

# *PERCEPTION<sup>®</sup> WORK-PAC*

## **Reports**

### **Labor Cost & Work Progress**

*A Training Guide*



**This training guide is a supplement to the user manual entitled “*PERCEPTION WORK-PAC Labor/Manpower Planning & Cost/Schedule Management*,” which provides more details for the user.**

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



**Other related training tutorials are the following:**

1. *PERCEPTION WORK-PAC - Starting From Scratch*
2. *PERCEPTION - Starting A New Project*
3. *PERCEPTION WORK-PAC Work Orders*
4. *PERCEPTION WORK-PAC Manpower Planning & Forecasting*



# Training Directory



**Continue**



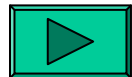
**Tracking Costs & Schedules**



**Rollups**



**WBS Performance Reports**



**SWBS**



**PWBS**



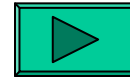
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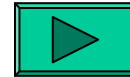
**Trades**



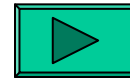
**CLINs**



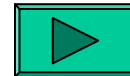
**Graphic Reports**



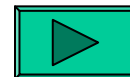
**Tracking Costs**



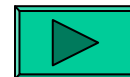
**Tracking Progress**



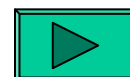
**Schedule Variances**



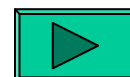
**Budget Variances**



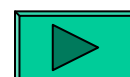
**Cost vs. Progress**



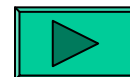
**Manpower**



**Work Order Listings**



**Performance vs. Estimate**



**What To Look for**



**This tutorial outlines a selection of the labor cost and schedule performance reports that have proved to be the most valuable for managing projects.**

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



# Tracking & Managing Costs and Schedules

*PERCEPTION* tracks the following cost and schedule information:

- Labor Hours
- Labor Dollars
- Overhead Dollars
- Material Dollars
- Purchased Services
- Total Dollars



**In addition, *PERCEPTION* measures and tracks the following:**

- ✓ **Labor Hours per 1% Progress**
- ✓ **Production Process Rates by Stage of Construction**
- ✓ **Weeks Ahead/Behind Planned Schedules**
- ✓ **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**



**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)**



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	38522.00			
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		



## An overall status of labor, overhead and material cost status also is available on-line.

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	Rework		
Man-Hours	698,984	692,646	660,706	1017998.00	984,817	88,522	8503.00		
Rate/Hour	18.00		17.35		17.18		17		
Labor Cost	12,581,716	12,467,625	11,462,875	18,323,964	16,916,054	1,592,510	147150.00		
Overhead	0	9,974,100	0	14,659,171	0	1,274,717			
Mat'l Cost	0	0	0	29,193,294	29,193,294	2,887,249	0		
<b>Total Cost</b>	<b>12,581,716</b>	<b>22,441,725</b>	<b>11,462,875</b>	<b>62,176,429</b>	<b>46,109,348</b>	<b>5,754,476</b>	<b>147150</b>		
			Total Reserves:	5,754,476		Estimated Remaining Hours	324,111		
			Total Budget + Reserves:	67,930,905					
			Less Total EAC:	46,109,348					
			Less Current Total Rework Cost:	147,150					
			Net Cost Margin:	21,674,407					
							NOTE: Rework included in ACWP and EAC		



# 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.



# Production Rollups

Most labor cost and schedule performance reports require that a *Production Rollup* be performed prior to users generating updated reports.

**The project manager should be responsible for ensuring that rollups are performed regularly and be the basis for any reports issued to management.**



**The project manager should produce quality labor status and forecast reports to management weekly...without fail:**

- 1. Top level tracking graphics reports**
- 2. Project WBS progress and labor cost reports**
- 3. Project WBS reports for material status**
- 4. Current project manpower planned, versus actual versus forecast to complete.**
- 5. Work Order Listings**

**And, to compliment these reports, a brief overview of identifiable problems and enacted/recommended solutions.**



# 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.**



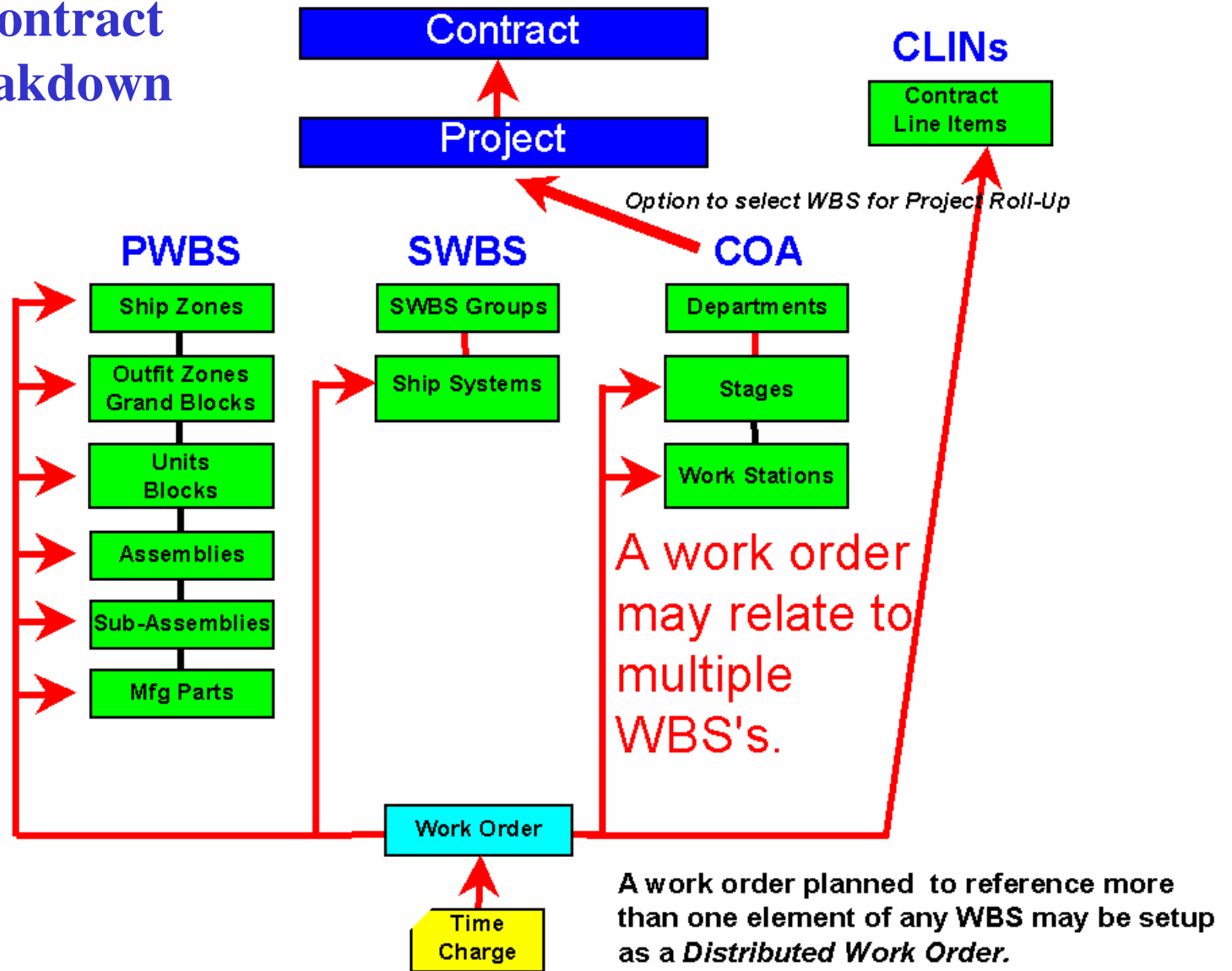
**Most modern shipyards manage their costs by way of the project Work Breakdown Structure (WBS).**

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

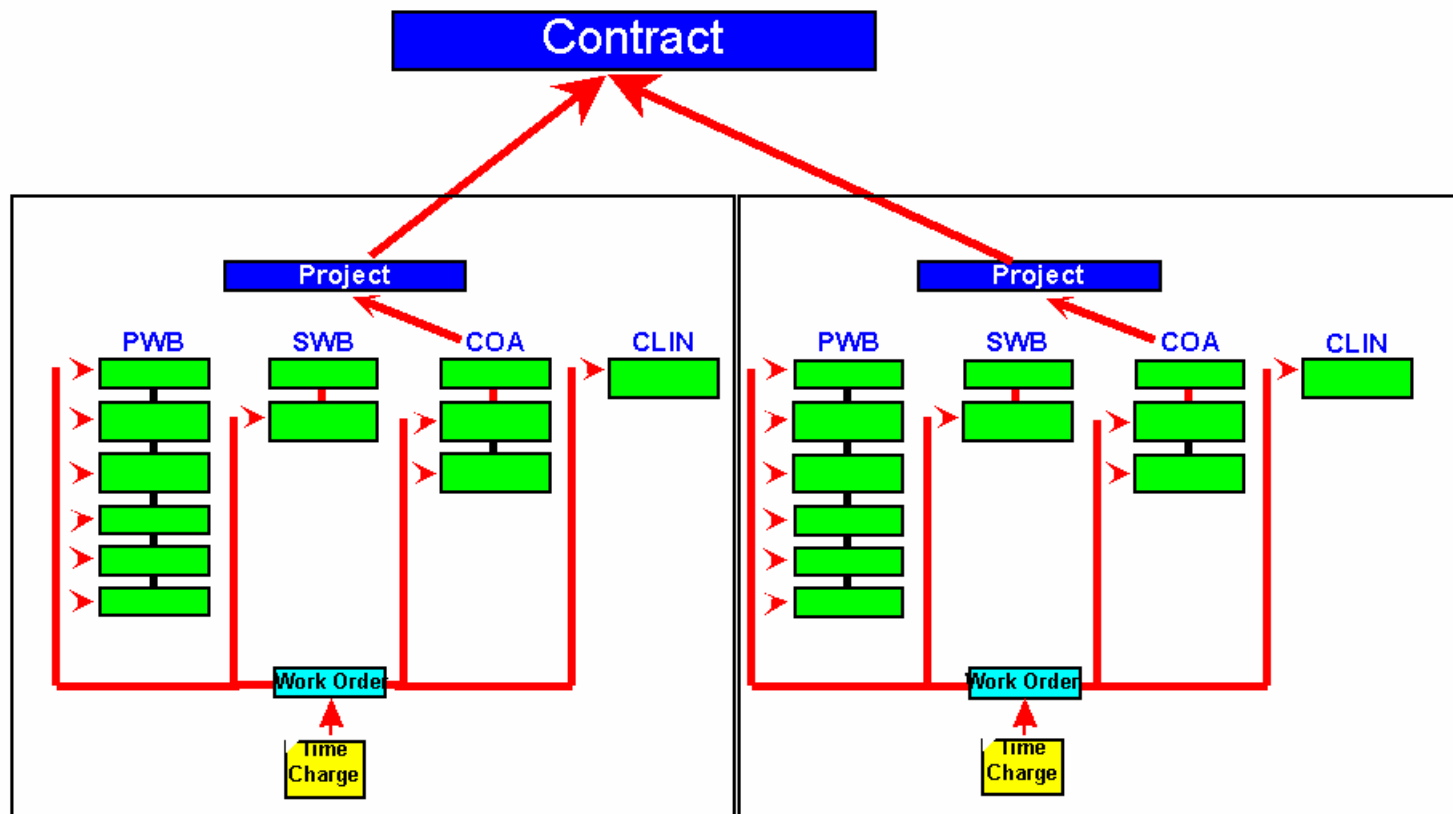
**The WBS is an ideal means for identifying areas of a project that may require special management attention to resolve problems that may be adversely impacting budgets and planned schedules.**



# Possible Contract Work Breakdown Structures



# Multi-Ship Program Management Cost & Schedule Consolidation



**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**



# SWBS Performance Reports

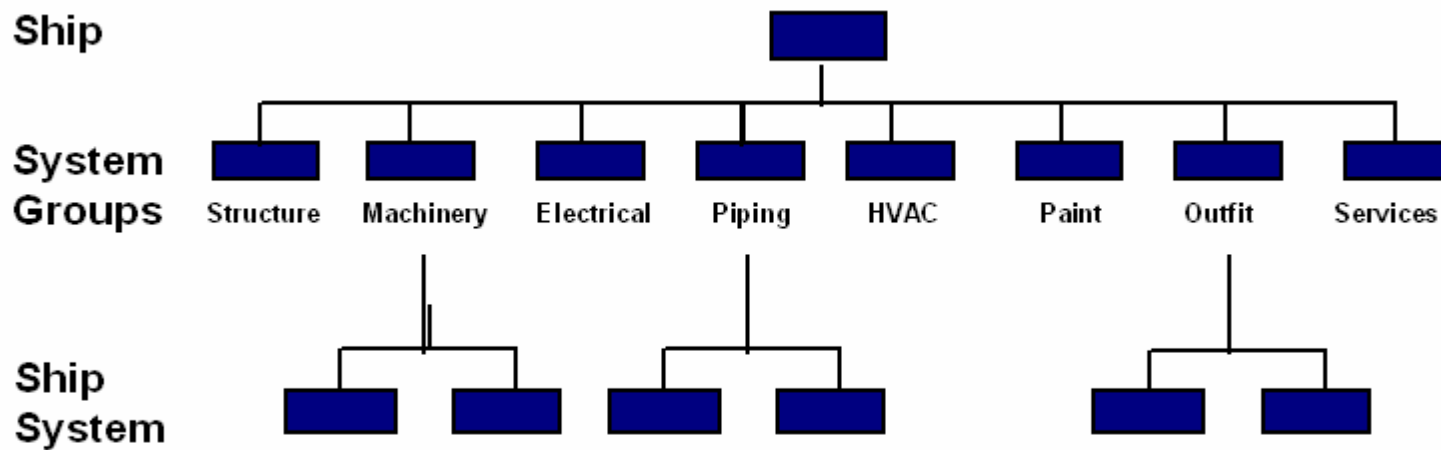
**A popular WBS is the Ship Systems Work Breakdown Structure (SWBS).**

**While almost every shipyard has its own version of SWBS, this WBS typically catalogs costs under categories that identify the major engineered ship systems.**

**Examples of SWBS systems include ship structures, piping systems, electrical, HVAC, etc.**



# System Work Breakdown Structure (SWBS)



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

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**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 SWBS 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)





**Labor hour performance can be tracked throughout the course of the project's schedule.**

**The management tracking graphics report plots the following costs (labor hours):**

- 1. Total WBS level budget (BAC)**
- 2. Estimated total costs at completion (EAC)**
- 3. Actual costs (ACWP)**
- 4. Earned value (BCWP)**
- 5. Time-phased budget plan (BCWS)**



**If the EAC rises higher than the BAC, then the system is predicting a final cost over-run.**

**If the earned value (BCWP) is lower than the planned budget plan (BCWS), then the system is estimating that the work is being performed behind planned schedules.**

**If the actual costs (ACWP) spent is higher than the earned value (BCWP), then the work is over-running its budgets.**



**The two more important pieces of information for the project manager to monitor are the following:**

- 1. Current weeks ahead or behind schedule**
- 2. Current budget ahead or behind schedule**
- 3. Current estimated labor hours at completion (as compared to the total budget)**



***PERCEPTION*** determines the number of weeks ahead or behind schedule from its assessment of progress from work order budget and schedule performance.

***PERCEPTION*** determines the estimated labor hours at completion (EAC) from its assessment of work order budget 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.



**To determine automated progress, the system collects work orders within the given Level of the WBS into three groups:**

- 1. Completed Work Orders**
- 2. In-Process Work Orders**
- 3. Un-Started Work Orders (Including WBS Budget Not Yet Assigned To Work Orders)**



**Actual progress includes progress achieved from both completed work orders and from in-process work orders.**

**Actual progress lies between a minimum progress achieved from completed work orders & maximum progress achieve if all in-process work orders were completed as well.**



**Minimum Progress =**

**Total Budget of Completed Work Orders**

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**Total Budget for WBS Level**

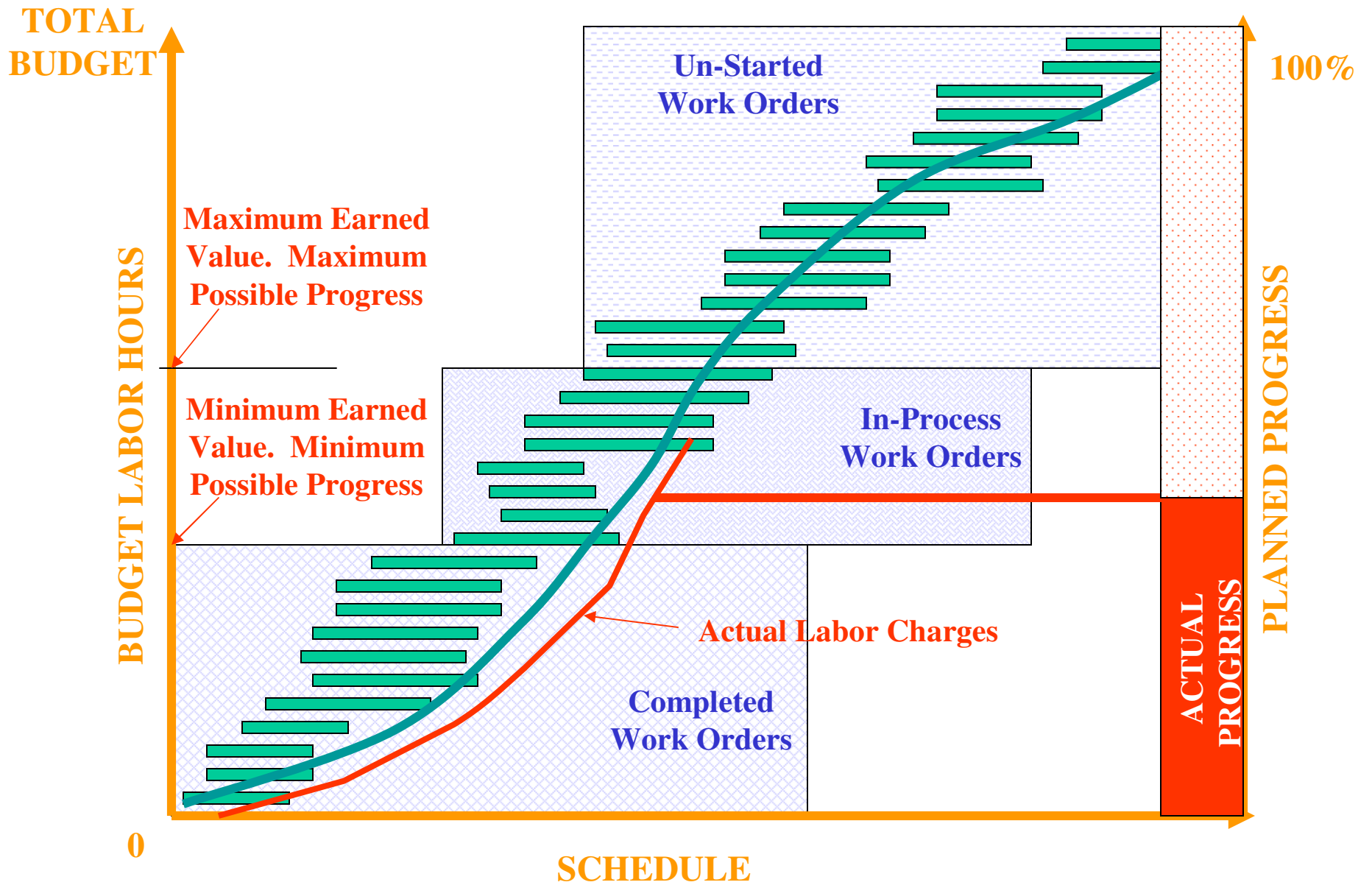
**Maximum Progress =**

**Total Budget of Completed Plus In-Process Work  
Orders**

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**Total Budget for WBS LEVEL**





## *Total WBS Level Progress*

$$= \frac{BH_{\text{completed}} + BH_{\text{earned in-process}}}{\text{Total WBS Level Budget Hours}}$$

*Total WBS Level Budget Hours*

Where  $BH_{\text{completed}}$  is the sum of budget hours of completed work orders, and

Where  $BH_{\text{earned in-process}}$  is the sum of earned budget hours of in-process work orders (started, but not yet completed).



**The earned value of completed work orders is easy to determine.**

**It is the total budget of completed work orders**



**The earned value of in-process work orders is not so easy to determine.**

**Manual methods require a physical assessment of progress of the in-process work orders.**



**The manual method of determining  
earned value of the in-process work  
orders**

**= Sum [Manual Progress x Work  
Order Budget]**



***PERCEPTION* uses another method:**

**The assessment of in-process work order progress based on the actual labor hours spent and how well work orders are keeping to budgets.**



**The total WBS level progress is determined from the estimated total labor hour at completion (EAC).**

***PERCEPTION* uses a method for estimating final total costs (EAC) that has a well-documented track record for being both accurate and consistent.**

**This method is totally objective.**



**For example, if work orders are keeping to budgets, every hour spent earns an hour of budget.**

**This earned value of budget, then is equivalent to earning progress at the percentage rate of the total budget.**



**However, if the work orders are not performing to budget, *PERCEPTION* will adjust the earned value of budget depending on how far the work orders are performing off budget.**



**If work orders are performing over budget, the system will not give full credit for earned value of budget by the actual hours spent. Progress for this case will be less than planned.**

**If work orders are performing under budget, the system will provide more credit of earned budget. Progress for this case will be more than planned.**



***PERCEPTION* computes budget variance (over-runs and under-runs), and uses this variance as a measure of what should be expected overall at the completion of the WBS level (i.e., the WBS level's EAC).**

**However, this measure is not strictly a direct application of the variance. The measure also takes into account how far into the scope of work the variance has been recorded.**



***PERCEPTION* does not emphasize the impact of early variances upon EAC.**

**As more and more of the scope of work is completed (i.e., as progress advances), the more impact this variance begins to have upon the EAC.**

***PERCEPTION* uses a progress factor to forecast the EAC variance.**



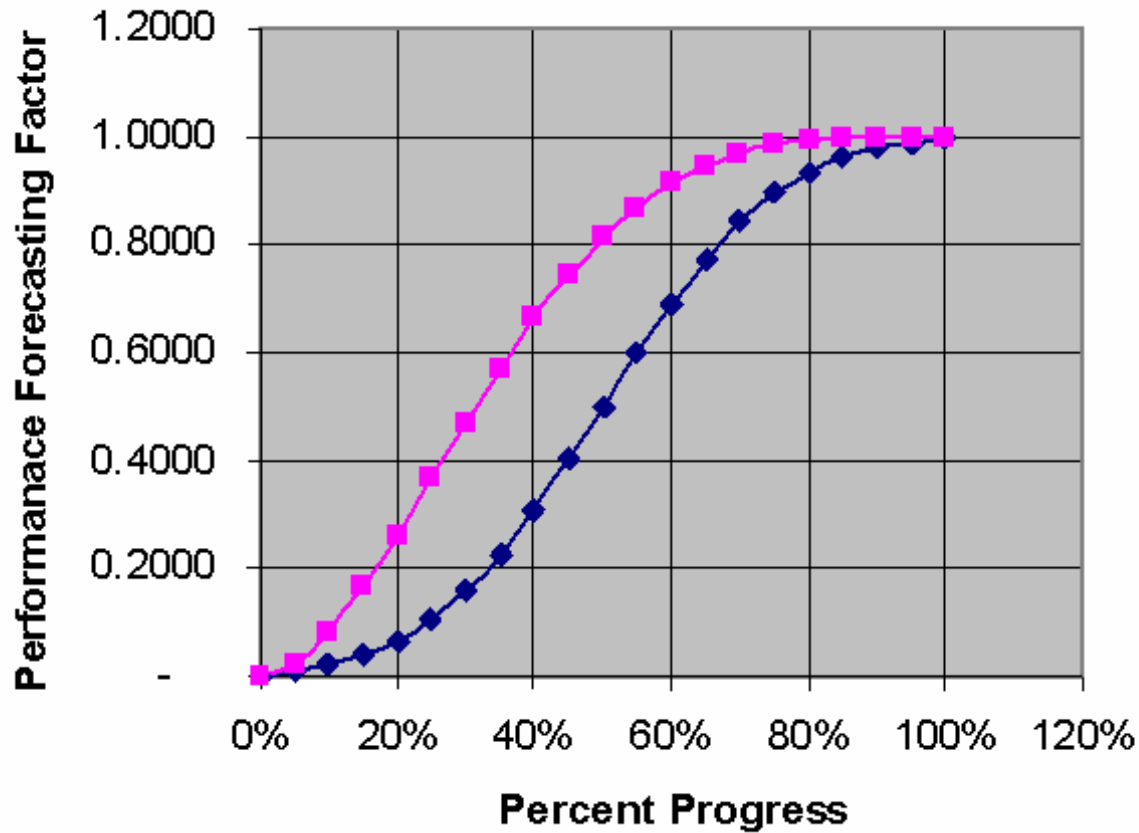
# Measuring Estimate At Completion (EAC)

*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.

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



# Budget Variance Progress Factor



As progress advances, *PERCEPTION* places greater emphasis on recorded budget variance for the EAC.



# Example

Completed work orders have over-run their budgets by an overall 35%.

Completed work orders represent 40% of the total WBS Level progress. At this level of progress, the variance progress factor is 0.65 (from preceding curves).

**The forecast EAC variance = 35% x 0.65 = 22.75%**

**$EAC = BAC \times [1.0 + 22.75\%]$**

*BAC is the Budget At Completion for the WBS Level.*



**This factoring process assumes management has the ability to implement some level of corrective actions for remaining work to keep them from over-running their budgets.**

**Earlier in progress, the system assumes that management has more opportunities to get costs back towards budget.**

**Later in progress, the system assumes that management has fewer opportunities to get work back towards budget.**



**The progress factors hit harder for conditions of cost over-runs than for cost under-runs.**

**Hence, two separate factors are used by the system.**



***PERCEPTION* makes adjustments for special conditions such as in-process work orders significantly over-running more than completed work orders, etc.**



# Measuring Progress

From EAC and ACWP, *PERCEPTION*  
computes actual progress:

$$\text{Progress} = 100 \times (\text{ACWP}/\text{EAC})$$



# Measuring Earned Value

From Progress and BAC, *PERCEPTION* computes earned value, BCWP:

$$BCWP = [Progress \times BAC] / 100$$



# SWBS

**For SWBS, each SWBS Account is assessed individually from the performance of work orders cataloged under the SWBS Account.**

**The performance of a SWBS Group is determined as the summation of the performances of its SWBS Accounts.**



**If the project has been set using SWBS as the primary WBS, the overall project's performance assessment is the summation of SWBS Group performances.**

**Refer to the project's *DETAIL* information and the *Options* tab window where the project's primary WBS may be selected.**



# A variety of SWBS (Level 2) progress and cost/schedule status reports.

PROG02 - SWBS Group Progress Report													
05/08/2003 09:26:37 <small>(Date format MM/DD/YYYY)</small>		<b>Chesapeake Marine Industries</b> <b>SWBS Group Progress Report (PROG02)</b> Contract TSHIP CONTRACT - T-SHIP Series Contract - Productio Project: 0 to <span style="border: 1px solid black; display: inline-block; width: 50px; height: 1em; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></span> Group: 0 to <span style="border: 1px solid black; display: inline-block; width: 50px; height: 1em; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></span>								Page 1 of 1			
Group	Description	Planned	Actual	Percent Progress		Current Labor Hours				Final Hours			
				Ahead	Weeks Ahead	BCWS	BCWP	Actual Hours	Schedule Ahead	Budget	EAC	ETC	Savings
Project	2002	Effective Date: 01/05/1993		Seyern Bulk Carriers (Detail Work Orders)									
		65.37	67.93	2.56	1.38	663,195	689,077	660,525	25,972	1,014,393	984,555	324,030	29,838
0	STEELWORK	88.10	95.34	7.24	6.27	414,871	448,968	450,538	34,117	470,923	474,632	24,094	-3,709
1	ACCOMMODATIONS OUTFIT	14.07	25.00	11.93	5.80	7,769	14,358	16,000	6,589	55,222	58,120	42,100	-2,898
2	CARGO SYSTEMS OUTFIT	50.60	64.47	13.87	3.64	28,548	36,370	26,925	7,822	56,418	44,712	17,787	11,706
3	MECHANICAL SYSTEMS OUTFIT	33.91	32.92	-0.99	-0.27	28,072	27,265	20,641	-807	82,784	73,453	52,812	9,331
4	PIPING SYSTEMS	52.19	48.02	-4.17	-1.80	43,027	39,601	26,504	-3,426	82,450	62,160	35,656	20,290
5	MACHINERY SYSTEMS	48.60	39.12	-9.48	-2.50	13,560	10,913	7,712	-2,647	27,899	23,832	16,120	4,067
6	ELECTRICAL SYSTEMS	33.67	8.95	-24.72	-8.98	19,536	5,195	4,821	-14,341	58,027	55,591	50,770	2,436
7	PRODUCTION SERVICES	55.23	62.95	7.72	5.21	71,024	80,951	81,089	9,926	128,601	131,270	50,181	-2,669
8	OWNER CHANGES	51.85	16.71	-35.14	-24.66	12,686	4,089	4,282	-8,596	24,466	32,702	28,420	-8,236
9	DESIGN & DRAWING	85.99	77.66	-9.33	-7.27	24,013	21,436	21,993	-2,576	27,603	28,084	6,091	-481
Group Totals for Project - 2002		65.37	67.94	2.57	2.55	663,195	689,165	660,525	26,060	1,014,393	984,555	324,030	29,838



# Other Project Work Breakdown Structures

*PERCEPTION* is capable of tracking cost and schedule performance by other work breakdown structures besides SWBS:

1. Product Work Breakdown Structure (PWBS)
2. Chart of Accounts (COA) of Shipyard Work Centers
3. Contract Line Items (CLINs) that identify ship owner's WBS.



# PWBS

**Product-Oriented Work Breakdown Structure (PWBS) is used to plan and collect labor costs by production interim products and stage of construction.**

**PWBS allows the shipyard to organize and manage labor efforts more efficiently utilizing modern shipbuilding methods:**

- 1. Pre-Outfitted Hull Block Construction**
- 2. Modular Construction**
- 3. Zone Outfit**
- 4. Group Technology Manufacturing.**



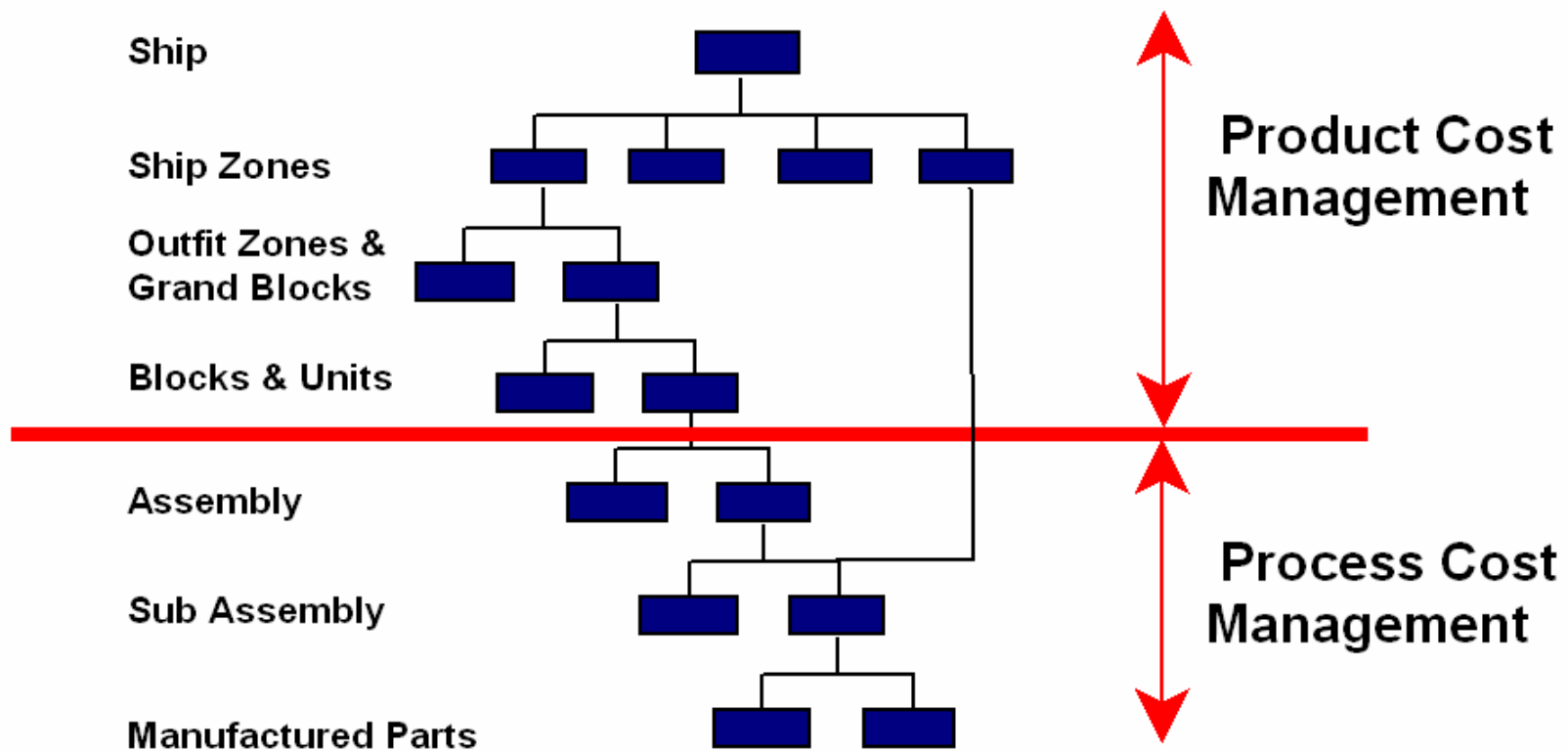
**PWBS is a WBS that often uses 2-3 levels below the project, but may be extended to 6.**

**PWBS may be used only where they provide a benefit to the estimating and/or management functions.**

**Each level of the PWBS can be given an alphanumeric identification (maximum 8 characters).**



# Product/Process Work Breakdown Structure (PWBS)



# A variety of PWBS progress and cost/schedule status reports.

04/14/2003 16:13:08

**SPAR Associates, Inc.**

Page 1 of 2

(Date format: MM/DD/YYYY)

## PWBS Zone Progress Report (PROG04)

:t TSHIP CONTRACT - T-SHIP Series Contract

Project: 0 to ZZZZZZZZ      Zone: 10 to 99

Zone	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>Sevren Bulk Carrier (work orders)</b>											
<b>Default WBS - SWBS</b>	<b>Project Totals:</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>
10	STERN <AFT PEAK>	89.89	86.82	-3.07	-2.43	5,436	5,251	4,838	-185	6,048	5,573	735	475			
13	AFT PEAK	95.15	96.84	1.69	0.86	1,960	1,995	1,355	35	2,060	1,399	44	661			
20	ENGINE ROOM	38.26	32.66	-5.60	-5.29	8,183	6,985	6,394	-1,198	21,386	19,579	13,185	1,807			
21	ER BELOW FLOOR PLTS	100.00	100.00	0.00	0.00	4,211	4,211	4,394	0	4,211	4,394	0	-183			
22	ER ABOVE FLOOR PLTS	56.33	48.10	-8.23	-4.14	18,766	16,024	13,279	-2,742	33,314	27,608	14,329	5,706			
23	ER MACHINERY DECK	51.38	25.19	-26.19	-9.14	9,947	4,877	4,352	-5,070	19,361	17,276	12,924	2,085			
24	ER MAIN DECK	38.11	30.80	-7.31	-1.86	8,565	6,921	6,741	-1,643	22,472	21,887	15,146	585			
25	ER CONTROL RM FLAT	37.08	9.50	-27.58	-10.29	312	80	80	-232	842	842	762	0			
26	H.F.O. TANK	37.01	0.00	-37.01	-13.86	123	0	0	-123	331	331	331	0			
27	ER CASING	31.49	18.77	-12.72	-5.00	1,230	733	635	-497	3,907	3,383	2,748	524			
28	FUNNEL	77.94	75.52	-2.42	0.86	261	253	511	-8	335	673	162	-338			
29	MAIN CONTROL ROOM	18.12	11.27	-6.85	-0.43	63	39	39	-24	346	346	307	0			
40	SEA LIFT CARGO DECK	48.76	49.33	0.57	0.57	3,272	3,310	3,065	38	6,710	6,213	3,148	497			
41	SEA LIFT DECK #1	68.51	80.60	12.09	8.86	28,118	33,082	17,952	4,964	41,045	22,274	4,322	18,771			
42	SEA LIFT DECK #2	65.84	36.88	-28.96	-9.29	10,042	5,625	5,360	-4,417	15,253	14,532	9,172	721			
50	CARGO HOLDS	62.61	36.85	-25.76	-5.43	1,786	1,051	249	-735	2,852	2,112	1,863	740			
51	#1 CARGO HOLD	0.00	41.06	41.06	13.57	0	85	85	85	207	207	122	0			
52	#2 CARGO HOLD	0.00	0.00	0.00	0.00	0	0	0	0	207	207	207	0			
53	#3 CARGO HOLD	7.54	51.69	44.15	9.57	16	107	107	91	207	207	100	0			
54	#4 CARGO HOLD	36.36	0.00	-36.36	-10.29	75	0	0	-75	207	207	207	0			
55	#5 CARGO HOLD	51.63	32.32	-19.31	-6.86	136	85	85	-51	263	263	178	0			



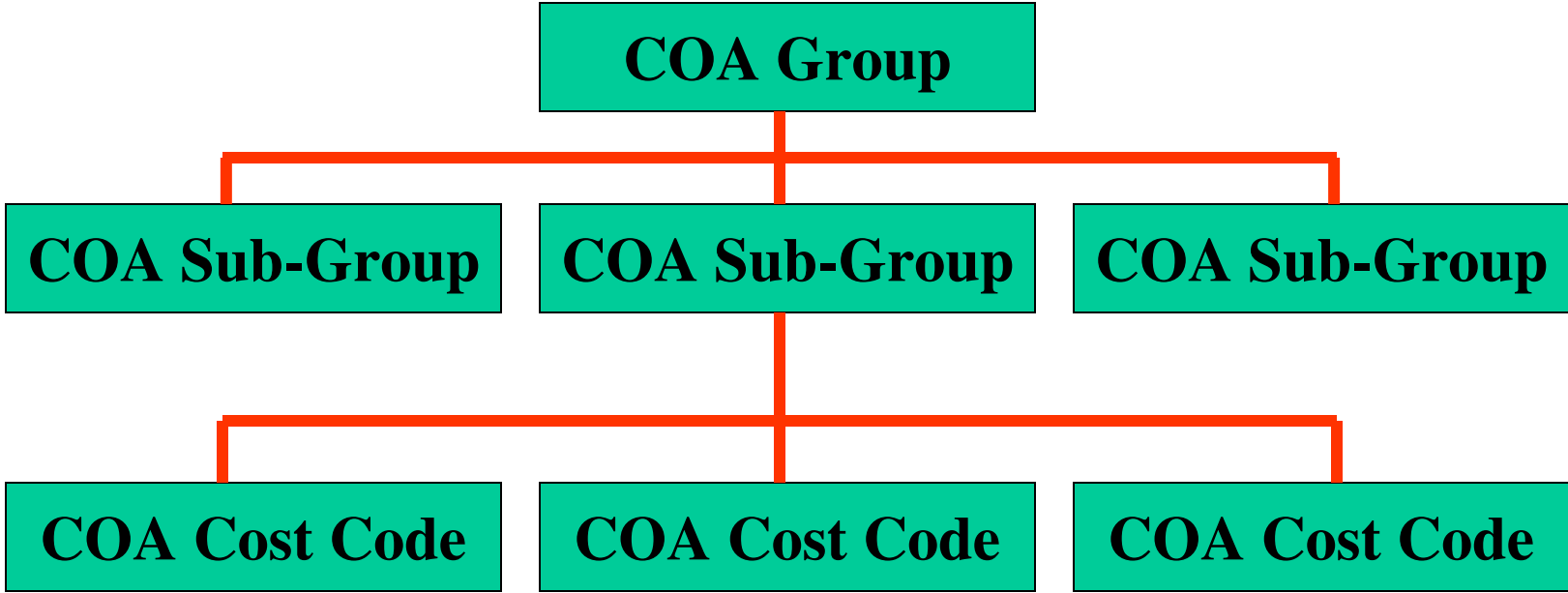
# COA

**Chart of Accounts (COA) may be used to identify shipyard production processes and work centers.**

**COA is a WBS that can extend down 3 levels below the project.**



# Chart of Accounts (COA)



**Names for the COA levels can be changed by clicking on *Library/Company Parameters* in the main menu and then opening the *Set COA Names* tab window.**

The screenshot shows a software window titled "System Parameters and Company Defaults" with several tabs: "Company Information", "Company Defaults", "Steel Setup", "Tax Rates", "Set COA Names", and "Accounting". The "Set COA Names" tab is active. Inside the window, there are four input fields: "Group" with the value "Division", "Sub Group" with "Shop", "Cost Code" with "Center", and "Supervisor" with "Supervisor". A large red arrow points to the "Group" field. At the bottom right, there are three buttons: "Save", "Close", and "Help".



# A variety of COA progress and cost/schedule status reports.

04/14/2003 16:19:58

(Date format: MM/DD/YYYY)

## WORK-PAC Center Progress Report (PROG14)

Page 1 of 1

### Labor Hours

Contract: TSHIP CONTRACT to TSHIP CONTRACT

Project: 0 to ZZZZZZZZ

Work Center: 0 to ZZZZZZZZ

Work Center	Description	Percent Progress		Weeks Ahead	% Diff	Current Labor Hours				Final Hours			
		Planned	Actual			BCWS	BCWP	Actual Hours	Schedule Ahead	Budget	EAC	ETC	Savings
T01	Steel Fabrication	100.00	89.57	-538	-10.43	70,081	62,772	61,353	-7,309	70,081	68,500	7,147	1,581
T02	Steel Assembly	100.00	100.00	13	0.00	198,580	198,580	199,130	0	198,580	199,130	0	-550
T03	Steel Erection	100.00	98.89	-529	-1.11	64,914	64,193	56,101	-721	64,914	56,731	630	8,183
T04	Steel Weldout	100.00	94.21	-534	-5.79	93,906	88,469	98,265	-5,437	93,906	104,300	6,035	-10,394
T05	Mould Loft	100.00	100.00	17	0.00	13,802	13,802	11,420	0	13,802	11,420	0	2,382
T06	Material Control	100.00	71.46	-532	-28.54	28,981	20,710	19,874	-8,271	28,981	27,811	7,937	1,170
T07	Planning and Control	100.00	75.82	-532	-24.18	19,328	14,654	13,816	-4,673	19,328	18,222	4,406	1,106
T09	Drawing Office	100.00	79.68	-555	-20.32	27,603	21,994	21,993	-5,609	27,603	27,603	5,610	0
T10	Production Services	100.00	53.06	-538	-46.94	89,882	47,691	49,473	-42,191	89,882	93,248	43,775	-3,366
T11	Carpenter's Shop	100.00	74.29	-539	-25.71	33,244	24,698	24,450	-8,547	33,245	32,912	8,462	333
T15	Miscellaneous	100.00	17.16	-569	-82.84	14,876	2,553	2,208	-12,323	14,876	12,869	10,661	2,007
T21	Joiner Shop	100.00	22.71	-539	-77.29	27,301	6,200	6,616	-21,101	27,301	29,127	22,511	-1,826
T22	Rigging Shop	100.00	72.77	-532	-27.23	21,515	15,656	10,724	-5,858	21,515	14,738	4,014	6,777
T23	Outfit Shop	100.00	55.26	-539	-44.74	28,606	15,808	14,627	-12,798	28,606	26,470	11,843	2,136
T24	Pipe Shop	100.00	62.31	-540	-37.69	42,939	26,755	26,504	-16,184	42,939	42,534	16,030	405
T25	Machine Shop	100.00	62.02	-539	-37.98	12,023	7,457	7,712	-4,566	12,023	12,435	4,723	-412
T26	Electrical Shop	100.00	25.84	-544	-74.16	18,660	4,822	4,821	-13,838	18,660	18,660	13,839	0
T31	On-Board Joinerwork	100.00	29.76	-538	-70.24	27,921	8,309	9,404	-19,612	27,921	31,605	22,201	-3,684
T32	On-Board Rigging	100.00	56.46	-540	-43.54	34,902	19,706	16,201	-15,196	34,903	28,695	12,494	6,208



# Trade Status Reports

For shipyards that employ multiple trades per work center or per work order, *PERCEPTION* generates progress and cost/schedule performance trade reports.



04/15/2003 09:44:47

(Date format: MM/DD/YYYY)

## WORK-PAC Trade Progress Report (PROG15)

Page 1 of 1

### Labor Hours

**Contract:** 19060 Tanker to WBS Shells  
**Project:** 0 to ZZZZZZZZ  
**Trade:** 0 to ZZZZZZZZ

Trade	Description	Percent Progress		Weeks Ahead	% Diff	Current Labor Hours				Final Hours			
		Planned	Actual			BCWS	BCWP	Actual Hours	Schedule Ahead	Budget	EAC	ETC	Savings
AD-HR-F	Personnel Manager	0.00	100.00	0	100.00	0	0	0	0	0	0	0	0
CT-PT-1	Painter	0.00	100.00	0	100.00	0	0	8	0	0	8	0	-8
CT-PT-PI	Painter / Blaster	0.00	40.00	12	40.00	0	16	16	16	40	40	24	0
Demo1	Welder	0.00	100.00	0	100.00	0	0	11,394	0	0	11,394	0	-11,394
EL-1	Electrician Class I	0.00	100.00	0	100.00	0	0	560	0	0	560	0	-560
EL-A	Electrician Apprentice	0.00	100.00	0	100.00	0	0	16	0	0	16	0	-16
HO-CM-'	Cabinet Maker	0.00	100.00	0	100.00	0	0	9	0	0	9	0	-9
HO-CM-'	Cabinet Maker Apprentice	0.00	100.00	0	100.00	0	0	23	0	0	23	0	-23
HO-CP-1	Carpenter Class I	0.00	100.00	0	100.00	0	0	0	0	0	0	0	0
HO-CP-'	Carpenter Apprentice	0.00	100.00	0	100.00	0	0	0	0	0	0	0	0
HV-SM-'	Sheet Metal Apprentice	0.00	100.00	0	100.00	0	0	8	0	0	8	0	-8
MA-1	Machinist Class I	0.00	0.00	-52	0.00	0	0	0	0	168	168	168	0
MA-A	Machinist Apprentice	0.00	100.00	0	100.00	0	0	0	0	0	0	0	0
PI-FT-1	Pipe Fitter Class I	100.00	99.00	-5	-1.00	4,137	4,096	9,813	-41	4,137	9,813	0	-5,676
PI-FT-2	Pipe Fitter Class II	100.00	99.00	-5	-1.00	4,520	4,475	11,251	-45	4,520	11,251	0	-6,731
PI-FT-A	Pipe Fitter Apprentice	100.00	99.00	-5	-1.00	3,038	3,008	10,131	-30	3,038	10,131	0	-7,093
PI-PL-1	Plumber Class I	0.00	100.00	0	100.00	0	0	7,857	0	0	7,857	0	-7,857
PI-PL-2	Plumber Class II	0.00	100.00	0	100.00	0	0	7,158	0	0	7,158	0	-7,158
PS-CO	Crane Operator	0.00	0.00	-52	0.00	0	0	0	0	160	160	160	0
PS-FM	Foremen & Assistant Foremen	0.00	100.00	0	100.00	0	0	0	0	0	0	0	0
PS-PM	Plant Maintenance	0.00	100.00	0	100.00	0	0	0	0	0	0	0	0
PS-SP	Superintendents	0.00	100.00	0	100.00	0	0	0	0	0	0	0	0
PS-WM	Watchman	0.00	100.00	0	100.00	0	0	0	0	0	0	0	0



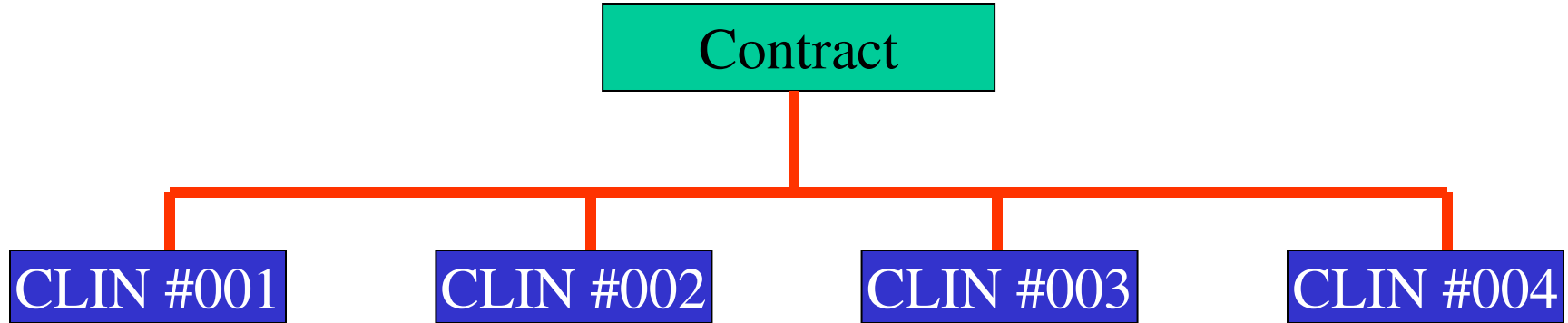
# CLINs

**CLINs are cost categories defined by the ship owner's bid specification.**

**Many bid specifications require the shipyard to respond directly to the ship owner's spec sheet organization.**

**CLINs are likely to be different from contract to contract.**





**Unlike the WBS, which must be defined as separate sets for each project in a contract, CLINs are defined only under the contract.**

**All detail cost items of the estimate can reference any project WBS and any CLIN.**

**CLINs are available only on one (1) level.**

***Each CLIN can be given an alphanumeric identification (maximum 8 characters).***



04/15/2003 10:30:34

(Date format: MM/DD/YYYY)

**SPAR Associates, Inc.**  
**CLIN Summary Report (SUM13)**  
 Contract USCG WHEC FRAM Sample USCG Repair Spec

CLIN: 0 to //

CLIN	Description	Budgeted		Actual		Rework		Premium		After Close	
		Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost
12313	FEED WATER TANKS	0	0	0	0	0	0	0	0	0	0
12314	POTABLE WATER TANKS	0	0	0	0	0	0	0	0	0	0
12315	LUBE OIL TANKS	0	0	0	0	0	0	0	0	0	0
12316	BALLAST TANKS	0	0	0	0	0	0	0	0	0	0
12317	CONTAMINATED OIL TANKS	0	0	0	0	0	0	0	0	0	0
12320	TRUNKS AND VOIDS	0	0	0	0	0	0	0	0	0	0
1501	SUPERSTRUCTURE	0	0	0	0	0	0	0	0	0	0
167	HULL STRUCTURAL CLOSURES (HATCHES)	0	0	0	0	0	0	0	0	0	0
1671	HULL STRUCTURAL CLOSURES (WATERTIGHT)	0	0	0	0	0	0	0	0	0	0
1681	DECKHOUSE STRUCTURAL CLOSURES (WATER	0	0	0	0	0	0	0	0	0	0
19211	COMPARTMENT TESTING, AIR	0	0	0	0	0	0	0	0	0	0
23511	PROPULSION GENERATOR, MAIN - NO. 1	0	0	0	0	0	0	0	0	0	0
2411	PROPULSION REDUCTION GEARS	0	0	0	0	0	0	0	0	0	0
24111	PROPULSION REDUCTION GEAR - SHAFT 1	0	0	0	0	0	0	0	0	0	0
24112	PROPULSION REDUCTION GEAR - SHAFT 2	0	0	0	0	0	0	0	0	0	0
24211	PROPULSION CLUTCHES AND COUPLINGS - SHA	0	0	0	0	0	0	0	0	0	0
24212	PROPULSION CLUTCHES AND COUPLINGS - SHA	0	0	0	0	0	0	0	0	0	0
31121	GENERATOR SET, SHIP SERVICE DIESEL - NO.1	0	0	0	0	0	0	0	0	0	0
31212	GENERATOR SET, EMERGENCY DIESEL - NO. 2	0	0	0	0	0	0	0	0	0	0
3131	SWTCHBOARD BATTERY CHARGING	0	0	0	0	0	0	0	0	0	0
4201	TESTING, NAVIGATION SYSTEM INTRA-SYSTEM	0	0	0	0	0	0	0	0	0	0
<b>Total for Contract USCG WHEC FRAM</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



# Management Report Graphics

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

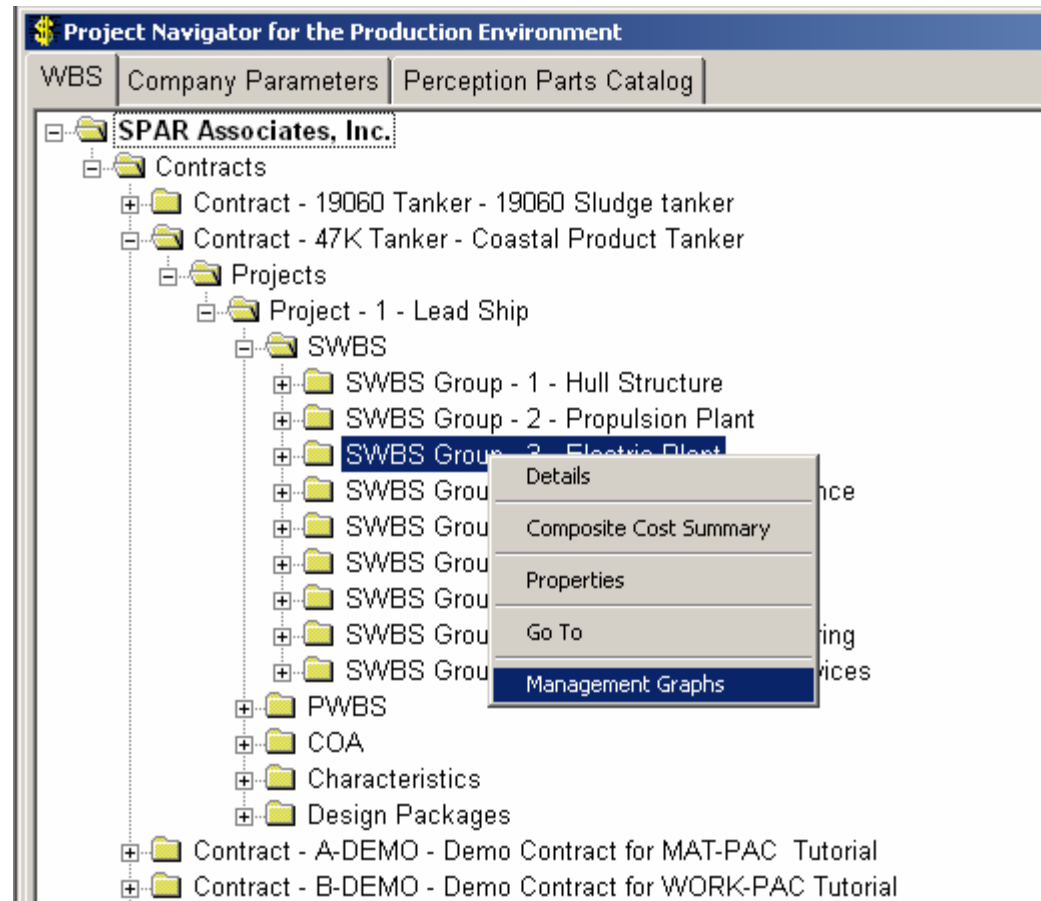
These can best be reviewed in graphical form.

These reports are accessed via the Project Navigator. Click on *Project Navigator* button on the tool bar.

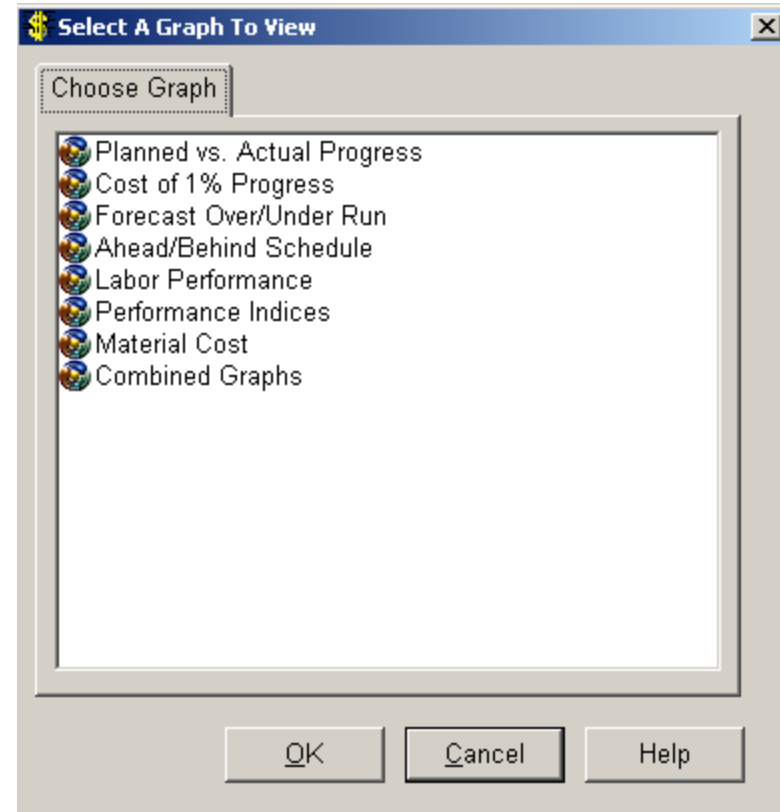


**Drill-Down  
the Navigator  
to the desired  
project and  
WBS level.**

**Right-click to  
open a pop  
up menu and  
select  
*Management  
Graphs.***

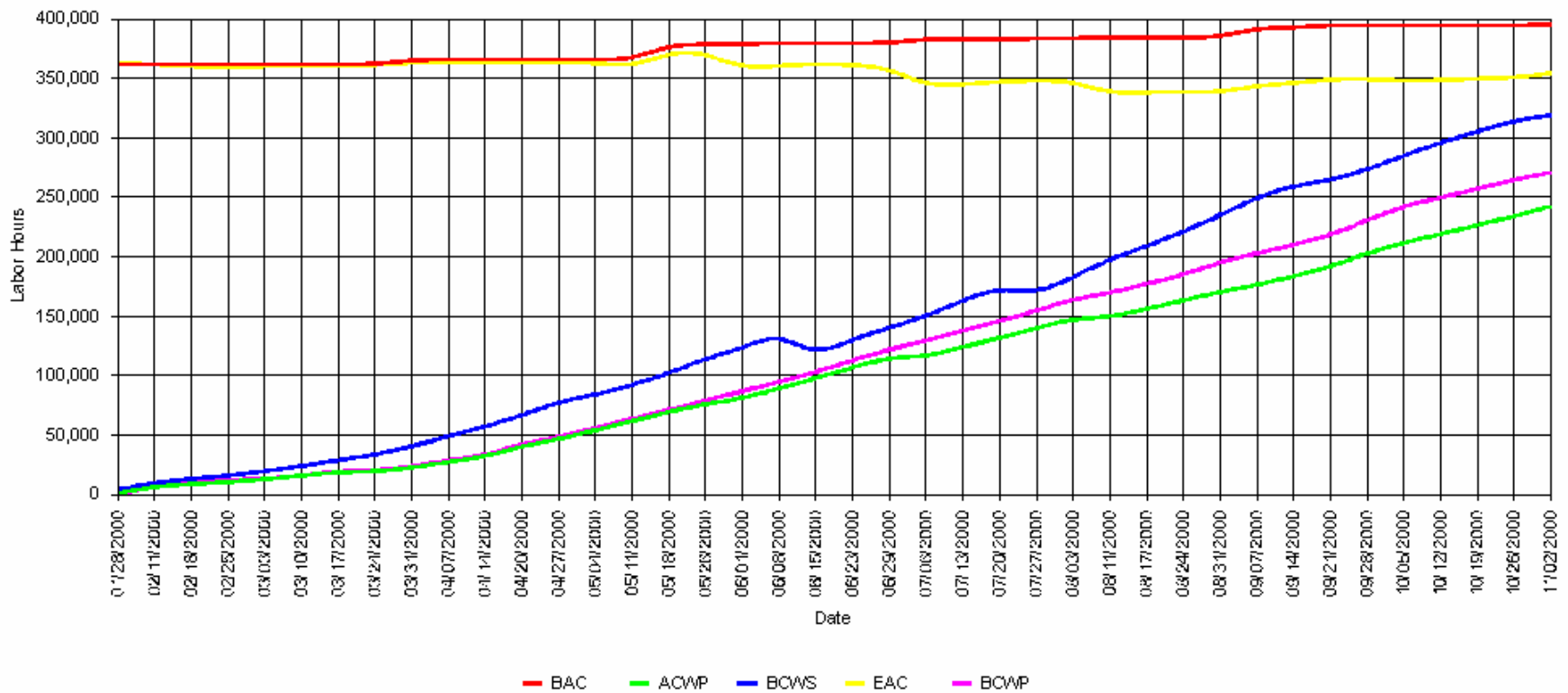


**Make the desired report selection (or select *Combined Graphs* which will display all the graphs that are available combined into one view).**



# Tracking Performance Costs

Cost Performance For Contract 47K Tanker Project 1

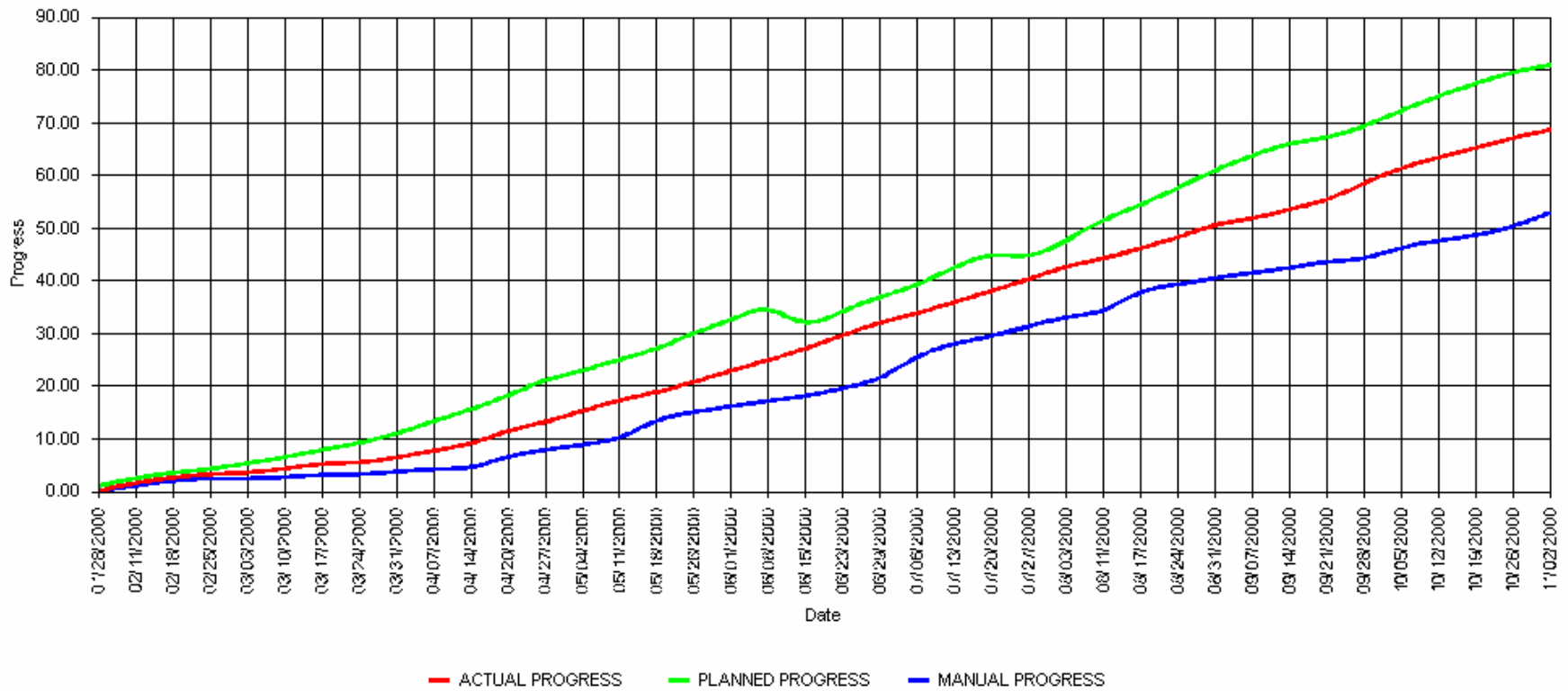


Perception



# Tracking Progress

Planned vs. Actual Progress For Contract 47K Tanker Project 1



Perception



**The progress tracking report tracks actual and manual progress (if recorded) against planned progress.**

- **Planned progress is the percentage of work order labor hour budgets to the total budget and as distributed according to their planned schedules.**

- **Actual progress is the progress determined by *PERCEPTION* employing the methods described earlier.**

- **Manual progress is the rollup of manually entered work order progress. When work orders are completed (closed), the system automatically assigns them 100% manual progress.**



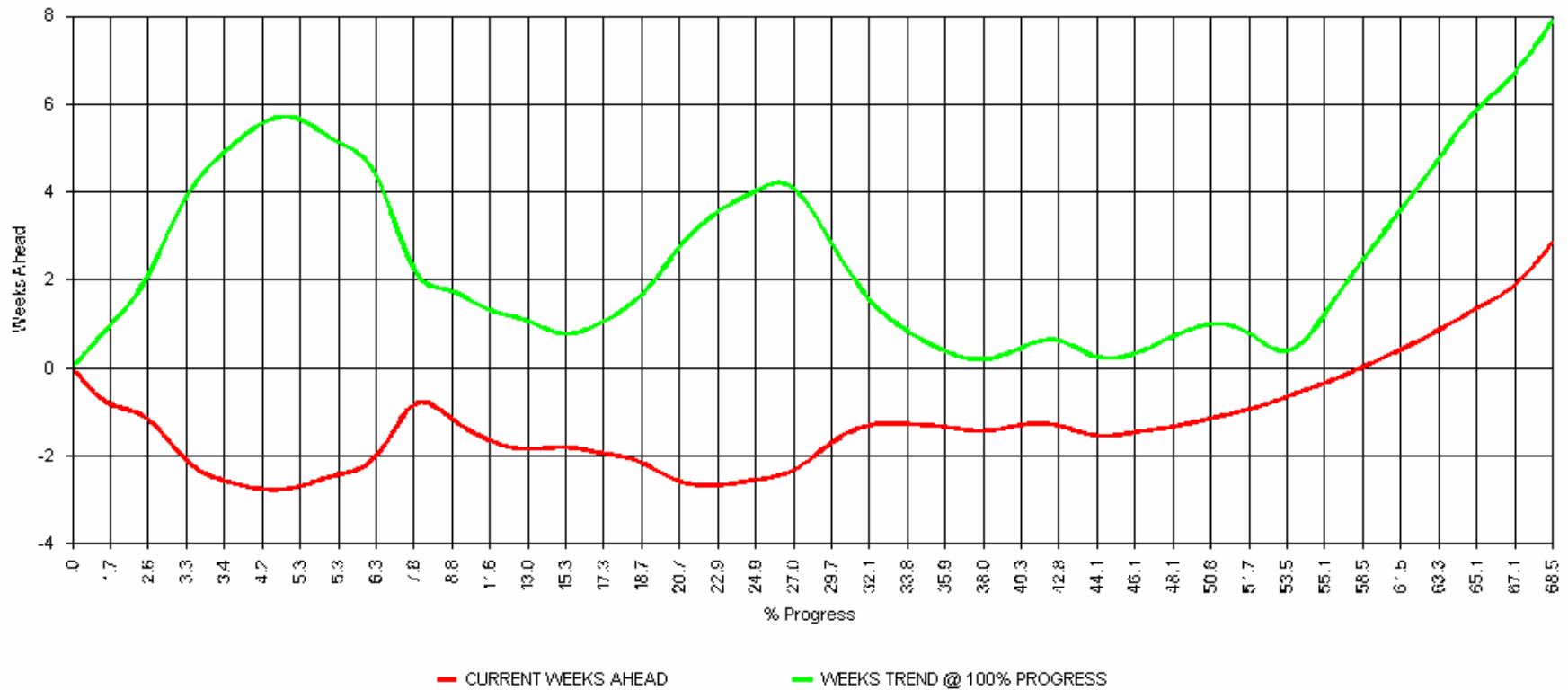
**Progress presented above the  
planned progress indicates progress  
ahead of schedule.**

**Progress presented below the  
planned progress indicates progress  
behind schedule.**



# Tracking & Forecasting Schedule Variance

Ahead/Behind Schedule For Contract 47K Tanker Project 1



Perception



***PERCEPTION*** measures schedule variance from the distribution of scheduled work order budgets and the current measurement of earned value.

The system determines where in time along the planned distribution of scheduled budget there is a correlation with the currently measured earned value (BCWP).

The planned date for the current BCWP is then measured against the date for the current planned budget expenditure (BCWS). This difference in dates indicates the weeks ahead or behind schedule.



**Work being performed with earned values exactly on schedule are presented with zero schedule variance.**

**•The schedule variances above zero (positive values) indicate that work currently is determined to be weeks ahead of schedule.**

**•The schedule variances below zero (negative values) indicate that work currently is determined to be weeks behind schedule.**



**In addition, as the estimated total schedule variance may change week to week, *PERCEPTION* computes and tracks the schedule variance trends.**

**This trend information is a measure of how well changes are being introduced into the project to improve schedule performance and resolve schedule problems.**

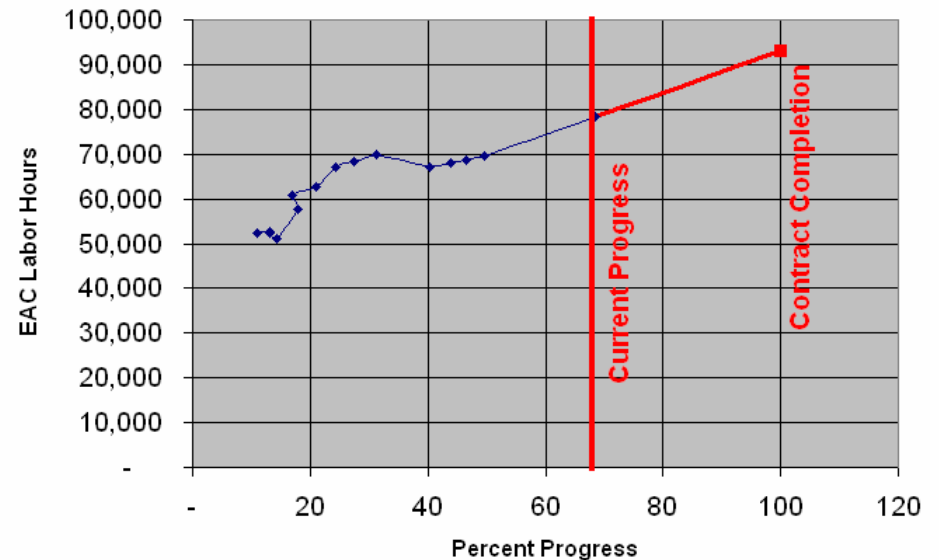


# Measuring Trends

*PERCEPTION* tracks cost and schedule performance week by week or month by month.

Using regression formulas and weighting the more recent data more heavily than older data, the system computes trends at completion.

Tracking & Measuring EAC Trend

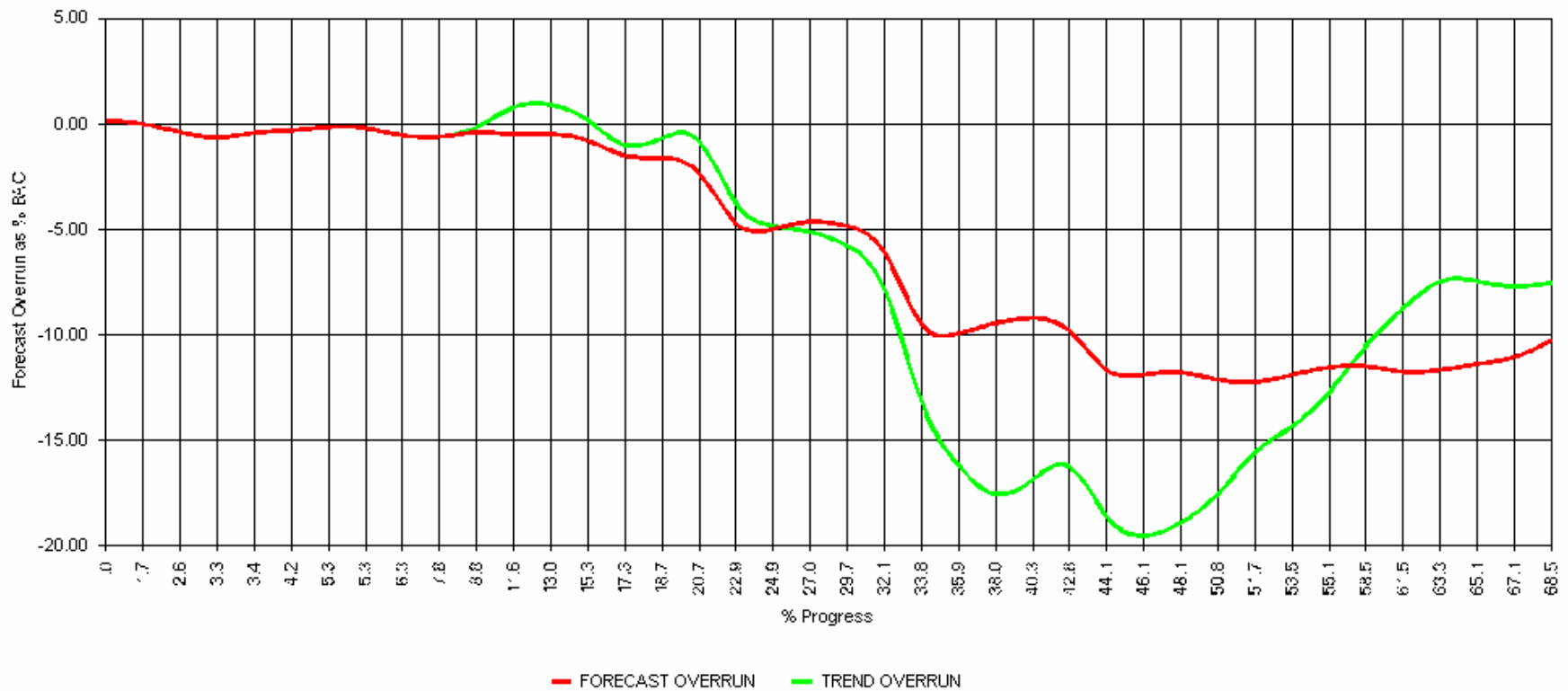


*Trends provide management with an early indication of how effective management efforts are keeping performance to budget and planned schedules.*



# Tracking & Forecasting Over-Budget/Savings Variance

Forecast Overrun For Contract 47K Tanker Project 1



Perception



*PERCEPTION* measures and tracks budget variance.

*PERCEPTION* computes the projected total over-all over-run or savings as the difference between the total budget (BAC) and the estimated cost at completion (EAC).

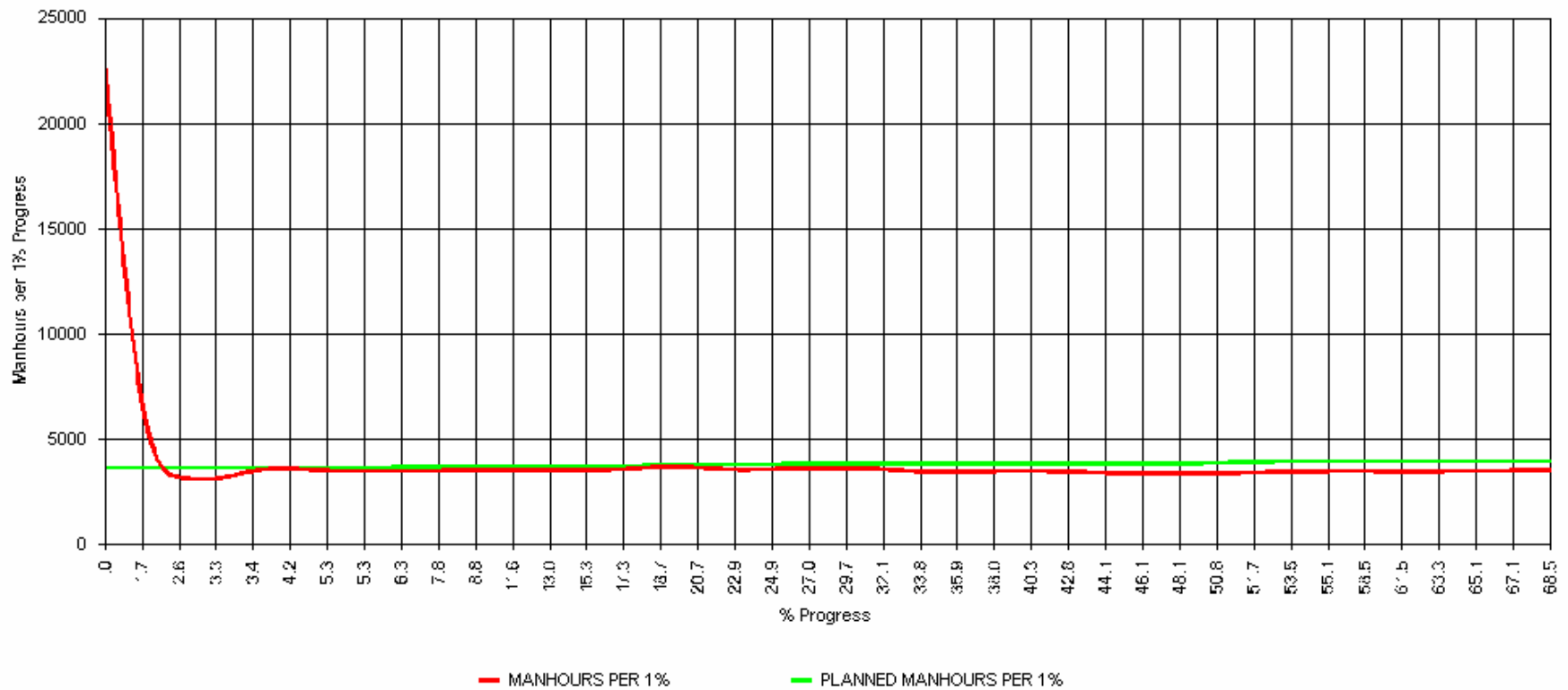
In addition, as the estimated total cost variance may change week to week, *PERCEPTION* computes and tracks the over-run/savings trends.

**This trend information is a measure of how well changes are being introduced into the project to improve cost performance and resolve cost problems.**



# Tracking Cost/1% Progress

Cost of 1% Progress For Contract 47K Tanker Project 1



Perception



**Tracking the rate that hours are being spent to accomplish progress is a good indication of how well budgets have been established for the project.**

**A flat tracking of labor hours per one percent progress indicates a well planned and budgeted contract.**

**It indicates that budgets are fairly distributed to all tasks from the beginning to the end of the contract.**

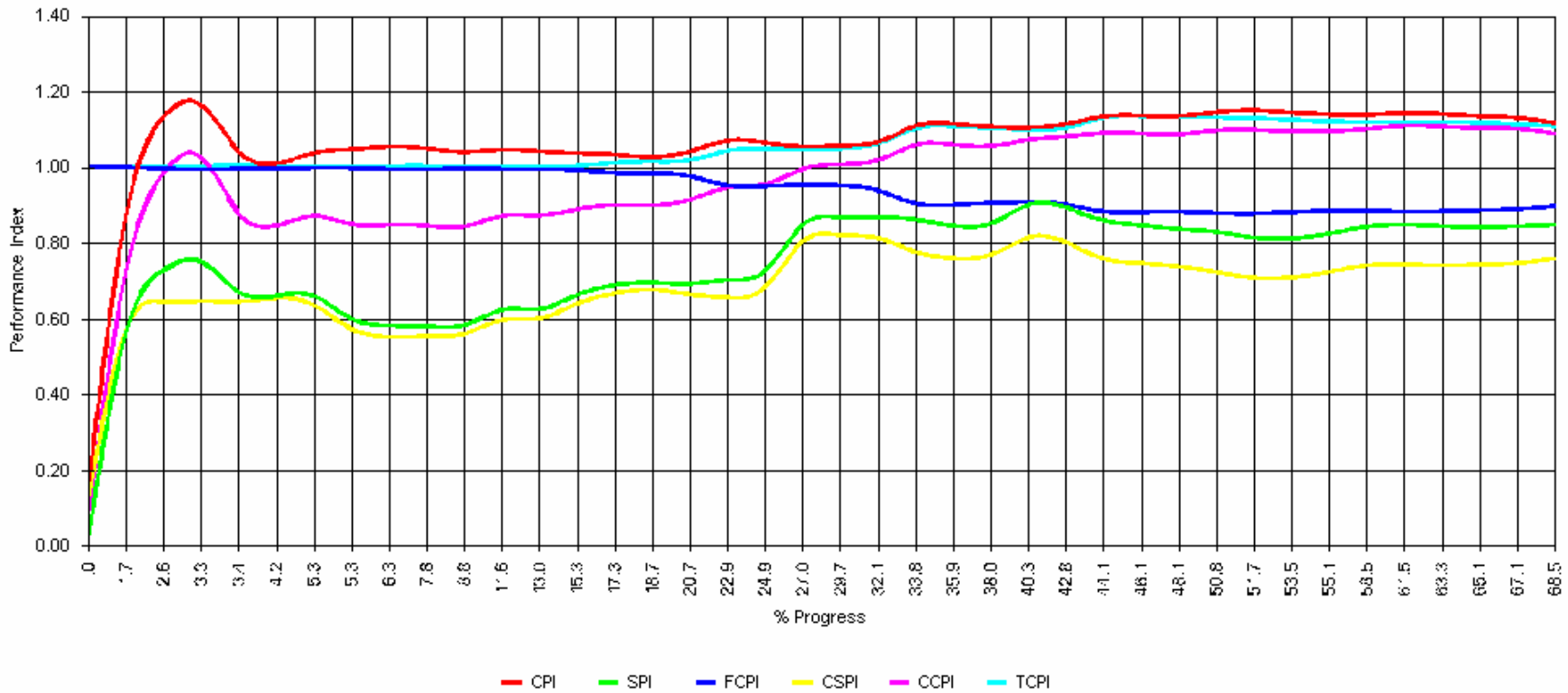
*Tracks that rise rapidly towards the end of a contract indicate a poor distribution of budgets. It also indicates work is being performed poorly in finishing the project.*

*This problem often is indicative of contracts that are heavily loaded with budget at the front end of the construction period in order to more favorably gain earned value recognition, when in fact, there is no real justification for such claims.*



# Tracking Performance Indexes

Performance Indices For Contract 47K Tanker Project 1



Perception



**Performance indexes are another method for tracking project performance of costs and schedules.**



## PERCEPTION computes and tracks

### five different indexes:

- **CPI: Cost Performance Index (BCWP/ACWP)**
- **SPI: Schedule Performance Index (BCWP/BCWS)**
- **FCPI: Forecast Final Cost Performance Index (BAC/EAC)**
- **CSPI: Current Schedule Performance Index (ACWP/BCWS)**
- **CCPI: Combined Cost Performance Index**  
 **$(0.5 \text{ CPI} \times [1 + \text{SPI} + \text{SPI} \times (\text{BCWS} - \text{BCWP})] / \text{BAC})$**
- **TCPI: To-Complete Performance Index**  
 **$(\text{BAC} - \text{BCWP}) / (\text{EAC} - \text{ACWP})$**



**The Cost Performance Index (CPI) is a measure of current budget performance.**

**When the CPI is greater than 1.0, work is under-running budgets.**

**The Schedule Performance Index (SPI) is a measure of current schedule performance.**

**When the SPI is greater than 1.0, work is being performed ahead of schedule.**



**The Forecast Final Cost Performance Index (FCPI) is a measure of the estimated final cost performance.**

**When the FCPI is greater than 1.0, the system is predicting that the project will finish under budget.**

**The Current Schedule Expenditure Index (CSPI) is a measure of the current expenditures of actual costs relative to the plan.**

**When the CSPI is greater than 1.0, actual expenditures are being spent at a rate greater than the plan.**



**The Combined Cost Performance Index (CCPI) is a composite measure of cost and schedule performance.**

**When the CCPI is greater than 1.0, the project currently is performing better than plan.**

**The To-Complete Performance Index (TCPI) is a measure of estimated performance for remaining work.**

**When the TCPI is greater than 1.0, remaining work is estimated to be performed under-budget.**



# Tracking & Managing Material Costs and Schedules

*PERCEPTION* manages and tracks project material costs as well as labor costs (hours and dollars).

The project manager should also monitor material costs and schedules to ensure they stay within budgets and planned schedules.

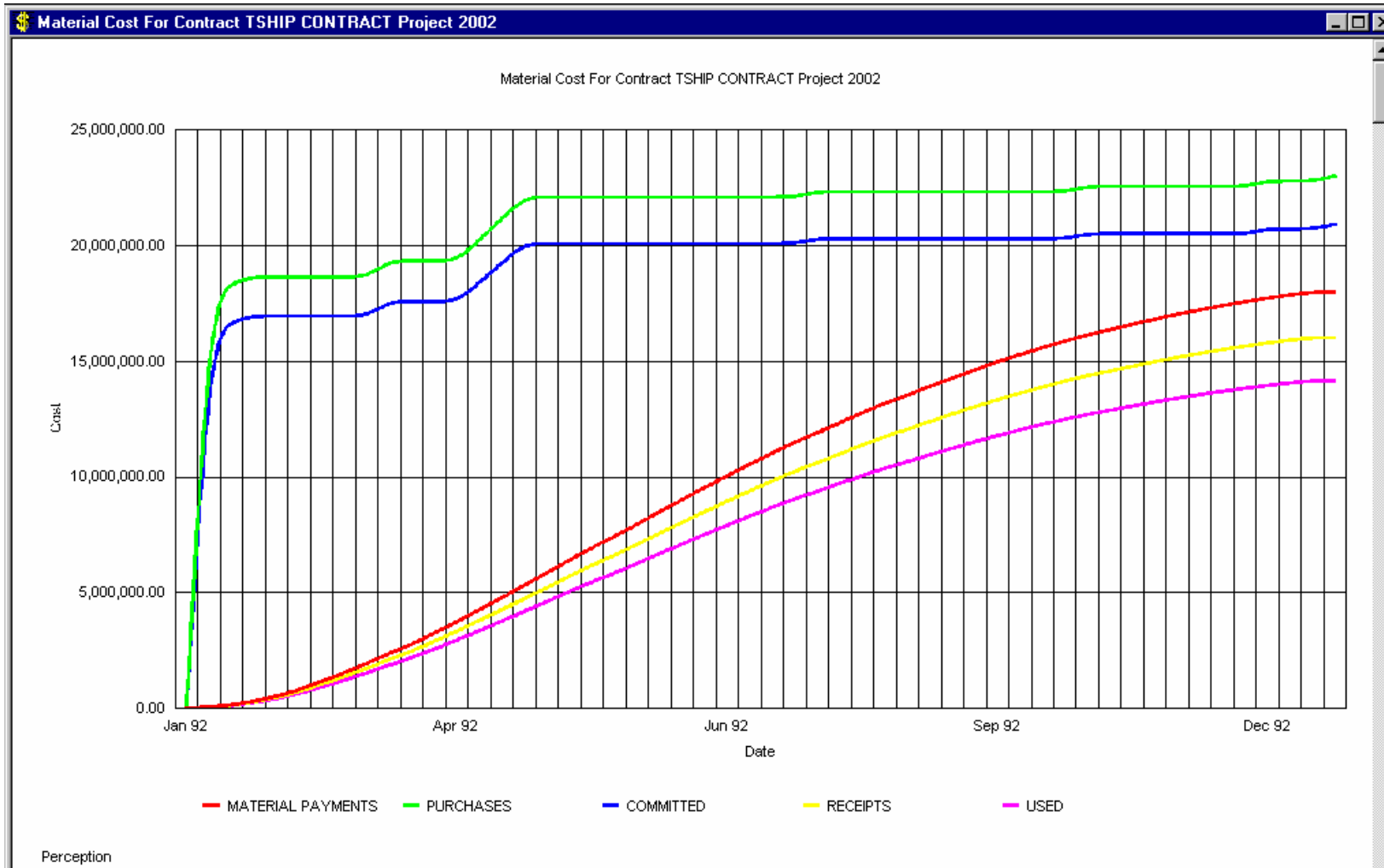


# ***PERCEPTION* tracks material costs at various stages and levels of detail:**

- ❖ **Total Committed Costs:**  
**Purchases + Stock Used + Stock Reserved**
- ❖ **Total Purchases**
- ❖ **Purchases Received**
- ❖ **Purchases Used**
- ❖ **Purchases Paid**
- ❖ **Stock Used**
- ❖ **Stock Reserved**



# Tracking Material Costs



# Tracking Manpower Requirements

**In addition to monitoring project costs and schedules, the project manager should periodically review the impact of project performance and changes upon the shipyard's manpower resources.**



# ***PERCEPTION* can generate a variety of manpower analysis reports:**

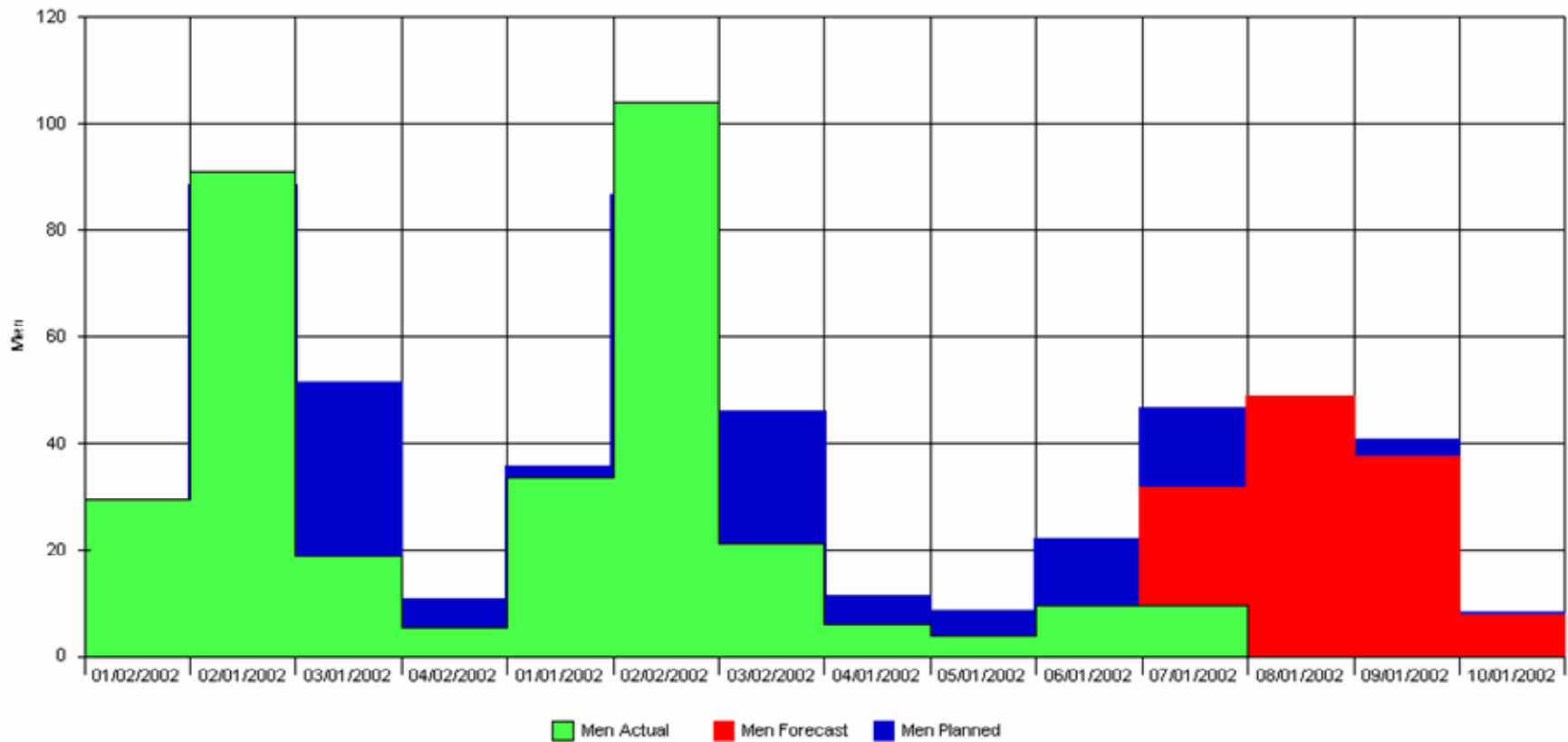
- **As Planned in Baseline**
- **As Currently Planned**
- **As Actually Expended To Date**
- **As Forecast to Complete**

**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.**

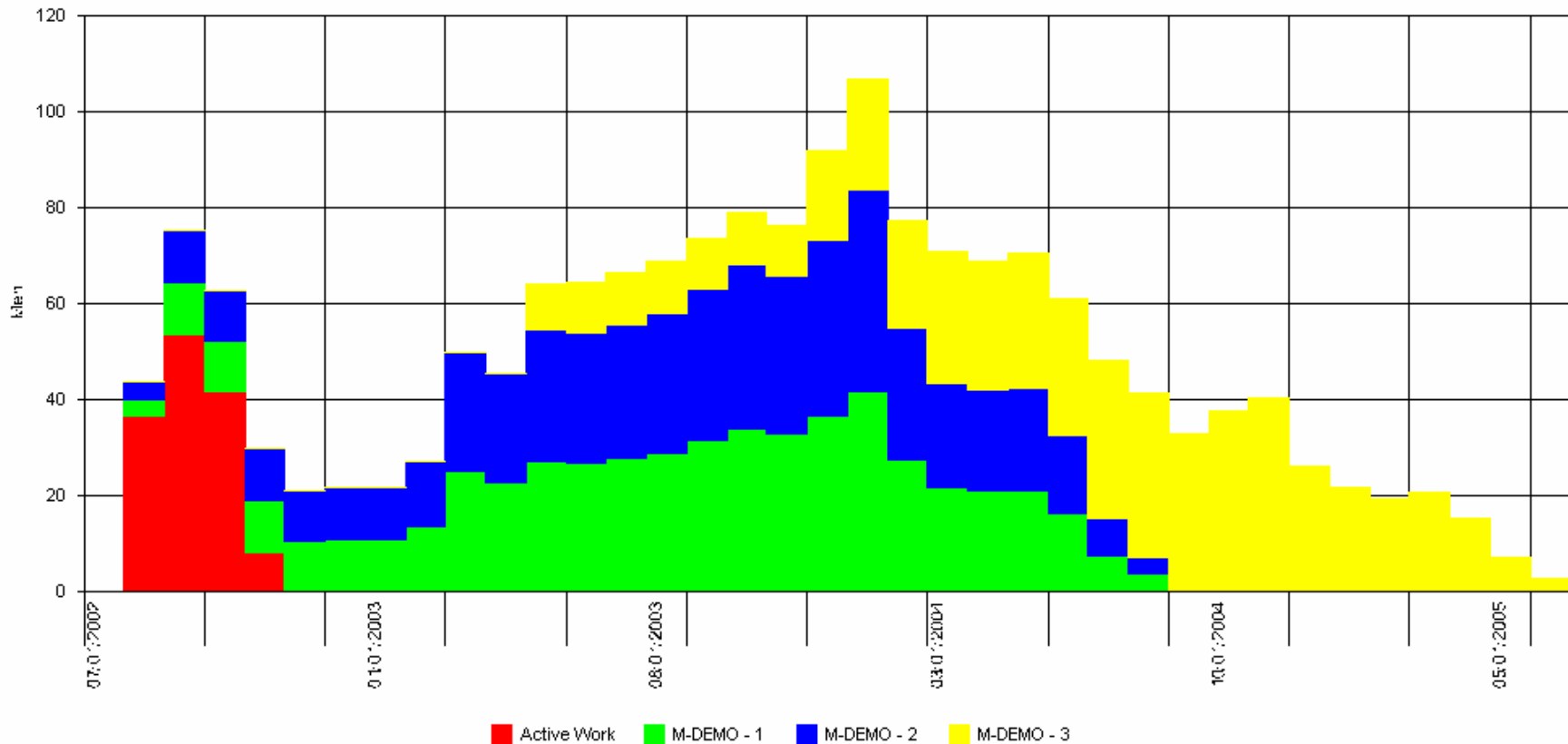


# Tracking Manpower Requirements (Planned Vs Actual Vs Forecast)



Perception

# New Work Manpower Modeled On Top Of Active Work Manpower



Perception



# 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  
 at TSHIP CONTRACT - T11

04/15/2003 10:44:00

(Date format: MM/DD/YYYY)

SPAR Associates, Inc.

Work Order Listing Report (WO05)

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

Work %  
 rs Prog

Work Center	Order	Heading	Unit	Acct	Auth	Planned Start	Planned Finish	Actual Start	Actual Finish	Budget Sta	Budget 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	



**The lists provide the following information about work orders:**

- 1. Description**
- 2. Planned & Actual Start Finish Dates**
- 3. Budget & Actual Charges**
- 4. Over-Run**
- 5. Premium Charges**
- 6. Rework Charges**
- 7. After Close Charges**



## Additional details of a work order can be viewed on-line by drilling down from the *Work Order Worksheet*.

Work Order Details Information for the Production Environment										
Contract	TSHIP CONTRACT	Project	2002	Heading	WAY 21-30 TOP PACKED	Issue Date				
Center	T33	Work Order	30422	Description		00/00/0000				
IPT		Planner		Foreman		Revision		Rev Date	00/00/0000	
Department		Process		Trade		Drawing		Start Date	Finish Date	
								Planned	01/05/1993	01/26/1993
								Actual	07/21/1992	09/10/1992
OA Supervisor		Qty	1.00	UoM	EA	Date of Last Charge	00/00/0000			
Zone	00	Labor CER	1.00	Labor Rate	0.00	Budget Material \$	0.00			
Outfit Zone						Actual Material \$	0.00			
Unit/Block		Hours		Cost		Product Code				
Assembly		Budget	277.00	Actual	285.00	4,986.00	4,960.00			
Sub Assembly		Rework	0.00	Premium	0.00	0.00	WO Type			Discrete
MFG Part		After Close	0.00	Estimated to Complete	0.00	Manpower Curve	0			
SWBS Group	3	Manual Progress	100.00	%		Authorization	NOT Authorized			
SWBS Account	304	Change Order ID		Pallet Budgeted Hours	0.00	Rework Status	NOT a Rework WO			
CLIN		Work Order Serial Number	468							
Activity Center										
Planning Activity										



# 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.



**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>



**The selected reports represent only a small number of reports available from *PERCEPTION*. They generally provide visibility at higher levels of the project work breakdown structure.**

**The intent of these high level reports is to help the project manager identify general areas of problems within the project.**

**The project manager should then proceed to lower level reports to identify more precisely the cause of the problems and initiate appropriate remedial actions as may be necessary.**



# What To Look For

**The system provides a wealth of information at all levels of detail.**

**In order to maintain control over a project, there are specific pieces of information that should be monitored on a regular basis.**



**Manual Progress Assessments:** The system accepts data entries of manual work order progress assessments.

These manual assessments are in addition to the automated progress assessments continually made by the system at all levels of the project WBS.

Differences between the manual and automated progress figures can be observed from various reports and from the progress tracking graphic report.



**Planning should review these manual assessments and make a judgment as to whether or not they are reasonable or whether they should be reviewed with the foreman.**

**Discrepancies may be due to the foreman not fully understanding the work order scope of work.**

**Correcting of past time charges may be in order.**



**Rework:** A work order may be designated strictly for rework.

The system segregates rework charges from normal charges so that their impact upon costs and schedules can be directly assessed.

*Rework should not be used only when budgets are exceeded.*

Rework should be so labeled only for major problems, such as repairing a dropped module.



**Rework also can be a valid designation for changes due to engineering changes.**

***Rework due to customer changes most likely should be designated as a billable change order, not rework.***



**Premium Hours:** The system records all premium labor charges by work order.

These charges should be monitored to ensure their added costs to the contract are reasonable and necessary.



**Hours Charged After Close:** When a work order is closed, the system permit additional labor charges against the work order, but these hours are identified as “hours charged after close.”

Oftentimes, late charges are acceptable, such as for miscellaneous pick up work. However, excessive late charges may indicate the following:

- Mischarges, which should be corrected
- Erroneous work order closing, which should be re-opened to allow the system to reset the actual finish date.



**Labor Hours Over-Runs:** System reports should be evaluated beginning at project WBS and working down. Where over-runs are indicated, an analysis of work orders often begins to tell the reason why there is the problem.

- Actual costs (ACWP) exceeding earned values (BCWP) indicate a cumulative to-date over-run condition.
- Estimates At Completion (EACs) exceeding total budgets (BAC) indicate a predicted final over-run condition.
- EAC trends are a result of a regression analysis that the system forecasts for a final over-run condition based upon whether or not they continue to increase or decrease over successive time periods.



**Planning should review serious problems with Production to ascertain the causes of over-runs and to develop an effective remedy.**

**Problems can be caused by poor production performance, unrecognized rework, and impacts of failures, errors and omissions from preceding manufacturing processes, poor engineering, and/or poor budgeting.**



**Labor Hours Under-Runs:** Review of under-runs follows a similar process as for examining over-runs.

Normally, this condition is not a problem unless it is an indication of a misapplication of project budgets.

It also can indicate that Production is not following the production plan, and there may be possible adverse cost and schedule repercussions later.



**Behind Schedule:** System reports should be evaluated starting at project SWBS accounts. Where schedule delays are indicated, an analysis of work orders under the account often begin to tell the reason why there is the problem.

- Budgeted Cost of Work Scheduled (BCWS) exceeding earned values (BCWP) indicate performance is not keeping up with the scheduled budget plan. The system measures the delay in terms of both labor hours and work weeks directly.
- Planned progress exceeding actual progress is another measure of schedule delay.
- Trends of weeks behind are a result of a regression analysis that forecasts the final delivery delay based upon whether or not delays continue to increase or decrease over successive time periods.



**A forecast manpower analysis also will measure the delays in terms of unfinished work piling up around the current reporting date.**

**This manpower condition is called a “bow wave”, an easily identifiable indication that additional resources need to be applied in order to regain the production schedule. This could be remedied with over-time, new hires, and/or subcontracting.**

**It also could be an indication that work is being delayed due to unavailable resources such as drawings or materials.**

**Should the bow wave become excessive, re-planning of work should be addressed as soon as possible.**



**Ahead of Schedule:** Review of schedules being performed ahead of schedule follows a similar process as for examining delays.

Normally, this condition is not a problem unless it is an indication of poor planning and scheduling.

It also can indicate that Production is not following the production plan, and there may be possible adverse cost and schedule repercussions later.



**Material Cost Monitoring:** Material costs are a major cost of any new construction contract, often about equal or more to labor and overhead costs.

The system generates various reports summarizing the status of material costs. Material estimates at completion (EAC) is developed by the system initially as the material budget.

When committed costs (purchased and stock) exceed the budget, the material EAC reflects this overage.



**It is strongly recommended that material cost status be monitored on a regular basis, at least monthly.**

**When committed costs are within 10% of the total material budget, more focused effort should be placed on these costs, as the system has no way of knowing what material remains undefined and therefore un-purchased.**

**These undefined costs can become a nasty surprise, blowing the material budget significantly.**

**Of special interest should be costs of subcontracted work.**



**Cost Estimate Monitoring:** The system provides reports that measures budgets, actual costs and EACs against the contract's original estimates.

Monitoring against the estimate can be beneficial, especially if large variances are due to significant changes in the scope of work.



**Errors & Exception Reports:** The system has a variety of error and exception reports that help identify data and performance problems.



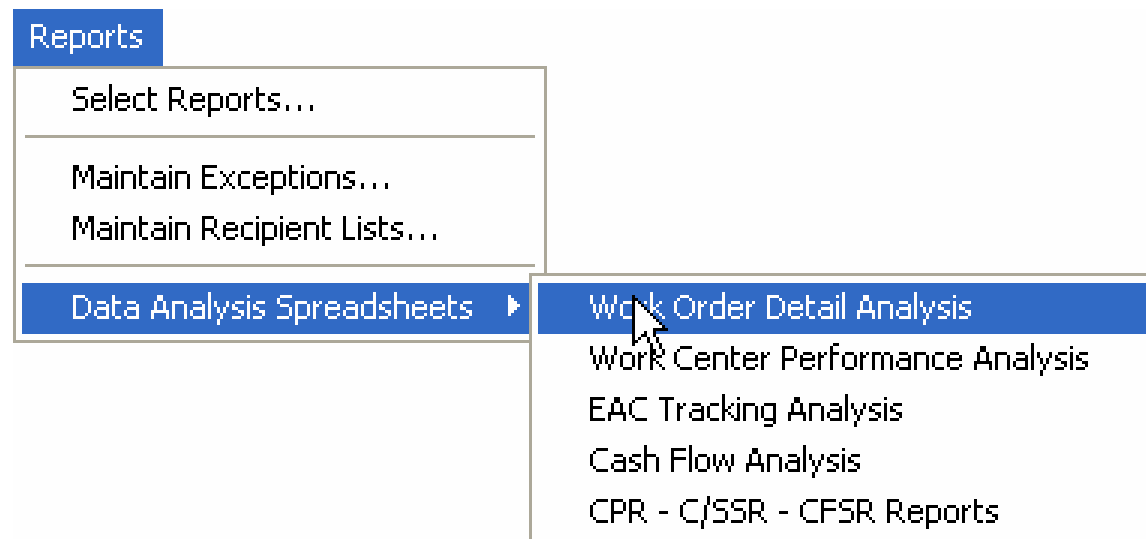
# Additional Graphics Reports

*PERCEPTION* provides a wide variety of graphics reports that analyze contract performance:

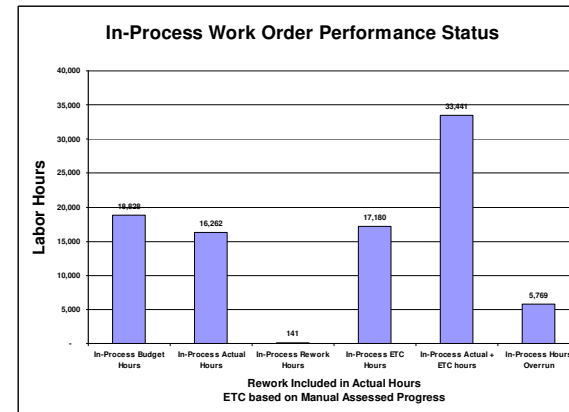
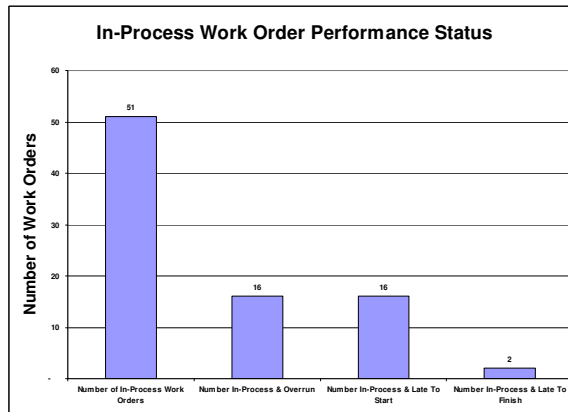
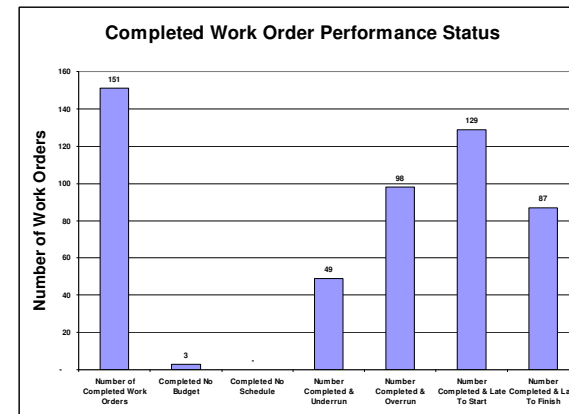
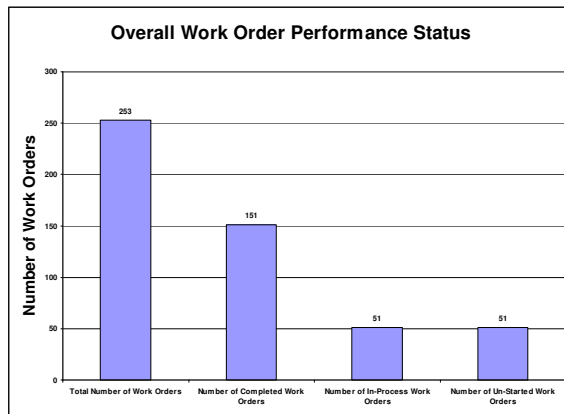
- Detail Work Order Analysis
- Project Summary Labor Hour Performance
- Shipyard Work Center Performance
- Project Cost & Cash Flow Performance



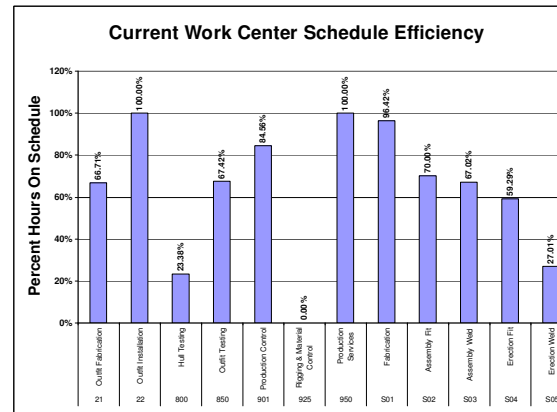
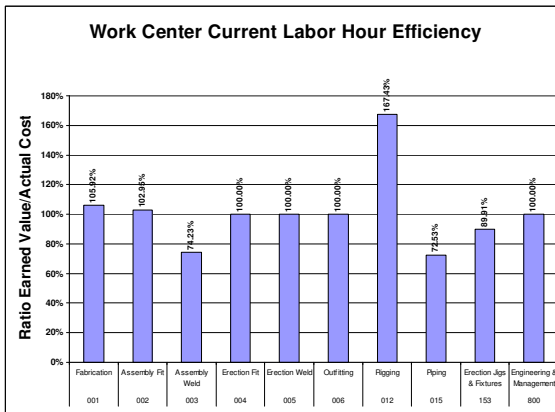
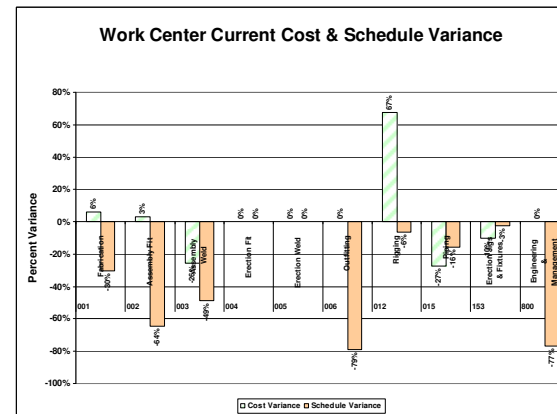
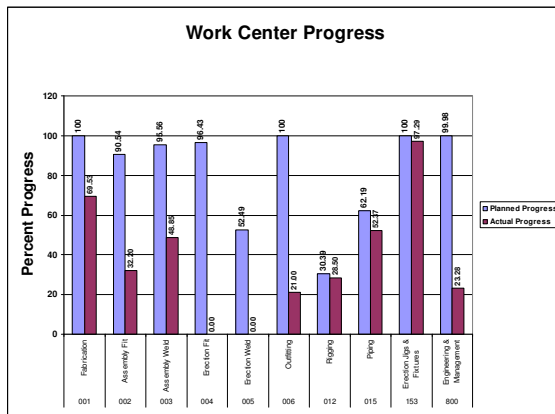
## Click on *Reports/Data Analysis Spreadsheets* for the various analysis options



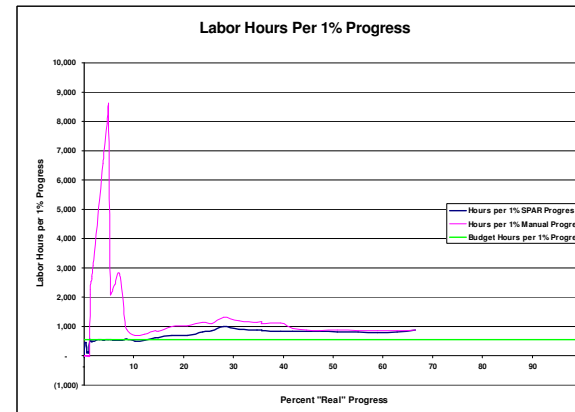
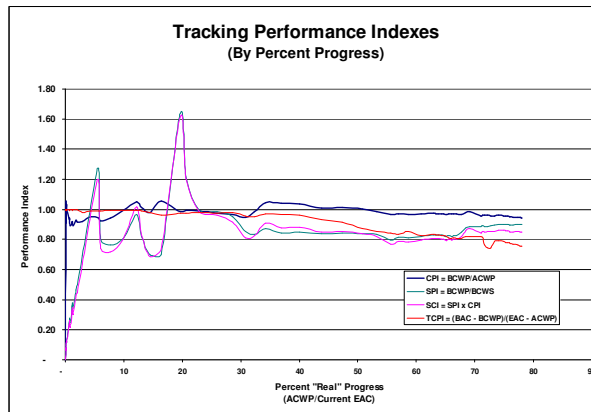
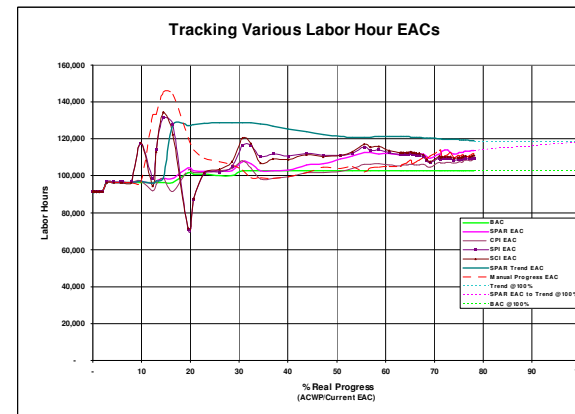
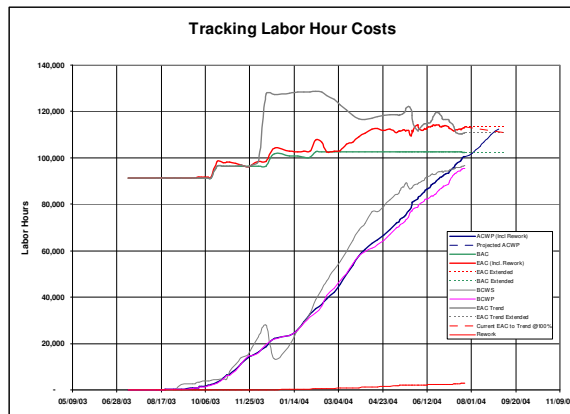
# Work Order Detail Analyses



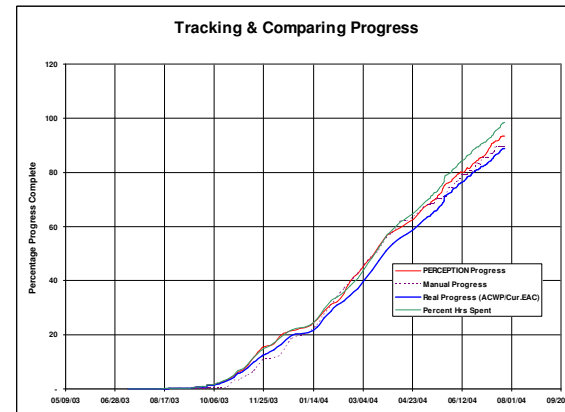
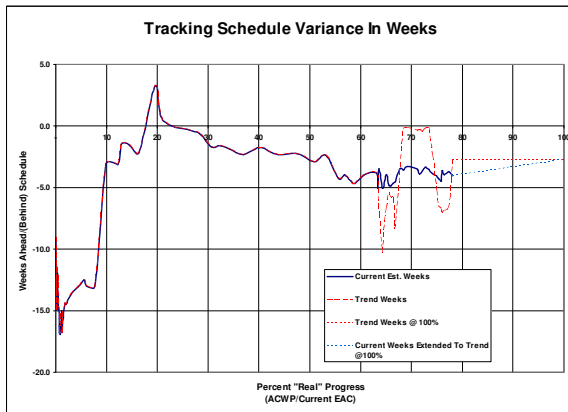
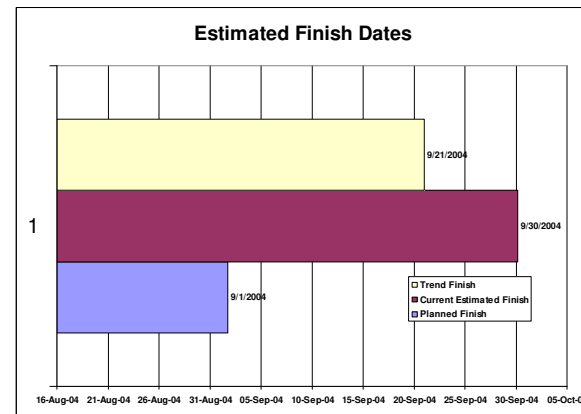
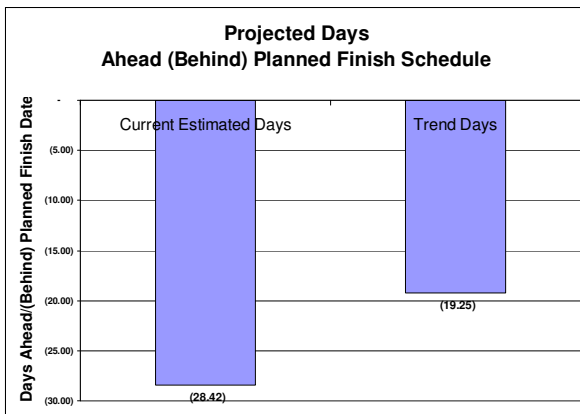
# Work Center Performance Analyses



# EAC Tracking Analyses



# Schedule Tracking Analyses



# Cash Flow Analyses

