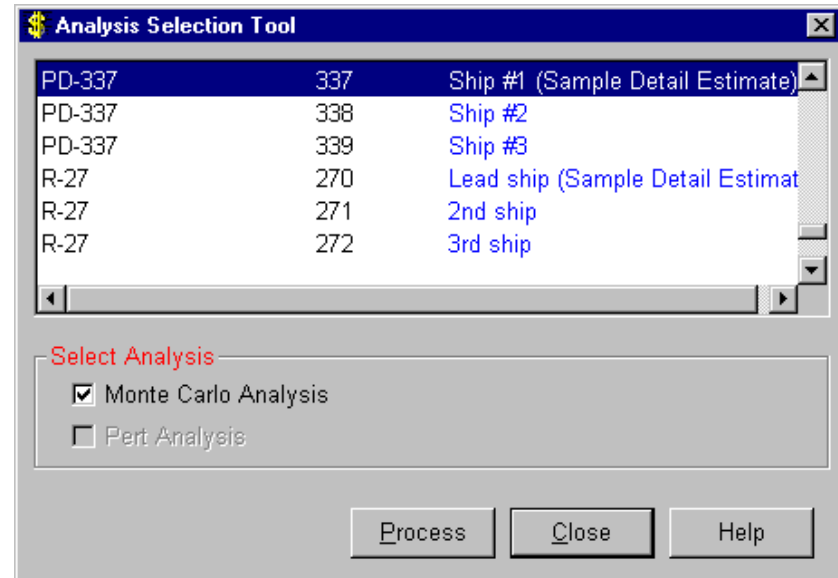
For each run and within each cost item's cost range, the system applies its random number generator to determine what cost to use within that cost range.

The cost risk probability is derived from the results of this multiple cost simulation process.

To execute the cost risk analysis, the user has to select *Environment/Cost Estimating/Risk Analysis* from the main menu.

The *Analysis Selection Tool* will open up where user can choose the project.

When the project is chosen, check the *Monte Carlo Analysis* check box and click the *Process* button. It will start the cost risk calculations.



After the process is performed, the Estimate Cost Risk window will open up. The first tab page displays the results:

Cost
Model
Monte
Carlo
Cost
Risk
Analysis
Results

PERCEPTION - Total Shipyard Management

File Edit View Environment Library Data System Reports Window Help

Results Of Risk Calculations

MONTE CARLO ANALYSIS | PERT ANALYSIS | MONTE CARLO GRAPH | PERT GRAPH

Minimum Total Cost: 45,575,048.00

Estimated Total Cost: 50,450,804.00

Maximum Total Cost: 74,713,792.00

Estimated Probability: 4.89%

Arithmetic Mean: 55,646,920.00

Standard Variance: 9,779,640,532,992.00

Standard Deviation: 3,127,241.75

Standard Skewness: 0.08

Standard Kurtosis: -1,503,866.25

Alternate Cost Probabilities								
10	20	30	40	50	60	70	80	90
51,644,052.00	53,020,036.00	54,020,756.00	54,865,108.00	55,646,920.00	56,460,004.00	57,304,360.00	58,305,076.00	59,681,060.00

Number of Iterations: 100

Date: 04/12/2001 02:58 PM

Ready | SPARV7 | Presentation | spar | Estimation | Frame

The results of the cost risk analysis are summarized as follows:

- 1. Minimum and Maximum Total Cost**
- 2. Estimated Total Cost (expected)**
- 3. Not-to-exceed probability of Estimated Total Cost**
- 4. Total costs for various levels of not-to-exceed probabilities**
- 5. Statistical data (mean, variance, deviation, skewness, kurtosis)**
- 6. Number of iterations**
- 7. Date and Time of the calculations**

For detailed information about the terminology used by the cost risk analysis, refer to the *PERCEPTION ESTI-MATE* “Cost Estimating New Construction & Ship Repair User Manual.”

The *Monte Carlo Graph* tab displays the range of “Total Cost Versus Not-To-Exceed Probability”

