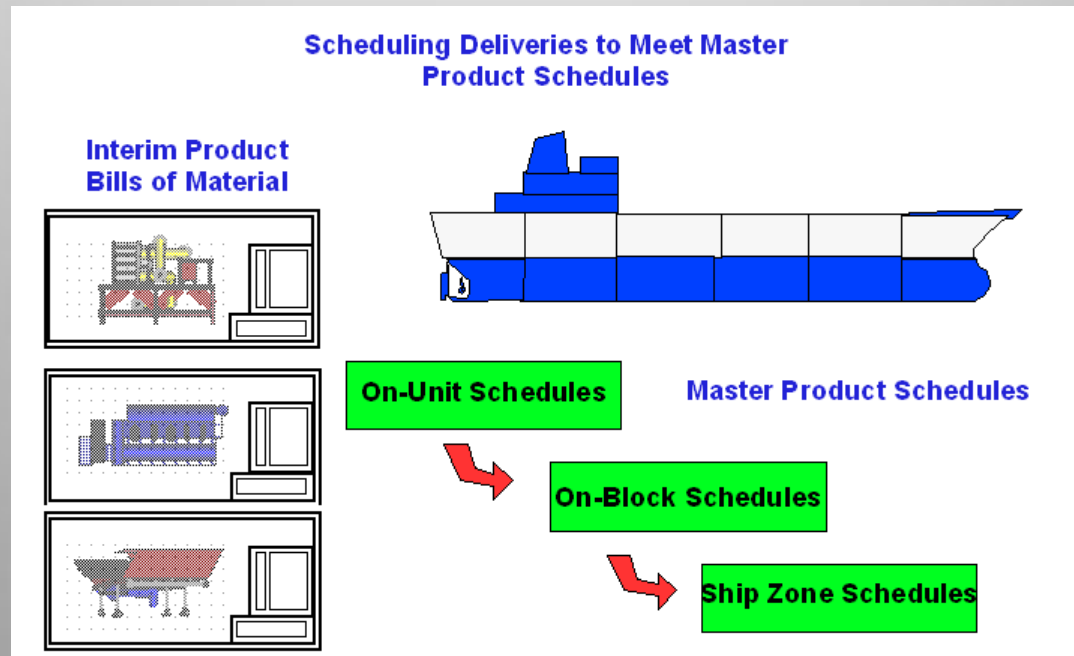


# PERCEPTION<sup>®</sup> PERT-PAC

## Scheduling Production



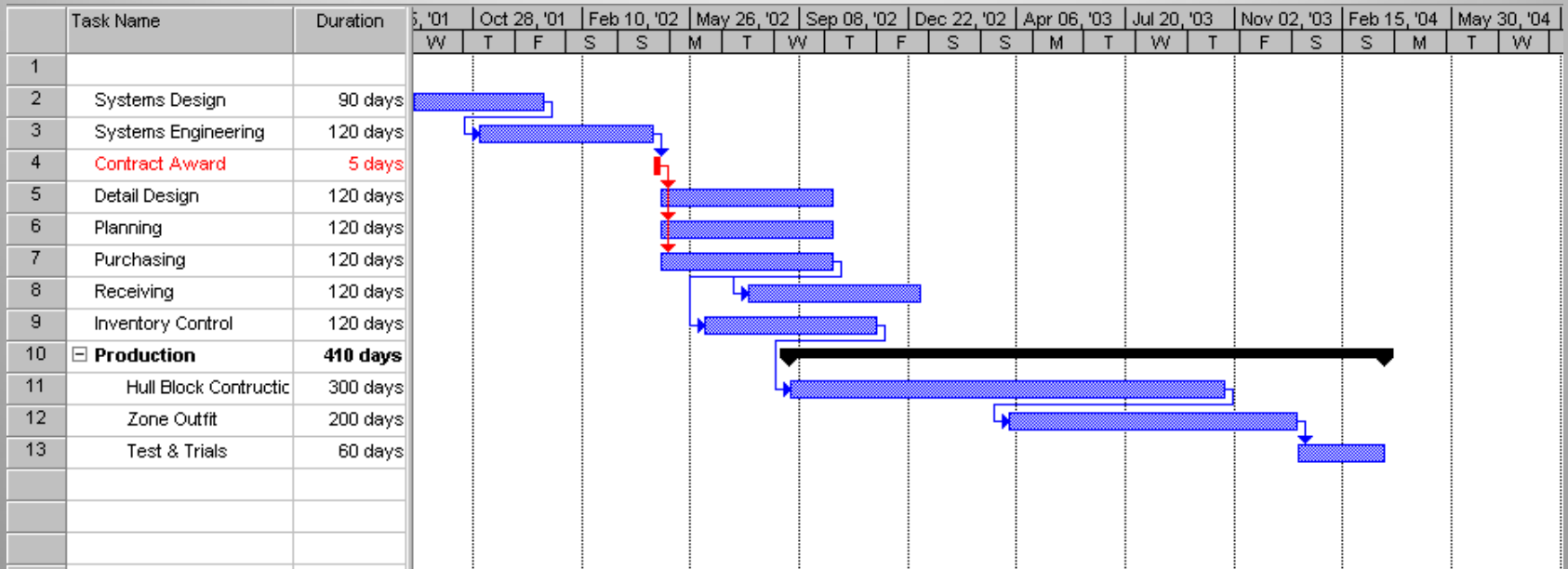
***PERCEPTION PERT-PAC*** provides a system's integration feature for using Microsoft *Project* to automatically develop and schedule Planning Activities.

Once Planning Activities are developed, *PERCEPTION* links them to production work orders and purchase order deliveries.

# System Benefits

1. **Better coordination of all engineering, purchasing and production activities for new construction and large scale refit contracts.**
2. **Automated scheduling of production work orders**
3. **Automated scheduling of material purchases.**
4. **Automated scheduling of subcontractors**
5. **Automated feedback of actual schedule performance (production work orders and material receipts) back to the scheduling system for schedule updates.**

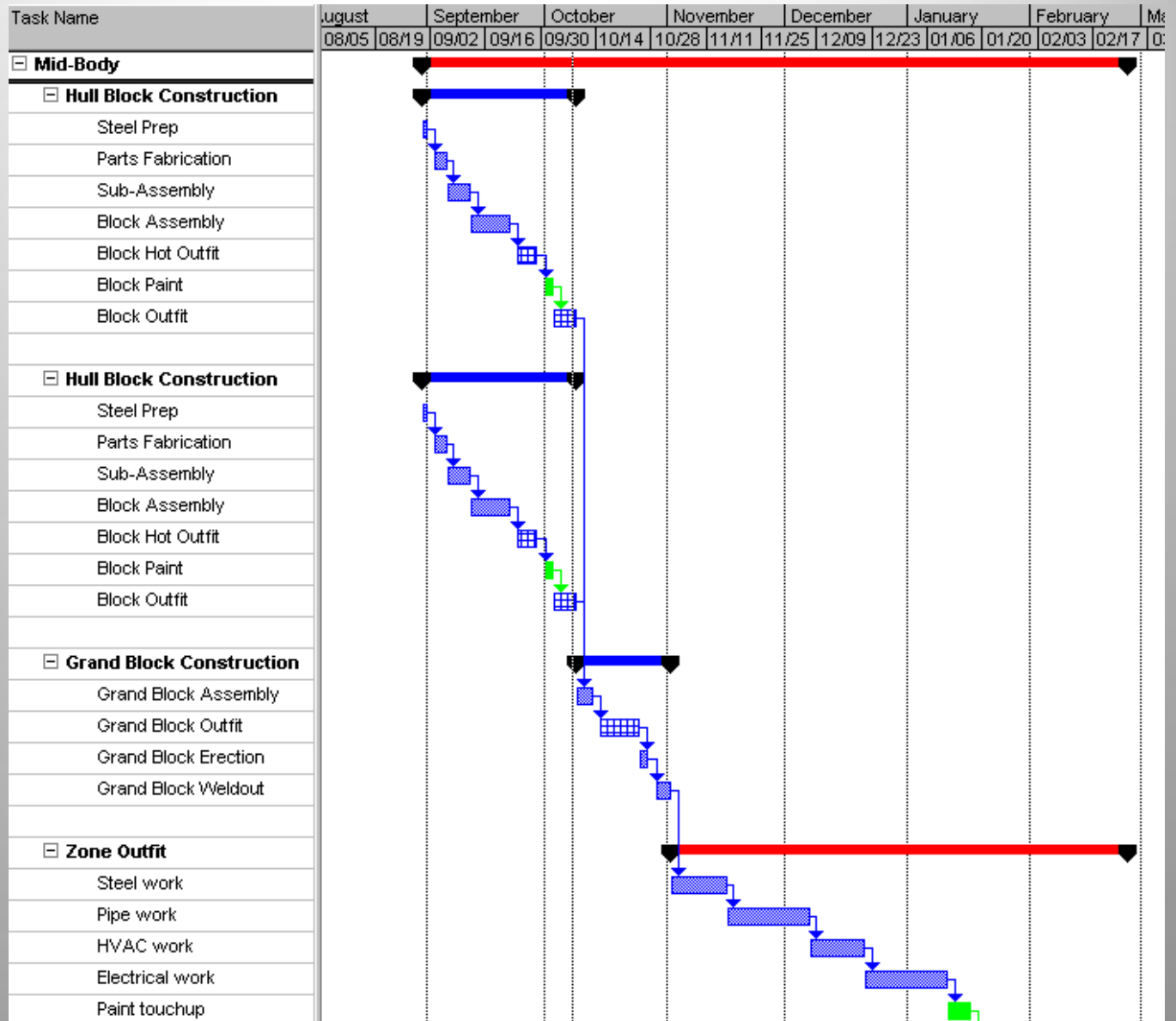
# Planning & Scheduling

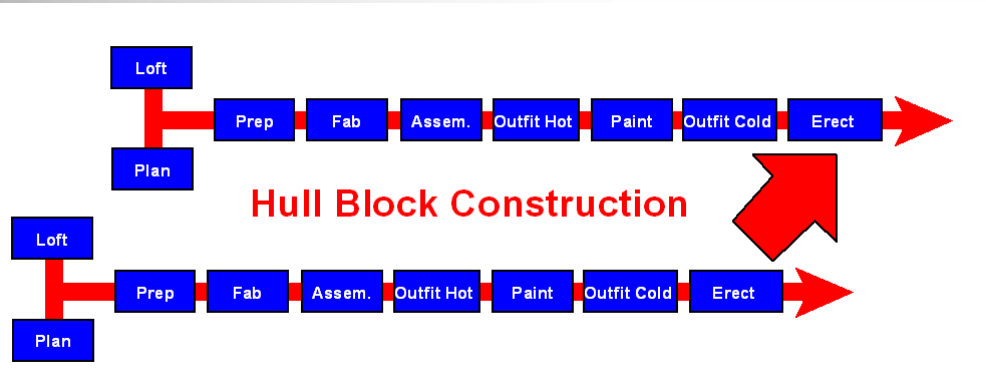


# ***PERCEPTION* has features for planning and scheduling all project activities:**

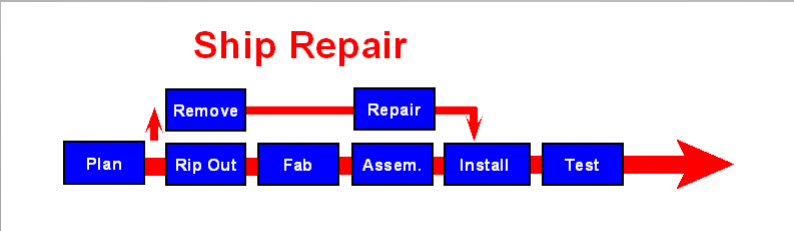
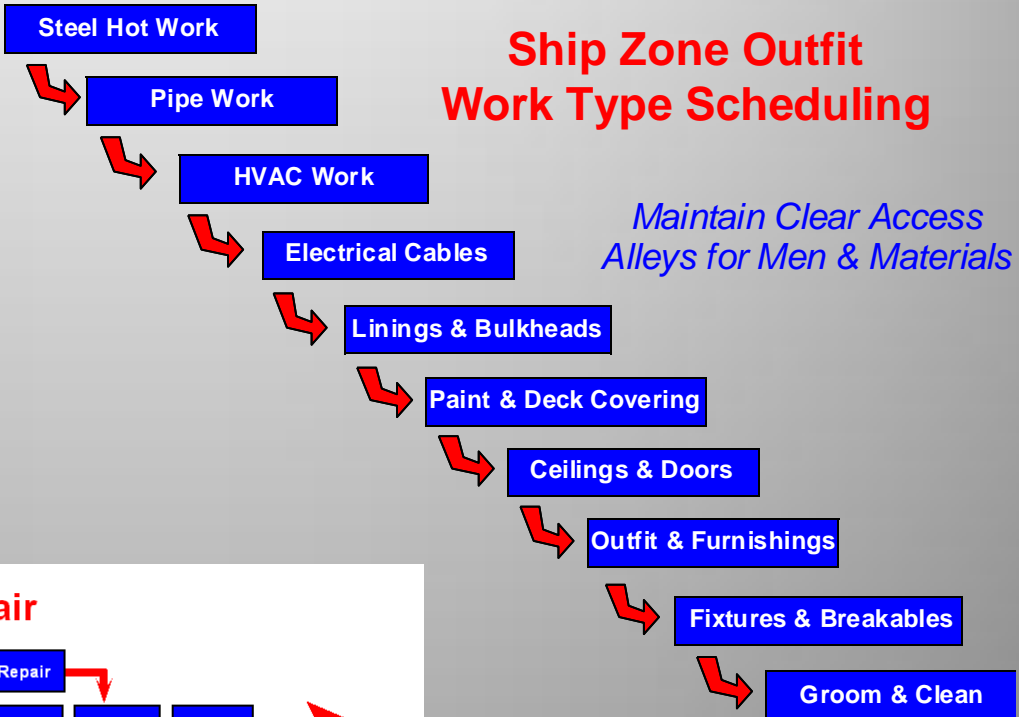
- **Schedule Design & Engineering Activities**
- **Schedule Engineering Drawings**
- **Schedule Production Work Orders**
- **Schedule Work Order Material Pallets**
- **Schedule Purchased Material Deliveries**
- **Schedule Subcontractors**
- **Schedule Tests & Trials**

# Detail Production Scheduling





Scheduling requires the proper sequencing of work and related project activities.



# Planning The Project

A project plan requires a good overall organization of the work. For new construction, this means the following basic items need to be defined:

1. The project work breakdown structure (WBS) that will provide a good overview of costs and schedules above the details. This avoids missing the “forest for the trees” when the project gets under way.
2. The organization structure of all who will be responsible for doing the work. *PERCEPTION* requires that all work be formally assigned to specific work centers.



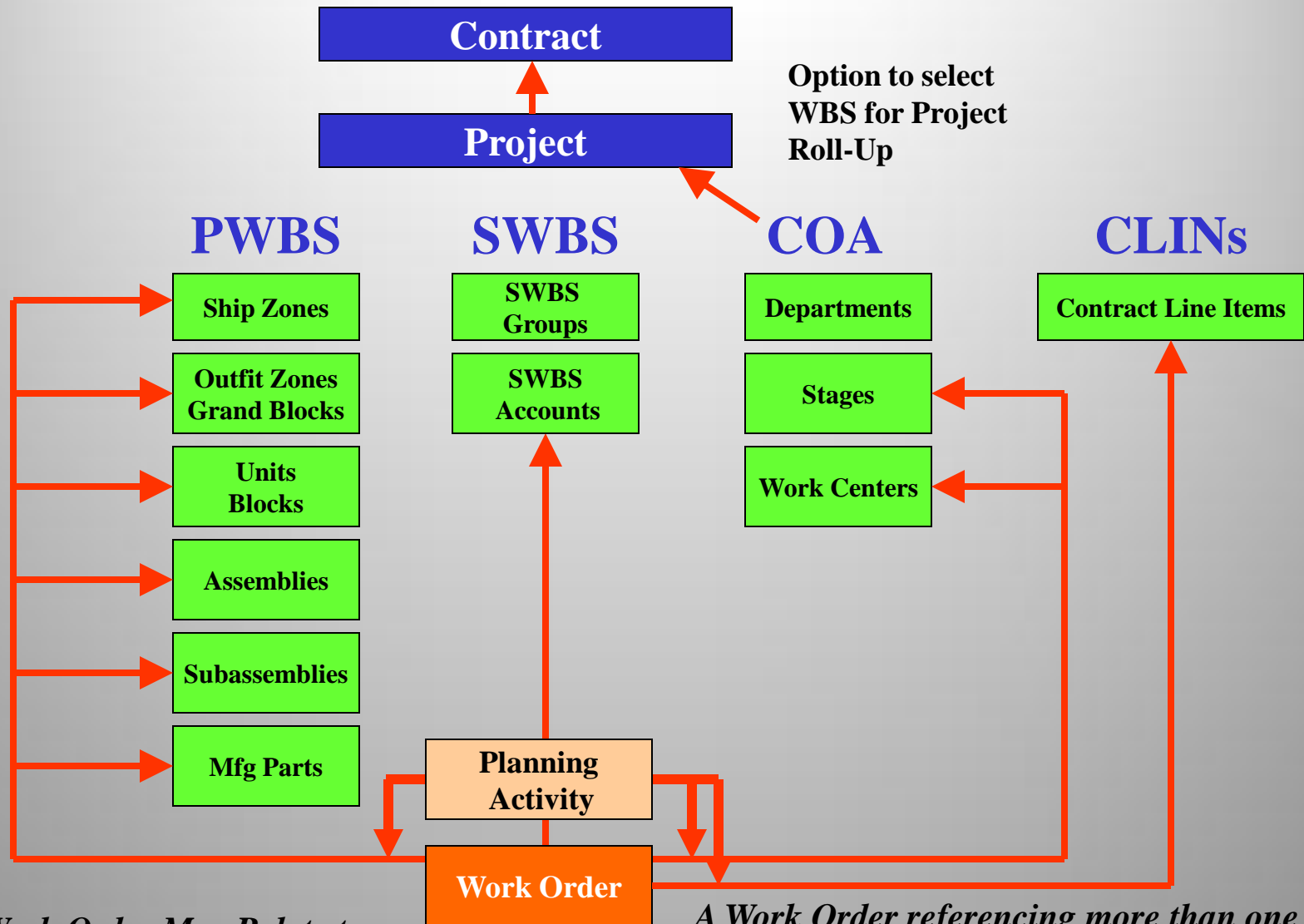
# ***PERCEPTION* Accommodates Four Different Work Breakdown Structures Simultaneously**

- **By SWBS (Ship System)**
- **By PWBS (Interim Product & Process)**
- **By COA (Shipyard Organization Structure)**
- **By CLIN (Contract Line Item, or ship owner's WBS)**

*Select the WBS that satisfies the internal and external planning and management needs of the shipyard.*

**All work efforts and contract costs should be associated with the elements of the selected project WBS:**

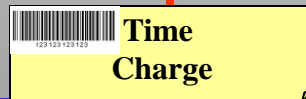
- The Cost Estimate**
- Planning Activities**
- Work Orders**
- Material Requirements**



Option to select WBS for Project Roll-Up

*A Work Order May Relate to Multiple WBS's*

*A Work Order referencing more than one element of any WBS may be setup as a Distributed Work Order.*



**Contract**

**Project**

**PWBS**

**SWBS**

**COA**

**CLINs**

Ship Zones

Outfit Zones  
Grand Blocks

Units  
Blocks

Assemblies

Subassemblies

Mfg Parts

SWBS  
Groups

SWBS  
Accounts

Departments

Stages

Work Centers

Contract Line Items

Planning  
Activity

Work Order

Pallet

Pallet

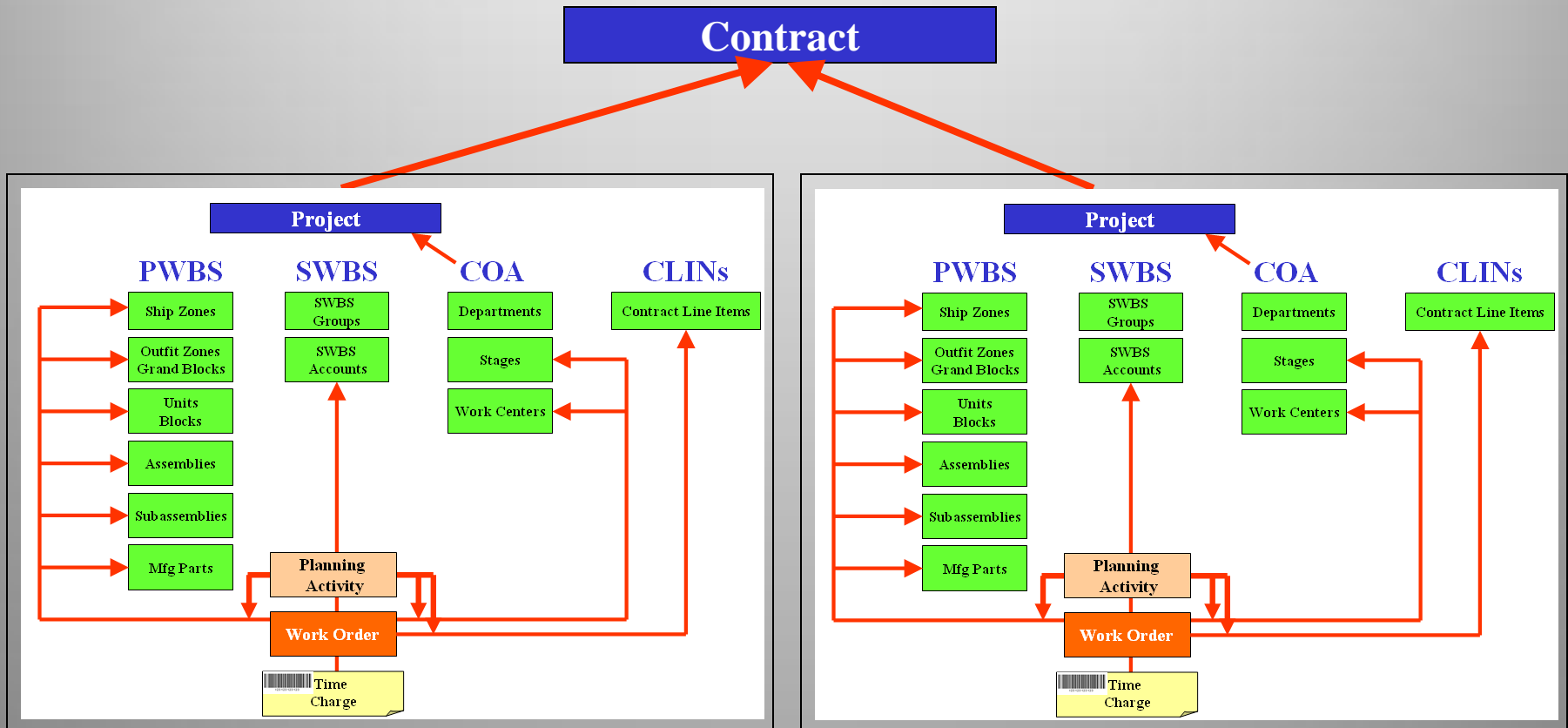
Requisition

- Stock issues
- Direct Purchase Materials
- Owner Furnished Materials
- Manufactured Parts

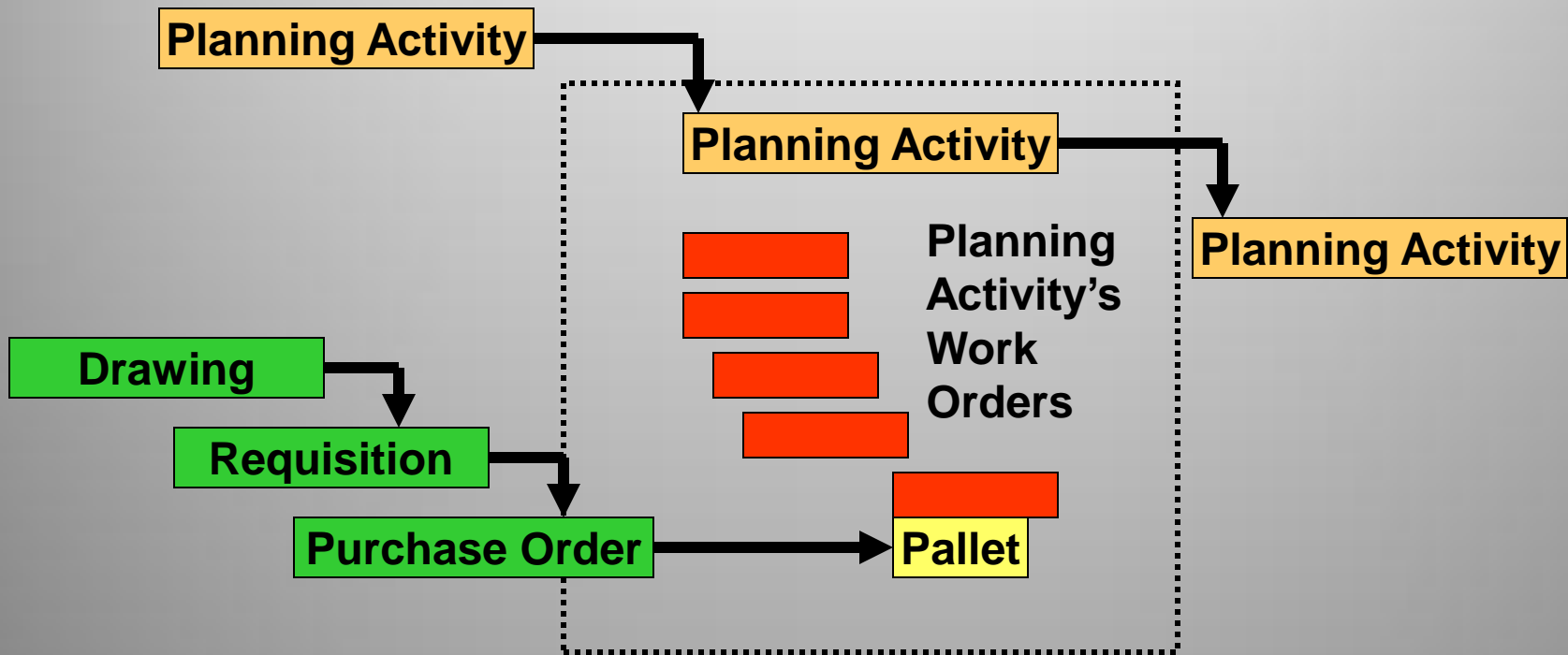
*Production Material*



# Multi-Ship Program Management Cost & Schedule Consolidation



# With *PERCEPTION*'s Planning Activities, Production Work Orders & Purchasing Schedules can be defined automatically



# Develop Build Strategy

The build strategy basically identifies “how” the work should be executed, “where” and by “whom”.

The “How” identifies the production processes, from manufacturing to assembly and installation.

The “Where” identifies the stage of construction for the work, whether on board, on block or on module.

The “Whom” identifies the party responsible for performing the work. This can be either in-house or subcontracted.

# Defining Project Tasks

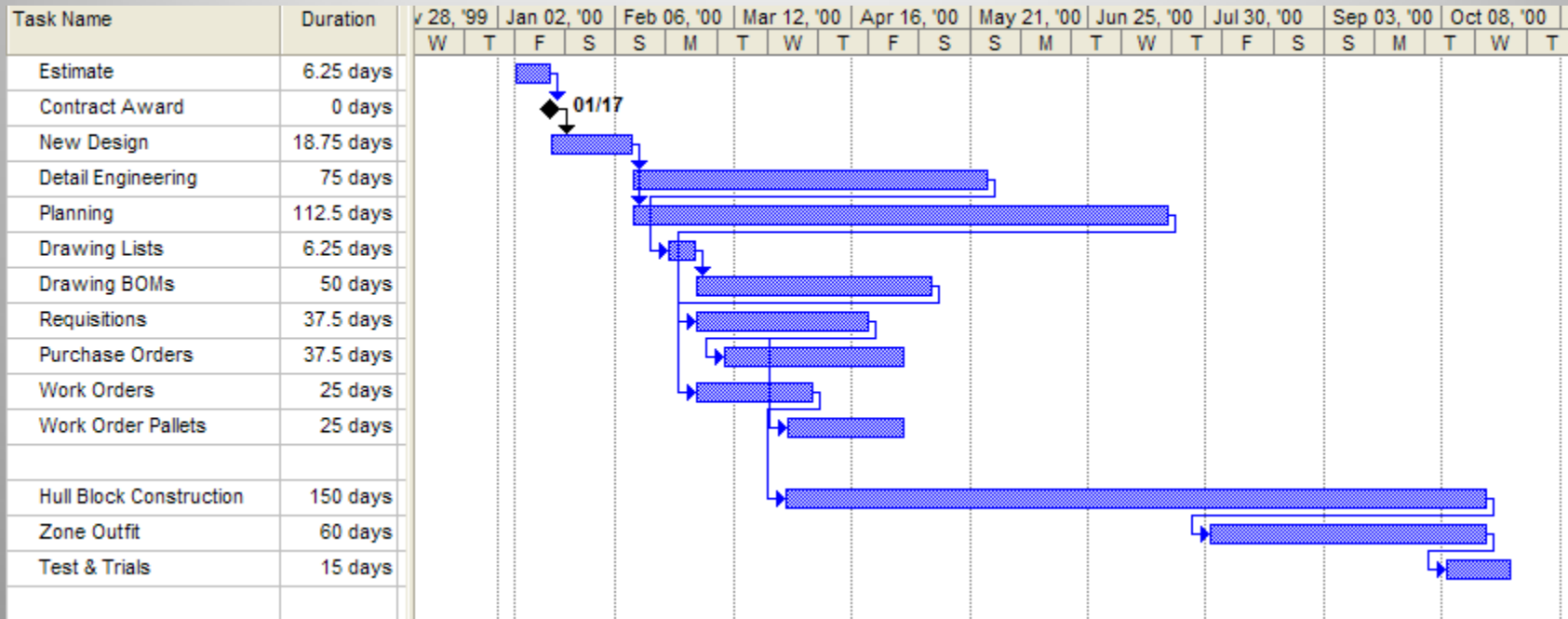
Project tasks can be entered directly into *Microsoft Project*. This process can be done task by task or by using the copy and paste features.



## **The basic master plan for new construction can be outlined as follows:**

- 1. Estimating**
- 2. Planning & Scheduling**
- 3. Engineering**
- 4. Requisitioning Materials**
- 5. Purchasing**
- 6. Work Order Development**
- 7. Hull Block Fabrication**
- 8. Hull Block Assembly & Outfit**
- 9. Hull Block Erection**
- 10. Zone Outfit**
- 11. Tests & Trials**

# The basic master plan for new construction



# Budgeting Labor

**Budgeting labor hours may be done in a number of different ways:**

- 1. Use a cost estimating relationship (CER)**
- 2. Use the estimated hours (often deducting a percentage for management reserves)**

**CERs are often used to develop budgets for hull block construction. The following are examples:**

<b>Stage of Construction</b>	<b>Hrs/Ton</b>
Steel Prep	0.75
Steel Parts Fab	1.50
Block Sub-Assembly	3.50
Block Assembly	8.50
Block Erection - Tack & Fit	6.25
Block Erection Welding	3.50
Total:	24.00

**To compute the budget hours,**

$$\text{Labor Hours} = \text{Tons} \times (\text{Hours/Ton})$$

# Task Durations

An important piece of information for scheduling is to estimate how long a task will require from start to finish.

The labor hours provide the scope of work, but the time frame in which these hours can be performed depends upon the number of resources (manpower) that will be made available.

**To compute the task duration, the following information needs to be defined:**

- 1. The total labor hours**
- 2. The number of hours per man-day**
- 3. The number of shifts per man-day**

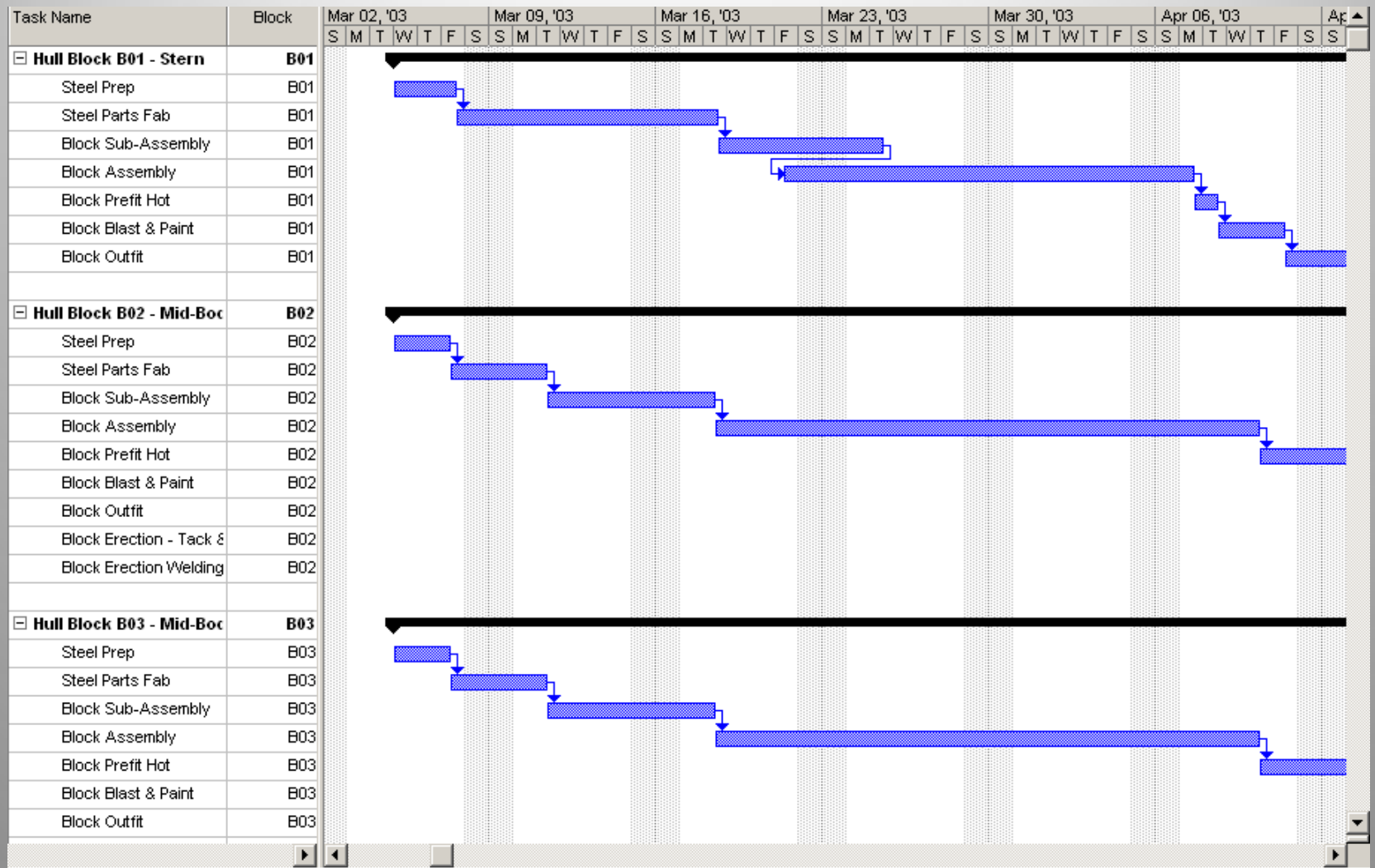
$$\text{Days Duration} = \text{Labor Hours} / (8 \text{ Hours/Day}) / (\text{Shifts/Day})$$

# Sequencing Tasks

**The next step is to link these tasks according to their normal inter-dependencies and sequence order.**

**This sequencing is needed to develop the production schedule.**

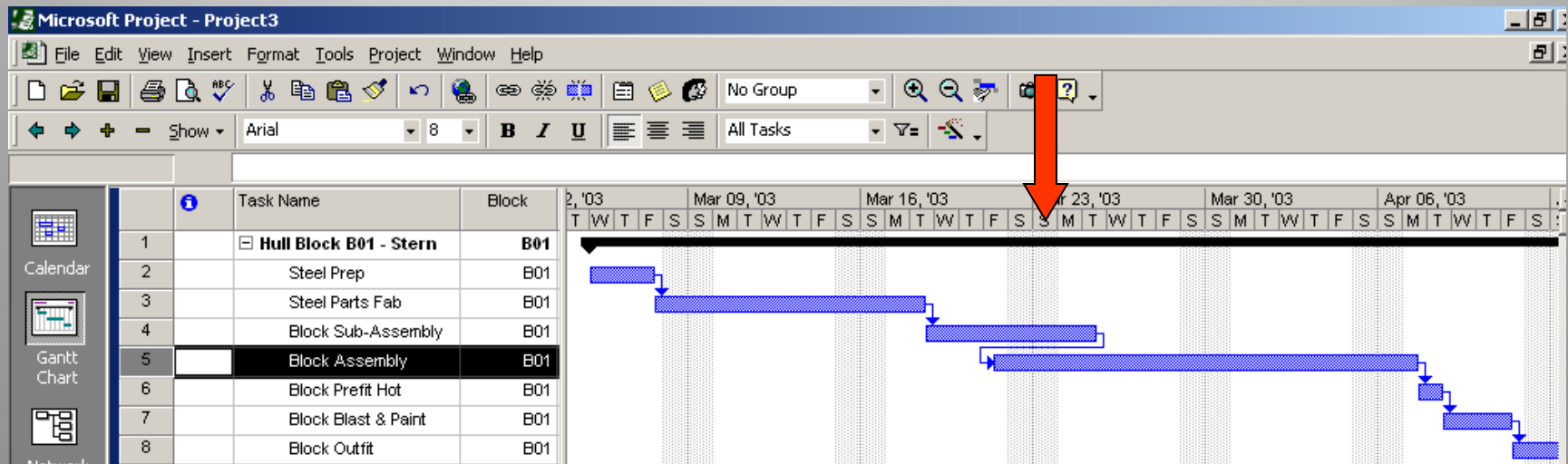
# Sequence tasks for each block & module





# Using Lag and Lead

Some task links need to be adjusted to account for either lead or lag,



**Lag** means that there is a specified amount of time that must pass before the succeeding task can start.

**Lead (negative lag)** means that the succeeding task can start before the preceding task has finished.

When the Task Information window appears, click on the *Predecessors* tab.

Enter the number of days lag or lead as required. Then click on the *OK* button.

Task Information

General Predecessors Resources Advanced Notes

Name: Block Assembly Duration: 9.38d?  Estimated

Predecessors:

ID	Task Name	Type	Lag
4	Block Sub-Assembly	Finish-to-Start (FS)	-2d

Help OK Cancel

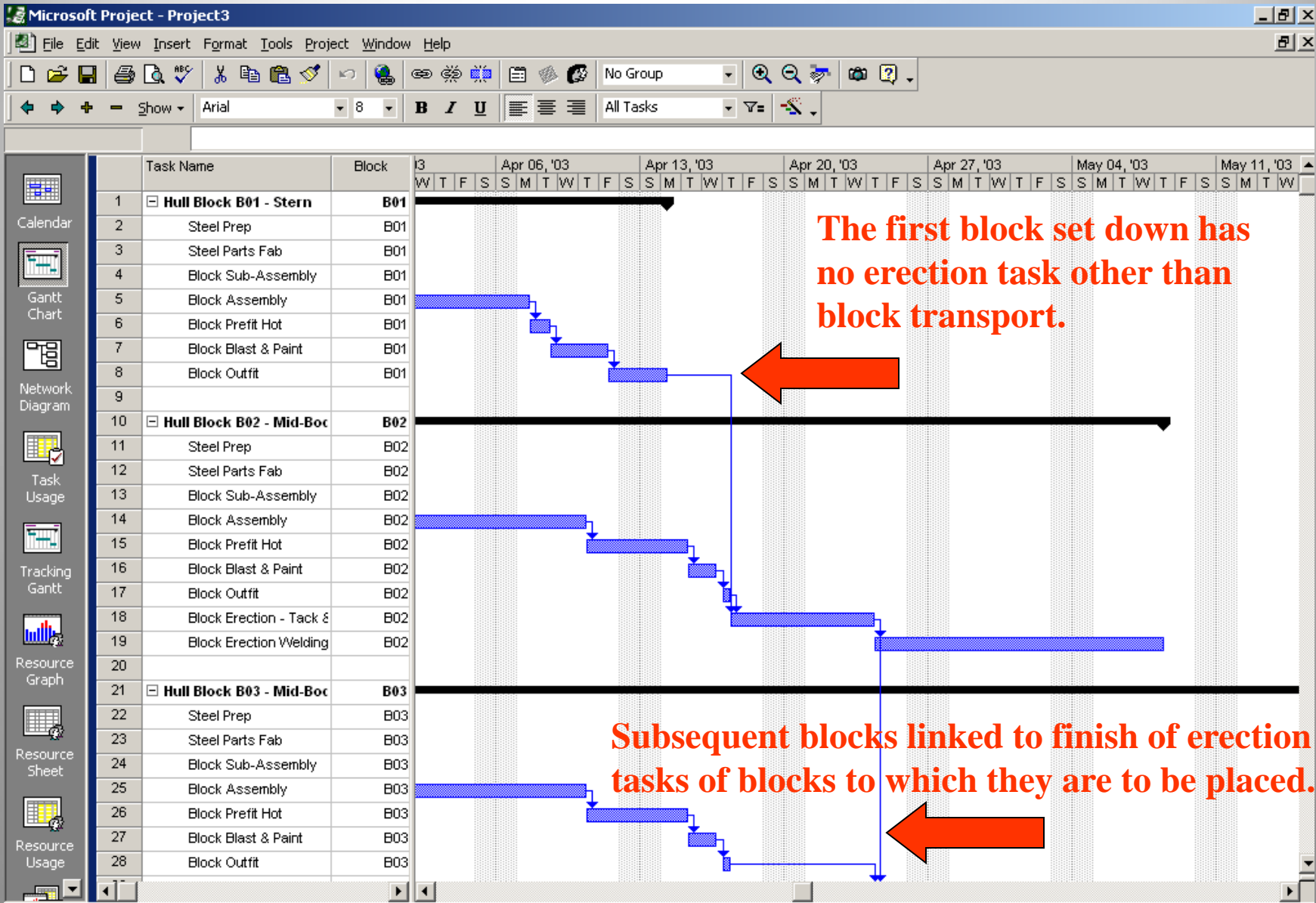
**Example of task starting 2 days before finish of preceding task.**

# Defining Erection Sequence

After each set of block tasks has been linked and sequenced, the blocks must be linked by their required erection sequence.

Use the same procedure for linking block erection tasks as for linking block tasks.

- First, highlight the erection task that needs to be sequenced first;
- Then highlight the following erection task.
- Click on the *Link Task* button to make the link.



The first block set down has no erection task other than block transport.



Subsequent blocks linked to finish of erection tasks of blocks to which they are to be placed.

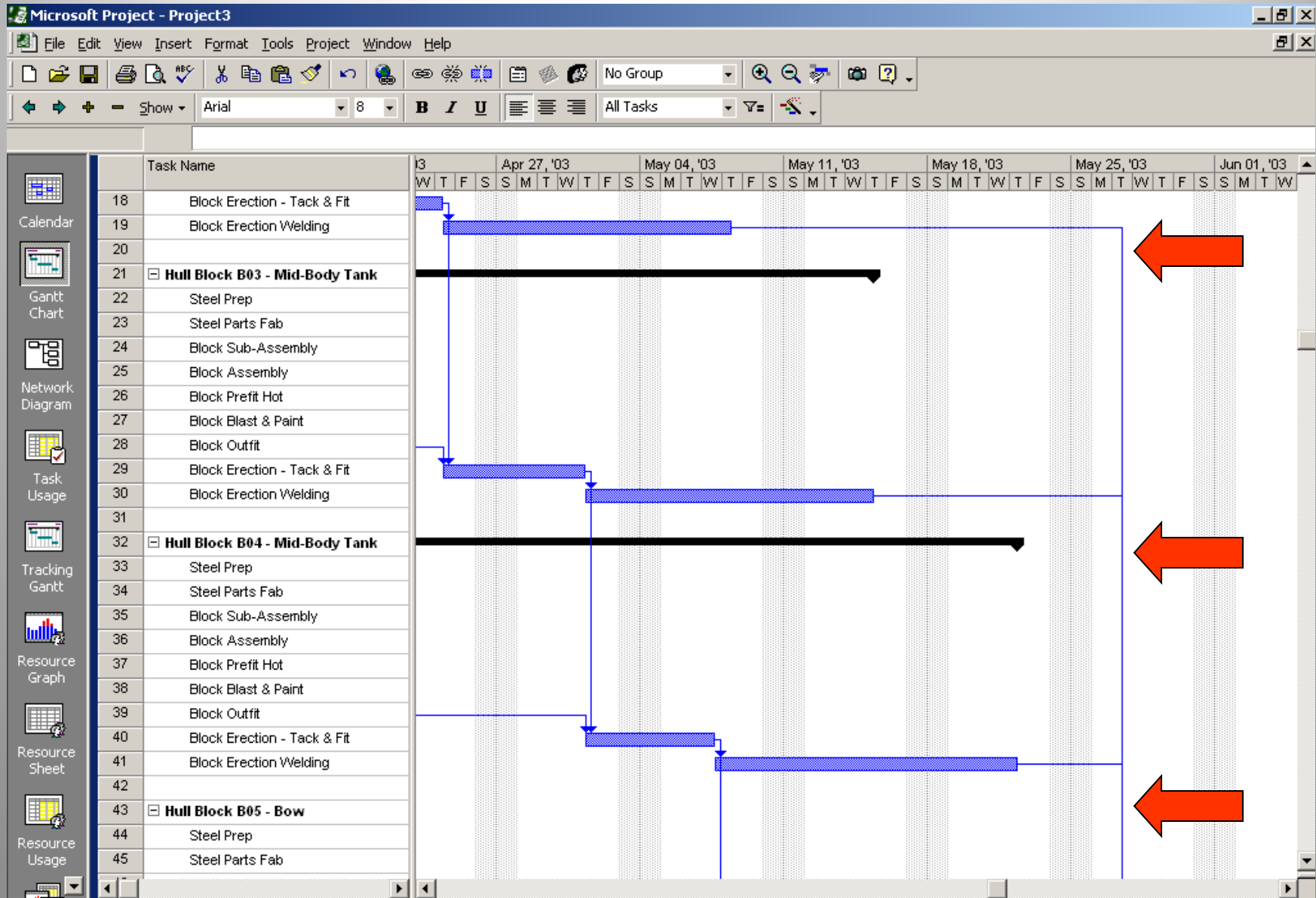


# Sequencing On-Board Outfit & Test Tasks

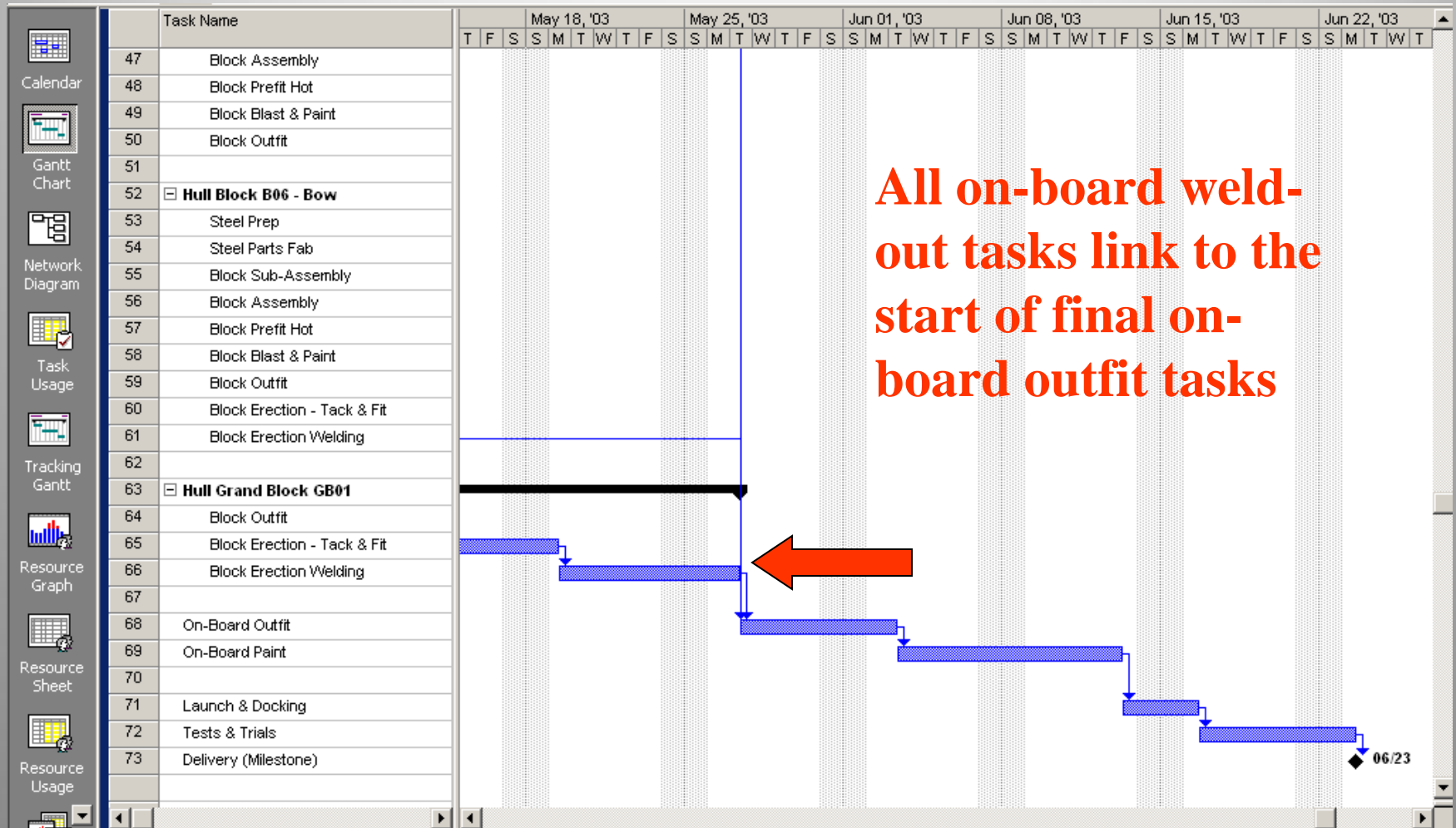
To complete the production schedule, the block erection and on-board weld-out tasks need to be linked for the final on-board outfit, launch and tests and trials.

Link each on-board block weld-out task to the on-board outfit task. This link must be done for each weld-out task individually.

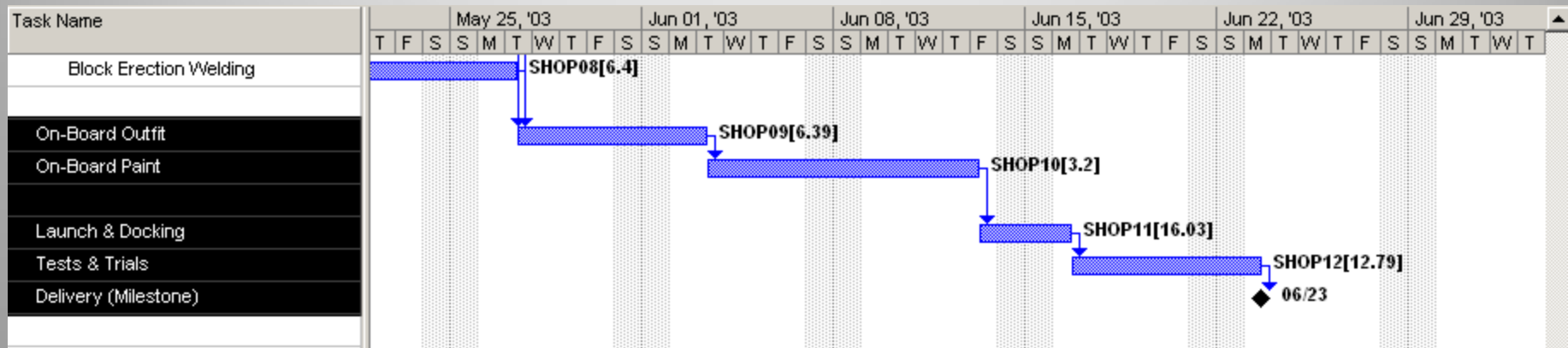
For large ship construction, the on-board tasks should be broken down by ship zone.



# Completing the on-board block weld-out tasks to the final on-board outfit tasks, leading to delivery.



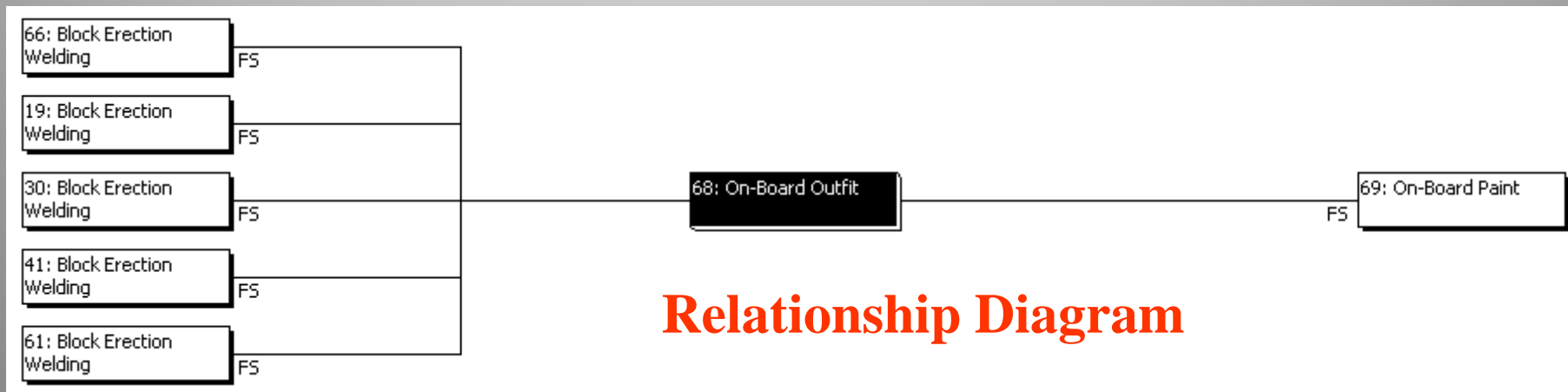
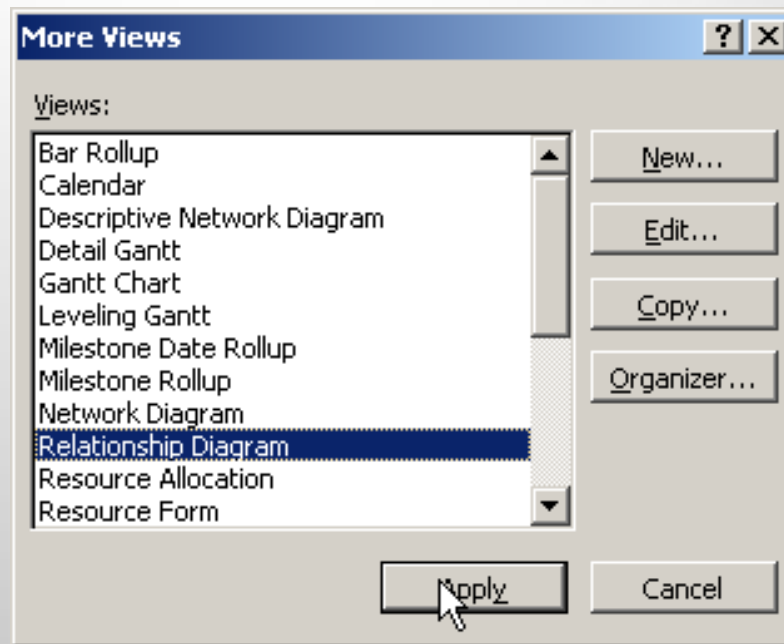
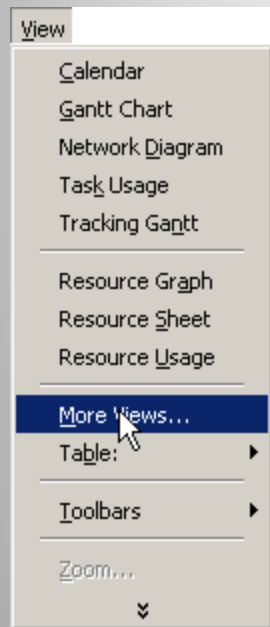
## Another view that can be helpful in ensuring that erection tasks link properly to on-board outfit tasks is the *Relationship Diagram*



**First, highlight the rows of tasks to display.**

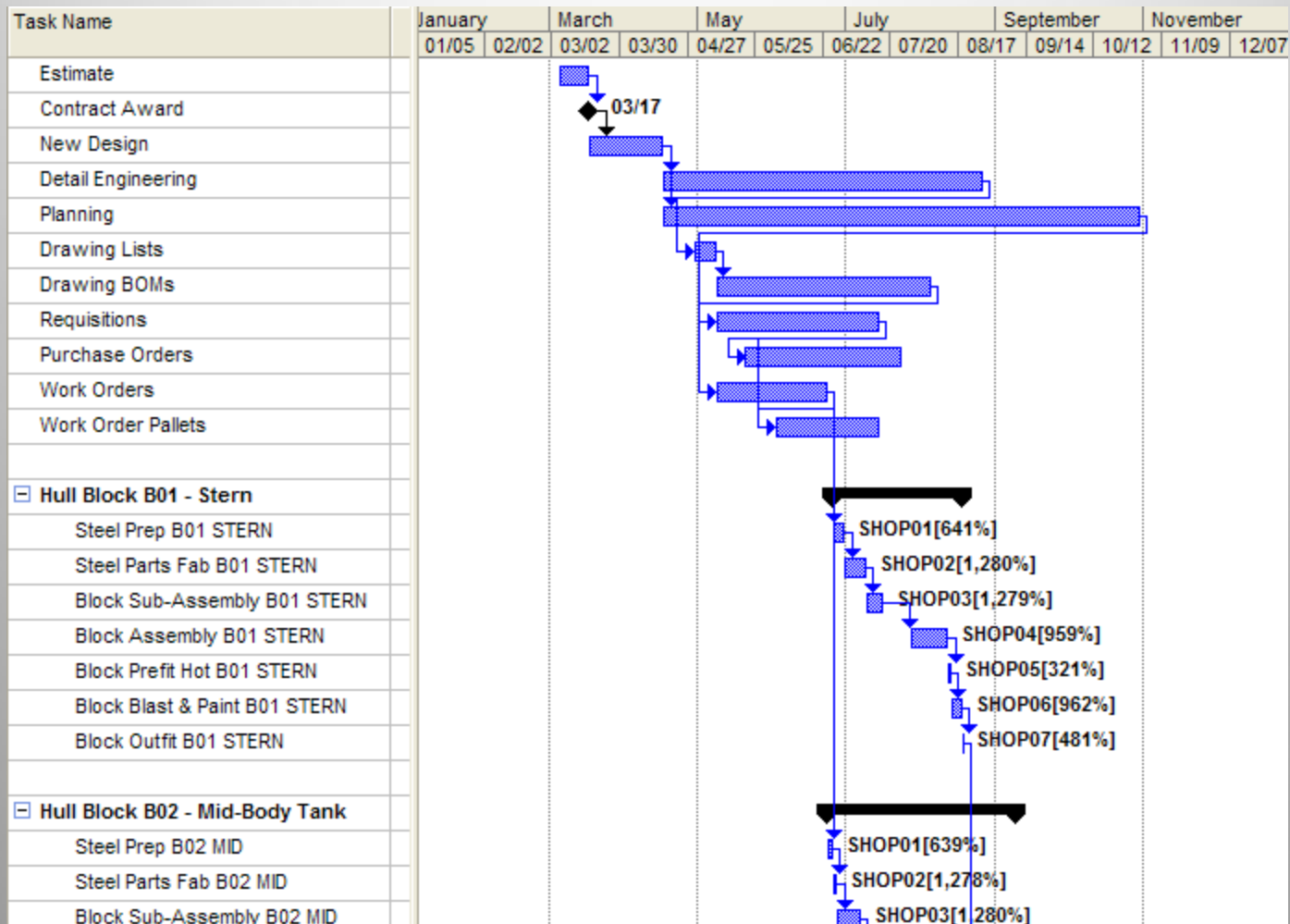
**Then, click on *View/More Views* from the main menu.**





# Engineering & Material Control

After all production tasks have been defined and linked, the tasks for engineering, planning & purchasing that are required to support the production plan must be defined and then linked into the project.



# Schedule Adjustments

The schedules at this point are the result only of sequenced (linked) tasks and their durations.

There usually are other considerations that affect schedules:

- **Fixed Time Date Requirements**
- **Task Priorities**
- **Limited Resources**

# Date Constraints

There are various types of date constraints:

1. **As Soon As Possible (Default)**
2. **As Late As Possible**
3. **Finish No Earlier Than mm/dd/yyyy**
4. **Finish no Later Than mm/dd/yyyy**
5. **Must Finish On mm/dd/yyyy**
6. **Must Start On mm/dd/yyyy**
7. **Start No Earlier Than mm/dd/yyyy**
8. **Finish No Earlier Than mm/dd/yyyy**

# Resource Loading

Except for the linking of block erection tasks and the block weld-out with the on-board outfit tasks, the schedule should consider any limitations of resources.

To modify the schedules so that they honor times of limited resources, a scheduling process called *resource leveling* is available.

# What is Resource Leveling?

Resource leveling is a way to resolve having too much work assigned to resources, which is known as “resource over-allocation.”

One way to level is to delay a task until the assigned resource has time to work on it.

Another method is to split a task, so that part of a task is done when planned, and the rest of it is done later when the assigned resource has time.

You can level resources yourself or have *Microsoft Project* level for you. The *Microsoft Project* leveling feature examines the following factors to determine which tasks should be delayed or split:

- **Task ID**
- **Available slack time**
- **Task priority**
- **Task dependencies**
- **Task constraints**
- **Scheduling dates**



# When and Why Should Resources Be Leveled?

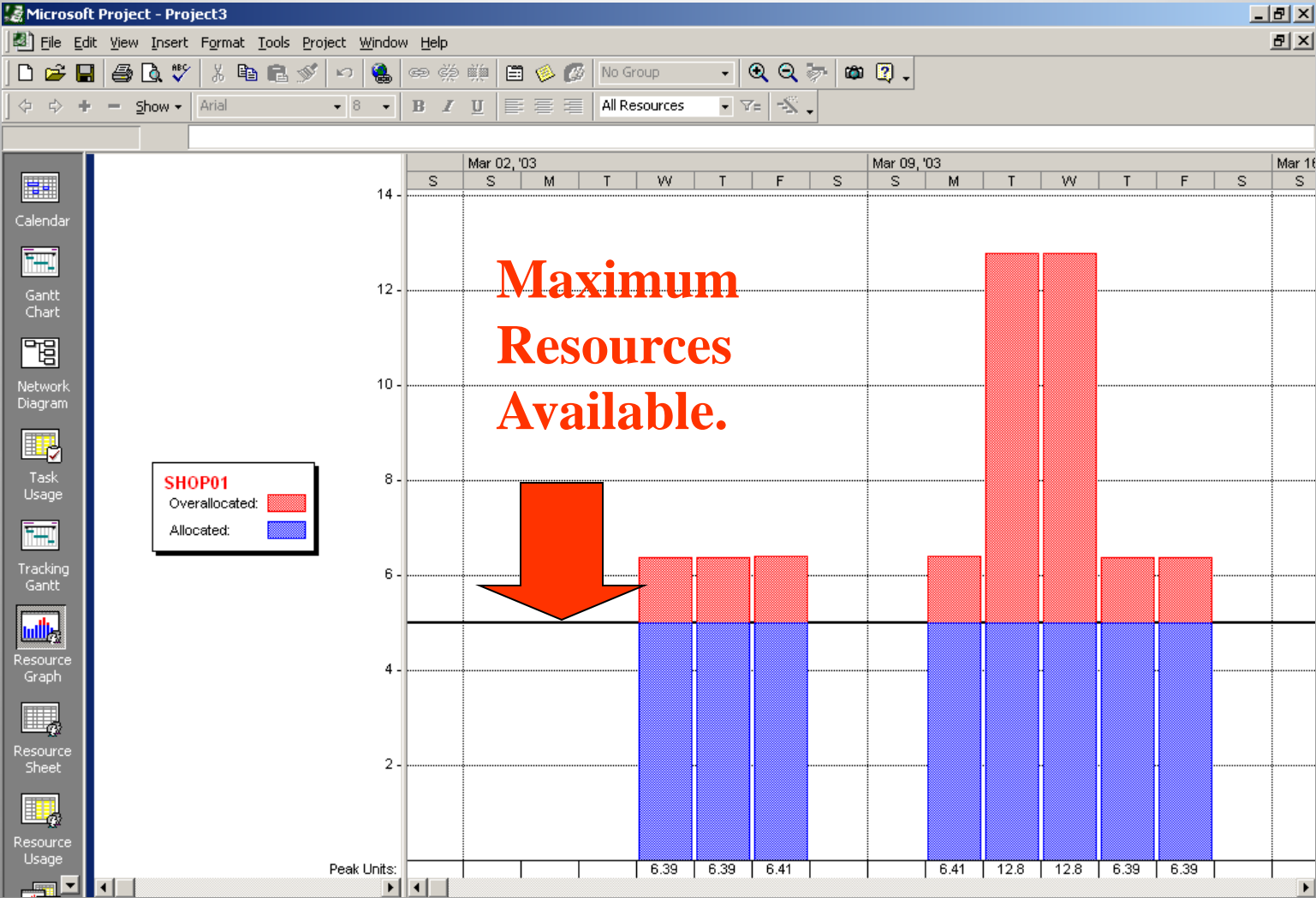
Level resources when you know you have over-allocations and only after you have entered all information about task scheduling and resource availability.

Don't rely on resource leveling to schedule your project.

You know you have over-allocations when you review a resource view (*Resource Usage* view, *Resource Sheet*, or *Resource Graph*) and **see resources highlighted in red.**

You can also level resources shared across multiple projects.

# Select *View/Resource Graph* from the main menu for graphical presentation of the over-allocation.




# Transfer Tasks To *PERCEPTION*

When the tasks in *Microsoft Project 2000* have all been scheduled, they can be transferred to *PERCEPTION* as project Planning Activities.

1. Identify the project in the *PERCEPTION* database
2. Turn on the *Transfer To PERCEPTION* option
3. Identify the *Microsoft Project 2000* file
4. Click on the *OK* button.

**Synchronize With MS Project**



**Contract and Project Selection**

List Only Open Contracts  
 List Both Open & Closed Contracts

Contract

Project

**Transfer Options**

Transfer To PERCEPTION  
 Transfer To Microsoft Project

**MS Project File**

**Progress**

**Work Orders & Material Requisitions can be linked directly to Planning Activities.**

**Therefore, Planning Activities provide the work orders and requisitions with their planned schedules.**

# 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

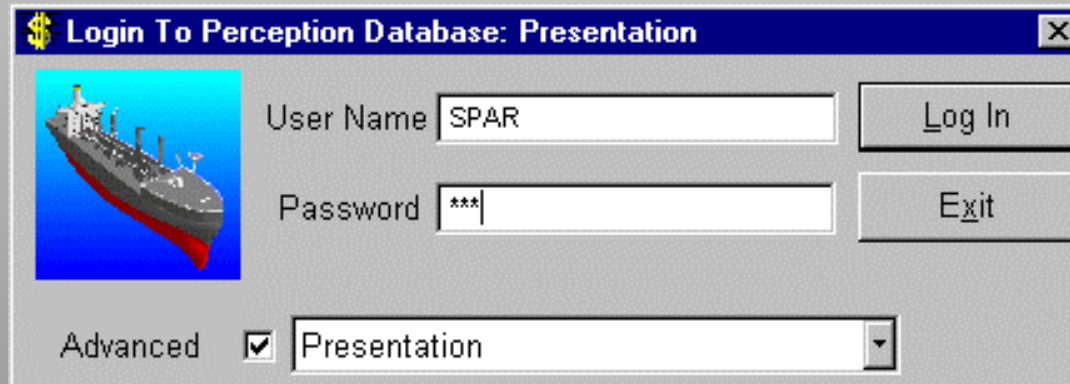
Accounting Time Charges

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.



The screenshot shows a login window with the following elements:

- Title Bar:** Login To Perception Database: Presentation
- Image:** A 3D rendering of a ship on the left side.
- User Name:** A text input field containing the text "SPAR".
- Password:** A text input field containing three asterisks "\*\*\*".
- Buttons:** "Log In" and "Exit" buttons are positioned to the right of the input fields.
- Advanced:** A checkbox labeled "Advanced" is checked.
- Dropdown:** A dropdown menu is set to "Presentation".



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- Shipyard management software
- Software development services
- Training & maintenance support
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