CHAPTER FOUR

4) GENERATION AND SELECTION OF ALTERNATIVES

Three alternatives has been identified and selected as counter measures to solve the problems in Purchasing Management. The alternatives are :

1. Restructure the organization of Purchasing section.
2. Improvement on documentation in the company.
3. Enhance the EDP system especially on MRP.

4-1) RESTRUCTURE THE ORGANIZATION OF PURCHASING SECTION

As purchase amount and volume is getting larger with the introduction of high value added products with volatile demands, the impact of failure in controlling purchasing especially for Memory products will cost the company hugh losses. It is time for new bloods or new generation of skill and knowledge to be injected into the organization of Purchasing section to keep pace with the business development of the company.

Since the purchasing manager is also incharge of Budgeting as well, his attention is divided especially during budgeting periods. He is the coordinator for both the job in Purchasing and Budgeting due to lack of experience in budgeting staffs and on the other hand lack of knowledge in purchasing staffs. A qualified purchaser with technical background is required for machinery parts in view of the engineers involved in purchasing presently.

Besides new recruitment, one of the present staff should also be up-graded to officer level by means of replacement with other department or enhancing his or her education and knowledge through a comprehensive training. However through the interviews conducted in this survey, none of the purchasing staff has the interest to up-grade his or her qualifications eventhough the company willing to sponsor them. Some are also reluctant to attend training to improve their skill. Reasons given were that they are too old to study and they have family commitments. Based on such a situation, it is proposed that the manager should take a lead in forming a "brain storming team" among his staff to discuss about daily problems and suggestions for improvement. This will promote participation and enhance the effectiveness besides arranging in-house training for them in area related to their jobs. Through this process all members will be well verse of their colleagues' jobs, and job rotation can be carried out easily. This restructuring will strengthen the whole organization workforce and increase the productivity of purchasing staff. With the new workforce, the following improvements are expected to be carried out :

1) Improvement in informations on Purchasing to other departments through reports on :

   a) Changes in Price and its trend - comparing previous, present and further prices.
   b) Backlog status - especially for non-stock items where goods are not receive within 90 days from the date of purchase order.
   c) Cost down - activities carried out that have reduced cost of purchase through price down or sourcing.
   d) Progress on purchases for new project - statistics on vendor, lead-time, price, inventory level and others.
   e) Abnormality - quality defect, failure of delivery, mis-match invoice with purchase order, theft and others.

2) Improve and up-grade Purchasing system in terms of computerization, procedures

and control.

3) To carry out vendor audit together with technical departments. Refer appendix D 1-4..

4-2) IMPROVEMENT ON DOCUMENTATION IN NECSEM.

This section focus on improvement on documentation as many policies and procedures were not written down.

4-2-1) The Company's Purchasing Policies And Procedures Must Be Clearly Written Down

First of all the company must make it clear and loud whether it wants a centralize or decentralize purchasing. Interviews conducted on 5 other electronics manufacturers has shown that most of the company practice decentralize purchasing within a stipulated boundaries meaning guidelines and procedures are clearly spelled out in their companies. The reason for these companies to choose decentralize purchasing is that there are many customized spare parts which are only familiar to machine specialist or those involve directly in the consumption usually the engineers.

After practicing decentralize purchasing for almost 20 years, it is more suitable for NECSEM to adopt decentralize purchasing but with clearly written policy and procedures.

4-2-2) Purchasing Policy

It is suggested that a committee should be set up which comprises of all departments' head to discuss on setting policy for purchasing. Chairman for this committee is the Assistant General Manager of Administration and Finance division and coordinated by Purchasing Manager. Problems in present purchasing system can be highlighted by Purchasing section to all members and each department's needs and requirements are also studied in detail. The propose policy for purchasing is as follows:

"In order to contribute to the attainment of business goals of the company and of individual divisions, the purchasing division shall endeavor to conduct rationalized operation on materials cost budget management, shall assist smooth production, and shall endeavor to lower the materials cost."

The policy is explain further through the following functions of Purchasing section :

1) Positive promotion of business support activities.
2) Decision on buying based on business policies.
3) Selection of vendors.
4) Preferred utilization of affiliates and related companies.
5) Cultivation of sub-contractors.
6) Decision on local purchase or regional purchase.
7) Assurance of stable supply.
8) Restriction on contract preparatory activity - only Purchasing division can decide.
9) Price and purchase record management and planning cost-down strategies.
10) Pre settlement of payment terms base on company's terms and regulations.

4-2-3) Purchasing Procedures And Flow

Since the company is recommended to adopt decentralize purchasing with boundaries, the following aspect must be carefully studied for improvement. It must be clearly stated who is authorized to purchase or place order; when purchase order must be used; who to do vendor sourcing; how the term "emergency or urgent" should be defined; what is contractual item; when to consider an item as stock item or non-stock item and so on.

It is very important to identify the authorized personnel's who place purchase order in view of the decentralize purchasing. This is only applicable for purchase of non-stock items because stock items are monitor and purchase by Planning department and if users require any stock items they can request from warehouse.

Each department is suggested to appoint one person to be incharge of placing order and all PRS for that department must be issued by him and the department is also advise to keep record of their purchases. For purchases of customize technical parts or machine parts , a list of authorize engineers or machine specialists must be given to the incharge person to ensure that only the relevant persons should be involved in purchasing. All PRS issued for machine related parts must attached with two vendor quotations if sourcing is done at departmental level. It is the department head's prerogative to decide on the names. The flow to place order remand the same as present; issue by incharge person and check by immediate superior and authorize by department head.

Ideally all purchases other than accrued expenses must use purchase order includes emergency purchases. PRS and invoice must attached together and summit to Purchasing section for such urgent purchases. Purchasing section will still create a purchase order number for recording purposes. All departments are requested to issue a monthly report on purchases of emergency items stating the reason for such a purchase.

In respect of processing invoices, checking junction in purchasing section can be abolished as purchase order contained all the relevant informations regarding purchases of a goods. Computer can do the "matching" between the purchase order and invoices. Particulars in invoice are input by warehouse during receiving. In addition of that, any discrepancies shall fall to a discrepancies file. These can save an estimation of 25% of the purchasing staffs' jobs.

Purchasing section should be involved in the negotiation of buying non-stock items otherwise purchasing members have the right to source again if they feel that other vendor can supply at a better cost.

Another area of concern is the increasing number of non-stock items. The number of non-stock items is going beyond the number of stock items which is not healthy for a manufacturing company with such a big expansion plan. Through discussion with all departments' head, a mutual agreement has derived on how to minimize non-stock items. The conclusion made was to convert non-stock items with frequency of usage of one time or more in a month, to stock item. If frequency of usage is one time in 3 months and price per unit exceeding RM50 should also be classified into stock item provided it is not an investment.

To facilitate further control, all contractual items shall be centralized as stipulated in the function of Purchasing section. Contracts should be evaluated and authorized by a team which will be leaded by head of purchasing section. This will standardize all the terms and condition on contractual items.

4-3) ENHANCE THE EDP SYSTEMS ESPECIALLY ON MRP.

Surprisingly there is linkage to Internet but internally the EDP systems are still not interlink. Top priority in improving the EDP systems is to interlink all systems in the company for optimum usage. Without solving this root cause other counter measures can not be visualized.

The biggest operating system is Acos which runs the PMCS, PCS and FAS. In other words most of the major systems are in Acos. Therefore it is advisable to maintain only one system, eliminate the Astra and transfer the MRP and Personnel systems to Acos.

Acos system is only 3 years old with the latest technology and high capacity sufficient to cater for another two systems, MRP and Personnel systems. Hence Acos should be maintained instead of Astra which was introduced in the seventies.

The second step towards the ideal MRP is to match the external and internal names for product. Presently Shipping system is using external names and the rest of the systems are using internal names. The company is recommended to adopt the external names in replace of the internal names. The advantage is that the interlink of product names within different systems will be more simplified. In addition most of the pellet manufacturers are moving towards standardizing pellets' name with products' name.

The third steps before going full swing to MRP is restructuring of stock code in present MRP system which do not cater for purchases of materials from more than one vendor or supplier. The direct one material to one vendor relationship should change to multiple relationships of material to vendor as practice in Purchasing and Inventory systems.

The implication is better visualized from the following comparison. Assume that material A is purchase from two vendors ABC and XYZ. The stock code for material A is 32A-xxxx. If

ABC and XYZ are from the same country, the stock code for material from ABC and XYZ will only be differentiated through the 4 serial numbers. In the case where ABC is a Japanese company located in Japan and on the hand XYZ is a local company, the stock code created for ACB and XYZ will be 32A-xxxx and 35A-xxxx respectively through the identification of 2 for Japan and 5 for local. Two separate codes are required not only for vendor identification but most important is the price and lead-time differences which will affect the computation of MRP.

In Purchasing and Inventory systems both stock codes are available but not in MRP. MRP system only able to cater for one stock code. Presently the computation of MRP is base on which ever price that is higher.

Once the 3 steps or counter measures are carried out, the full implementation of MRP is then possible. The following discussion will explain in detail the implementation of MRP which will be divided into 4 stages. The implementation is proposed to go by stages so that material controller's job can be simplied in stages rather then waiting for the whole system to complete fully which may take 2 years based on the EDP members' estimation. The ultimate system of MRP must be able to provide the following requirements :

1) Automatic computation of material requirement (MRP) once sales plan is input.
2) Automatic generation of purchase order upon computation of MRP and when inventory level reaches the minimum stock level.
3) Giving alarm on materials that fall below the critical stock balance and slow moving materials.

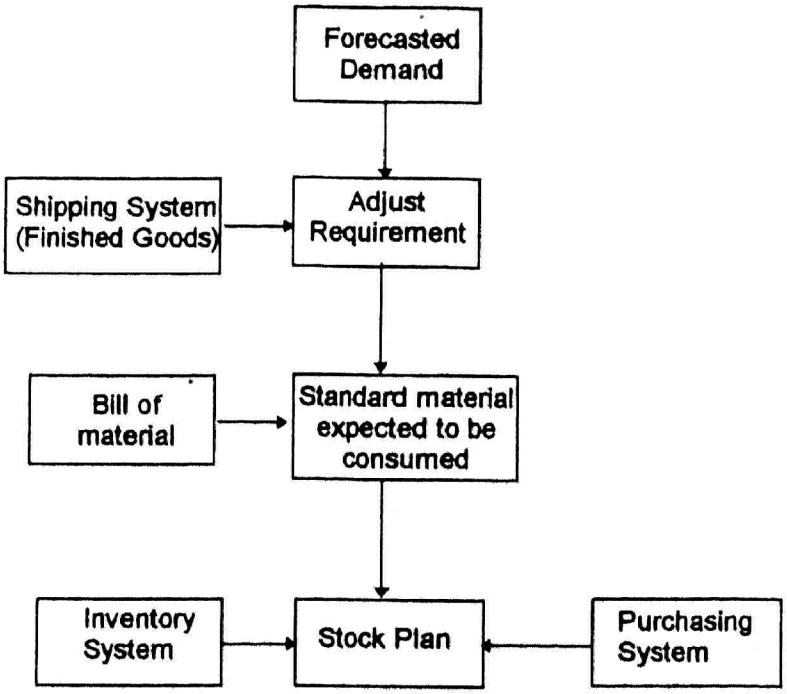
4-3-1) Stage One

At the first stage, I would like to propose a simple MRP system that runs in Acos system as Acos is the mainframe and most of the systems operating under this system. This will simplify the interlink of MRP to all other related systems. A new "Material-product relationship" shall be developed using external product names instead of material names. Through this, linkage of market demand quantity (sales plan) in Shipping system to MRP as well as linkage to Inventory and Purchasing systems are possible and the inter-relation is easy to understand by all members. With consideration of safety stock margin a simple MRP system can be computed out . The following example and flow chart will give a clearer picture of how a simple MRP works at stage one.

Referring to flow chart of simple MRP in figure 8, the computation of MRP should base on the following steps:

1) Forecast sales demand for the coming 5 months and input into Shipping system.
2) Adjust sales requirement by deducting finished goods available at Shipping system.
3) Link to Bill of materials which will provide informations on material - product relationship and standard material requirement to produce a piece of product. This linkage will give the standard material requirement based on the adjusted sales requirement.
4) A stock plan can then be generated with consideration of material stock balance in Inventory system and purchase backlog from Purchasing system plus the safety stock which will be included into the formulae of computation.

Figure 8 : Simple MRP At Stage One



The implications of the proposed new system at stage one are the elimination of human inputting errors in computing stock plan and also speed up the process of calculating MRP. Standard material cost can be derived at any time for costing purposes. Unfortunately it did not consider raw material already issued by warehouse and kept at production floor waiting for construction into work in progress. The whole work in progress at production floor is also not considered over here. Scheduling on material delivery is still has to be done manually because vendor lead-time has not incorporate into the formulae.

4-3-2) Stage Two

The second stage of MRP is to improve some of the weakness at stage one. It shall incorporate :

1) vendor lead-time of ordering

2) raw material kept at production floor.

The number of vendors supplying for raw materials is very small totally 20 suppliers which are supplying more than 90% of the total purchase amount of materials & spare parts excluding investments. Lead-time of delivery for materials varies according to vendors. So far lead-time given to vendors is between 2 weeks to 4 months depending of the location of vendors' plant and the type of materials. Leadtime for vendor should be incorporated into vendors' file.

Basically a product has to go through nine processes before completion which usually takes about 11 days on average. At the initial 5 processes different types of raw material are consume at different processes. These processes are called Assembly process. Production floor runs on 24 hours basis and warehouse is only open during normal working hours (8.30 a.m. to 5.15p.m.). Therefore the supervisior in charge of second shift (3.00 p.m. to 11.00 p.m.) has to request material from warehouse for the third shift (11.00 p.m. to 7.00 a.m.) consumption and partial requirement of the first shift (7.00 a.m. to 3.00 p.m.). In such a case there will always be material kept at production floor. Presently there is no system capturing this raw material stocks. Inventory system has considered it as already issued from warehouse and PCS system does not capture it as work in progress because it is a raw material. This loop-hole often create a problem of excessive material being brought in by material controller once stock balance is low because they do not know how much material is kept at production floor.

It is suggested that the PCS system should have a field to capture material in process separately from work in progress. The data is equally important to minimize the unnecessary

time spend in checking the actual usage of raw material and the unnecessary bringing in of additional stock. At this second stage of implementation the computation of stock plan is more accurate.

4-3-3) Stage Three

The final stage of MRP will complete the ideal system in Purchasing Management. At this stage, work in progress (WIP) will be incorporated into MRP and automatic generation of purchase order by computer. The computation of stock plan is the same as at stage two but there will be additional linkage that is to PCS system in order to capture the amount of WIP. With the incorporation of WIP, all elements related to MRP are now taken into considerations in computing the final purchase requirement which is fully computerized on on-line basis.

Following is an example of stock plan after the completion of the above 3 stages. There are a few assumptions to be considered when calculating the MRP namely :

1) Purchase orders are issue in advance to vendors according to their lead-time and it is a promise delivery.
2) The model shows only one type of material to one product type and one vendor.
3) There is continuous demand for the particular product however fluctuation of demand still exists.
4) There is no yield loss.

Here, MRP is calculate with consideration of material at production floor and vendors' lead-time assuming it is a blanket order. Refer to table 3.

Table 3 : Computation of stock plan after implementation of 3rd. stage MRP

Time (MTH)		X	X+1	X+2	X+3	X+4
Shipping Plan		0	100	110	120	130
Finished Goods Stock		40	0	0	0	0
Instock Plan		-	100-40=60	110-0=110	120-0=120	130-0=130
Assembly	Day					
A-7	1	10				
A-6	2					
-5	3	10				
A-4	4					
A-3	5					
A-2	6					
A-1	7					
Assembly Plan Or Input Plan			40	110	120	130
			40+27.5	82.5+30	90+32.5	
Material Stock		25	7.5	0	0	
Backlog			50	-	-	
Net Requirement			0	105	122.5	
(Vendor L/T : 7)						
Purchasing Qty			105	122.5		
			26.25	78.75+30.6		

For the row we have shipping plan, finished goods, instock or output plan, production assembly flow, assembly or input plan, material stock balance, backlog of purchase order already placed, net requirement, vendor delivery lead-time and quantity to be purchased. For the column we have time that is X, X+1, X+2 and X+3 month.

With the shipping plan of 100 units and finished goods of 40, we only need to instock or output 60 units presuming we keep zero finished goods stock. The amount of work in progress (WIP) in the production line which be can output is 20 units. Therefore we only require to assemble 40 units for the current month.

Since the assemble lead-time is 7 days, for the 1st. week requirement of the following month need to be assembled in current month. The following (X+1) month's shipping plan is 110, therefore we have to assemble about 25% of 110 in this month that is 27.5 units. Total input plan for current month is now 67.5 units (40 + 27.5 units).

We have material stock of 25 units and backlog for order placed yet to be received the goods from vendor is 50 units. With the assumption that the 50 units are received in X month or current month, material available will be 75 units and input requirement is only 67.5 units, meaning no purchase is required for current month as there is a stock balance of 7.5 units (75 - 67.5).

However lead-time to received goods from vendor is 7 days. Therefore eventhough no purchase is required for current month, we need to order for next month's 1st week requirement. Using the same method of calculation as x month, requirement for (x+1) month is computed to be 105 pcs [110-(110*25%)+(120*25%)-7.5]. With the lead-time of 1 week to received goods, 26.25 units of (x+1) month's requirement is ordered in x month. The same process will continue for the following months.

What have been explained in the previous table is without the consideration of safety stock. Safety stock is important to ensure smooth production flow in the case of failure of delivery by vendor or high material rejection rate.

In determining the safety stock, one must understand clearly :

1) Frequency of delivery - schedule or non schedule
2) Lead-time of delivery and mode of delivery (air, sea or road)
3) Manufacturing process lead-time
4) Fluctuation in demand

Refer back to our previous calculation on material requirement, assume that safety margin is set at 25% of the following month's requirement then the x month purchase order will be 7.5 units stock balance minus 25% of next month requirement for safety margin that is 28.12 units. The net purchase quantity will be 20.62 unit (28.12 - 7.5) in x month.

If delivery lead-time by vendor for that particular material is one month, then the purchase quantity will be 20.62 units plus (x+1) month's requirement of 112.5 units and 25% of (X+2) month's safety stock of 30.6 units. The final quantity to be order in x month is 135.6 units assuming it is a blanket order. Table 4 will show the final outlook of the purchasing and stock plan.

Table 4 : Stock Plan With Safety Margin

Time (MTH)	X	X + 1	X+ 2	X+ 3
Gross Requirement	67.5	112.5	122.5	
Backlog	50.0	-	-	
Material Stock	7.5			
Safety Stock 25% Of the Following Month	28.12	30.6		
(Short)/Excess	20.62			
P/O (L/T = 1 MTH) *	(20.62 + 114.98)			
Received	135.6	20.62 + 114.98		

* Leadtime from Purchase order to receiving = 1 month

1) Gross Requirement - requirement in that particular month

2) Backlog - order already placed and expected to receive in x month

3) Stock - stock balance in warehouse

4) Safety stock - standard stock required to be kept

The success of all the stages could not rely solely on EDP systems alone. The tracing of delivery is equally important. If the assumptions mentioned earlier is not actualized in practice, the whole MRP system is also a failure no matter how accurate is the data. In other words, tracing the progress of delivery is a must for purchasing staff.

Tracing or scheduling format for delivery should be able to breakdown monthly consumption into daily basis to avoid excess stock or material shortage in between the month. Immediate counter measures can be taken instantly once the scheduling data show a negative situation. Actions like re-negotiation on delivery date or change of mode of delivery can be arranged with vendor. The following is the detail format for scheduling. Refer to table 5.

Table 5 : Detailed Scheduling Format

Daily	Open	1	2	3	4	.....	31	Remarks
Standard Requirement Actual Issued								
Expected Putchase Actual Received								
Expected Stock Actual Stock								
Excess/ (Shortage)								

4-3-4) Stage Four

Once the MRP is running at full swing with excellent performance, another great improvement to be considered if the time and cost is permissible, is to link NECSEM's PMCS system with its headquarter in Japan through the availability of Internet. Through this linkage NECSEM could access to the stock level of materials at headquarter and purchase order could be transmitted directly via data transmission modem. The linkage will provide a better situation for material controllers to make immediate adjustment in the case where headquarter can not meet NECSEM's purchase order, thus saving time and cost. Another advantage is the cost saving in papers as data is transmitted electronically.