Asprova's "Pocket manual" series No.1

Splitting operations

Divide operations up within one process and distribute them to multiple resources. Match to actual on-site lot size flow. Reduce lot size to cut lead-time.

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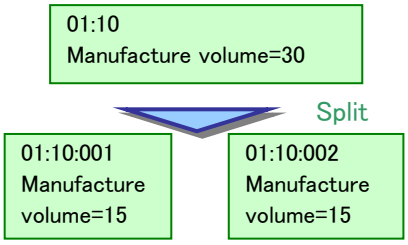
What is job splitting?

Operational split is a function for dividing one work object into several parts in one process. Fig. 1 shows an example in which job 01:10 is divided into two parts, jobs 01:10:001 and 01:10:002.



▲ Fig 1 shows an image of a job split into two. Attached to the split job's name is : (colon) and index.

Every split job can then be split further and each of those sections distributed and allocated to different resources.

There are several different splitting methods and each has different properties to be assigned.

	Method of splitting	Property name
A	Number of jobs after split	Split number
B	Upper limit of manufacture volume	Operation split size MAX
C	Ratio of manufacture volume	Split ratio

The example in Fig. 1 had no original relation to manufactured volume and when number of jobs was decided after splitting, **Split number** was always used. (A) In other words, if the **Split number** is set to 2, jobs will be split as shown in Fig. 1. If **Split number** is 3, then the number of jobs is 3, and the manufacture volume for each is 10.

To split by manufacture-volume units, assign the **Operation split size MAX** (B)。 Setting **Operation split size MAX** to 15 splits the jobs as shown in Fig. 1.

To control the manufacture volume of split jobs, set the **Split ratio**. Setting **Split ratio** to 1:1, gives the split shown in Fig. 1. The user example shown splits a job having real performance up to a certain point into a part that has real performance and one that doesn't. In the example in Fig. 1, only job "01:10" is complete. To divide it into 10 and 20, set the **Split ratio** to 1:2.

Splits can also be assigned by "item", "job", "resource" and "master user instruction" (user instructions in the integrated master table) classes.

After deciding the method for splitting each item, set product type class (Fig. 2). When the split setting is different for each order, set the job class (Fig. 3). Assigning a method of splitting to item and job class and then splitting is known as static splitting because the manufacture volume of the split job will be decided before allocation.

Property	Value	
ProductA-Mixing	ProductA-Mixing	
Split number		Spe
Split ratio (0)		Spe
Split parallel number		Spe
Operation split size MIN		Whe
Operation split size MAX		Whe
Operation split size UNIT		The
Match original qty	Yes (consider results)	Con
Split recursive process number (forward)		Spe
Split recursive process number (backward)		Spe
Split recursive 1 to 1 (forward)	No	Eve

General | Spec | Settings | Inventory | Lot | **Split** | Fix | Evaluati

▲Fig. 2 Properties for splitting item classes (property window)

Property	Value	
01:Packing	01:Packing	
Split number		Sp
Split ratio (0)		Sp
Split parallel number		Sp
Operation split size MIN		Sp
Operation split size MAX		Sp
Operation split size UNIT		Th
Match original qty	Yes (consider results)	Co
Split recursive process number (backward)		Sp
Split recursive process number (forward)		Sp
Split recursive 1 to 1 (forward)	No	Ev

General | **Split** | Assignment | Results | Evaluation | KPI | Link

▲Fig. 3 Properties for splitting job classes (property window)

When the unit for manufacture quantity is decided for each resource, set that unit in the resource class. If the unit is product-dependent, assign it to the master user instruction as well as to the resource. For example, when the manufacture unit quantity is determined for certain resources with no relation to product type, use the resource class's **Operation split size MAX** property in Fig. 4 but if the unit quantity is determined as resource- or product-dependent, use the master user instruction class's **Operation split size MAX** property in Fig. 5. Assigning a method

of splitting to resource and master user instruction classes is called **dynamic splitting** because the method of splitting is not decided if allocated resources have not been decided.

Property	Value	
Packer1	Packer1	
Resource split size MIN	0	Specif
Resource split size MAX	0	Specif
Resource split size UNIT		The qu

General | Spec | Settings | **Split** | Task

▲Fig. 4 Properties for splitting resource classes (property window)

Integrated Master Editor table

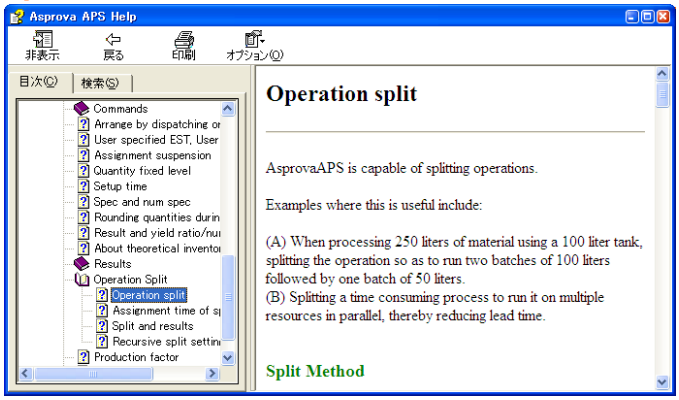
	Item	Resource/Item	Operation split size	Operation split size	Operation split size
1	ProductA	ProductA-MATERIAL			
2		Mixer1	0	0	
3		Packer2	0	0	
4		Packer1	0	0	
5		InspectionCenter1	0	0	

▲Fig. 5 Properties for splitting user instruction classes (integrated master table)

Help Job splitting (Help No. 784000)

Give an overview of job splitting in addition to the methods of splitting.

There are also several help pages about splitting under the key word "split."



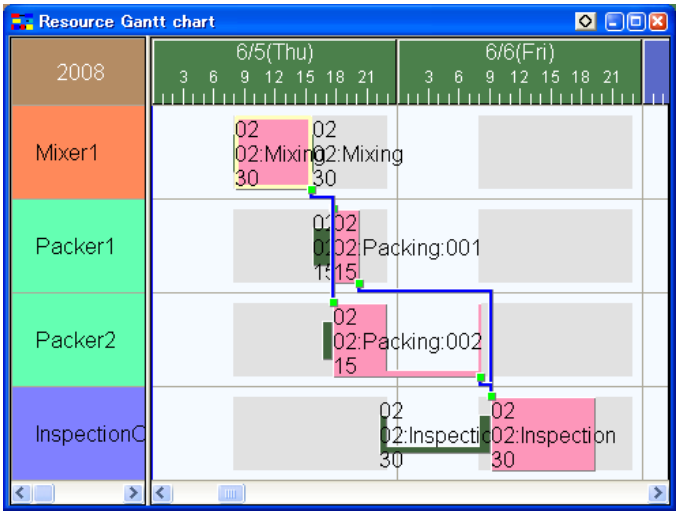
Let's split it

Sample 1 shows an attempt to split a job. Here, the number 15 to is assigned to **Operation split size MAX** for product item "manufacture A-20."

Property	Value
ProductA-Packing	ProductA-Packing
Split number	
Split ratio (0)	
Split parallel number	
Operation split size MIN	
Operation split size MAX	15
Operation split size UNIT	

▲Fig. 6 Assigning **job lot size MAX** to property window

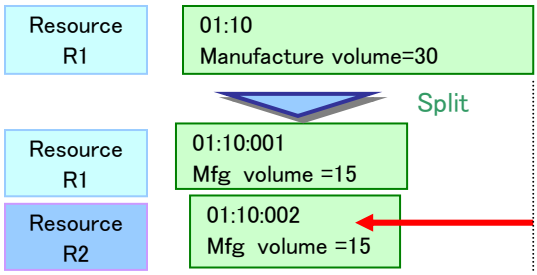
Fig. 7 shows the splitting of the job in process 2 for rescheduling. Static splitting is done using the order explosion command and dynamic splitting is done using any of the assignment command types.



▲Fig. 7 Gantt resource chart after rescheduling
The packing process is split into two packing processes.

Splitting shrinks lead-time

One method of reducing lead-time onsite is to make lots smaller. However, a re-scheduler can be used in similar fashion, splitting jobs to reduce lead-time. Fig. 8 shows an example in which manufacturing lead-time is shortened when split jobs and different resources are used to divide work. (This applies of course only to resources having a manufacturing time that is dependent on manufacture volume.)



▲ Fig. 8 The job is split into two parts working in parallel and allocated to multiple resources. Here, work is split and manufacturing lead-time is shortened.

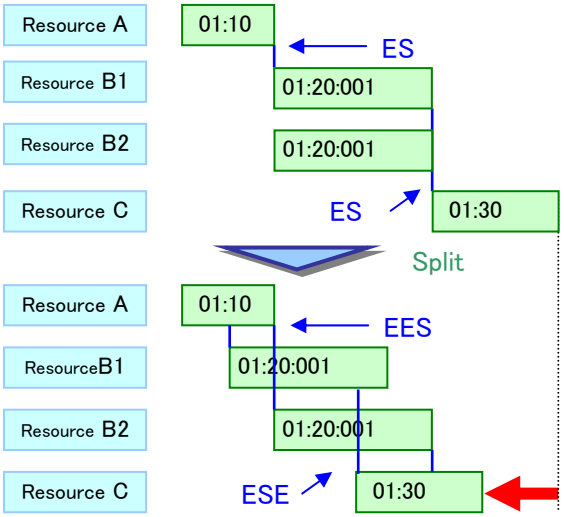
Simply setting splits will not allow the use of multiple resources as in Fig. 2, and only one resource may be allocated. However, if you intend to use multiple resources use the **Split parallel number** property.

Help

"Operating split jobs in parallel" (HelpNo.116000)

"Assignment to run in parallel jobs split into product categories" (Help No. 342000)

If splitting jobs will allow a subdivision and flow of goods in pre- and post-process, that split can be achieved by assigning the **time constraint method**. (See Fig. 9)

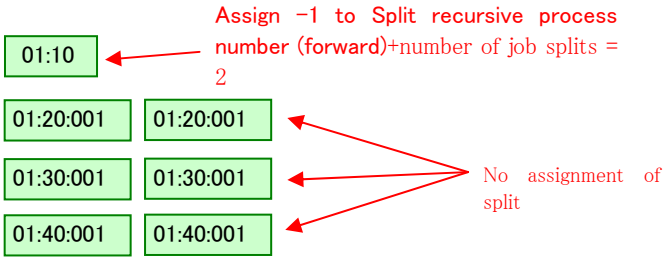


▲Fig. 9 A job is divided into two and time constraint methods ESE and EES are used. Small lot flow shortens lead-time.

Help
"Overlapping Method" (Help No. 753000)
"P: Overlapping method EES and ESE、number of job splits, specification of parallel job numbers (Help No. 921000)
"Changing the overlapping method" (Help No. 16130)

Recursive splitting

Recursive splitting can be set with **Split recursive process number (forward)** not for just one process but to a certain subsequent process, or, to the final process. Conversely, to recursively split processes prior to that, set the **Split recursive process number (backward).**



▲Fig. 10 When using the **Split recursive process number** you don't have to assign the same splits for each process. (※For infinite recursion, assign -1 as the **Split recursive process number**)

Help "Recursive split assignment"(Help No. 784300)

Q&A

1 What kind of results in business performance will you get with job splitting?

The same as when you don't split the jobs. If you import a worktable and a performance table, and key-in a work code, you have to specify the work code externally. This occurs when the external system does not recognize the split job code. Say, for example, that the only data that has gone into the system for that day is the data for production volume. When that happens, quantities are appropriately allotted and the dates and times for starting to manufacture split child-jobs is, in the order of earliest first in the intermediate system. A change in extemporaneous status must be made to either "complete" or to "already begun.

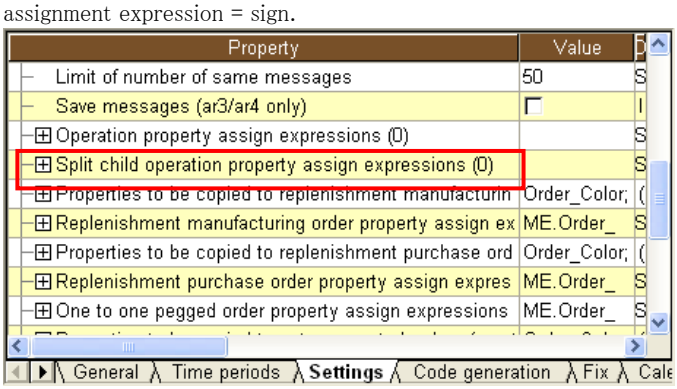
In a case where the job codes problem is solved and real performance volume differs from planned volume (manufacture volume for instructions given), the need arises to adjust the manufacturing volume for other split jobs. For more detailed information, see the help page cited below.

Help

"Splitting and Performance" (Help No. 784250)

2 I want to set up the program so I can automatically assign comments to split jobs.

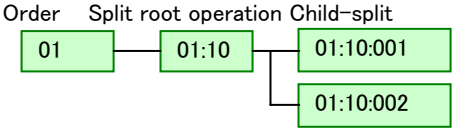
The planning assignments (project properties) contain a property known as Split child operation property assign expressions. All that need be done here is to describe the expression using the assignment expression = sign.



▲ Fig. 11 Use of the **number of split assignment recursion processes** eliminates the need to assign the same split to each process.

Assigning "ME.Comment[1]=OTHER.Comment[1]", for example, copies the **split root operation** comment.

※ The **split root operation** is a job object generated between the order to be split and the split job.



▲Fig. 12 Relationship between parent and child object after splitting The split route job becomes the child object of the order, and the child split job becomes the child object of the split route job.

3 I don't want split jobs to be scattered all about after allocation.

The scheduling parameter class has a property known as Assign split operations near each other. Use that to control scattering.

Help

"For date and time for allocating job splits" see (Help No. 784200)

4 How do you assign splits by both product item and job?

Splitting is done by assignments set in the job. That is also where splits start when splits are assigned to resources and to master use instructions. In other words, a static split is made first and then a dynamic split is made for each job that has been statically split. If, for example, a split is made like the static split shown in Fig. 1, and if the number 10 is assigned to **lot size MAX** for resources, the manufacturing volumes for the split jobs will be, respectively, 10, 5, 10 and 5.

Additional material

1) Sample P

Sample P uses the assignment of split work number for splitting, and also uses the split parallel number and the overlapping methods EES and ESE.

2) Sample Q

Sample Q makes splits with the master user instruction class (integrated master table) using the split lot size MAX.

3) Practical training

In our practical training you will learn how to reduce lead-time and assign time constraint methods while simultaneously splitting.

→ 6 Reducing lead time by splitting jobs and splitting orders