Asprova

Introductory Manual

Sample 1 (Packing)

Asprova Corporation

Notice

Purpose of this manual

This manual presents the basic operation, functions and master settings of Asprova through a sample file. After following and studying the steps presented in this manual, the reader will understand the fundamentals of Asprova APS.

Table of Contents

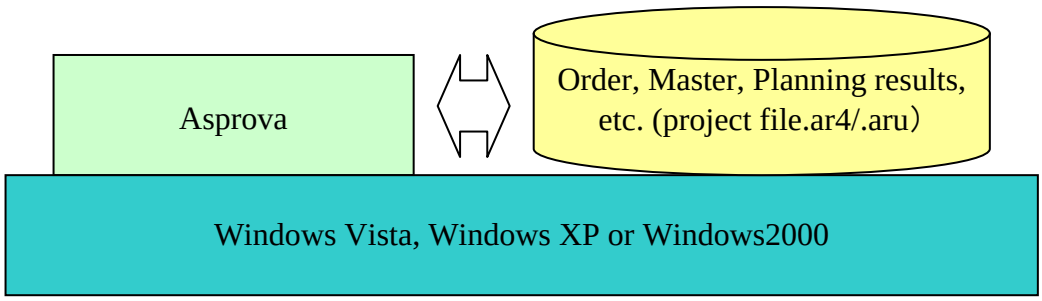
Asprova Overview

●What is Asprova?

Asprova is a production scheduler, to schedule preparations for production requiring multi-items/processes at high speed. It prepares accurate schedules by the second for tomorrow and onward, for each machine as well as respective personnel assigned in a factory, and outputs practical operational instructions. In addition, it enhances the rate of keeping punctual deliveries and provides customers with greater profits while preparing for highly accurate production schedule over the several months in the future, allowing easy visualization of the factory status, shortening production lead-time and reducing inventory.

●Basic configuration of Asprova

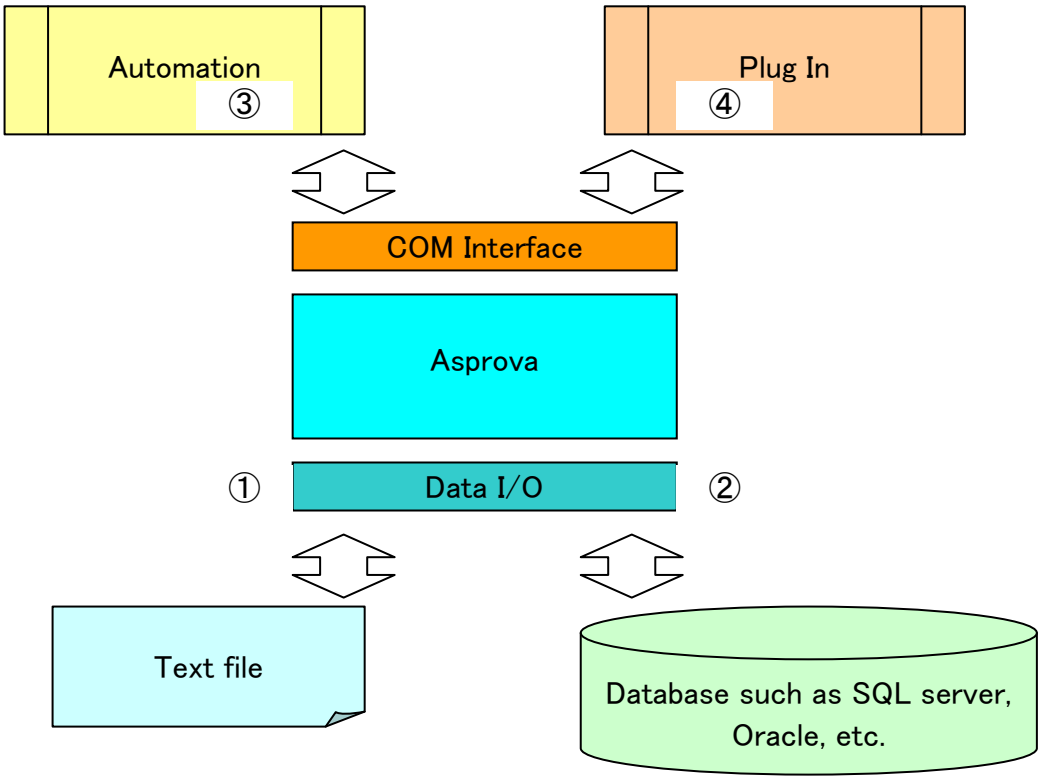
Asprova is stand-alone software program and runs on Windows Vista, Windows XP or Windows 2000. Asprova data is stored into a project file (binary file type).



●Data Input/Output interface and feature expansions

(1) It is possible to input or output data in text files (separated by comma or tab) through the standard interfaces of Asprova.
(2) It is possible to input or output data to databases such as SQL Server or Oracle.
(3) By creating an automation client, these data transfers can take place programmatically by using Asprova's COM interface. In addition, this gives control over the start and termination of Asprova.

Additional features and customization can be made as necessary by plug-ins, using the COM interface.



Let's use Asprova.

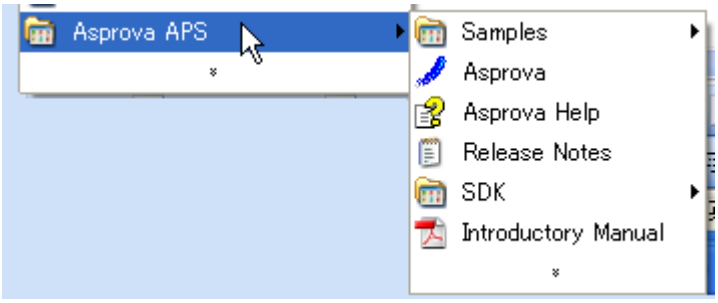
Here we will explain the terminology, operation method, and features of Asprova in the flow, which start from Master setup and finish with rescheduling. You will be able to understand the basics of Asprova if you follow up with this guideline.

Let's prepare for Asprova.

●Let's install the free version of Asprova.

After downloading and unzipping Asprova, please run setup.exe. This will execute the installation of Asprova. Please install Asprova in accordance with the instructions given on the screen.

When the installation has been finished, the menu item Asprova APS will be added to the Windows start menu. Now everything is ready for starting Asprova.



[Asprova APS] menu added to [All programs]

Supplemental information: How to obtain a trial version of Asprova

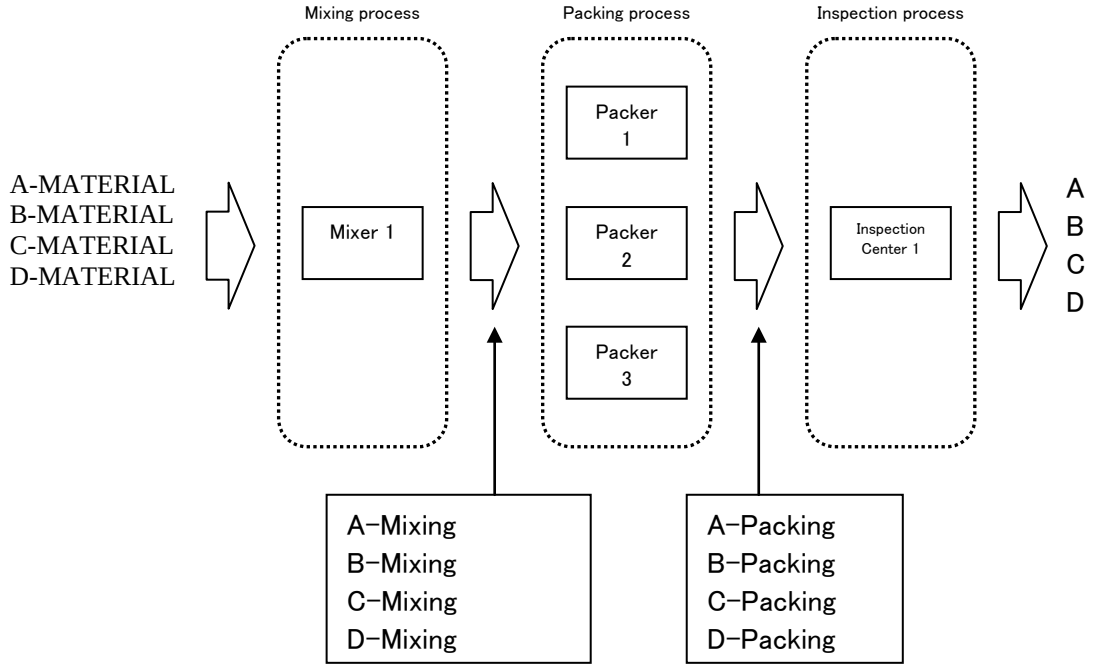
You can obtain the free version of Asprova in accordance with the procedures as stated below:

1. Please access http://www.asprova.com/ for Asprova Corporation's home page.
2. Please go through the membership registration. If you have already registered, please open the page where you can change the membership information. This is located on the membership page.
3. Please place the check mark for [Download a free version of Asprova.] In addition, please register/update the required information after inputting other requisite information.
4. When you have completed these registration/updates, the downloading information will be notified to you via e-mail within several days. After that, please download the files as instructed.
5. The download file is a compressed zip file. Please unzip it to a folder on your computer.

* There may be an occasion that we will contact you by telephone or via e-mail to confirm the purpose for your usage or verify your identification.

Startup Sample 1

●Process explanation for Sample 1



This sample is the example where a packer packs the products A, B, C and D at a factory. In the actual project data, these are called ProductA, ProductB etc, but here we have abbreviated them.

■ The equipment Mixer 1 is used for the mixing process.

■ There are 3 machines, Packers 1, 2 and 3, any of which can be used for the packing process.

■ The Inspection Center 1 resource is used for the inspection process.

■ The input materials for product A is A-MATERIAL, the input for product B is B-MATERIAL, and so on.

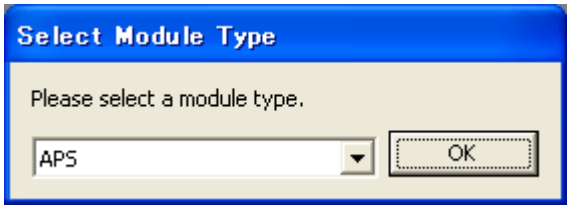
■ The input materials start by going through the mixing process.

■ The result of the mixing process is an ‘intermediate item’, called for example A-Mixing, which will then go into the packing process.

■ Items coming out of the packing process (eg. A-Packing) will next be inspected, after which they finally become the final product item, A, B, C or D.

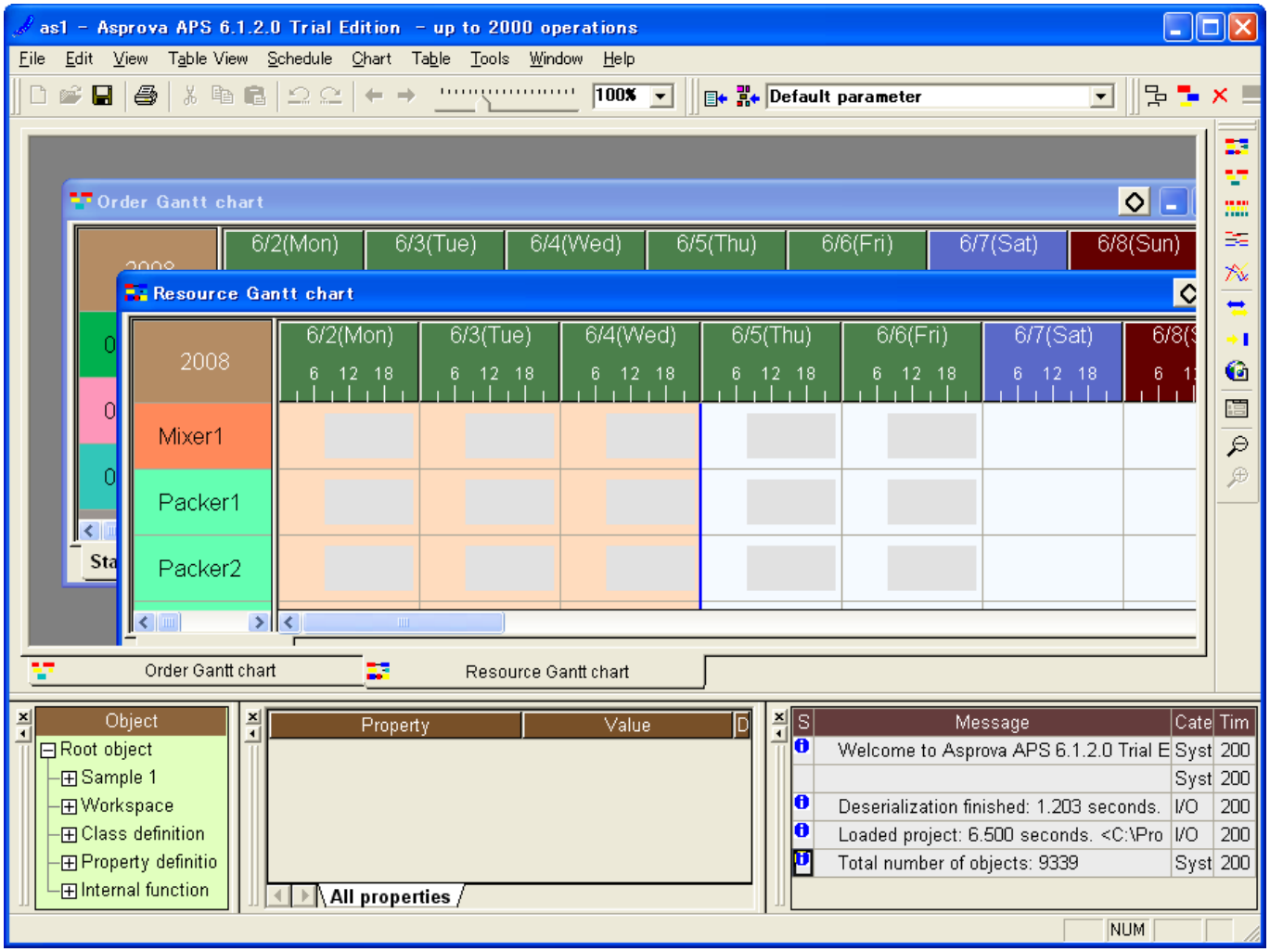
● Let's look at Sample 1.

You can start Asprova APS and open Sample 1 by choosing Asprova APS, Sample, Sample1 from the start menu. This will display the following module type selection dialog. Please select MS and click OK.



Module Type Selection Dialog *

The data for Sample 1 (project) will be then opened. Initially the screen will appear as follows:



Asprova immediately after opening Sample 1

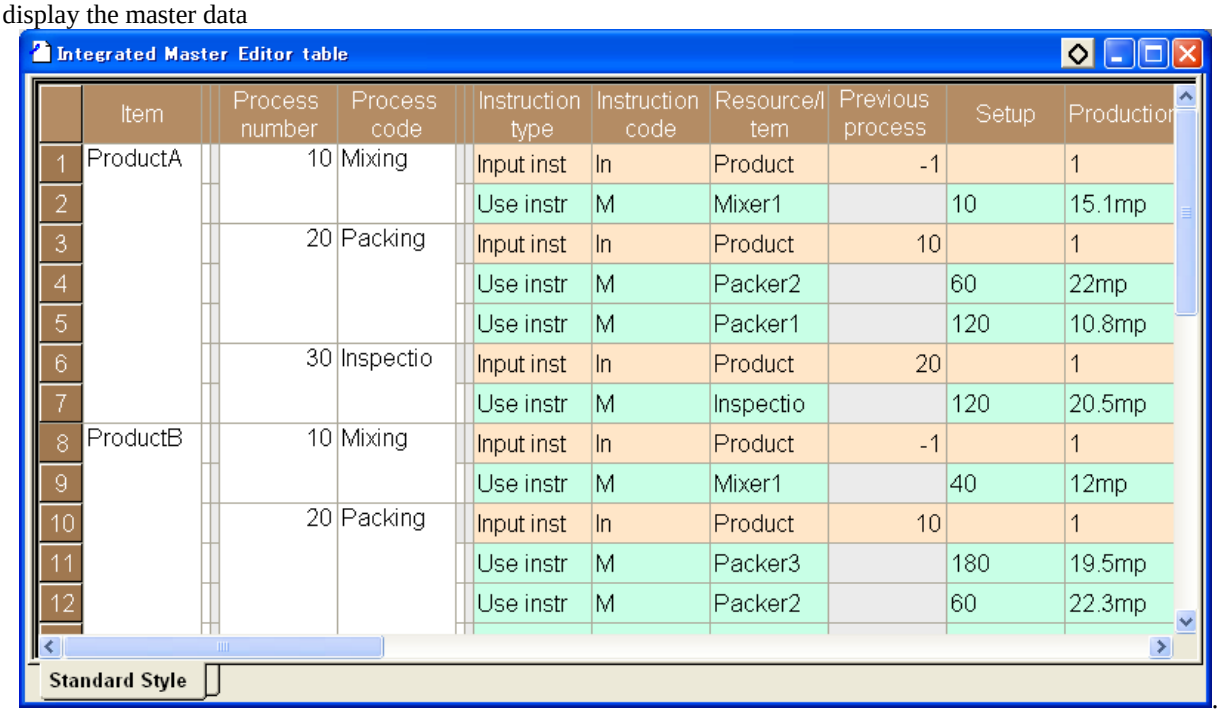
* Asprova APS offers several types of license options. The free version of Asprova allows you to select these at startup to see which is the most appropriate for your requirements.

Integrated Master Editor

You can do maintenance on the bill of materials (BOM), which is the main master data for Asprova. It is possible to set up almost all of the fundamental master data using this one table.

●Let's open the Integrated Master Editor.

You can open the Integrated Master Editor by choosing [Table View/Integrated Master Editor] from the main menu. This will display the master data



	Item	Process number	Process code	Instruction type	Instruction code	Resource/Item	Previous process	Setup	Production
1	ProductA	10	Mixing	Input inst	In	Product	-1		1
2				Use instr	M	Mixer1		10	15.1mp
3		20	Packing	Input inst	In	Product	10		1
4				Use instr	M	Packer2		60	22mp
5				Use instr	M	Packer1		120	10.8mp
6		30	Inspectio	Input inst	In	Product	20		1
7				Use instr	M	Inspectio		120	20.5mp
8	ProductB	10	Mixing	Input inst	In	Product	-1		1
9				Use instr	M	Mixer1		40	12mp
10		20	Packing	Input inst	In	Product	10		1
11				Use instr	M	Packer3		180	19.5mp
12				Use instr	M	Packer2		60	22.3mp

Integrated Master Editor

You can directly input into the integrated master, using features such as copy, paste, filling, etc., in a very similar manner to Excel. In addition, the contents you have changed on the master will be reflected immediately. This enhances the efficiency when editing data. After finishing editing, you can reschedule without quickly, and are able to prepare for planning with the master you have edited.

Settings in the Integrated Master Editor

You can input the following data for Production BOM.

■ Item ■Process no. ■Process code ■Instruction type ■Instruction code ■Item/resource
■Setup ■Production ■Teardown ■Time constraint method ■Time constraint MIN

Generally these are input in order of Item, Process Number, Process Code, Instruction Type, Instruction Code, since specifying each of these makes the next one available to input. So this is to be done from left to right.

Item
Please input the item for finished product.

Process number
Any whole number can be used, and the production of the item will occur in the order given. Usually some space is left between these numbers, for example 10, 20, 30. This way, if it becomes necessary to insert processes between them later, the additional processes can be added (eg. 15 or 25) without changing the existing process numbers.

Process code
Please input process codes. In Asprova, 'code' is just another way of saying 'name'. Typically this is a description of what the process does, mixing, weighing, stamping etc.

Instruction type

There are input, output, and use instructions available for instruction types.

- Input instructions

An input instruction means that some material is required as input to the process. The time constraint method between processes is also set up in the input instruction rows. The following table shows the main contents that need to be set up for the input instruction rows.

Input item	Input details
Instruction code	"In" is the default value, however, you can also specify an arbitrary code. There are different meanings when several input instructions exist for the same process. Asprova will choose one of each unique code as input to the process. So if a process has inputs with differing codes (eg. In0 and In1) then both of these inputs will be used. Where more than one input has the same code (eg. two inputs both have the code In0) then one of those will be used.
Item/resource	The item to be input for the process.
Production	The quantity of the input item required for producing one unit of the output item.
Time constraint method	Specifies the time constraint method between processes.
Time constraint MIN	Specifies the minimum time to be left between processes.

- Use instructions

A use use instruction means that the use of some resource (personnel or equipment) is required by the process. Use instructions also specify the time taken to perform the process by that resource. The main contents to set up for a use instruction are as follows:

Input items	Input details
Use code	"M" is the default value for a main resource, and "Sn" (n: an integer number to be more than 0 and less than 9) is typically used for sub-resources. The criteria for selecting which use instructions to use together are the same as for the input instructions mentioned above.
Item/resource	The name of the resource to use.
Setup	The time required for a setup, if any.
Production	Specifies the time taken to carry out the process with this resource.
Teardown	The time required for teardown/cleanup, if any.
Time constraint method	Specifies the time constraint method between processes.
Time constraint MIN	Specifies the minimum time to be left between processes.

For example with Product A, "A–MATERIAL" will be input into the resource "Mixer 1" to manufacture the intermediate item "A–Mixing". Next, the "A–Mixing" produced by the first process will be input into either "Packer 1" or "Packer 2" to manufacture "A – Packing." Eventually, "A-Packing" will go through the inspection process and be completed as the finished item "Product A".

Here is the integrated master table showing the entries for the first process highlighted in the red outline.

Integrated Master Editor table

	Item	Process number	Process code	Instruction type	Instruction code	Resource/ Item	Setup	Production	Teardown	Time constraint method	Time constraint MIN
1	ProductA	10	Mixing	Input in	In	Product		1		ES	0
2				Use ins	M	Mixer1	10	15.1mp	10		
3		20	Packi	Input in	In	Product		1		ES	120
4				Use ins	M	Packer	60	22mp	0		

Integrated master editor settings for the mixing process

Instruction code

- For an input instruction

"In" is set by default, however, you can specify an arbitrary code. There are different meanings when several input instructions exist for the same process. If the instruction code is same, this means that one of the input instructions is to be used. On the other hand, if the instruction codes are different, it means that several input instructions are to be used simultaneously (i.e., merger process).

- For a use instruction

The main resource "M" is set by default and the sub resource is to be "Sn" (n: an integer number being more than 0 and less than 9), however, you can specify an arbitrary code.

Item/Resource

- For an input instruction

Please specify the item code to be input for that process.

- For a use instruction

Please specify the resource to be used for that process (A resource refers to equipment, machinery, die, jigs, workers, etc. that are to be used for production.) You can specify more than one resource by separating them with semi-colons. Alternatively you can specify a resource group, and set up groups of resources in the resource table.

Setup

This refers to a setup time required before the process can begin, for example adjusting machinery or getting equipment into position, or warmed up etc. A simple numerical value will be interpreted as a time in minutes. However, you can utilize different units in the same way as for the production time, as explained below.

Production

- For an input instruction

This specifies the quantity of the input item required in order to produce one of the output item of the process.

In the case of Sample 1, "1" is specified for everything. This means that one unit (eg. liter, pound, kilogram) of A-MATERIAL is required to produce one unit of A-Mixing. The required volume is calculated for each process based on this ratio and the production quantity for the order.

For example, it will be as follows:

12 bottles are necessary for Product A - Packer in order to produce one case of Product A.	⇒	12 is specified for the required production quantity.
1 liter is necessary for Product A - Material Mix in order to produce one bottle of Product A - Packer.	⇒	1 is specified for the required production quantity.
1.5 kg is necessary for Product A - Material in order to produce one liter of Product A - Material Mix.	⇒	1.5 is specified for the required production quantity.

When there is a production order of say, “100 cases of Product A” based on the above setting, it would be ‘exploded’ as follows:

ProductA	100 (case)
ProductA-Packing	1200 (bottle)
ProductA-Mixing	1200 (liter)
ProductA-MATERIAL	1800 (kg)

-For a use Instruction
For a use instruction, the production value refers to the capacity (time requirement) of the resource to carry out the process. This can be expressed using certain codes, as follows:

Unit	Meaning
sp	seconds per piece
mp	minutes per piece
hp	hours per piece
ps	pieces per second
pm	pieces per minute
ph	pieces per hour
s	seconds
m	minutes
h	hours

The first six codes in the table mean that the time taken to carry out the process will vary with the quantity that is being produced. The last three can be used when the quantity being processed makes no difference to the time taken.
In our example, the production time for the first process is given as 15.1mp or “15.1 minutes per piece”. So if the quantity being processed is 10, the time taken will be 151 minutes. The setup and teardown values are simply 10, so they will take ten minutes regardless of the quantity being processed.

Teardown
This refers to a teardown time after the process has completed, perhaps for cleaning machinery etc. As for the setup time, a simple numerical value will be interpreted as a time in minutes, and more complex settings can be given in the same way as for the production time.

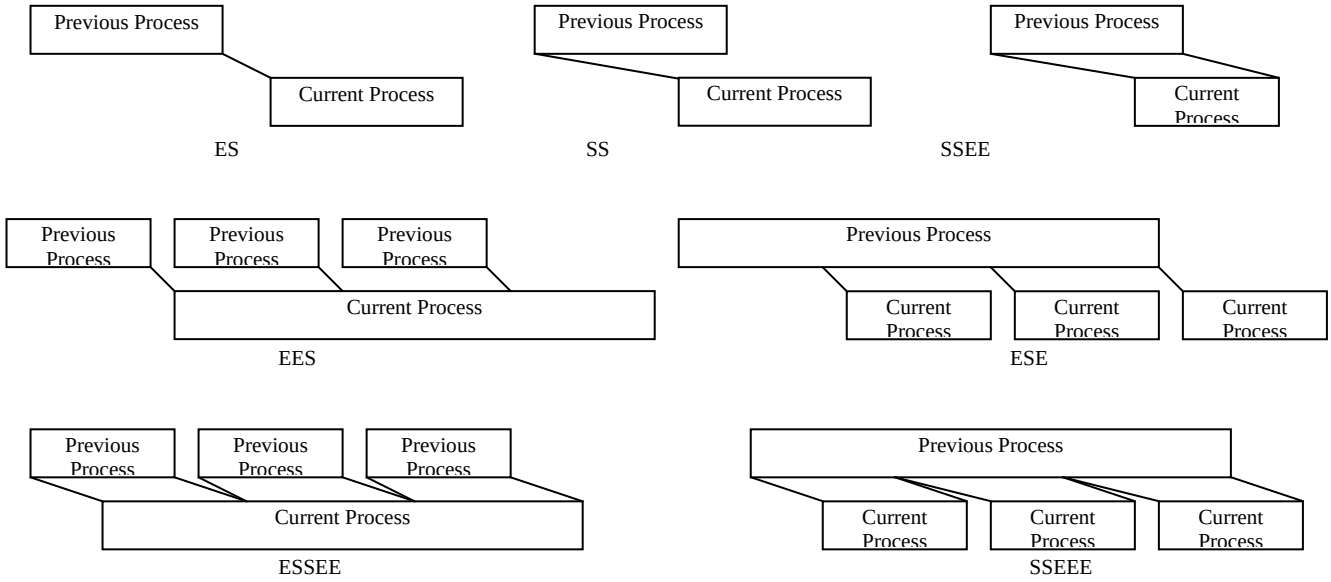
Time Constraint Method, Time Constraint MIN

Time Constraint Method and Time Constraint MIN specify the time constraint relationship between processes. You can set these up for both input instructions and use instructions.
When Time Constraint MIN for input instructions is blank, Time Constraint Method and Time Constraint MIN are taken from use instructions.

- Time Constraint Method

Time Constraint Method represents the time relation with the previous process. There are different types of such methods as stated below.

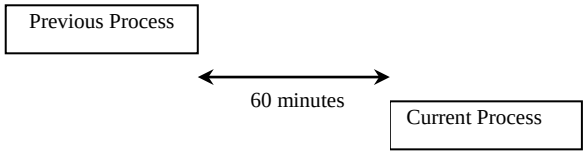
Unit	Meaning
ES	End-Start. The previous process must finish before this process can start.
SS	Start-Start. The previous process must start before this process can start.
SSEE	Start-Start, End-End. The previous process must start before the current process can start, and it must end before the current process can end.
EES	Each-End-Start. Where multiple previous processes exist, each previous process must end before its relevant portion of this process can start.
ESE	Each-Start-End. Where this process is one of many coming from a single previous process, the relevant portion of the previous process must end before this process can start.
ESSEE	Each-Start-Start, End-End. As for EES but with the additional constraint that previous processes must occur in sequence.
SSEEE	Start-Start, End-End-Each. As for ESE but with the additional constraint that this process must occur in sequence with its 'sibling' processes.



- Time Constraint MIN

You can specify the minimum time to be left between processes. A simple numeric value will be interpreted as a value in minutes. In this example, 60 are specified for the inspection process for Product A meaning a one hour wait is necessary.

The right figure is the case where ES and 60 are specified for Time Constraint Method and Time Constraint MIN respectively. This means that a minimum of 60 minutes is to be left between the production finish time of the previous process and the production start time of this process.

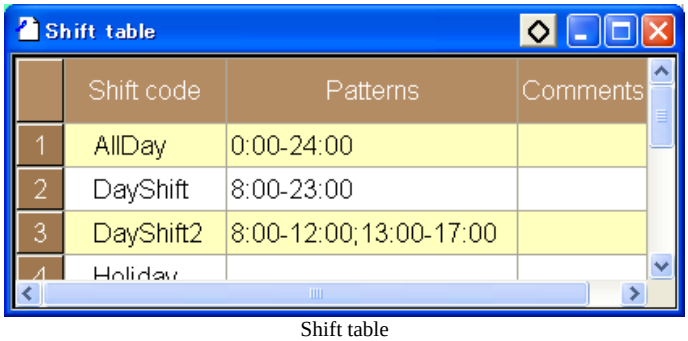


Now let's look at some other settings which are required to produce a schedule.

Shift Table

● Shift table

The shift specifies the patterns for working shifts during a day. You can open this from [Table View/Shift] on the main menu.



Shift table

Shift code

This specifies the name for a type of shift. It is convenient to register different patterns such as normal-time, over-time, etc. in advance, then these can be referred to later on the calendar table.

Patterns

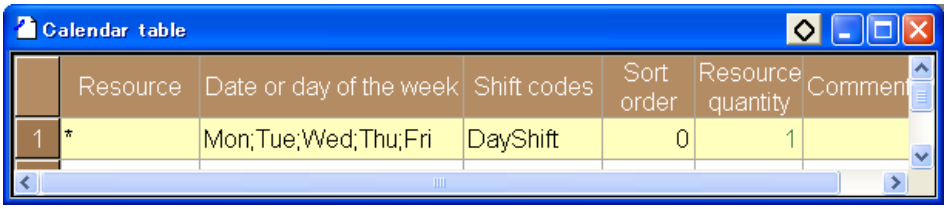
This sets up the working times for the shift. When a hyphen (-) connects two times, the interval between those times becomes the working time. To specify multiple operational times, you can separate them with semicolons.

Pattern	Meaning
8:00-12:00 ; 13:00-17:00	From 8:00 to12:00 and then from 13:00 -17:00 (one hour break from 12:00 to 13:00)
8:00-10:00 ; 10:15-12:15 ; 13:00-17:00	From 8:00 to 17:00 with a 15 minute break at 10:00 and a 45 minute break at 12:15

Calendar Table

● Calendar table

The calendar specifies a shift for each resource and day. You can open this from [Table View/Calendar] on the main menu.



Calendar table

Resource

Specifies the resource for the calendar setting. In the example in Sample 1, this is given as an asterisk (*) which means "every resource", but individual resources can be set here too.

Date or day of the week

Specifies which days this shift applies to. You can directly specify dates or ranges of dates, or a day of the week or range of days of the week. Multiple values can be given, separated by semicolon as in the example above. Here are some more example settings:

Specified date(s)	Meaning
Mon	Monday
Mon – Fri	From Monday through to Friday.
2008/1/1	2008/1/1
2008/1/1 – 2008/1/3	From 2008/1/1 through to 2008/1/3
*	All dates (every day)

Sort order

Specifies the priority of calendar settings. Where multiple settings are relevant to the same resource and day, that with the larger sort order will be applied.

Shift codes

Specifies the shifts applicable to the resource code and the date.

Examples:

Resource	Specified date(s)	Sorting order	Shift code
*	Mon – Fri	1	Day Shift
*	2007/2/5	10	Day off

2007/2/5 is a Monday, so both of these settings are relevant. However, the larger sorting order is to be applied. As a result, this day will become a "day off."

Resource	Specified date(s)	Sorting order	Shift code
*	Mon - Fri	10	Day shift
*	2007/2/5	1	Day off

2007/2/5 is a Monday, so both of these settings are relevant. However, the larger sort order is to be applied, which results in this day becoming a "day shift".

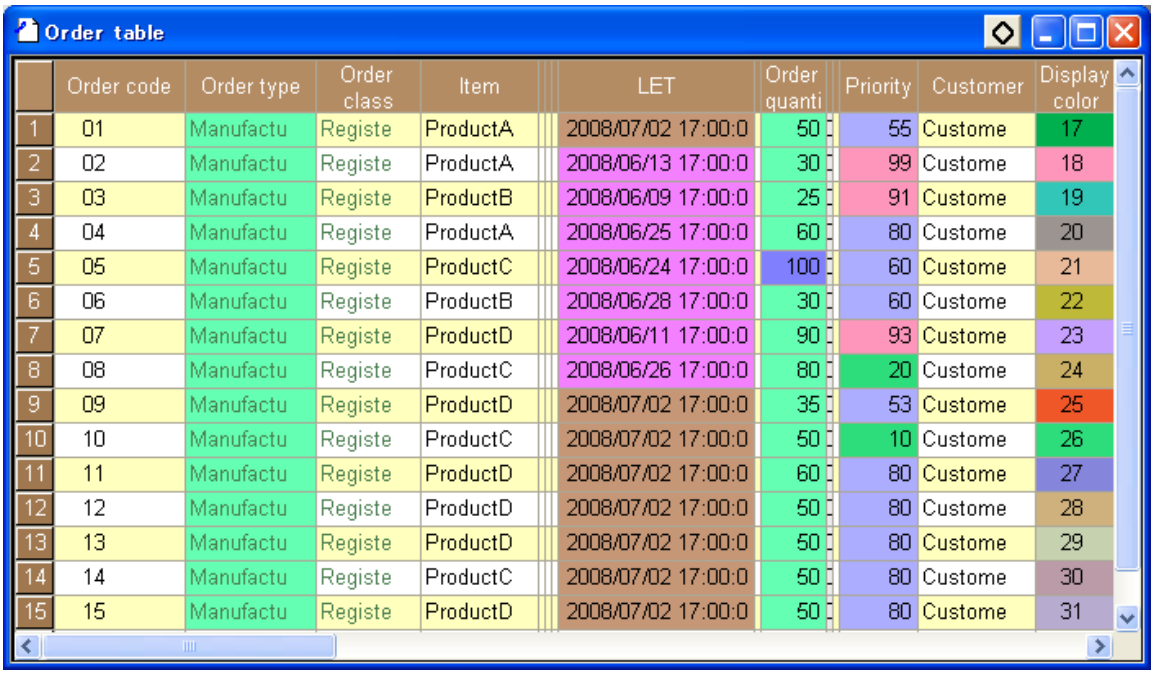
Generally wide ranging settings such as asterisk will be given a small sort order to lay down the typical shift settings for a normal week, then the exceptions to the rule (eg. public holidays) can be given higher sort order numbers to override this.

When these three tables (i.e., integrated master, shift, calendar) are set up, the basic master settings are complete.

Order Table

Order table

When you are finished with the master settings, the next thing is to specify orders. You can display the order table by selecting [Table View/Order] from Menu.



	Order code	Order type	Order class	Item	LET	Order quanti	Priority	Customer	Display color
1	01	Manufactu	Registe	ProductA	2008/07/02 17:00:0	50	55	Custome	17
2	02	Manufactu	Registe	ProductA	2008/06/13 17:00:0	30	99	Custome	18
3	03	Manufactu	Registe	ProductB	2008/06/09 17:00:0	25	91	Custome	19
4	04	Manufactu	Registe	ProductA	2008/06/25 17:00:0	60	80	Custome	20
5	05	Manufactu	Registe	ProductC	2008/06/24 17:00:0	100	60	Custome	21
6	06	Manufactu	Registe	ProductB	2008/06/28 17:00:0	30	60	Custome	22
7	07	Manufactu	Registe	ProductD	2008/06/11 17:00:0	90	93	Custome	23
8	08	Manufactu	Registe	ProductC	2008/06/26 17:00:0	80	20	Custome	24
9	09	Manufactu	Registe	ProductD	2008/07/02 17:00:0	35	53	Custome	25
10	10	Manufactu	Registe	ProductC	2008/07/02 17:00:0	50	10	Custome	26
11	11	Manufactu	Registe	ProductD	2008/07/02 17:00:0	60	80	Custome	27
12	12	Manufactu	Registe	ProductD	2008/07/02 17:00:0	50	80	Custome	28
13	13	Manufactu	Registe	ProductD	2008/07/02 17:00:0	50	80	Custome	29
14	14	Manufactu	Registe	ProductC	2008/07/02 17:00:0	50	80	Custome	30
15	15	Manufactu	Registe	ProductD	2008/07/02 17:00:0	50	80	Custome	31

Order table

Order code

This is a code to distinguish the orders. In the example these are given the naming 01 through to 15 but there is no requirement that the code be numerical – any type of naming can be given.

Item

The item of production for the order.

LET (Latest end time)

The latest end time is the due date for the order. You can specify it down to the second.

Order quantity

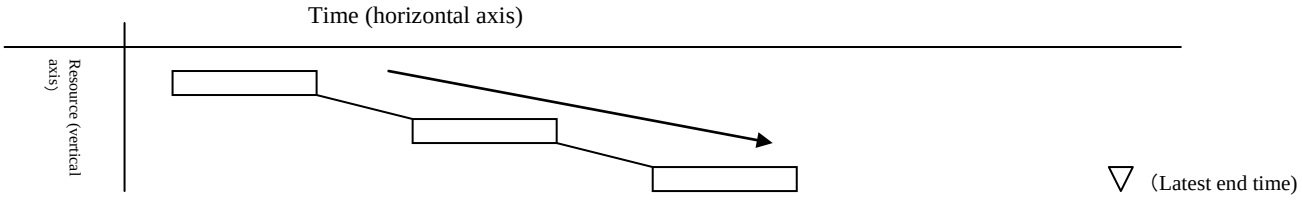
Specifies the quantity for production.

Priority

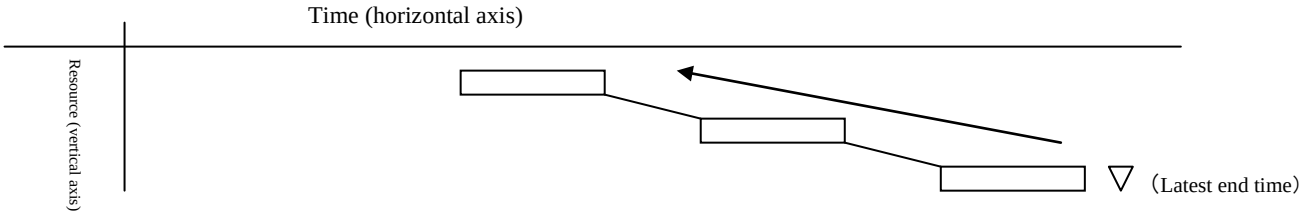
This numeric value specifies how orders are prioritized during assignment. You can specify the priority as a numeric value more than 0 and less than 100. In this case, the larger value is normally prioritized. Depending on the value of priority, the order's assignment direction is determined, as stated below.

Range of order priority	Assignment direction
More than 90 and less than100	Forward assignment
More than 50 and less than 90	Backward assignment
More than 0 and less than 50	Forward assignment

Forward assignment seeks for the earliest possible assignment date, starting from the initial process.



Backward Assignment takes place by assigning a final process to the date, which is closest to a delivery date. Then the assignment tracks back toward previous processes.

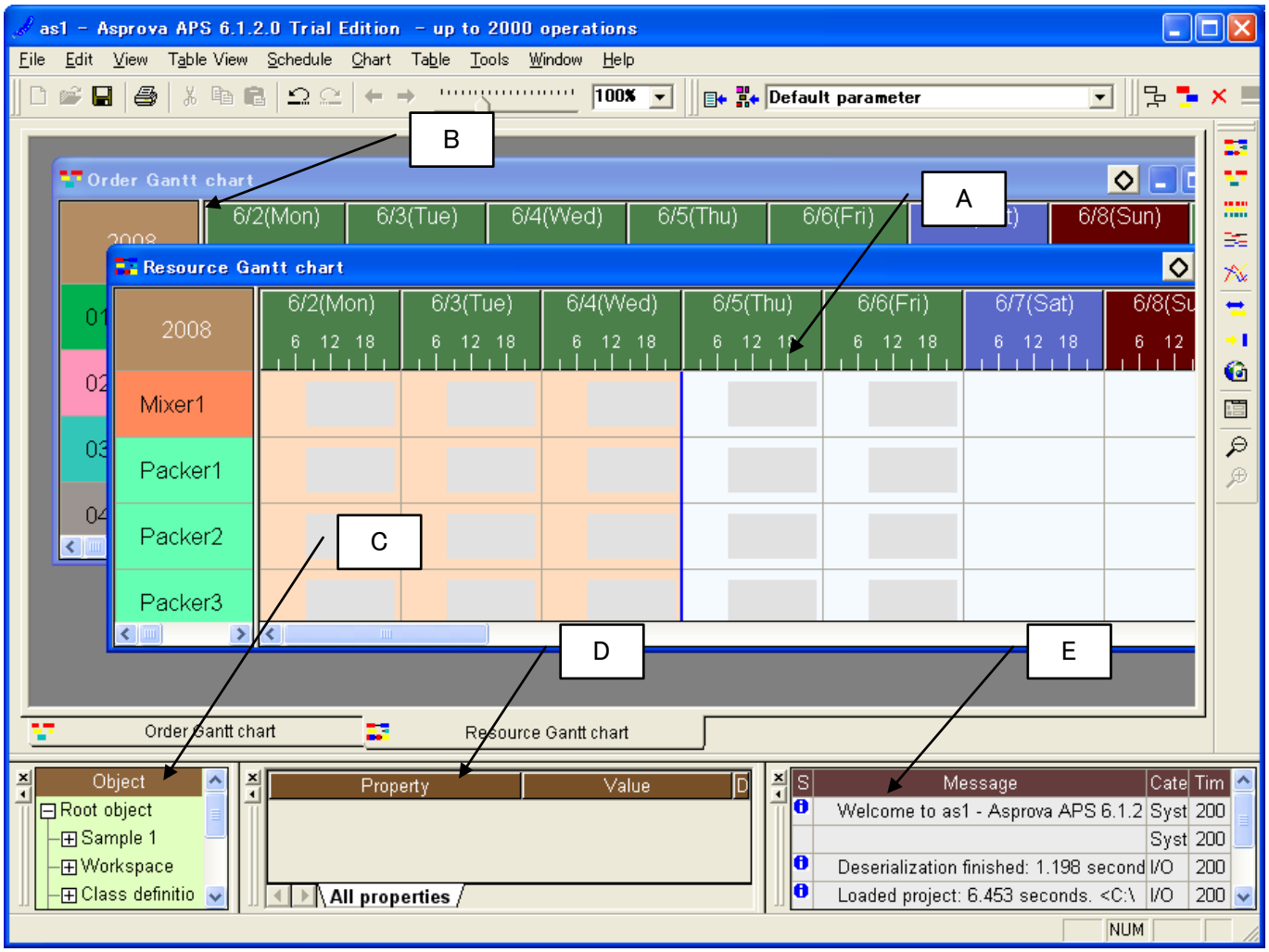


When the priority is more than 90, it is assigned toward the beginning. So this is often used for an urgent order. When it is more than 50 and less than 90, the final process is assigned near the delivery date. So this is used for orders which are to be done on a just-in-time basis. When the priority is less than 50, it follows after the urgent orders and the just-in-time orders. So it will be assigned so as to fill the gaps on the Gantt chart.

When you are finished with the input of the master and the orders, it is now ready to prepare for a schedule.

Let's do scheduling.

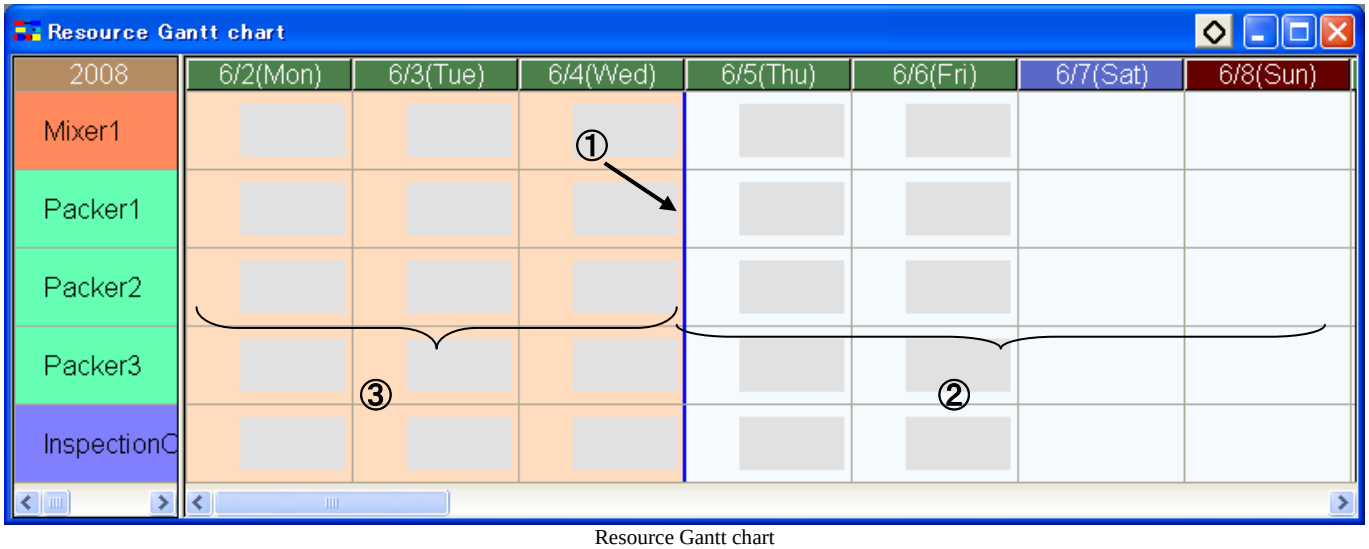
Sample 1 displays a resource Gantt chart (A), order Gantt chart (B), object window (C), property window (D), and message window (E).



Right after Asprova opened Sample 1

● How to interpret a resource Gantt chart

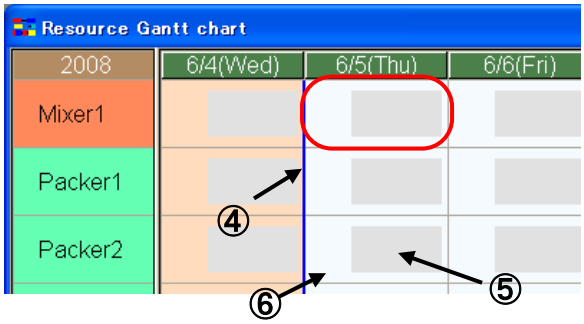
A resource Gantt chart is a chart with the vertical axis representing resources and the horizontal axis representing time. This is the main chart for Asprova.



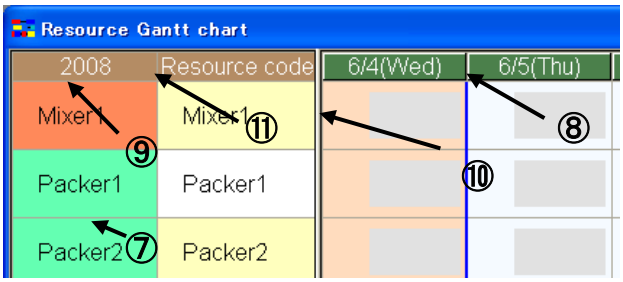
Resource Gantt chart

On the resource Gantt chart, the blue line (1) indicates the planning start time. The right side of this line is the planning period (2) and its left side is the past (3).

The quadrangle where a resource and a date are crossed is called a cell (4). The grey portion inside the cell indicates an operational time (5), while the other portion (white: planning portion, pink: past) refers to non-operational time (6).

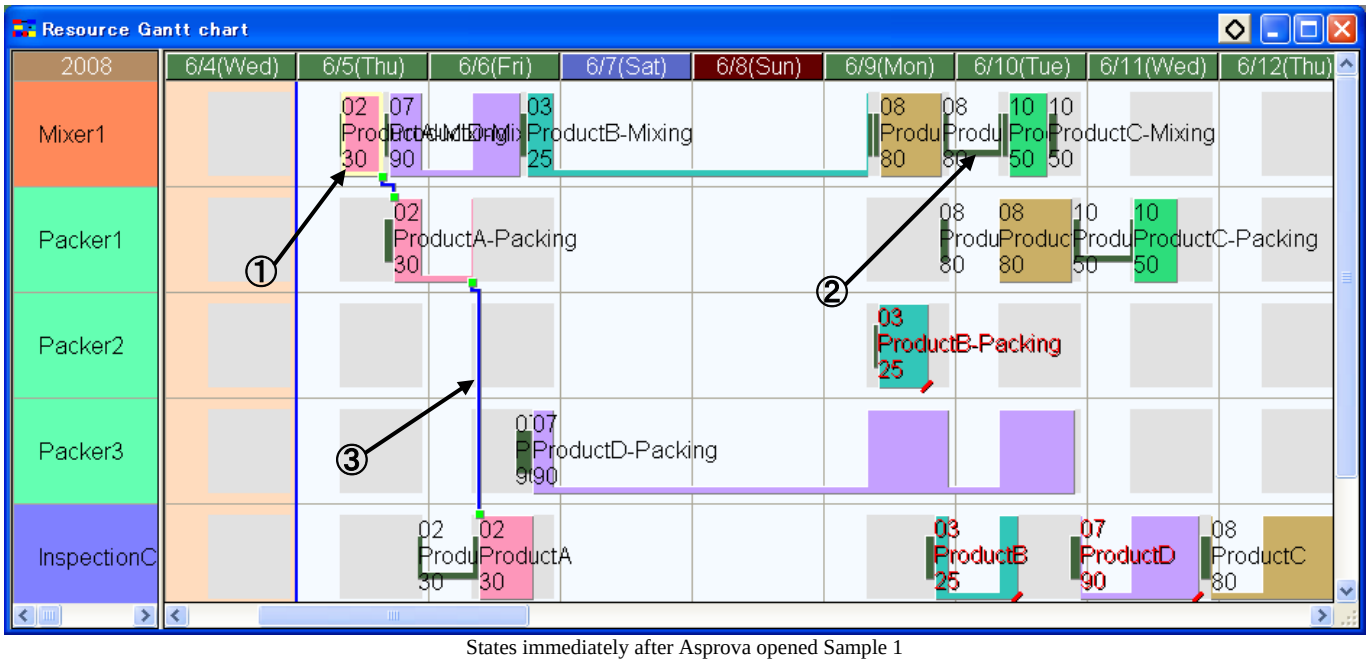


When you move a mouse cursor on the border between resources (7), move a mouse while holding down the left button of a mouse and release your hand at your desired point, you can adjust the height of a cell. In the same manner, you can adjust the width of a cell on the border between dates (8), the height of the horizontal axis (i.e., date axis) on the place between a resource and a year (9). In addition, you can change the width of a vertical axis (i.e., resource axis) on its axis, by moving (11). The splitter between the chart side and the table side (10) can also be moved, to view the resource table on the left.



● Rescheduling

When you click the “reschedule” button (), Asprova automatically do scheduling at a high speed based on the master and the order, and displays the assignment results on the Gantt chart. Let’s check the resource Gantt chart after rescheduling is done.



States immediately after Asprova opened Sample 1

The bar (1) indicates an operation. As Sample 1 is specified with 3 processes (material mix, packer, inspection), 1 order is composed of 3 operations. In addition, as the display color of the operational bar is specified as an order, the operations of the same order show in the same color.

The narrow bar which is either located between the operations (2) or in front of the operation indicates a setup time. The setup time you have specified is assigned in manner.

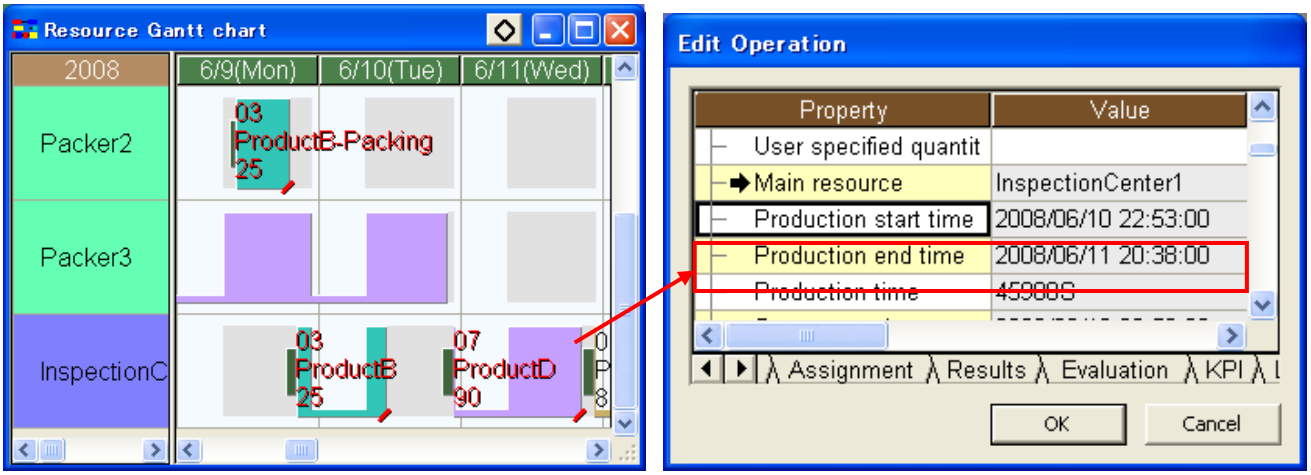
Three lines of text are displayed inside the operation. This can be customized by the Use instruction bar text property. The first line shows the order code. The second line shows item which this process outputs, and the third line is the quantity for which production is under way. When you place a mouse cursor on the operation, information is also displayed in the

tooltip. You can customize the tooltip text too. Thus you can prepare for an easy-to-understand Gantt chart where a variety of information is on display.

When you click on an operation, the line (3) will be displayed. This line is called an operation connecting line. As it connects operations of the same order, it is easy to recognize where the previous and next operations are assigned.

Looking at the operation for order 07 which is assigned from 6/10 to 6/11 for Inspection 1, the characters are shown in red and a red check mark is placed in the right lower corner of the operation. This indicates that the delivery date will not be met. The packing and inspection of order 03 are also delayed.

Let's look at the information for the inspection operation of Order 07.
Right click on the inspecting operation and select [Operation/Edit Operation] from the pop up menu. The property window for the operation will be displayed.

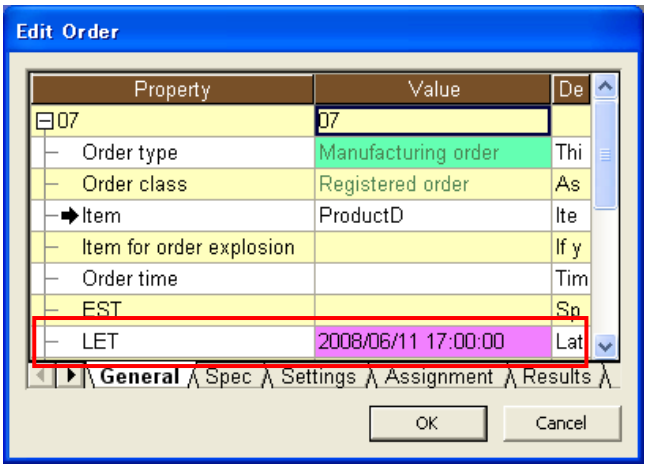


Display of a delayed delivery date (right) and the property window for the targeted operation

Please select the tab [All properties] from Property Window. When you scroll it downward a little and look at [Production end time]," it reads as 2008/06/11 20:38. Close the property window by clicking the OK button.

Next, let's verify a delivery date using the order information. Right click on the inspection operation and select [Order/Edit Order] from pop up menu. After that, Property Window will be displayed.

When you look at [Latest end time] in the tab [General] located in the Property Window, it reads as 2008/06/11 17:00.

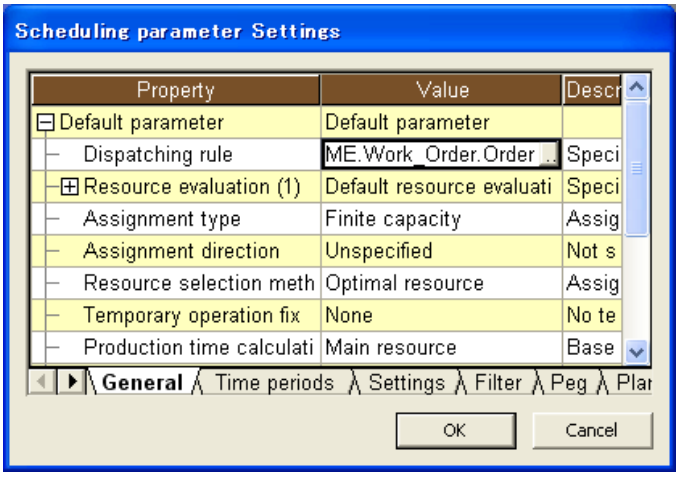


When this is compared with "Production end time" for the operation, you will notice that it will be late by approximately 3.5 hours.

We cannot leave this late delivery date as it is. It seems appropriate to revise the planning by changing the assignment to another resource.

Let's revise the planning now.

Adjusting the schedule.



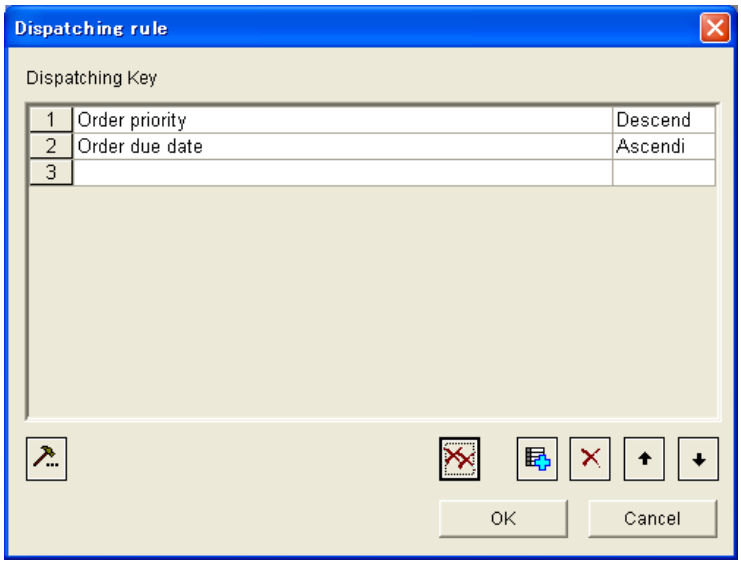
● Changing the scheduling parameter.

The scheduling parameter, “Default parameter” is used as the current schedule result.

Please click the command button to set up a parameter, which is located on the left side of “Current Planning Parameter” (above image).

The property window for a planning parameter setup will be displayed. When you click the mark  , which will be displayed after you click the cell of the property value for “Dispatching Rule,” the dispatching rule setup dialog, which specifies the order for the assignment processing, will be displayed.

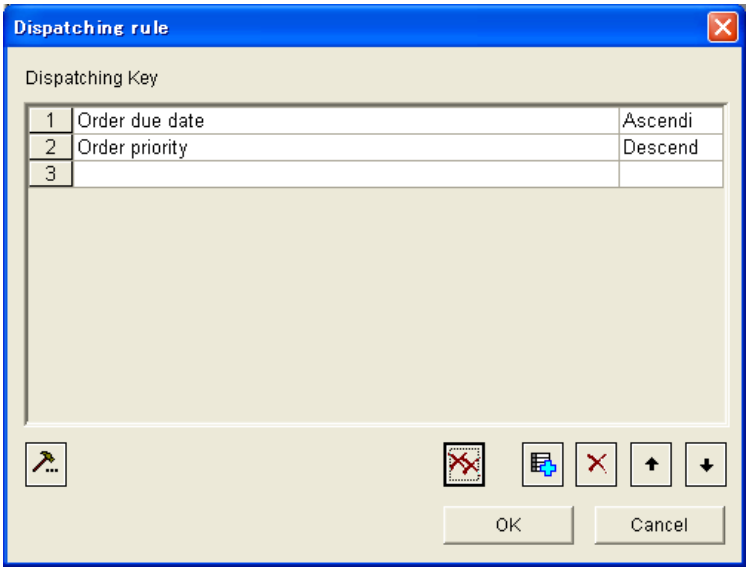
When you look at Dispatching Rule Setup Dialog, order priority (descending order) and the order delivery date (ascending order) are set up for the first and second key respectively.
In this state, the early delivery date orders are scheduled when the order priority is low. This causes the assignment order to take a backseat. Therefore, it is more likely that a delivery date will be delayed.



Dispatching rule setup dialog

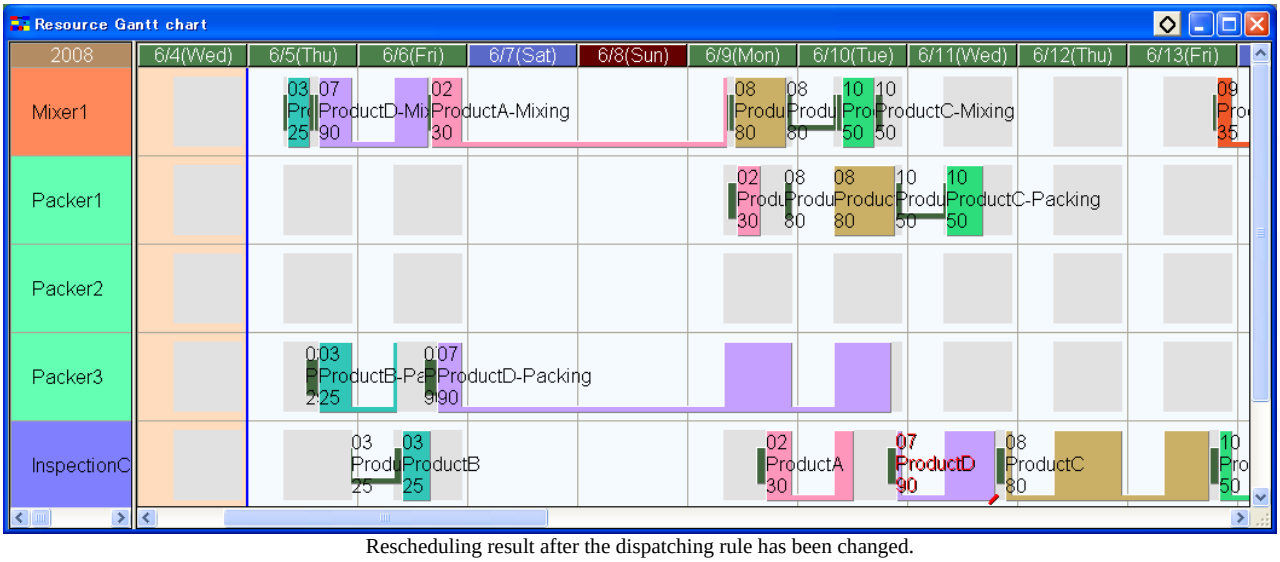
Accordingly, let’s switch this order to emphasize the delivery date.

A dropdown list box will be displayed when you select the cell for a dispatching key from Dispatching Rule Setup Dialog. Please setup an order delivery date (ascending order) for the top priority key and an order priority (descending order) for the 2nd key. As a result, the dispatching rule, which has emphasized a delivery date, has been set up. Let's click the OK button and close the dialog.



"Order due date" key has been set up as the first key

Let's reschedule.
When you look at the Gantt chart after rescheduling has been done, you can notice the change that took place on the assignment. In particular, the three delayed delivery date operations have been reduced to one.

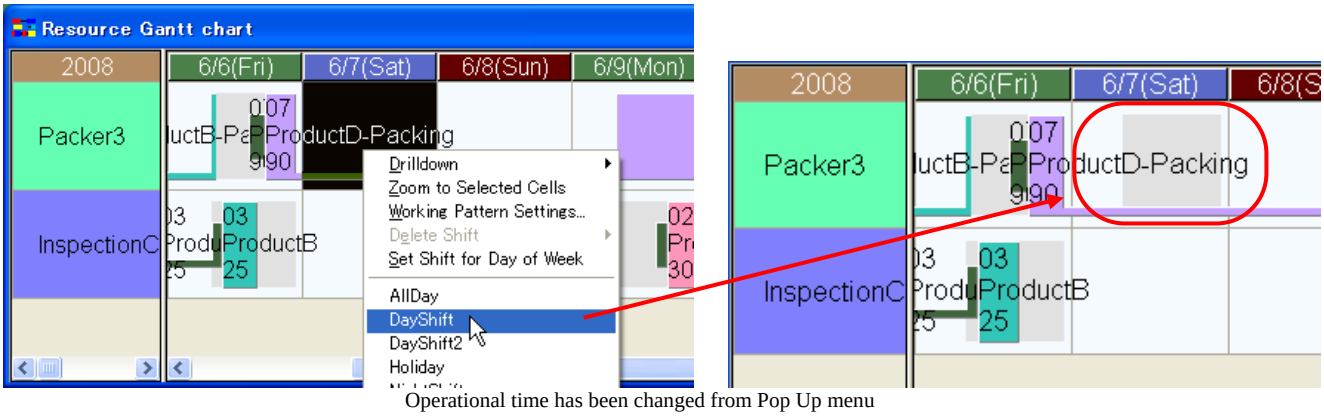


Rescheduling result after the dispatching rule has been changed.

Changing working time

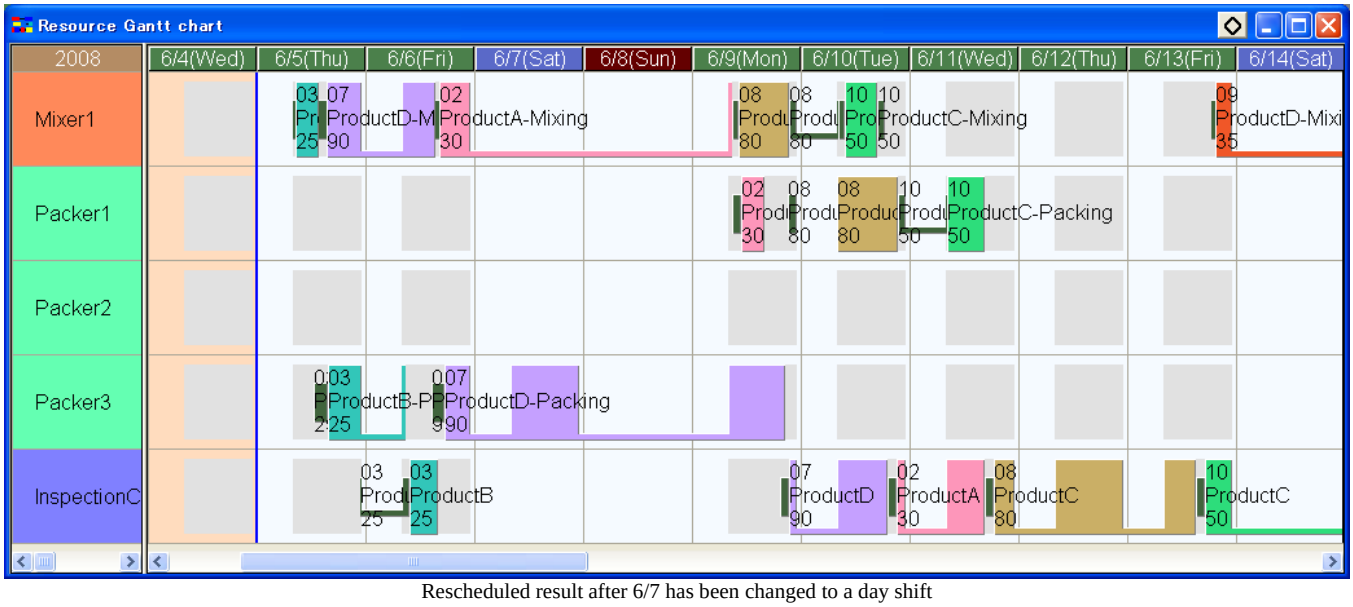
Although you have set up the planning parameter with the emphasis placed on a delivery date, the inspection operation for order 07 is still behind schedule delivery-wise. The packer operation at the previous process for this operation is assigned for Packer 3 from June 6 through 9, striding over Saturday and Sunday.

In this situation, there is a possibility that you can improve the situation by setting up June 7, Saturday, as a working day. Place the mouse on the cell for 6/7, Packer 3, and click the right button. A pop up menu will be displayed. From the shift codes displayed on the pop up menu, select “Day Shift.” After that, 6/7, which used to be a holiday, is now changed as a day shift, and an operational time has been incorporated.



Operational time has been changed from Pop Up menu

Let’s click a reschedule button and execute the assignment. As the result of the rescheduling, the packer operation for Order 7 has been assigned to Packer 3 for 6/7, which has been changed as a day shift. At the same time, the assignment has been shifted toward the left as a whole. This solved the delayed delivery date issue for the inspection operation for Order 07.

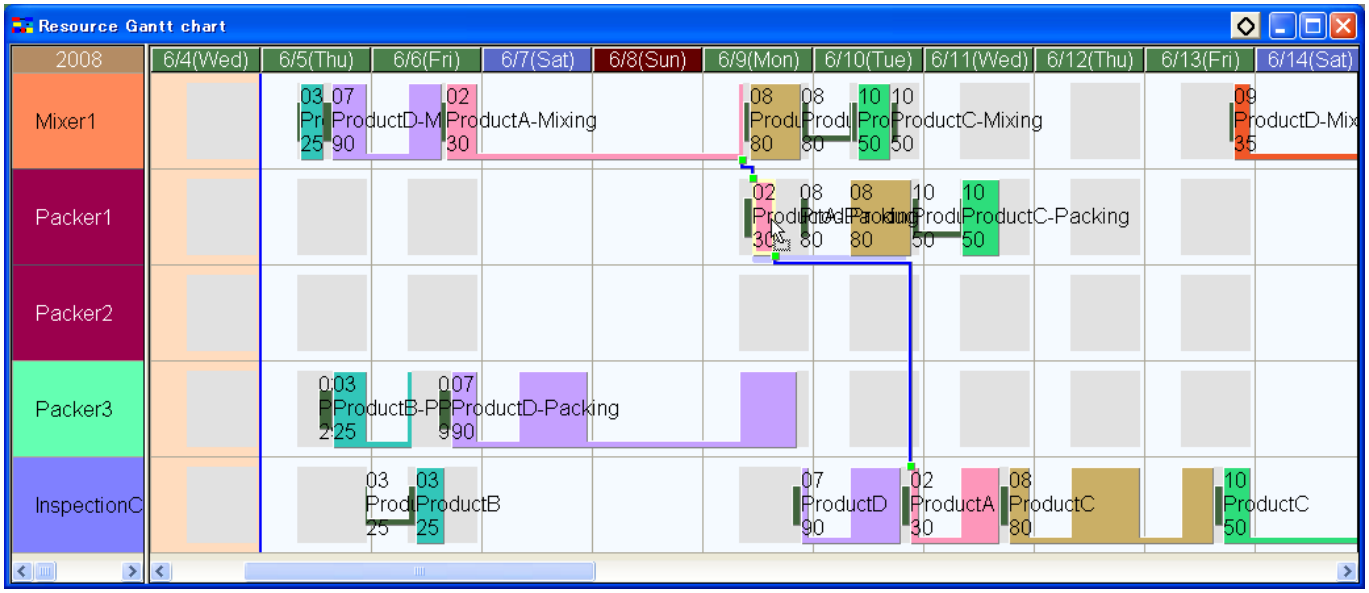


Rescheduled result after 6/7 has been changed to a day shift

Moving operation

You will probably encounter operations for which you want to manually specify their resources or dates while preparing for scheduling. Asprova allows you to use a mouse on the Gantt chart and manually revise the operational assignment.

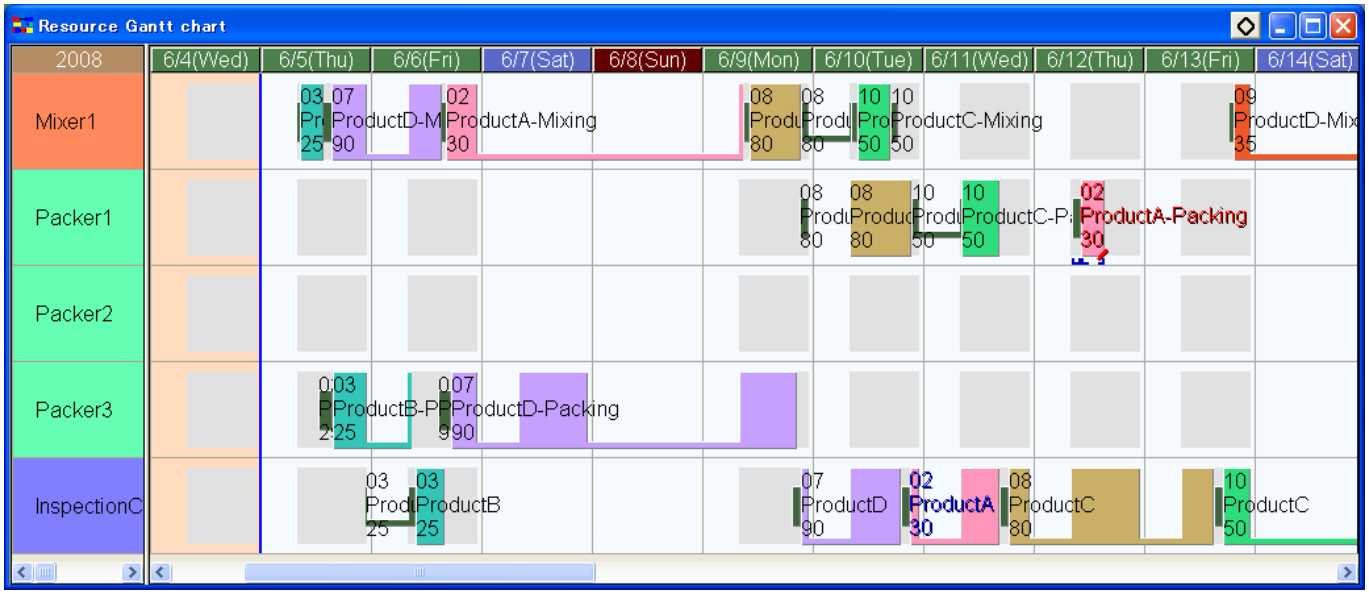
The packing operation for Order 02 is assigned for Packer 2, June 9. Let's manually change this operation to June 12. Use the mouse to drag the packing operation of order 02. Notice the change in the vertical axis while the operation is being dragged. The colors of Packer 1 and Packer 2 have changed to indicate that it's possible to put it on either Packer 1 and Packer 2. Try moving it to June 12 on Packer 1. Drag it while holding the left button of the mouse down, then release the button.



When the left button of a mouse is pressed on the operation

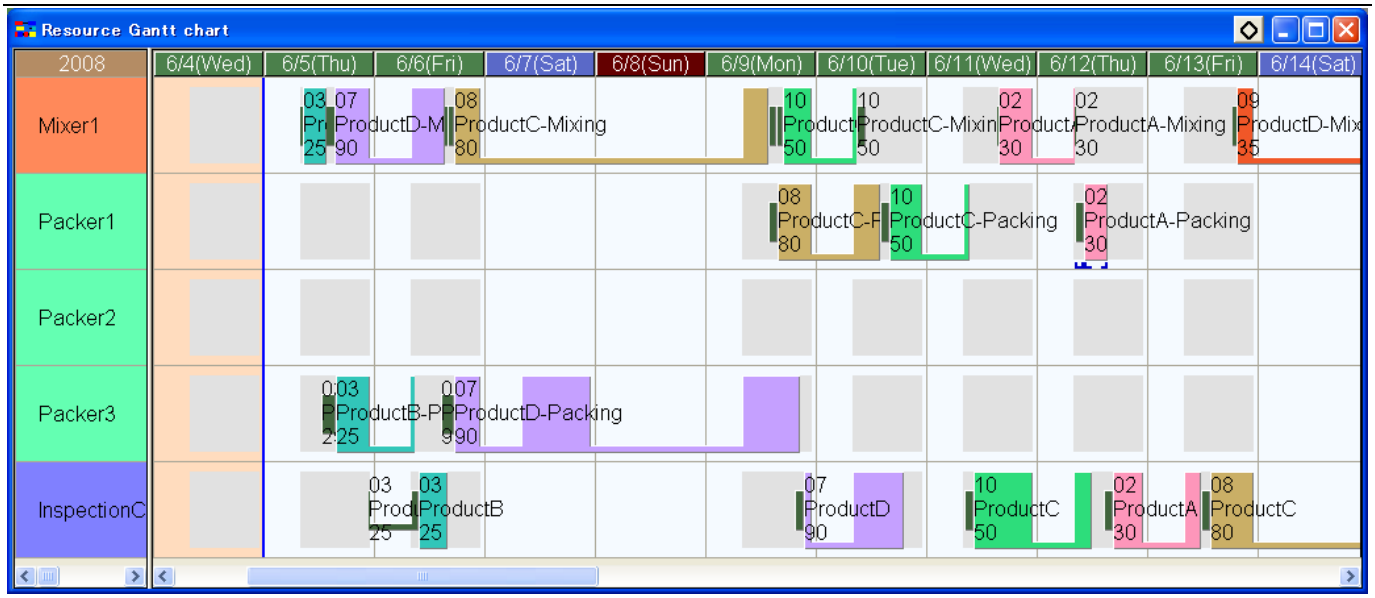
Now you have been able to move the packing operation for order 02 to June 12. A blue mark is placed below the operation, which you have moved. This is the mark to fix the whole operation and means that this operation is fixed at this location.

Furthermore, as to Asprova, it is possible to move the operation by operating the keyboard. You can move the operation with [Ctrl + arrow key] after selecting the operation.



After the operation has moved

Asprova allows you to neglect time constraints between processes while you are moving an operation by a mouse or a keyboard, as in this example where the inspection process now occurs before the packing process. After rescheduling is done, the assignment positions will change for the operations connected to fixed operations, and the violation of time constraints will be corrected.



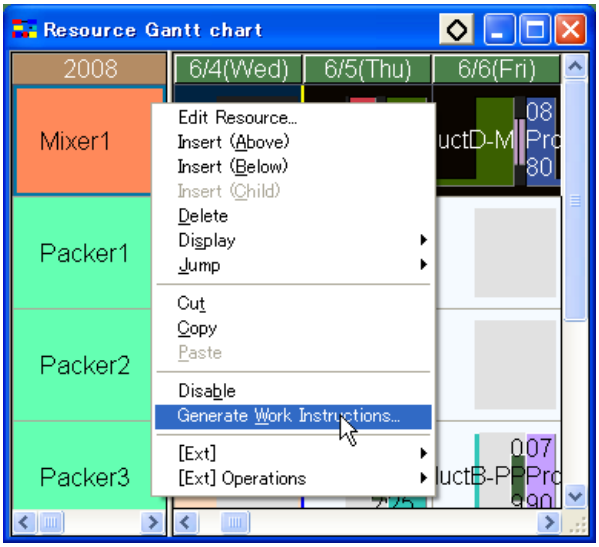
Constraints between processes corrected after the operation was moved and rescheduled

When you have made the schedule through the utilization of various features equipped with Asprova, the schedule can be saved by choosing [File/ Save] from the main menu.

Outputting work instructions

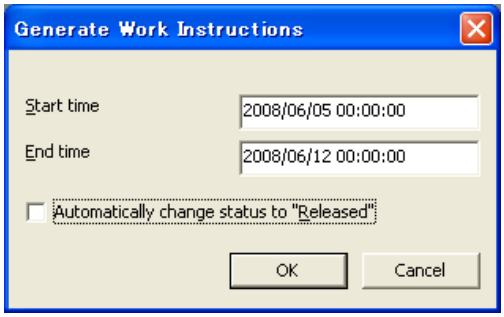
After making a schedule, you can forward it to the shop floor as an work instructions. It is popular to output the planned results of operational instructions externally from Asprova, to utilize them for preparation. Here let's look at the feature for work instructions with which Asprova is equipped.

Please select one or more resource rows on the resource Gantt chart and then click the right button of a mouse. After that, please select [Operational Instruction Preparation] in pop up menu.



Then, Operational Instruction Preparatory Dialog will be displayed. Please adjust both the start time when an operational instruction is prepared and the finish time when it is finished. After that, please remove the check mark from [Automatically changed status to "Released"] and click OK.

* When the checkbox is checked, the status of relevant operations will become [Released].



The operations will be displayed in table format. This list displays the operational details for each resource.

Work Instructions

Resource	Operation	Main output item	Start time	End time	Total use time	Quantity
Mixer1	03:Mixing	ProductB-Mixing	2008/06/05 08:40:00	2008/06/05 13:40:00	5H	25
	07:Mixing	ProductD-Mixing	2008/06/05 15:30:00	2008/06/06 15:30:00	15H	90
	08:Mixing	ProductC-Mixing	2008/06/06 17:20:00	2008/06/09 13:40:00	11H20M	80
	10:Mixing	ProductC-Mixing	2008/06/09 16:50:00	2008/06/10 08:55:00	7H5M	50
	02:Mixing	ProductA-Mixing	2008/06/11 15:35:43	2008/06/12 08:08:43	7H33M	30

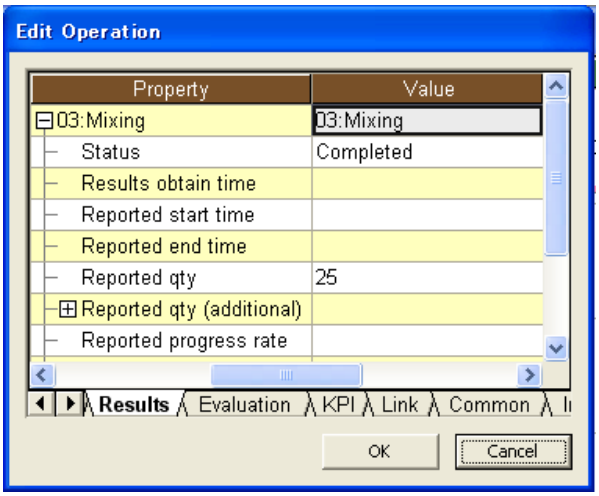
Work instructions table

Inputting results

The shop floor proceeds with production in according with the instructions, and results are returned. A pop up menu will be displayed when you click the right button of the mouse on the operation where the result is input for a resource Gantt chart. After that, please select [Operation/ Results.] The property results of that operation will be displayed on the property window.

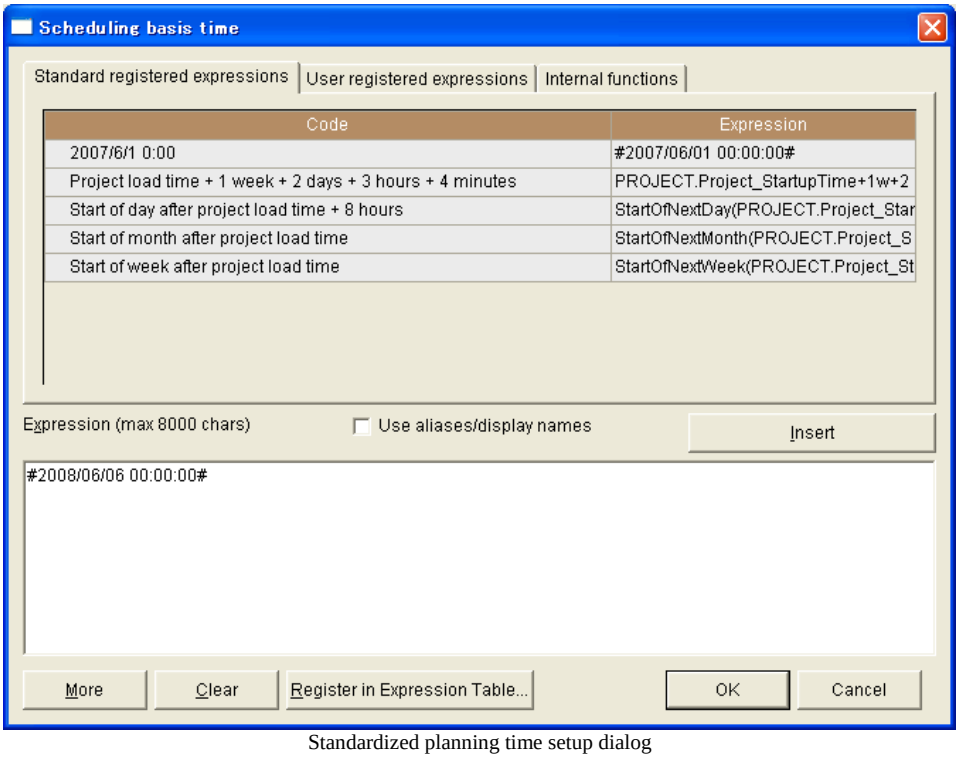
Please input the quantity for [Reported qty] property, which that operation has produced. Then set the [Status] property as [Started] or [Completed.] Suppose that one day of work has resulted in the following results.

Operational code	Result quantity
3:10	25
7:10	10
3:20	23



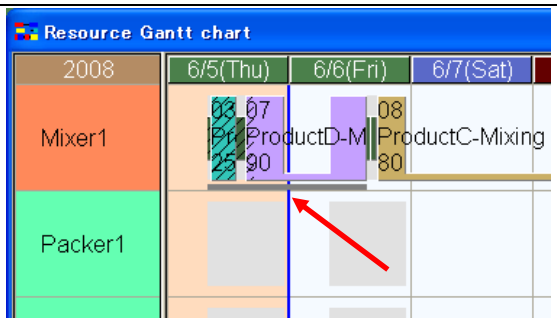
After you have set up [Completed] for STATUS by selecting the operation and inputting the result quantity, the input results will be immediately reflected on the Gantt chart and the diagonal lines with light grey lines will be inserted below the operations. The grey underlines indicate the results for which the results have been input. The shaded area displays the completed portion.

As it is supposed that one day has passed in order to obtain these results, the date also advances one day for Asprova. Please click the right button of a mouse when a cursor is on the date portion for a resource Gantt chart. If you select [Term period settings] in the pop up menu, a property window will be displayed. There is [Scheduling basis time] property. It is currently set up as 2003/06/05. Let's change it to 2003/06/06. Please click the button  . After that, Standardized Planning Time Setup Dialog will be displayed. Please change an absolute time from 2003/06/05 to 2003/06/06 and press the OK button.



Standardized planning time setup dialog

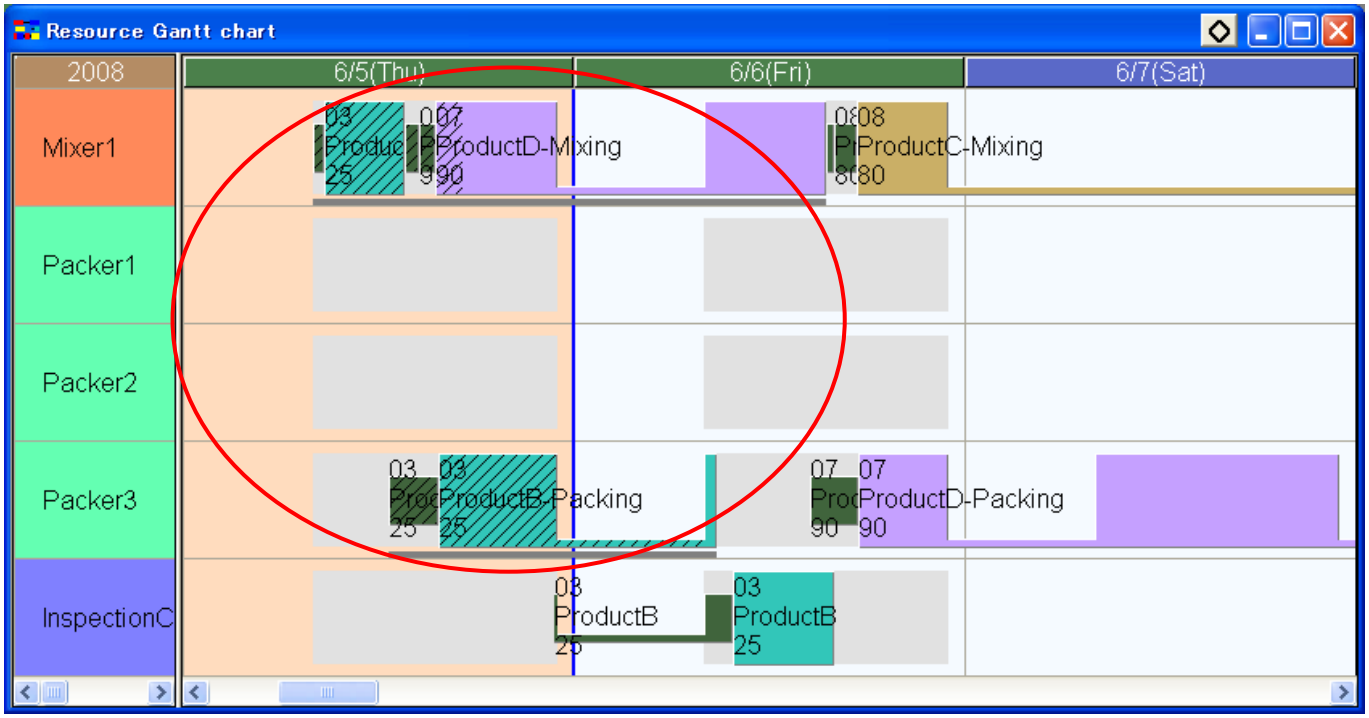
The blue line of a planning start time date has advanced one day which is located between 6/5 and 6/6.



※ The scheduling basis time can be set to the time the project was opened, to save you from changing it every time.

When you look at a Gantt chart on June 5, you will notice these operations now have diagonal lines with light grey lines below them. This indicates the operation where the results have been inputted. The diagonal lines indicate the completed areas.

Material mix operation for Order 03	25 of all planned quantity has been completed.
Material mix operation for Order 07	10 out of 90 planned have been completed.
Packing operation for Order 03	23 out of 25 planned have been completed.



Resource Gantt chart where one-day has advanced for a standardized planning time after the input of results.

The shaded area may be overlapping the right side of a planning start time. Or the area where the diagonal lines are not applied may be overlapping the left side of a planning start time. In this situation, the progress status indicates whether the operation is ahead or behind the schedule.

Let’s add an urgent order.

● Let’s add an urgent order.

Not only results but also order data alters as time passes by. Some of the order data alterations are as follows:

- Adding order
- Deleting order
- Changing quantity
- Changing delivery date
- Changing priority

Here we add one urgent order. Please click [Table View/Order] in the main menu and add one order to the order table.

Order table

	Order code	Order type	Order class	Item	LET	Order quantit	Priority	Customer	Display color
14	⊞14	Manufacturi	Register	ProductC	2008/07/02 17:00:0	50	80	Customer	30
15	⊞15	Manufacturi	Register	ProductD	2008/07/02 17:00:0	50	80	Customer	31
16	Rush order	Manufacturi	Register	ProductD	2008/06/09 17:00:0	10	99.9	Customer	1

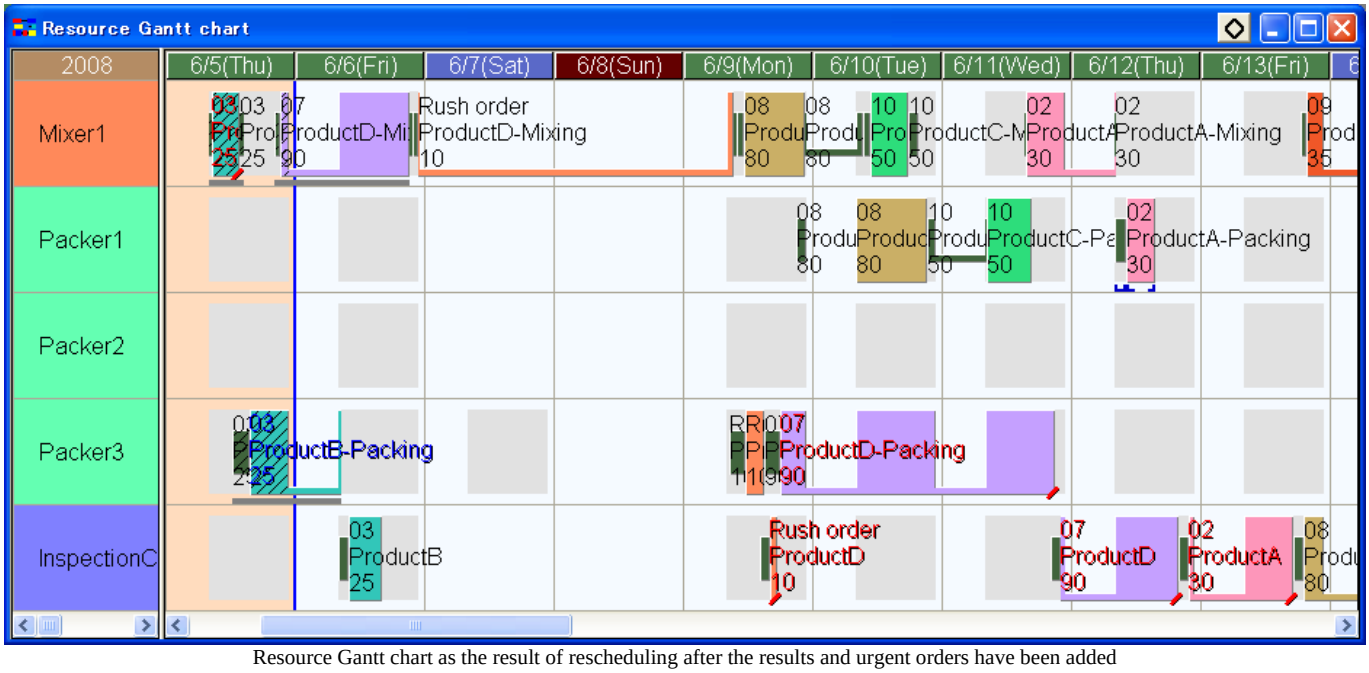
Adding an urgent order

Reflecting the results and urgent order into the schedule.

● Let's reflect results and urgent orders into the schedule.

When the rescheduling is done, Asprova incorporates these progresses/additional orders, and automatically prepares for a new planning. Let's click the rescheduling button.

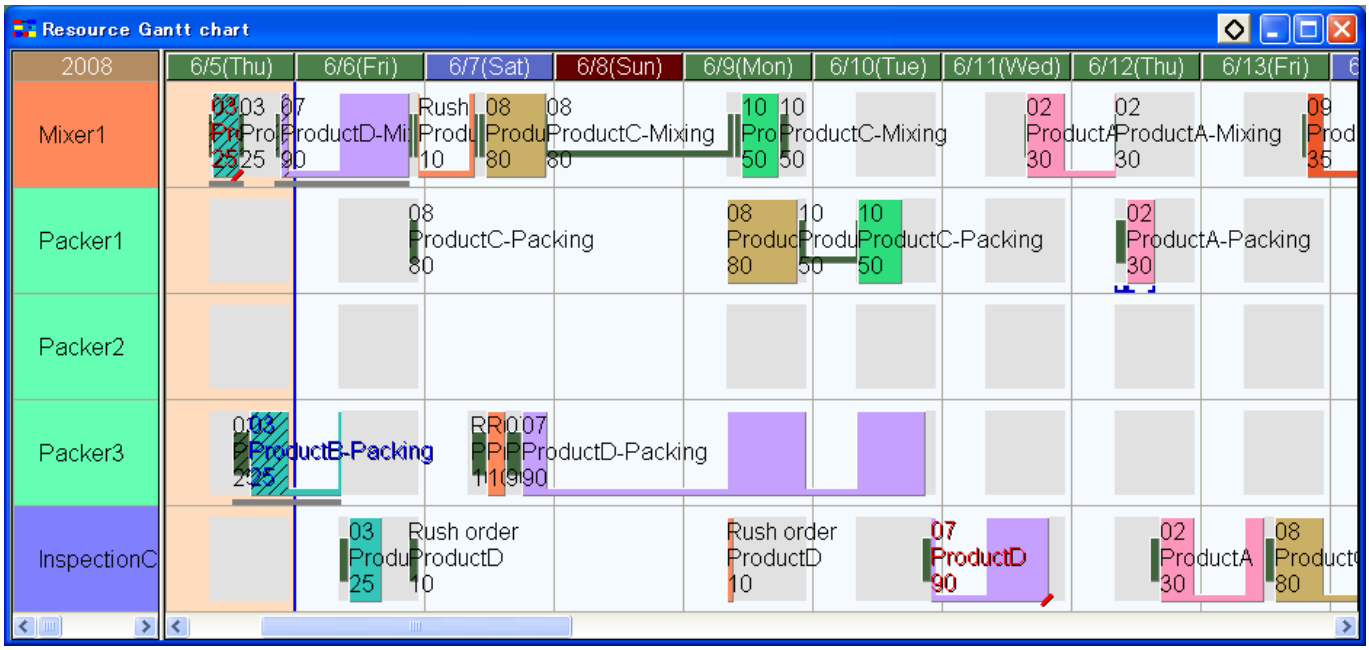
As a result of the rescheduling, the area where diagonal lines are not applied are pushed to the right side of a planning start time and the shaded area receded to the left side of a planning start time. In addition, the added urgent order has been assigned by cutting in the position after the already started operations.



Resource Gantt chart as the result of rescheduling after the results and urgent orders have been added

However, the delayed delivery date operation has newly occurred due to the effects of result or urgent order. From now on, we repeat a series of operations by revising and storing the planning, and giving instructions to the shop floor in accordance with various ways we have learned so far.

As referred to in the above condition, the "Mixer 1" of 6/7 has been changed to a day shift. The following chart shows the result where the rescheduling has been done.



Example: rescheduling result after changing "Mix 1" for 6/7 from a day to a daytime working

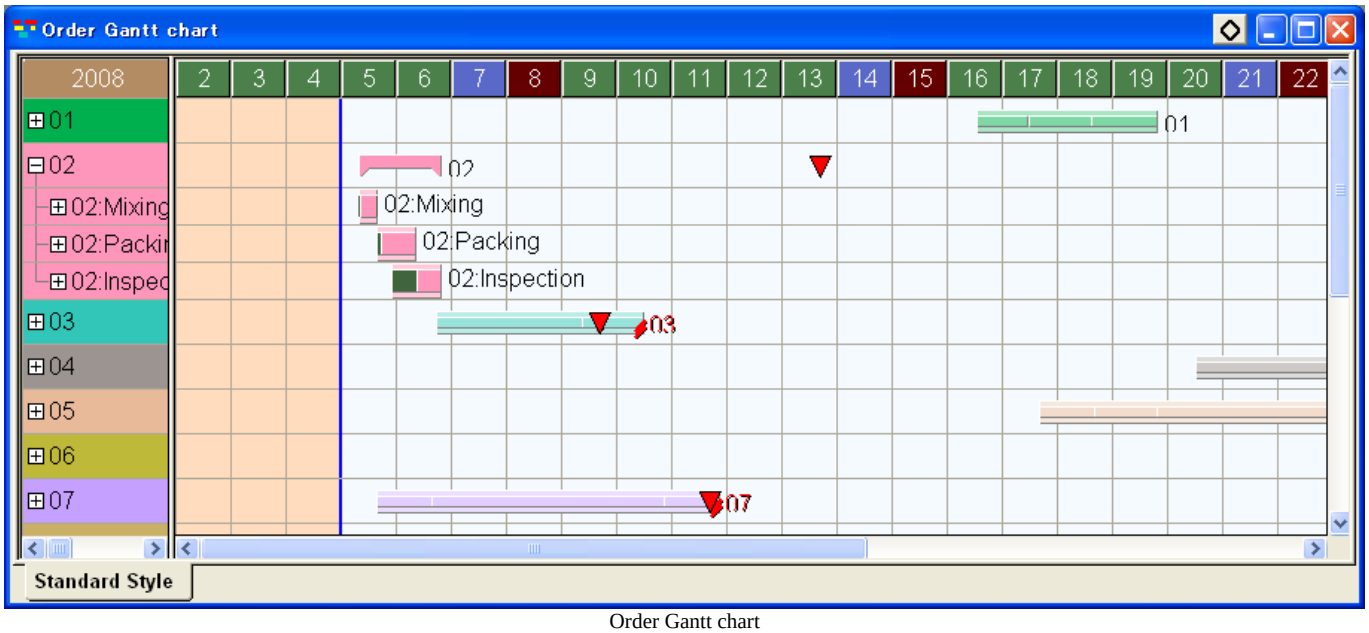
That's all about the basic operations for Asprova.

Let's look at other charts.

We have so far explained the resource Gantt chart only as far as Asprova 2003 charts are concerned. However, the standard version of Asprova 2003 is equipped with several windows other than resource Gantt charts.

● Order Gantt chart

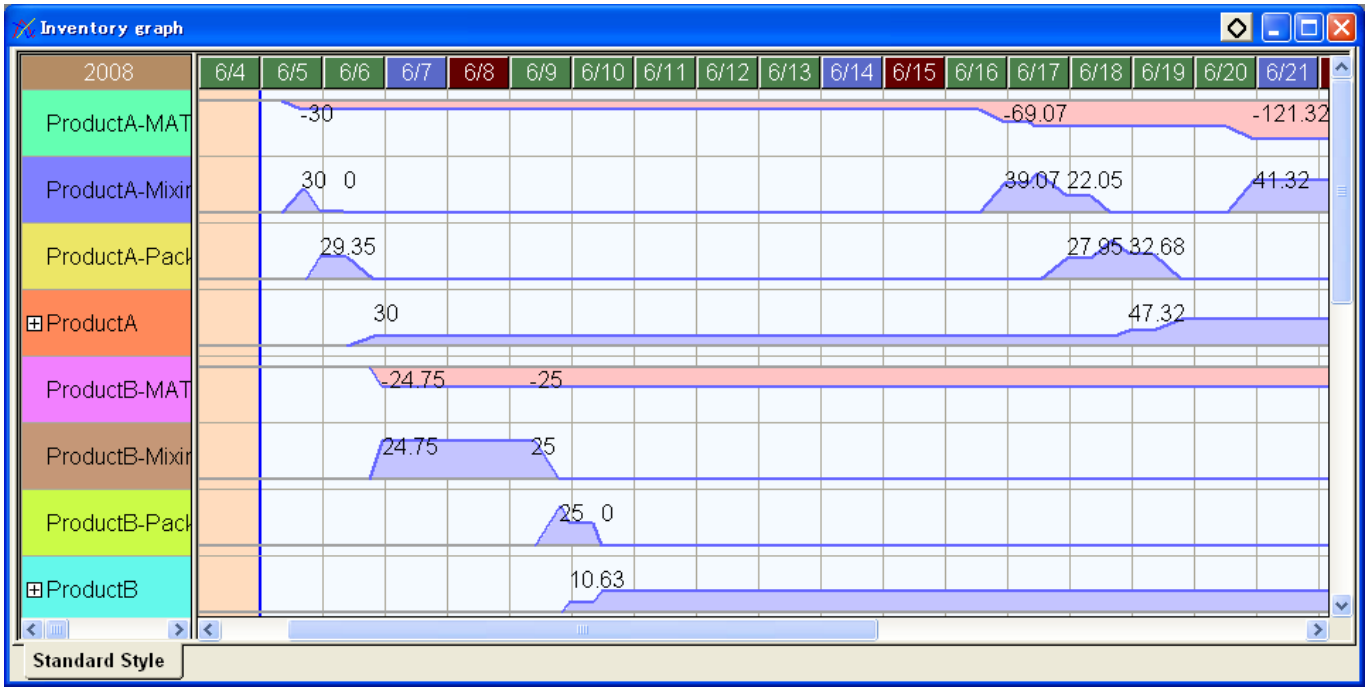
The order Gantt chart displays the assignment for each order with a vertical axis representing orders and horizontal axis representing dates. You can verify the scheduling status, which has developed the selected orders for each process by clicking the mark [+]. In addition, the connecting lines will be displayed when a mouse is placed on the developed process. In this way, you can easily grasp the connections between processes. Furthermore, you can visually verify both delivery dates and assignments as the red triangle mark displays the delivery dates.



Order Gantt chart

●Inventory graph

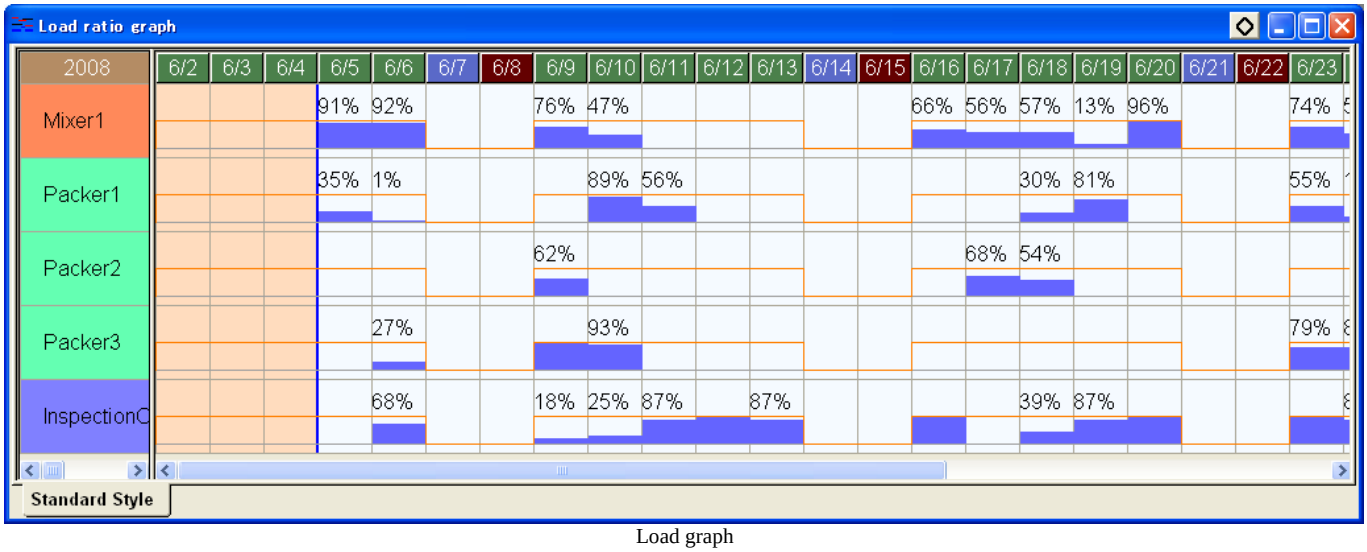
An inventory graph is the chart with a vertical axis representing an item and a horizontal line representing a date. Both graph and numerical value display the increase/decrease of quantity for each item.



Inventory graph

●Load graph

The load graph is the chart with a vertical line representing a resource and a horizontal line representing dates. Both graph and numerical values indicate the load of a resource. You can check to see if the load is over or not.



Load graph

Besides, other different charts are equipped with Asprova. Please refer to the help files for Asprova and other samples data.

Appendix A
Glossary of Terms

Order Target of assignment process. When orders are specified in order table and rescheduling executed order planning takes place. Several types of orders exist.

Production order: order for a factory to make N pieces of items before a due date.
Inventory order (absolute amount): order to have N pieces of items at stock at certain time.
Inventory order (fluctuation): order to take N pieces of items from stock.
Sales order: order to deliver N pieces of items before a due date (sales option).
Purchase order: order to purchase N pieces of items before a due date (purchase option).
Event order: periodic or non-periodic maintenance, washing or setup action (event option).

Time constraint method Specifies the time relationship between this process and previous process. Is set for master input instructions and master use instructions. Available methods are ES, SS, SSEE, ESSEE, and SSEEE. For example, ES method defines the minimum amount of time separating the end of the previous process and the start of the current process. Refer to 9P for more information.

Time constraint MIN/MAX The time for the relationship between this process and the previous process, as given by the time constraint method. For example, with time constraint method set to ES and time constraint MIN to 60 minutes, there are at least a move time of 60 minutes between the end of this process and the start of the next process. Refer to 9P for more information.

Scheduling basis time Basis time for scheduling that separates the past from the future. When a project load time is used as scheduling basis time, the current time is used. Can be set in project settings (time periods tab).

Project settings The properties of the project. Contains general settings for the project such as scheduling basis time and production factor. Project settings can be accessed by selecting [Schedule] – [Project Settings] from the main menu.

Scheduling parameter Used to tune rescheduling settings. Enables for setting and evaluating dispatching rules, assignment methods, assignment periods and tentative assignment results. Can be accessed by selecting [Schedule] – [Scheduling Parameter Settings] from the main menu.

Instruction Details of a single process. Three following types of instructions exist:

Input instruction: to input raw materials to a process.
Output instruction: to produce items in a process.
Use instruction: to use raw materials in a process.

Instructions defined in integrated master editor are called master input instruction, master output instruction and master use instruction. Instructions produces as a result of rescheduling are called operation input instruction, operation output instruction, and operation use instruction. Operation instruction tables can be accessed by selecting [Table View] – [Advanced Settings] – [… Instruction] from the main menu.

Earliest Start Time (EST) When set for an order, during forward scheduling used as a starting time (towards the future) for the assignment. Can be specified in the order table.

Latest End Time (LET) When set for an order, during backward scheduling used as a starting time (towards the past) for the assignment. Can be specified in the order table.

Operation An object created from orders for each process using master data. In later version (previously called as job). Composed of setup, production and teardown. Operation table can be accessed by selecting [Table View] – [Operation]. Example: operation table, operation split, operation Gantt chart.

Expression Expression strings that can be used like macros to affect the operation of Asprova. Asprova's unique format is used. For details, see Expressions Handbook.

Resource General term for equipment, workers, or jigs. Each process has at least one resource defined. Sub resources (workers, jigs, etc.) are resources that are used together with main resources. Resources are defined in resource table. When defined in integrated master editor, resource table is automatically specified. Example: resource setup, next resource constraints.

Integrated master Process information. Bill of material (BOM) data combined with resource capacity information, consisting of input instructions, output instructions, and use instructions. Without master and order information,

planning cannot be done. Integrated master editor can be accessed by selecting [Table View] – [Integrated Master Editor] from the main menu. Example: integrated master table, graphical master window.

Dispatching Taking one operation from the operation table for assignment. Dispatching order means the order in which the operations are assigned one by one. The more optimal the order is, the easier it is to assign an operation to the right place. Using dispatching rules found from scheduling parameter settings, the dispatching order can be changed. The dispatching order for every operation can be found from dispatching order property (assign tab in property window).

Internal function A function used in expressions such as *Left* (concatenates a string) or *ResourceLoad* (returns the load ratio of a resource). The internal function tab of expression dialog can be accessed by selecting [Table View] - [Advanced Settings] – [Internal Function] from the main menu.

Backward One of the assignment directions. Performs assignment towards the past.

Item General term for raw materials, intermediate items, and products. When Resource/Item cells are inputted with information, the item table is automatically updated. Asprova manages the intermediate items in the item table for every process. The quantity of each item can be viewed over the inventory graph.

Forward One of the assignment directions. Performs assignment towards the future.

Plug-in Used to customize Asprova. Utilizing Visual Basic and C++ programming languages, dll files can be written to add custom features. Special scheduling logic or GUI controls can be added, for instance. Installed plug-ins can be viewed by selecting [Help] – [Plug-in Information...] from the main menu.

Preview version The bug fix version of Asprova. Official version of Asprova is released once every month. In the between, a preview version is released. If the fourth digit in Asprova's version number is zero, this means an official release, whereas the fourth digit being non-zero indicates a preview version. For example, version number 6.2.0.7 stands for a preview version as the fourth digit is 7.

Property definition An identifier for a table column. Adding a column name, display format can be customized. The property definitions for a table can be viewed by right clicking over the table column and selecting [Column Settings].

Module type Asprova has various license types: APS, MS, MS Light, LS, MRP, BOM, MES, KPI. Asprova is one program, but the ways to use it varies, and therefore the module (license) type should be selected accordingly. In the protector key, always one module type is selected.

Reschedule Creates a new production plan by executing the currently selected scheduling parameter. Rescheduling can be performed by selecting [Schedule] – [Reschedule] from the main menu.

COM interface Component Object Model. Through this interface plug-ins and automation clients can access Asprova's internal properties and make function calls. COM interface members are highlighted with blue font color in [Classes – Properties] – [Class List] section of the help file.

DBIO Means the possibility to connect every table in Asprova with an external database, or import/export the table data using text files. IO settings can be accessed by selecting [File] – [Data I/O Settings] from the main menu.

Appendix B
Asprova Table Overview

Asprova contains the following tables. Their contents and need for usage varies.

Table Name	Contents
Order	Manufacturing orders: items, order quantities, and due dates related information. Sales orders: items, their quantities, and due dates related information. Purchase orders: items, their quantities, and arrival dates related information. Inventory orders: items, their quantities, and inventory time. Needs to be specified.
Integrated Master	Process, required raw material quantities, used equipment and their attributes related information. Needs to be specified.
Resource	Equipment, workers, jigs etc. related information. Needs to be specified, however information is automatically created when master data is inputted.
Item	Information on final items, by-product items, intermediate items, raw material items. Needs to be specified, however information is automatically created when master data is inputted.
Calendar	Shift information for each resource and day. Needs to be set.
Shift	Pattern information of daily working time. Needs to be set.
Process	Process related information. Is created automatically when master data is inputted.
Customer	Customer information such as name. Is created automatically when master data is inputted.
Task Master	Task specific information.
Input Instruction Master	Input instruction code specific information.
Output Instruction Master	Output instruction code specific information.
Use Instruction Master	Use instruction code specific information.
Operation	The result information from scheduling (generated from orders according to inputted master data). Created during scheduling.
Task	Task related information created as a result of scheduling.
Input Instruction	Input instruction related information created as a result of scheduling.
Output Instruction	Output instruction related information created as a result of scheduling.
Use Instruction	Use instruction related information created as a result scheduling.
Peg	Peg related information created as a result scheduling.
SpecN Setup	Setup information used when spec is changed. Specified when needed.
Item Setup	Setup information used when item is changed. Specified when needed.
Resource Setup	Setup information used when resource is changed. Specified when needed.
Spec	Spec information. Specified when needed.
Result	Result information. Specified when needed.
Item Time Series	Quantity change information for each item. Constructed from scheduling results.
Resource time series	Quantity change information for each resource. Constructed from scheduling results.
Message	Messages produced by the program.
Schedule Evaluation Results	Used to evaluate created schedules. Constructed from evaluation results.
Event Counter	Event counter related information used in Asprova Event option. Specified when needed.
Purchase Plan	Information on purchased quantities by item, customer and date. Created during scheduling.
Production Plan	Information on production quantities by resource, item and date. Can be created from scheduling results.
KPI	KPI evaluation results information. Can be created from scheduling results.
Sales Plan (aggregate)	Requirement information (sales forecast, firm orders, etc.) per item over user specified time period. Specified when needed.
Sales Plan (daily)	Requirement information (sales forecast, firm orders, etc.) per item over daily or monthly time period. Specified when needed.

Appendix C
Feature Specific Sample Overview

During the installation of Asprova, feature specific sample files are copied to the computer.
The following presents a short description on each sample along with sample code.

* Sample code is an identifier string for the sample preceding the sample name.

Item	Description	Sample Code
Resource	Metal mold and tooling	A
	Variable number of available workers	B
	Disabling a resource	B
	Resource split size MIN and resource split size MAX	B
	Controlling resource assignment by num spec	C
	Outsourcing a process	D
	Ignoring resource quantity constraints	D
	Controlling resource assignment by spec	E
	Varying production time according to resource quantity	E
	Workers and Metal molds	F
	Rounding production times and start and end times	F
	Single worker operating multiple machines simultaneously	G
	Resource capacity of machine operator	G
	Specifying combinations of main and sub resources	H
	Specifying a scheduling freeze time for each resource	H
	Specifying furnaces	I
	Specifying a maximum operation suspend time	I
	Constraining which resource can follow which	K
	Assigning resource quantity in proportion to production quantity	N
	Resource buffer	O
	Specifying production suspend time MAX and Setup suspend time MAX	Q
Master	Operation lot size MAX	B
	Merging process (items to peg 1-to-1)	D
	Specifying a repeated process	E
	Managing versions of registered data	H
	Specifying Versions of input instructions	K
	Specifying move time between processes	M
	Setting time relationship between production time of previous process and setup start time of next process	O
	Time constraints methods EES and ESE	P
	Branching process	Q
	Specifying operation split size MIN/MAX/UNIT	Q
Item	Specifying a priority resource for each item	B
	Generating replenishment orders by setting the Auto-replenish flag to "Yes", "Yes (one-to-one production)", or "Yes (inventory + one-to-one production)"	R
	Time period grouping feature	J-2
Setup	Setup time for switching a sub resource (metal mold and tooling)	A
	Specifying a setup sub resource	C
	Specifying allowable time periods for performing setup	C
	Item setup	C
	Spec setup	E
Order	Inventory constraints	A
	Disabling an order	D
	Auto-replenishment production	J
	Assigning user-specified settings corresponding to a particular process within an order	K
	Next Orders	L
Operation	Specifying split number and split parallel number	P
Other	Bottleneck fixed composite scheduling	Q

Appendix D
Q & A

Questions to which you can find answers in Hands-on Training Manual

The following presents the table of contents of Hands-on Training Manual, which you can use for finding topics for which you may have questions.

Other Q & A

(1) You can input and output master data and other Asprova data in CSV text file format.
(2) For the CSV text files mentioned above (1), you can convert data output by Asprova APS to pass to an external system as well as convert external data to import to Asprova APS.
(3) "Asprova Schedule Monitor" is software that allows you to view Asprova's schedule on another PC.
(4) You can develop an automation client to exchange data through interprocess communication using COM interfaces.
(5) You can develop plug-ins using COM interfaces to add custom features to Asprova.
(6) You can link data to ODBC databases such as SQL Server and Oracle through interfaces for external input/output provided by Asprova.

Appendix E
Profit Increase Diagnosis Sheet (Example)

Profit Increase Diagnosis Sheet					
Company / Factory Name	ABC Corporation				
Filled out by	Kuniyoshi Takahashi			Filled out on	*2003/07/10*
Tel	*+81-3-5498-7071*	FAX	*+81-3-5498-7072*	E-mail	*info@asprova.com*

■ Products to which you are planning to apply the system

Bolt

■ Process flow for the products

Item name	*Bolt*	*Cap*	*Bolt*
Item code	*A, B, C*	*X*	*AX, BX, CX*
Item type	*Intermediate item*	*Intermediate item*	*Finished item*
# of items	*3*	*1*	*3*
Monthly production	*50,000*	*50,000*	*50,000*
Process 1	*Cutting*	*Molding*	*Assembly*
Process 2	*Processing*	*Inspection2*	*Inspection3*
Process 3	*Inspection1*		*Packing*

*In the packing process, finished items are packed by 100 or 200 pieces depending on the type of packing.

■ Equipment, workers, and outsourcing for each process

Process name	Type of machine (number of the machine), Number of workers, Name of outsourced company	Shift
Cutting	*Cutter (2), Workers (2),* *Outsourcing (Takahashi Mfg. Co.)*	*Day shift* *Outsourcing*
Processing	*NC machine (1), Workers (2)*	*Day shift*
Inspection1	*Workers (2)*	*Day shift*
Molding	Molding machine	*Day shift*
Inspection2	*Workers (2)*	*Day shift*
Assembly	*Workers (2)*	*Day shift*
Inspection3	*Workers (2)*	*Day shift*
Packing	*Workers (2)*	*Day shift*

■ Shifts

Day shift	*8:00 - 12:00; 13:00 - 17:00*	*Holidays on Saturdays and Sundays*
Outsourcing	*All day*	*Holidays on Saturdays and Sundays*

Process(es) considered to be a bottleneck	*Assembly process because it takes time.*

■ Order status and order processing method

Type of production	☐ Make-to-stock ☐ Make-to-order ■ Mixture of Make-to-stock and Make-to-order	
Sales orders	*5000* orders /month	Orders from customers counted by shipping.
Manufacturing orders	*1500* orders /month	Orders of finished items or intermediate items counted by production at the factory.
Purchase orders	*300* orders /month	Orders for placing orders to suppliers for materials.
Method of creating manufacturing orders for finished items (*Multiple answers allowed)	☐ Creating from sales forecast / demand forecast ☐ Creating from MPS (master production schedule) system output ■ Creating from unofficial information from customers ■ Creating from sales orders ☐ Creating manually on MS Excel or other tool ☐ Other _____.	
Method of creating manufacturing orders for intermediate items (parts) (*Multiple answers allowed)	☐ Creating manufacturing orders for intermediate items (parts) from MRP system output ☐ Creating manually on MS Excel or other tool ■ Other *Calculating by our own production management system.*	
Method of creating purchase orders (*Multiple answers allowed)	☐ Creating from MRP system output ☐ Creating based on sales orders ☐ Creating based on (forecast) manufacturing orders ☐ Placing advance order for items with long-term due date ■ Creating manually on MS Excel or other tool ☐ Provided by customers ☐ Other _____.	
Rush orders	■Yes ☐No	
Trial product orders	■Yes ☐No	
Average delivery lead time	*7* days	If available, please attach data for each item.
On-time delivery rate # of orders base Quantity base Monetary base	 *73* % *80* % *80* %	Rate at which due dates were met. If available, please attach data for each item.

■ Inventory status

Finished item inventory	Turnover period	*10* days, *15000* 00,000 yen
Intermediate item inventory	Turnover period	*20* days, *12000* 00,000 yen
Purchased item inventory	Turnover period	*40* days, *4400* 00,000 yen

■ Production scheduling method

Scheduling cycle	*1* time(s) *1* week(s)	
Scheduling period	*1* week(s)	
Scheduling method	Backward	
Average production lead time	*5* days	If available, please attach data for each item.

■ Existing production management system

	System developer, package name	Date of introduction	Computers used	Person in charge	Future plans for system development
Master data management					
Order management					
Rough scheduling					
Detailed scheduling					
MRP					
Work instructions					
Gathering of results					
Shop floor control					
Inventory management					
Shipping management					
Purchase management					

■ Method of managing master and other data

Location of master data	■ Host ☐ PC ☐ On paper ☐ Other_____.
Location of order data	■ Host ☐ PC ☐ On paper ☐ Other_____.
Method of distributing work instructions	■ Hand-written directives ☐ Computer-output directives ☐ Other_____.
Use of bar codes in work instructions	☐ Yes ■ No
Method of gathering results	■ Hand-written reports ☐ Manually entered into computer ☐ MES system ☐ Other_____.

■ Issues and their severity

Issue	Severity	Target value
Shorten lead times	High	
Reduce inventory	Medium	
Increase on-time delivery rate	Medium	

■ Please describe problems causing bottlenecks in production schedules.

1. We cannot make an accurate judgment on whether we can meet a due date of an order received from a customer.
2. We want to reduce the production lead time by half.
3. We want to increase the on-time delivery rate to 100%.
4. We want to decrease the inventory of intermediate items.

Appendix F
Profit Increase Diagnosis Sheet

Profit Increase Diagnosis Sheet					
Company / Factory Name					
Filled out by				Filled out on	/ /
Tel		FAX		E-mail	

■ Products to which you are planning to apply the system

■ Process flow for the products

Item name			
Item code			
Item type			
# of items			
Monthly production			
Process 1			
Process 2			
Process 3			
Process 4			
Process 5			
Process 6			
Process 7			

* Please increase or decrease rows as necessary.

■ Equipment, workers, and outsourcing for each process

Process name	Type of machine (number of the machine), Number of workers, Name of outsourced company	Shift

* Please increase or decrease rows as necessary.

■ Shifts

Process(es) considered to be a bottleneck	

■ Order status and order processing method

Type of production	☐ Make-to-stock ☐ Make-to-order ☐ Mixture of Make-to-stock and Make-to-order	
Sales orders	orders /month	Orders from customers counted by shipping.
Manufacturing orders	orders /month	Orders of finished items or intermediate items counted by production at the factory.
Purchase orders	orders /month	Orders for placing orders to suppliers for materials.
Method of creating manufacturing orders for finished items (*Multiple answers allowed)	☐ Creating from sales forecast / demand forecast ☐ Creating from MPS (master production schedule) system output ☐ Creating from unofficial information from customers ☐ Creating from sales orders ☐ Creating manually on MS Excel or other tool ☐ Other _____.	
Method of creating manufacturing orders for intermediate items (parts) (*Multiple answers allowed)	☐ Creating manufacturing orders for intermediate items (parts) from MRP system output ☐ Creating manually on MS Excel or other tool Excel ☐ Other _____.	
Method of creating purchase orders (*Multiple answers allowed)	☐ Creating from MRP system output ☐ Creating based on sales orders ☐ Creating based on (forecast) manufacturing orders ☐ Placing advance order for items with long-term due date ☐ Creating manually on MS Excel or other tool Excel ☐ Provided by customers ☐ Other _____.	
Rush orders	☐Yes ☐No	
Trial product orders	☐Yes ☐No	
Average delivery lead time	days	If available, please attach data for each item.
On-time delivery rate # of orders base Quantity base Monetary base	 % % %	Rate at which due dates were met. If available, please attach data for each item.

■ Inventory status

Finished item inventory	Turnover period	days,	00,000 yen
Intermediate item inventory	Turnover period	days,	00,000 yen
Purchased item inventory	Turnover period	days,	00,000 yen

■ Production scheduling method

Scheduling cycle	time(s) week(s)	
Scheduling period	week(s)	
Scheduling method	Forward / Backward / Mixture of forward and backward	
Average production lead time	days	If available, please attach data for each item.

■ Existing production management system

	System developer, package name	Date of introduction	Computers used	Person in charge	Future plans for system development
Master data management					
Order management					
Rough scheduling					
Detailed scheduling					
MRP					
Work instructions					
Gathering of results					
Shop floor control					
Inventory management					
Shipping management					
Purchase management					

■ Method of managing master and other data

Location of master data	☐ Host ☐ PC ☐ On paper ☐ Other_____.
Location of order data	☐ Host ☐ PC ☐ On paper ☐ Other_____.
Method of distributing work instructions	☐ Hand-written directives ☐ Computer-output directives ☐ Other_____.
Use of bar codes in work instructions	☐Yes ☐No
Method of gathering results	☐ Hand-written reports ☐ Manually entered into computer ☐ MES system ☐ Other_____.

■ Issues and their severity

Issue	Severity	Target value
Shorten lead times	Low/Medium/High	
Reduce inventory	Low/Medium/High	
Increase on-time delivery rate	Low/Medium/High	

■ Please describe problems causing bottlenecks in production schedules.

Asprova APS Introductory Manual

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