

# Asprova's "Pocket manual" series No.13

## Parametric features of the integrated master

On these pages, valid condition expressions will be used to show master data (Integrated Master Table) adaptable to a wide range of conditions. These conditions are assigned to reduce data volume. An example application will be used to introduce a general-purpose master for use with individual orders received that allows rescheduling of new items without changing the master data.

Asprova Corporation  
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<http://www.asprova.com/>

### Advantages of a parametric master

A parametric master is one that adapts to conditions, by having those conditions specified as parameters. The conditions might be like:

- ① Adds or deletes a process as determined by conditions.
- ② Adds a part or materials as determined by conditions.
- ③ Changes the line as determined by conditions.
- ④ Uses external orders as determined by conditions
- ⑤ Assigns workers or tools as determined by conditions.
- ⑥ Changes process time as determined by conditions.

When these conditions differ, a schedule can be drafted by editing the Integrated Master Table to add support for that case. However if done in this way, the creation of a large number of masters that differ only slightly in one particular part, but have almost the same configuration as each other, may increase maintenance load, deteriorate performance and present obstacles to efficient management.

Registering parametric master information decreases, by a large fraction, the number of lines in the Integrated master table. An optionally determined property can control process or material, so all that need be done is to create a property once, add items in the post-operational task and assign that attribute (property) to make improvements without maintaining an integrated master table.

### Multiple lines of processing → Process selector valid condition

With different lines (different manufacturing patterns), use the "Process selection" and "Process selector valid condition" to select one of those lines as requirements determine.

A, B, C and D are processes. This is an example in which there are two methods of manufacture.

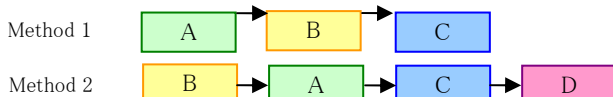


Fig. 1 shows an example taken from the practical training course on how the "Process selector" is used. Whether the HT process is

performed depends on whether or not the condition "without heat treat" is assigned to the order's "Spec 1" property. This data only causes differences in process selector; the effect is even greater when raw materials, for example, are completely different.

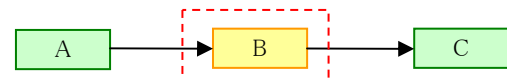
Item	Process selector	Process selector valid condition	Process number	Process code	Instruction type	Resource /Item
1	A	1	ME.Spec1='Without heat treat'	10	CT	Input inst M1
2					Use instr	CT1
3				20	PR	Use instr PR1:PR
4				30	CK	Use instr CK1
5	2	2	ME.Spec1='Without heat treat'	10	CT	Input inst M1
6					Use instr	CT1
7				20	PR	Use instr PR1:PR
8				25	HT	Use instr HTG
9					Use instr	HT1
10					Use instr	HTS
11				30	CK	Use instr CK1

▲ Fig. 1 Examples for using the "Process selector" and the "Process selector valid condition"

### For special processes → Process valid condition Expression

Even if manufacturing patterns are multiple, use "Process valid condition" when conditions determine that a part of the process sequence should be skipped entirely. Expressing the example in Fig. 1 by "Process valid condition" will give the example shown in Fig. 2.

Example of process B generation as determined by conditions



Item	Process selector	Process selector valid condition	Process number	Process code	Process valid condition expression	Instruction code
12	E		10	CT		In
13						In
14						M
15			20	PR		M
16			25	HT	ME.Spec1!=Without heat treat	M
17						M
18						S0
19						Out1
20			30	CK		M

▲ Fig. Example of how to use the Process valid condition expression

## Choosing resource combinations → Task selector valid condition

Use “Task selector” and “Task selector valid condition” when a combination of resources differ as determined by conditions.

X, Y and Z are resources. This is an example of resources in combination.

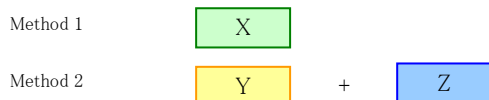


Fig. 3 shows an example from the practical training course. Whether or not the order volume is 100 or greater is determined by the assigned condition of only one pallet of resource “HTG”, or by the assigned condition of “HT1+HTS” in combination. (In the practical training course, HTG is an external order and HTS is an assignment of personnel.) If, when testing all Task selectors (Evaluation by tentative assignment), there is more than one that matches those conditions, the Task selector with highest estimated value will be used.

Item	Process number	Process code	Task selector	Task selector valid condition	Instruction code	Resource/Item
12	E	10	CT		In	M2
13					In	M1
14					M	CT1
15		20	PR		M	PR1;PR2
16		25	HT	Outsourcing ME.Order.Qty>=100	M	HTG
17			Self manufacture	ME.Order.Qty<100	M	HT1
18					S0	HTS
19					Out1	R1
20		30	CK		M	CK1

▲ Fig. 3 Example of how to use Task selector and Task selector valid condition

## When using special resources → Valid condition, Resource valid condition

To assign whether to conditionally use resources, assign either “Valid condition” or “Resource valid condition” to the master use instruction.

Use the “Resource valid condition” when multiple resources are registered in the Master use instruction’s “Resource/Item” and when the use of these resources will depend on some condition. Fig. 4 shows that only skills above 80 are allowed as a condition for using candidates for the two resources registered for process PR. Done in this way, the skill map in the Resource table can be used to manage which resources are going to be used in which process

without having to manage each and every assignment with the Integrated master table.

Item	Process number	Process code	Instruction code	Resource/Item	Resource valid condition	Valid condition
10	E	10	CT	M	CT1	
11		20	PR	M	PR1;PR2	ME.Skill1>80
12		25	HT	M	HTG	
13				M	HT1	
14				S0	HTS	ME.Order.Qty>100
15		30	CK	M	CK1	

▲ Fig. 4 An example of how to use the instruction’s Valid condition and Resource valid condition

In this regard, if conditions are to be applied, assign “Valid condition” no matter how many resources are registered in “Resource/Item” and no matter what the resource is.

Fig. 5 shows that an order volume exceeding 100 assigns the condition of using sub-resource HTS in the HT process.

Item	Process number	Process code	Instruction code	Resource/Item	Valid condition
12	E	10	CT	In	M2
13				In	M1
14				M	CT1
15		20	PR	M	PR1;PR2
16		25	HT	M	HTG
17				M	HT1
18				S0	HTS
19				Out1	R1
20		30	CK	M	CK1

▲ Fig. 5 An example of using the instruction’s “Valid condition”

## Conditional use of materials/parts → Valid condition

Depending on what the conditions are, assign “Valid condition” to the Master input instruction to assign whether resources or materials will be added. The condition of different parts use in Fig. 5 is assigned to process CT according to whether the customer order is for company A or company B.

## Conditional generation of by-product → Valid condition

Assign “Valid condition” to the Master output instruction to assign whether a by-product will be generated as determined by condition. Assigning spec “R1” to process HT in Fig. 5 assigns the condition for generating sub-product “R1”.

### Help

“Using selectors” (Help No. 16320)

“Process selector” (Help No. 751000)

“Sample H” (Help No. 913000)

“Sample K” (Help No. 916000)

“Candidate resource combination selection” (Help No. 767000)

“Skill map” (Help No. 749200)

“Expressions” (Help No. 741000)

“Expression handbook” (ExpressionHandbook.pdf)

## Model of an integrated master for handling separate orders

Here we'll look at an integrated master table used as an example of practically application for the Parametric integrated master table.

Fig. 6 is an Order table used together with the Integrated master table to set conditions on the orders received. This order table has properties for assigning the type of process that an item should pass through, with a maximum of four processes (the properties "Process1", "Process2", "Process3" and "Process4").

Each process allows the assignment of time (capacity value) required for manufacture in each (Process A capacity Qty×[min], Process A capacity Qty×[min], Process A capacity Qty×[min], Process A capacity Qty×[min]).

	Order code	Process count	Proc ess1	Proc ess2	Proc ess3	Proc ess4	ProcessA capacity Qty*[min]	ProcessB capacity Qty*[min]	ProcessC capacity Qty*[min]	ProcessD capacity Qty*[min]
1	01	3	A	B	D		25	10		10
2	02	2	D	C					20	10
3	03	4	A	B	C	C	20	10	10	10
4	04	3	A	B	C		20	15	20	
5	05	3	A	B	D		25	10		10
6	06	3	B	A	D		10	15		10

▲ Fig. 6 Order table when using an integrated master table for use with separate orders received. Capacity volume (volume x minutes and process can be assigned to the Order table.

For example order "01" is made from three processes and assigns manufacturing in the sequence A→B→D. The manufacturing time required per unit for each process is assigned as 25 minutes, 10 minutes and 10 minutes.

The number of processes registered can be anything required and the same goes for sequence. They may also overlap. Fig. 7 shows the results of rescheduling.



▲ Fig. 7 Results of rescheduling during the use of the integrated master table for separate orders received. Assign by the process assigned to the order table.

## A look at the integrated master table

Here we have made two different types of Integrated master table. The Process valid condition expression was used with the first, the Process selector with the second. Since the one with which the Process valid condition expression was used is more compact, we will discuss that one.

Fig. 8 shows the basic construction. Only a maximum of eight processes are registered. Here, it is only four processes (although the distribution data is 10 processes). Now assign FValid(ME.Spec1), etc. to the Process valid condition expression. Spec 1 in the Order table corresponds to the "Process1 property" in Fig. 6. That assigns which process is effective and whether it is assigned to the

order's "ProcessN".

Item	Process s	Process code	Process valid condition expression	Instruction type	Instruction code	Resource /Item	Production	Resource valid condition
16	Using process v	10 Process	FValid(ME.Spec1)	Use instr	M	Resour	ME Order	CheckAllCont
17		20 Process	FValid(ME.Spec2)	Use instr	M	Resour	ME Order	CheckAllCont
18		30 Process	FValid(ME.Spec3)	Use instr	M	Resour	ME Order	CheckAllCont
19		40 Process	FValid(ME.Spec4)	Use instr	M	Resour	ME Order	CheckAllCont
20		50 Process	FValid(ME.Spec5)	Use instr	M	Resour	ME Order	CheckAllCont

▲ Fig. 8 Using the integrated master table for separate orders received. This is an example using the Process valid condition expression.

Next, for resources, the resource group called "Resource" is assigned as a temporary resource (see Fig. 9). If it were to remain as it is, all resources would be assigned candidates but to filter just the resources that are equivalent to those assigned to the order table, assign the expression

**CheckAllContents\_Or(ME.OperationCode,'==',OTHER.Order.Spec1)**

to the "Resource valid condition" property. That will determine whether the process code assigned to the order specs is equal to the "Target operation code" in the Resource table.

	Resource code	Resource groups	Target operation code
1	A1	Resource	A
2	A2	Resource	A
3	B1	Resource	B
4	B2	Resource	B
5	B3	Resource	B
6	C1	Resource	C
7	C2	Resource	C
8	D1	Resource	D
9	D2	Resource	D
10	Resource		

▲ Fig. 9 Resource table

All resources are contained in the Resource Groups called "Resource."

Now the properties shown below are assigned to capacity value ("manufacture" in the example).

```
ME.'Order'.Order quantity*
IF(ME.'Order'.Process1=='A',ME.'Order'.ProcessA capacity Qty*[min],
IF(ME.'Order'.Process1=='B',ME.'Order'.ProcessB capacity Qty*[min],
IF(ME.'Order'.Process1=='C',ME.'Order'.ProcessC capacity Qty*[min],
IF(ME.'Order'.Process1=='D',ME.'Order'.ProcessD capacity Qty*[min],0)))
```

This is the capacity value for process 1, and depending on whether process 1 is process A, B, C or D, is assigned for reference to be made to the Order table's ProcessA capacity Qty\*[min]" property or to its ProcessB capacity Qty\*[min]" property. This is later multiplied with the order Quantity so that it will be proportional to Order Quantity. That concludes the assignments. You may feel that the expressions or properties are difficult, but the number of assignments is not large and you will notice that the subsequent descriptions (such as 1, 2, 3 and 4 or A, B, C and D) are repetitive. This even if the number of processes increase, all you have to do is to imitate the assignments and increase them.

There is one more example using the Process selector, but other than the Process selector being prepared according to number of processes, it is actually the same as when the Process valid condition expression is used. (See Fig. 10).

Item	Process selector	Process selector valid condition	Process	Process code	Instruction type	Instruction code	Resource item	Production	Resource valid condition
1 Using process s	1	ME ProcNum==1	10	Process1	Use inst	M	Resour	ME Orde	CheckAllCont
2	2	ME ProcNum==2	10	Process1	Use inst	M	Resour	ME Orde	CheckAllCont
3	3	ME ProcNum==3	20	Process2	Use inst	M	Resour	ME Orde	CheckAllCont
4			10	Process1	Use inst	M	Resour	ME Orde	CheckAllCont
5			20	Process2	Use inst	M	Resour	ME Orde	CheckAllCont
6			30	Process3	Use inst	M	Resour	ME Orde	CheckAllCont
7	4	ME ProcNum==4	10	Process1	Use inst	M	Resour	ME Orde	CheckAllCont
8			20	Process2	Use inst	M	Resour	ME Orde	CheckAllCont
9			30	Process3	Use inst	M	Resour	ME Orde	CheckAllCont
10			40	Process4	Use inst	M	Resour	ME Orde	CheckAllCont
11	5	ME ProcNum==5	10	Process1	Use inst	M	Resour	ME Orde	CheckAllCont
12			20	Process2	Use inst	M	Resour	ME Orde	CheckAllCont
13			30	Process3	Use inst	M	Resour	ME Orde	CheckAllCont
14			40	Process4	Use inst	M	Resour	ME Orde	CheckAllCont
15			50	Process5	Use inst	M	Resour	ME Orde	CheckAllCont

▲ Fig. 10 Using the integrated master table for separate orders received. This is an example using the Process selector.

※ Process valid condition expression has been used in releases in and after Ver.6. We have explained those that used the Process selector up to that time.

#### For more information

Asprova Corporation

Tel: +81-3-5498-7071

Fax: +81-3-5498-7072

Web: <http://www.asprova.com/>