

An Estimating System
For
New Construction & Ship
Repair



Cost Estimating

PERCEPTION was developed to permit cost estimating that can reflect modern ship design and production methods.

Using product- and process-based information, cost estimates can be generated quickly and accurately at any level of detail:

- **Parametric cost estimates** based upon modifiable ship design and mission characteristics
- **Standard shipbuilding & ship repair interim products & services**
- **Detail cost estimates** based upon engineered bills of material and equipment specifications.

System Benefits

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**.

Benefits for the Estimator: Provide an estimating tool that provides an array of functional capabilities:

- Automated Cost Escalation
- Global Edits and Update Features
- Application of Learning Curves
- Complexity & Productivity Factors
- Cost Trade-Off
- Cost Risk Analysis
- Return Cost Data Analysis
- User Documentation of Cost Estimate
- Tracking of Estimate Sources and Changes
- Central database of important cost information
- An estimating tool that is easy to use and easy to learn*

***ESTI-MATE* Integrates The Shipyard Business Processes:**

- Provides a system that can operate across different business units
- Provides a system that can interface easily with other systems and popular desktop software products.
- Provides a system that can interface with design and engineering (CAD/CAE) systems
- Provides a system that can interface with shipyard production control systems

***ESTI-MATE* develops estimates at various stages of design:**

1. **Concept Design** using parametric formulas & cost models
2. **Preliminary Design** using historical data and libraries of standard work packages
3. **Contract Design** using library work packages & detail bills of material
4. **Ship Repair & Overhauls** using library work packages & detail bills of material

General Features

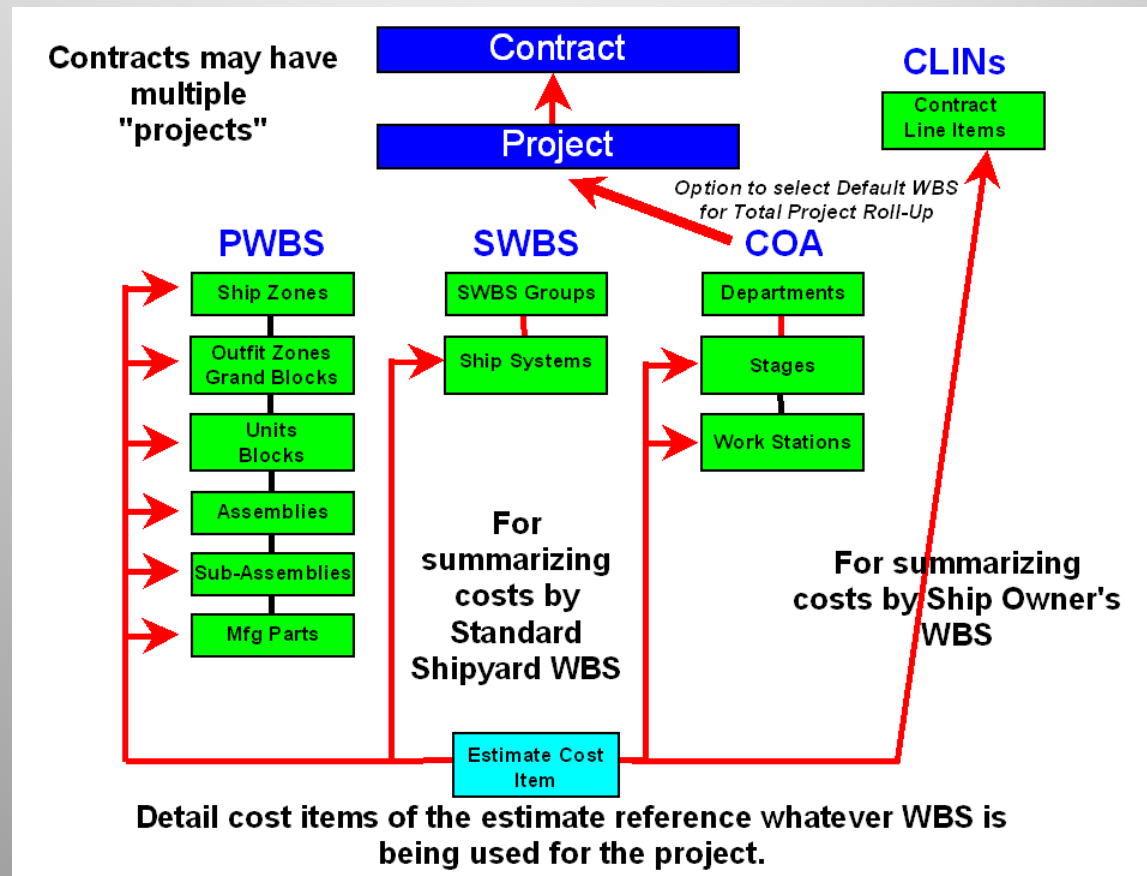
1. Breakout of labor, material & subcontractor costs
2. Automated calculations of labor, taxes, & indirect costs from rate tables
3. Multi-year and multiple work center rates
4. Multi-ship contract proposals
5. Convenient global copy, change & delete functions
6. Ship weight control reporting

***ESTI-MATE* is a relational database system cataloging costs in unique formats that enable estimates to be developed and reviewed from many different points of view.**

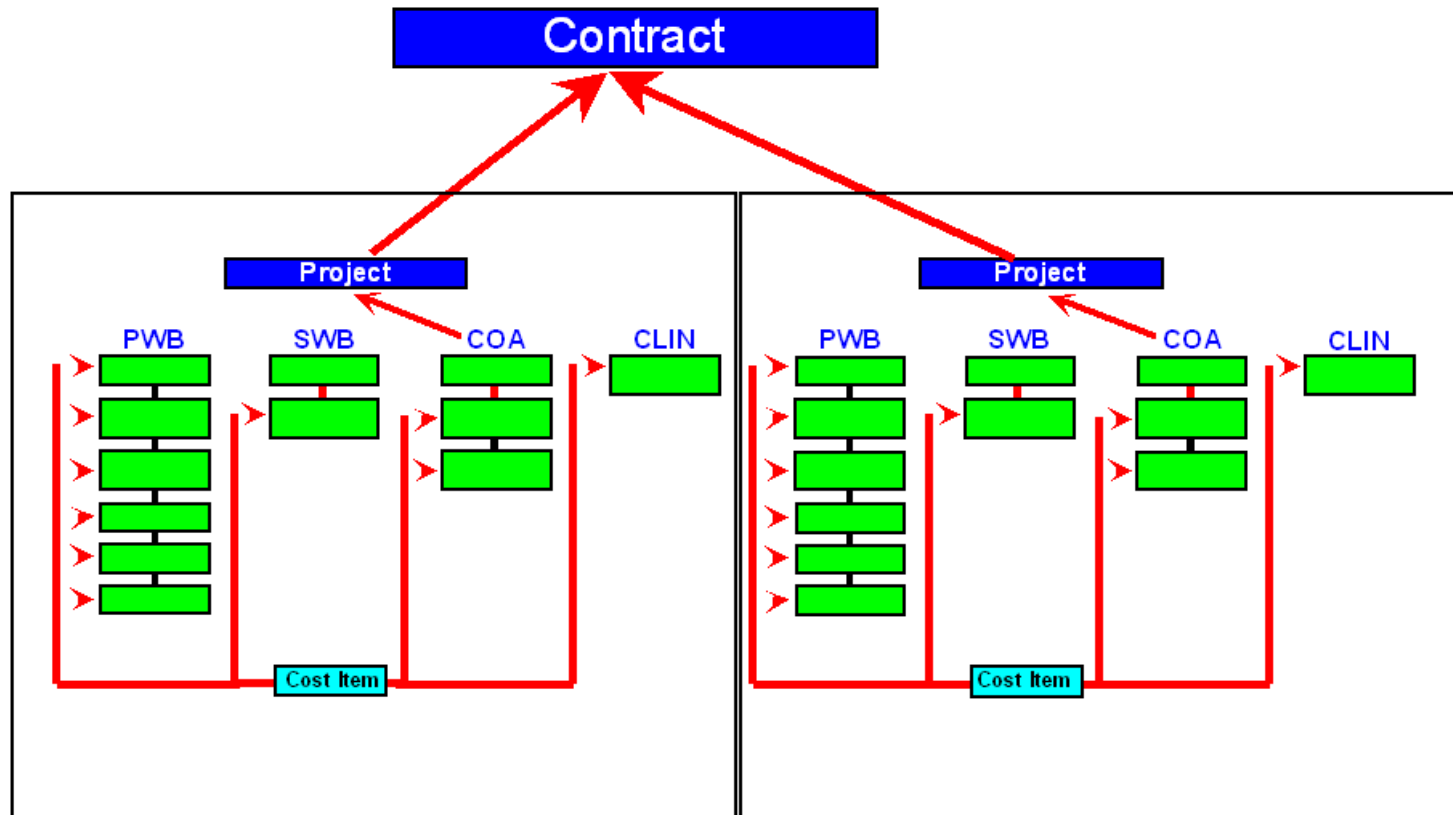
Cost Cataloging

1. By ship engineered systems work breakdown structure (SWBS)
2. By construction interim product (ship zones, hull blocks, units, etc.) work breakdown structure (PWBS)
3. By shipyard chart of accounts (“COA”) of departments, work centers & work stations
4. By contract line item (CLIN)
5. By ship repair work item or paragraph

Summarizing Costs Up Through Various Work Breakdown Structures



Multi-Ship/Project Contract Work Breakdown Structures



Special libraries can be developed:

- Prior Contracts
- Standard Production Rates
- Standard Material Costs
- Standard Work Packages
- Cost Estimate Formulas & Equations

***PERCEPTION* manages extensive cost estimating libraries**

- 1. Various libraries of Cost Estimating Relationships (“CERs”)**
- 2. Standard Parts Catalog for detail parts costs**
- 3. Standard Interim Products & Services Packages that identify standard manufacturing, assembly and support operations plus material requirements**
- 4. Rate & Cost Escalation tables**

Develop Libraries of Labor & Material Cost Packages:

Complete Equipment Packages

Cargo Zone Packages

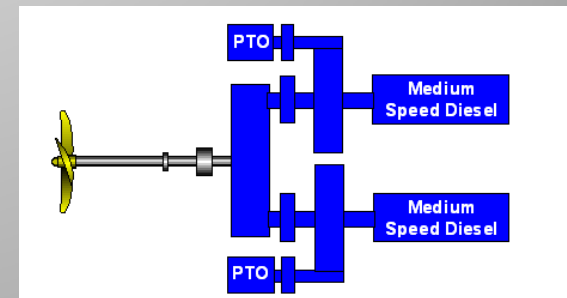
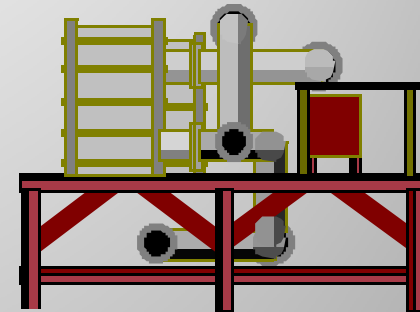
Accommodations Outfit Packages

Safety Equipment Packages

Electronics Packages

Shipyard Services Packages

.....and more.



Typical Standard Unit Costs for shipyard production processes:

- 1. Hull block construction by type of structural assembly**
- 2. Piping systems by size & type pipe**
- 3. Electrical system by size & type cable**
- 4. Standard costs per linear, square & cubic units of measure**
- 5. Standard costs for production services**

Interim Product Packages for the Estimating Environment

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

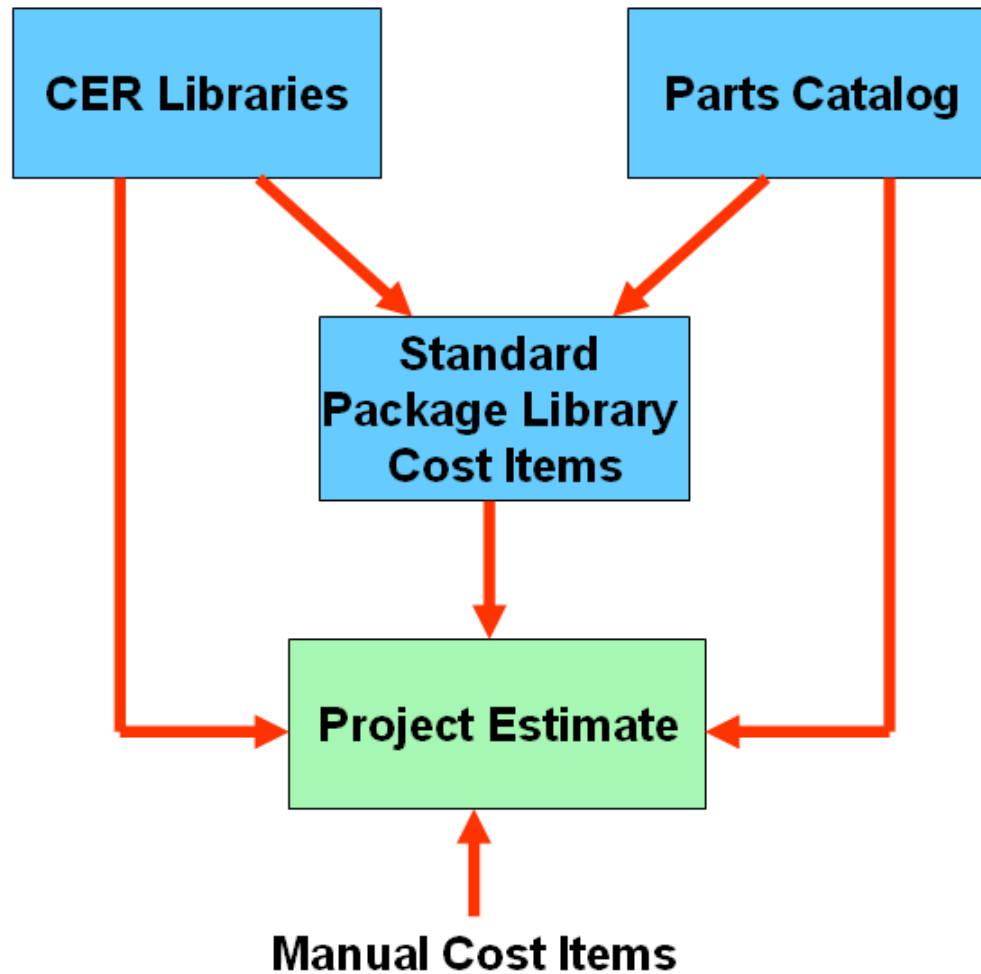
Package Listing

Package Details

Package Detail Information for the Estimating Environment

Package ID	Package Item ID	Description	Quantity	UoM	Work Center	SWBS Account	Labor CER	Material CER
1AL-BHD-ER	01	Engine Room Bulkhead Prep & Fab	1.00	MTOI	0	100	13.5506	\$0.0000
2AL-BHD-ER	02	Engine Room Bulkhead Assemble	1.00	MTOI	0	100	141.3417	\$0.0000
3AL-BHD-ER	03	Engine Room Bulkhead Erect	1.00	MTOI	0	100	69.5949	\$0.0000
4AL-BHD-ER	04	Engine Room Bulkhead Weldout	1.00	MTOI	0	100	373.4347	\$0.0000
5AL-BHD-ER	05	Mild Steel (A, B, C, CS, D, E)	1.00	MTOI	0	100	0.0000	\$1,035.6800
25AL-DECK-UPROM		Upper Prom Deck						
26AL-DECK-WTHR		Weather Decks - Av.						
27AL-DKHSE-AV		Deckhouse - Total Av.						
28AL-FND-EQUIP		Foundations - Misc. Equipment						

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



Sample List of Standard Estimating Packages

\$ Interim Product Packages for the Estimating Environment		
	Package	Description
54	TA-Boiler	Boiler package
55	TA-Compressed Air	Compressed air system package
56	TA-Cooling	Central cooling package
57	TA-EOS	Engineering operating station package
58	TA-FO Pure	Fuel oil purification system
59	TA-FO Trans	Fuel oil transfer system
60	TA-H2O Treat	Water treatment system
61	TA-Hydraulic	Hydraulic service pack
62	TA-Inert gas	Inert gas system
63	TA-LO Pure	Lube oil purification system
64	TA-LO Service	Lube oil service system
65	TA-MSD	Marine sanitation package
66	TA-Potable	Potable water system
67	TA-Reefer	Refrigeration and chilled water package
68	TA-Seawater	Seawater system
69	TA-Sludge	Sludge transfer system package
70	TA-Spares	Spare parts package
71	TA-Workshop	Workshop package
72	TD-Accommodations	Outfit costs of the deckhouse accommodations
73	TD-CargoHandling	Tanker cargo handling package
74	TD-CrewCosts	Annual salary and benefit cost of ship's normal crew compliment
75	TD-Design	Engineering and design package
76	TD-Generator	Generator package
77	TD-Machinery	Engine room support services
78	TD-MainEngine	Main engine package

Sample Standard Package Item List

# Interim Product Package Items for the Estimating Environment							
Package ID	Item	Description	Quantity	UoM	Labor Hours	Material Cost	Work Center SWBS
1	PME1	1 Main Engine	1.00	EA	0.00	\$6,500,000.00	25 233
2	PME1	2 Gearbox	1.00	EA	0.00	\$75,000.00	25 241
3	PME1	3 Mfg hold-down bolts	1.00	PKG	500.00	\$5,000.00	25 233
4	PME1	4 Machine M/E & G/B Chocks	1.00	PKG	600.00	\$6,000.00	25 233
5	PME1	5 Land Main Engine	1.00	PKG	300.00	\$0.00	25 233
6	PME1	6 Land Gear Box	1.00	PKG	200.00	\$0.00	25 241
7	PME1	7 Align & Chock Main Engine	1.00	PKG	900.00	\$0.00	25 233
8	PME1	8 Align & Chock Gear Box	1.00	PKG	500.00	\$0.00	25 241
9	PME1	9 Fit Main Engine & Gear Box Coupling	1.00	PKG	200.00	\$0.00	25 242
10	PME1	10 Install collision chocks	1.00	PKG	50.00	\$2,500.00	25 233
11	PME1	11 Run & test main engine machinery	1.00	PKG	200.00	\$0.00	25 233
12	PME1	12 Fab & Install M/E Seats	1.00	PKG	3,500.00	\$126,000.00	25 182

ESTI-MATE provides a **toolbox** of special functions to add, change and delete data:

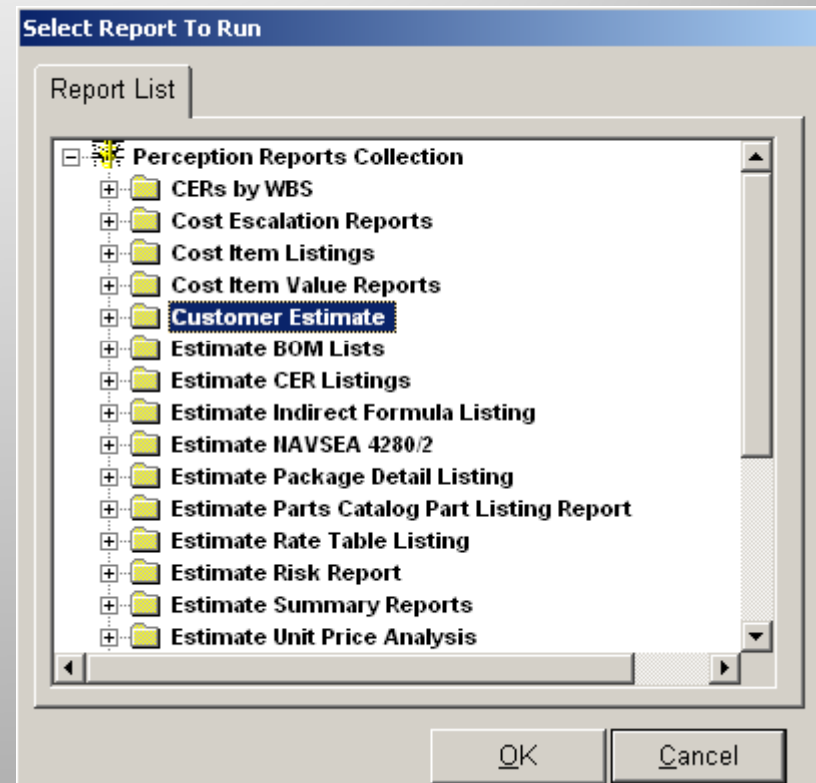
**Plug & Play different module &
package options**

**Plug & Play different manufacturing
& outsourcing options**

Plug & Play different schedule options

In addition to a wide variety of standard reports.....,

an optional graphical report writer, as well as Standard Query Language (SQL), is available for customized reports and output formats.



Summary of Costs by Ship Systems Work Breakdown Structure

08/08/2002 14:32:36

(Date format: MM/DD/YYYY)

Chesapeake Marine Industries SWBS Account Summary Report (SUM03)

Page 4 of 26

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

Account Description	Labor Hours	Labor Cost	Material Cost	SubCon Hours	SubCon Cost	Travel Cost	Direct Cost	Taxes	Indirect Cost	Total Cost	Profit	Total Price
Project 337 Ship #1 Sample Detail Cost Estimate												
Group 3 Electric Plant												
321 Ship Service Power Cables	38,000	503,500	1,740,000	0	0	0	2,243,500	43,500	479,405	2,766,405	189,641	2,956,046
322 Emergency Power Cable System	0	0	0	0	0	0	0	0	0	0	0	0
323 Casualty Power Cable System	0	0	0	0	0	0	0	0	0	0	0	0
324 Switch Gear & Panels	0	0	0	0	0	0	0	0	0	0	0	0
331 Lighting Distribution	21,920	290,440	789,120	0	0	0	1,079,560	19,728	259,642	1,358,930	96,437	1,455,367
332 Lighting Fixtures	9,150	121,238	329,400	0	0	0	450,638	8,235	108,382	567,254	40,255	607,510
341 SSTG Lube Oil	0	0	0	0	0	0	0	0	0	0	0	0
342 Diesel Support Systems	0	0	0	0	0	0	0	0	0	0	0	0
343 Turbine Support Systems	0	0	0	0	0	0	0	0	0	0	0	0
398 Electric Plant Operating Fluids	0	0	0	0	0	0	0	0	0	0	0	0
399 Electric Plant Repair Parts & Tolls	0	0	0	0	0	0	0	0	0	0	0	0
Group: 3 Totals	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
Group 4 Command & Surveillance												
400 Command & Surveillance	0	0	0	0	0	0	0	0	0	0	0	0
401 General Arrangement - Command & S	0	0	0	0	0	0	0	0	0	0	0	0
402 Security	0	0	0	0	0	0	0	0	0	0	0	0
403 Personnel Safety	600	7,950	21,600	0	0	0	29,550	540	7,107	37,197	2,640	39,837
404 Radio Frequency Transmission	0	0	0	0	0	0	0	0	0	0	0	0
405 Antennas	0	0	0	0	0	0	0	0	0	0	0	0
406 Grounding & Bonding	0	0	0	0	0	0	0	0	0	0	0	0

Summary of Costs by Product Work Breakdown Structure

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(Date format: MM/DD/YYYY)

Chesapeake Marine Industries PWBS Zone Summary Report (SUM04)

Page 1 of 1

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

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
Project 337 Ship #1 Sample Detail Cost Estimate													
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
wV	Ship Wide	0	0	0	0	0	0	0	0	0	0	0	0
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
Project 338 Ship #2													
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	333,234	0	0	0	4,693,544	8,331	2,991,253	7,693,128	752,651	8,445,779
10	Stern	603,426	7,995,395	11,522,343	0	0	0	19,517,738	288,059	6,344,253	26,150,049	2,038,888	28,188,937
50	Midships	446,145	5,911,423	14,557,317	0	0	0	20,468,739	363,933	5,166,156	25,998,828	1,872,017	27,870,845
70	Bow	111,214	1,473,586	2,772,411	0	0	0	4,245,997	69,310	1,220,366	5,535,672	414,947	5,950,619
90	Superstructure	256,036	3,392,477	8,377,956	0	0	0	11,770,433	209,449	2,966,648	14,946,530	1,075,755	16,022,286
Project: 338 Totals		1,745,901	23,133,190	37,563,260	0	0	0	60,696,450	939,082	18,688,676	80,324,207	6,154,258	86,478,465

Cost Item Detail Listings

08/08/2002 14:36:12

(Date format: MMDD/YYYY)

Chesapeake Marine Industries Cost Item Listing by SWBS Accounts(CI03)

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

Project Range: 0 to ZZZZZZZZ Group Range: 0 to ZZZZZZZZ Account 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											
Group 1 - Hull Structure											
Account 100 - Hull Structure			0.00								
01	2768	Aft Bulkheads	265.00		36.0000	1,003.7736	9,540	0	266,000	266,000	2/2002 12:00:00
					Account: 100 Totals		9,540	0	266,000	266,000	
Account 110 - Shell & Supporting Structure			0.00								
01	2771	Midbody Shell Units	2846.00		30.5000	999.6486	86,803	0	2,845,000	2,845,000	2/2002 12:00:00
01	2793	Bow Shell Units	1.00		30,958.0000	406,000.0000	30,958	0	406,000	406,000	2/2002 12:00:00
					Account: 110 Totals		117,761	0	3,251,000	3,251,000	
Account 120 - Hull Structural Bulkheads			0.00								
01	2772	Midbody Bulkheads	929.00		48.5000	997.8471	45,057	0	927,000	927,000	2/2002 12:00:00
01	2794	Bow Bulkheads	1.00		3,960.0000	133,000.0000	3,960	0	133,000	133,000	2/2002 12:00:00
					Account: 120 Totals		49,017	0	1,060,000	1,060,000	
Account 130 - Hull Decks			0.00								
01	2769	Aft Hull Decks	211.00		99.8294	1,947.8673	21,064	0	411,000	411,000	2/2002 12:00:00
01	2773	Midbody Decks	1024.00		41.1895	803.7109	42,178	0	823,000	823,000	2/2002 12:00:00
01	2795	Bow Deck Units	1.00		4,760.0000	137,000.0000	4,760	0	137,000	137,000	2/2002 12:00:00
					Account: 130 Totals		68,002	0	1,371,000	1,371,000	
Account 140 - Hull Platforms & Flats			0.00								
01	2770	M/S Platforms and Flats	91.00		1,800.9231	20,065.9341	163,884	0	1,826,000	1,826,000	2/2002 12:00:00
01	2777	Portable Decks - Fab	4.00	PKG	280.0000	113,000.0000	1,120	0	452,000	452,000	2/2002 12:00:00
02	2833	Portable Decks - Assembly	4.00	PKG	2,300.0000	0.0000	9,200	0	0	0	2/2002 12:00:00
03	2838	Portable Decks - Erection	4.00	PKG	500.0000	0.0000	2,000	0	0	0	2/2002 12:00:00
					Account: 140 Totals		176,204	0	2,278,000	2,278,000	



Sample Summary Cost Proposal



Estimate Date

08/08/2002

TO CUSTOMER 400 Seventh Street, SW Washington, DC 20590	ESTIMATE	PROPOSAL FROM Chesapeake Marine Industries 927 West Street Annapolis, MD 21401
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Contract PD-337 - Multiple Commercial Cargo Ship Program - Estima
Project 337 - Ship #1 Sample Detail Cost Estimate

Cost Item #	Quantity	UoM	Description	Unit Price	Extended Cost
Account 243					
3108	2.00	EA	Line Shaft	17,500.00	35,000.00
3109	1.00	EA	Tail Shaft	20,000.00	20,000.00
3113	1.00	EA	Fwd Stern Tube Seal	1,000.00	1,000.00
3117	1.00	PKG	Machine Stern Tube	400.00	0.00
3118	1.00	PKG	Bore & Fit Stern Tube	750.00	0.00
3120	1.00	PKG	Install Shafts	400.00	0.00
3121	1.00	PKG	Shaft Alignment	300.00	0.00
			Total for Acct: 243		56,000.00
Account 244					
Propulsion Shaft Bearings					
3110	4.00	EA	Line Shaft Bearings	6,250.00	25,000.00
3111	1.00	EA	Stern Tube Bearing	25,000.00	25,000.00

***PERCEPTION* has full Import/Export capabilities from**

- **Microsoft *Excel***
- **Microsoft *ACCESS***
- ***dBASE***
- ***Paradox***
- **ASCII Text Files**
- **SQL ODBC Databases**

Options for CAD Integration: Automating Cost Estimates from the Design Process.

Ship Design & Engineering System

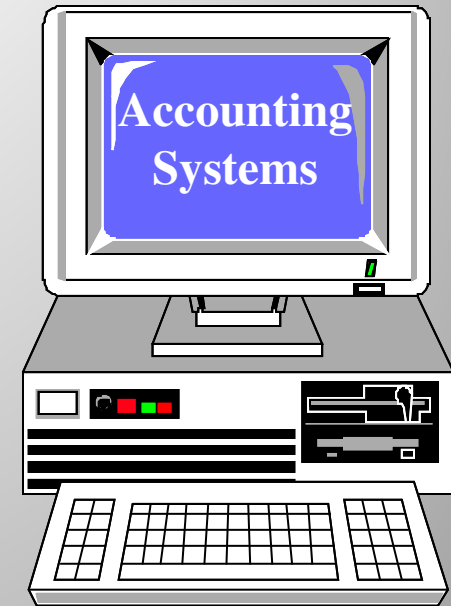
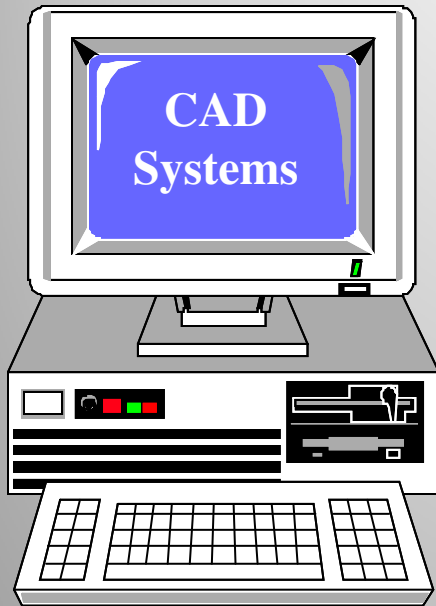
Name	Zone	Block	Area
stern	stern	side-single	180.79
hullbulk	cargo	side-single	512.263
inner bottom	cargo	bottom-sin...	1907.73
end bottom mid	cargo	bottom-sin...	575.15
end bottom	stern	bottom-sin...	1432.55
bow shell	bow	side-single	1733.72
stern shell	stern	bottom-sin...	2055.44
end bottom	hull	bottom-sin...	407.016

Immediate Cost Estimate of the Ship Design

Contract - A-CLINA	Contract - B-DEMA	Contract - C-DEMA	Contract - PD-337	Projects	Project - 337	Project - 337	Contract - F	Contract - G
907,572.50	17,920,905.00	3,010,712.04	3,235,762.90	8,960,452.50	0.00	1,310,936.50	0.00	0.00
33,117,832.44								


Date	Min Risk	Weight
00/00/0000	62,962,872.99	8,912.00
00/00/0000	87,342,261.05	0
00/00/0000	92,620,949.03	# of Cost Items


System's Integration



PERCEPTION


Desktop
& Internet
Products


 Volo View Express

 Acrobat Assistant


 Internet Explorer


 Outlook Express


 Microsoft Access

 Microsoft Excel

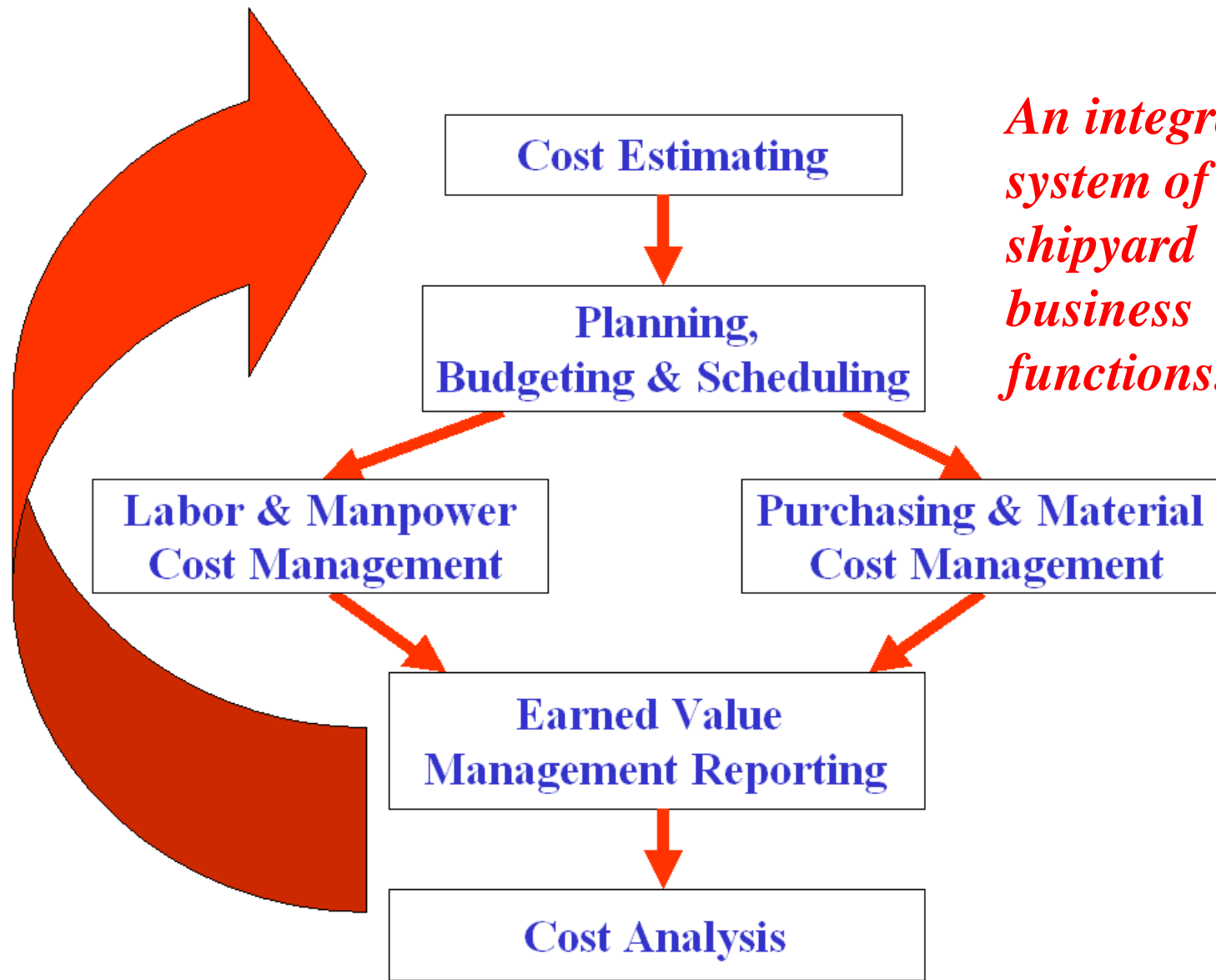
 Microsoft FrontPage

 Microsoft Outlook

 Microsoft PowerPoint

 Microsoft Word

PERCEPTION ESTI-MATE is
fully integrated with other
PERCEPTION Shipyard
Management Functions.



An integrated system of shipyard business functions.

Directly from the estimate, *PERCEPTION* can be directed to create

- Work Orders ready for execution**
- Material Requisitions ready for purchasing or stock reservations**

Pre-Developed Databases that are available for purchase:

- 1. Ship Repair Unit Cost Library (CERs)**
- 2. Commercial New Construction Unit Cost Library (CERs)**
- 3. Parametric Mono-Hull Cost Model**
- 4. Parametric Catamaran Cost Model**
- 5. Parametric Trimaran Cost Model**
- 6. Parametric Cost Models - Patrol Boat, Cutter, Corvette & Frigate Cost Model; Tanker/Product Carrier, RO-PAX ; Container Ship; Bulk Carrier; Hydrographic/Research Vessel; Tank Barges; Forebody Replacement**

SPAR Associates, Inc.

Over 30 Years Providing

- **Shipyard management software**
- **Software development services**
- **Training & maintenance support**
- **Planning & scheduling services**
- **Cost estimating services**
- **Management consulting**

Over 35 Years Serving the Shipbuilding & Repair Industry

