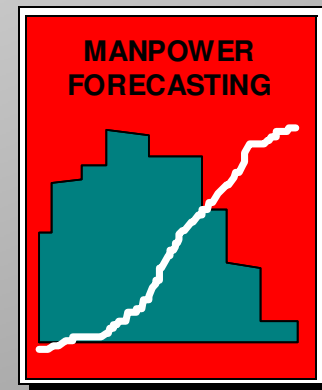
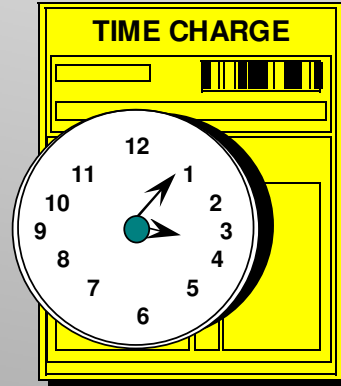
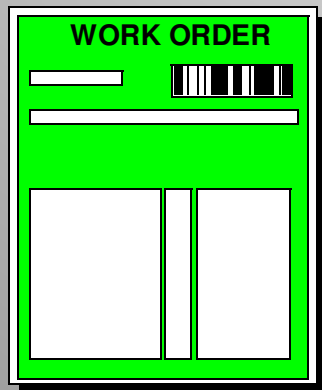


# *PERCEPTION<sup>®</sup> WORK-PAC*

## Managing Labor Costs & Schedules



***PERCEPTION WORK-PAC*** is designed to plan and manage shipyard labor costs and schedules.

The basis for this capability are shipyard work orders that the system generates and provides for inputs of worker time charges.



**The system produces reports at various levels of details, from daily employee time charges, work order performance and summaries up through various work breakdown structures.**

**These reports provide management with the cost and schedule performance visibility necessary to maintain project budgets and planned schedules.**



# System Benefits

1. Better labor planning cost/schedule control.
2. Improved management control of job progress and labor expenditures.
3. Immediate job cost reporting and summarization.
4. Fast and accurate reporting of labor cost problems.
5. Labor costing by project (job) work breakdown structure and by organization structure.
6. Automated final labor cost forecasting based upon actual performance.
7. Automated job progressing - no manual assessments required.
8. Generous checks for erroneous data and bad timecard charges.

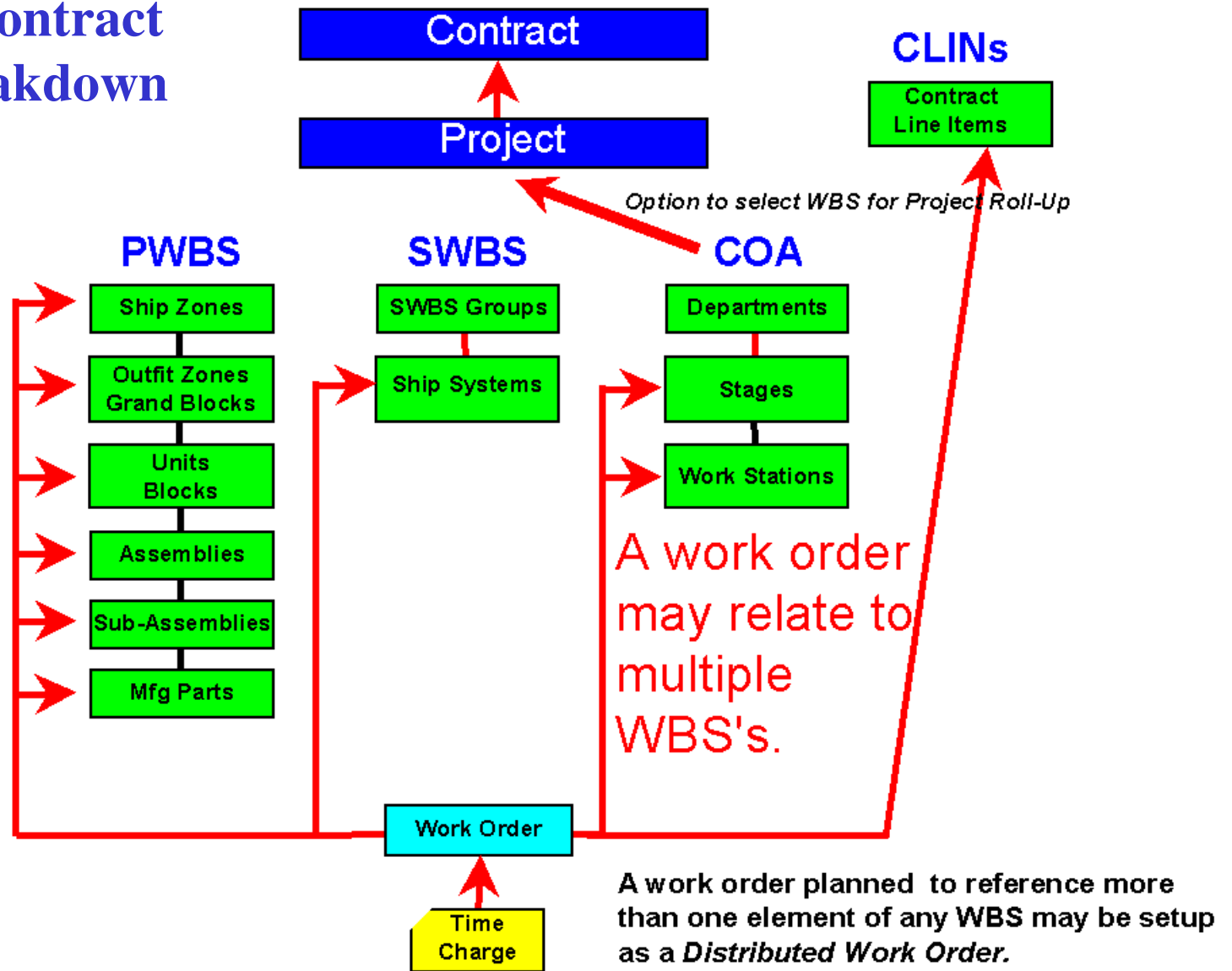


**Costs and schedules can be summarized by several different project work breakdown structures (WBS) simultaneously:**

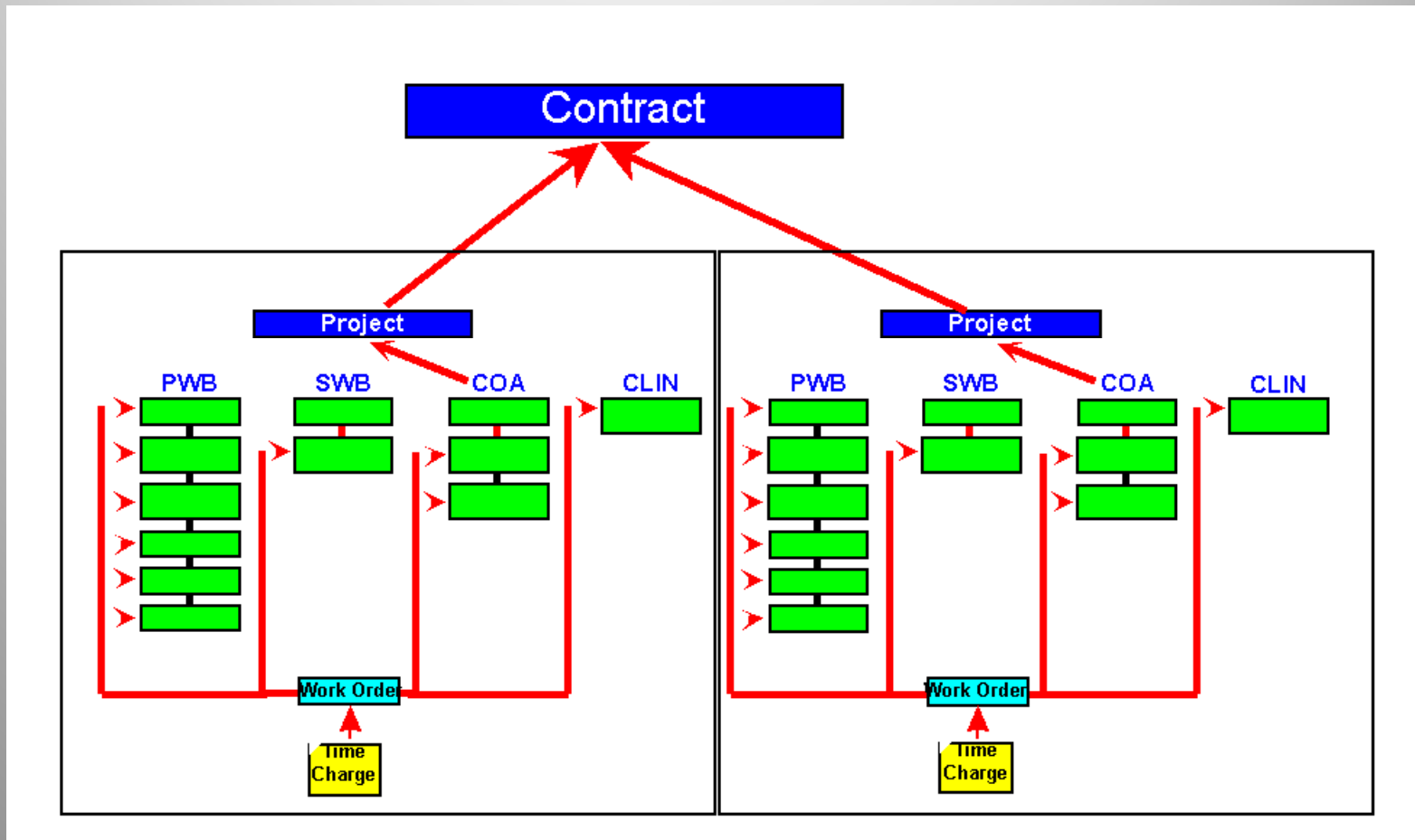
- **By Systems Work Breakdown Structure (SWBS)**
- **By Product Work Breakdown Structure (PWBS)**
- **By Shipyard Organization (COA)**
- **By Contract Line Item (CLIN)**



# Possible Contract Work Breakdown Structures



# Multi-Ship Program Management Cost & Schedule Consolidation



## ***PERCEPTION WORK-PAC* measures and tracks the following:**

- ✓ **Labor Hours per 1% Progress**
- ✓ **Production Process Rates by Stage of Construction**
- ✓ **Weeks Ahead/Behind Planned Schedules**
- ✓ **Forecast & Trend Weeks Ahead/Behind for 100% Progress**
- ✓ **Forecast & Trend Over-Run/Under-Run**





## ***PERCEPTION* further tracks different phases of costs and schedules:**

- Original Estimated Costs & Schedules**
- Baseline Costs & Schedules**
- Current Budget Costs & Planned Schedules**
- Management Reserves**
- Actual Labor Costs & Schedules**
- Rework**
- Change Orders**



# Labor Performance Reporting

*PERCEPTION* produces many excellent high-level status and tracking reports.

These reports provide the project manager with the visibility and status of labor costs and schedules. These reports quickly identify problem areas of costs and schedules.

The quicker someone recognizes the problems, the sooner they can be resolved and any damage to costs and schedules minimized.



# WBS Performance Reports

This function of tracking and managing requires accurate and timely feedback of costs and schedules which can be measured against a baseline of budgets and planned schedules.

*PERCEPTION* can produce a wide variety of reports that provide visibility of project performance at different levels of detail.



# WBS Summarizes Performance

Most modern shipyards manage their costs by way of the project Work Breakdown Structure (WBS).

The WBS summarizes cost and schedule information in various categories and provides a high level view of a project's performance.

The WBS is an ideal means for identifying areas of a project that may require special management attention to resolve problems that may be adversely impacting budgets and planned schedules.



**For any level of the project's WBS, *PERCEPTION* summarizes cost and schedule performance:**

- **BAC: Budget At Completion**
- **MR: Management Reserves**
- **BCWS: Budgeted Cost of Work Scheduled**
- **BCWP: Budgeted Cost of Work Performed**
- **ACWP: Actual Cost of Work Performed**
- **EAC: Estimated Cost At Completion**
- **EAC Trend for 100% Progress**
- **Planned & Actual Progress**
- **Calendar Schedule Variance**
- **Calendar Variance Trend for 100% Progress**



## The Summary Progress reports provide the following status information:

1. % progress (planned, actual, & current variance from planned)
2. **Weeks ahead or behind schedule**
3. Current budget hours earned from labor hours charged (BCWP)
4. Current budget hours scheduled as planned (BCWS)
5. Current actual hours charged (ACWP)
6. **Current budget hours ahead or behind planned schedule (BCWP-BCWS)**
7. Total labor hours budget (BAC)
8. **Estimated labor hours at completion (EAC)**
9. Estimated labor hours to complete (ETC)
10. Estimated total labor hours savings (BAC – EAC)



# SWBS Summary Progress Reports Available At Group and Account Levels.

04/14/2003 08:32:57

(Date format: MM/DD/YYYY)

**SPAR Associates, Inc.**

Page 1 of 1

## SWBS Group Progress Report (PROG02)

Contract TSHIP CONTRACT - T-SHIP Series Contract

Project: 0 to ZZZZZZZZ Group: 0 to ZZZZZZZZ

Group	Description	Percent Progress				Current Labor Hours				Final Hours			
		Planned	Actual	Ahead	Weeks Ahead	BCWS	BCWP	Actual Hours	Schedule Ahead	Budget	EAC	ETC	Savings
<b>Project 2002</b>	<b>Effective Date: 01/14/1993</b>	<b>Severn Bulk Carrier (work orders)</b>											
		<b>68.66</b>	<b>68.04</b>	<b>-0.62</b>	<b>-0.33</b>	<b>698,984</b>	<b>692,646</b>	<b>660,706</b>	<b>-6,338</b>	<b>1,017,998</b>	<b>984,817</b>	<b>324,111</b>	<b>33,181</b>
0	STEELWORK	90.85	95.36	4.51	3.65	431,102	452,518	450,719	21,416	474,528	474,895	24,176	-367
1	ACCOMODATIONS OUTFIT	16.55	26.00	9.45	4.70	9,138	14,358	16,020	5,221	55,222	58,120	42,100	-2,898
2	CARGO SYSTEMS OUTFIT	56.66	64.47	7.81	1.58	31,964	36,370	26,925	4,406	56,418	44,712	17,787	11,706
3	MECHANICAL SYSTEMS OUTFIT	38.56	32.92	-5.64	-1.47	31,921	27,265	20,641	-4,656	82,784	73,453	52,812	9,331
4	PIPING SYSTEMS	55.66	48.02	-7.64	-3.40	45,891	39,601	26,504	-6,290	82,450	62,160	35,656	20,290
5	MACHINERY SYSTEMS	54.17	39.12	-15.05	-6.11	15,112	10,913	7,712	-4,199	27,899	23,832	16,120	4,067
6	ELECTRICAL SYSTEMS	38.33	8.95	-29.38	-9.20	22,242	5,195	4,821	-17,047	58,027	55,591	50,770	2,436
7	PRODUCTION SERVICES	57.24	62.95	5.71	3.99	73,617	80,951	81,089	7,334	128,601	131,270	50,181	-2,669
8	OWNER CHANGES	55.12	16.71	-38.41	-25.13	13,485	4,089	4,282	-9,396	24,466	32,702	28,420	-8,236
9	DESIGN & DRAWING	88.80	77.66	-11.14	-8.93	24,512	21,436	21,993	-3,076	27,603	28,084	6,091	-481
<b>Group Totals for Project - 2002</b>		<b>68.66</b>	<b>68.04</b>	<b>-0.62</b>	<b>0.62</b>	<b>698,984</b>	<b>692,695</b>	<b>660,706</b>	<b>-6,289</b>	<b>1,017,998</b>	<b>984,817</b>	<b>324,111</b>	<b>33,181</b>



**Critical Information: Weeks Ahead (or behind), Scheduled Hours Ahead (or behind) & Labor Hours EAC**



The *details* of labor cost and schedule information at any level of the project WBS can be viewed on-line by drilling down from the WBS level's worksheet.

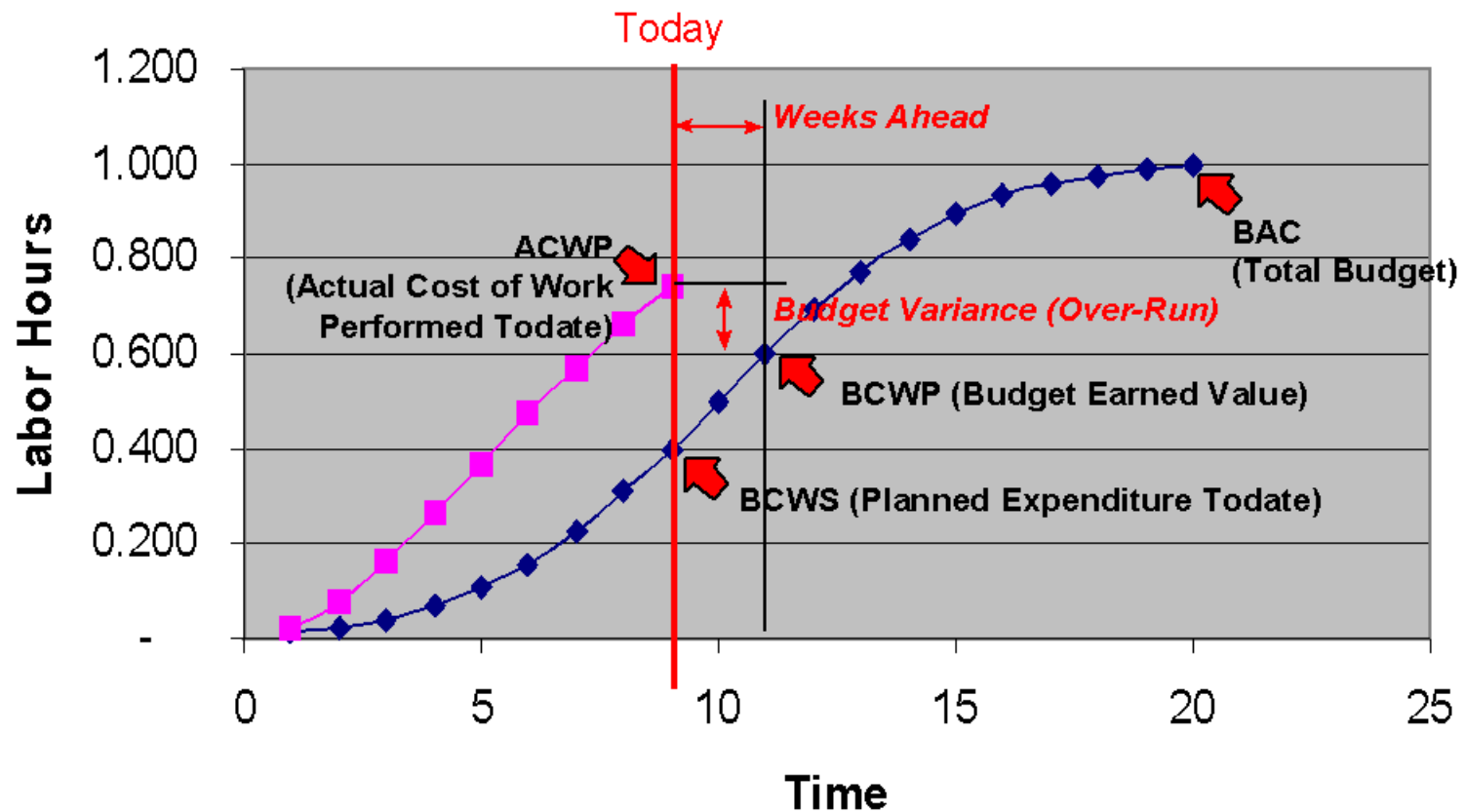
Project Details Information for the Accounting Environment										
Details	Material Status	Overall Status	Indexes	Variances	Notes	Baseline	Options	Milestones	Characteristics	
Contract	TSHIP CONTRACT		Description				Severn Bulk Carrier (work orders)			
Project	2002		Effective Date:				01/14/1993			
	Budgeted Cost of Work Scheduled	Budgeted Cost of Work Performed	Actual Cost of Work Performed	Budgeted Cost	Estimated at Completion	Reserves				
Man-Hours:	698,984	692,646	660,706	1,017,998	984,817	385,220.00				
Rate/Hour:	18.00		17.35		17.18					
Labor Cost:	12,581,716	12,467,625	11,462,875	18,323,964	16,916,054	1,592,510				
	Budget + Reserves	Less EAC	Less Rework	= Labor Margin	Estimated Remaining Labor	<i>NOTE: Rework included in ACWP and EAC</i>				
Man-Hours:	1,106,520	984,817	8,503	113,200	324,111					
Labor Cost:	19,916,474	16,916,054	147,150	2,853,270	5,453,179					
	Start Date	Finish Date	Total Progress	68.04 %	(Closed	58.40 %	In-Process	9.64 %		
Planned	09/12/1991	09/17/1993	Total Planned	68.66 %	(Behind	-0.62 %		-0.33 weeks)		
Actual	05/13/1991	00/00/0000	Total Manual	58.48 %	Number of Work Packages:		2181			
					Budgeted Hours:		1,018,212.00			





# *PERCEPTION* determines WBS level performance from work order performance.

## Measuring Schedule Performance



# Measuring Progress

*PERCEPTION* allows manual progress assessments to be entered against work orders.

*PERCEPTION* also measure progress automatically. Its method is very accurate, and is uniquely objective.



# Measuring Estimate At Completion (EAC)

*PERCEPTION* applies the progress factor for EAC. As work orders are completed, the system better learns the extent of cost variance for these work orders.

$$EAC = BAC + \text{Factor} \times [\text{Variance}_{\text{completed w/os}} + \text{Adjustments}_{\text{in-progress w/os}}]$$



# Work Orders

Work orders for the basis for planning shipyard labor and for collecting time charges.

*“The 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.”*

For new construction, work orders should average 250-500 hours and have a schedule of 2-4 weeks in duration. Smaller work orders will make time charging more difficult and therefore less accurate. Larger work orders will lose visibility of progress and cost/schedule performance.

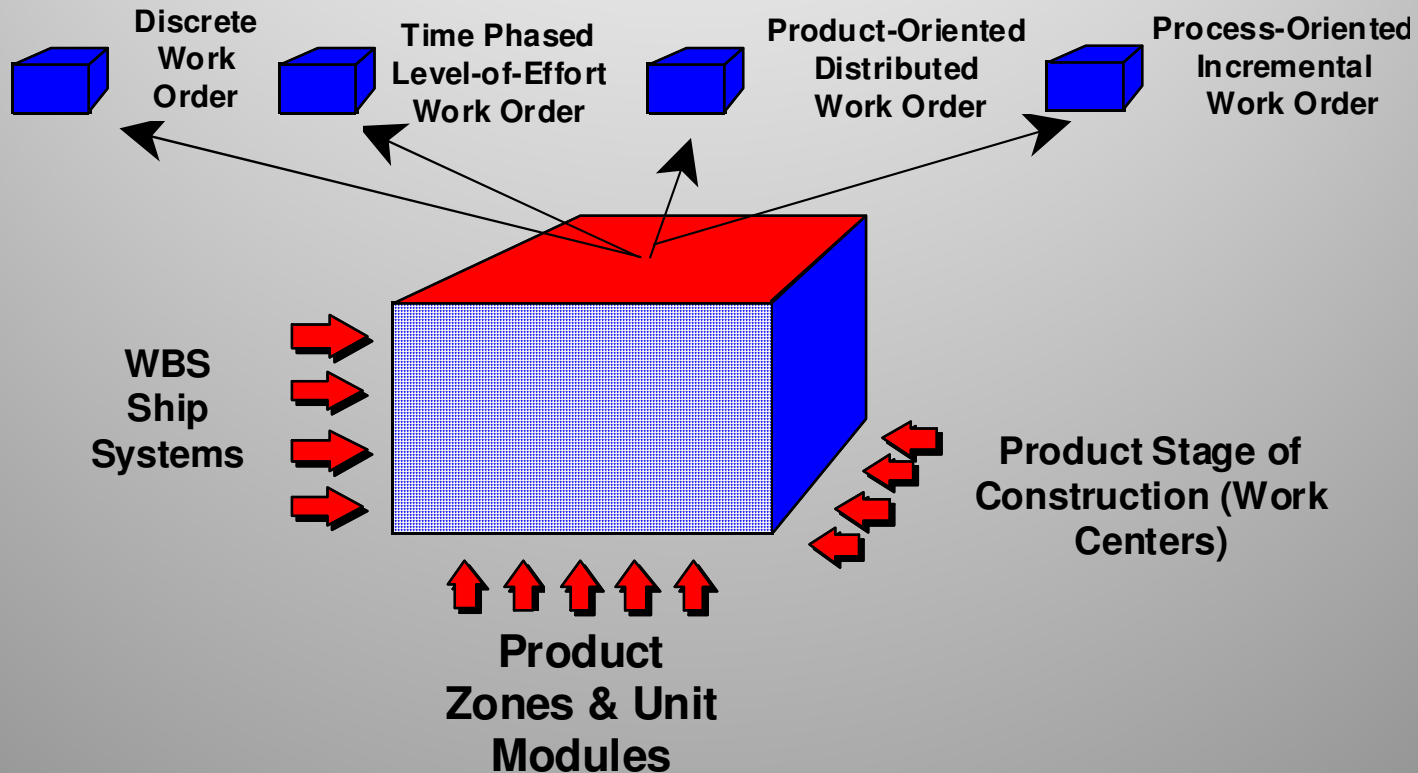


# The system allows the user to develop four different types of work orders:

1. Discrete work order (default) that can clearly be assigned to any single element or level of the project WBS.
2. Distributed work order that cannot be assigned to any single project WBS element, but rather includes work that involves multiple elements.
3. Time-phased level of effort work order that has no clear-cut end product, but rather is a service to be provided over time within a fixed budget.
4. Incremental process work order that measures progress and performance on the basis of physical production throughput.



# Four Types of Work Orders Provide Extra Flexibility



# Work Order Listings

*PERCEPTION* generates a variety of work order listings.

With the exception of time charge transactions that the system also tracks, work orders represent the lowest level of detail for managing labor hours, costs and schedules.



04/15/2003 10:42:10

(Date format: MM/DD/YYYY)

**SPAR Associates, Inc.**  
**Work Order Listing Report (WO04)**

Project/SWBS Account/WC/WO Sort  
 ct TSHIP CONTRACT - T11

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04/15/2003 10:44:00

(Date format: MM/DD/YYYY)

**SPAR Associates, Inc.**  
**Work Order Listing Report (WO05)**

Project/Zone/Planned Start Sort  
 ct TSHIP CONTRACT - T32

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Work %  
rs Prog

Work Center	Order	Heading	Unit	Acct	Auth	Planned Start	Planned Finish	Actual Start	Actual Finish	Budget Sta	Hours	Actual Hours	Over Run	Premium Hours	After Close	Rework Hours	% Prog		
Project 2002	Effective Date: 01/14/1993					Severn Bulk Carrier (work orders)												0	100.00
Zone 00	MISC TOTAL SHIP																	0	0.00
T32	24600	FABRICATE RIGGING	246	N		12/23/1992	02/02/1993	06/19/1992	00/00/0000	*	384	75.00		0	0	0	0.00		
T36	60300	UNLOAD MCC CONNECT	603	N		12/23/1992	07/26/1993	00/00/0000	00/00/0000	LS	373	0.00		0	0	0	0.00		
T23	30413	31-40 BBOARDS+TIMBER	304	N		01/05/1993	02/02/1993	09/23/1992	10/02/1992	C	497	490.00		0	0	0	100.00		
T33	30422	WAY 21-30 TOP PACKED	304	N		01/05/1993	01/26/1993	07/21/1992	09/10/1992	C	277	285.00 *		0	0	0	100.00		
T33	30442	CLEAR BERTH + HULL	304	N		01/05/1993	02/17/1993	00/00/0000	00/00/0000	LS	3,451	0.00		35	0	0	0.00		
T33	31900	WT + OIL TIGHT DOORS	319	N		01/05/1993	05/14/1993	00/00/0000	00/00/0000	LS	111	0.00		0	0	0	0.00		
T36	60600	FAB NAVAIID FITTINGS	606	N		01/05/1993	02/09/1993	00/00/0000	00/00/0000	LS	870	0.00		0	0	0	0.00		
T23	30423	WAY 31-40 TOP PACKED	304	N		01/12/1993	02/02/1993	10/02/1992	10/09/1992	C	277	260.00		0	0	0	100.00		
T33	30404	WAY 41-50 SET+PACKED	304	N		01/12/1993	02/09/1993	10/01/1992	10/30/1992	C	456	370.00		13	0	0	100.00		
T33	30414	41-50 BBOARDS+TIMBER	304	N		01/12/1993	02/09/1993	08/20/1992	10/30/1992	C	497	328.00		11	0	0	100.00		
T33	30436	JACKING SHORES+LUGS	304	N		01/12/1993	02/02/1993	00/00/0000	00/00/0000	LS	324	0.00		0	0	0	0.00		
T33	30438	ROPE + STRAP TIMBERS	304	N		01/12/1993	02/02/1993	07/06/1992	11/06/1992	C	787	0.00		8	0	0	100.00		
T33	30440	18 DRAG CHAINS+BOXES	304	N		01/12/1993	02/17/1993	00/00/0000	00/00/0000	LS	1,628	0.00		34	0	0	0.00		
T36	60200	MASTS CABLING	602	N		01/12/1993	04/21/1993	00/00/0000	00/00/0000	LS	180	0.00		0	0	0	0.00		
T31	16790	SIDELIGHTS SHOPWORK	167	N		01/20/1993	06/22/1993	08/12/1992	00/00/0000	*	152	41.00		0	0	0	0.00		
T33	30424	WAY 41-50 TOP PACKED	304	N		01/20/1993	02/09/1993	10/12/1992	10/30/1992	C	277	147.00		0	0	0	100.00		

















05/13/2002 16:02:35

(Date format: MM/DD/YYYY)

### Chesapeake Marine Industries Bar Code Work Order Listing Report (BAR02) Work Center/WO Planned Start Date Sort

<b>Contract:</b>	Ship Repair to Ship Repair	<b>Project:</b>	0 to ZZZZZZZZ	<b>Division:</b>	0 to ZZZZZZZZ
<b>Work Center:</b>	0 to ZZZZZZZZ	<b>Outfit/Zone:</b>	0 to ZZZZZZZZ	<b>Department:</b>	0 to ZZZZZZZZ
<b>Work Order:</b>	0 to ZZZZZZZZ	<b>Unit:</b>	0 to ZZZZZZZZ	<b>Process:</b>	0 to ZZZZZZZZ
<b>Group:</b>	0 to ZZZZZZZZ	<b>Assembly:</b>	0 to ZZZZZZZZ	<b>Planned Date:</b>	01/01/1950 to 01/01/2050
<b>Account:</b>	0 to ZZZZZZZZ	<b>Sub Assembly:</b>	0 to ZZZZZZZZ	<b>Actual Date:</b>	01/01/1950 to 01/01/2050
<b>Zone:</b>	0 to ZZZZZZZZ	<b>Part:</b>	0 to ZZZZZZZZ	<b>Drawing:</b>	0 to ZZZZZZZZZZZZZZZZZZZ

Work Order	Heading	Start Date	Finish Date		Work Order	Heading	Start Date	Finish Date	
<b>Work Center: 0</b>					<b>Work Center: 0</b>				
506001	Remove & replace sea grids	00/00/0000	00/00/0000		120006	Top coat alkyd	09/29/1998	10/09/1998	
102002	U.T. emergency room bhd	09/29/1998	10/09/1998		127001	Paint ships name	09/29/1998	10/09/1998	
700001	Dock preparation	09/29/1998	10/09/1998		129001	Paint draft marks	09/29/1998	10/09/1998	
102001	U.T. hull	09/29/1998	10/09/1998		201001	Rivets & seams	09/29/1998	10/09/1998	
112001	Remove manhole covers	09/29/1998	10/09/1998		112003	Repairs to covers	09/29/1998	10/09/1998	
112002	Replace manhole covers	09/29/1998	10/09/1998		500001	Tailshaft readings - Revised	09/29/1998	10/09/1998	

*Sample Bar Coded Work Order List  
(Optional)*



# Work Order Reports

Special features of work order reports include:

- Actual hours charged versus budget hours
- Actual start & finish dates versus planned schedules
- Whether authorized for charging or not
- Hours worked after work order has been closed
- Premium hours charged
- Rework hours charged



# Cataloging of Work Orders

Each work order must be properly cataloged so that its cost and schedule performance information can be summarized to the project:

- Contract number (20 characters maximum)
- Project number (8 characters maximum)
- Work center assigned (8 characters maximum)
- Work order number (8 characters maximum)
- SWBS account assigned (8 characters maximum)
- PWBS assigned (optional) (8 characters maximum)



# Time Charging to Work Orders

The time charge transactions only requires the following information:

- Project number
- Work center
- Work order number.
- Date
- Hours charged
- Employee number

If bar codes are used for collecting time charge transactions, the bar code uses an internal work order sequence number in lieu of the project, work center and work order numbers.



# Comparing Production Performance With Estimate

The performance of production costs should be monitored and compared against the original estimate.

*PERCEPTION* generates summary reports at any level of the project WBS comparing the estimate against the current budgets, actual costs charged to date, and the estimated costs at completion.



# Comparing Production Costs with Estimate

04/15/2003 14:14:35

SPAR Associates, Inc.

Page 1 of 1

(Date format: MM/DD/YYYY)

## SWBS Group - Estimate vs Production Labor/Material Status Report (EvsP02)

Contract TSHIP CONTRACT - T-SHIP Series Contract

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

Group	Description	Estimated Hours	Production Budget Hours	Actual Hours	EAC Hours	Estimated Material Cost	Budget Material Cost	Committed Material Cost
<b>Project 2002</b>	<b>Severn Bulk Carrier (work orders)</b>	<b>1,106,520</b>	<b>1,017,998</b>	<b>660,706</b>	<b>984,817</b>	<b>32,080,543</b>	<b>29,193,294</b>	<b>25,982,032</b>
0	STEELWORK	515,791	474,528	450,719	474,895	17,150,061	15,606,555	13,889,834
1	ACCOMODATIONS OUTFIT	60,024	55,222	16,020	58,120	1,932,770	1,758,821	1,547,103
2	CARGO SYSTEMS OUTFIT	61,324	56,418	26,925	44,712	1,910,240	1,738,318	2,193,595
3	MECHANICAL SYSTEMS OUTFIT	89,983	82,784	20,641	73,453	2,708,477	2,464,714	2,108,533
4	PIPING SYSTEMS	89,620	82,450	26,504	62,160	2,603,448	2,369,138	687,686
5	MACHINERY SYSTEMS	30,325	27,899	7,712	23,832	849,100	772,681	1,376,678
6	ELECTRICAL SYSTEMS	63,073	58,027	4,821	55,591	1,699,813	1,546,830	1,981,189
7	PRODUCTION SERVICES	139,784	128,601	81,089	131,270	2,446,215	2,226,055	376,916
8	OWNER CHANGES	26,593	24,466	4,282	32,702	465,386	423,501	255,146
9	DESIGN & DRAWING	30,003	27,603	21,993	28,084	315,034	286,681	1,565,350
	<b>Grand Total</b>	<b>1,106,520</b>	<b>1,017,998</b>	<b>660,706</b>	<b>984,817</b>	<b>32,080,543</b>	<b>29,193,294</b>	<b>25,982,032</b>



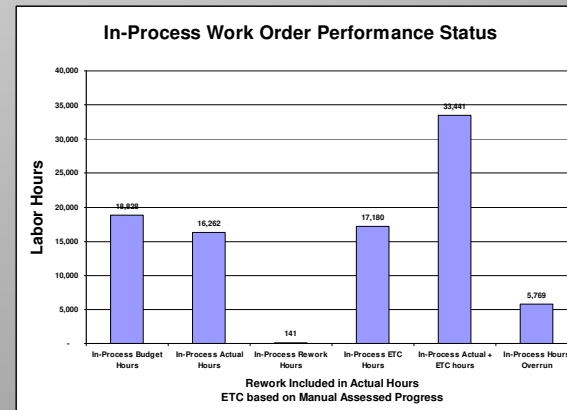
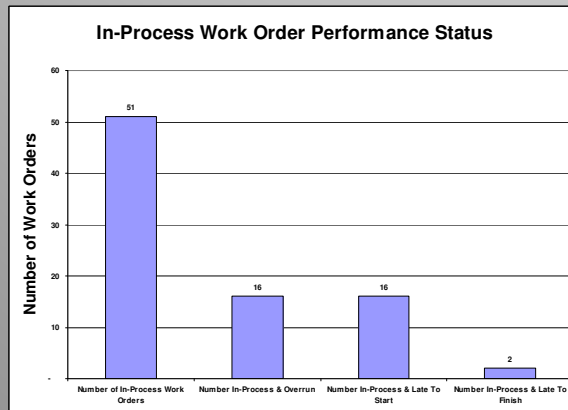
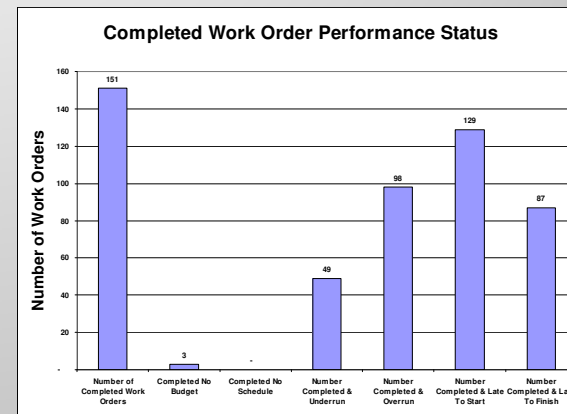
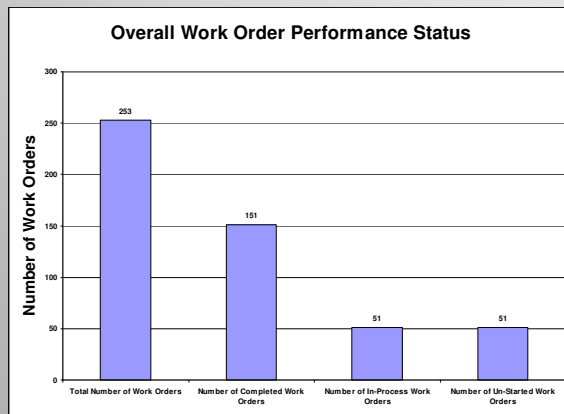
# Management Report Graphics

Other high-level reports track a project's performance throughout the course of its execution.

These can best be reviewed in graphical form.

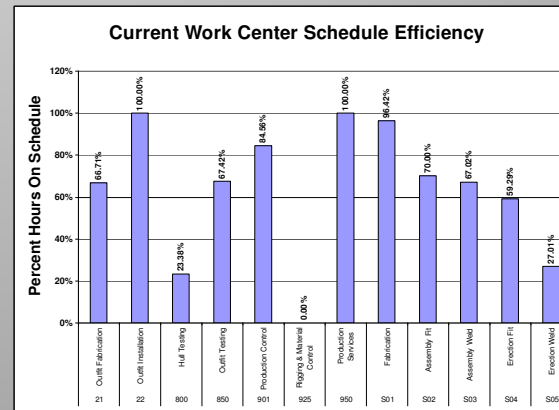
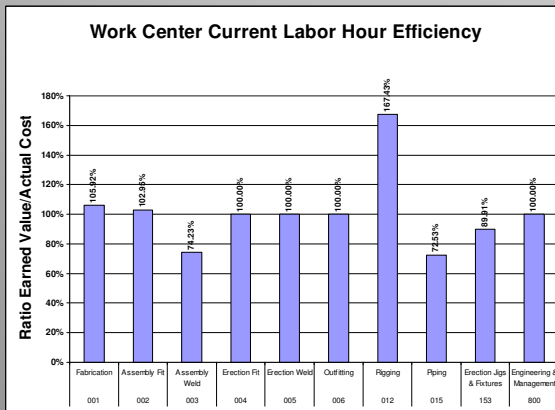
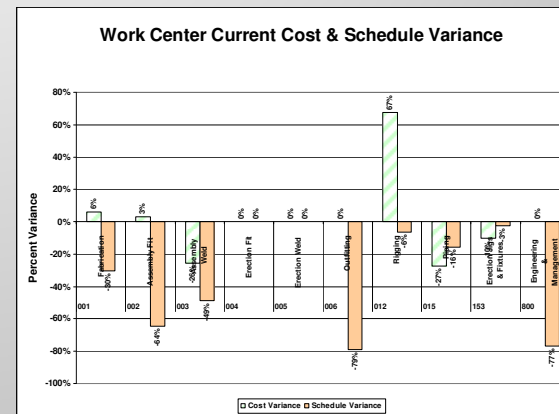
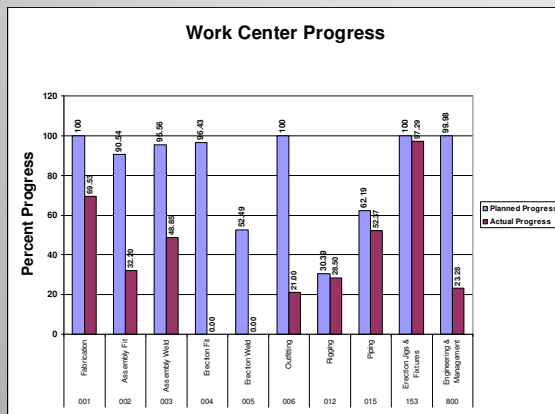


# Work Order Detail Analyses

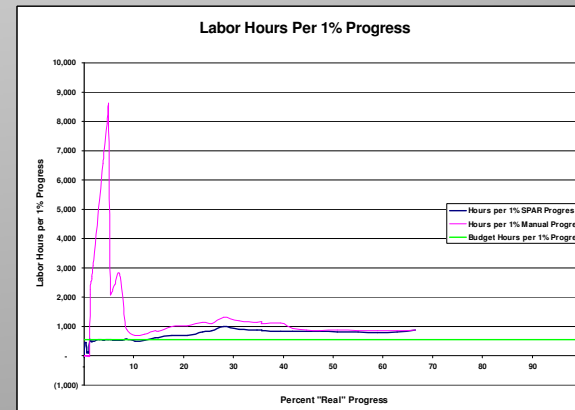
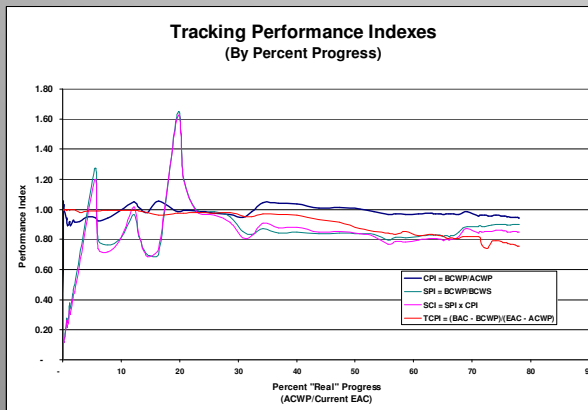
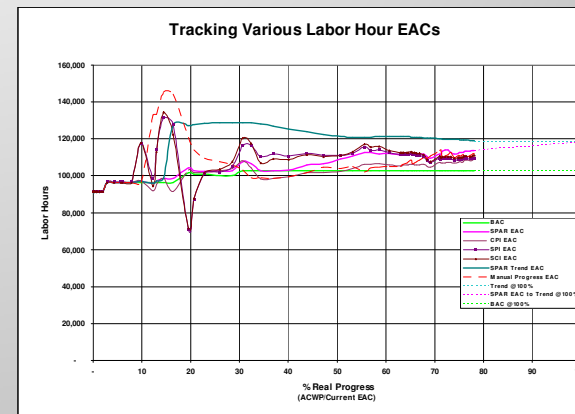
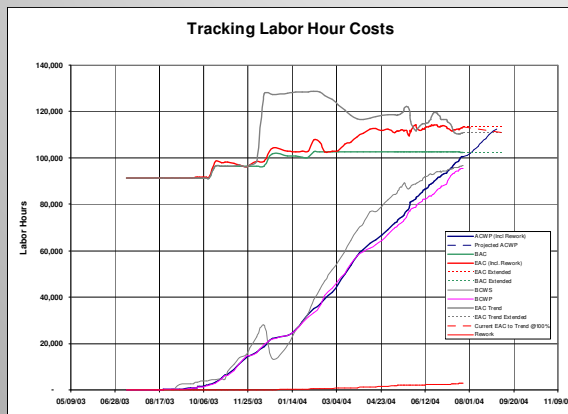




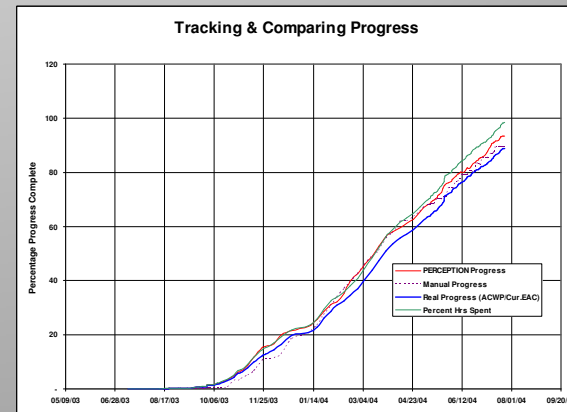
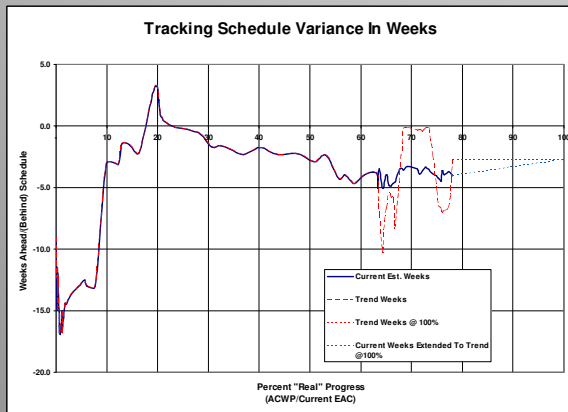
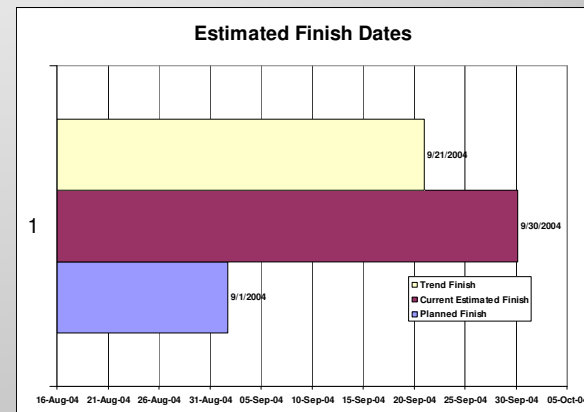
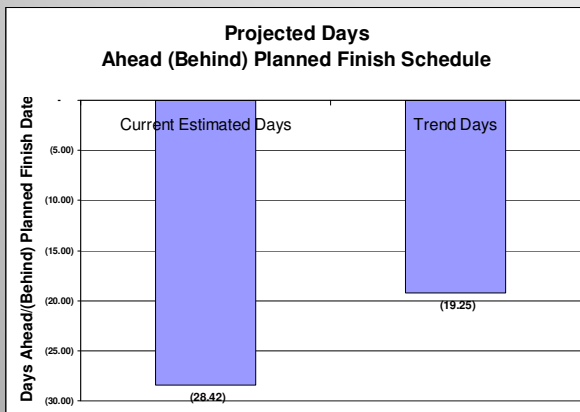
# Work Center Performance Analyses



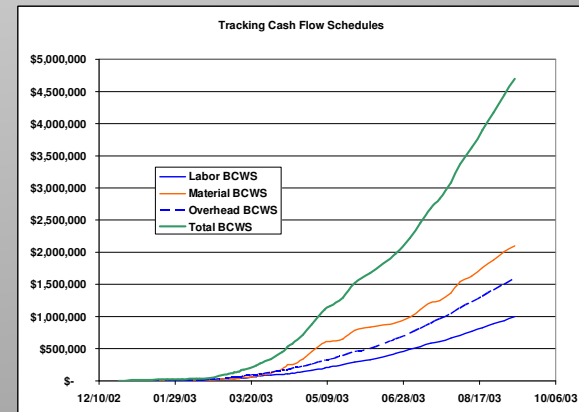
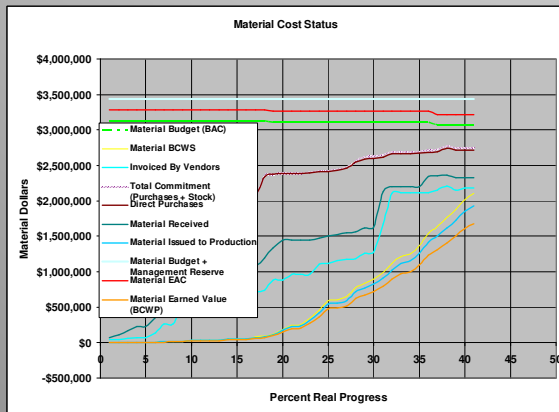
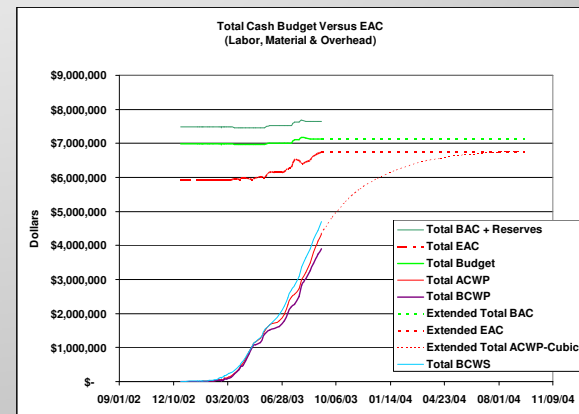
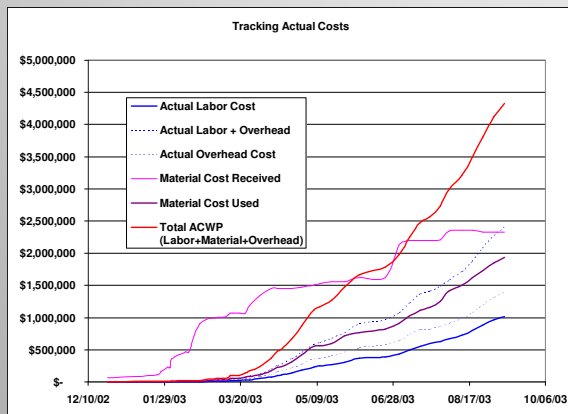
# EAC Tracking Analyses



# Schedule & Progress Tracking



# Cash Flow Analyses



# Tracking Manpower Requirements

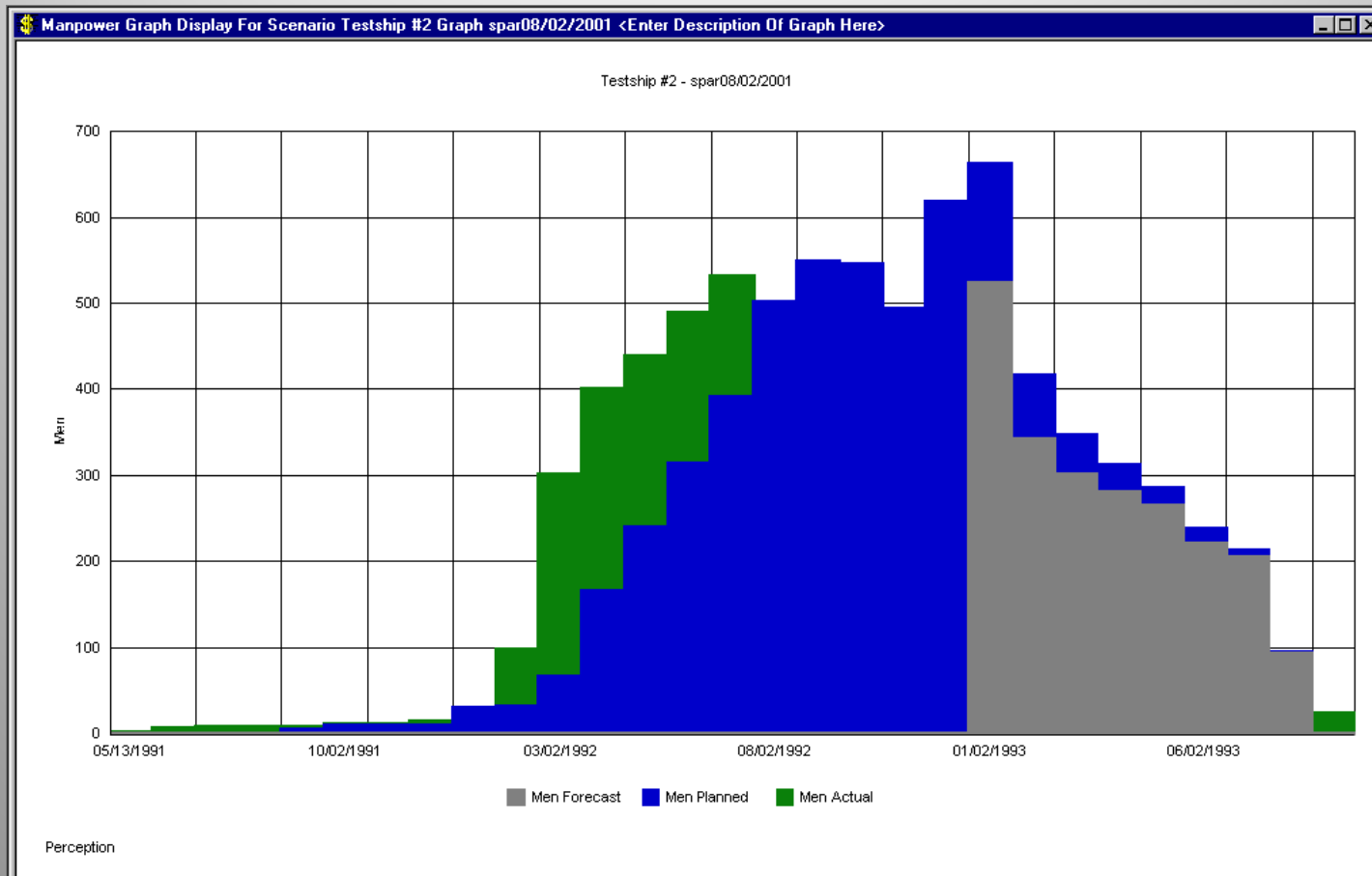
- As Planned in Baseline
- As Currently Planned
- As Actually Expended To Date
- As Forecast to Complete

Manpower can be evaluated by WBS, by shipyard work center, for one project or across multiple projects.

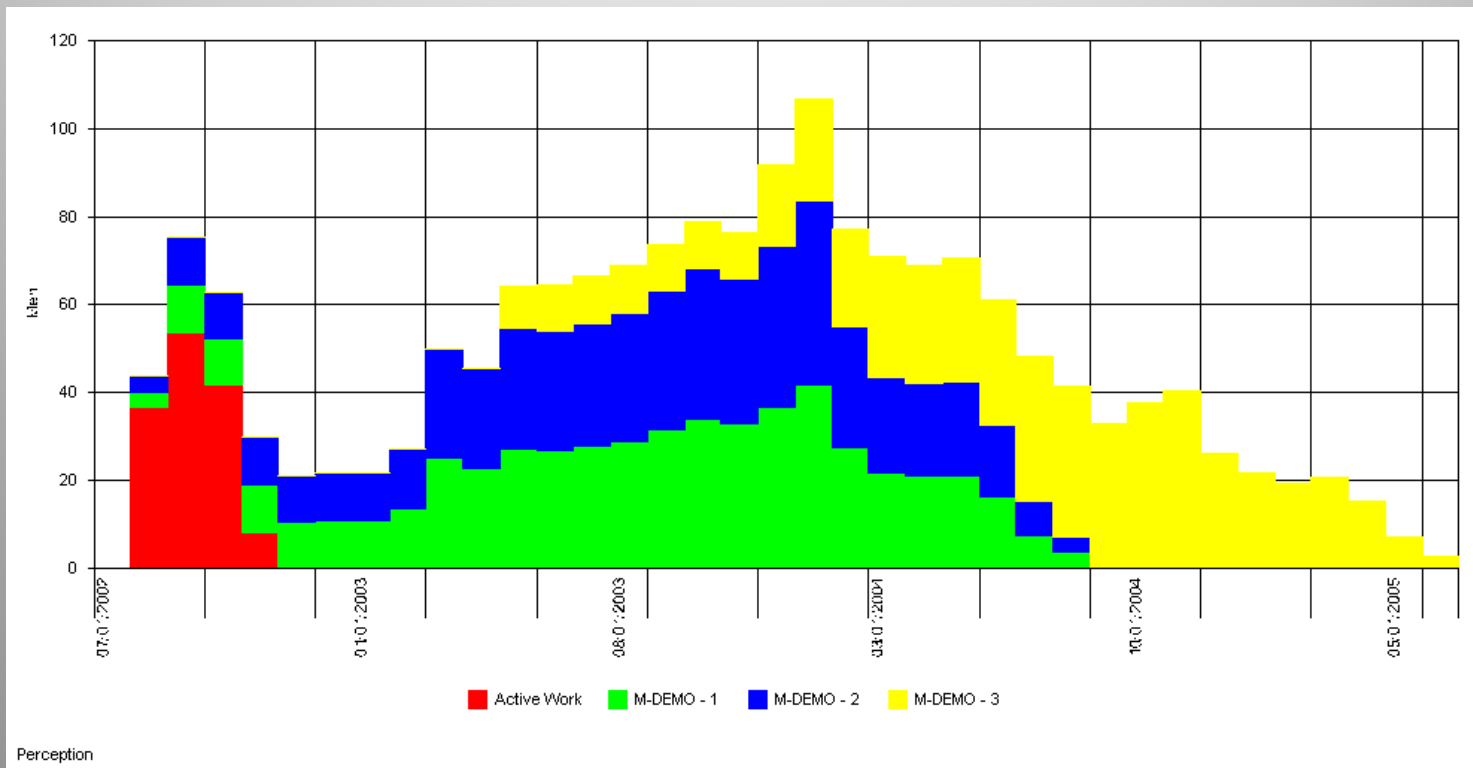
The analysis can combine current back-log with proposed new work.



# Tracking Project Manpower Requirements



# Total Shipyard Manpower Modeling (New Work Modeled On Top Of Active Work)



# Training Tutorials

*PERCEPTION* system includes a wide range of training tutorials depending upon the user's specific needs and scope of system functions authorized to use.





# Training Tutorials:

Getting Started – General System Features

Starting A New Project

ESTI-MATE Cost Estimating Libraries

ESTI-MATE Estimating New Construction

ESTI-MATE Estimating Ship Repair

PERT-PAC Integrated Scheduling

PERT-PAC Scheduling Hull Block Construction

WORK-PAC Starting From Scratch for Work Order  
Planning & Management

WORK-PAC Generating Work Orders

WORK-PAC Project Manpower Planning & Forecasting

WORK-PAC Shipyard Total Manpower Modeling

MAT-PAC Starting From Scratch for Material Planning,  
Purchasing & Inventory Control.

MAT-PAC Managing Drawings

MAT-PAC Managing Stock Inventories

MAT-PAC Material Requisition

MAT-PAC Purchase Orders

MAT-PAC Receiving & Warehousing

MAT-PAC The Parts Catalog

MAT-PAC Tool Room Management Control

MAT-PAC Withdrawing Material

MAT-PAC Work Order Pallets

Project Manager Activities

Reports - Labor Cost & Work Progress

Reports - Material Cost & Schedule Status

Accounting New Project Setup

Accounting Customer Billings

Accounting Interface Setup

Accounting Time Charges

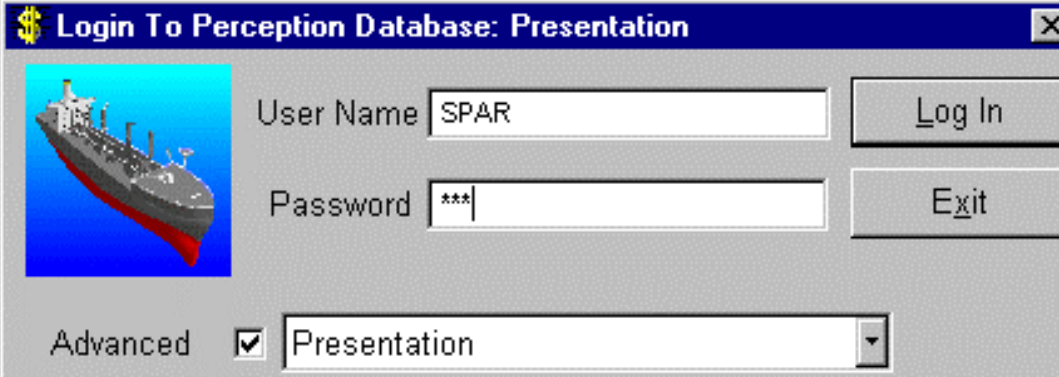
Accounting Vendor Invoices



# System Security

All users are required to log into the system with their name and password.

Each user also is formally assigned authorized areas of the software to access and restricted from all others.



\$ Login To Perception Database: Presentation

User Name SPAR

Password \*\*\*

Log In

Exit

Advanced  Presentation



# **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

