

CHAPTER 3

A SURVEY OF DETAILED P&IC SYSTEM IN THAI SMIs

In this chapter, a survey of P&IC current practice of selected Thai SMIs is discussed. This chapter is divided into six sections. Sections 3.1 to 3.5 deal with the summary of P&IC of the selected companies. The summary of P&IC of each company can be classified into three parts which are the current practice of purchasing planning, the current practice of production planning, and discussion of these practices. P&IC practice of each company is shown in figure 3.1 to 3.5. Summary and conclusion of this chapter are shown in section 3.6.

There are five companies as follows:

1. Kulthorn Kirby Co., Ltd.
2. Kulthorn Universal Co., Ltd.
3. Siam Inter Pacific Co., Ltd.
4. Siam Kubota Co., Ltd.
5. Thai Hygiene Products Co., Ltd.

The selected companies are interviewed by the common questions shown as follows:

1. What is an address of the company?
2. What are the products of this company?
3. How much is the income of this company?
4. How many permanent staffs are in the company?
5. How many permanent staffs are in the planning department?
6. By what mean does company receive information of demands from customer? (text file, fax, hard copy)
7. What kind of demands does company receive? (sales order, forecast order)
8. How long are the time bucket and horizon of the received demands?
9. How many levels of the product structure are there?
10. How does company process the received sales order?
11. If there are some finished goods in the store, how does company deliver the goods to customer? (full deliver or partially deliver)
12. How does company update the inventory on-hand after delivering?
13. What does company do when the forecast order is received?
14. Does company perform any capacity planning before calculating the net requirement?
15. How does company calculate the net requirement in order to satisfy the demand (software or manual calculation)?
16. Does company perform any capacity planning after calculating the net requirement?
17. What are the data used for the net requirement calculation? (on-hand, on-purchased order, on-work order, work-in-process)
18. What is the formula used for net requirement calculation?
19. What is the lot-sizing policy in net requirement calculation?
20. Is the P&IC software developed in-house or a commercial software?
21. What is the name of the P&IC software if it is being used?
22. Have all above-mentioned transactions been performed in the software?

23. How does company release the purchase orders obtained from net requirement?
24. Is there any additional requirement on the purchasing quantity obtained from net requirement in order to protect against the defective production?
25. How does company receive the purchased material from vendors? (full or partially receive)
26. How does company update the inventory on-hand after receiving the purchased materials?
27. Is there any quality inspection before updating the inventory on-hand? And how?
28. How does company release the production orders obtained from net requirement calculation?
29. How does company withdraw material to the production shop?
30. Does company include the defective rate during withdrawing?
31. Does company allow withdrawing more than the ratio in the BOM?
32. Does company return the excess materials to the store?
33. Does company record the scrap and rework data after manufacturing?
34. How does company update the inventory data after completing the production?
35. How does company do when an urgent order comes? What is a policy to serve this situation?
36. How often does the company recalculate the plan?
37. Does company use lot control policy in order to track the usage of material?
38. How does company perform accounting transactions? Are they performed in the same software or separate software?

The survey process is to ask the questions to production planning staffs assigned by each company. During interviewing, all required site visiting and documents are also prepared and provided by these staffs. Each question is asked in order to get the different information of P&IC practice. Question numbers 1 to 4 deal with the detail of company profile. A number of man-power used in the planning department is obtained from question number 5. Order receiving practice can be determined by question numbers 6 to 7. Question numbers 8-9 are asked to know the time bucket and a number of levels of product structure. Question numbers 10 to 12 deal with the practice of delivering the product to customer. The inventory updating after delivery is also obtained by these questions. A procedure after receiving the forecast order is obtained by question number 13. Question numbers 14, 15, and 16 deal with a relationship between capacity planning and net requirement calculation. We would like to know whether they perform capacity planning before and after net requirement calculation. Parameters and formula used in net requirement calculation are obtained by question numbers 17 to 19. Question numbers 20, 21, and 22 let us know about the P&IC software used in the selected companies. There are two types of the software, in-house development and commercial software. The purchasing practice after net requirement calculation is obtained from question numbers 23 to 26. Quality control activity can be obtained by question number 27. We do not want to know the detail of quality inspection but we just want to know whether they perform this operation or not. Question numbers 28 to 36 deal with a production planning and shop floor practices including withdraw material practice and urgent order policy. Lot number control practice can be obtained by question number 37. Question number 38 deals with the requirement of finance and accounting transactions. All answers and information after interviewing are summarized and discussed as shown in sections 3.1 to 3.6.

3.1 The current practice of Kulthorn Kirby (KK) Co., Ltd.

Location : Ladkrabang
 Products type : Compressor
 Number of products : more than 400
 Raw Material : Copper wire, Steel sheet, etc.
 Purchasing lead-time : 4 months (Max)
 P&IC Tool : MRP software package

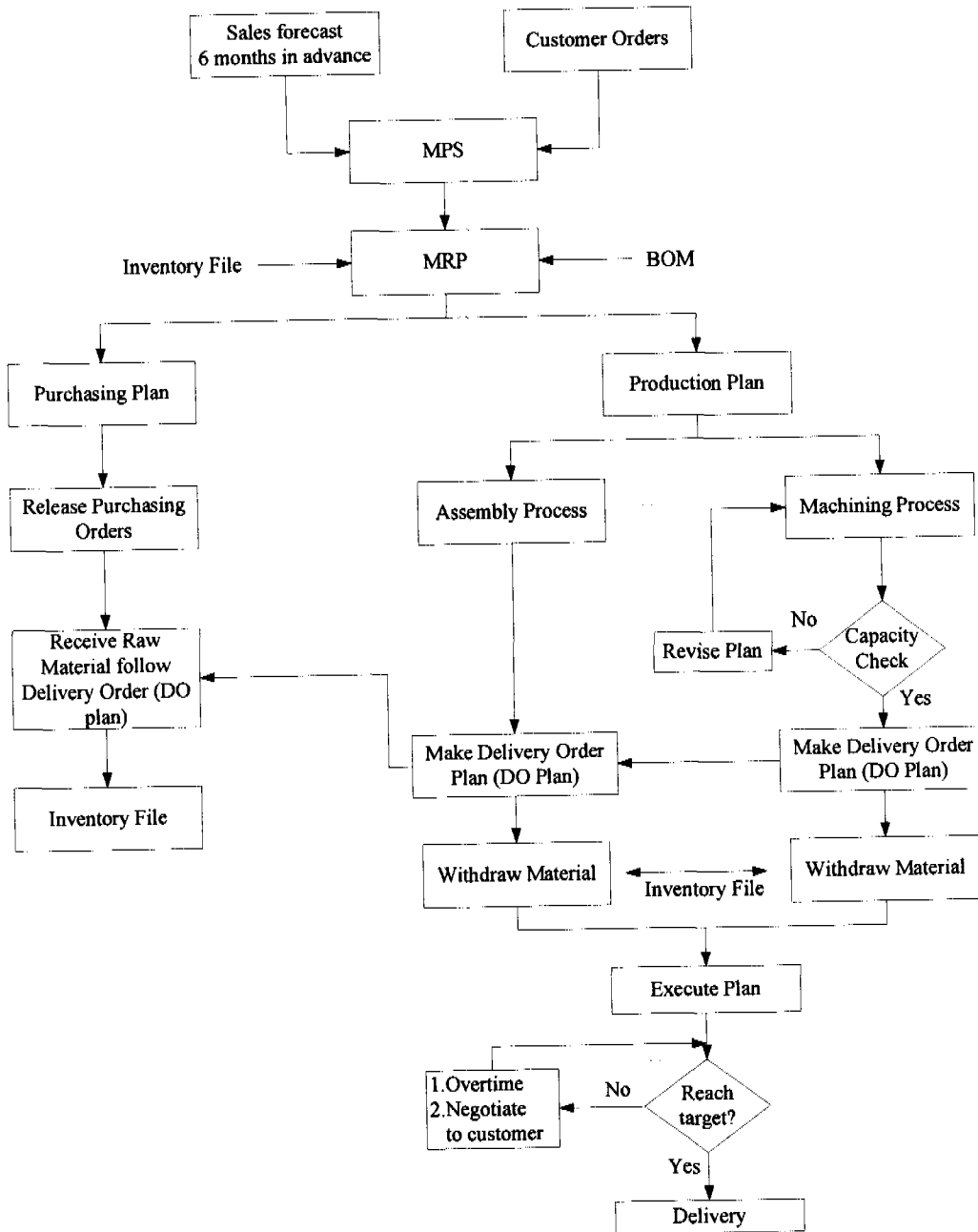


Figure 3.1 The current practice of Kulthorn Kirby Co., Ltd.

Purchasing Planning Practices

- Step1. Receive sales forecast six months in advance from sales department.
- Step2. Planning Department constructs the Master Production Schedule (MPS). The MPS has only the quantities of finished goods in each month. There is no detailed due date in this schedule.
- Step3. Send only 70% of quantities of each item from step 2 into MRP software. At this step, the production and purchasing plan have been generated.
- Step4. The planner calculates total quantities of purchase items in each month from the purchasing plan. At this step, the quantity of these items have been sent to supplier (inform only quantity needed in each month without delivery date).
- Step5. Receive customer orders at the third week of the month and generate production and purchasing plans similar to step3 again.
- Step6. Compare the purchase plans generated based on customer order and sales forecast.
- Step7. Place more purchase orders to suppliers when the orders based on sales forecast are not enough.

Production Planning Practices

- Step1. Receive the customer orders at the third week of the month and generate the production plan by MRP software. This plan can be classified into two types, namely, assembly plan and machining plan.
- Step2. For the assembly plan, the planner will follow the suggestion from MRP since they have never faced the capacity problem at this process. For the machining plan, they must check the capacity of resources first and revise the machine plan if it is infeasible to execute. The planner also revises the machining plan considering the resources capacity and minimum setup time simultaneously.
- Step3. After revising the plan, the delivery dates of purchase items (DO plan) have been made by the release and due date from the revised plan. The suppliers will send these items based on this plan.
- Step4. During executing the plan, there are two policies when they could not reach the target. Overtime has been applied as the first priority. The next priority is to postpone the customer due dates.

Discussions

This company faces a problem that the sales target has never been satisfied. This target has been forecasted by the sales department. Since the sales department does not know the updated production capacity, their forecast may violate the production capacity. If the planner uses the whole quantities from sales target they will produce a lot of inventory and finally can not reach the target. So far this problem has been tackled by

using only 70% of sales target. This way is not a good idea because it tackles at the end of the problem. We suggest solving at the cause of the problem. The production department should update the production capacity and inform the sales department. After that the sales target should be set considering the production capacity.

For inventory control problem, they faced a problem of controlling work-in-process (WIP). The problem is that they could not withdraw a number of materials as they wanted due to the limitation of pallet's sizes. For example, they wanted to withdraw 100 pieces but there are 500 pieces on the pallet so they had to take them all. Furthermore they always forget to send the excess WIP back to the store. This is why we have seen a lot of WIP in some processes. There are two ways to correct this problem. Firstly, they should consider investing with various sizes of small pallets. Secondly, they should set the material returning policy. If they withdraw more than their needed, they must send the rest back to the store as soon as possible.

There is a problem during revising the plan. It is very difficult to find an efficient plan manually in a short period since there are too many factors which have to be considered at the same time. To correct this problem, they should develop software that can generate the efficient schedule.

To prevent the nervousness in calculation due to an urgent order or any change in order (both quantity and due date), they specified the freezing period. The freezing period of this company is 7 days. It is specified by making an agreement with customers. They accept that during this period, any urgent or any change in order will not be allowed.

3.2 The current practice of Kulthorn Universal Co., Ltd.

Location : Ladkrabang
 Products type : motor
 Number of products : more than 200
 Raw Material : Copper wire, Steel sheet, etc.
 Purchasing Lead-time : 4 months (Max)
 P&IC tool : Manual calculation

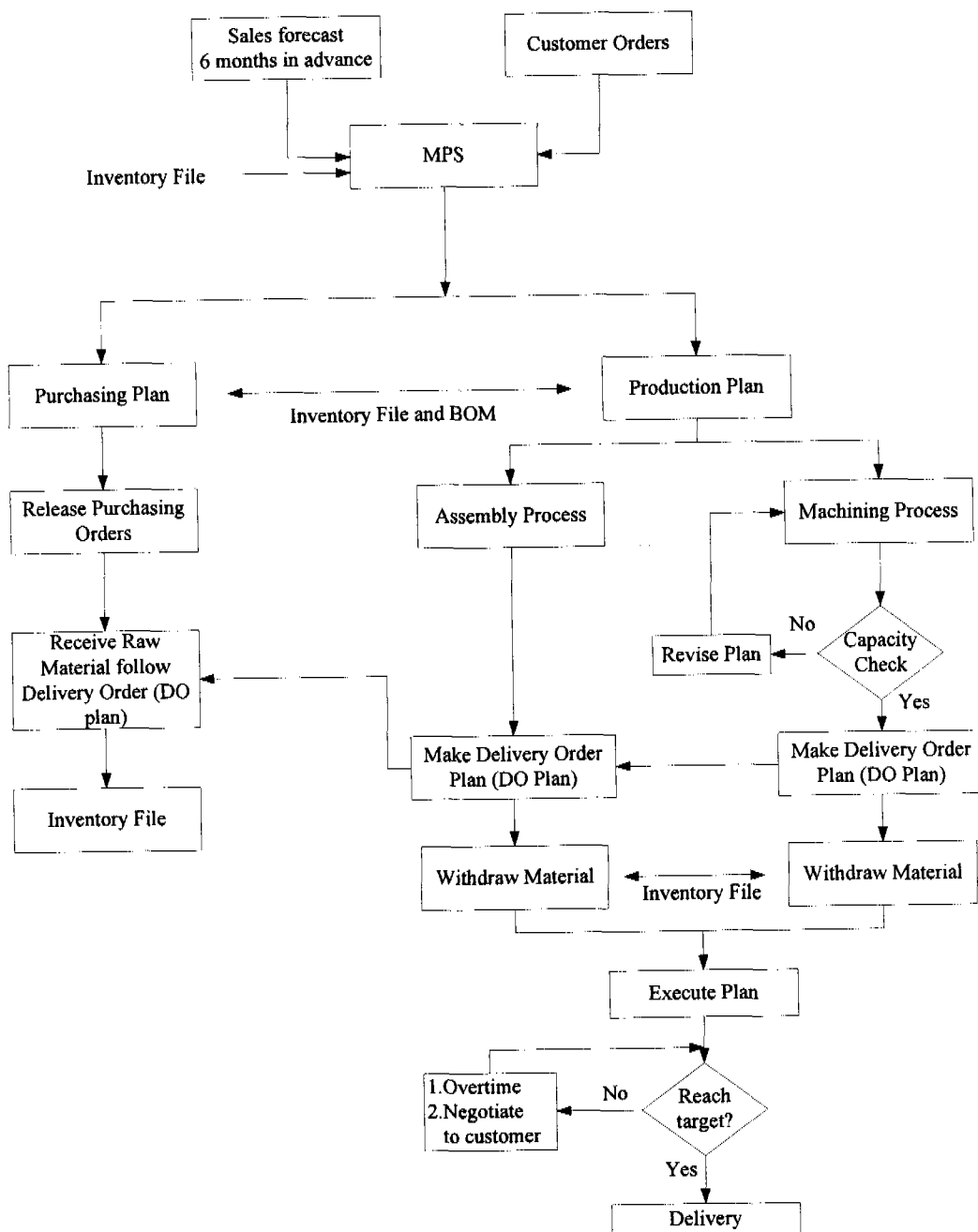


Figure 3.2 The current practice of Kulthorn Universal Co., Ltd.

Purchasing Planning Practices

- Step1. Receive sales forecast six months in advance from sales department.
- Step2. Planning Department constructs the Master Production Schedule (MPS) considering only inventory on-hand. The MPS has only the quantities of finished goods in each month. There is no detailed due date in this schedule.
- Step3. The planner calculates required quantities of purchase items in each month from the purchasing plan by using BOM and only inventory on-hand. At this step, the quantity of these items have been sent to supplier (inform only quantity needed in each month without delivery date).
- Step4. Receive customer orders at the second week of each month and calculate the net requirements of the purchase items again.
- Step5. Increase the net requirement of all purchased items obtained from step 4 by 10% to provide for safety.
- Step6. Compare the result from step 5 with the purchasing plan based on the sales forecast. Place more purchase orders to suppliers if the quantity of the purchasing plan based on sale forecast is less than that of the purchasing plan based on customer orders.

Production Planning Practices

- Step1. Receive the customer orders at the second week and generate the production plan manually by using BOM and inventory data (on-hand). This plan can be classified into two types, namely, assembly and machining plans.
- Step2. For the assembly plan, the planner follows the release date and due date from step1. For the machining plan, the capacity of resources must be checked first and the plan will be revised if it is impossible to execute. The planner also revises the machining plan considering the resources capacity and minimum setup time simultaneously.
- Step3. After revising the plan, the delivery dates of purchase items (DO plan) are updated according to the due dates of the revised plan. The suppliers follow the DO plan for delivering these items.
- Step4. During executing the plan, there are two policies when they cannot reach the target. The overtime has been applied as the first priority. The next priority is to postpone the customer due date.

Discussions.

The first problem is occurred during net requirement calculation. Because of manual calculation and no computerized system, this company has to use only inventory on-hand without considering the work-in-process in calculating the material requirements. Another reason is that the inventory data is not up-to-date since the company records inventory transactions using a manual stock card. Because of unreliable inventory data, they have to increase the net requirement by 10% for safety reason. This is a reason why there are a lot of inventory in the store.

The second problem is that it takes a long time to adjust the production plan based on limited resource capacity. Since this plan is calculated manually, it is very difficult to determine a feasible plan in a limited time.

The last problem is similar to the problem of the Kulthorn Kirby company. It is about the pallet's sizes and nervousness in calculation. We have already described these problems in the discussion of that company.

To correct the problems above, Firstly, they should update the inventory data as frequent as possible whenever they have to calculate the material requirements. Secondly, they should include other inventory data (on-order and WIP) into their calculation. Thirdly, they should consider investing in various sizes of small pallets and set the material returning policy. This policy is to return the excess WIP as soon as possible. Fourthly, to prevent the nervousness in calculation from an urgent order or any change in order (quantity and due date), they should specify the freezing period. The freezing period of this company is fourteen days therefore during this period, any change or any urgent order will not be allowed. Finally, the computerized system should be developed for controlling the inventory transactions and calculating the production and material plan.

3.3 The current practice of Siam Inter Pacific Co., Ltd.

Location : Ladkrabang
 Products type : Dog Foods
 Number of products : more than 500
 Purchase Lead-time : 3 months (Max)
 P&IC tool : Manual calculation

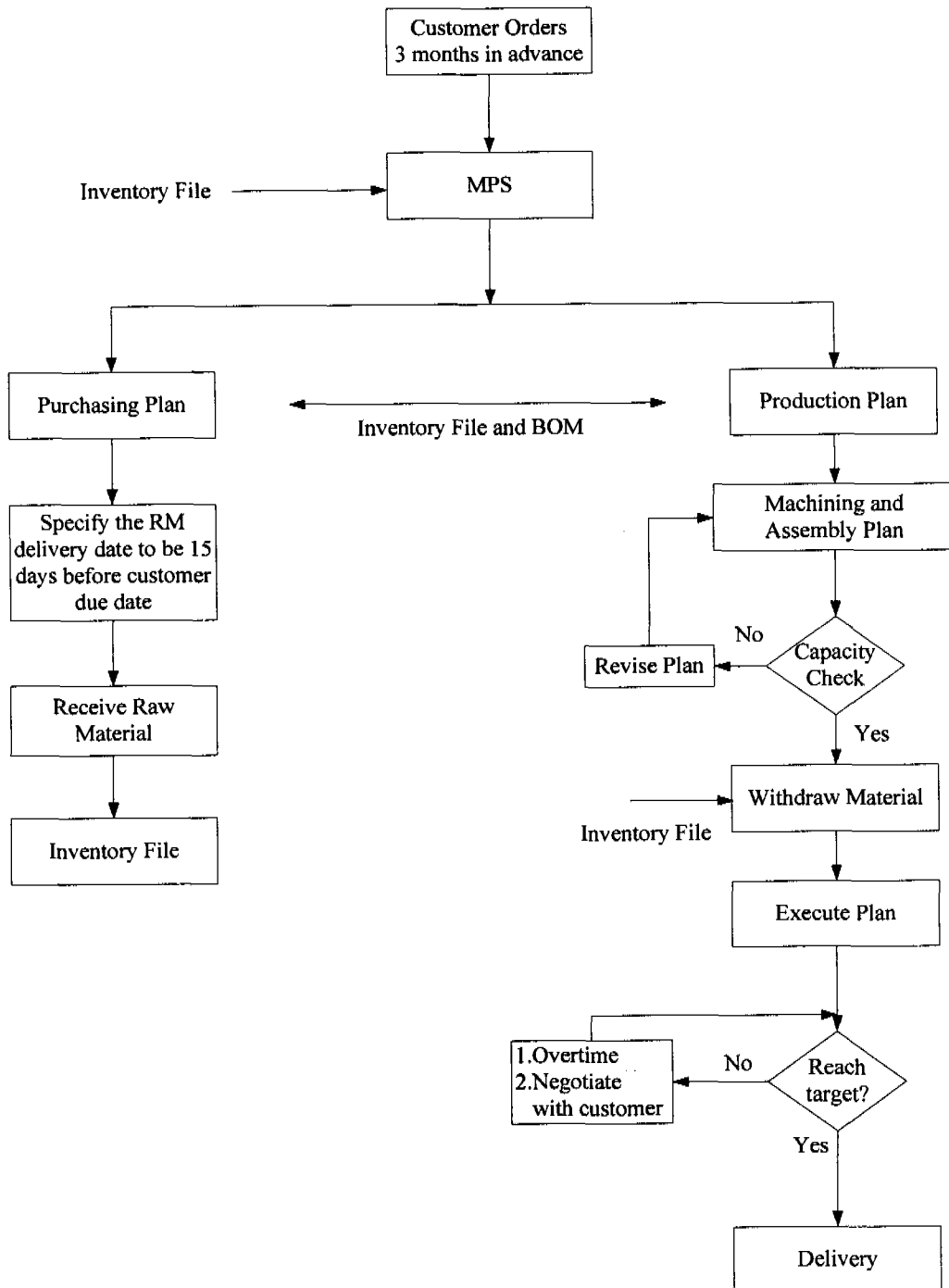


Figure 3.3 The current practice of Siam Inter Pacific Co., Ltd.

Purchasing Planning Practices

- Step1. Receive customer orders from sales department three months in advance.
- Step2. Planning Department constructs the Master Production Schedule (MPS) considering only inventory on-hand.
- Step3. The planner calculates the required quantities of purchase items of each order using only BOM without considering the inventory data. Due dates of these items are set 15 days before customer due date.

Production Planning Practices

- Step1. Receive the customer orders and generate the production plan manually.
- Step2. Based on the plan, the capacity of resources must be checked. The plan will be revised if it is infeasible.
- Step3. During executing the plan, there are two policies when they cannot reach the production target. The overtime is applied as the first priority. The next priority is to postpone the customer due date.

Discussions

There are some problems of the purchasing planning practice. During the calculation of net requirement of raw materials, the inventory data have not been used. Therefore, the net requirements may be over estimated. The raw material due date is set to 15 days before customer due date. This may result in missing customer's due dates since some orders may be produced more than 15 days depending on the quantities and products. Therefore, they should set the due date of raw materials based on the real starting time of each production order.

For the production planning, there are ten planners who determine the production plan. There are ten main serial processes for this company. Some orders have to pass through all processes but others do not. Each planner calculates independently. For example, the first process may be calculated before the last process. The release date for each order is calculated by equation 1.

$$\text{Release date of process (i)} = \text{customer due date} - \sum_{j=i}^n \text{lead-time of process j} \quad (1)$$

The release date from equation 1 could be wrong due to two reasons. Firstly, they do not know the current resource capacity of other processes, therefore, the release date from the equation may be infeasible. Secondly, because they calculate independently, the release date and due date of consecutive processes may be conflicting.

To correct this problem, they should calculate using a backward logic by equation 2.

$$\text{Release date of process (i)} = \text{Due date of process (i+1)} - \text{Lead-time of process (i)} \quad (2)$$

The calculation should start from the last process and then the second last process and so on. Finally, they should develop or buy a P&IC software package, which is appropriate for their current practice. This way can help them to improve their performance of P&IC system.

3.4 The current practice of Siam Kubota Co., Ltd.

Location : Navanakorn
 Products type : Diesel Engines
 Number of products : more than 200
 Purchase Lead-time : 2 months (Max)
 P&IC tool : P&IC software (self developed)

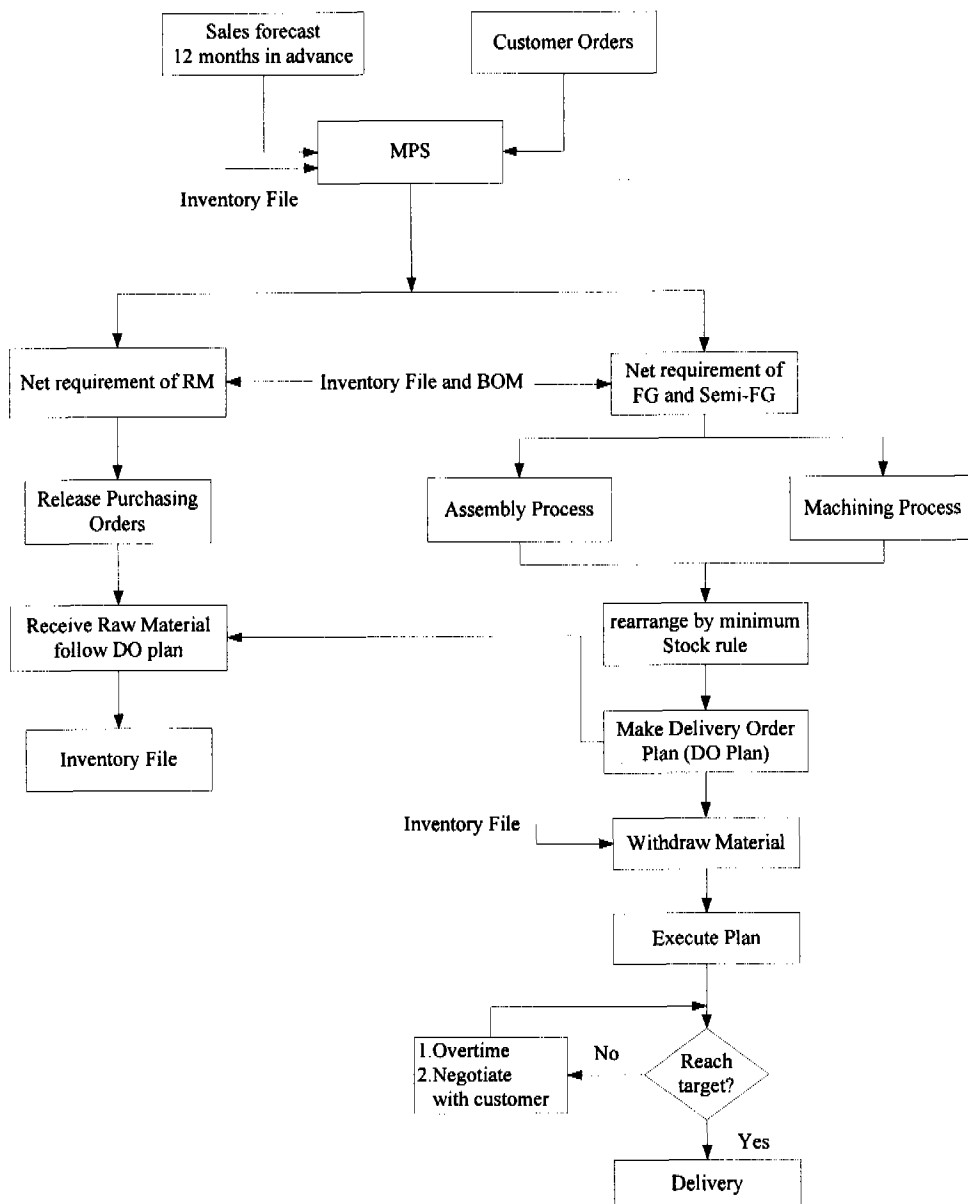


Figure 3.4 The current practice of Siam Kubota Co., Ltd.

Purchasing Planning Practices

- Step1. Receive sales forecast from sales department twelve months in advance.
- Step2. Planning Department constructs the Master Production Schedule (MPS) considering inventory on-hand. The MPS shows only the quantities of finished goods in each month. There is no detailed due date in this schedule.
- Step3. The planner calculates the required quantities of purchase items in each month based on the MPS, BOM, and only inventory on-hand. At this step, the quantity of these items is sent to the supplier (inform only quantity needed in each month without delivery date).
- Step4. Receive customer orders at the second week of the month and calculate the net requirements of purchase items again.
- Step5. Compare the purchase plans generated based on customer order and sales forecast.
- Step6. Place more purchase orders to suppliers when the orders based on sales forecast are not enough.

Production Planning Practices

- Step1. Receive the customer orders.
- Step2. Generate the production plan manually using BOM and inventory data. This plan can be classified into two types, namely, assembly and machining plans.
- Step3. For both plans, the planner will release the orders following the minimum stock rule. By this rule, it tries to produce the part with the lowest stock level first.
- Step4. After rearranging the plan by the minimum stock rule, the delivery dates of purchase items (DO plan) have been calculated based on the release and due date from the revised plan. The suppliers will send these items based on the DO plan.
- Step5. During executing the plan, there are two policies if they cannot reach the target. The overtime is applied as the first priority. The next propriety is to postpone the customer due date.

Discussions.

The production planning for this company is the same as make to stock method. The safety stock is very important since they do not know the customer due date. For both assembly and machining plans, they have to prioritize the orders by the minimum stock rule before executing the plans. By this rule, they try to produce the part with the lowest stock level first.

Although the P&IC software is self-developed, there is a problem in calculation of material requirements. Only inventory on-hand in the store without considering work-in-process is used in the calculation. This results in wrong net requirements. To solve this

problem, On-order inventory and WIP must be maintained in the software and considered in calculation the net requirements.

3.5 The current practice of Thai Hygiene Products Co., Ltd.

Location : Navanakorn
 Products type : Condom
 Number of products : more than 100
 Purchase Lead-time : 2 months (Max)
 P&IC tool : P&IC software (self-developed)

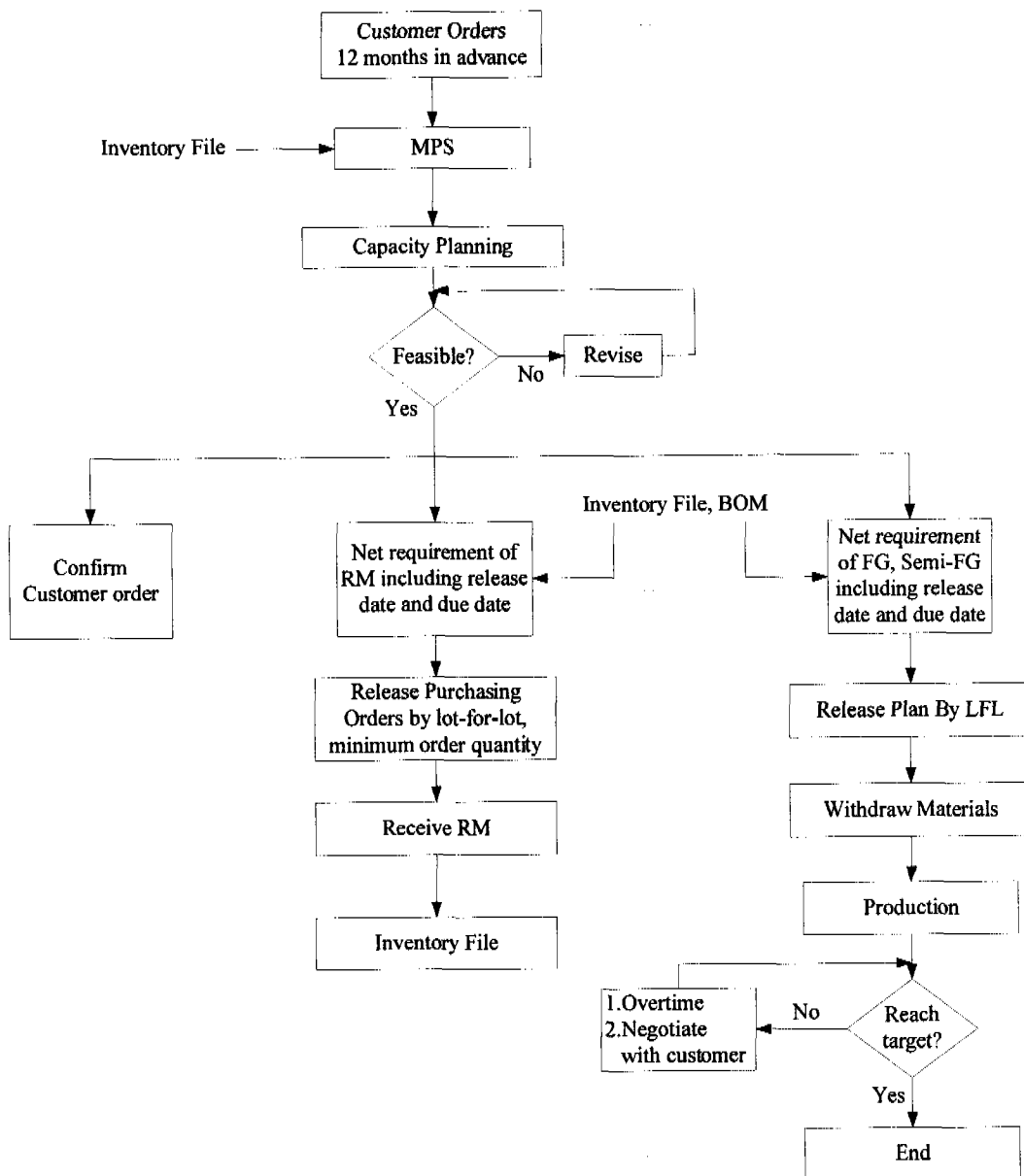


Figure 3.5 The current practice of Thai Hygiene Products Co., Ltd.

Purchasing Planning Practices

- Step1. Receive customer orders from sales department twelve months in advance.
- Step2. Planning Department constructs the Master Production Schedule (MPS) considering only inventory on-hand data. The MPS shows both quantities and due date of finished goods in each month.
- Step3. Check the production capacity required by the MPS. If the capacity is not feasible, the MPS will be revised.
- Step4. Calculate the requirement of all purchased items manually considering BOM and inventory on-hand.
- Step5. Try to release purchase orders by lot-for-lot rule. However, for some parts which are required in very small quantity, they should combine lots to the minimum quantity and specify new release and due dates before releasing.

Production Planning Practices

- Step1. After revising the MPS considering the production capacity, the production plan is generated by the software. This plan can be classified into two types, namely, assembly and machining plans.
- Step2. For both plans, the planner follows the release date suggested by the software. These plans will be released by lot-for-lot rule.
- Step3. During executing the plan, there are two ways if the production target is not reached. The overtime is applied as the first priority. The next priority is to postpone the customer due date.

Discussions.

This company is different from others. They receive the customer orders twelve months in advance and apply capacity planning before calculating the material requirements. This company checks the capacity of the resources before calculating the net requirements whereas others do not. However they do not check the capacity problem again after calculating the material requirements. Therefore the capacity problem may still exist. To correct this problem, they should check the capacity of the resources again after the material plan has been generated and revised the MPS if the capacity problem still exists.

A lot sizing rule for this company is lot-for-lot. They released the production orders by lot-for-lot rule since there are only 3 products produced by this company. A reason is that these products require the machine processing time and the set up time are very short.

This company has developed P&IC software by themselves but the WIP and on-order data have never been used in calculation. Therefore, the results are incorrect. To correct this problem, they should add the on-order and WIP data into their program.

The purchasing plan of this company is calculated manually. Therefore, the existing program should be modified in order to calculate the purchasing and production plans at the same time.

3.6 Conclusions

This section presents a summary of P&IC current practice of Thai SMIs. Five companies are selected. The current practices for production and purchasing planning are discussed. The current practices of five companies are summarized in table 3.1

Table 3.1 Summary of the current practices of 5 selected companies

Company	Inventory data	Capacity Plan	Purchase Lot size	Production Lot size	Software Platform
Kulthorn Kirby (KK)	on-hand, on-order, WIP for all items	After material requirement calculation	LFL, Minimum quantity, Quantity discount	LFL for assembly orders, Revise by considering capacity and setup time for machining orders	Commercial MRP Software
Kulthorn Universal (KU)	on-hand	After material requirement calculation	LFL, Minimum quantity, Quantity discount	LFL for assembly orders, Revise by considering capacity and setup time for machining orders	Manual
Siam Inter Pacific (SIP)	on-hand for only FG	After material requirement calculation	LFL, Minimum quantity, Quantity discount	Revise by considering capacity and setup time for assembly and machining orders	Manual
Siam Kubota (SK)	on-hand	After material requirement calculation	LFL, Minimum quantity, Quantity discount	Revise by minimum stock rule for assembly and machining orders	Microsoft Excel
Thai Hygiene Products (THP)	on-hand	Before material requirement calculation	LFL, Minimum quantity, Quantity discount	LFL for assembly and machining orders	Visual Basic

It can be seen from table 3.1 that only commercial MRP software at KK uses all inventory data (on-hand, on-order, WIP) for the material requirement calculation. However, KU, SIP, SK, and THP stated that a reason to ignore WIP in their formula is that collecting the WIP data is very difficult.

KK, KU, SK, and SIP, apply capacity planning after calculating material requirement whereas THP applies capacity planning before calculating material requirement. Actually, the capacity planning should be applied both before and after material requirement calculation.

For the purchasing lot-sizing method, all of them used the same method namely, LFL, minimum quantity, and quantity discount.

Focusing on releasing the production orders, KK and KU release the assembly orders by LFL technique and revise the machining orders considering capacity of resources and minimum set up time before releasing. A reason for this is that the processing time of assembly order is very short whereas it takes longer for the machining order. SK revises both assembly and machining orders considering the minimum stock rule since a manufacturing policy is to make to stock. THP releases both orders by lot-for-lot rule since it is very easy to track and understand by the planner.

The last category is about software platform. SK and THP use Microsoft Excel and Visual Basic with Microsoft Access database, respectively. The recommended platform for P&IC system should be a platform, which can handle a large database, for example, Oracle, Access, and SQL. Software such as Microsoft Excel is not appropriate for P&IC system since it is very difficult to develop the user interface for data entering.

Based on the current practices of selected Thai SMIs, the appropriate P&IC software will be developed. The development of P&IC software for Thai SMIs will be described in the next chapter.