PERCEPTION® PERT-PAC
Using *Microsoft Project 2000*

to Plan & Schedule

A Training Tutorial

(Sample Hull Block Construction)

This training tutorial outlines the basic features of the *Microsoft Project 2000* system for planning and scheduling shipyard engineering and production activities.

It is a supplement to the user manual entitled "*PERCEPTION Integrated Planning & Scheduling*," which provides more planning and scheduling details for the user.

For details on the operation of *Microsoft Project 2000* not covered by this tutorial, the user is urged to use Microsoft's "User Guide for Microsoft Project 2000."

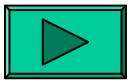
Additional detailed instructions for planning and scheduling using *PERCEPTION* are provided in the following tutorial:

PERCEPTION PERT-PAC

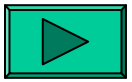
Integrated Planning & Scheduling

Training Directory

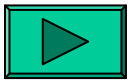
Continue



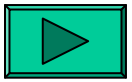
Planning the Project



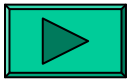
The Project Calendar



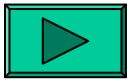
Scheduling Options



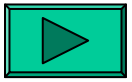
Project Settings



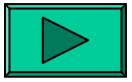
The Worksheet Columns



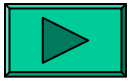
Defining Resources



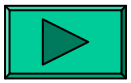
Defining Tasks



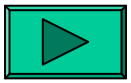
Budgeting Labor



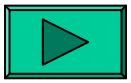
Task Durations



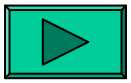
Copying *Excel* Tasks to *Project*



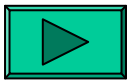
Sequencing Tasks



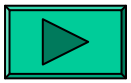
Engineering and Material Control



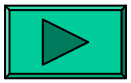
Project Schedule



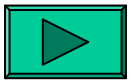
Schedule Adjustments



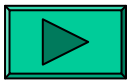
Resource Loading



Resource Leveling



Task Priorities



Transfer to *PERCEPTION*

This tutorial describes the process for using *Microsoft Project 2000* to plan and schedule shipyard production activities ("tasks").

This process includes sequencing tasks with all necessary inter-dependencies. What results is a project schedule developed using the Critical Path Method (CPM).

CPM develops not only the start and finish dates for each task, but also determines how much free time is available to each task to accommodate delays before these delays impact the overall project schedule.

Those tasks that have no free time, called float or slack time, are called critical.

This tutorial uses the new construction project of building a barge as an example of how to go about the planning and scheduling process.

The plan is based on modern hull block construction methods of work organization.

This includes the outfitting of hull blocks prior to erection, followed by a zone-oriented organization of the final on-board work efforts that ultimately lead to tests, trials and delivery.

An example of scheduling a Grand Block also is included.

Group Technology Manufacturing: This sample project does not include an example of group technology manufacturing activities, per se, although these methods also can be accommodated by the procedures described in the scheduling process.

Material Scheduling: While this sample does not address the planning and scheduling of material requirements, their schedules (via *PERCEPTION*) can be driven directly from the production schedules and the latter's Need Dates.

Cash Flow Scheduling: While not addressed by this sample project, *Microsoft Project 2000* also can model the cash flow requirements resulting from the project plan and schedule.

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.**

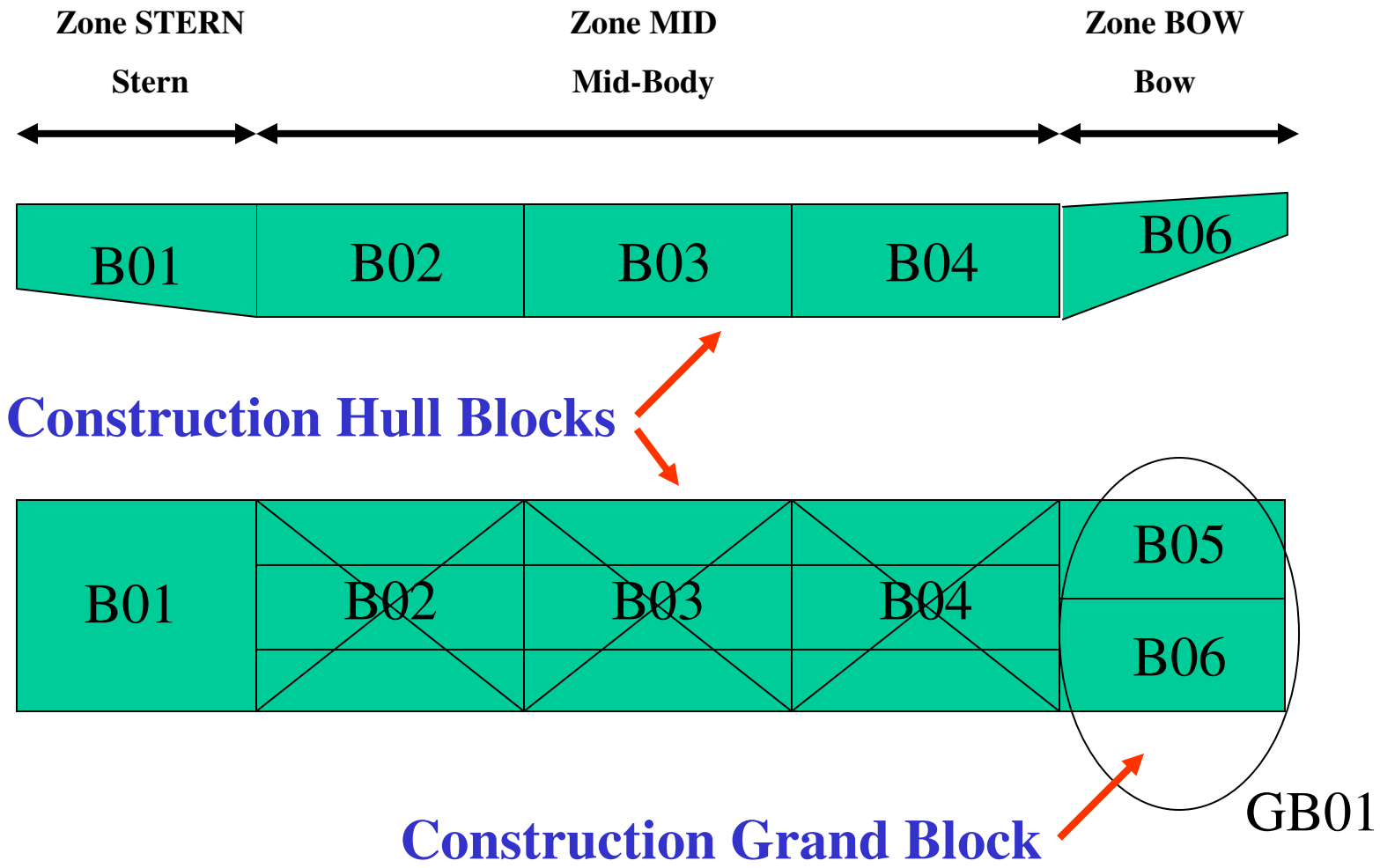
The Project WBS can be a combination of ship systems (SWBS) and interim products (PWBS).

Each type of WBS has its value in the development of the new build project.

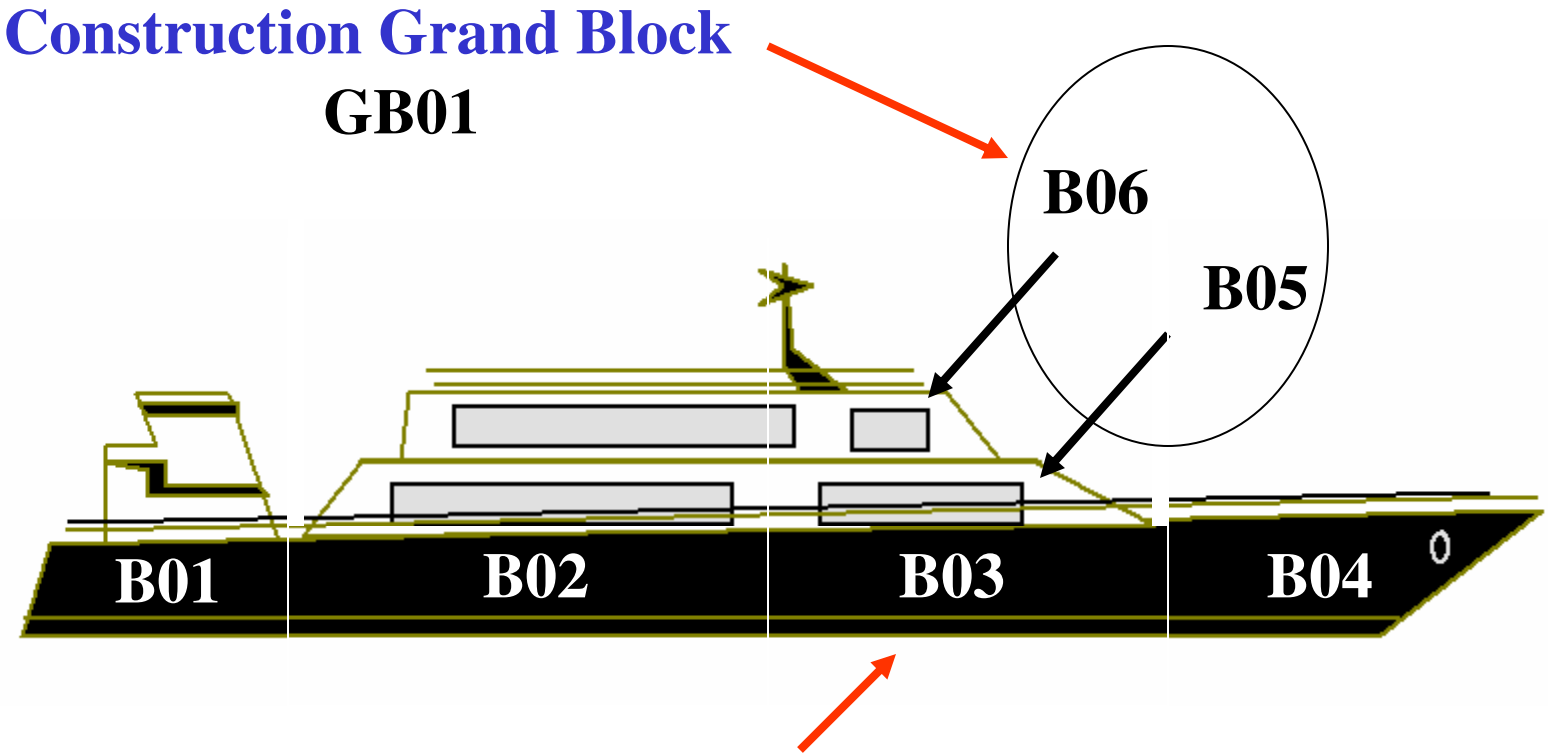
For this sample project, however, the plan will be based on the organization of work by interim products:

- **Manufactured Parts**
- **Sub-Assemblies**
- **Hull Blocks**
- **Hull Grand Blocks**
- **Ship Zones**

Sample New Build Barge Project



The same planning principles can apply to any ship construction project.



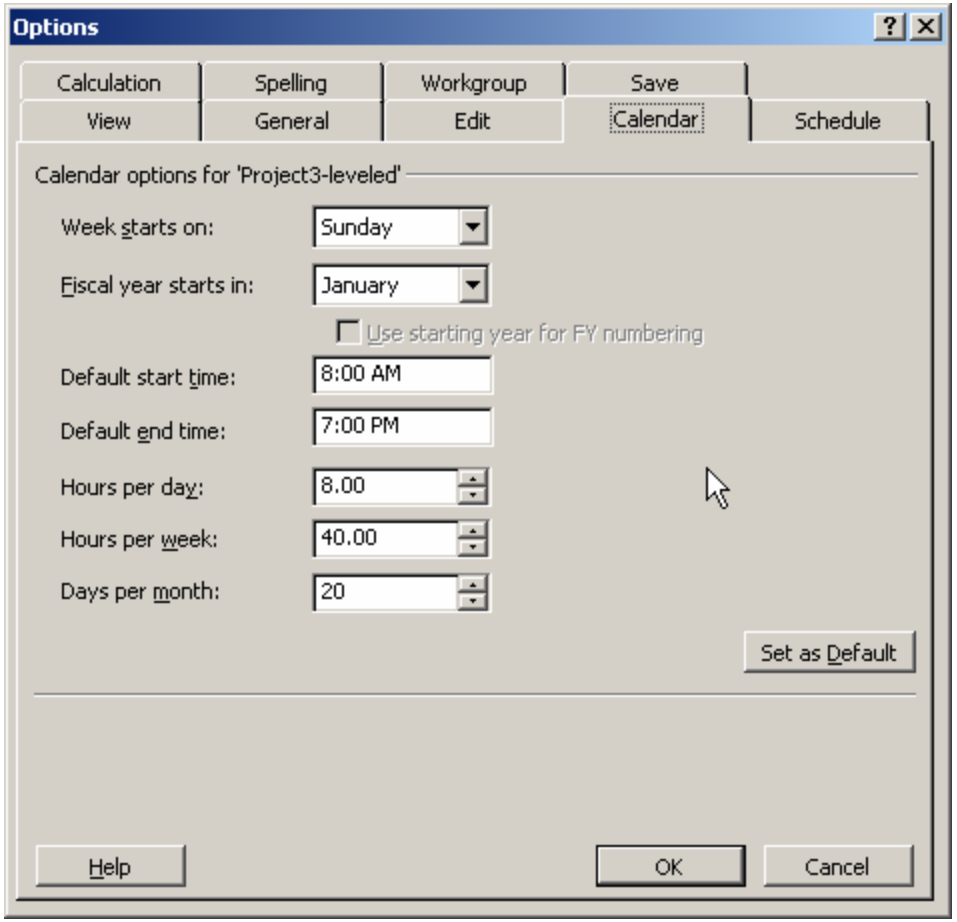
Setting Up Project Calendar

Before working on the project, select *Tools/Options* from the main menu.

The *Options* tab window will appear. There are many different options to select, but the following are most important:

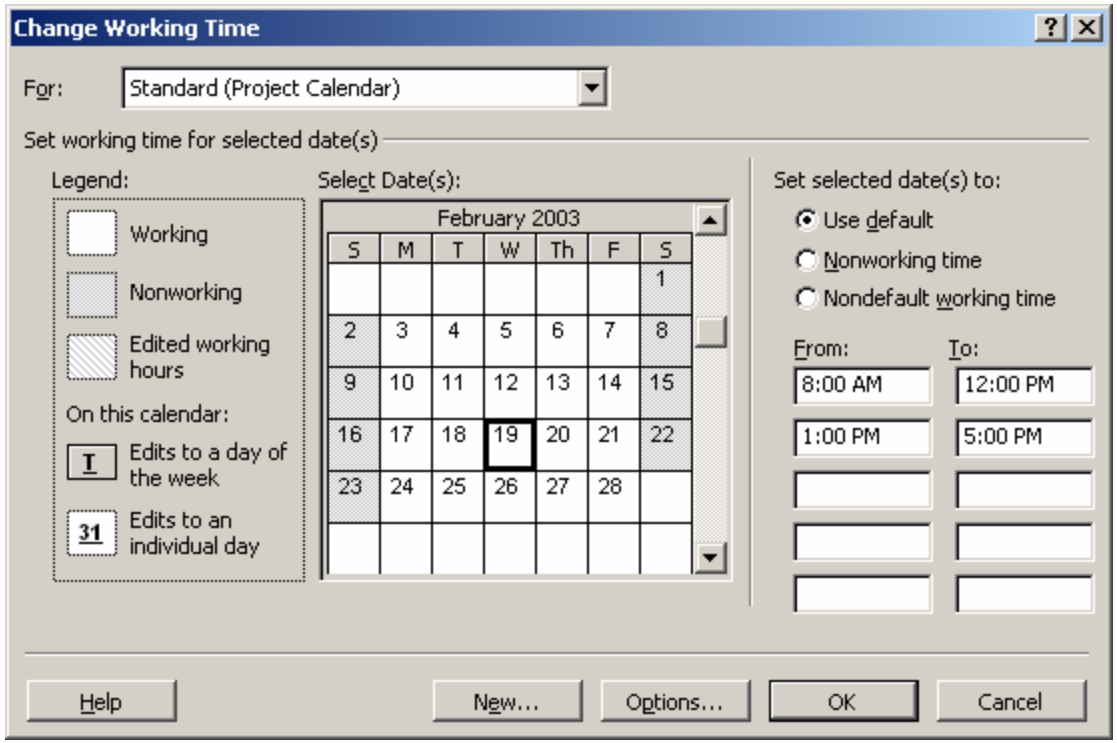
Select the *Calendar* tab and set the calendar and working week specifications for the project.

Microsoft Project allows the use of multiple calendars, but this one will be used as a default when project tasks are defined.

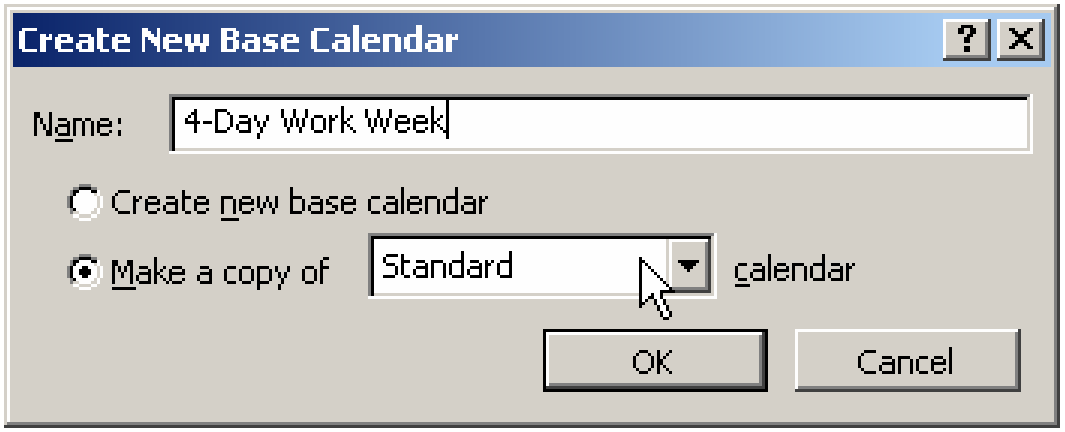


The standard *Microsoft Project* Calendar is a 5-day week, 8 hours per day.

To set up an alternate calendar for the project (for example, a 4-day work week, 10 hours per day, with specific holidays, click on *Tools/Changing Working Time* from the main menu.



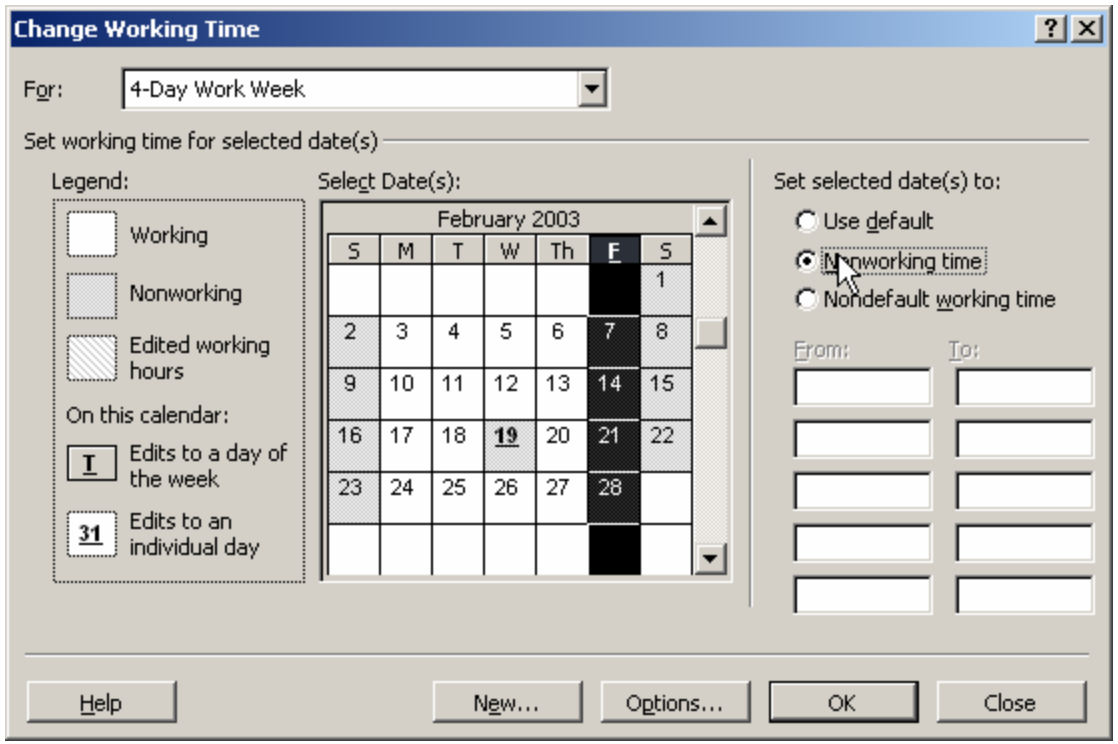
Click on the *New* button to define the alternative calendar for the project:



Click on the *Friday* title heading in the calendar display, then set selected dates to *Non-Working time*.

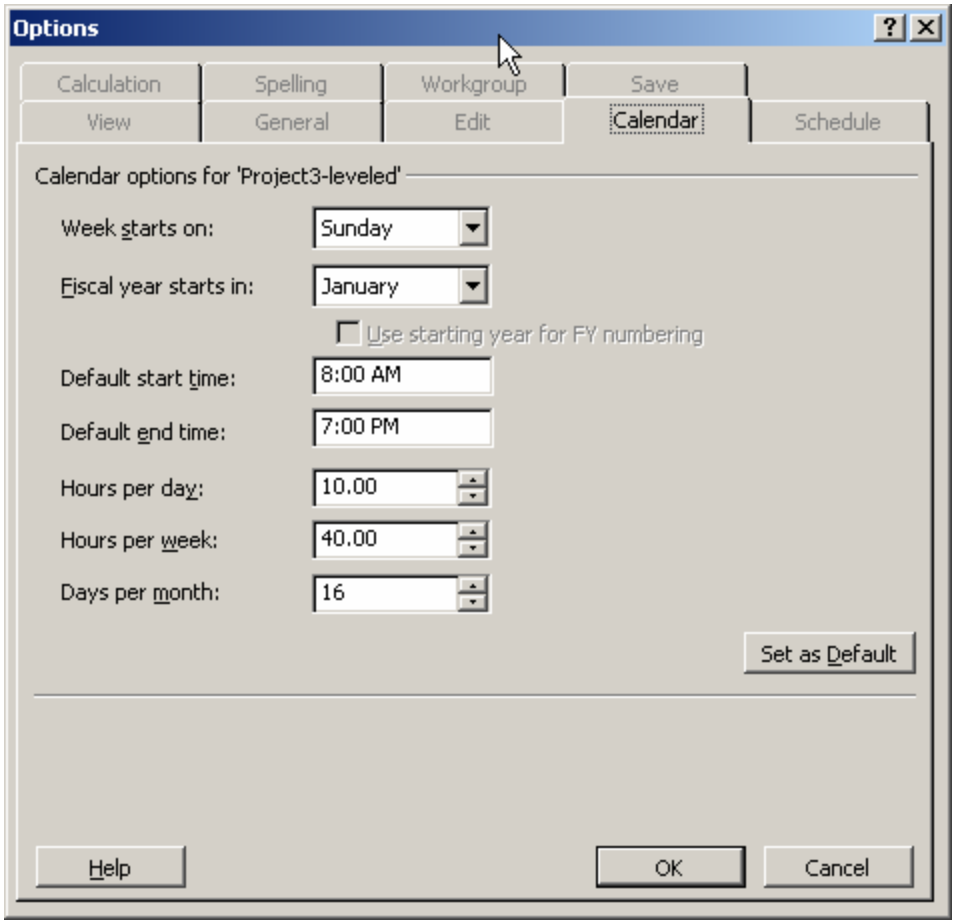
This procedure makes all Fridays non-working. However, other days including holidays can be set in similar fashion.

Finally, to set the number of hours per week, etc., click on the *Options* button.



Set the options parameters as required.

Click *OK* when finished.



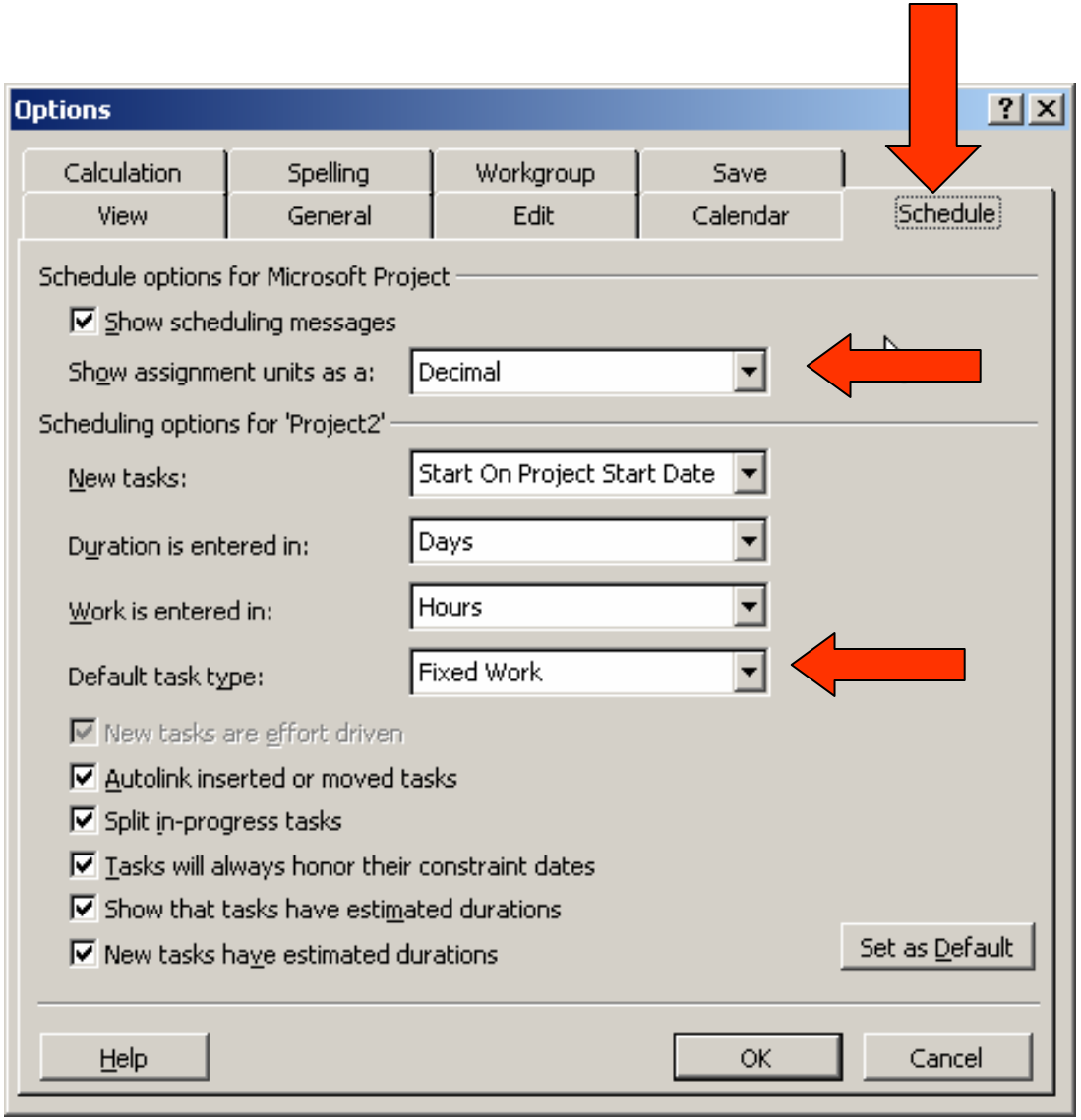
Setting Up Scheduling Options

Click on *Tools/Options* from the main menu.

When the Options window is displayed, click on the *Schedule* tab and make the following changes to the default specifications:

- ***Show (resource) assignment units as a* Decimal.**
- ***Default task type:* Fixed Work**

Click on the *Set as Default* button.



Showing the resource assignment units as decimals, rather than as percentages, means that resources will be allocated in terms of men, for example, and not as percentages of total available men.

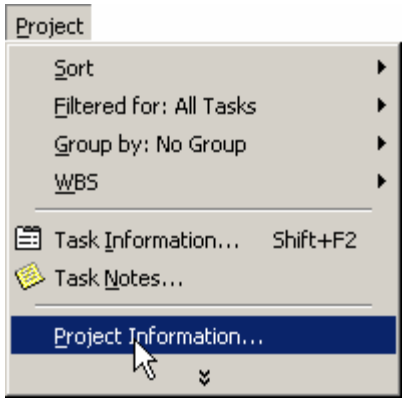
Default Task Type Options:

1. **Fix Duration:** The Duration stays constant regardless of either resource Units or Work effort changes. Change the Duration and the Work effort will change.
2. **Fixed Units:** The number of resource Units stays constant regardless if either Duration or Work effort changes. Change the resource units and the Duration will change.
3. **Fixed Work:** The Work effort stays constant regardless if either Duration or resource Units are changed. Change the Work and the Duration will change.

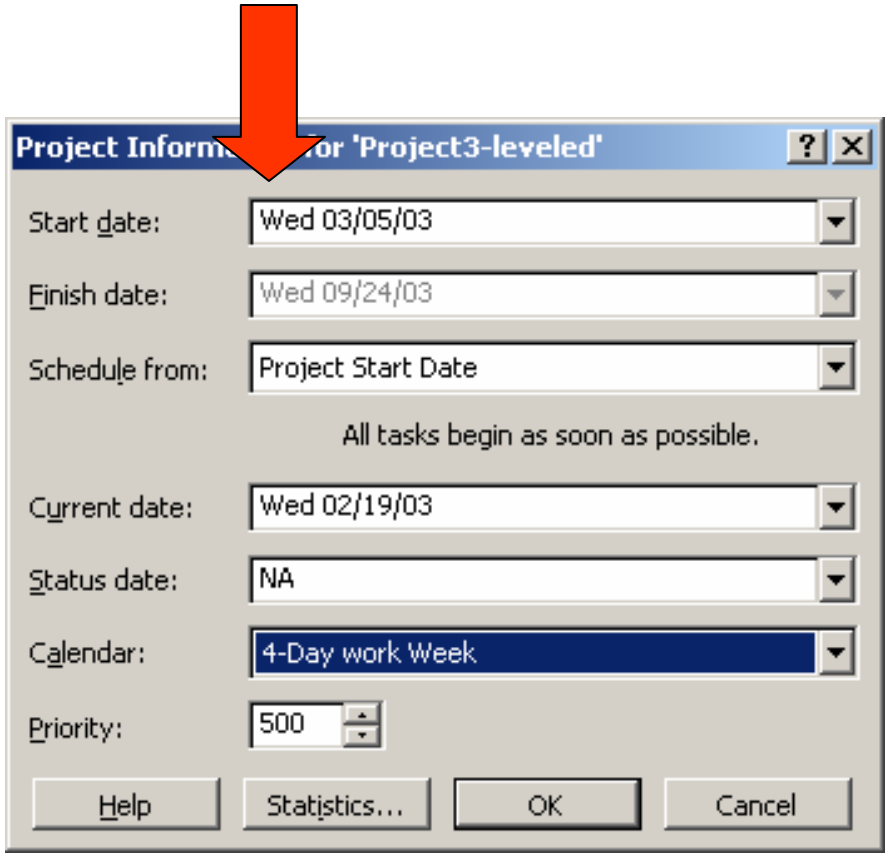
For production work, <u>Fixed Work</u> should be used. It means that regardless of how many people are assigned to do the job and regardless of the planned time duration, the scope of Work should remain the same.

Project Settings

To set the project start date, select *Project/Project Information* from the main menu.



The project information window will appear where the project start date or finish date can be entered.



- **Choose whether you want the project to be scheduled from the start date or the finish date.**
- **Enter the start date for a project to be scheduled from the start date.**
- **Enter the finish date for a project to be scheduled from the finish date.**
- **Specify which base calendar is to be used as the project calendar.**
- **Obtain overall project statistics for start and finish dates, duration, work, and cost.**

The following are details about the default base calendars in the *Calendar* list.

If you create additional base calendars, or if you modify the working times in the existing base calendars, these become available in the *Calendar* list as well.

Standard

The base calendar that has a standard work day and work week of Monday through Friday, 8:00 A.M. to 5:00 P.M., with 12:00 P.M. to 1:00 P.M. of nonworking time for a break.

24 Hours

The base calendar that has no nonworking time. All time, from Sunday through Saturday, 12:00 A.M. to 12:00 P.M., is set as working time.

Night Shift

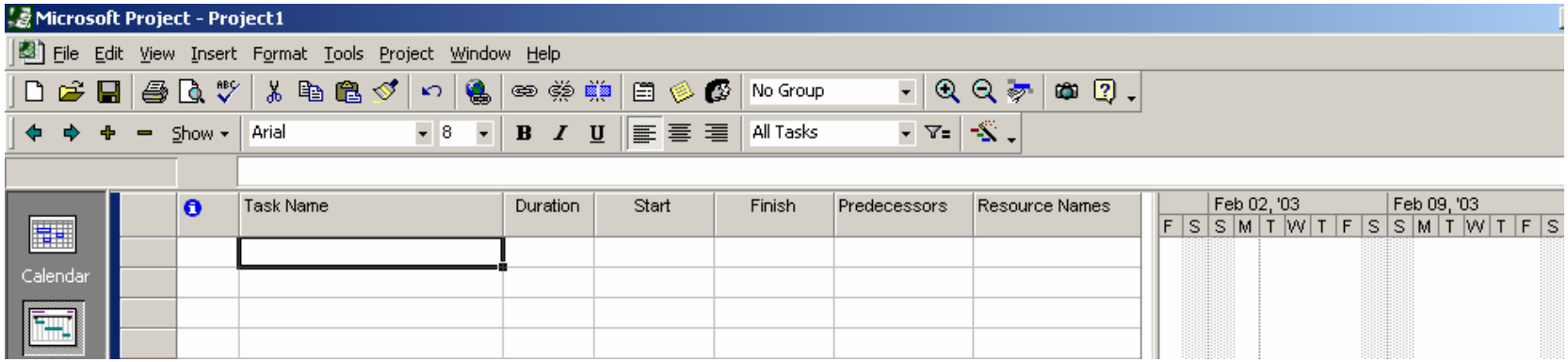
The base calendar that is set up for a graveyard shift. Working times are Monday night through Saturday morning, 11:00 P.M. to 8:00 A.M., with 3:00 A.M. to 4:00 A.M. of nonworking time for a break.

If an alternative calendar is to be used, select it from the drop-down list.

Click *OK* when the *Project Information* window is complete.

Set Up Project Task Worksheet Columns

The Gantt Chart view provides not only a graphical display of task schedules and interdependencies, but also columns of task information.

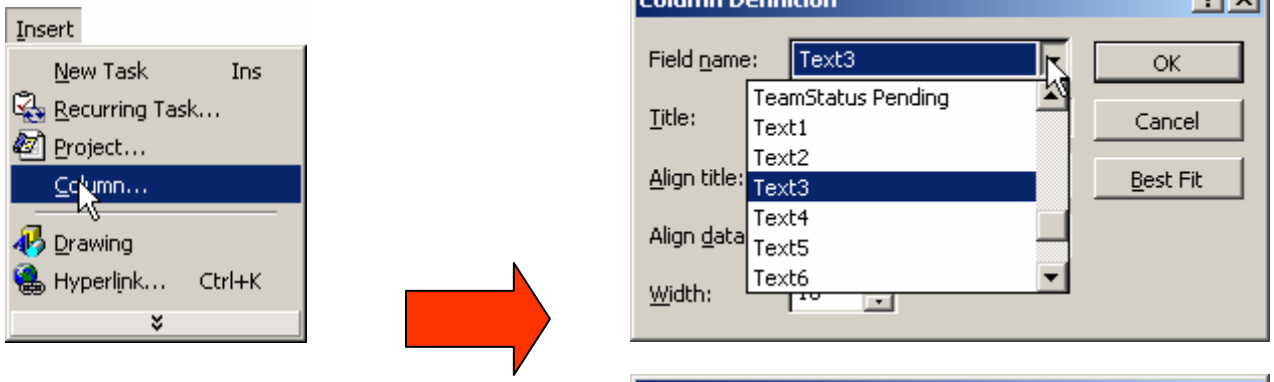


Standard Gantt chart columns

Additional columns will be required to integrate with *PERCEPTION*.

To create additional columns, click on the column header to the right of where you want to insert a new column.

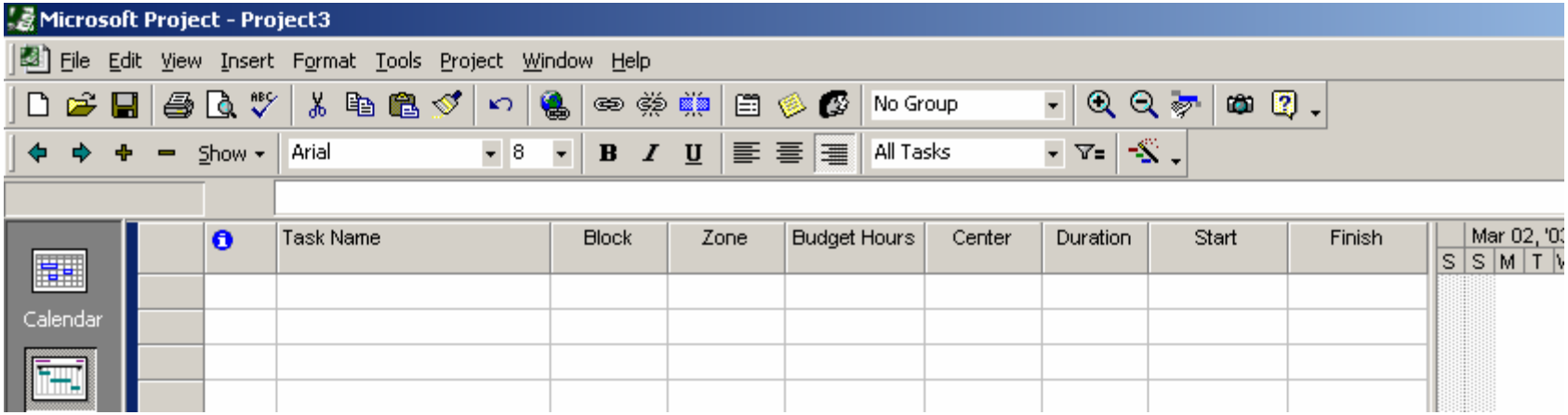
Click on *Insert/Column* on the main menu. The Column Definition window will appear.



Select the Field name from the drop-down list and enter your own Title. Click *OK* to finish.

Insert the following four (4) columns into the worksheet in order to the left of the default column "Duration"

"Field Name"	"Title"
Microsoft Project	*PERCEPTION*
Column Name	Column Name
Text7	Block
Text5	Zone
Work	Budget Hours
Text 15	Center

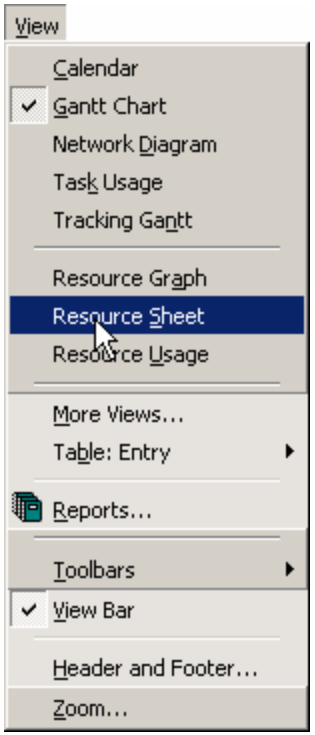


New columns inserted for Block, Zone, Budget Hours & Center.

Defining Resources

In order to refine project schedules so that they can be performed without exceeding the available supply of resources, the project resources must be defined.

Select *View/Resource Sheet* from the main menu.

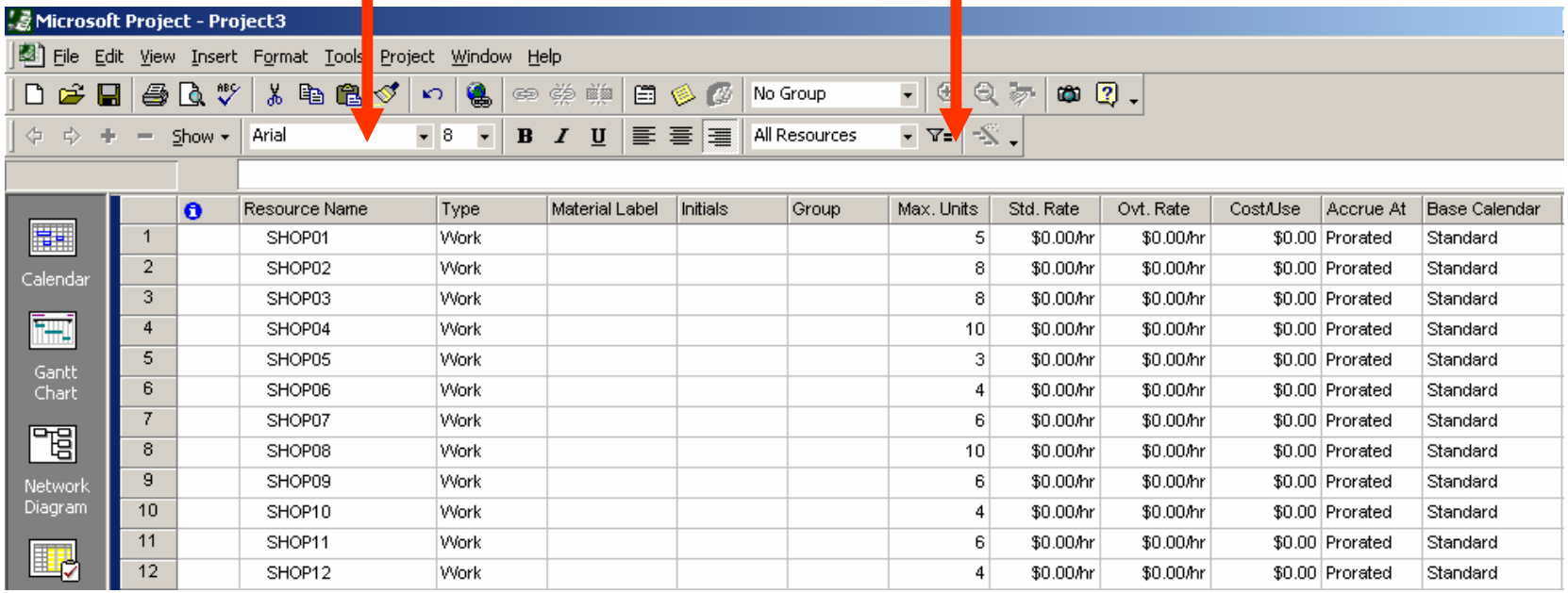


Define all resources with maximum available.

This sample sets up resource maximums (manpower) for each work center.

Work Center

Max. Men, Incl. Multiple Sites



	Resource Name	Type	Material Label	Initials	Group	Max. Units	Std. Rate	Ovt. Rate	Cost/Use	Accrue At	Base Calendar
1	SHOP01	Work				5	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
2	SHOP02	Work				8	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
3	SHOP03	Work				8	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
4	SHOP04	Work				10	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
5	SHOP05	Work				3	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
6	SHOP06	Work				4	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
7	SHOP07	Work				6	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
8	SHOP08	Work				10	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
9	SHOP09	Work				6	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
10	SHOP10	Work				4	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
11	SHOP11	Work				6	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
12	SHOP12	Work				4	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard

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.

However, this sample project is first developed in *Microsoft Excel* and the results copied and pasted into *Project*.

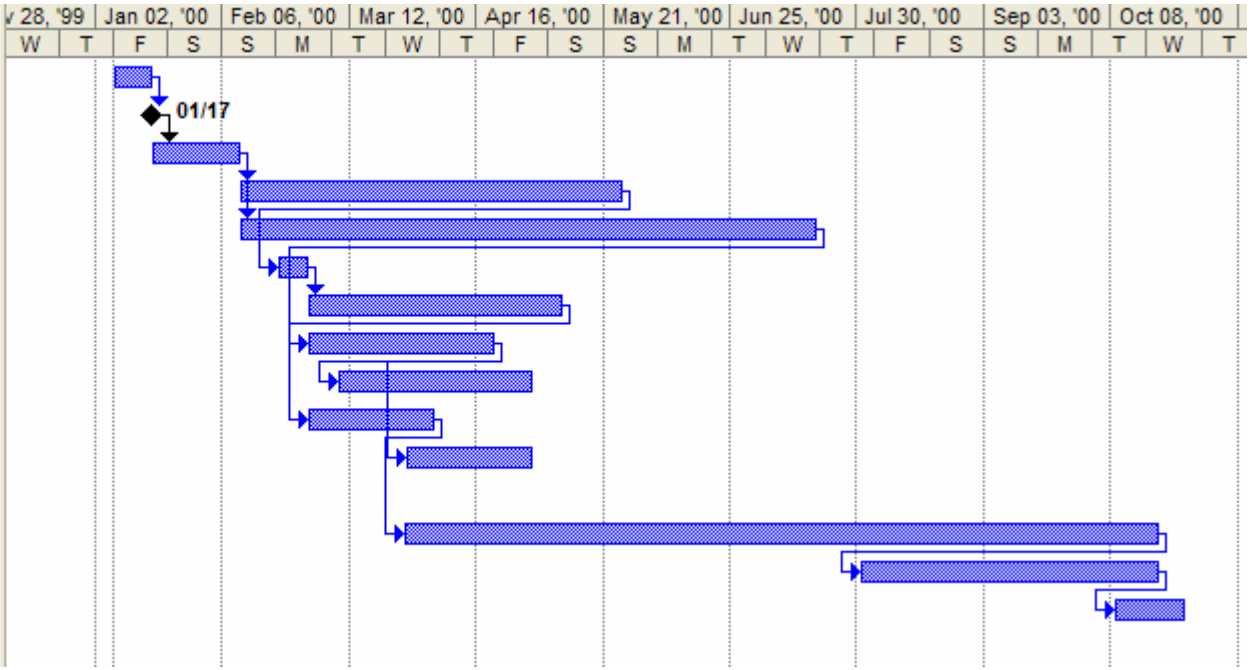
The reason for this approach is that each task must have its time duration identified in *Project*. *Excel* can be used to compute these durations from labor hours estimates (budgets) and estimate man loadings per task.

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 :

Task Name	Duration
Estimate	6.25 days
Contract Award	0 days
New Design	18.75 days
Detail Engineering	75 days
Planning	112.5 days
Drawing Lists	6.25 days
Drawing BOMs	50 days
Requisitions	37.5 days
Purchase Orders	37.5 days
Work Orders	25 days
Work Order Pallets	25 days
Hull Block Construction	150 days
Zone Outfit	60 days
Test & Trials	15 days



The following slides display the project tasks as set up in *Excel*.

Sample Hull Block Construction

	Block	Zone	Hours	Center	Days Duration	Average Men	Shifts	Tons	Total Hrs/Ton	Steel Hrs/Ton
Hull Block B01 - Stern	**B01**	**STERN**	**2,500**					**200**	**12.50**	**4.00**
Steel Prep	B01	STERN	150	SHOP01	2.34	4	2	200	0.75	
Steel Parts Fab	B01	STERN	700	SHOP02	5.47	8	2	200	3.50	
Block Sub-Assembly	B01	STERN	500	SHOP03	3.91	8	2	200	2.50	
Block Assembly	B01	STERN	900	SHOP04	9.38	6	2	200	4.50	
Block Prefit Hot	B01	STERN	25	SHOP05	0.78	2	2	5	5.00	
Block Blast & Paint	B01	STERN	200	SHOP06	2.08	6	2	200	1.00	
Block Outfit	B01	STERN	25	SHOP07	0.52	3	2	10	2.50	
Hull Block B02 - Mid-Body Tank	**B02**	**MID**	**3,835**					**150**	**25.57**	**18.32**
Steel Prep	B02	MID	113	SHOP01	1.76	4	2	150	0.75	
Steel Parts Fab	B02	MID	225	SHOP02	1.76	8	2	150	1.50	
Block Sub-Assembly	B02	MID	525	SHOP03	4.10	8	2	150	3.50	
Block Assembly	B02	MID	1,275	SHOP04	13.28	6	2	150	8.50	
Block Prefit Hot	B02	MID	75	SHOP05	2.34	2	2	15	5.00	
Block Blast & Paint	B02	MID	150	SHOP06	1.56	6	2	150	1.00	
Block Outfit	B02	MID	10	SHOP07	0.21	3	2	8	1.25	
Block Erection - Tack & Fit	B02	MID	938	SHOP08	3.91	15	2	150	6.25	
Block Erection Welding	B02	MID	525	SHOP08	8.20	4	2	150	3.50	
Hull Block B03 - Mid-Body Tank	**B03**	**MID**	**3,835**					**150**	**25.57**	**18.32**
Steel Prep	B03	MID	113	SHOP01	1.76	4	2	150	0.75	
Steel Parts Fab	B03	MID	225	SHOP02	1.76	8	2	150	1.50	
Block Sub-Assembly	B03	MID	525	SHOP03	4.10	8	2	150	3.50	
Block Assembly	B03	MID	1,275	SHOP04	13.28	6	2	150	8.50	
Block Prefit Hot	B03	MID	75	SHOP05	2.34	2	2	15	5.00	
Block Blast & Paint	B03	MID	150	SHOP06	1.56	6	2	150	1.00	
Block Outfit	B03	MID	10	SHOP07	0.21	3	2	8	1.25	
Block Erection - Tack & Fit	B03	MID	938	SHOP08	3.91	15	2	150	6.25	
Block Erection Welding	B03	MID	525	SHOP08	8.20	4	2	150	3.50	

Sample Hull Block Construction

	Block	Zone	Hours	Center	Days Duration	Average Men	Shifts	Tons	Total Hrs/Ton	Steel Hrs/Ton
Hull Block B04 - Mid-Body Tank	**B04**	**MID**	**3,835**					**150**	**25.57**	**18.32**
Steel Prep	B04	MID	113	SHOP01	1.76	4	2	150	0.75	
Steel Parts Fab	B04	MID	225	SHOP02	1.76	8	2	150	1.50	
Block Sub-Assembly	B04	MID	525	SHOP03	4.10	8	2	150	3.50	
Block Assembly	B04	MID	1,275	SHOP04	13.28	6	2	150	8.50	
Block Prefit Hot	B04	MID	75	SHOP05	2.34	2	2	15	5.00	
Block Blast & Paint	B04	MID	150	SHOP06	1.56	6	2	150	1.00	
Block Outfit	B04	MID	10	SHOP07	0.21	3	2	8	1.25	
Block Erection - Tack & Fit	B04	MID	938	SHOP08	3.91	15	2	150	6.25	
Block Erection Welding	B04	MID	525	SHOP08	8.20	4	2	150	3.50	
Hull Block B05 - Bow	**B05**	**BOW**	**1,228**					**100**	**12.28**	**4.78**
Steel Prep	B05	BOW	75	SHOP01	1.17	4	2	100	0.75	
Steel Parts Fab	B05	BOW	150	SHOP02	1.17	8	2	100	1.50	
Block Sub-Assembly	B05	BOW	50	SHOP03	0.39	8	2	100	0.50	
Block Assembly	B05	BOW	800	SHOP04	8.33	6	2	100	8.00	
Block Prefit Hot	B05	BOW	40	SHOP05	1.25	2	2	10	4.00	
Block Blast & Paint	B05	BOW	100	SHOP06	1.04	6	2	100	1.00	
Block Outfit	B05	BOW	13	SHOP07	0.26	3	2	5	2.50	
Hull Block B06 - Bow	**B05**	**BOW**	**2,103**					**100**	**21.03**	**13.53**
Steel Prep	B05	BOW	75	SHOP01	1.17	4	2	100	0.75	
Steel Parts Fab	B05	BOW	150	SHOP02	1.17	8	2	100	1.50	
Block Sub-Assembly	B05	BOW	50	SHOP03	0.39	8	2	100	0.50	
Block Assembly	B05	BOW	800	SHOP04	8.33	6	2	100	8.00	
Block Prefit Hot	B05	BOW	40	SHOP05	1.25	2	2	10	4.00	
Block Blast & Paint	B05	BOW	100	SHOP06	1.04	6	2	100	1.00	
Block Outfit	B05	BOW	13	SHOP07	0.26	3	2	5	2.50	
Block Erection - Tack & Fit	B05	BOW	725	SHOP08	3.02	15	2	100	7.25	
Block Erection Welding	B05	BOW	150	SHOP08	2.34	4	2	100	1.50	

Sample Hull Block Construction

	Block	Zone	Hours	Center	Days Duration	Average Men	Shifts	Tons	Total Hrs/Ton	Steel Hrs/Ton
Hull Grand Block GB01	**GB01**	**BOW**	**1,768**					**200**	**8.84**	**6.34**
Block Outfit	GB01	BOW	18	SHOP07	0.36	3	2	7	2.50	
Block Erection - Tack & Fit	GB01	BOW	1,450	SHOP08	6.04	15	2	200	7.25	
Block Erection Welding	GB01	BOW	300	SHOP08	4.69	4	2	200	1.50	
On-Board Outfit		SW	250	SHOP09	3.91	4	2			
On-Board Paint		SW	200	SHOP10	6.25	2	2			
Launch & Docking		SW	250	SHOP11	1.56	10	2			
Tests & Trials		SW	500	SHOP12	3.91	8	2			
Delivery (Milestone)		SW			0.00					

The tasks are identified by ship zone and by shipyard work center.

Ship Zones

Zone	Zone Description
STERN	Stern
MID	Mid-Body
BOW	Bow
SW	Ship-Wide

Center	Center Description
SHOP01	Steel Prep - Wheelabrator & Trim
SHOP02	Steel Parts Fab - NC Plate Cutting
SHOP03	Block Sub-Assembly - Panel Line
SHOP04	Block Assembly
SHOP05	Block Prefit Hot - Pipe, Rails, Grates, Foundations
SHOP06	Block Blast & Paint
SHOP07	Block Outfit - Pumps, Valves, Electrical Trays
SHOP08	Block Erection - Tack & Fit
SHOP08	Block Erection Welding
SHOP09	On-Board Outfit
SHOP10	On-Board Paint
SHOP11	Launch & Docking
SHOP12	Tests & Trials

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:

Stage of Construction	Hrs/Ton
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,

Labor Hours = Tons x (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**

From this, the days duration can be determined as an *Excel* calculation:

Days Duration = Labor Hours / (8 Hours/Day) / (Shifts/Day)

Copying *Excel* Tasks To *Project*

After the basic schedule data has been developed in *Excel*, it must be copied into *Project*.

Special Note: The column order of the *Excel* data must be the same column order set up in *Project*.

In *Excel*, highlight the data to copy into *Project*. click on the *Copy* button  on the *Excel* tool bar.

Microsoft Excel - Sample Hull Block Construction.xls

File Edit View Insert Format Tools Data Window Help

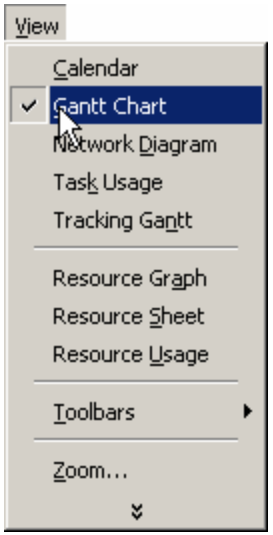
Arial 10 B I U

A5 =CONCATENATE(M5," ",B5," ",C5)

	A	B	C	D	E	F	G	H	I	J	K
1	**Sample Hull Block Construction**										
2						Days	Average			Total	Steel
3		Block	Zone	Hours	Center	Duration	Men	Shifts	Tons	Hrs/Ton	Hrs/Ton
4	**Hull Block B01 - Stern**	**B01**	**STERN**	2,500					**200**	12.50	**4.00**
5	*Steel Prep B01 STERN*	*B01*	*STERN*	*150*	*SHOP01*	*2.34*	4	2	200	0.75	
6	*Steel Parts Fab B01 STERN*	*B01*	*STERN*	*700*	*SHOP02*	*5.47*	8	2	200	3.50	
7	*Block Sub-Assembly B01 STERN*	*B01*	*STERN*	*500*	*SHOP03*	*3.91*	8	2	200	2.50	
8	*Block Assembly B01 STERN*	*B01*	*STERN*	*900*	*SHOP04*	*9.38*	6	2	200	4.50	
9	*Block Prefit Hot B01 STERN*	*B01*	*STERN*	*25*	*SHOP05*	*0.78*	2	2	5	5.00	
10	*Block Blast & Paint B01 STERN*	*B01*	*STERN*	*200*	*SHOP06*	*2.08*	6	2	200	1.00	
11	*Block Outfit B01 STERN*	*B01*	*STERN*	*25*	*SHOP07*	*0.52*	3	2	10	2.50	
12											
13	**Hull Block B02 - Mid-Body Tank**	**B02**	**MID**	3,835					**150**	25.57	**18.32**
14	Steel Prep B02 MID	B02	MID	113	SHOP01	1.76	4	2	150	0.75	
15	Steel Parts Fab B02 MID	B02	MID	225	SHOP02	1.76	8	2	150	1.50	
16	Block Sub-Assembly B02 MID	B02	MID	525	SHOP03	4.10	8	2	150	3.50	
17	Block Assembly B02 MID	B02	MID	1,275	SHOP04	13.28	6	2	150	8.50	
18	Block Prefit Hot B02 MID	B02	MID	75	SHOP05	2.34	2	2	15	5.00	
19	Block Blast & Paint B02 MID	B02	MID	150	SHOP06	1.56	6	2	150	1.00	
20	Block Outfit B02 MID	B02	MID	10	SHOP07	0.21	3	2	8	1.25	
21	Block Erection - Tack & Fit B02 MI	B02	MID	938	SHOP08	3.91	15	2	150	6.25	
22	Block Erection Welding B02 MID	B02	MID	525	SHOP08	8.20	4	2	150	3.50	

Re-open *Microsoft Project* and open the Gantt Chart worksheet.

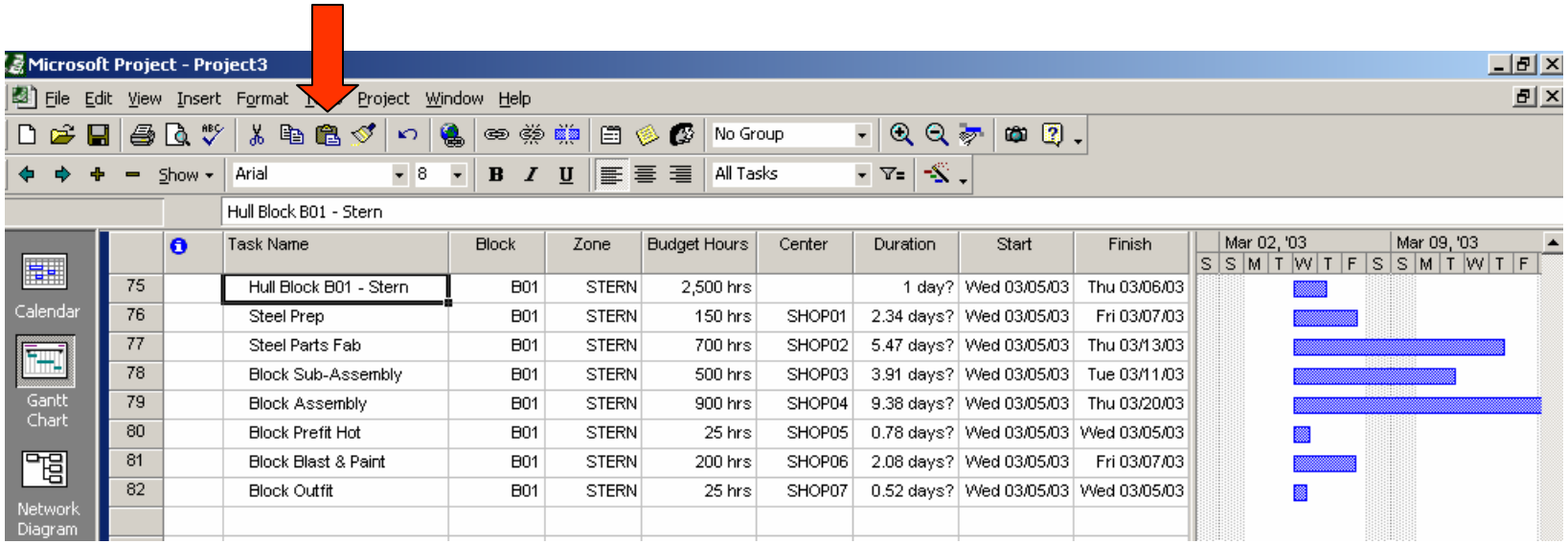
Select *View/Gantt Chart* from the main menu.



In *Project*, click on the upper left corner of columns where the data is to be copied (Task Name).

Then click on the *Paste* button  in the *Project* tool bar.

The selected tasks will be put into *Project* directly.

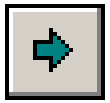


	Task Name	Block	Zone	Budget Hours	Center	Duration	Start	Finish
75	Hull Block B01 - Stern	B01	STERN	2,500 hrs		1 day?	Wed 03/05/03	Thu 03/06/03
76	Steel Prep	B01	STERN	150 hrs	SHOP01	2.34 days?	Wed 03/05/03	Fri 03/07/03
77	Steel Parts Fab	B01	STERN	700 hrs	SHOP02	5.47 days?	Wed 03/05/03	Thu 03/13/03
78	Block Sub-Assembly	B01	STERN	500 hrs	SHOP03	3.91 days?	Wed 03/05/03	Tue 03/11/03
79	Block Assembly	B01	STERN	900 hrs	SHOP04	9.38 days?	Wed 03/05/03	Thu 03/20/03
80	Block Prefit Hot	B01	STERN	25 hrs	SHOP05	0.78 days?	Wed 03/05/03	Wed 03/05/03
81	Block Blast & Paint	B01	STERN	200 hrs	SHOP06	2.08 days?	Wed 03/05/03	Fri 03/07/03
82	Block Outfit	B01	STERN	25 hrs	SHOP07	0.52 days?	Wed 03/05/03	Wed 03/05/03

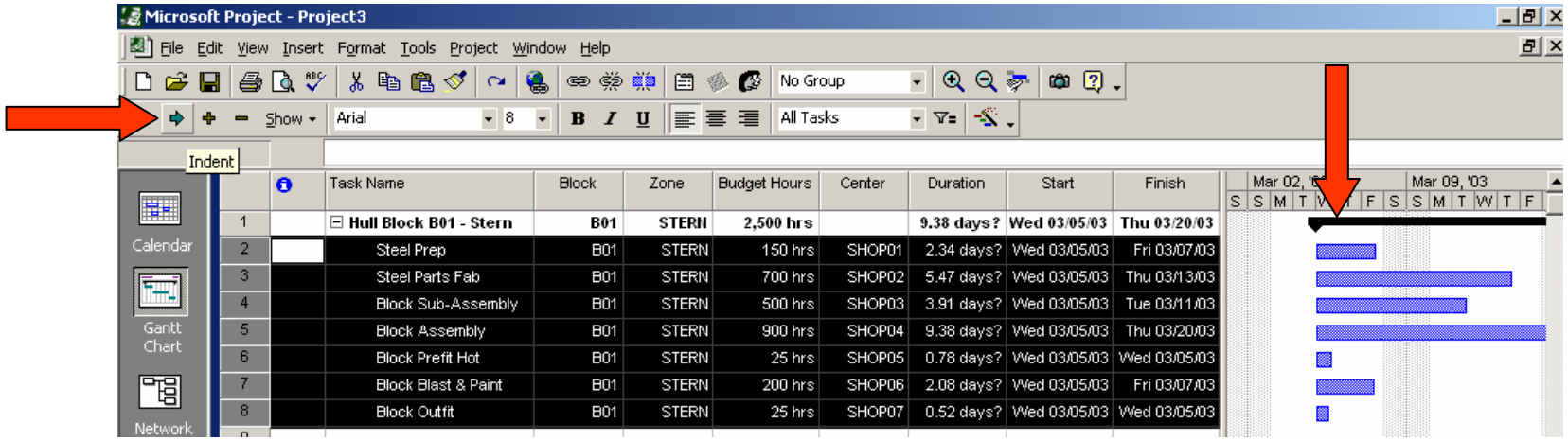
Tasks copied from *Excel* initially will have the same start date. Their finish dates will vary depending on their days durations.

Summary Tasks

In this example, the top row of block data is a summary of the detail breakdown of block tasks.

Highlight all of the block tasks below the block summary row and click on the *Indent* button  **on the tool bar.**

The summary row will turn bold and its schedule bar will be displayed in color black and span the overall duration of the block tasks.



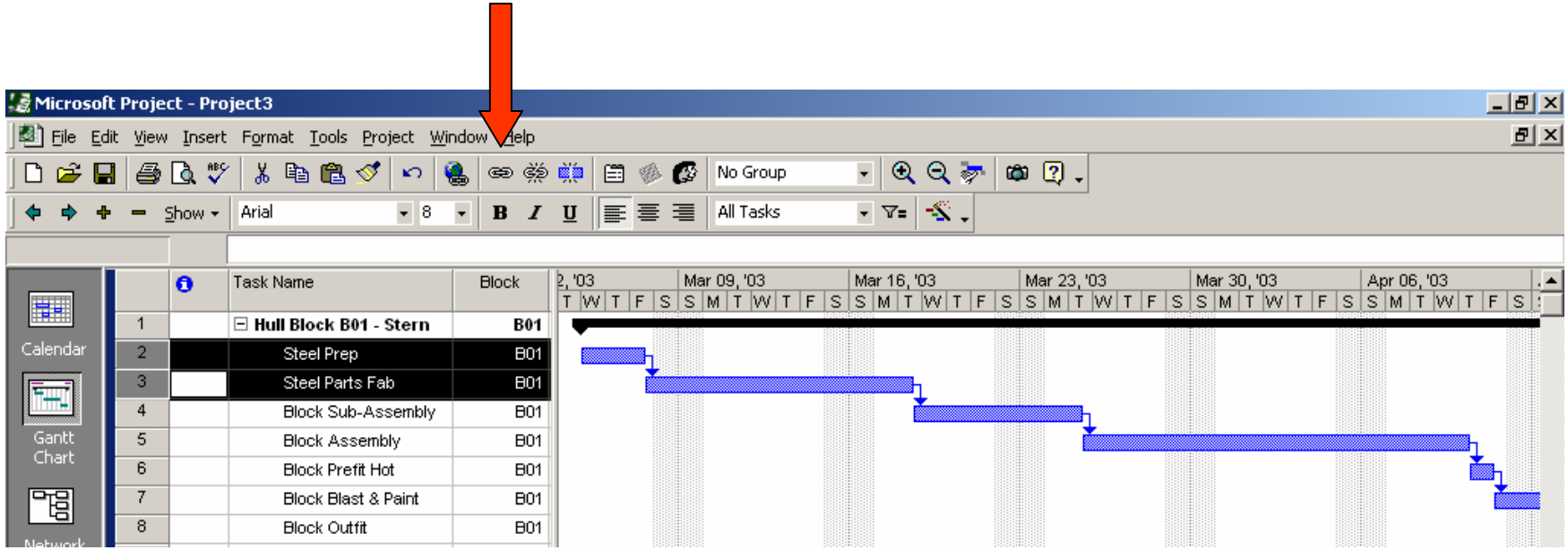
Sequencing Tasks

Tasks copied from *Excel* initially will have the same start date. Their finish dates will vary depending on their days durations.

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.

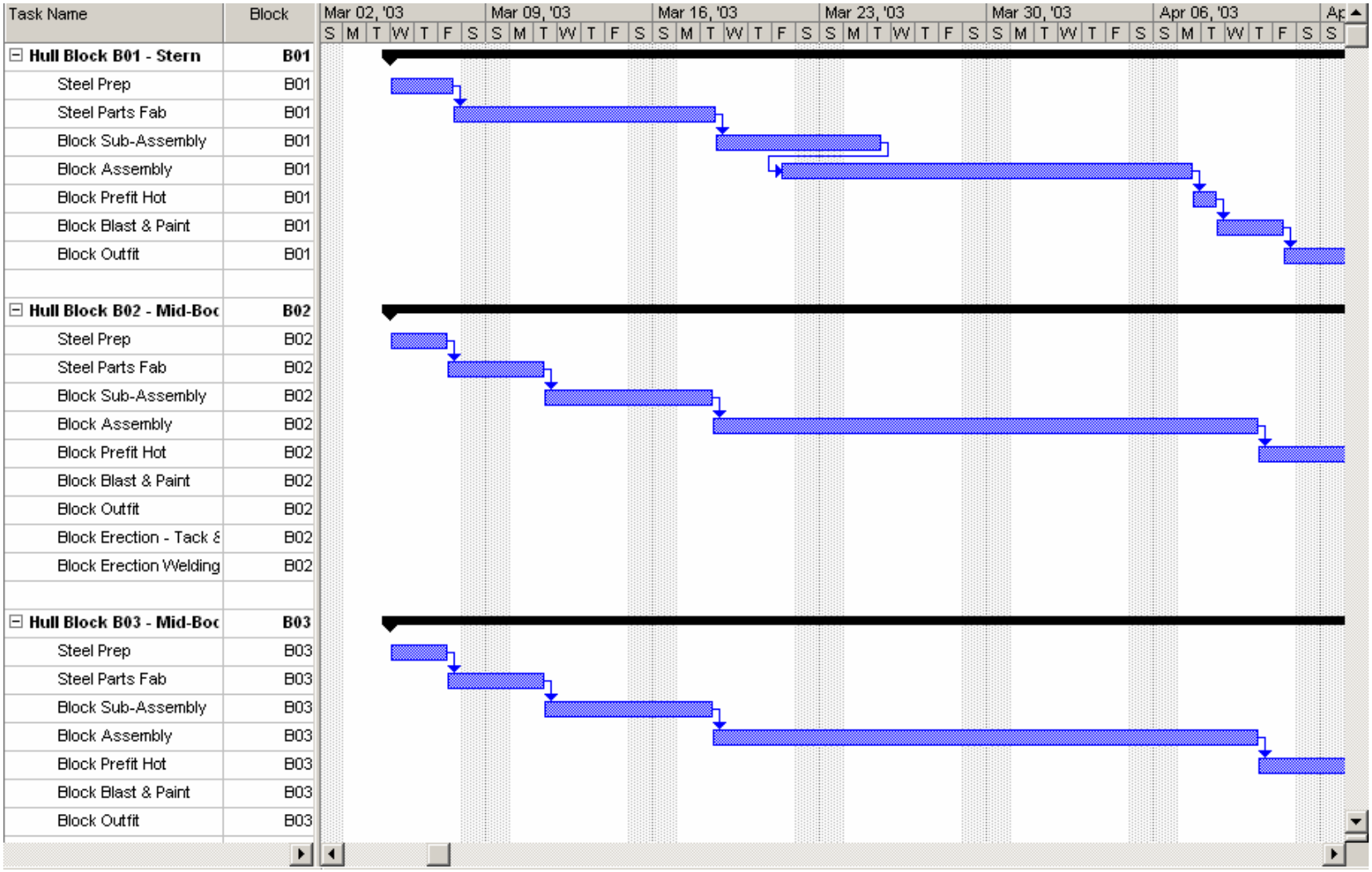
To link tasks, highlight first the preceding task, then highlight the succeeding task and click on the *Link Tasks* button on the tool bar.



***Project* will link the two tasks in predecessor-successor order.**

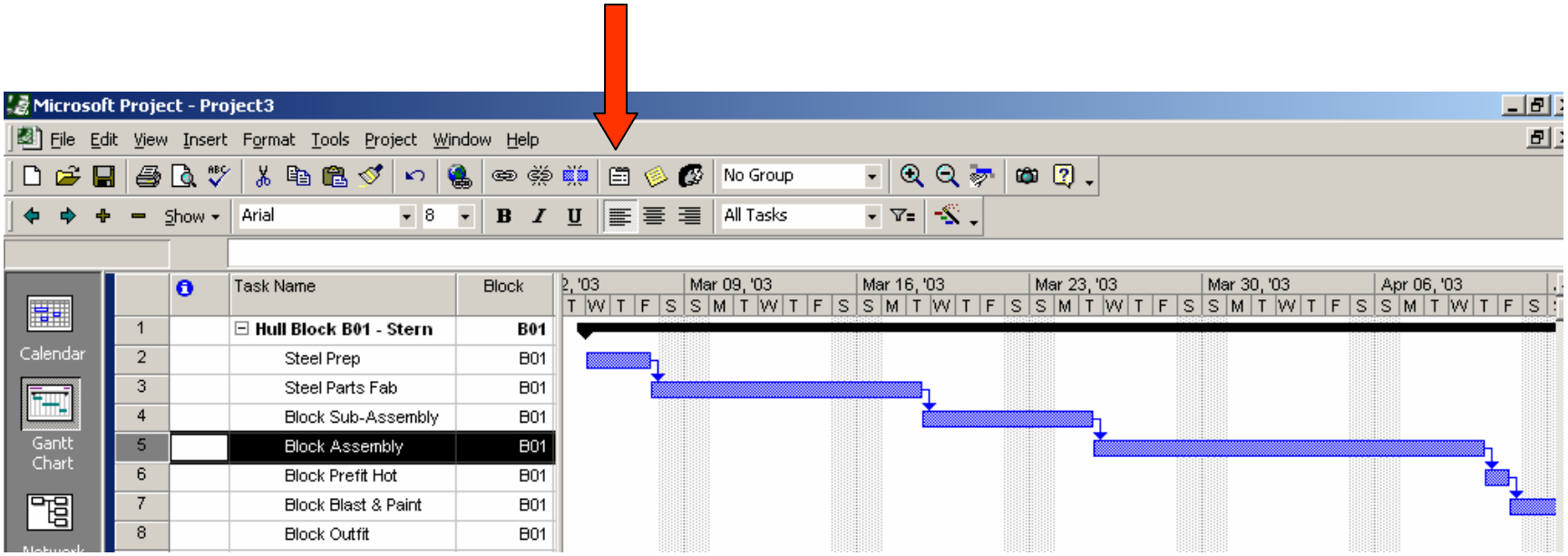
Link all tasks as they should occur in time sequence.

Sequence tasks for all blocks



Using Lag and Lead

If a link needs to be adjusted to account for either lead or lag, highlight the task then click on the *Task Information* button on the tool bar.

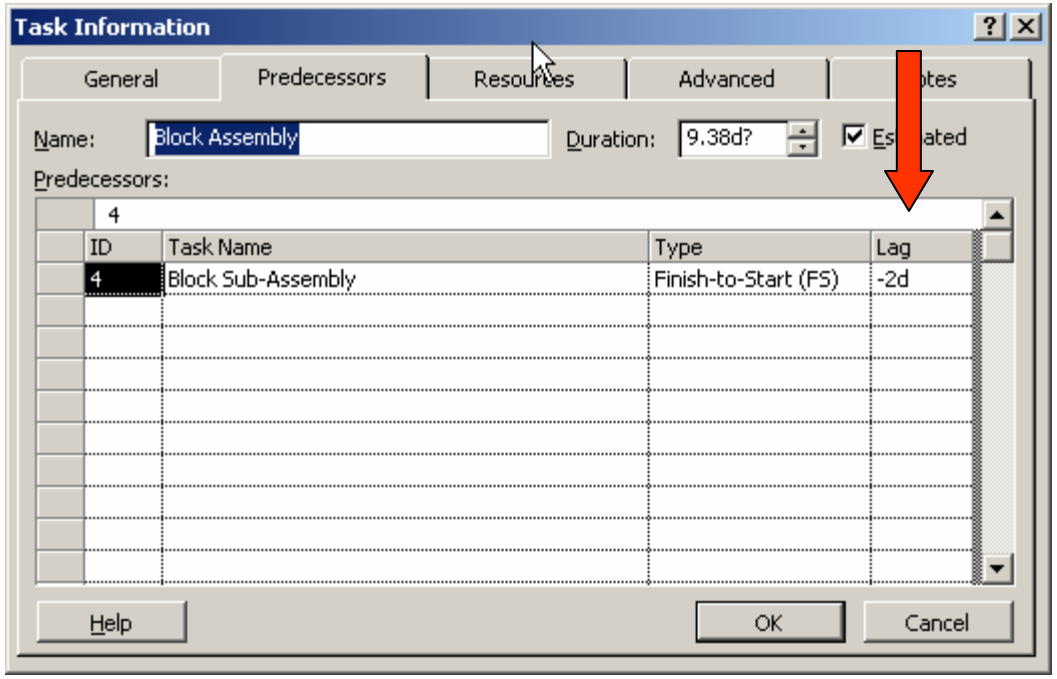


Lag means that there is a specified amount of time that must pass before the succeeding task can start.

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

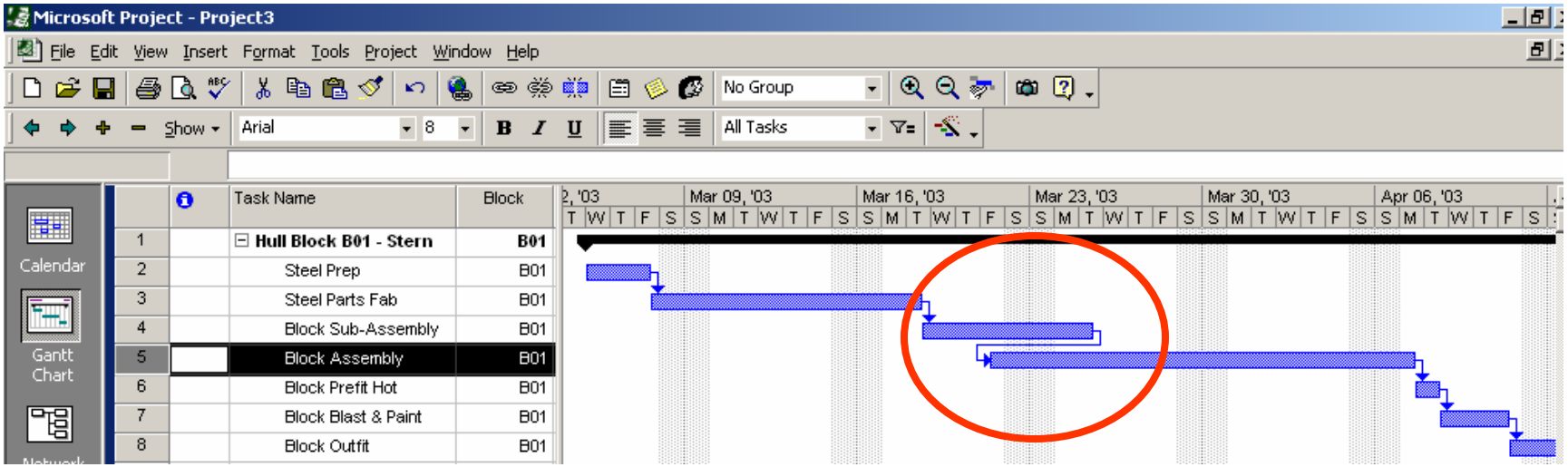
When the Task Information window appears, click on the *Predecessors* tab.

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



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

Project will respond by applying the lead or lag to the task.

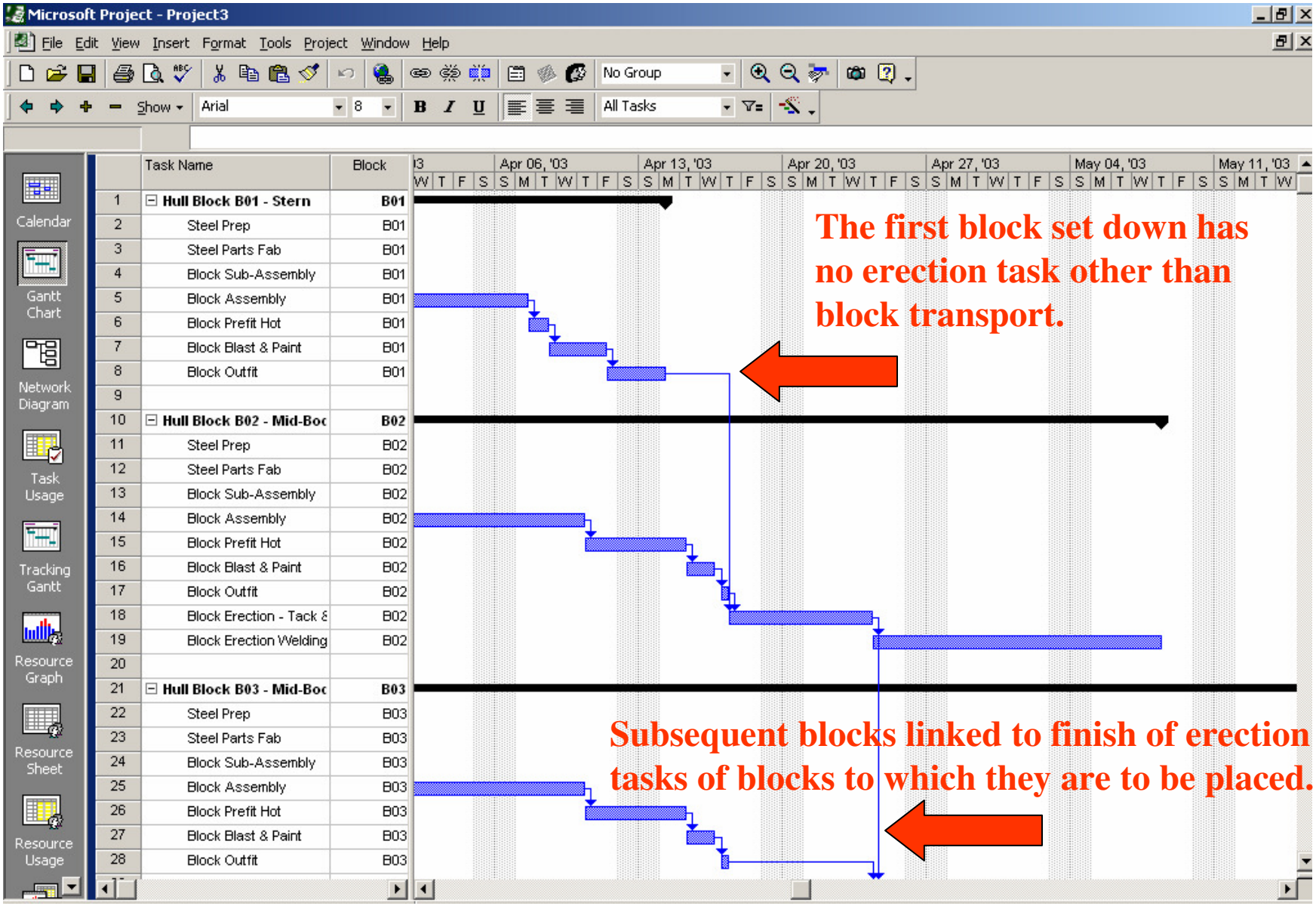


Defining Erection Sequence

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.**


Microsoft Project - Project3
File Edit View Insert Format Tools Project Window Help
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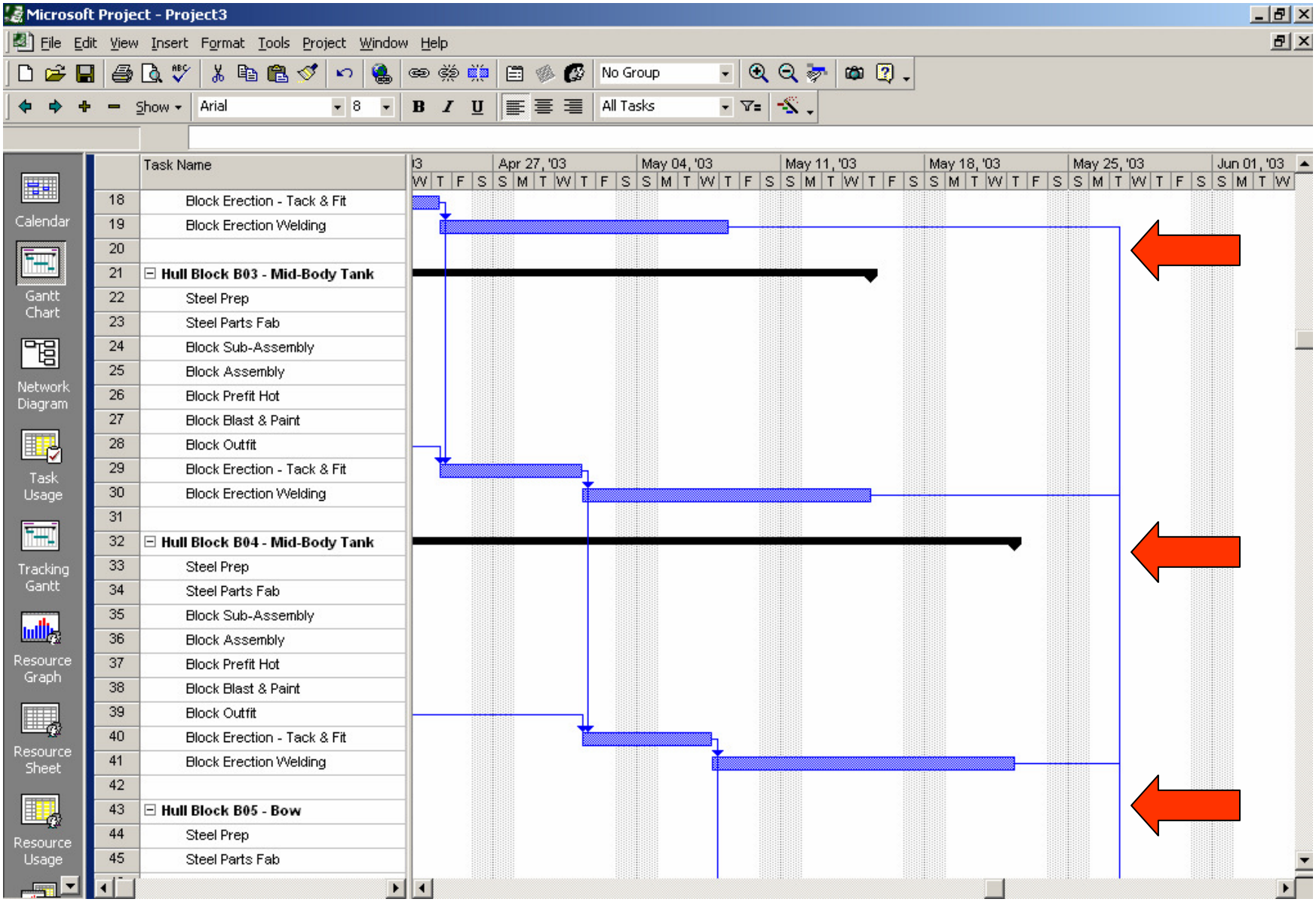
Show Arial 8 All Tasks
Calendar
Gantt Chart
Network Diagram
Task Usage
Tracking Gantt
Resource Graph
Resource Sheet
Resource Usage
Task Name
Block
Apr 06, '03
Apr 13, '03
Apr 20, '03
Apr 27, '03
May 04, '03
May 11, '03
1 Hull Block B01 - Stern B01
2 Steel Prep B01
3 Steel Parts Fab B01
4 Block Sub-Assembly B01
5 Block Assembly B01
6 Block Prefit Hot B01
7 Block Blast & Paint B01
8 Block Outfit B01
9
10 Hull Block B02 - Mid-Boc B02
11 Steel Prep B02
12 Steel Parts Fab B02
13 Block Sub-Assembly B02
14 Block Assembly B02
15 Block Prefit Hot B02
16 Block Blast & Paint B02
17 Block Outfit B02
18 Block Erection - Tack & B02
19 Block Erection Welding B02
20
21 Hull Block B03 - Mid-Boc B03
22 Steel Prep B03
23 Steel Parts Fab B03
24 Block Sub-Assembly B03
25 Block Assembly B03
26 Block Prefit Hot B03
27 Block Blast & Paint B03
28 Block Outfit B03
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.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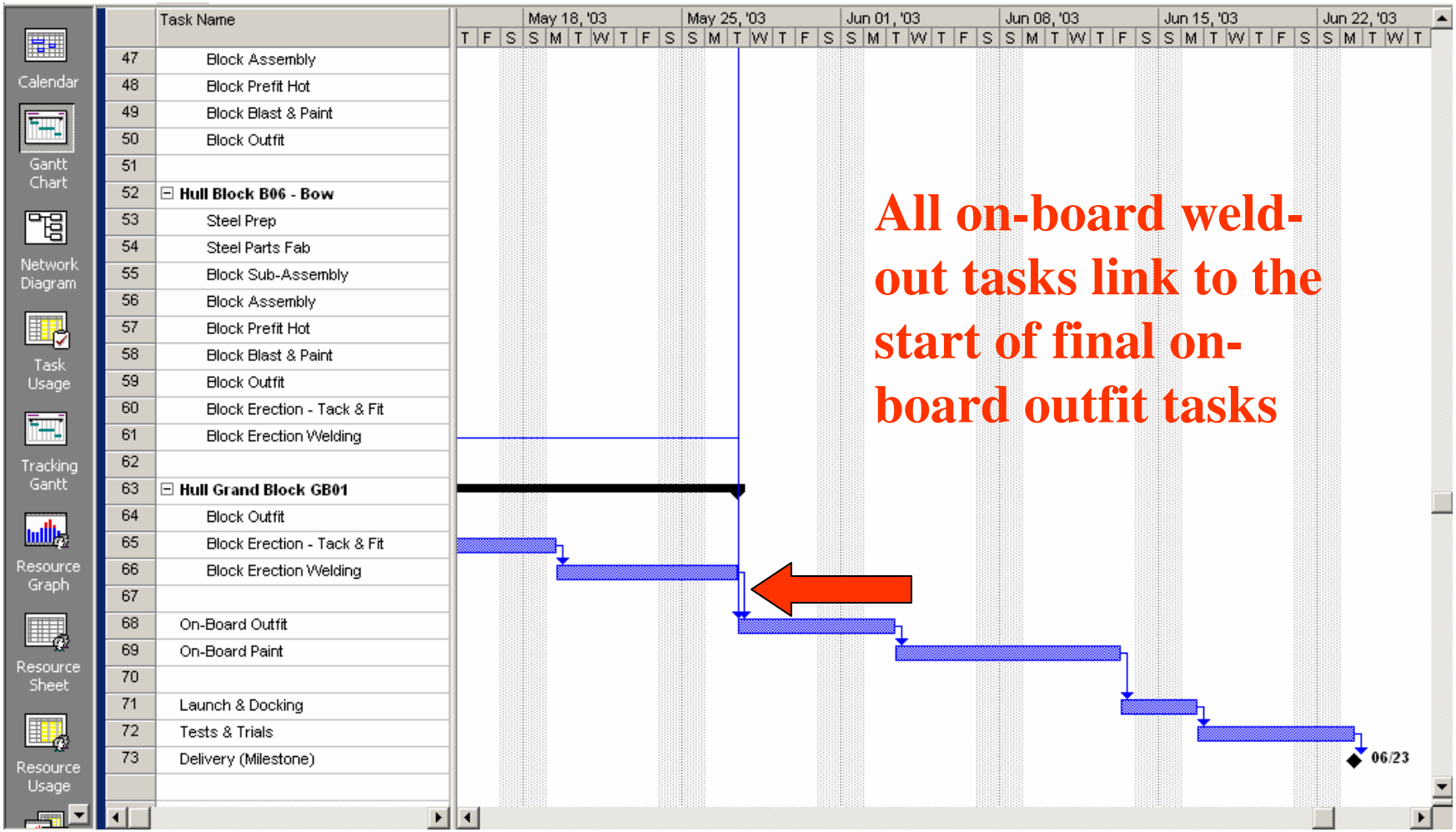
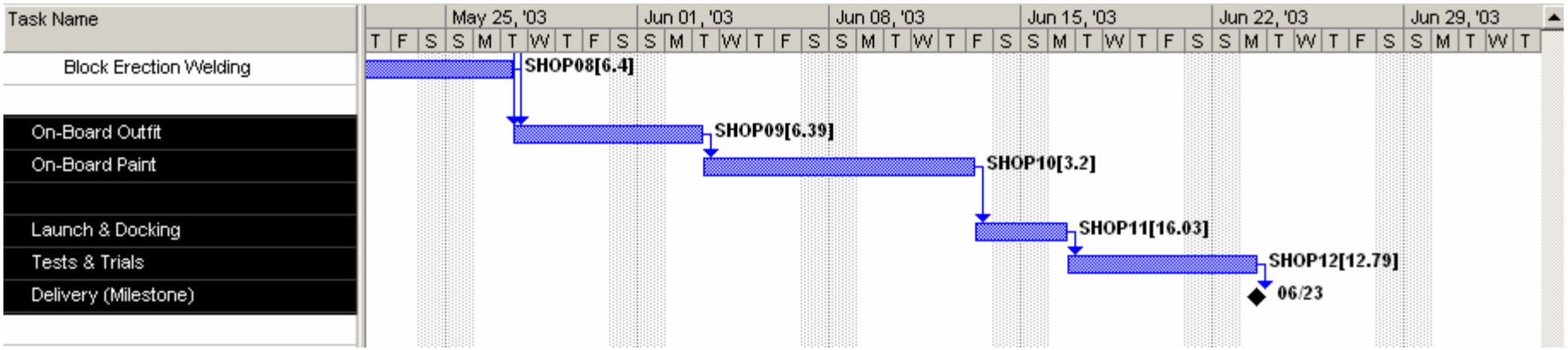
Gantt Chart
Network Diagram
Task Usage
Tracking Gantt
Resource Graph
Resource Sheet
Resource Usage
Task Name
18 Block Erection - Tack & Fit
19 Block Erection Welding
20
21 Hull Block B03 - Mid-Body Tank
22 Steel Prep
23 Steel Parts Fab
24 Block Sub-Assembly
25 Block Assembly
26 Block Prefit Hot
27 Block Blast & Paint
28 Block Outfit
29 Block Erection - Tack & Fit
30 Block Erection Welding
31
32 Hull Block B04 - Mid-Body Tank
33 Steel Prep
34 Steel Parts Fab
35 Block Sub-Assembly
36 Block Assembly
37 Block Prefit Hot
38 Block Blast & Paint
39 Block Outfit
40 Block Erection - Tack & Fit
41 Block Erection Welding
42
43 Hull Block B05 - Bow
44 Steel Prep
45 Steel Parts Fab
Apr 27, '03
May 04, '03
May 11, '03
May 18, '03
May 25, '03
Jun 01, '03

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

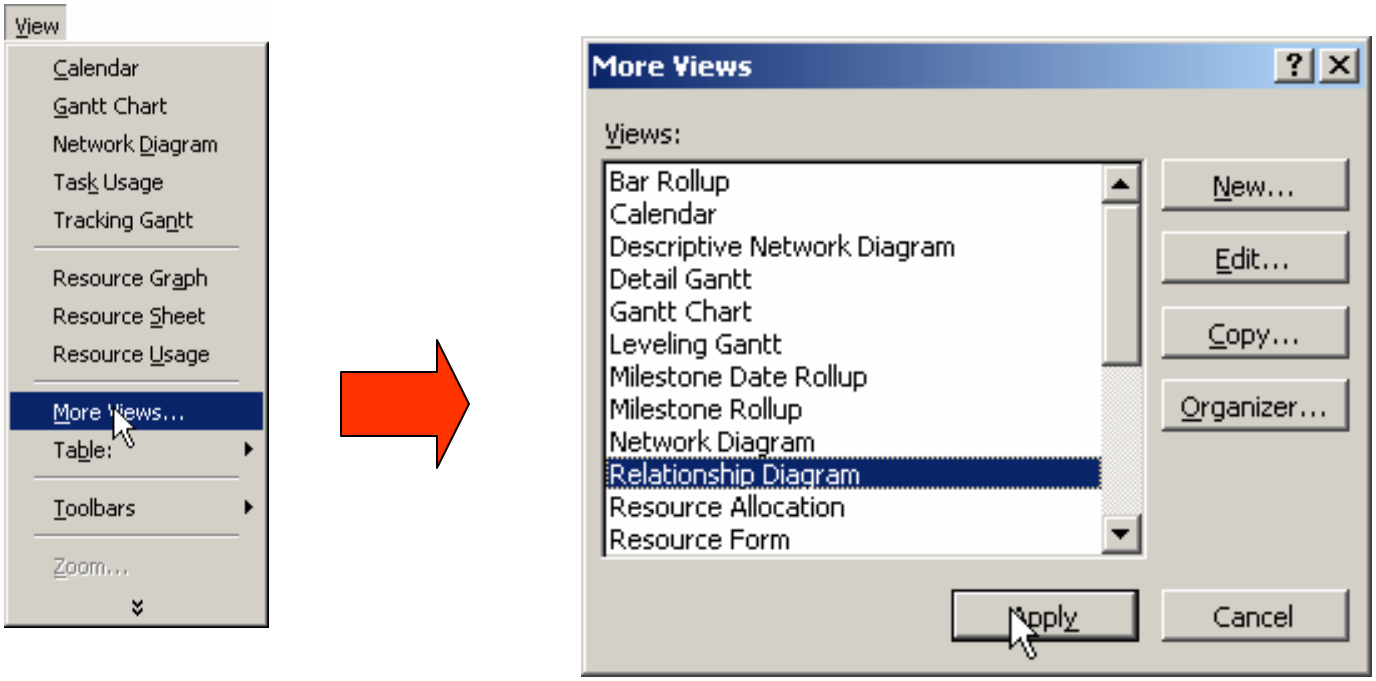


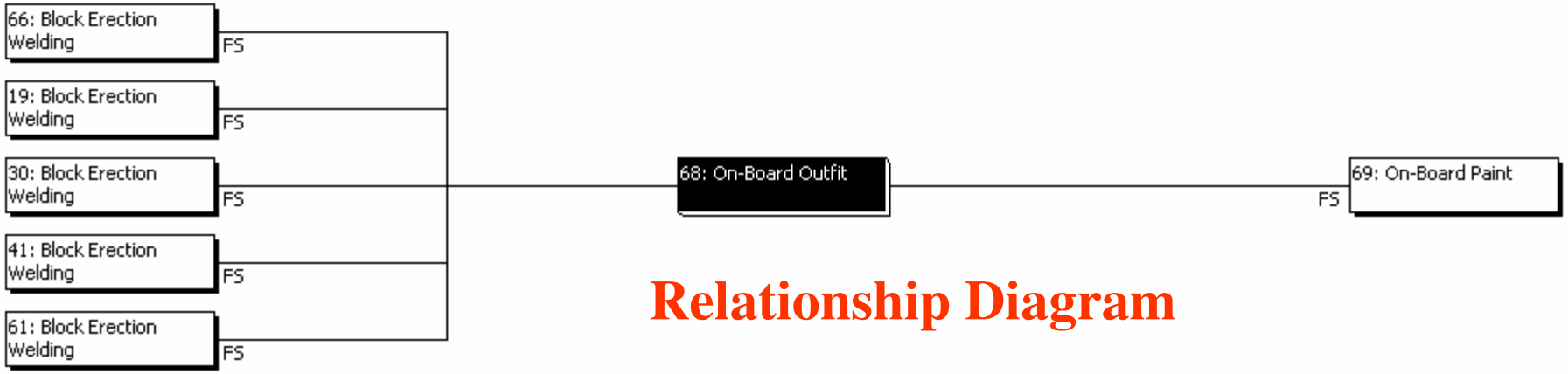
Another view that can be helpful in ensuring that erection tasks link properly to on-board outfit tasks is the *Relationship Diagram*



First, highlight the rows of tasks to display.

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

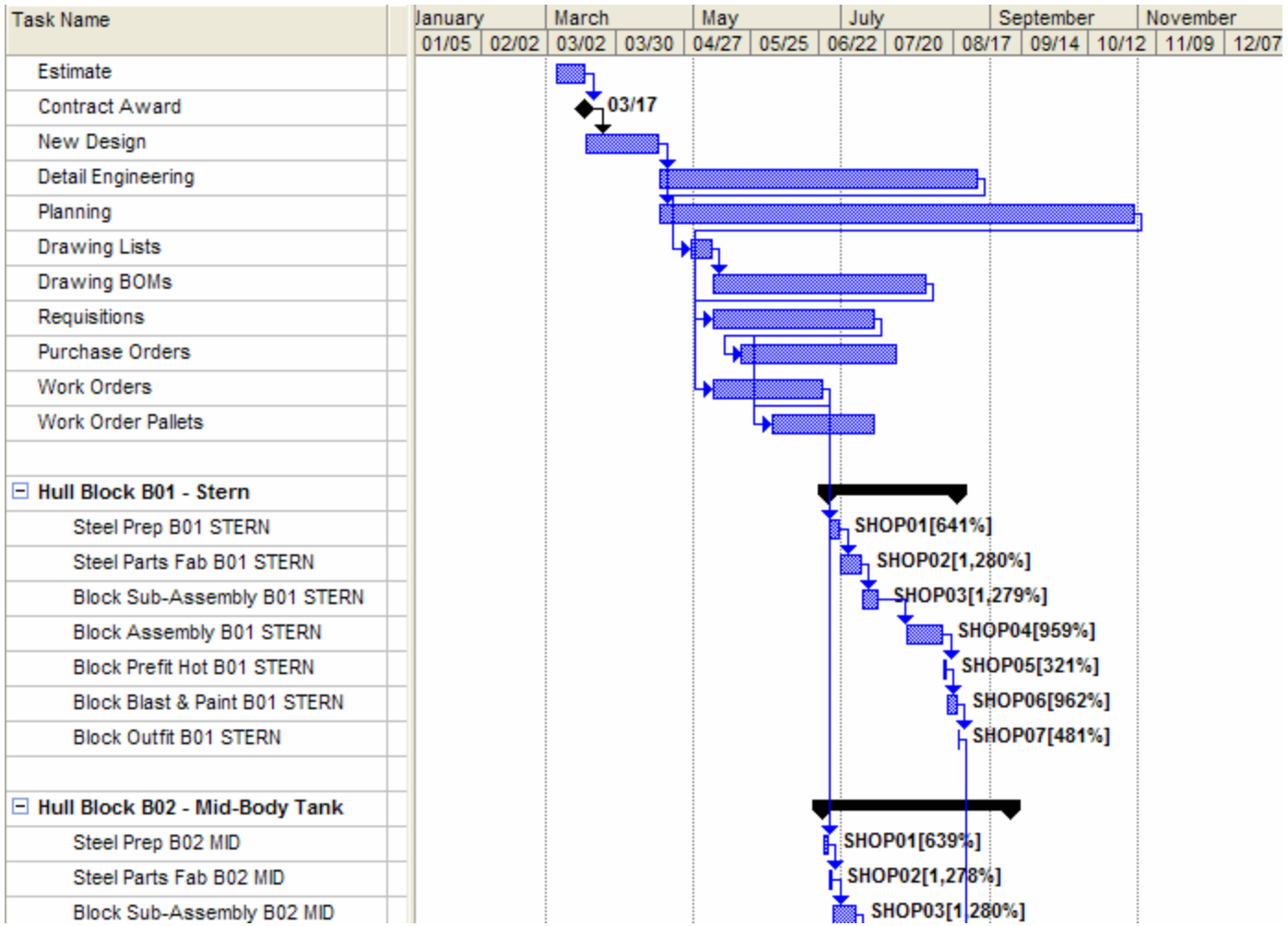




Relationship Diagram

Engineering & Material Control

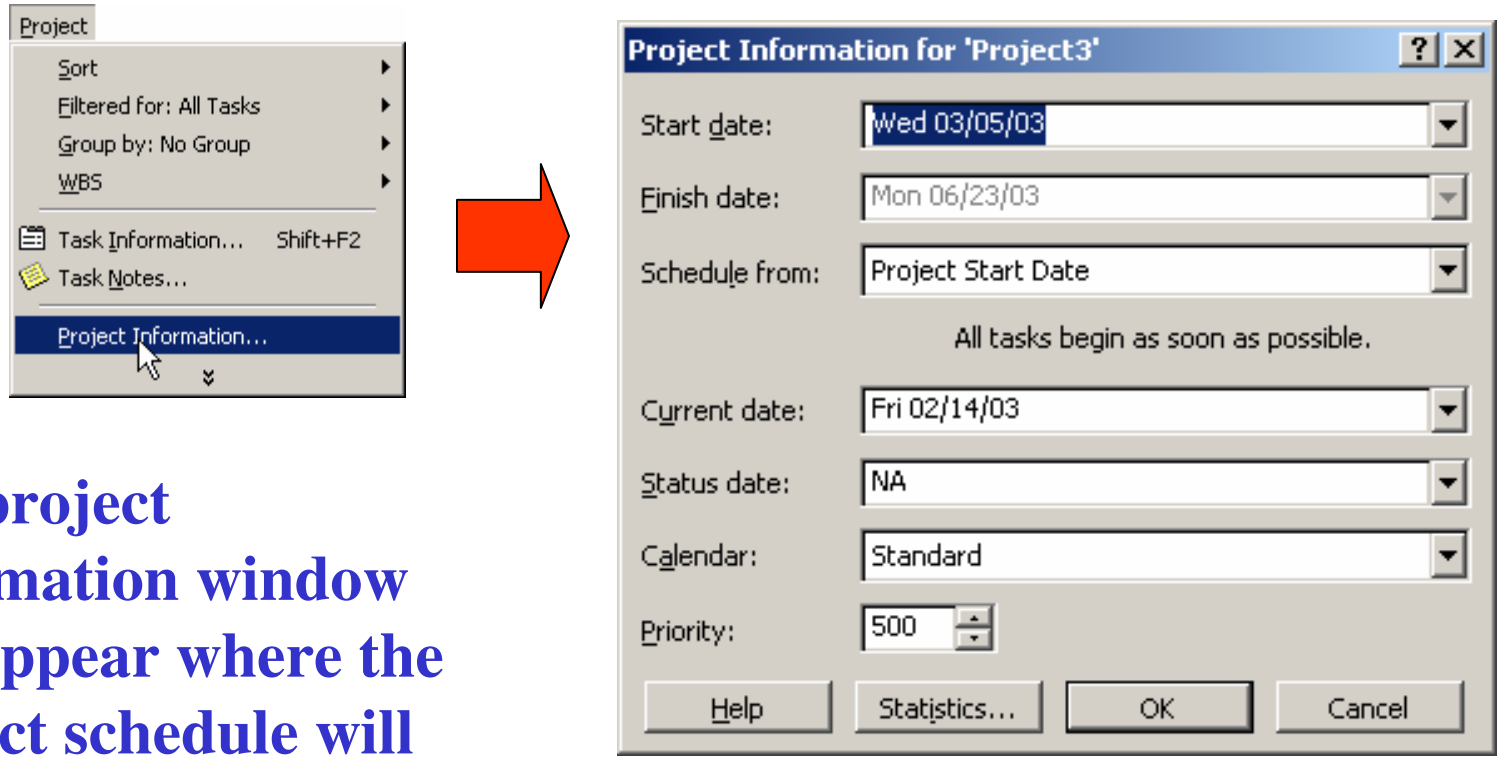
After all production tasks have been defined and linked, the tasks for engineering, planning & purchasing that are required to support the production plan must be defined and then linked into the project.


Task Name
January
March
May
July
September
November
01/05
02/02
03/02
03/30
04/27
05/25
06/22
07/20
08/17
09/14
10/12
11/09
12/07
Estimate
Contract Award
New Design
Detail Engineering
Planning
Drawing Lists
Drawing BOMs
Requisitions
Purchase Orders
Work Orders
Work Order Pallets
Hull Block B01 - Stern
Steel Prep B01 STERN
Steel Parts Fab B01 STERN
Block Sub-Assembly B01 STERN
Block Assembly B01 STERN
Block Prefit Hot B01 STERN
Block Blast & Paint B01 STERN
Block Outfit B01 STERN
Hull Block B02 - Mid-Body Tank
Steel Prep B02 MID
Steel Parts Fab B02 MID
Block Sub-Assembly B02 MID
03/17
SHOP01[641%]
SHOP02[1,280%]
SHOP03[1,279%]
SHOP04[959%]
SHOP05[321%]
SHOP06[962%]
SHOP07[481%]
SHOP01[639%]
SHOP02[1,278%]
SHOP03[1,280%]

Project Schedule

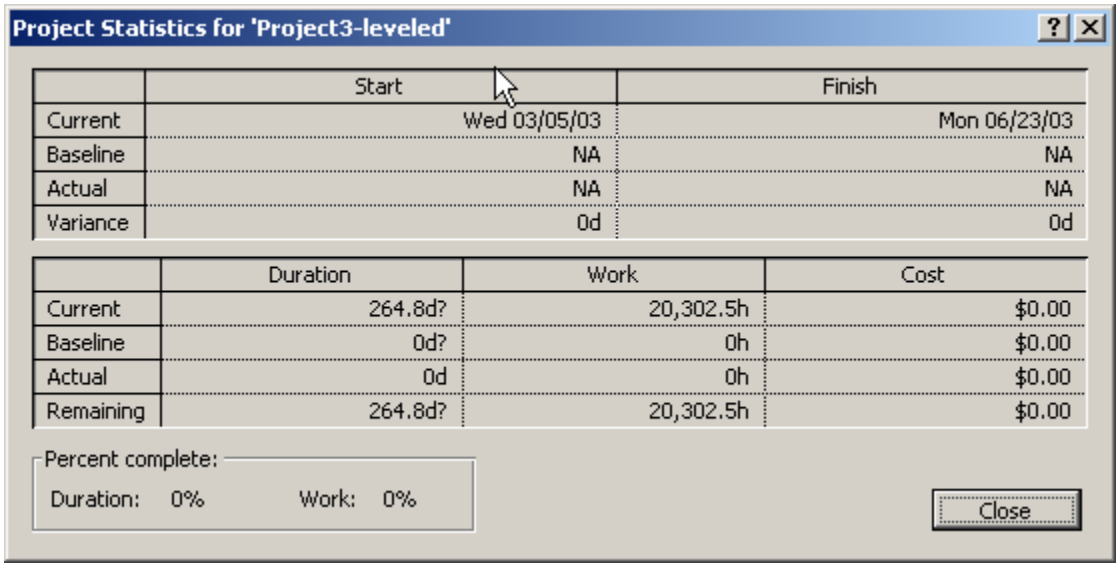
After all tasks have been defined and linked, the system will have developed the project schedule from start to finish.

To view the resulting overall project schedule, select *Project/Project Information* from the main menu.



The project information window will appear where the project schedule will be displayed.

By clicking on the *Statistics* button in the *Project Information* window, the system will display a summary of the project schedule and its statistics.



When *Microsoft Project* schedules tasks, it calculates the schedule based on the requirements of the task, not the availability of resources assigned.

For example, the panel line may have a manpower availability of 10 men a day; however, *Microsoft Project* might still schedule tasks such that there may be required 15 men for any given day.

It's not until you level the panel line's over-allocation that this conflict is resolved.

The project tasks are now all linked and sequenced. They also have been developed with start and finish dates.

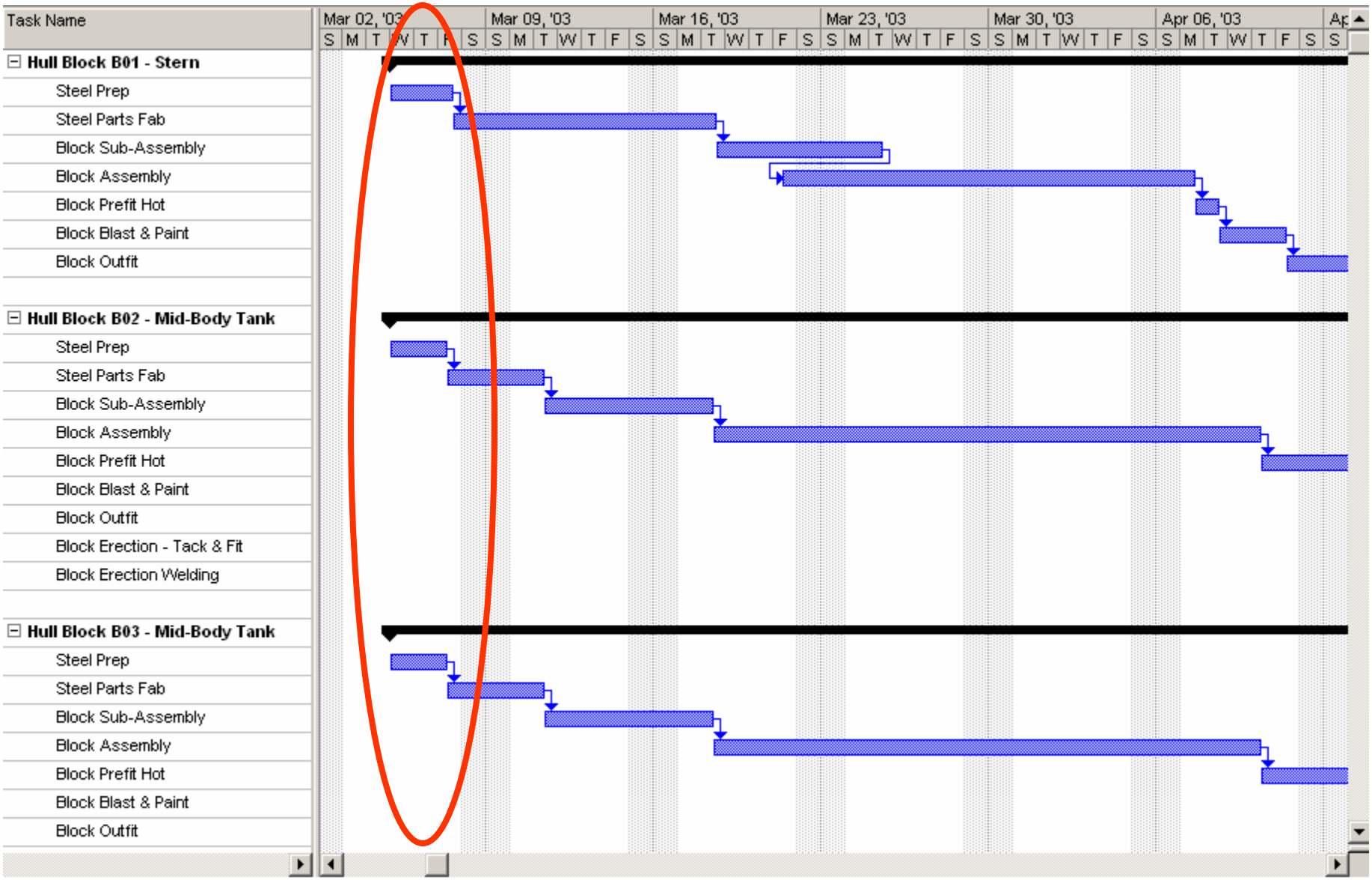
However, at this point, non-critical tasks have schedules that are based on early start and finish dates.

These dates are not likely to be practical as many have the same start dates and would require an over-load of resources to complete as scheduled.

The following figure displays the manufacturing and assembly tasks for several blocks, all starting about the same time (note steel prep tasks).

With limited resources, manpower for example, this schedule is not realistic.

Resource limitations will cause these tasks to become staggered in time to accommodate resource availabilities.


Task Name
Mar 02, '03
Mar 09, '03
Mar 16, '03
Mar 23, '03
Mar 30, '03
Apr 06, '03
S M T W T F S
Hull Block B01 - Stern
Steel Prep
Steel Parts Fab
Block Sub-Assembly
Block Assembly
Block Prefit Hot
Block Blast & Paint
Block Outfit
Hull Block B02 - Mid-Body Tank
Steel Prep
Steel Parts Fab
Block Sub-Assembly
Block Assembly
Block Prefit Hot
Block Blast & Paint
Block Outfit
Block Erection - Tack & Fit
Block Erection Welding
Hull Block B03 - Mid-Body Tank
Steel Prep
Steel Parts Fab
Block Sub-Assembly
Block Assembly
Block Prefit Hot
Block Blast & Paint
Block Outfit

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**

When entering information about task scheduling, keep the following in mind:

- **If tasks occur in a sequence, enter task dependencies to create that sequence.**
- **Use date constraints (such as *Must Start On* and *Must Finish On*) only when required. Constraints limit the adjustments that *Microsoft Project* can make when determining which tasks to level.**
- **Use priorities sparingly. Use a task priority 1000 (meaning do not level this task) only when a task absolutely cannot be delayed or split or when you have other tasks that you definitely prefer to delay or split if leveling is necessary.**

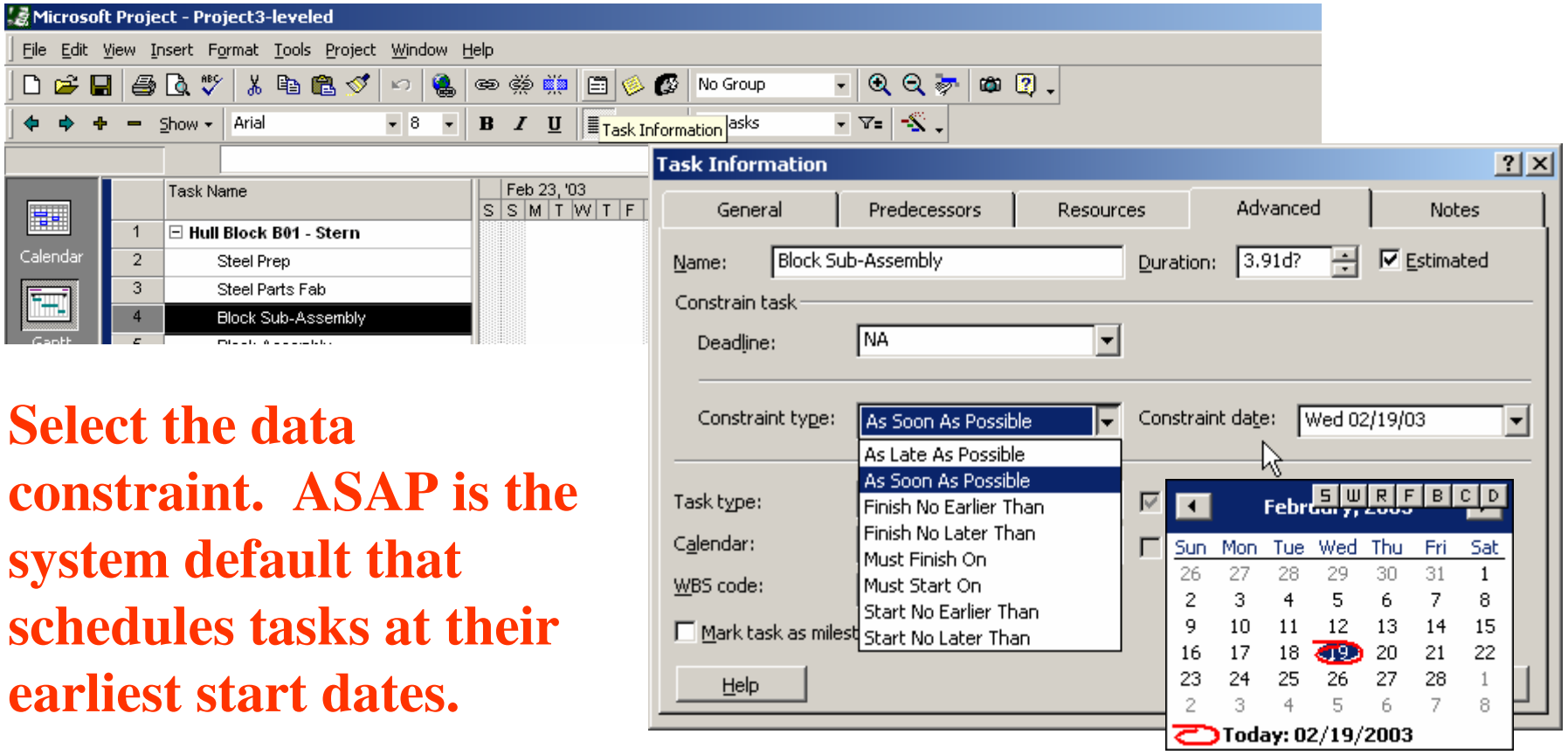
Date Constraints

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**

Highlight the task, then click on the *Task Information* button on the toolbar.

Open the *Advanced* tab of the Task Information data window.



Select the data constraint. ASAP is the system default that schedules tasks at their earliest start dates.

Resource Loading

Except for the linking of block erection tasks and the block weld-out with the on-board outfit tasks, the schedule thus far does not 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.

In order to schedule within available resources, the following steps must be done:

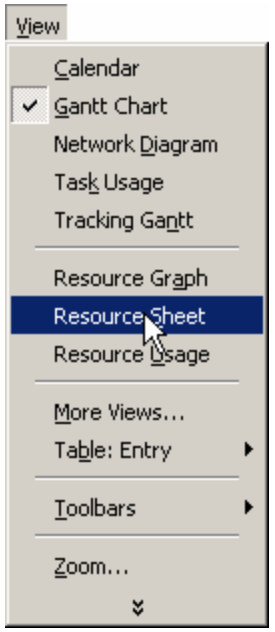
1. **Define available Resources.**
2. **Assign resources to Tasks.**
3. **Initiate schedule changes (Resource Leveling) where and when resources are over-allocated.**

Defining Resources

Define the list of critical resources and how many are available per work day.

Open the *Resource Sheet* from the main menu. Where manpower is a critical resource:

1. Define each of the work centers (*Resource Name*)
2. These resources are of *Type* "Work"
3. Enter the *Max Units* (maximum number of Men across all shifts per day in the work center)



	Resource Name	Type	Material Label	Initials	Group	Max. Units	Std. Rate	Ovt. Rate	Cost/Use	Accrue At	Base Calendar
1	SHOP01	Work				5	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
2	SHOP02	Work				8	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
3	SHOP03	Work				8	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
4	SHOP04	Work				10	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
5	SHOP05	Work				3	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
6	SHOP06	Work				4	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
7	SHOP07	Work				6	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
8	SHOP08	Work				10	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
9	SHOP09	Work				6	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
10	SHOP10	Work				4	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
11	SHOP11	Work				6	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
12	SHOP12	Work				4	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard

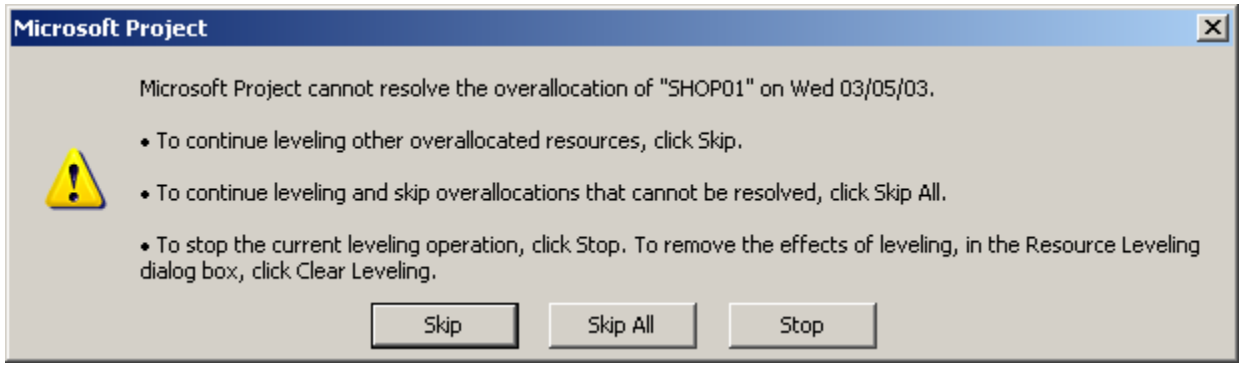
Allocate Resources To Tasks

Where manpower resources are limited per work center, copy the task work centers to the column titled *Resource Names*.

Task Name	Block	Zone	Budget Hours	Center	Duration	Start	Finish	Predecessors	Resource Names
Hull Block B05 - Bow	**B05**	**BOW**	**1,227.5 hrs**		**13.61 days?**	**Wed 03/05/03**	**Fri 03/28/03**		
Steel Prep	B05	BOW	75 hrs	SHOP01	1.17 days?	Wed 03/05/03	Thu 03/06/03		
Steel Parts Fab	B05	BOW	150 hrs	SHOP02	1.17 days?	Thu 03/06/03	Fri 03/07/03	44	
Block Sub-Assembly	B05	BOW	50 hrs	SHOP03	0.39 days?	Fri 03/07/03	Mon 03/10/03	45	
Block Assembly	B05	BOW	800 hrs	SHOP04	8.33 days?	Mon 03/10/03	Mon 03/24/03	46	
Block Prefit Hot	B05	BOW	40 hrs	SHOP05	1.25 days?	Mon 03/24/03	Wed 03/26/03	47	
Block Blast & Paint	B05	BOW	100 hrs	SHOP06	1.04 days?	Wed 03/26/03	Thu 03/27/03	48	
Block Outfit	B05	BOW	12.5 hrs	SHOP07	0.26 days?	Thu 03/27/03	Fri 03/28/03	49	

Task Name	Block	Zone	Budget Hours	Center	Duration	Start	Finish	Predecessors	Resource Names
Hull Block B05 - Bow	**B05**	**BOW**	**1,227.5 hrs**		**24.14 days?**	**Thu 03/20/03**	**Fri 05/02/03**		
Steel Prep	B05	BOW	75 hrs	SHOP01	1.17 days?	Thu 03/20/03	Mon 03/24/03		SHOP01[6.41]
Steel Parts Fab	B05	BOW	150 hrs	SHOP02	1.17 days?	Thu 03/27/03	Fri 03/28/03	44	SHOP02[12.82]
Block Sub-Assembly	B05	BOW	50 hrs	SHOP03	0.39 days?	Mon 03/31/03	Mon 03/31/03	45	SHOP03[12.82]
Block Assembly	B05	BOW	800 hrs	SHOP04	8.33 days?	Mon 04/14/03	Mon 04/28/03	46	SHOP04[9.6]
Block Prefit Hot	B05	BOW	40 hrs	SHOP05	1.25 days?	Mon 04/28/03	Wed 04/30/03	47	SHOP05[3.2]
Block Blast & Paint	B05	BOW	100 hrs	SHOP06	1.04 days?	Wed 04/30/03	Thu 05/01/03	48	SHOP06[9.62]
Block Outfit	B05	BOW	12.5 hrs	SHOP07	0.26 days?	Thu 05/01/03	Fri 05/02/03	49	SHOP07[4.81]

As you paste in the work centers into the *Resource Names* columns, the system will display warnings to the user if over-allocations have been detected.



By selecting *Skip All*, the leveling process will be performed and tasks will be rescheduled so that they have schedules during times when their resources are available.

What is an Over-Allocated Resource?

An over-allocated resource has more work assigned than can be done in the resource's available time.

Over-allocations can result from the following:

- A resource being assigned to work full-time on more than one task.
- Increased duration of tasks.
- Increased assignment units to resources.
- Decreased unit availability for resources.
- A resource being assigned to a summary task as well as one or more of the subtasks.

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.

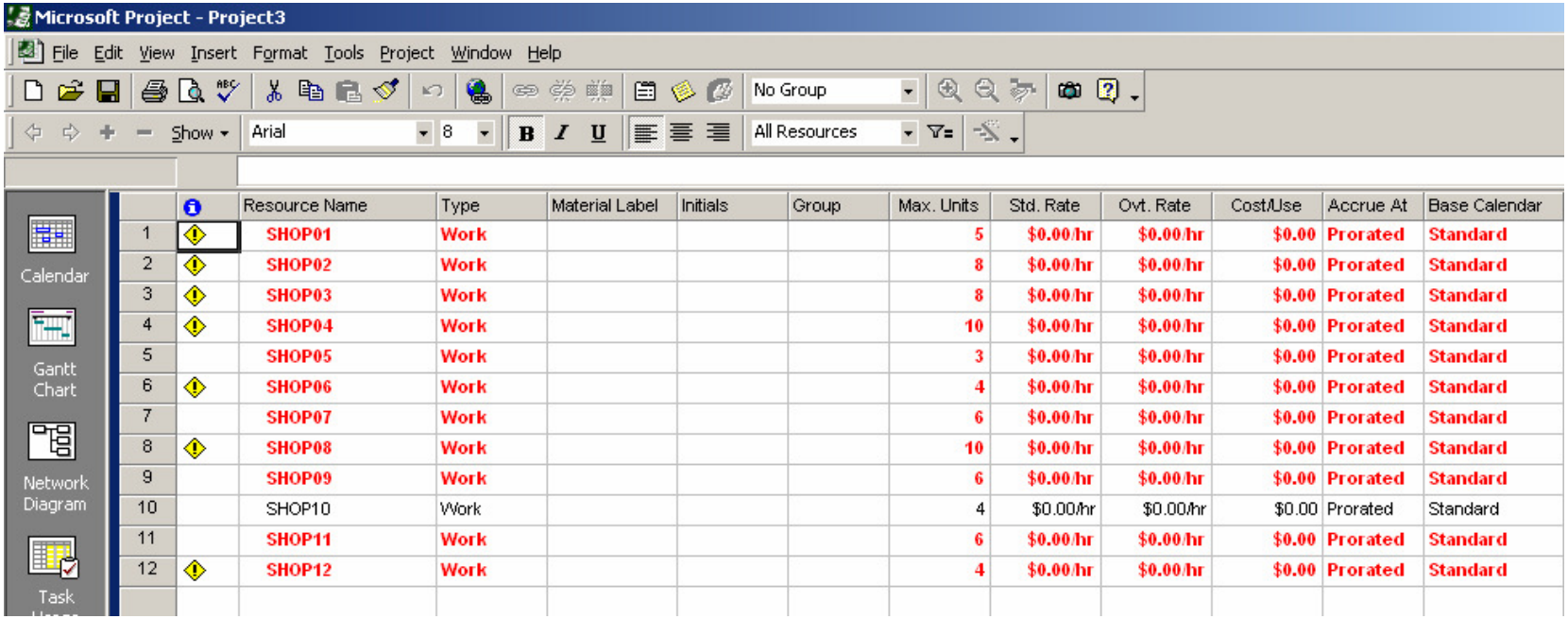
Don't rely on resource leveling to schedule your project.

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.

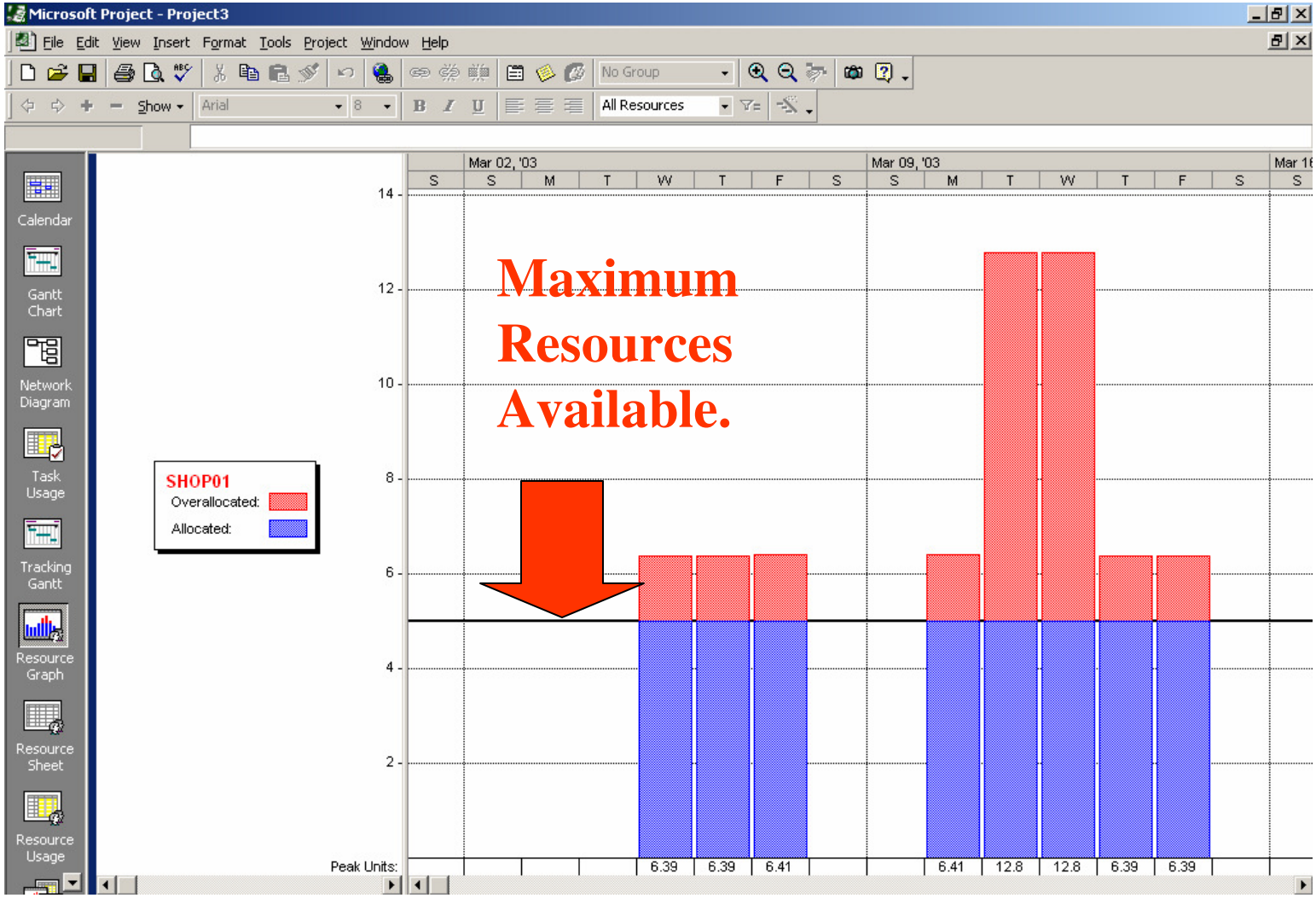
You can also use the *Resource Allocation* view to help find and review detailed task and assignment information about over-allocated resources.

Select *View/Resource Sheet* from the main menu to see what resources are over-allocated.



	Resource Name	Type	Material Label	Initials	Group	Max. Units	Std. Rate	Ovt. Rate	Cost/Use	Accrue At	Base Calendar
1	SHOP01	Work				5	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
2	SHOP02	Work				8	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
3	SHOP03	Work				8	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
4	SHOP04	Work				10	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
5	SHOP05	Work				3	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
6	SHOP06	Work				4	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
7	SHOP07	Work				6	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
8	SHOP08	Work				10	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
9	SHOP09	Work				6	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
10	SHOP10	Work				4	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
11	SHOP11	Work				6	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
12	SHOP12	Work				4	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard

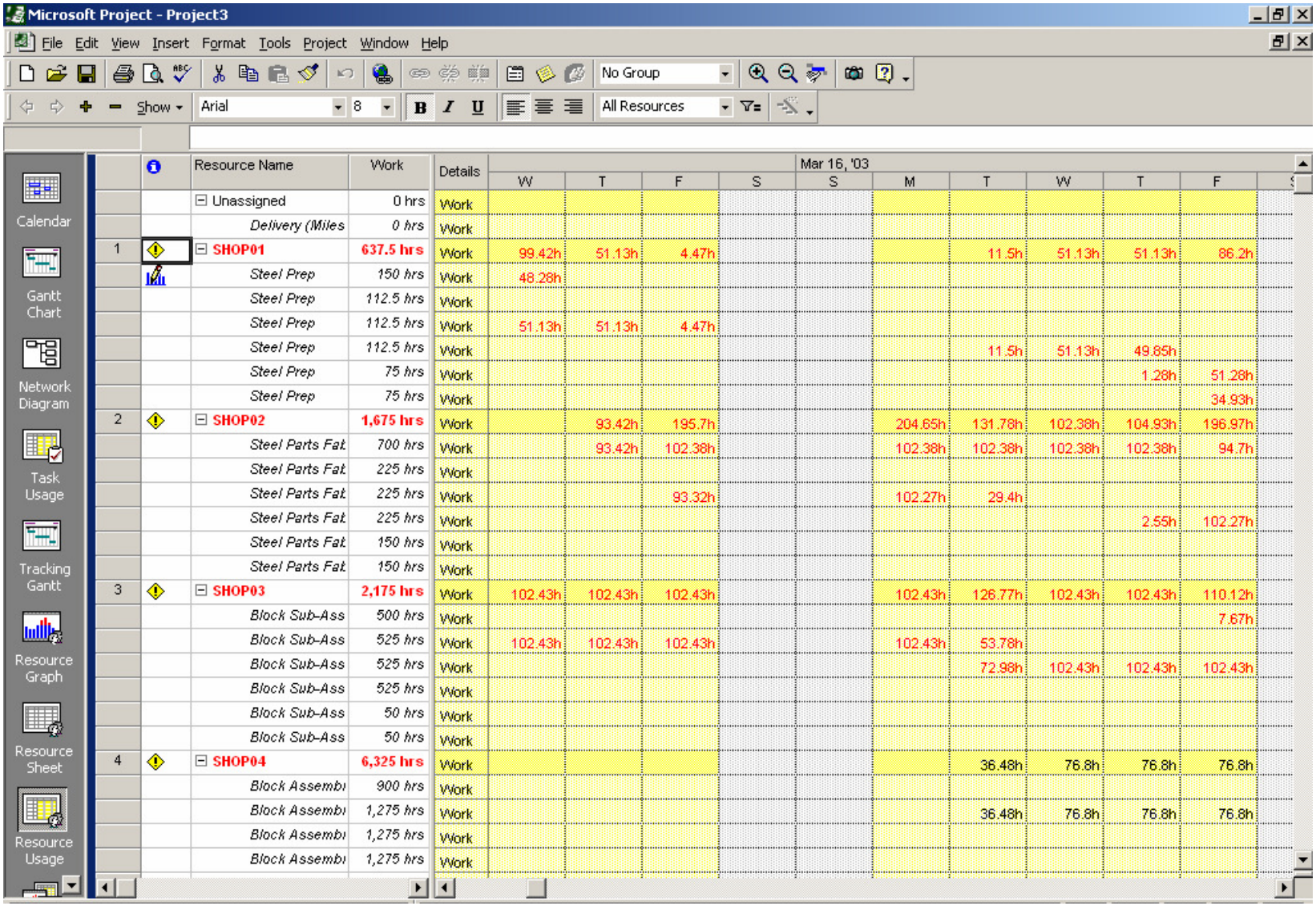
Select *View/Resource Graph* from the main menu for graphical presentation of the over-allocation.



You can quickly find over-allocated resources in any resource view, in which the names of over-allocated resources are highlighted in red.

The *Resource Usage* view in particular can show the amount of time that the resource is over-allocated within a selected time period.

Select *View/Resource Usage* to see resource allocations as scheduled.



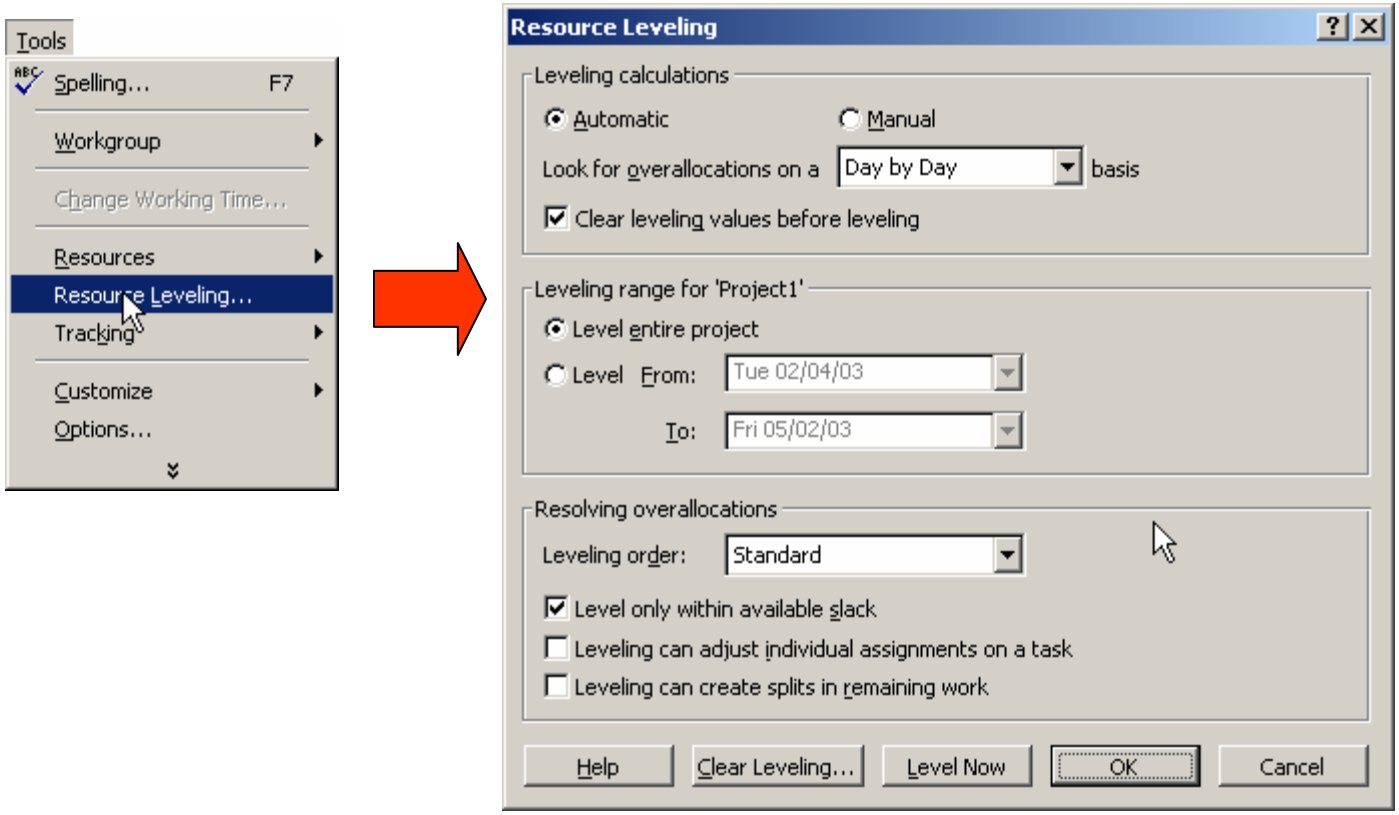
		Resource Name	Work	Details	Mar 16, '03 W	T	F	S	S	M	T	W	T	F
		Unassigned	0 hrs	Work										
		Delivery (Miles	*0 hrs*	Work										
1		SHOP01	637.5 hrs	Work	99.42h	51.13h	4.47h				11.5h	51.13h	51.13h	86.2h
		Steel Prep	*150 hrs*	Work	48.28h									
		Steel Prep	*112.5 hrs*	Work										
		Steel Prep	*112.5 hrs*	Work	51.13h	51.13h	4.47h							
		Steel Prep	*112.5 hrs*	Work							11.5h	51.13h	49.85h	
		Steel Prep	*75 hrs*	Work									1.28h	51.28h
		Steel Prep	*75 hrs*	Work										34.93h
2		SHOP02	1,675 hrs	Work		93.42h	195.7h			204.65h	131.78h	102.38h	104.93h	196.97h
		Steel Parts Fat	*700 hrs*	Work		93.42h	102.38h			102.38h	102.38h	102.38h	102.38h	94.7h
		Steel Parts Fat	*225 hrs*	Work										
		Steel Parts Fat	*225 hrs*	Work			93.32h			102.27h	29.4h			
		Steel Parts Fat	*225 hrs*	Work									2.55h	102.27h
		Steel Parts Fat	*150 hrs*	Work										
		Steel Parts Fat	*150 hrs*	Work										
3		SHOP03	2,175 hrs	Work	102.43h	102.43h	102.43h			102.43h	126.77h	102.43h	102.43h	110.12h
		Block Sub-Ass	*500 hrs*	Work										7.67h
		Block Sub-Ass	*525 hrs*	Work	102.43h	102.43h	102.43h			102.43h	53.78h			
		Block Sub-Ass	*525 hrs*	Work							72.98h	102.43h	102.43h	102.43h
		Block Sub-Ass	*525 hrs*	Work										
		Block Sub-Ass	*50 hrs*	Work										
		Block Sub-Ass	*50 hrs*	Work										
4		SHOP04	6,325 hrs	Work							36.48h	76.8h	76.8h	76.8h
		Block Assembl	*900 hrs*	Work										
		Block Assembl	*1,275 hrs*	Work							36.48h	76.8h	76.8h	76.8h
		Block Assembl	*1,275 hrs*	Work										
		Block Assembl	*1,275 hrs*	Work										

Leveling Options

The easiest way to get started with *Microsoft Project's* leveling feature is to use the defaults provided in the *Resource Leveling* dialog box.

As you become more familiar with the details of how leveling affects your schedule, you can fine-tune the options available in the dialog box.

To open the Resource Leveling dialog box, click on *Tools/Resource Leveling* from the main menu.



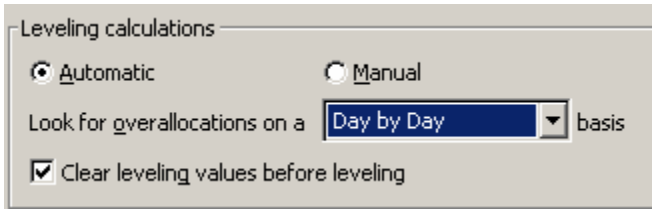
Microsoft Project **levels over-allocated resources by delaying and splitting tasks, based on criteria you set in this dialog box. You can:**

- **Specify whether you want *Microsoft Project* to level automatically (as soon as it detects an over-allocation) or manually (only when you click *Level Now*).**
- **Indicate how much a resource needs to be over-allocated (for example, by an hour, day, or week) before they should be leveled.**
- **Set the criteria for the order that tasks should be reviewed for over-allocations and leveling.**

Automatic:

Automatic leveling levels resources instantaneously when you change a task or resource.

- If your project is large, automatic leveling might slow down your work in the schedule.
- If you choose this option, unselect the *Clear leveling values before leveling* check box. This check box is selected by default, but when leveling automatically, clearing values can significantly affect schedule performance.



Manual:

Manual leveling allows you to control when *Microsoft Project* levels resources. It levels only when you open the Resource Leveling dialog box and click *Level Now*. This is the default option.

Look for over-allocations on a specified time basis:

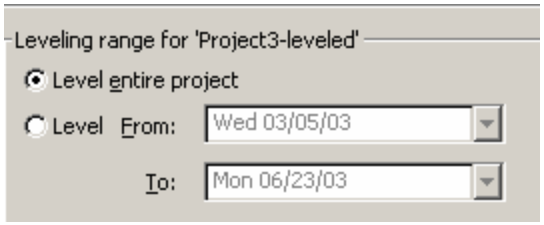
Click a time period for the sensitivity with which leveling will recognize over-allocations. This setting establishes the point at which you want leveling to intervene.

- **Minute by Minute** Level resources when there is an over-allocation of at least one minute.
- **Hour by Hour** Level resources when there is an over-allocation of at least one hour.
- **Day by Day** Level resources when there is an over-allocation of at least one day.
- **Week by Week** Level resources when there is an over-allocation of at least one week.
- **Month by Month** Level resources when there is an over-allocation of at least one month.

Clear leveling values before leveling:

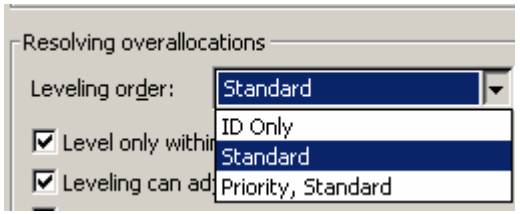
Selecting this check box indicates that any delays previously entered as a result of leveling, or as a result of manually entering leveling delay, are to be cleared before the next leveling operation is done. This is selected by default.

Leveling range:



Specify whether you want the entire project leveled or only those tasks falling within a specific time range.

Leveling order:



Specify the order in which you want *Microsoft Project* to delay or split tasks that have over-allocations. After *Microsoft Project* determines which tasks are causing the over-allocation and which tasks it can delay, it uses the order you specify.

ID Only

Microsoft Project delays tasks as needed with the higher ID numbers before considering other criteria.

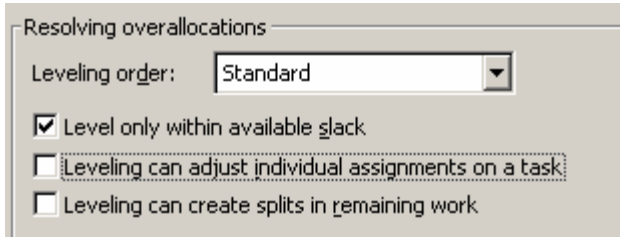
Standard

Microsoft Project looks at predecessor relationships, slack (a task with more total slack time is delayed first), dates (a task with a later start date is delayed first), priorities, and constraints to determine whether and how tasks should be leveled. This is the default.

Priority, Standard

Microsoft Project looks first at priorities and then at predecessor relationships, slack, dates, and constraints to determine whether and how tasks should be leveled.

Level only within available slack

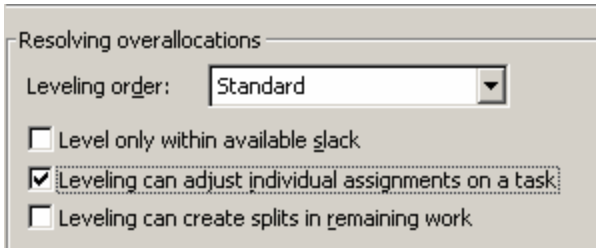


Select this check box if you want to prevent the finish date of your project from being delayed.

In many projects, however, unless there is a lot of built-in slack, with this setting you might not see a significant change after leveling.

By default, this check box is cleared.

Leveling can adjust individual assignments on a task

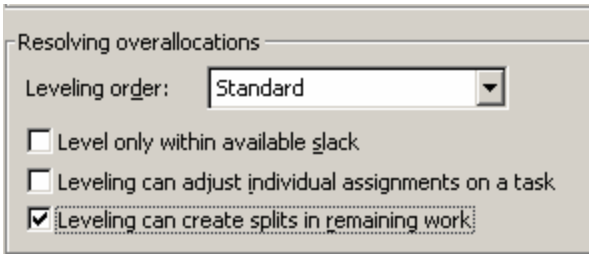


Select this check box to allow leveling to adjust when a resource works on a task independent of the other resources working on the same task.

This is a global setting for all tasks and is selected by default.

If you want to selectively allow leveling on individual assignments for specific tasks, you can add the *Level Assignments* field to a task sheet, and then set the field to "Yes" or "No."

Leveling can create splits in remaining work



Select this check box if you want leveling to interrupt tasks by creating splits in the remaining work on tasks or assignments.

This is a global setting for all tasks, and is selected by default.

If you want to selectively allow leveling to split remaining work for specific tasks, you can add the *Leveling Can Split* field to a task sheet, and then set the field to "Yes" or "No."

When you use leveling, *Microsoft Project* checks each of the resources in turn.

If a resource is over-allocated, *Microsoft Project* searches for the tasks that are causing the over-allocation and identifies which of those tasks can be delayed.

***Microsoft Project* does not delay tasks that:**

- **Have a constraint of Must Start On or Must Finish On.**
- **Have a constraint of As Late As Possible, if this project is being scheduled from the start date.**
- **Have a constraint of As Soon As Possible, if this project is being scheduled from the finish date.**
- **Have a priority of 1000, meaning Do Not Level.**
- **Have an actual start date. However, as long as the Leveling can create splits in remaining work check box is selected, any remaining work can be split for leveling.**

After determining which tasks can be delayed, *Microsoft Project* picks the task to delay based on its task dependencies, start date, priority, and constraints.

To review the changes leveling made to tasks:

1. **On the *View* menu, click *More Views*.**
2. **Click *Leveling Gantt*, and then**
3. **Click *Apply*.**

***Review* your tasks in the Leveling Gantt view to see the results of leveling and to see how much delay leveling has added to tasks.**

Typically, when you delay a task, either by using resource leveling or by adding delay manually, if you click *Clear Leveling* in the Resource Leveling dialog box, this delay is removed.

However, suppose a task is split or delayed as a result of leveling, and then that task is subsequently set with a priority 1000 (Do Not Level).

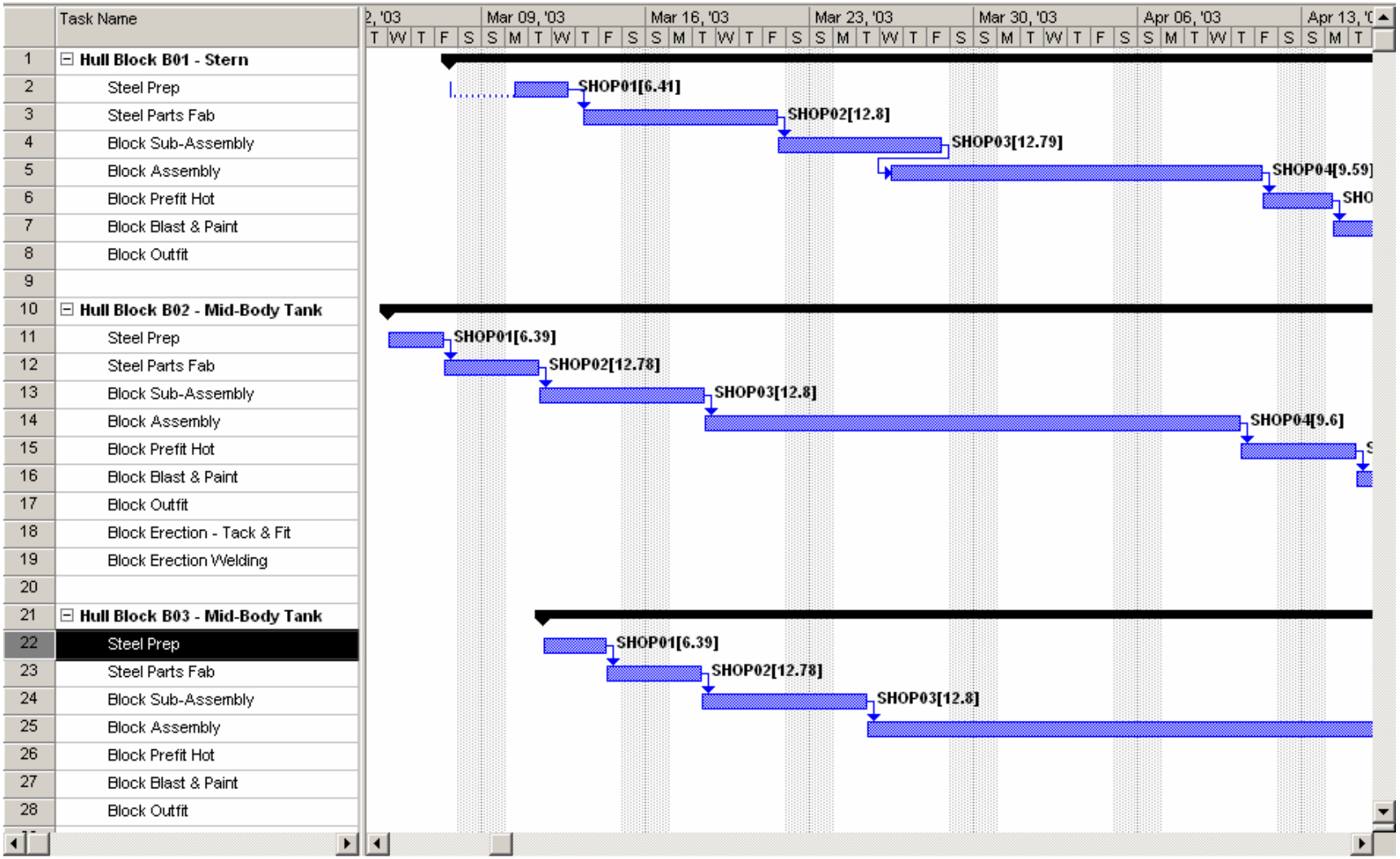
If you click *Clear Leveling* in the Resource Leveling dialog box, the leveling delay or split is not removed.

When *Microsoft Project* levels resources, it does not change resource assignments, and it does not change task information. It only delays or splits tasks.

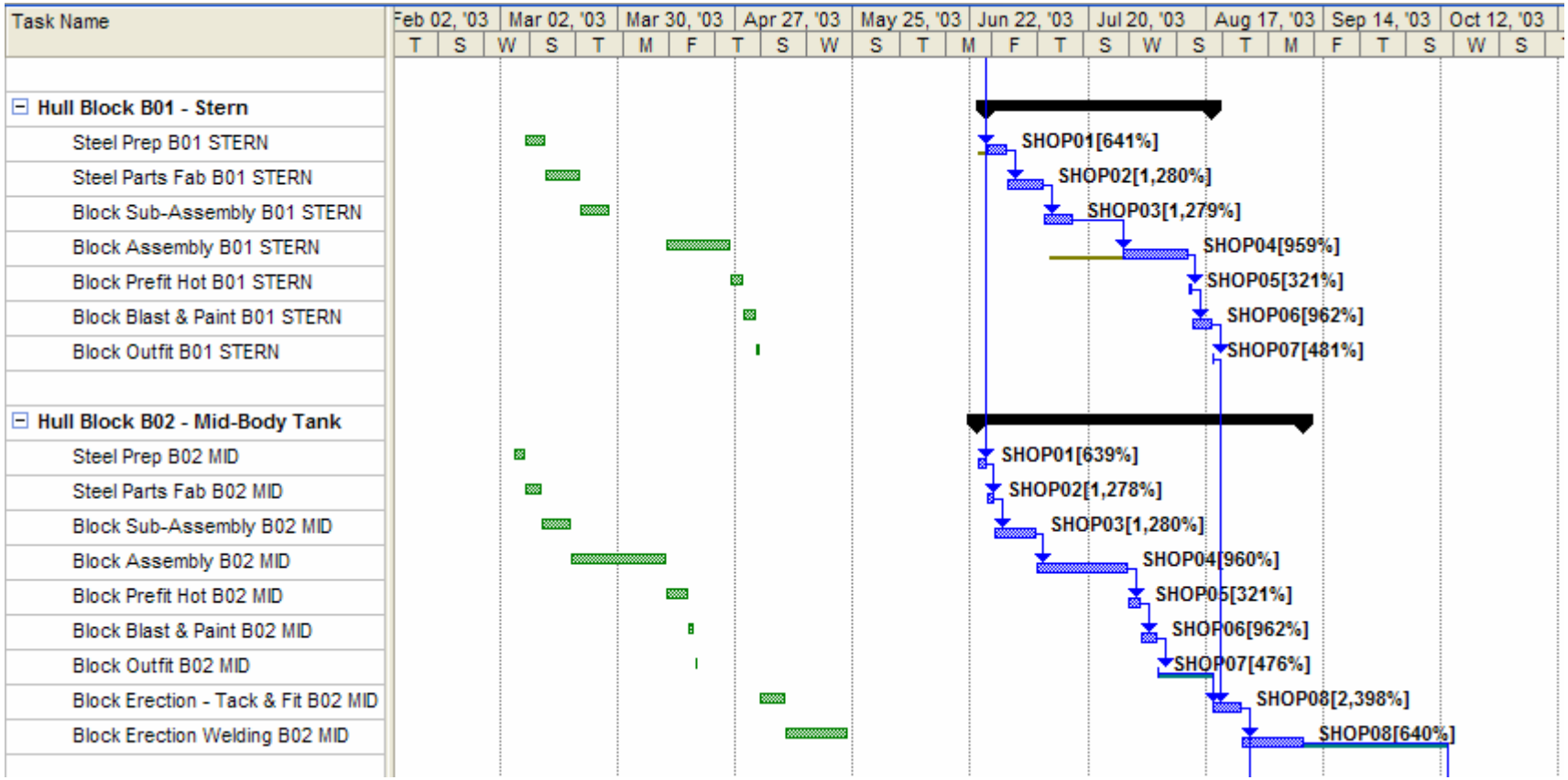
When you level resources yourself, you can look at the same factors, and then adjust the task or resource to resolve over-allocations. For example, you can delay a task, or assign additional resources.

The methods you choose to reduce over-allocations depend on the limitations of your project, including budget, resource availability, finish date, and the amount of flexibility available for scheduling tasks.

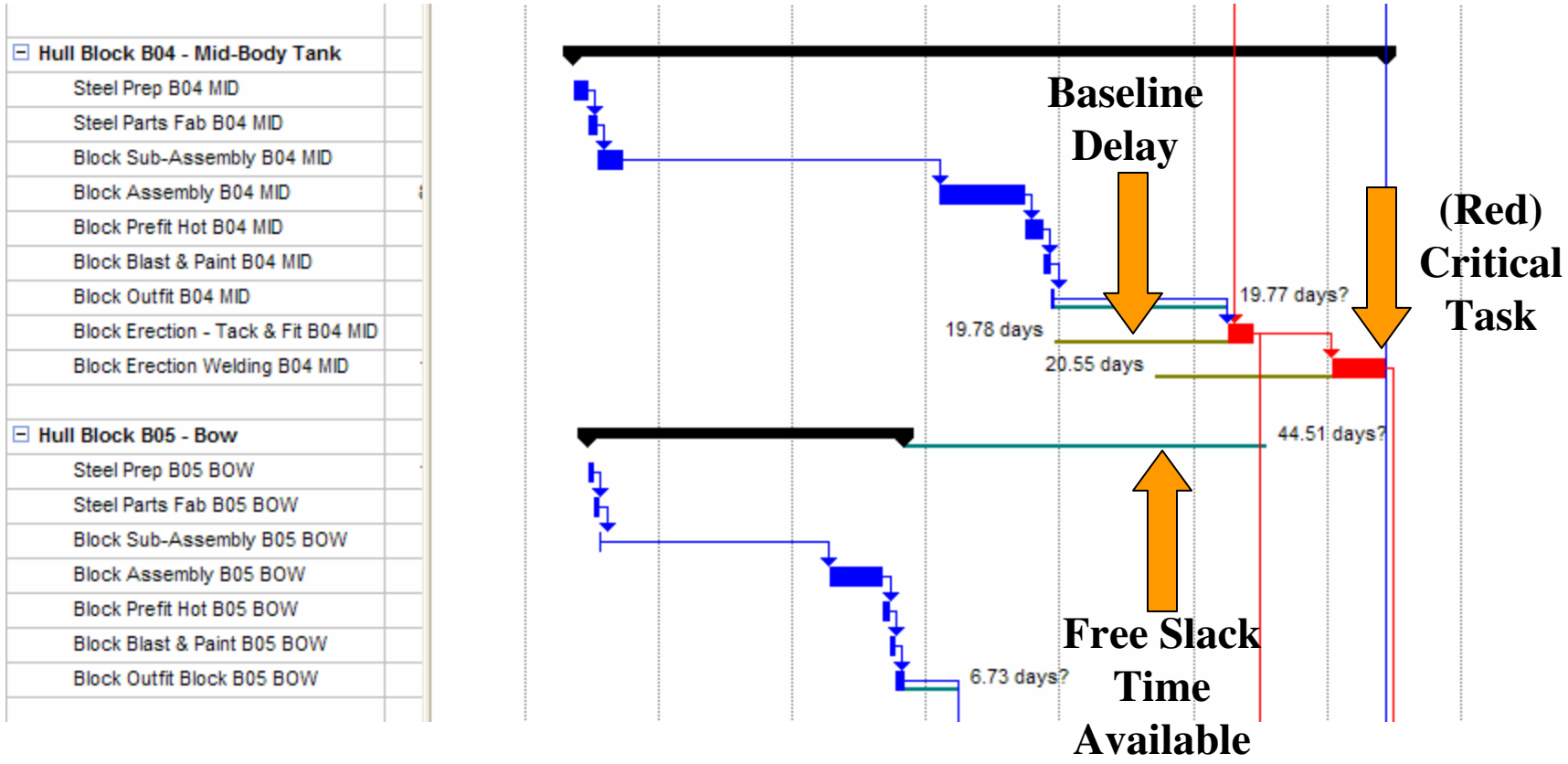
Gantt Chart View After Leveling



Leveling Gantt View Showing Before & After Leveling



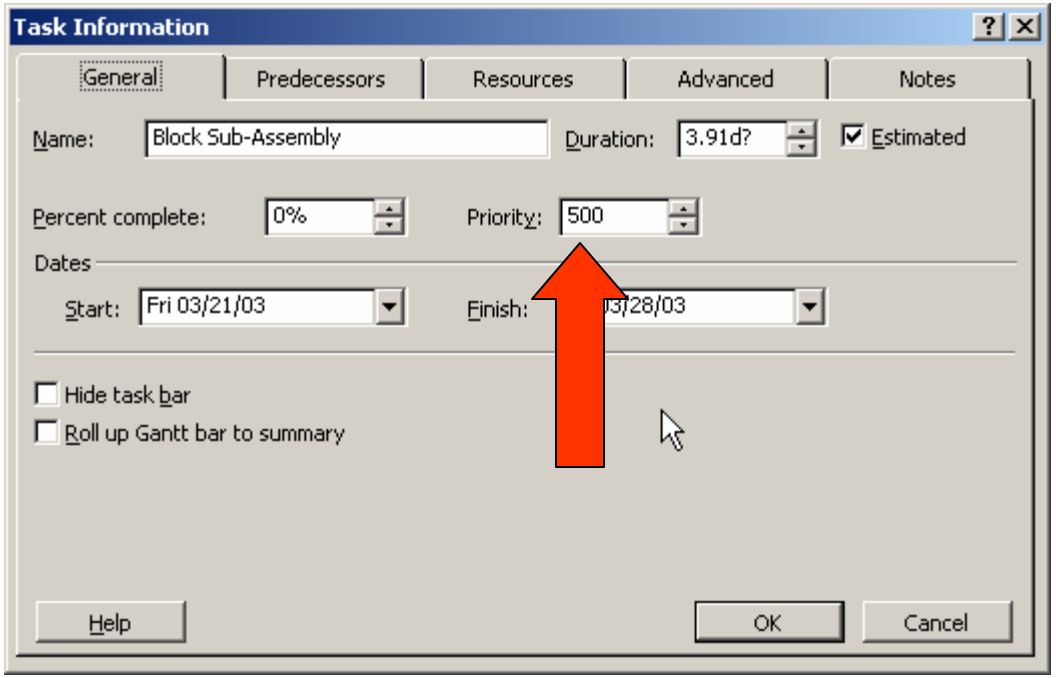
Detail Gantt View Showing After Leveling



Task Priorities

Resource Leveling can be adjusted by assigning priority levels to selected tasks. Higher priority numbers indicate tasks that cannot be rescheduled as easily as tasks with low priorities.

- **Highlight the task, then**
- **Click on the *Task Information* button  on the tool bar.**



Click the *General* tab, and then enter a value in the Priority box.

Choices are 0–1000, with 0 being the lowest priority, and 1000 being the highest priority, having the effect of "Do Not Level."

The default priority is 500.

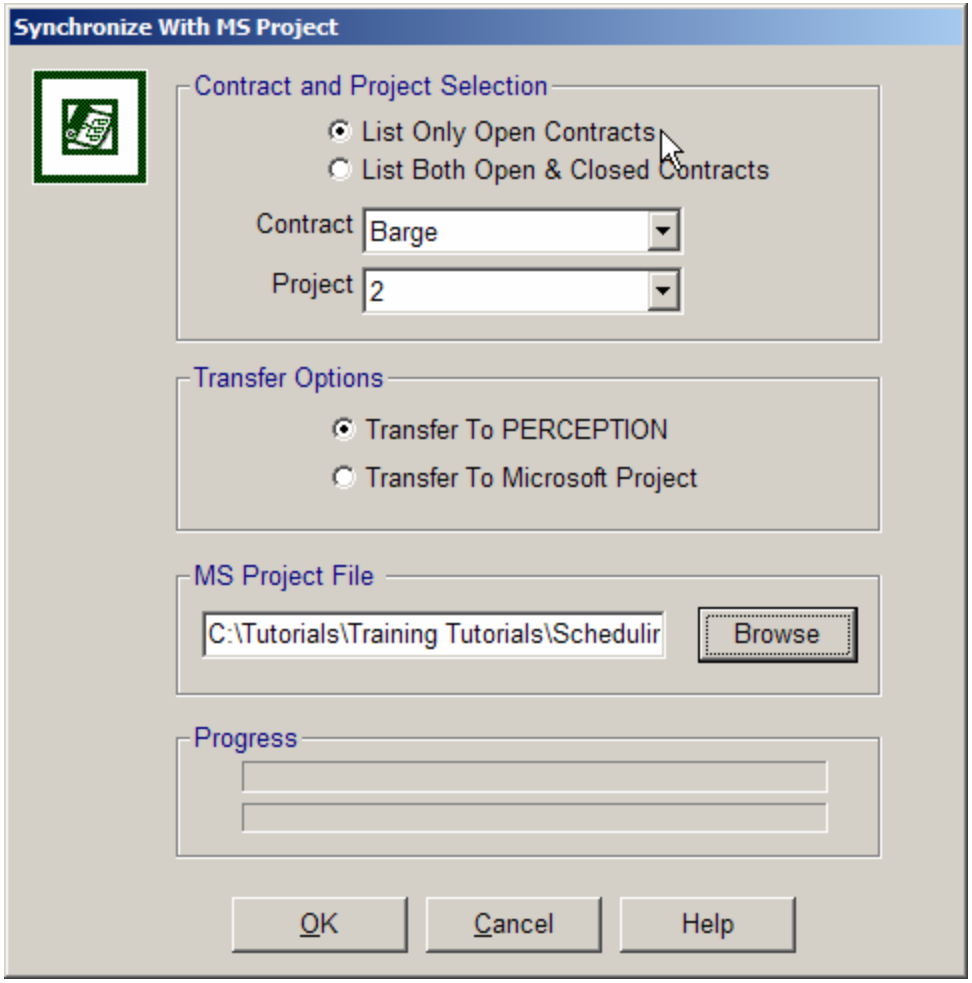
If you are working with resources in multiple projects, you can also set priorities for projects in the *Project Information* dialog box.

On the Project menu, click *Project Information*, and then enter a value in the Priority box.

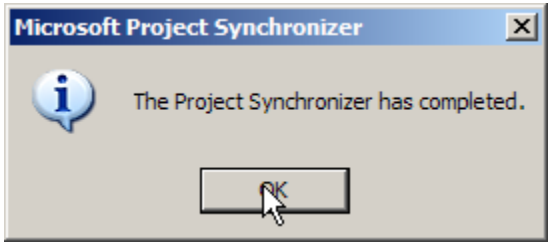
Transfer Tasks To *PERCEPTION*

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.**



When the Project Synchronizer has finished the transfer, all *Microsoft Project 2000* tasks have been transferred as Planning Activities onto the *PERCEPTION* database.



Planning Activities Created (Transferred) From *Microsoft Project 2000*

Planning Activities Information for the Planning Environment

	Contract	Project	Center	Activity	Description	Budget Hours	Planned Start	Planned Finish	Slack
1	Barge	2	0	1	Estimate	0.00	03/05/2003	03/17/2003	0
2	Barge	2	0	3	New Design	0.00	03/17/2003	04/16/2003	0
3	Barge	2	0	4	Detail Engineering	0.00	04/17/2003	08/26/2003	42.0000
4	Barge	2	0	5	Planning	0.00	04/17/2003	10/30/2003	0
5	Barge	2	0	6	Drawing Lists	0.00	04/29/2003	05/08/2003	54.0000
6	Barge	2	0	7	Drawing BOMs	0.00	05/08/2003	08/05/2003	54.0000
7	Barge	2	0	8	Requisitions	0.00	05/08/2003	07/14/2003	60.0000
8	Barge	2	0	9	Purchase Orders	0.00	05/20/2003	07/24/2003	60.0000
9	Barge	2	0	10	Work Orders	0.00	05/08/2003	06/23/2003	0
10	Barge	2	0	11	Work Order Pallets	0.00	06/02/2003	07/14/2003	67.0000
11	Barge	2	0	12			00/00/0000	00/00/0000	
12	Barge	2	0	14	Steel Prep B01 STERN	150.00	06/25/2003	06/30/2003	0
13	Barge	2	0	15	Steel Parts Fab B01 STERN	700.00	06/30/2003	07/09/2003	0
14	Barge	2	0	16	Block Sub-Assembly B01 STERN	500.00	07/09/2003	07/16/2003	0
15	Barge	2	0	17	Block Assembly B01 STERN	900.00	07/28/2003	08/12/2003	0
16	Barge	2	0	18	Block Prefit Hot B01 STERN	25.00	08/12/2003	08/13/2003	0
17	Barge	2	0	19	Block Blast & Paint B01 STERN	200.00	08/13/2003	08/18/2003	0
18	Barge	2	0	20	Block Outfit B01 STERN	25.00	08/18/2003	08/18/2003	0
19	Barge	2	0	21			00/00/0000	00/00/0000	
20	Barge	2	0	23	Steel Prep B02 MID	112.50	06/23/2003	06/25/2003	7.0000
21	Barge	2	0	24	Steel Parts Fab B02 MID	225.00	06/25/2003	06/27/2003	7.0000
22	Barge	2	0	25	Block Sub-Assembly B02 MID	525.00	06/27/2003	07/07/2003	7.0000
23	Barge	2	0	26	Block Assembly B02 MID	1,275.00	07/07/2003	07/29/2003	7.0000
24	Barge	2	0	27	Block Prefit Hot B02 MID	75.00	07/29/2003	08/01/2003	7.0000
25	Barge	2	0	28	Block Blast & Paint B02 MID	150.00	08/01/2003	08/05/2003	7.0000
26	Barge	2	0	29	Block Outfit B02 MID	10.00	08/05/2003	08/05/2003	7.0000
27	Barge	2	0	30	Block Erection - Tack & Fit B02 MID	937.50	08/18/2003	08/25/2003	0
28	Barge	2	0	31	Block Erection Welding B02 MID	525.00	08/25/2003	09/09/2003	19.0000