Asprova's "Pocket manual" series No.6

Pallets and yield settings

We introduce here a method for determining the number of units to be entered in the initial process of car part manufacturing, when auto-replenishment production is used, pallets with a predetermined number of items are moving forward on a processing line and estimated yield is reached during the process.

With data

Problems with auto-replenishment

Let's consider the auto-replenishing of manufacturing orders from either unofficial orders or predetermined data such as "sales order options. Because auto-replenishment is being use lot size must be specified, a problem occurs at certain teams with yield if lot size is the same as the number of products on the pallet. Assume, for example, that the number of units on the pallet is 100 and the yield is 0.8. If we enter 100 into "Production lot size MAX", the number of units entering the initial process line becomes 125, which exceeds the limit on palletized units.

Final processscount-100   Initial process count-125
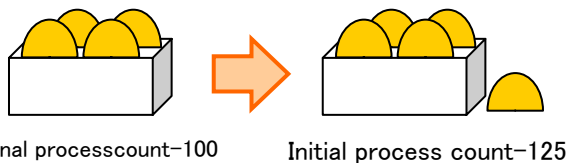
▲Fig. 1 Palletized quantities in each process. When the number of palletized units is the same as "Production lot size MAX" the number of units initially placed into the process exceeds the limit.

Thus, in considering yield with "Production lot size MAX," 100×0.8=80 must be specified.

Final process count 80   Initial process count 100
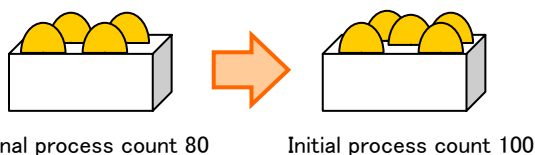
▲Fig. 2 Palletized quantities in each process. When the number of palletized units becomes the same as "Production lot size MAX, the number of units initially placed into the process exceeds the limit.

That alone would allow one to specify a lot size the same as that when the "Integrated Master Table" was registered, so if you give it the effort in the first instance, subsequent operation won't be difficult. However, daily fluctuations in yield mean that keeping in compliance with "Production lot size" requires that effort.

Help

"Sales order option"(Help No. 777200)
"Sales plan"(Help No. 706300)
"Auto-replenishment production"(Help No. 774000)
"Sample J"(Help No. 915000)

How to handle standard functions?

The requirement is to make production lot size conform to yield so there is a system for conducting the process off schedule, and creating a plug-in will give a solution to the problem. This time, though, the example shown will use standard functions to solve the problem.
Instructions output in the integrated master table will specify yield itself (see Fig. 3).

	Item	Process number	Process code	Instruction type	Instruction code	Resource/Item	Yield rate
1	X	10	10	Input ins	In	X-Material	1
2				Use instr	M	A	
3				Output i	Out	X-10	1
4		20	20	Input ins	In0	X-10	1
5				Use instr	M	B	
6		30	30	Input ins	In0	X-20	1
7				Use instr	M	C	

▲Fig. 3　Yield rate in the integrated master table

To input yield rate here all that need be done is to change product item X's "Production lot size MAX" values. There are several different methods for doing that but here we will assign the number of palletized units in the production item table and use the "modify properties command" to assign the value of "production lot size MAX."

Specific assignment method

A real number property is first added to the product item class. Pallet size is used as the name and, as the name indicates, it will assign the number of palletized units.

	Item code	Auto-replenish flag	Production lot size MAX	Production lot size MIN	Production lot size UNIT	Pallet size
1	⊞X	Yes	100	100	1	100

▲Fig. 4　Add the "pallet size" property to the product table

Add an additional property to the product table and assign virtual property so that the integrated master table's yield rate will be output (see Fig. 5). The "virtual property expression is shown below.

ME.Child[1].Bom_OutputInstruction['Out'].Yield

▲Fig. 5 Add the "custom yield rate" property to the product table

Next insert a parameter that will update lot size (lot size update parameter) into the planning parameter and in front of the assignment parameter (default scheduling parameter).

▲Fig. 6 Command configuration (Command Editor Dialog)

"Production lot size MAX" and "Production lot size MIN," which are part of the "Modify properties command," and are shown in Fig. 7, assign the "Yield rate" (virtual property) from pallet size and, after taking yield into consideration, make that the lot size.

Property	Value
⊟Modify properties	Modify properties
├⊞Order expression (0)	
├⊞Operation expression (0)	
├⊞Resource expression (0)	
├⊟Item expression (2)	ME.ManufacturingOrderQtyMax=ME.Yield*ME.PalletSize;ME.
├ [1]	ME.ManufacturingOrderQtyMax=ME.Yield*ME.PalletSize
├ [2]	ME.ManufacturingOrderQtyMin=ME.Yield*ME.PalletSize

▲ Fig. 7 Values assigned to "Production lot size MAX" and "Production lot size MIN" in the property editing command's assignment product types

※ The "virtual property expression" is used here but does not necessarily have to be used. Everything should be fine as long the assignments below are given to the "Item expression." "Virtual property expression" is used here for ease of understanding.

    ME.ManufacturingOrderQtyMax=ME.Child[1].Bom_OutputInstruction['Out'].Yield*ME.PalletSize

Help

"Virtual property expression – Virtual property inverse expression"(Help No..:741100)
"New Property Definition dialog"(Help No..:736500)

Let's try it

Let's attempt an assignment. Generate the sales order data as shown here from the sales order plan table in data knowledge006.ar4.


▲Fig. 8 Sales plan table. Sales orders are generated from here.

Rescheduling in a status with yield unassigned gives a situation like that in Fig. 9. The second step in character string B is the operation's manufacture volume.
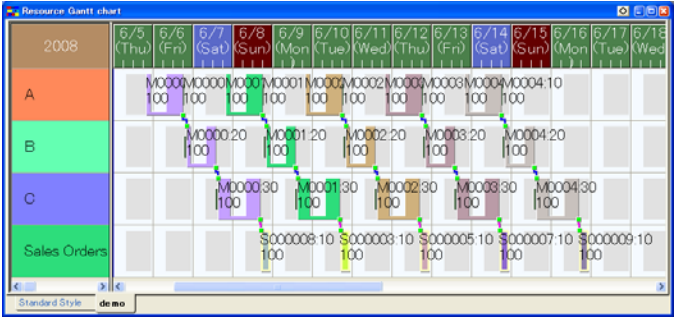

▲Fig. 9 Rescheduling results when yield is not set

Setting the yield at 0.8 and rescheduling by default planning parameter gives the situation shown in Fig. 10. "Production lot size MAX" remains at 100, and because yield is based on that, manufacture volume in the first process is 125, which exceeds pallet size.
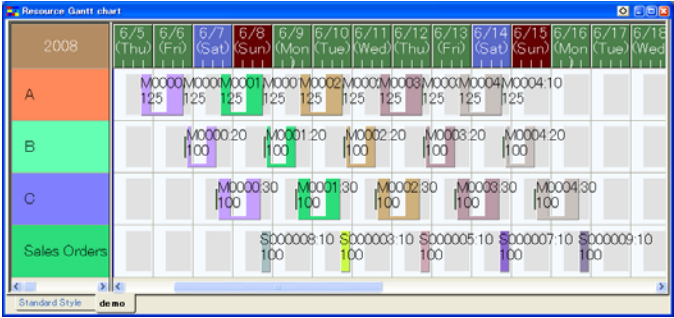
▲Fig. 10 A resource Gantt chart after assigning yield and then rescheduling by "default scheduling parameter." Manufacture volume in the first process is greater than pallet size.

Rescheduling by "Update lot size and reschedule" planning parameter (Fig. 5) gives manufacture volume in the first process that is the same as pallet size (shown in Fig. 11).
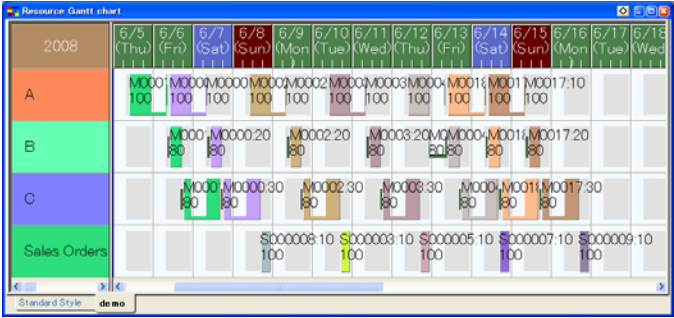
▲Fig. 11 Rescheduling by "default scheduling parameter" after assigning yield

The product item table after rescheduling shows projection lot size having a value that takes yield into consideration.

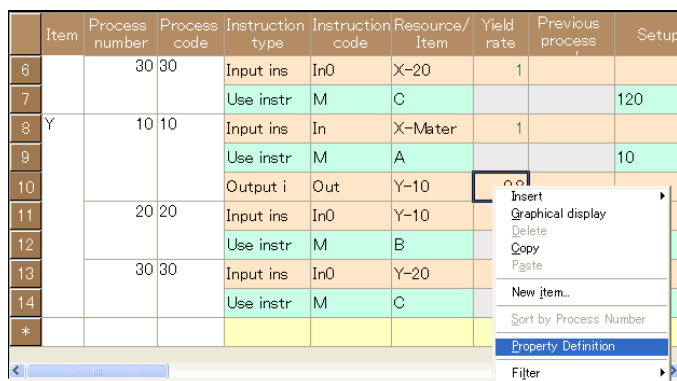|	Item code	Custom yield rate	Auto-replenish flag	Production lot size MAX	Production lot size MIN	Production lot size UNIT	Pallet size
1	⊞X	0.8	Yes	80	80	1	100
2	⊞Y	0.8	Yes	80	80	1	100

▲Fig. 12 The product item table after rescheduling. Manufactured lot size has changed from 100 to 80.

Appendix-A method tested by the author: The display inversion expression for yield rate

There are of course, other methods of dealing with this problem. One thing I did in the past was to use the integrated master table to assign a "Display inverse expression" in the "yield rate's" property definition for the master output instruction. Then I would refer with the value assigned to yield in "Production lot size MAX" of the final product when yield rate is input. If this can be done, then we can, without assigning "Production lot size," use the planning parameter to make a "Modify properties command" during rescheduling.

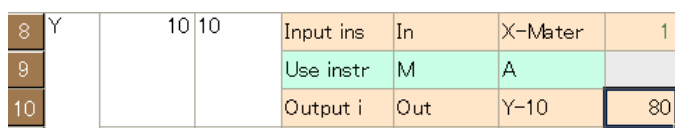The expression shown below was assigned to "Display inverse expression."

HOLDER.FinalItem.ManufacturingOrderQtyMax=HOLDER.FinalItem.PalletSize*FindNumberL(INPUT,1)   ––––––––
（expression1）

	Item	Process number	Process code	Instruction type	Instruction code	Resource/ Item	Yield rate	Previous process	Setup
6		30	30	Input ins	In0	X-20	1		
7				Use instr	M	C			120
8	Y	10	10	Input ins	In	X-Mater	1		
9				Use instr	M	A			10
10				Output i	Out	Y-10	0.8		
11		20	20	Input ins	In0	Y-10			
12				Use instr	M	B			
13		30	30	Input ins	In0	Y-20			
14				Use instr	M	C			
*									

(Context menu: Insert ▸, Graphical display, Delete, Copy, Paste, New item..., Sort by Process Number, **Property Definition**, Filter ▸)

▲Fig. 13 The Property definition for the master output instruction is written in the "Integrated master table". Right click on the master output instruction.

This should be fine because 80 will be assigned when 0.8 is assigned to "Yield rate" (see Fig. 14). That is the value that should be entered into "Production lot size MAX".

8	Y	10	10	Input ins	In	X-Mater	1
9				Use instr	M	A	
10				Output i	Out	Y-10	80

▲Fig.14   If 0.8 is entered into "Yield rate" then the actual value assigned for "Production lot size" will be 80.

In fact, a substitution expression using an equal sign is assigned to expression 1, but the equal sign in the substitution operator itself returns the substituted value. These are the same specifications as in C and other programming languages. Therefore, "80", the value substituted in "Production lot size MAX," is returned rather than the "0.8" actually input and it is transferred through "display inverse expression" to the "Yield rate" property.

If this were used, the yield rate would be strange so here we introduce the method explained in this version.

※ Prior to Asprova Ver.6.0.1, the use of the "Display inverse expression" in the Integrated master table had a bug in it. This can be avoided by using the latest version of Asprova.