Inventory Management of an Electronic Products Manufacturer

by

Mr. Ongard Chuckchaikul

A Final Report of the Three-Credit Course
CE 6998 Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer and Engineering Management
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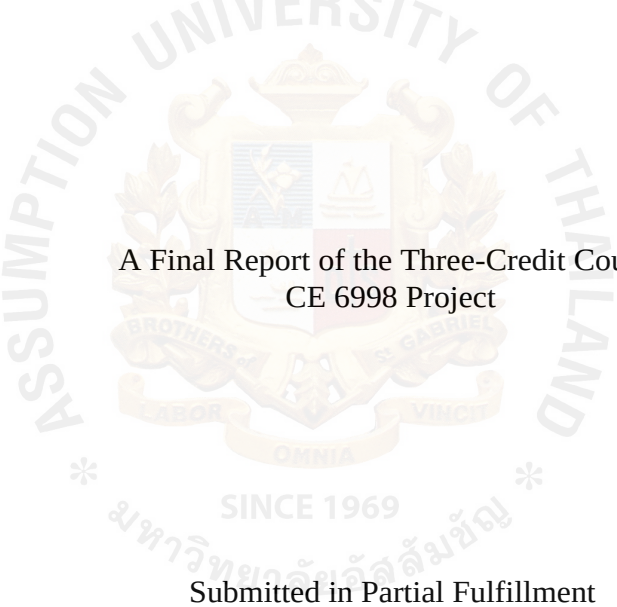

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The Graduate School of Assumption University has approved this final report of the three-credit course, CE 6998 PROJECT, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management.

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ABSTRACT

This project is done for providing the concept of Inventory Management techniques, the objective of which is to minimize the inventory holding cost and the inventory turnover days. Material Requirement Planning or MRP and ABC classification system are the techniques used in this paper. Both techniques apply the use of product component details in Bill of Material or BOM for the inventory holding cost and the inventory turnover day calculations.

The case study of an electronics manufacturing company, DT Electronics Co., Ltd., uses MRP technique by describing the technique implementation and showing the calculation of the inventory cost and turnover day in order to reach the company's target. But it seems that the inventory holding cost and the inventory turnover days are still high. Therefore, DT Electronics's management decides to study and implement ABC classification system, instead of MRP. The technique details are also described. The content of the project shows the comparison of the inventory holding cost and inventory turnover day between MRP and ABC Classification System. This will provide the result in terms of improvement in reaching the company's target.

The readers will receive a clearer view of both techniques (MRP and ABC Classification System). From the case study Furthermore, the recommendation will provide the more practical understanding and those who are interested should also study and consider the advantage, disadvantage and the possibility of other techniques such as Third Party Warehouse and Localized Factory in Thailand.

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I am indebted to the following people and organizations. Without them, this thesis would not have been possible.

I wish to express my sincere gratitude to my advisor and chairman of the Advisory Committee, Dr. Chamnong Jungthirapanich. His patient assistance, guidance, and constant encouragement has led me from research inception to research completion. I would like to express appreciation to my boss Mr. Chris, and Mr. Manus for their constructive comments and advice throughout the research.

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I. INTRODUCTION

1.1 Background of project

The dawning of a new century is being heralded by unprecedented changes in organizational operations. It has become painfully obvious that organizations are able to operate with little inventory and still enjoy a competitive advantage. Many organizations are involved with benchmark and continuous improvement strategies that stress continual inventory reductions with fewer suppliers, smaller lot sizes, shorter lead times, reduced setup times, total quality programs, preventive maintenance, employee training, and increased emphasis on customer satisfaction. If these thrusts are successful, they are manifested in lower inventory requirements because of simplification, automation, integration, and less dwell time within the organization.

Management's role in any organization involves the acquisition, disposition, and control of the factor of production, typically labor, capital, equipment, and materials. Organization uses, transforms, distributes, or sells materials of one form or another. The management of materials concerns their flow to, within, and from the organization. The efficiency and efficacy of the flow can substantially influence costs and revenue generation and thus hold serious implications for marketing, financing, and production. Materials management seeks a balance between shortages and surpluses in an uncertain environment, and has a tremendous influence on the ultimate cost of a product. Because material management handles the total flow of materials for an organization, the total flow can extend from suppliers to production and subsequently through distribution centers to customers. Encompassed in the management of the material flow is the responsibility for the planning, acquisition, storage, movement, and control of materials and final products. The emphasis is primarily on planning and controlling the flow.

Furthermore, it will be best to make zero inventories, which impacts the production cost. For this project, methodologies to make zero inventories are presented by using the data from DT Electronic (Thailand) Co., Ltd. as the case study. DT is engaged in the development, designing, manufacturing and marketing of electronic components and equipment for OEM/ODM and distribution. With fast business growth and continuous progress in new product development, DT has become the world's leading switching power supply manufacturer and a major supplier of video displays & electronic components, telecommunications, networking and other industries.

1.2 Objectives of the project

(a) To control inventory cost to be lowest and close to zero.

(b) To analyze and reduce inventory holding cost.

1.3 Scope of the project

The scope and limitation of survey study are to reduce the electronic production raw material inventory and inventory holding period, by using Material Requirements Planning (MRP) and ABC Classification System.

1.4 Deliverables of the project

This project will bring the methodologies (ABC Classification system Analysis and Material Requirements Planning or MRP) to solve the problem of the existing inventory system of the organization, which help reduce costs.

II. LITERATURE REVIEW

2.1 Inventory (Tersine 1994)

The control and maintenance of inventory is a problem common to all organization in any sector of the economy. The problems of inventory do not confine themselves to profit marketing institutions but like wise are encountered by social and nonprofit institutions. Inventories are common to farms, manufacturers, wholesalers, retailers, hospitals, churches, prisons, zoos, universities, and national, state, and local governments. Indeed, inventories are also relevant to the family unit in relation to food, clothing, medicines, toiletries, and so forth.

The term inventory can be used to mean several things, such as;

(a) The stock on hand of materials at a given time (a tangible asset which can be seen, measured, and counted);

(b) An itemized list of all physical assets;

(c) (as a verb) to determine the quantity of items on hand;

(d) (For financial and accounting records) the value of the stock of goods owned by an organization at a particular time.

In this text, inventory refers to item unless otherwise specified. A more comprehensive definition would refer to inventory as material held in an idle or incomplete state awaiting future sale, use, or transformation.

2.2 Types of Inventory Control (Tersine 1994)

Inventory may consist of supplies, raw materials, in-process goods, and finished goods. Supplies are inventory items consumed in the normal functioning of an organization that are to a part of the final product. Typical supplies are pencils, paper,

light bulbs, disks, drill bits, cutting tools, and facility maintenance items. (Factory supplies are called MRO, for maintenance, repair, and operating supplies.) Raw materials are items purchased from suppliers to be used as inputs into the production process. They will be modified or transformed into finished goods. Typical raw materials for a furniture manufacturer are lumber, stain, glue, screws, varnish, nails, paint, and so forth. In-process goods (Appendix A) are partially completed final products that are still in the production process. They represent both the accumulation of partially completed work and the queue of material waiting further processing. Finished goods are the final product, available for sale, distribution, or storage.

The assignment of inventory to any of these categories is dependent on the entity under study. This is because the finished product of one entity may be the raw material of another. For example, a refrigerator manufacturer considers copper tubing as a raw material, but the firm that produces the tubing considers it as a finished good. The customer for finished goods inventory may be the ultimate consumer, a retail organization, a wholesale distributor, or another manufacturer. Figure 2.1 indicates the types of inventory.

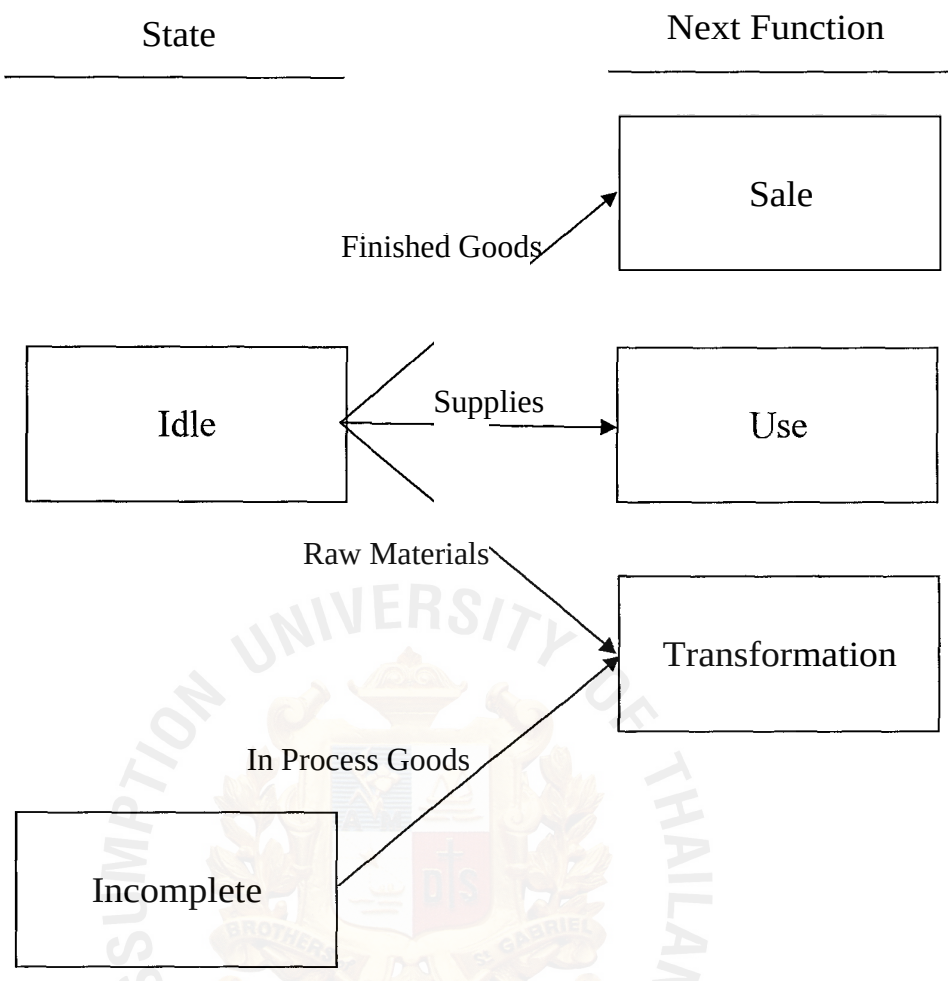


Figure 2.1. Types of Inventory.

2.3 Functions of Inventory (Tersine 1994)

Inventory exists because supply and demand are difficult to synchronize perfectly and it takes time to perform material-related operations. For several reasons, supply and demand frequently differ in the rates at which they respectively provide and require stock. These reasons can best be explained by four functional factors of inventory-time, discontinuity, uncertainty, and economy.

The time factor involves the long process of production and distribution required before goods reach the final consumer. Time is required to develop the production schedule, cut raw material requisitions, ship raw materials from suppliers (transit time),

inspect raw materials, produce the product, and ship the product to the wholesaler or consumer (transit time). Few consumers would be willing to wait for such an extended period of time on all their purchases. Inventory enables an organization to reduce the leas time in meeting demand. Profitability can be enhanced by a reputation of having products available immediately or within a reasonable time.

The discontinuity factor allows the treatment of various dependent operations (retailing, warehousing, manufacturing, and purchasing) in an independent and economical manner. Inventories make it unnecessary to gear production directly to consumption or to force consumption to adapt to the necessities of production. Inventories free one stage in the supply-production-distribution process from the next, permitting each to operate more economically. Raw material inventory isolates the supplier from the user, in-process inventory isolates production departments from each other, and finished goods inventory isolates the customer from the producer. The discontinuity factor permits the firm to schedule many operations at a more desirable performance level than if they were integrated dependently.

The uncertainty factor concerns unforeseen events that modify the original plans of the organization. It includes errors in demand estimates, variable production yields, equipment breakdowns, strikes, acts of God, shipping delays, and unusual weather conditions. When inventory is available, the organization has some protection from unanticipated of unplanned occurrences.

The economy factor permits the organization to take advantage of cost reducing alternatives. It enables the organization to purchase or produce items in economic quantities. Bulk purchases with quantity discounts can reduce cost significantly. Per unit costs can be excessive if items are ordered separately without regard to transportation and lot size economies. Price hedging against impending material cost increases ma also

favor large quantity purchases. Inventories can be used to smooth production and stabilize manpower levels in undulating and seasonal businesses.

Another way to explain the purposes inventory serves is by introducing functional classifications of inventory. Based on its utility, all inventories can be placed in one or more of the following categories:

(a) Working stock (also known as cycle of lot size stock) is inventory acquired and held in advance of requirements so that ordering can be done on a lot size rather than on an as needed basis. Lot sizing is done in order to minimize ordering and holding costs, achieve quantity discounts, or qualify for favorable freight rates. In general, the average amount of inventory on hand that result from lot sizes constitutes an organization's working stock.

(b) Safety stock (often called buffer or fluctuation stock) is inventory held in reserve to protect against the uncertainties of supply and demand. Safety stock averages out to the amount of stock held during a replenishment cycle as a protection against stock outs.

(c) Anticipation stock (also known as seasonal or stabilization stock) is inventory built up to cope with peak seasonal demand, erratic requirements (promotional programs, strikes, or vacation shutdowns), or deficiencies in production capacity. It is supplied or produced in advance of requirements and depleted during peak demand periods to keep production rates level and stabilize the work force.

(d) Pipeline stock (often referred to as transit stock or work-in-process) is inventory put in transit to allow for the time it takes to receive material at the input end, send material through the production process, and deliver goods at the output end. Externally, pipeline stock is inventory on trucks,

ships, and railcars or in a literal pipeline. Internally, it is being processed, waiting to be processed, or being moved.

(e) Decoupling stock is inventory accumulated between dependent activities or stages to reduce the requirement for completely synchronized operations. It isolates one part of the system from the next to allow each to operate more independently. Thus, it acts as lubrication for the supply production-distribution system that protects it against excessive friction.

(f) Psychic stock is retail display inventory carried to stimulate demand and act as a silent salesperson. It increases the chance an item is seen and considered for purchase. Full shelves increase sales by exposing customers to as much stock as possible and creating greater product visibility. Under stocked shelves as well as stock outs can lead to lost sales and lost customers. While other stock categories support low cost operations, psychic stock is a revenue generating category. It is concerned with revenue generation via demand creation versus cost minimization which is supply oriented.

Inventories usually are not held for their own sake but as means to an end. The ends are the objectives established by the organization-its reasons for existence. Clearly there are various types of inventory that are intended to serve a variety of purposes. They cannot be managed in exactly the same way, but must be overseen in keeping with their specific function.

Inventory is a necessary part of doing business. While functional factors and functional classifications explain the existence of inventory, this does not mean that attempts at its reduction should not be pursued. Inventory can hide operational problem or make problems easier to live with. It is more desirable to eliminate problems than to cover

them up with excess inventory. A wise strategy is to attempt to reduce inventory by minimizing or eliminating operational encumbrances that dictate its existence.

2.4 Inventory Control Systems (Russell and Taylor III 2003)

An inventory system controls the level of inventory by determining how much to order (the level of replenishment), and when to order. There are two basic types of inventory systems: a continuous (or fixed-order-quantity) system and a periodic (or fixed-time-period) system. In a continuous system, an order is placed for the same constant amount whenever the inventory on hand decreases to certain level, whereas in a periodic system, an order is placed for a variable amount after specific regular intervals.

2.4.1 The ABC Classification System (Russell and Taylor 2003)

The ABC system is a method for classifying inventory according to several criteria, including its dollar value to the firm. Typically a company, especially in manufacturing, holds thousands of independent demand items in inventory but a small percentage is of such a high dollar value to warrant close inventory control. In general, about 5 to 15 percent of all inventory items account for 70 to 80 percent of the total dollar value of inventory. These are classified as A, or Class A items. B items represent approximately 30 percent of total inventory units but only about 15 percent of total inventory dollar value. C items generally account for 50 to 60 percent of all inventory units but represent only 5 to 10 percent of total dollar value. For example, a discount store such as Wal-Mark normally stocks only a few television sets, a somewhat larger number of bicycles or sets of sheets, and hundreds of boxes of soap powder, bottles of shampoo, and AA batteries.

In ABC analysis each class of inventory requires different levels of inventory control-the higher the value of the inventory, the tighter the control. Class A items

should experience tight inventory control; B and C require more relaxed (perhaps minimal) attention.

The first step in ABC analysis is to classify all inventory items as either A, B, or C. Each item is assigned a dollar value, which is computed by multiplying the dollar cost of one unit by the annual demand for that item. All items are then ranked according to their annual dollar value, with, for example, the top 10 percent classified as A items, the next 30 percent, as B items, and the last 60 percent, as C items. These classifications will not be exact, but they have been found to be close to the actual occurrence in firms with remarkable frequency.

The next step is to determine the level of inventory control for each classification. Class A items require tight inventory control because they represent such a large percentage of the total dollar value of inventory. These inventory levels should be as low as possible, and safety stocks minimized This requires accurate demand forecasts and detailed record keeping. The appropriate inventory control system and inventory modeling procedure to determine order quantity should be applied. In addition, close attention should be given to purchasing policies and procedures if the inventory items are acquired from outside the firm. B and C items require less stringent inventory control. Since carrying costs are usually lower for C items, higher inventory levels can sometimes be maintained with larger safety stocks. It may not be necessary to control C items beyond simple observation. In general, a items frequently require a continuous control system, where the inventory level is continuously monitored; a periodic review system with less monitoring will suffice for C items.

Although cost is the predominant reason for inventory classification, other factors such as scarcity of parts or difficulty of supply may also be reasons for giving items a higher priority. For example, long lead times for some parts might be a problem for a

company in Australia ordering from Europe, thus requiring a higher-priority classification for those parts.

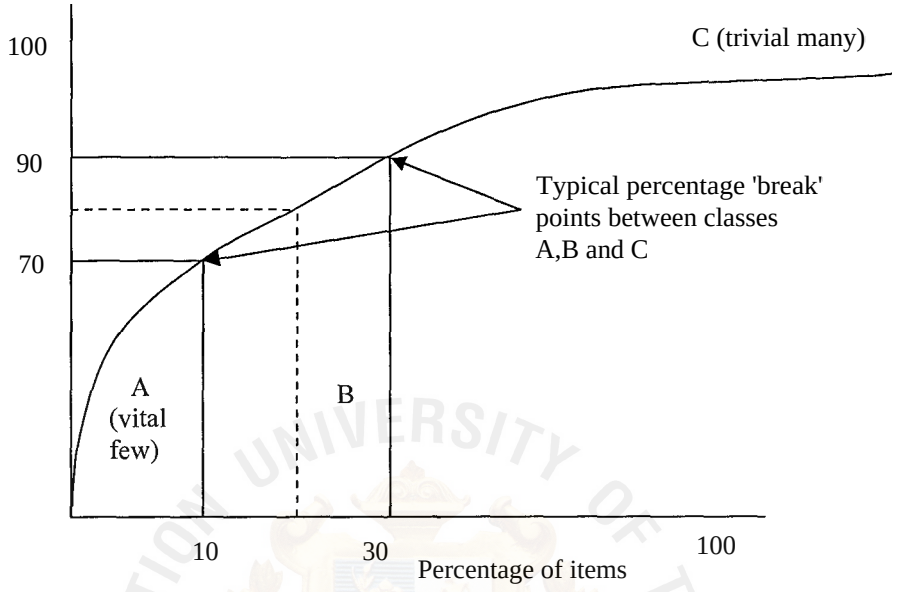


Figure 2.2. Typical ABC Curve Showing 80:20 Relationship.

The recognition of this disproportion enables a differential approach to be taken to categories of stock, with appropriate approaches to control being taken according to the usage value of each item.

ABC analysis, which is simply the refinement of the idea of there being tow categories of stock into a series of three categories and delay employed.

Category A items, small in number, high in usage value-the vital few from a financial point of view.

Category B items, medium number, medium usage value- 'normal' items.

Category C items, high number, low usage value- the 'trivial many'.

Figure 2.2 industries a typical ABC curve; it should be remembered that the break points between classes A B C are arbitrarily set and can be placed at the points on the

Pareto curve which suit the operator. The break points shown may, however, be regarded as.

2.4.2 Material Requirements Planning (MRP) system (Donald, David and Lamar 1990)

MRP system is concerned with customer demand production schedules, inventory levels, and available capacity at work centers within a plant. With ERP the scope is broadened to customer demand and available capacity at company plants worldwide, and production schedules and inventory levels along its supply chain as well as throughout the company. Before ERP can plan worldwide, however, it must have accurate data from within each plant.

The Production planning systems, how closed loop MRP systems functions as complete production planning and control systems. The material requirements planning module is an integral part of such a system. Through its bill of materials explosion and aggregation process, this element of the system generates on a weekly basis the projected materials requirements for all the finished products included in a firm's updated master production schedule for all the coming two-to three-month period.

Taking the projected gross requirements for a given material during the planning period, the logic of the MRP module then calculates the net requirements by subtraction on-hand inventory and any scheduled receipts of the item as production is scheduled to progress through the planning period. This produces a "time-phased" purchase order requirement to be released at a calculated future date. (The reader may wish to review this logic by referring to Figure A typical MRP planning record)

The inventory that is carried in the system is a function of three factors: (1) the quantity purchased when each order is placed, (2) the purchase lead time specified by the buyer, and (3) any safety stock that is routinely carried. The objective of time phasing the order point is to keep the inventory as close to zero as is practical until the

material is actually needed for production. Consequently, using an MRP system, the average inventory levels of most materials are relatively low over the long term.

In the case of some materials, no safety stock is carried. In other cases a one-to two-week supply may be carried as a hedge against uncertainties such as possible fluctuations in demand, variations in supplier lead time requirements or anticipated scrap or reject rates. Variations in supplier lead time requirements also may be covered by simply extending the lead time figure used in calculating the order release date; in this case safety stock would be reduced correspondingly. These safety stock and lead time hedge values typically are determined judgmentally on the basis of past experience with specific materials and suppliers.

The when to order question, then, is answered by the logic of the system. Deciding how much to order is in part a judgmental issue. The most common approach, as was the case in the cyclical system, is to order the quantity required during the planning period-the "lot for lot" approach. This method typically tends to minimize the inventory in the system. At times, however, the lot-for-lot approach many produce an order quantity that is too small to be economical because of high acquisition costs or production setup costs, order size may have to be larger. In this case, the ABC or a related least-cost calculation is frequently used to obtain a more appropriate order quantity figure, a number of other decision rules are sometimes used, but those just mentioned appear to be the most common.

The MRP system is designed for use with dependent demand items-that is, production materials. The only way it can handle an independent demand item is by tying such an item's use into a product bill of materials. For production tools and certain other MRP system can be adapted for use in a continuous or a processing-type

operation, but it does not fit such operations well and usually it offers few significant advantages over the other types of systems.

Order Point or fixed Order Quantity System

The order point system, historically known as the fixed order quantity system, is another inventory control system that has been used for years in this country by both manufacturing and no manufacturing organizations. The system recognizes the fact that each item has its own unique optimum order quantity, and it is therefore based on order point and order quantity factors, rather than on the time factor.

Operation of an order point system requires two things for each inventory item:

(a) The predetermination of an order point, so that when the stock level on hand drops to the order point, the item is automatically "flagged" for reorder purposes. The order point is computed so that estimated usage of the item during the order lead time period will case the actual stock level to fall to planned minimum level by the time the new order is received. Receipt for the new order then increases the stock level to a preplanned maximum figure.

(b) The predetermination of a fixed quantity to be ordered each time the supply of the items is replenished. This determination typically is based on considerations of price, rate of usage, and other pertinent production and administrative factors.

The automatic feature of the system is achieved by maintaining a perpetual inventory record for each item. The computer, or an inventory clerk in the case of a manual system, continues to post all material issues until the balance of an item falls to its order point. At this point the system notifies the appropriate buyer, who replenishes the stock in a quantity that takes the inventory to its planned maximum level. During the

course of operation, the ongoing inventory level is thus maintained between the planned minimum and maximum values.

The predetermined order point, then, tells the buyer when to order. In most organizations the order point is determined in the following manner: First, basic operating data about demand and lead time must be obtained. Next, a decision must be made about the desired service level. For most materials, most firms target for 100 percent-that is, they don't want to run out of stock before the new order arrives. At this point in the discussion, the process can be described most easily with the use of a simple illustration. Suppose the following data have been determined for a given inventory item:

Purchasing lead time = 1 week (very stable; little chance of variation)

Material usage = 50 units per week, with +10 percent variation over the long run

So: Maximum usage during lead time = 55 units

Average usage during lead time = 50 units

Minimum usage during lead time = 45 units

Figure 2.3. Order Point or Fixed Order Quantity System.

Figure 2.3 illustrative simplified inventory movement patterns for a given material, with a maximum usage rate. Shows a simplified, or idealistic, inventory movement patterns for the material in question, with the usage rate constant at the maximum level of 55 units per week. Now, if the buyer does not want to run out of stock, at what inventory level should the new order be placed? If lead time is known to be one week, and the maximum usage has been determined to be 55 units per week, the new order clearly should be placed when the stock level falls to 55 units. Under these

conditions, the new order will arrive just when the stock level reaches zero. So — the order point is 55 units.

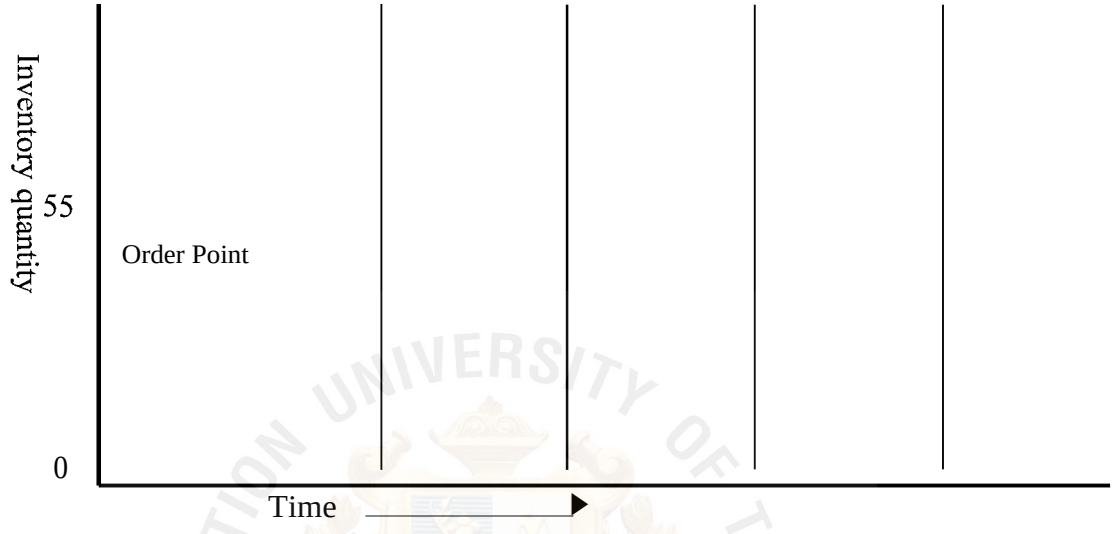


Figure 2.4. Simplified Inventory Movement Patterns For Given Material, with a Maximum Usage Rate.

Now, what happens when the usage rate runs around 50 units per week, as it does much of the time? The inventory movement pattern shown in Figure 2.4 Preceding movement patterns with an average usage rate, showing safety stock determination. With an order point of 55 units, as long as the average usage rate of 50 units per week prevails, the new order will arrive when 5 units (55-50=5) are still left in stock. This brings us to the definition of safety stock. In an order point system, set up as just described, safety stock is normally defined as the maximum lead time usage minus the average lead time usage. In this case, then, the order point is 55 units and the basic safety stock is 5 units.

In operation, over a period of time, this means that the low point of the inventory pattern saw tooth will occasion ally fall to 0 as the new order arrives (55-55=0); and when usage is at its lightest, the low point of the saw tooth will be as high as 10 units when

the new order arrives (55-45=10). Most of the time, the low point of the saw tooth will fluctuate between these two extremes, with occurrences concentrated around the safety stock value of 5, which is also defined as the theoretical planned minimum, as shown in Figure 2.5 Typical inventory movement patterns for a reasonably stable material, with a fixed order quantity. depicts this situation hypothetically.

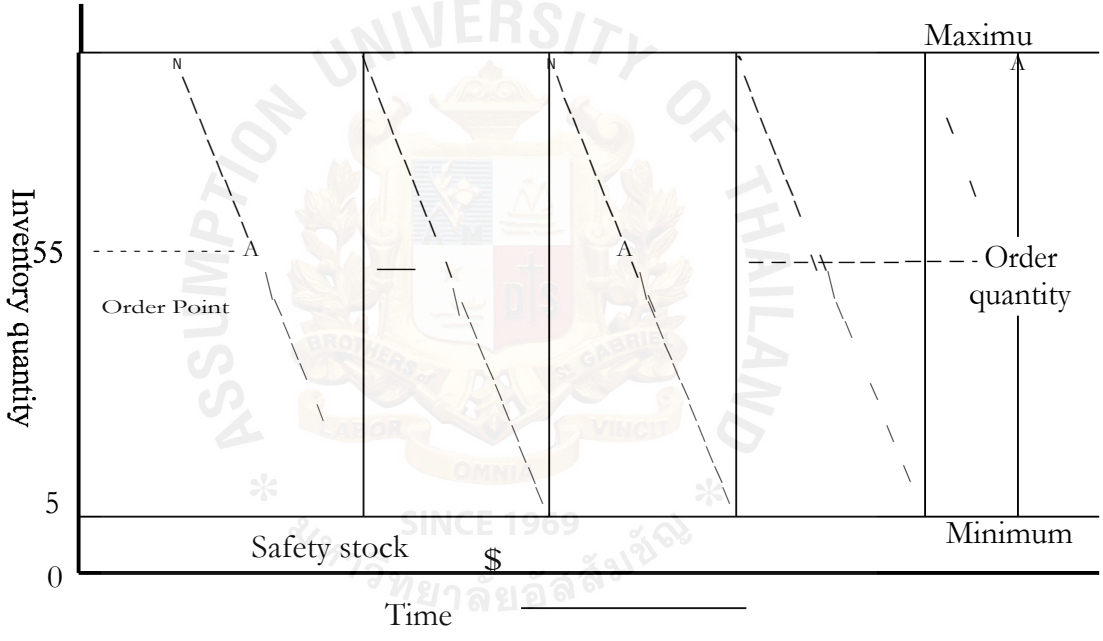


Figure 2.5. Preceding Movement Patterns with an Average Usage rate, Showing Safety Stock Determination.

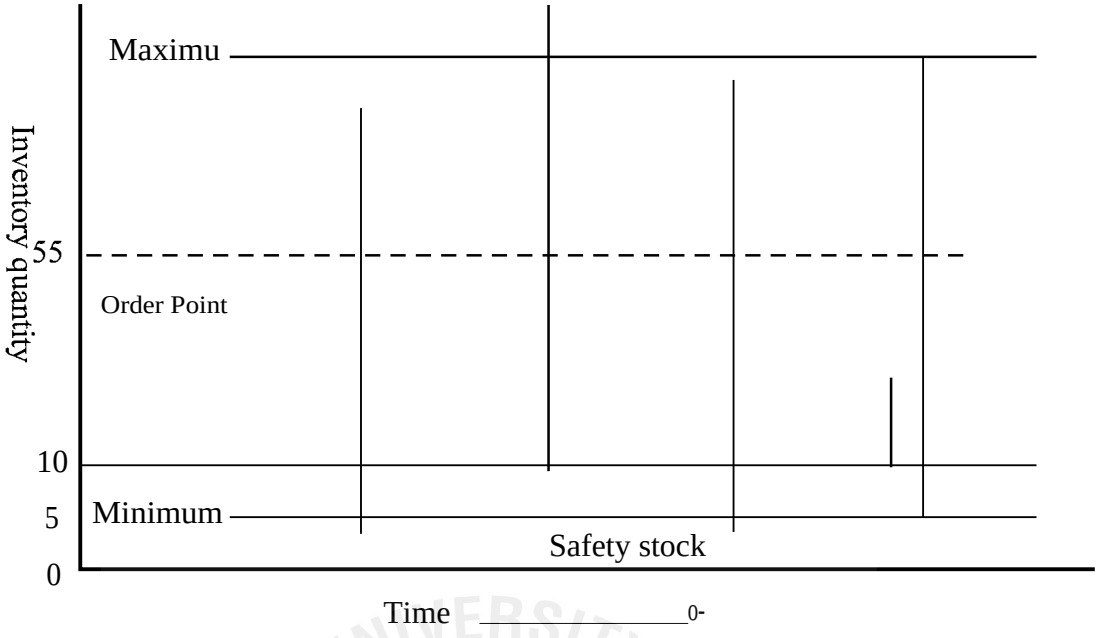


Figure 2.6. Typical inventory Movement Patterns for a Reasonably Stable Material, With a Fixed Order Quantity.

2.4.3 Bills of Material (BOM)

A bill of material is a listing of all the components and parts required to make one of an assembly. There are two important points:

(a) The bill of material shows all the parts required making one of the item.

(b) Each part or item has only one part number. A particular number is unique to one part and is not assigned to any other part. Thus, if a particular number appears in two different bills of material, then the part so identified is the same.

The BOM originates in product design when the parts to produce the product were either designed or purchased form vendors. The representation of the BOM in design engineering was often just a list of parts and subassemblies necessary to build the product. The information associated with each part includes description, level or

materials, manufacturing part number, quantity unit, part number, and specifications necessary for manufacturing or purchase.

Production engineering, responsible for planning the total manufacturing and shipment of the product, frequently adds the design bill boxing and packaging items along with raw material requirements. In manufacturing planning and control the bill was represented as either a product structure diagram or and indented bill of materials. The product structure diagram and indented BOM for a simple product, table (see in Appendix A). The representation as an indented bill was much easier help to explain how the time-phased material requirements planning records were used to plan the production of the table and its components.

In other type of production operations, planning bills of material were generated to represent product families with large numbers of end-item configurations. The planning bill was not a different BOM, just a different representation of the design bill.

Type of Bill of Material (Arnold 1991)

Parts List; the bill of material (BOM) shown in Figure 2.8 is called a parts list. It lists all the parts that are needed to make one of the assembly. The parts list is produced by the product design engineer and does not necessarily reflect the way the parts go together or any subassemblies that might be made.

Multilevel BOM; this BOM reflects the way in which the product will be manufactured. It shows the grouping of parts into subassemblies and components. Figure 2.7 shows the product structure for the table used in Figure 2.8

It is the responsibility of manufacturing engineer to decide how the product is to be made: the operations to be performed, their sequence, and their grouping. The subassemblies that have been created are the result of this. Manufacturing has decided to assemble the sides, ends, and leg supports (part of the hardware kit) into a frame (P/N

300). The legs, leg hots, and frame subassembly are to be assembled into the base (P/N 200). In turn, the top is to be made from three boards glued together. Note that the original parts are all there, but they have been grouped into subassemblies and each of the subassemblies has its own part number.

One convention used with bills of material is that the last items on the tree (legs, leg bolts, ends, sides, glue, and boards) are all purchased items. As a general rule, a bill of material is not complete until all legs of the product structure chains end in a purchased part. Each level in the bill of material is assigned a number starting from the top and working down, beginning at level 0 for the end production.

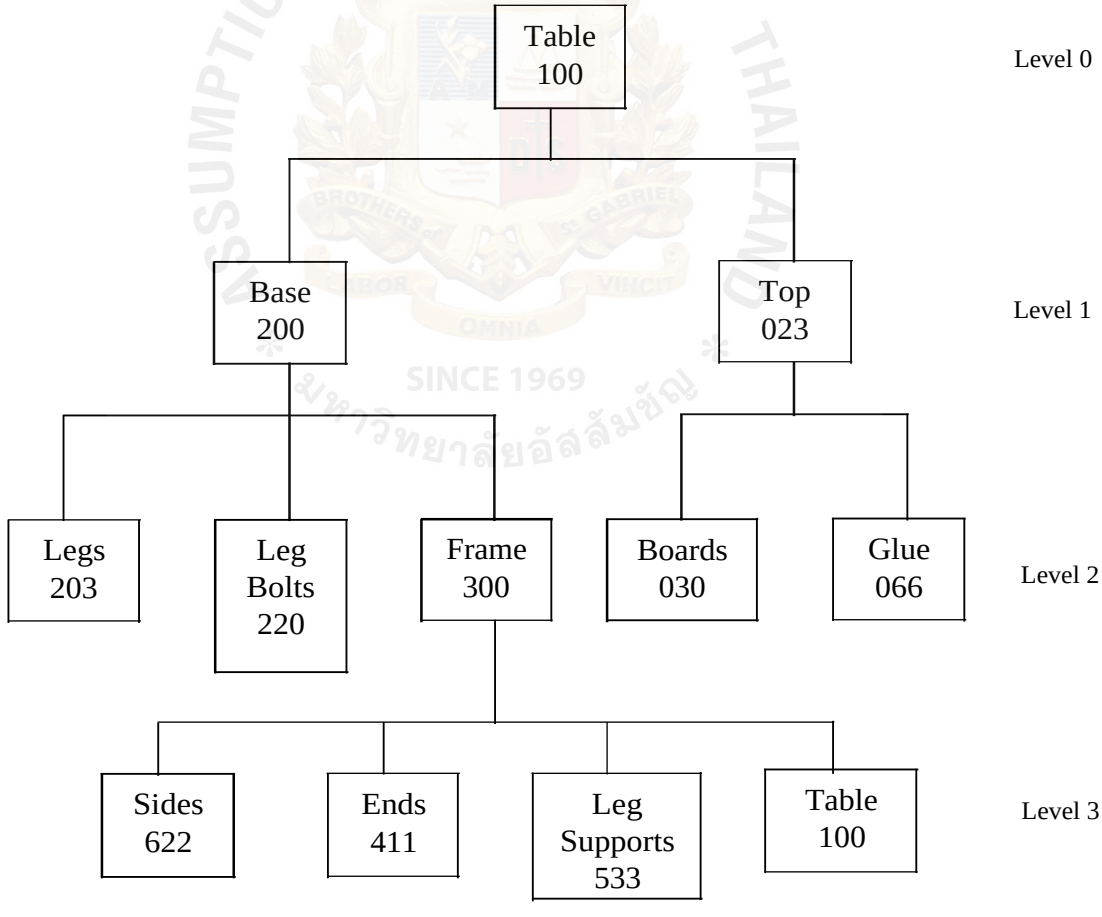


Figure 2.7. Multilevel Product Tree.

MANUFACTURING BILL OF MATERIAL TABLE P/N 100		
Part Number	Description	Quantity Required
200	Base	1
203	Legs	4
220	Leg Bolts	4
300	Frame	1
622	Sides	2
411	Ends	2
533	Leg Supports	4
066	Glue	
023	Top	1
030	Boards	3
066	Glue	

Figure 2.8. Indented Bill of Material.

III. A CASE STUDY

3.1 Background of DT Electronics

DT Electronics is engaged in the development, design, manufacturing and marketing of electronic and equipment for OEM and ODM and distribution. With fast business growth and continuous progress in new product in new product development, DT Electronics has become the world's leading switching power supply manufacturer and a major supplier of video displays & electronic components for computers, telecommunications, networking and other industries.

With continuous innovation, they are committed to providing energy efficient products to improve the quality of life.

(a) Established In 1970 as a Manufacturer of Component for TV

(b) From Component experience to Power Supplies Expertise

(c) 3 Main Core Business Groups: Power Supplies 50%, Display Product 15% and Components 10% of Total Sales

(d) Non-Core Business Groups: Networking Products and Othters25% of Total Sales

Major Product Lines

(a) Switching Power Supplies for PC, Peripherals, Servers, Workstations, Networking and office Equipment

(b) Power supplies for Portable Computers/Peripherals, Mobile Telecom & Other External Power Source Requirements

(c) Telecommunication Rack power Systems.

(d) High Resolution Color Monitors, LCD Monitors and Projectors

(e) ODM Networking Products

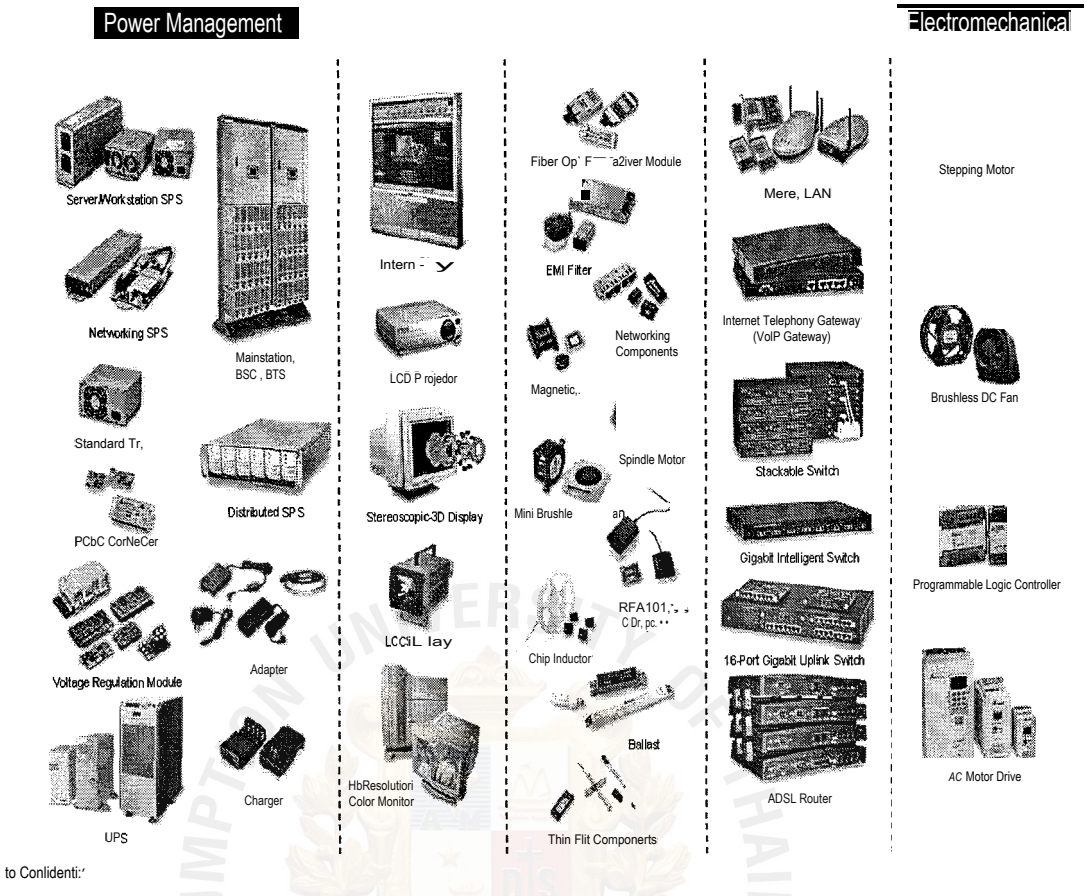


Figure 3.1. Major Products of Company Producing Inventory Holding.

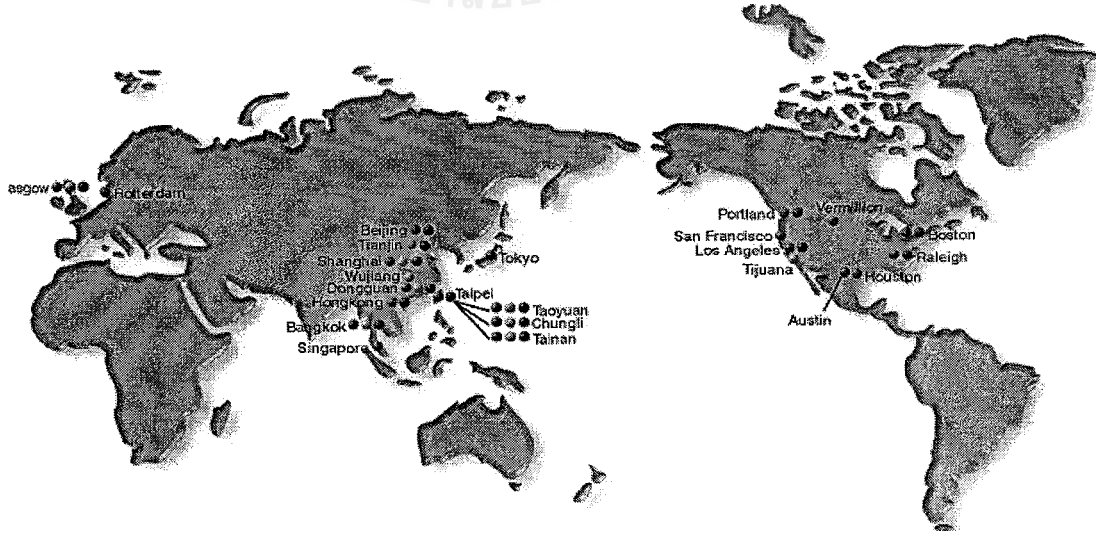


Figure 3.2. World Wide Manufacturing and Global Operation Service.

3.2. DT Electronics Inventory Management

DT Electronic's Inventory management process startes from production department receiving order from sales person. The production department will issue BOM or Bill of Material, which shows the parts used for producing the finished product for one product model as shown in Table 3.1. Bill of Material or BOM details the part levels for the production process of the finished product (Switching Power Supply model D-500 A). Figure 3.3 illustrates the part levels of BOM as the organization chart. The highest part level is level 0. All parts listed in BOM will be documented as purchas requisition, which is distributed to the purchasing officers who are responsible for inventory plan, control and for issuing purchasing order of those parts. The details of BOM are distributed to MRP as set by the system.

DT Electronics purchasing officer uses material requirement planning or MRP for calculating the cost and the quantity of raw material, which need to be purchased. The quantity requirement in BOM or purchase requisition will be input in MRP system for calculation as shown in Table 3.2.

Table 3.1. Switching Power Supply the Model: D-500 A, Bill of Material.

DT ELECTRONICS PUBLIC CO, LTD.

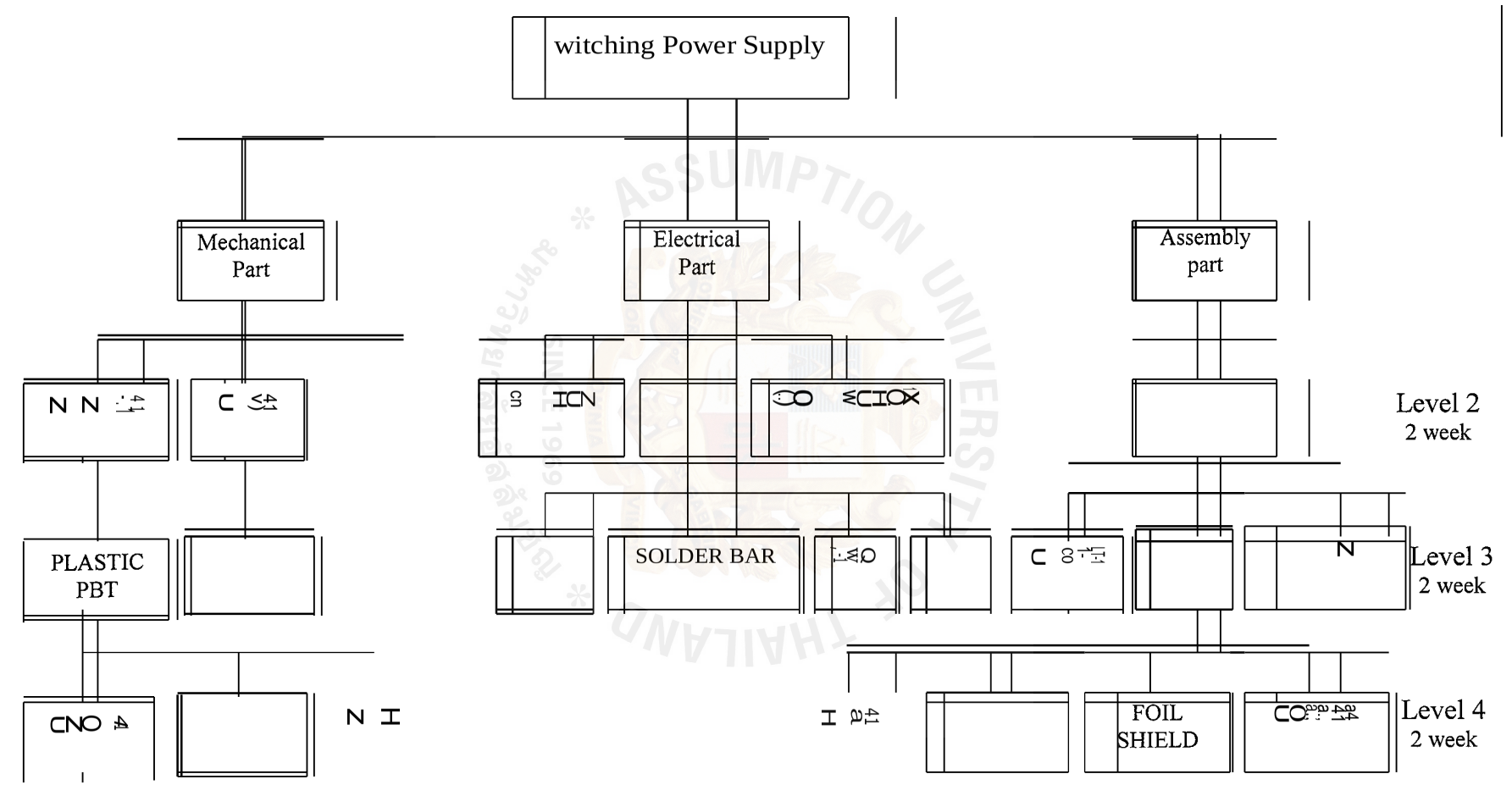
Indented Bill of Material

MODEL NO: D-500 A (500W)

ITEM	LEVEL	PART NO.	DESCRIPTION	.GRP %	QPA	UM
1	1	2909004201	FLTR 1OGENW3C (MW1) FOR DEIC		1	PCE
2	.2	1101046327	CAP Y CD 250VAC 2.2KP M E I	100%	2	PCE
3	.2	1604312030	CAP X MP PC 275VAC .1U K P15	100%	1	PCE
4	.2	3140310500	COVER PBT 20%GF WHITE		1	PCE
5	..3	4020301400	PLASTIC PBT 20%GF BLK	100%	4.5	GRM
6	.2	3203874100	LABEL PE T0.075 FOR 1OGENW3C		1	PCE
7	.2	3320020500	CASE SPCE NI 42.1*27.8*20.5		1	PCE
8	.2	3421020700	FRAME SST T:0.2 R1.0 23*15.8		2	PCE
9	.2	3512044900	PARTITION 269*228*75		0.036	PCE
10	.2	3520081500	PE BAG 225*12*330 T---.06		0.012	PCE
11	.2	3520130100	DRYER		0.024	PCE
12	.2	3800061800	SOCKET ASSY SK-1021 3350470100		1	PCE
13	..3	3030150100	SOCKET PBT 30%GF BLACK		1	PCE
14		3350160800	TERMINAL BRS NI 19.5*8*5.4		1.015	PCE
15		4020301100	PLASTIC PBT 30%GF BLK		7.3	GRM
16	..3	3350470100	TERMINAL BRS NI 31.1*8*16.3		1	PCE
17	..3	4090000900	SOLDER WIRE 50/50 1.2mm		0.2	GRM
18	.2	3810460600	CHOKE ASSY 14*8*4LA		1	PCE
19	..3	3140070200	COVER NY66 94-0 NAT 15*7*2.35		2	PCE
20	..3	4010810000	WIRE CU 0.9 OUEWN NAT MW-28		7	GRM
21	..3	4140149900	CORE SORTING OF 4140140001		1	PCE
22	.2	3840260100	CON WIRE ASSY WITH 3041111100		1	PCE
23	..3	4001307000	WIRE PVC #18 1430 G/Y		0.073	MTR
24	..3	3041018200	TERMINAL BRASS #16-22		1	PCE
25	..3	4001306100	WIRE PVC #18 1430 BROWN		0.118	MTR
26	.2	3840310200	CON WIRE ASSY WITH 3040118234		1	PCE
27		3070335034	HEADER NY66 94V-0 2PIN P2.0 S BROWN		1	PCE
28		3071118234	HEADER NY66 94V0 SPIN	100%	1	PCE
29		3100003000	SCREW M M3*0.5*28 FLAT C S18C ZN BLK		4	PCE
30		3103000601	SCREW M #6-32*6.3 FLAT C S20C ZN		5	PCE
31		3103300600	SCREW M #6-32*6.3 PAN C S20C ZN		5	PCE

Table 3.1. Switching Power Supply the model: D-500 A, Bill of Material (Continued).

ITEM	LEVEL	PART NO.	DESCRIPTION	.GRP %	QPA	UM
32	1	3208005801	LABEL BMSI 33.5*12.0 D-500 A		1	PCE
33	1	3230035300	LED BUSHING ABS		3	PCE
34	1	3248011300	INSULATOR PP 200*55.6*0.43		1	PCE
35	1	3309012301	CASE CHASSIS SECC 335mm T=0.8		1	PCE
36	1	3309012400	CASE COVER SECC 300.1mm T=0.8		1	PCE
37	1	3350390100	TERMINAL ALUM DEGREASING		1	PCE
38	.2	4041000100	STEEL SHEET AL1100 W=29 T=0.5		0.62	GRM
39	1	3421192500	LED HOUSING NYLON 66 94V-2		3	PCE
40	1	3429503500	FAN BRACKET SECC T=0.8mm		1	PCE
41	1	3430104700	BUSHING STEEL NPS-330AB A		2	PCE
42	1	3470901401	HANDLE PC+ABS 75.4*62.9		1	PCE
43	.2	3508002100	PE FOAM BLOCK 35*72*65		1	PCE
44	.2	3510116801	TUBE 1142*958*819H		0.005	PCE
45	.2	3518006000	PARTITION 440*360*96 H		0.25	PCE
46	.2	3520031000	PALLET 1200*1000*128H		0.005	PCE
47	.2	3520082400	PE FILM t=0.02mm W=500		1.31	GRM
48	.2	3520089500	PE SHEET 1800*1600*.1		0.005	PCE
49	.2	3520130100	DRYER		0.25	PCE
50	.2	3520142700	PLASTIC STRIP W=12 T.5 BLACK		0.083	MTR
51	.2	3520142800	STAPLE WIRE 28*21.5*1.3		0.021	PCE
52	.2	3200199300	LABEL SHIPPING 60*45		0.006	PCE
53	..3	3200196900	LABEL ORIGINAL 60*45		1	PCE
54	.2	3203309400	LABEL PE OD=29 AFB0612EH-BFOO		1	PCE
55	.2	3421101400	SPRING SST H:5 DIA:0.45		1	PCE
56	.2	3430101300	BEARING BALL ISC 693T12AZZM3	100%	2	PCE



Switching Power Supply Materials Structure Tree

Table 3.2. Raw Material of Terminal Inventory Master File Information for MRP.

DT ELECTRONICS (THAILAND) PUBLIC CO.,LTD.

Material.. 3071135400	TERMINAL BRASS T0.3	PSB1	Critical Part
		MRP date ..	08/04/2003
Mfg part : TO301MRB-2E	Vender code.... 400014	Vender name.... JWT	
Mrp type..... PD	Mrterial type.. ROH	Unit..... PCE	
Mrp controller. 307	Mrp group.... 0000	Lot size indic. WB	
Purchasing group 3M	Processing ind..	Fixed lot size..	0.000
Stock on hand	25,000 In spec Stock 0	Round value....	0.000
Normal Stock	OWIP Stock 0	CG Stock	0

WEEK	PAST DUE	1	2	3	4	5	6	7	8	9	10
PORDUCT REQUEST:	0	24000	23000	40000	40000	40000	30000	40000	0	40000	40000
FIRM ORDERS:	0	35000	35000	35000	70000	0	70000	0	35000	35000	
PLAN ORDERS:	0	35000	35000	70000	0	70000	0	35000	35000	0	0
NET AVAILABLE:	25000	36000	48000	43000	73000	38000	73000	33000	68000	63000	23000

!«««««««««««««< SUPPLY >>>>>>>>>>>>>>>>>>>>>>>>>>>»1

PO/PL	VENDOR	QTY	DELIVERY. DATE	IN HOUSE DATE
PO T3AA37211	400014	35,000.000		week 1
PO T3AA37212	400014	35,000.000	week 1	week 2
PO T3AA37213	400014	35,000.000	week 2	week 3
PO T3AA37214	400014	70,000.000	week 3	week 4
PO T3AA37215	400014	70,000.000	week 5	week 6
PO T3AA37216	400014	35,000.000	week 7	week 8
PO T3AA37217	400014	35,000.000	week 8	week 9

This information, together with the bill of materials is used to calculate the quantities of materials needed. In practice, there may be some parts already in stock, so the master schedule and Bill of Materials are used to calculate production requirements. If the current stock is subtracted from the gross stock, the production requirements is obtained as shown in figure 3.4. There might also be some orders for material which have already been placed and which will arrive in time to meet the production requirements.

The Bill of Materials for this case is shown in Table3 .2, using a standard format, the easiest way to arrange the calculations. These items are finished products, starting by looking at the net available from given production requirements. The assembly time required is one week, so assembly of the production must be started one week earlier.

The scheduled receipts are now added to show the number of units which become available in a week, which is the number started as the lead time previously. This gives the assembly plan shown in Table 3.2.

Production requirement =	number of units to be produced	*	materials required for each unit
Materials to be ordered =	Production requirement — current stock — stock on order		

Figure 3.4. Calculation of Production Requirement & Materials Ordering.

From the above formulation, supposing available stock on hand is 25,000 units and production requirement is 24,000 units, the stock balance will be 1,000 units. Then the firm orders 35,000 units as the minimum order for one time order with one week lead time. Then the available stock becomes (1,000 + 35,000) 36,000 units. In the second week, production requirement is 23,000 units, so raw material stock is sufficient for production. Therefore, in the second week, net available stock is (36,000 — 23,000) 13,000 units. When the new shipment of raw material 35,000 units arrives, the total stock available will become (13,000 + 35,000) 48,000 units. This is sufficient to support production.

3.3 DT Electronics Inventory Holding Cost and Turnover Days

The inventory holding cost and inventory turnover are the important factors that affect the profit of DT Electronic Company. Therefore, the company's main objective is to minimize cost. Table 3.3 shows the details of information regarding the number or quantity of each item on hand or order and committed to use in various time periods. The Bill of Materials for this is already shown in Figure 3.3 and the easiest way to arrange the calculations is shown in Table 3.2.

Refer to the Table 3.3 (Top Material High Inventory Cost and Inventory Days of July 2002), the total inventory holding cost in July is 13,011,487.17 with average turn over of 15.18 days. It shows that high cost is occurring because of **4** main parts, which are item 1, item 2, item 3, and item 4. For example, item 1, part no. 307511528 Connector, is cost 78.8 per unit holding with total stock of 25,898 pieces. Therefore, total amount in holding item 1 is 2,040762.40 Baht and inventory turn over of 15.732 days. Item 2, part no. 307511644 Connector, is cost 102.83 per unit holding with total stock of 15,441.00 pieces, so the total amount in holding item 2 is 1,587,798.03 Baht and inventory turn over of 18.139 days. Item 3, part no. 3079917000 Connector, is cost 5.81 per unit holding with total stock of 183,092.00 pieces, then, total amount in holding item 3 is 1,063,764.52 Baht and inventory turn over of 16.18 days. And item 4, part no. 3079920500 Connector LCP, is cost 634.11 per unit holding which has the highest cost with total stock of only 1,638 pieces but the total amount in holding item 4 is 1,038,672.18 Baht and inventory turn over of 999999 days. 999999 indicate that this part will keep ideal and will not use it until a new product model come in and use it. From above information, the cost holding these 4 items is almost 50% of the total inventory cost.

Finally, these orders may need some adjustment to allow for minimum order quantities, price discounts, the quantities to be ordered, and when they should arrive. To find the time when orders must be placed information about lead times is necessary so that orders can be placed before materials are actually needed.

Table 3.3. Top Material High Inventory Holding Cost and Inventory Days of Year 2002.

Item	Part Number	Description	Cost	Total Stock	Stock Amount	Inventory Days
1	3075110528	CONNECTOR	78.8	25,898.00	2,040,762.40	15.732
2	3075111644	CONNECTOR	102.83	15,441.00	1,587,798.03	18.139
3	3079917000	CONN B TO B	5.81	183,092.00	1,063,764.52	16.18
4	3079920500	CONN LCP	634.11	1,638.00	1,038,672.18	999999
5	3075302725	CONNECTOR	72.84	12,378.00	901,613.52	110.67
6	3071450729	HEADER	35.15	22,900.00	804,935.00	229
7	3075140144	CONNECTOR	179.95	3,729.00	671,033.55	46.033
8	3071082200	WAFER	5.01	102,920.00	515,629.20	33.2
9	3070018325	HEADER	79.27	4,680.00	370,983.60	999999
10	3050260000	HOUSING	67.65	3,440.00	232,716.00	999999
11	3075110000	CONNECTOR	239.93	816	195,782.88	6.915
12	30753510GE	CONN D-SUB	36.59	5,125.00	187,523.75	29.286
13	3070367000	HEADER	350.47	530	185,749.10	999999
14	3070941000	PIN HEADER	4.68	37,366.00	174,872.88	999999
15	3071538200	TERMINAL	238.12	700	166,684.00	999999
16	3059900100	HOUSING-PIN	59.98	2,765.00	165,844.70	48.794
17	3075110344	CONNECTOR	179.95	915	164,654.25	10.167
18	3075111628	CONNECTOR	106.09	1,536.00	162,954.24	31.67
19	3075302625	CONNECTOR	72.84	2,193.00	159,738.12	999999
20	3076810025	CONN SLOT	9.43	16,638.00	156,896.34	2.381
21	3071142028	TERMINAL	33.99	4,477.00	152,173.23	27.41
22	30714440GE	HEADER BOX	28.71	5,092.00	146,191.32	29.097
23	3070108601	CONNECTOR PBT	49.27	2,901.00	142,932.27	999999
24	3076323029	PIN HEADER	51.41	2,000.00	102,820.00	30
25	3071499100	HEADER HOUSING	0.85	118,745.00	100,933.25	10,477.50
26	30709690GE	CONN SOCKET	18.29	5,317.00	97,247.93	16.277
27	3070134300	HOUSING	51.84	1,844.00	95,592.96	72.219
28	3076711028	HEADER HOUSING	75.19	1,243.00	93,461.17	14.125
29	3071143000	TERMINAL BLOCK	26.56	3,405.00	90,436.80	291.857
30	3076750125	HEADER	3.34	26,850.00	89,679.00	6.793
31	3075111844	CONNECTOR	141.39	576	81,440.64	999999
32	3071450529	HEADER	6.56	11,950.00	78,392.00	119.5
33	3070915066	HEADER	3.15	24,820.00	78,183.00	37.23
34	3070296125	HEADER	17.14	4,090.00	70,102.60	999999
35	3076409069	WAFER	10.07	6,939.00	69,875.73	37.173
36	3070936134	HEADER	8.26	8,160.00	67,401.60	69.943
37	3070356034	HEADER	8.61	6,500.00	55,965.00	3.43
38	3075302701	HEADER	72.84	750	54,630.00	20.625
39	3071137300	WAFER	25.24	1,860.00	46,946.40	398.571
40	3071137200	WAFER	20.81	2,035.00	42,348.35	421.034
41	3076290066	HEADER	2.1	19,900.00	41,790.00	4.39
42	3071054034	PIN HEADER	4.61	8,982.00	41,407.02	13.473
43	3070828029	PIN HEADER	15.85	2,296.00	36,391.60	999999
44	3070945140	PIN HEADER PBT	2.31	14,460.00	33,402.60	20.177
45	3070310428	CONNECTOR	29.69	1,100.00	32,659.00	9.167
46	3070296025	HEADER	15	2,140.00	32,100.00	999999
47	3075200600	CONNECTOR	286.21	104	29,765.84	999999
48	3070941100	PIN HEADER	5.46	5,400.00	29,484.00	999999
49	3076420934	WAFER	1.96	14,860.00	29,125.60	11.315
Total Amount by Plant & top Inventory					13,011,487.17	
Grand Total Inv.Day:						15.18

Figure 3.5 shows the over all inventory turnover of Connector Buyer in 2002. The targeted inventory turnover is 7 days but the actual outcome is varied over the target period, which means it could not meet the target and it will have negative effect on company's inventory.

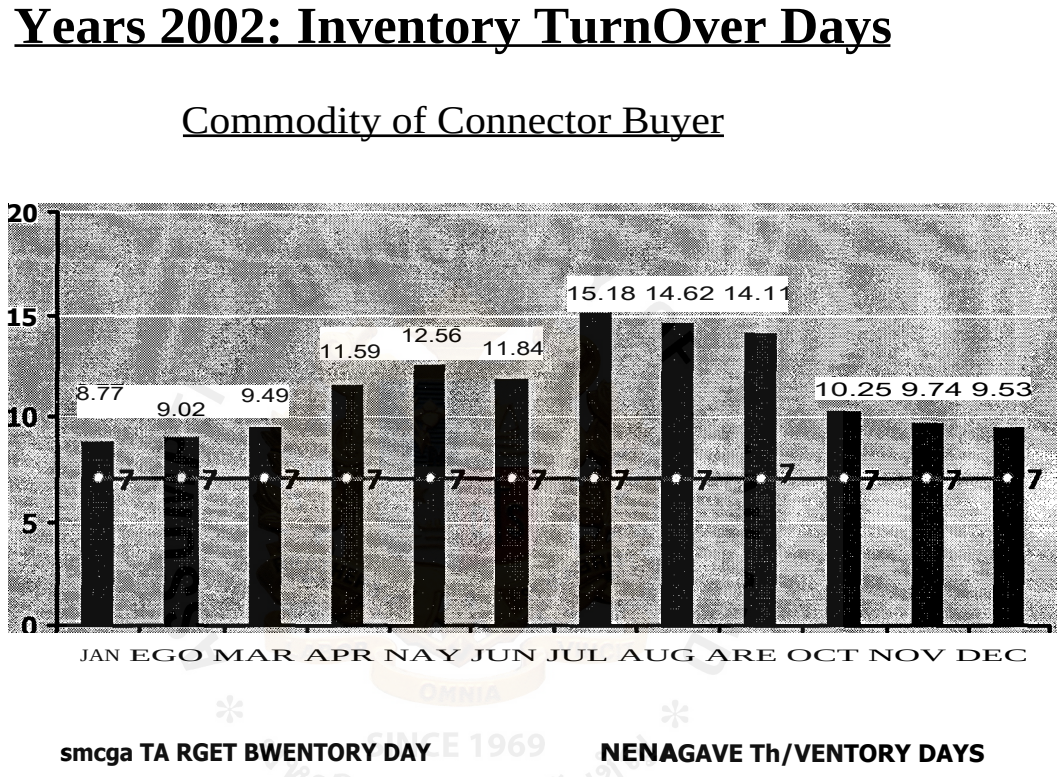


Figure 3.5. Year 2002: Inventory Turn Over Days by Commodity of Connector Buyer.

Table 3.4. Year 2002 Inventory Holding Cost and Turnover day's calculation.

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Table 3.4 shows the calculation of actual inventory turnover days based on actual cost in each month.

3.4 DT Electronic Inventory Holding Improvement

MRP schedules may give intermittent demands for an item every period. Frequent ordering can lead to high costs, so some means of increasing order size is preferred and hence reduce overall cost. In practice, there are several approaches for this.

(a) Lot-for-lot ordering. This is the approach already described, and it has the drawbacks of generating small, frequent orders.

(b) Fixed order quantity. This is similar to the economic order quantity in that an order of fixed size is always placed. The drawback is that it does not match supply directly to known demand, and hence reduces one of the main advantages of MRP.

(c) Period order quantity. This places regular orders for the quantities needed in the next period. Although it is simple to administer, this method does not attempt to minimize costs.

(d) Dynamic lot sizing. This determines the pattern of orders which minimizes overall costs, but constant changes in both order quantities and timing are difficult to administer. _

Because of its aim of minimizing costs, dynamic lot sizing is often the best approach, despite the difficulty of administration. In this section dynamic lot sizing in terms of a simple batching rule is described. Although this analysis is described in relation to MRP, it can be used in any circumstances where demand is variable, but known in advance.

It is found that with independent demand systems small, frequent orders produce higher administration and delivery charges, while large, infrequent orders result in higher holding costs. The situation with dependent demand inventories is exactly the same, and again a compromise order quantity which balances these two competing costs is preferred. One way of approaching this is to assume there is some optimal number of periods demand which should be combined into a single batch. If orders are placed more frequently than this, the administration and delivery charges will be high and high overall costs will invur; if orders are placed less frequently, stock levels will be high and again it results in high overall costs. Thus, a cost curve with a distinct minimum is assumed, as shown in Figure 3.6.

In this analysis, it is assumed that demand for an item is variable and discrete. In other words, the demand varies from one period to the next, and it occurs at discrete points in time (typically once a week). All the costs of placing and receiving an order are combined into the reorder cost, while all costs associated with holding a unit of stock for a unit of time are combined into the holding cost. If enough stock is bought to cover all orders for the next periods, an average cost per period can be calculated. The objecive is to find the optimal value of number, which minimizes this average cost.

Without modification, MRP would suggest small frequent orders. Costs can be reduced by combining several of these into a single larger order. A batching rule, which gives low costs, has been described for this.

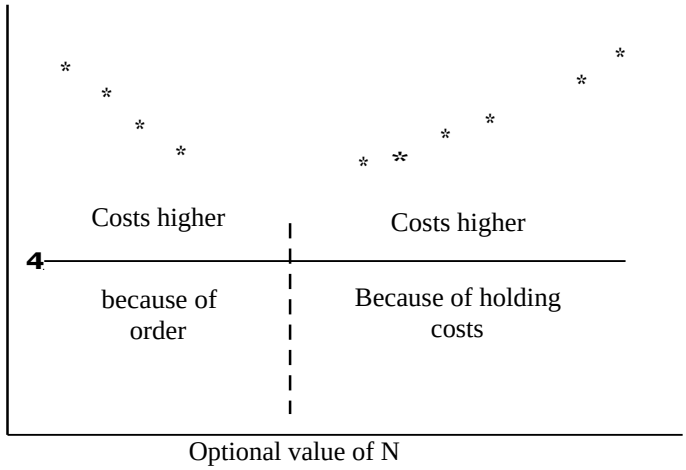

Figure 3.6. Cost Curve with Distinct Minimum.

ABC classification inventory control system can be used to decide the importance of items, therefore the type of control needed is the ABC inventory classification. Most companies carry a tremendous number of items in stock. To have better control of these items at a reasonable cost, it is helpful to be able to classify them accordingly. Usually this is based upon the annual dollar volume, but other criteria may be used and can be used to help control inventories.

We have seen that efficient inventory control needs a considerable effort. Most control systems are computerized, but they still need manual effort to input data, check values, update supplier details, confirm orders, make subjective judgments, monitor operations, establish the item characteristics that influence the results of inventory management, classify each item into groups based on the criteria established, apply degree of control in proportion to the importance of the group that affects the importance of the item, including annual dollar usage, unit cost and scarcity of material.

Using the ABC approach, there are two general rules

(a) Have plenty of low value items.

(b) Use the money and control effort saved to reduce the inventory of high value items.

Different controls used with different classifications might be the following:

20% A items: High priority, tight control including complete accurate records, regular and frequent review by management, frequent review of demand forecasts, and close follow-up and expediting to reduce lead time. DT Electronic uses the 20% number of items, which have the highest inventory holding cost.

;()°,) B items: Medium priority, normal controls involving good records, regular attention, and normal processing. DT Electronic uses the 30% number of items, which have the highest inventory holding cost.

50% C items: Lowest priority, simplest possible controls make sure there are plenty, simple or no records perhaps use a two-bin system or periodic review system. Order large quantities and carry safety stock. DT Electronic uses the 50% number of items, which have the highest inventory holding cost.

The procedure for an ABC analysis starts by taking each item and multiplying the number of units used in a year by the unit cost. This gives the total annual use of items in terms of value. Usually, a few expensive items account for a lot of use, while many cheap ones account for little use. If we list the items in order of decreasing annual use by value, A items are at the top of the list and C items are at the bottom. See Table 3.6 for what we might typically find. Plotting the cumulative percentage of annual use against the cumulative percentage of items gives a graph of the type shown in Table 3.4.

ABC analysis allows items to be categorized according to importance so that available effort can be shored out appropriately. The most important, A, items should be given most careful control.

After the new technique of implementation (ABC classification system) the solution is shown in the Table 3.6 The resound of the inventory holding cost compared with year 2002 (MRP technique) inventory can be reduced to 60%, holding cost and lead time also reduced 60%

Item 1, the inventory holding cost is reduced by postponing the delivery schedule. This means that the available quantity of this item 25,898 units have to be used in production until the stock is left at 6,000 units, and then the postponed delivery will be informed to reschedule of arrival. This also makes the turnover inventory days decline. Item 2 and 3 use the same way as item 1, but there is a little difference in holding inventory days because of the different lead-time and location of vendors' warehouses.

Item 4 and 10, the holding inventory is 1,638 units with stock amount of 38,672 bahts. Inventory holding days are 999999, which mean dead stock. Reducing this type of inventory can be done by asking R & D substitute to another model. Item 5, the inventory days are reduced by postponing the delivery schedule. Item 6 is released by the unexpected order. Item 7 is held as the customer's forecast. This item will be released when the customer confirms the order. Item 8 is from the customer postponing delivery schedule. Purchasing officer has to stop all pending orders of this customer and wait until there is a new order using this item. Item 9 is released by the unexpected orders.

Table 3.5. ABC Items Classification by 80-20% Technique.

Item	Part Number	Description	Cost	Total Stock	Stock Amount	Inventory Day
1	3075110528	CONNECTOR	78.8	25,898.00	2,040,762.40	15.732.
	3075111644	CONNECTOR	102.83	15,441.00	1,587,798.03	18.139
	3079917000	CONN B TO B	5.81	183,092.00	1,063,764.52	16,155.18
	3079920500	CONN LCP	634.11	1,638.00	1,038,672.18	999999
5	3075302725	CONNECTOR	72.84	12,378.00	901,613.52	110.67
	3071450729	HEADER	35.15	22,900.00	804,935.00	229
	3075140144	CONNECTOR	179.95	3,729.00	671,033.55	46.033
8	3071082200	WAFER	5.01	102,920.00	515,629.20	33.2
9	3070018325	HEADER	79.27	4,680.00	370,983.60	99y,' 1)
10	3050260000	HOUSING	67.65	3.44100	232.716.00	99''',')9
11	70"5110990	coNNrF,()R	99';'	816	197 "'S"' 1	(, ? I
P	',07 ;:rnoc,1	(_()NN I)_ ;c1;	(i	s o)u	1 ' 1	7U 29(,
	,(n) ;(,Th{ o	1 H \pi K	i50 1	5i()	IX 1) lo	)),;(»),)))
II	Thmiullu»0	1 1"', III \1)1 R	4.r 8 ;	((,r) On	1 I. 2 88	)))»099
15	30 15 11.12 H1	"1 11,\11;\ 11	I1.12	700	1r,(,J,5;;»)	uuu'/')(/
In	10 5 0)(01)0	1101 S1\,(1-11 N	5').9)8	(,', UK	1 6 ,1 7()	01
17	11-- 11 ; 11	( ))1\ NI (Er)R	u u 5	915	H 1.().5-1	10 Ir)
19	10751110:18	( )NNI (I(	11)() o))	(r) 00	Ir 1 2	31h7
I')	10 r).1r(.:s	(0N\1 (1)P	7 14	i); Mr	1.1'	0 ,
;	;07,91025	(H.1\IN 91.01	u II	1(,))38.0r)	1 6M 1	1
2.1	30 11-12021-1	111n1IN U.	,)	4.177.00	15227;	2 11
	.1071114061	W..11)14111( ).N	2; 1	). uo HO	11(1,191 ;	)1)7
	d)7()1( )1	(()NN] (I( )! 1'1(1	-r) 27	2 u01 o))	1-1	r)0)19)1
	;07)62302))	11 '', ill \1)11:	51 11	2:0(:.00	pc x2,»)(1	I)
25	(1)711t01(0	)11 1DER1I01 '-(1 (	U- ', -	1 Li. 45 fin	I(1:) . ')	if: 177.59
26	30709690GE	CONN SOCKET	18.29	5,3,17.00	97,247.93	16.277
27	3070134300	HOUSING	51.84.	1,844.00	95,592.96	72.219
28	3076711028"	HEADER HOUSING	75.19	1,243.00	93,461.17	14.125
29	3071143000	TERMINAL BLOCK	26.56	3.405.00	90,436.80	291.857
30	3076750125 •	HEADER	3.34	26.850.00	89,679.00	6.793
31	3075111844'	CONNECTOR	141.39	576	81,440.64	999999
32	3071450529	HEADER	6.56	11,950.00	78,392.00	119.5
33	3070915066	HEADER	3.15	24,820.00	78,183.00	37.23
34	3070296125	HEADER	17.14	4,096.00	70,102.60	999999
35	3076409069	WAFER	• 10.07	6.939.00	69,875.73	37.173
36	•3070936134'	HEADER	8.26	8,160.00,	67,401.60	69.943
37	3070356034	HEADER	8.61	6,500.00	55.965.00	3.43
38	'3075302701	HEADER	72.84	750	54,630.00	20.625

Table 3.5. ABC Items Classification by 80-20% Technique (Continued).

Item	Part Number	Description	Cost	Total Stock	Stock Amount	Inventory Day
39	3071137300	WAFER	25.24	1,860.00	46,946.40	398.571
40	3071137200	WAFER	20.81	2,035.00	42.348.35	421.034
41	3076290066	11EADER	1	19,900.00	41.790.00	4.39
42	3071054034	PIN HEADER	4.61	8,982.00	41.407.02	13.473
43	3076828029	PIN I WADER	15.85	2,296.00	36.391.60	999999
44	3070945140	PIN HEADER PBT	2.31	14,460.00	33,402.60	20.177
45.	3070310428	CONNECTOR	29.69	1,100.00",	32,659.00	9.167
46	3070296025	HEADER	15	2.140.06-	32,100.00	999999
47	3075200600	CONNECTOR	286.21	-a 04	29,765:84	999999
48	'3070941100	PIN HEADER	5.46	5,400.00'	29,484.00	999999
49	3076420934	WAFER '	1.96	14,860.00	29,125.60	11.315
Total Amount by Plant & top Inventory					15,317,613.26	
Grand Total Inv.Day:						15.18

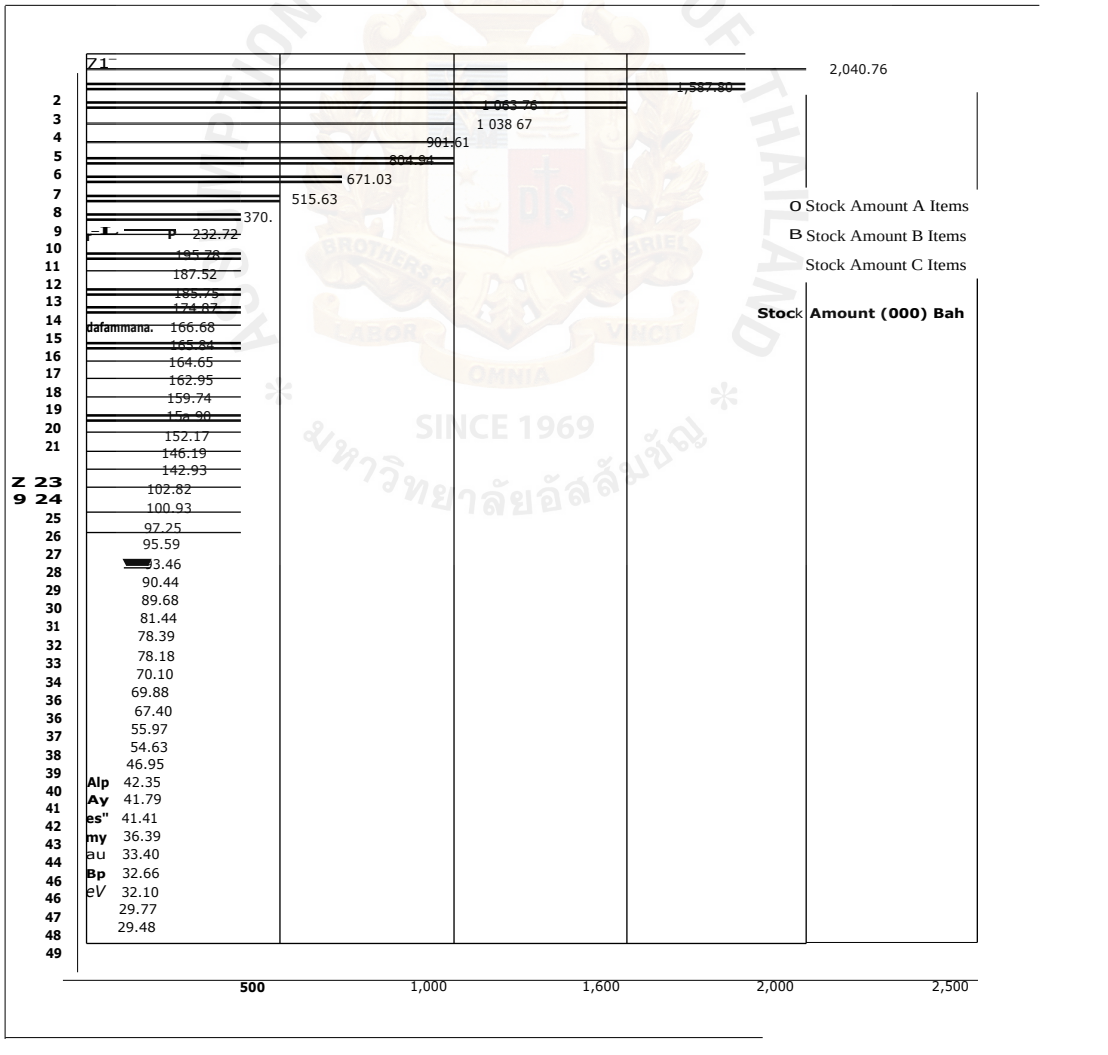

Figure 3.7. ABC Items Classification by 80-20% Technique.

Table 3.6. Improvement by ABC Classification of Top Material High Inventory Holding Cost and Inventory Day of October 2003.

Item	Part Number	Description	Cost	Total Stock	Stock Amount	Inventory Day
13	3070367000	HEADER	350.47	2,318	812,389.46	16.3
1	3075110528	CONNECTOR	78.8	6,441.00	662,362.40	9.4
2	3075111644	CONNECTOR	102.83	7,898.00	622,328.03	7.3
47	3075230625	CONNECTOR	286.21	1500	429,315.00	25.75
3	3079917000	CONN B TO B	5.81	63,092.00	366,564.52	7.18
23	3070108601	CONNECTOR PBT	49.27	4,901.00	241,472.27	18
5	3075302725	CONNECTOR	72.84	2,378.00	173,213.52	10
12	30753510GE	CONN D-SUB	36.59	4,513.00	165,130.67	29.286
17	3075110344	CONNECTOR	179.95	915	164,654.25	10.167
7	3075140144	CONNECTOR	179.95	2,680.00	132,043.60	16.5
22	30714440GE	HEADER BOX	28.71	4,192.00	120,352.32	14.2
24	3076323029	PIN HEADER	51.41	2,000.00	102,820.00	30
29	3071143000	TERMINAL BLOCK	26.56	3,405.00	90,436.80	291.857
8	3071082200	WAFER	5.01	42,920.00	86,269.20	11.5
9	3070018325	HEADER	79.27	2,680.00	86,269.20	9.8
21	3071142028	TERMINAL	33.99	2,477.00	84,193.23	12.98
26	30709690GE	CONN SOCKET	18.29	4,317.00	78,957.93	14.2
35	3076409069	WAFER	10.07	6,939.00	69,875.73	37.173
36	3070936134	HEADER	8.26	8,160.00	67,401.60	69.943
6	3071450729	HEADER	35.15	1,900.00	66,785.00	3.5
37	3070356034	HEADER	8.61	6,500.00	55,965.00	3.43
38	3075302701	HEADER	72.84	750	54,630.00	20.625
25	3071499100	HEADER HOUSING	0.85	58,745.00	49,300.00	7.20
33	3070915066	HEADER	3.15	15,820.00	47,697.30	37.23
16	3059900100	HOUSING-PIN	59.98	765.00	45,884.70	3.48
27	3070134300	HOUSING	51.84	844.00	43,752.96	36.5
40	3071137200	WAFER	20.81	2,035.00	42,348.35	421.034
41	3076290066	HEADER	2.1	19,900.00	41,790.00	4.39
42	3071054034	PIN HEADER	4.61	8,982.00	41,407.02	13.473
11	3075110000	CONNECTOR	239.93	172	41,267.96	99999
14	3070941000	PIN HEADER	4.68	7,366.00	34,472.88	30
20	3076810025	CONN SLOT	9.43	3,638.00	34,306.34	2.381
44	3070945140	PIN HEADER PBT	2.31	14,460.00	33,402.60	20.177
45	3070310428	CONNECTOR	29.69	1,100.00	32,659.00	9.167
46	3070296025	HEADER	15	2,140.00	32,100.00	999999
48	3070941100	PIN HEADER	5.46	5,400.00	29,484.00	999999
49	3076420934	WAFER	1.96	14,860.00	29,125.60	11.315
30	3076750125	HEADER	3.34	6,850.00	22,878.00	3.64
43	3070828029	PIN HEADER	15.85	1,296.00	20,541.60	3.79
28	3076711028	HEADER HOUSING	75.19	243.00	18,271.17	4.23
19	3075302625	CONNECTOR	72.84	193.00	14,058.12	16.97
32	3071450529	HEADER	6.56	1,950.00	12,792.00	120.5
39	3071137300	WAFER	25.24	360.00	9,086.40	999999
18	3075111628	CONNECTOR	106.09	36.00	3,819.24	7
4	3079920500	CONN LCP	634.11	0.00	0.00	0
10	3050260000	HOUSING	67.65	0.00	0.00	0

Table 3.6. Improvement by ABC Classification of Top Material High Inventory Holding Cost and Inventory Day of October 2003 (Continued).

Item	Part Number	Description	Cost	Total Stock	Stock Amount	Inventory Day
15	3071538200	TERMINAL	238.12	0	0.00	0
31	3075111844	CONNECTOR	141.39	0	0.00	0
34	3070296125	HEADER	17.14	0.00	0.00	0
Total Amount by Plant & top Inventory					15,442,727.71	
Grand Total Inv.Day:						5.83

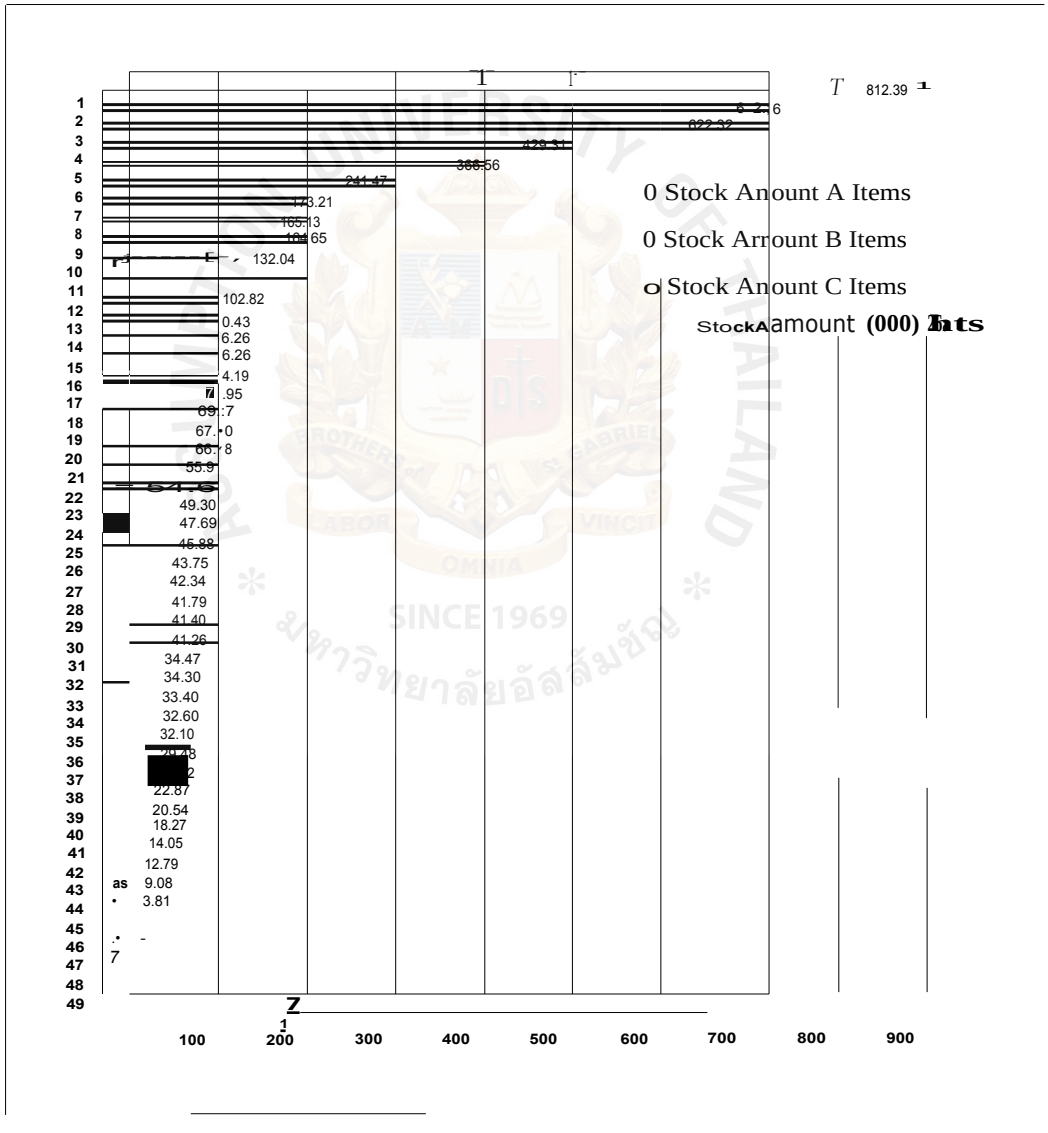

Figure 3.8. Improvement by ABC Classification of Top Material High Inventory Holding Cost and Inventory Day of October 2003.

In Table 3.6, the results are from the same step as used in Table 3.5. They show positive improvement of inventory amount and inventory days.

Year 2003 Inventory Turn Over Days (ABC Analysis)

Commodity of Connector Buyer

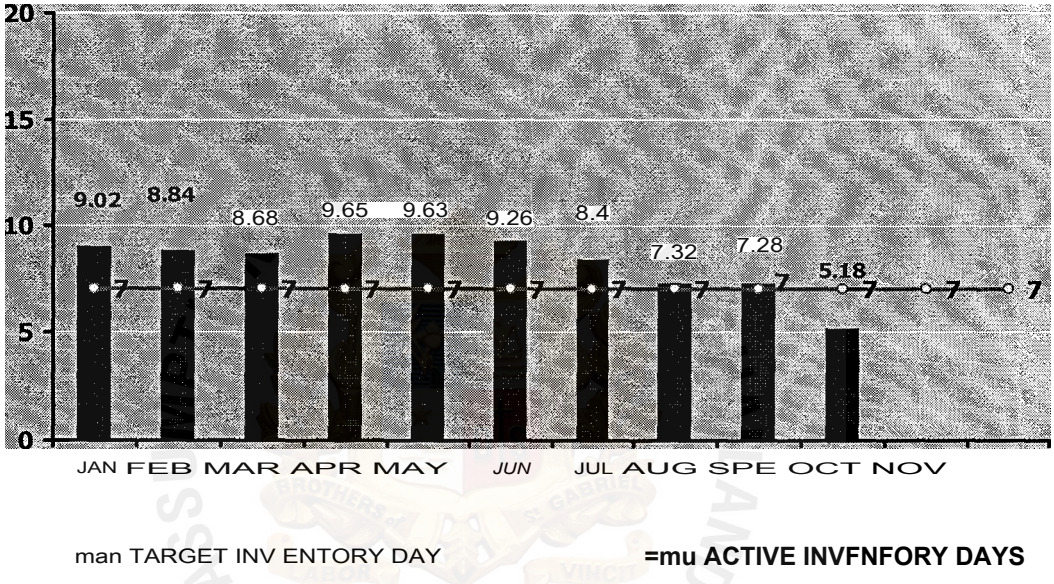

Figure 3.9. Year 2003 Turn Over Days by Commodity of Connector Buyer.

Table 3.7. Year 2003 Inventory Holding Cost and Turn Over Days Calculation.

2003	AN	MI I AM APR Mk\	JUN	JUL	AUG	SEP	OCT	NOV	DEC
T, RH 'I IN\ 1).1111.	Sfil	9 ii RJUJ 'AK' 7.IIII	-,011	1).1111	h.nII	b,IH1	).110	1 HI	8,00
Af.1 1:11.1NVINTORYA \H.	1031	(p1u 9,92 9.65	(3	),20	7.211	6 2	6.24	5.83	
TARGET IN VL.1 OM 11.\	7.O	'00 7.00 7.00	".110	7.00	"OO	7.00	7,00	7.00	'110 ' 7,OO
ACTU 11.1V.' \ 1111.	9.02	.6s 9.65 9.O	)'6	848	7.32	"]%	5.10	-	-

In the Figure 3.9 and Table 3.7 show the trend of actual inventory amount and actual inventory turnover days which decline to under target after ABC analysis has been implemented.

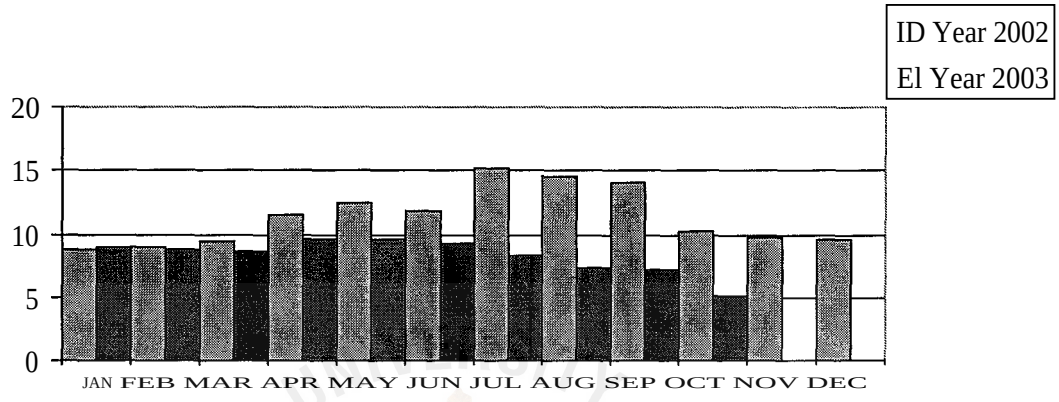

Figure 3.10. Inventory Turnover Days Comparison between Year 2002 and Year 2003.

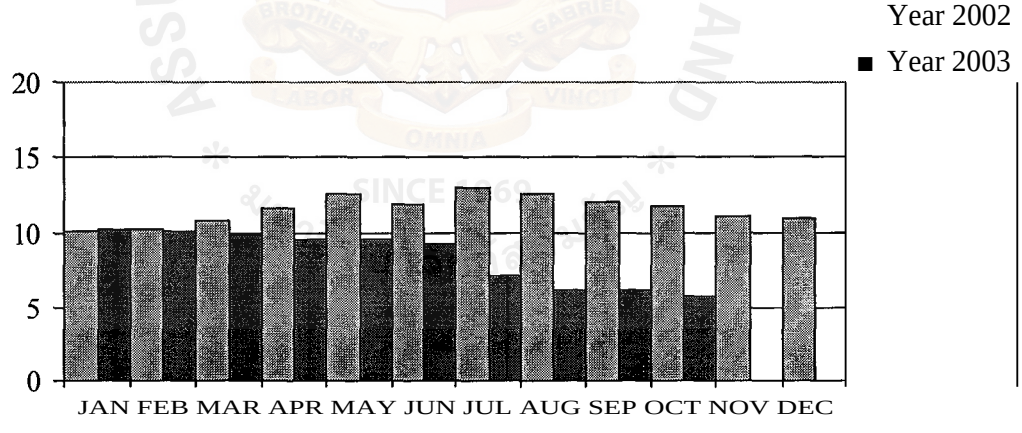

Figure 3.11. Inventory Holding Cost Comparison between Year 2002 and Year 2003.

Refering to Figure 3.8 and 3.9, the charts show that there is improvement in the inventory holding cost and inventory turnover days in Year 2003 (By ABC Classification System) when compared with Year 2002 (By Material Requirement Planning or MRP).

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This project implies that good inventory planning and control are very important factors for inventory holding cost and inventory turnover day reduction. There are many techniques for inventory management and control. Each technique cannot provide the same level of inventory holding cost and turnover days reduction. As in this case study, it is seen that MRP technique is not suitable for producing Switching Power Supply because inventory holding cost and inventory turnover days are still high, and do not reach the company's target (minimize cost and zero inventory). So, ABC system analysis was implemented instead of MRP technique by using item A 70%, item B 20% and item C 10% for minimizing cost and turnover day. From the result of ABC analysis implementation it is found that inventory holding cost and inventory turnover days are reduced to 60%.

Bill of material is the most important factor in creating MRP and ABC. If it can breakdown all the materials that are consumed in the improvement project, MRP and ABC can be exactly estimated. Also the lead-time in every material is the major factor in specifying the period of manufacturing low voltage switchboard and other products. Lead-time can a effect the safety stock; whenever the lead-time of material is too long, the manufacturer should keep stock on hand. Otherwise, manufacturing time would be extended.

Even though the ABC is based on independent demand inventory, for this study it is applied to use for dependent demand of switchboard. But this refers to the fixed material that is used in this kind of switchboard. The forecasting quantity, holding cost, and ordering cost are the major factors in implementing the ABC and stock holding

cost. If we can reduce it, all those costs would be reduced and the cost of finished product would be reduced accordingly.

5.2 Recommendations

From the inventory management techniques presented in this project, it does not always guarantee the actual results because the inventory techniques used for inventory control have to be studied and considered before implementing then in the manufacturing companies. For example, the manufacturers or producers who use MRP technique should understand that it should be used with raw materials which are not complicated and not too large.

Accurate information of each material item is required, such as the lead-time and quantity specification; otherwise, the MRP program would be affected in planned receipt, ordering time, and delivery time of product. The material that is frequently used should be studied, and then kept in stock as consuming material. Therefore, ordering cost of each material, and suppress the part past due which causes late production can be reduced.

For ABC Classification System, it should be used with the raw materials, which are quite complicated and in large quantities because it is impossible to concentrate on all material types at the same time. Therefore this technique is suitable for focusing on high inventory holding cost.

However, before using inventory management techniques, whether MRP or ABC Classification Analysis, accurate bill of materials or BOM is a very important factor to avoid wrong material purchase.

Inventory holding cost and inventory turnover day may occur from unforeseen customer's cancellation, breaking down of production line customer placing the small quantity orders, etc. However, the most causes are human errors.

5.3 Further Study

After studying MRP and ABC Classification System in the case study, it seems to minimize the inventory holding cost although these techniques are not efficient. The interesting technique, which should be studied is third party warehouse and it is being planned for implementation. This technique means manufacturers will push the cost burden (inventory holding, warehouse space, etc.) to customers only. Another study should concentrate on the advantage and disadvantage in long-term also. Furthermore, the possibility of consolidating vendors or suppliers to localize their factory is also interesting for studying in Thailand.

APPENDIX A

BILL OF MATERIAL MODEL D-500 A

MODEL NO: D-500 A REV: 016 SMPS 500W

ITEM	LEVEL	PART NO.	MFG PART	DESCRIPTION	ALT.GRP	% QPA	UM	DESIGN NO	ITEM TEXT
1	1	2909004201	IOGENW3C (MVO	LTR 1OGENW3C (MW I) FOR DEIC		1.0000	PCE		EMI FILTER
2	.2 ...	1101046327		P Y CD 250VAC 2.2KP M E I		100 % 2.0000	PCE		AA
3	.2 ...	1101046332	CS11-E2GA222MYAS	AP Y CD 250VAC 2.2KP M E I		0 % 2.0000	PCE		AA
4	.2 ...	1604312018	KNB1530-0.IUFML25	AP X PP PC 275VAC .IU M P15	AB	0 % 1.0000	PCE		AB
5	.2 ...	1604312029	2222 336 26104	C X MP PC 275VAC .IU M P15	AB	0 % 1.0000	PCE		AB
6	.2 ...	1604312030	RE104-L	P X MP PC 275VAC .1U K P15	AB	100 % .0000	PCE		AB
7	.2 ...	3140310500		VER PBT 20%GF WHITE		.0000	PCE		
8	.2 ...	3170100700		SE PBT 20%GF BLK 30.1*26		1.0000	PCE		
9	..3 ..	4020300100	3210-2	LASTIC PBT GLASS FI	AA	0 % .7000	GRM		AA
10	..3	4020301400		ASTIC PBT 20%GF BLK	AA	100 % 4.5000	GRM		AA
11	.2 ..	3203874100		BEL PE TO.075 FOR 1OGEN'W3C		.0000	PCE		
12	.2	3227001900		AFIT 5*0.25 BL TUBE HS POLYOLEFIN 5*.25 BLACK					0.0460 MTR
13	.2 ..	3227001900		AFIT 5*0.25 BL TUBE HS POLYOLEFIN 5*.25 BLACK					0.0150 MTR
14	.2 ..	3320020500		ASE SPCE NI 42.1*27.8*20.5		.0000	PCE		
15	.2 ..	3421020700		RAME SST T:0.2 R1.0 23*15.8		2.0000	PCE		
16	.2 ..	3510050400		RTON 13-2 495*295*267		0.0060	PCE		
17	.2 ..	3510134100		AD PAPER 25.7*21.7*0.6		0.0120	PCE		
18	.2 ..	3510420100		AY PAPER 280*240*75		0.0360	PCE		
19	.2 ..	3512044900		RTITION 269*228*75		0.0360	PCE		
20	.2	3520081500		BAG 225*12*330 T=.06		.0120	PCE		
21	.2 ..	3520130100		YER		0240	PCE		
22	.2	3800061800		CKET ASSY SK-1021 3350470100		1.0000	PCE		
23	..3	3030150100		CKET PBT 30%GF BLACK		1.000	PCE		
24		3350160800		RMINAL BRS NI 19.5*8*5.4		.0150	PCE		
25	...4	3350160900		RMINAL BRS NI 18.1*7		2.0300	PCE		
26	...4	4020301100		ASTIC PBT 30%GF BLK		.3000	GRM		
27	..3	3350470100		RMINAL BRS NI 31.1*8*16.3		1.000	PCE		
28	..3	4090000900		LDER WIRE 50/50 1.2mm		.2000	GRM		
29	.2 ..	3810460600		OKE ASSY 14*8*4LA		.0000	PCE		
30	.3	3140070200		VER NY66 94-0 NAT 15*7*2.35		2.0000	PCE		
31	.3	4010810000		RE CU 0.9 OUEWN NAT MW-28		7.0000	GRM		
32	..3	4140149900	OR-14-8*4LA GP-I1	ORE SORTING OF 4140140001		.0000	PCE		
33	.2	3840260100		N WIRE ASSY WITH 3041111100		1.0000	PCE		
34	..3	3041003000	61793-1	TERMINAL STEEL AMP61793-1	AA	0 % 1.0000	PCE		AA
35	..3	3041003300		TERMINAL BRASS	AA	0 % 1.000	PCE		AA
36	3	3041111100	B40317BS-2	RMINAL BRASS TIN PLATED T=0.5mm	AA	100 % 1.0000	PCE		AA

ITEM	LEVEL	PART NO.	MFG PART	DESCRIPTION	ALT.GRP	%	QPA	UM	DESIGN NO	ITEM TEXT
37	_3	4001307000		WIRE PVC #18 1430 G/Y			0.0730	muz.		
38	.2	3840300200		CON WIRE ASSY WITH 3040118234			1.0000	PCE		
39		3041018200	FDFD1-187(8)	TERMINAL BRASS #16-22			1.0000	PCE		
40		4001306100		WIRE PVC #18 1430 BROWN			0.1180	MTR		
41	.2	3840310200		CON WIRE ASSY WITH 3040118234			1.0000	PCE		
42		3041014500	FDFD1-250	TERMINAL BRASS			1.0000	PCE		
43	_3	4001306600		WIRE PVC #18 1430 BLUE			0.1180	MTR		
44	.2	4020110000		ADHESIVE LI-BOND1101 JET-MEL			0.8870	GRM		
45	.2	4090001200		SOLDER BAR 50/50			0.2000	GRM		
46	.2	4090103000	KIC#33	SOLDER WIRE 60/63 #1.2			0.8960	GRM		
47	.2	4090103100	KK#28	SOLDER WIRE 60/63 #1.2			0.4000	GRM		
48	1	3070335034	A2002WV2-2P	HEADER NY66 94V-0 2PIN P2.0 S BROWN			1.0000	PCE		LED WIRE
49	1 ...	3071107200	22-04-1031/5045	HEADER NYLON66 94V-0 3PIN	AA	0 %	1.0000	PCE		FOR DCFAN
50	1 ...	3071118234	A2508WV0-3P	HEADER NY66 94V0 3PIN	AA	100 %	1.0000	PCE		FOR DCFAN
51	1 ...	3100003000		SCREW M M3*0.5*28 FLAT C S18C ZN BLK			4.0000	PCE		FOR DCFAN
52	1 ...	3103000601		SCREW M #6-32*6.3 FLAT C S20C ZN			5.0000	PCE		FOR CASE
53	1 ...	3103300600		SCREW M #6-32*6.3 PAN C S20C ZN			5.0000	PCE		FOR DCT-126
54	1 ...	3103300600		SCREW M #6-32*6.3 PAN C S20C ZN			1.0000	PCE		FOR FG
55	1 ...	3103300600		SCREW M #6-32*6.3 PAN C S20C ZN			3.0000	PCE		FOR MAIN BOARD
56	1 ...	3103301000		SCREW M #6-32*9.5 PAN C S20C ZN			2.0000	PCE		FOR 0/P CONNECT
57	1 ...	3109060101		SCREW T #6-32*6 FLAT C S20C NI			8.0000	PCE		FOR CASE
58	1 ...	3120012800		FUSE CLIP PHOSPHOR BRONEE			2.0000	PCE		FOR FUSE
59	1 ...	3200375000		LABEL BLANK 70*43mm NPS-330AB A			1.0000	PCE		
60	1 ...	3200441500		LABEL WARNING POLYESTER DPS-350AB A			1.0000	PCE		
61	1 ...	3201089901		LABEL CAUTION POLYESTER			1.0000	PCE		
62	1 ...	3208005801		LABEL BMSI 33.5*12.0 DPS-500CB A			1.0000	PCE		FOR BMSI WARNIN
63	1 ...	3208006200		LABEL CCIB 33.5*12 DPS-500CB A			1.0000	PCE		FOR CCIB WARNIN
64	1 ...	3208006500		LABEL 152.4'102 BLANK			0.0050	PCE		FOR SHIP TO SLC
65	1 ...	3230035300		LED BUSHING ABS			3.0000	PCE		FOR LED
66	1 ...	3248011300		INSULATOR PP 200*55.6*0.43			1.0000	PCE		FOR CASE COVER
67	1	3248011401		INSULATOR PP 302.9*61.6*0.43			1.0000	PCE		
68	1 ...	3248014400		INSULATOR PP 274.5*66.4*0.43			1.0000	PCE		
69	1 ...	3309012201		CASE CHASSIS SECC 315.2 T=0.08			1.0000	PCE		FOR DCT-126
70	1 ...	3309012301		ASE CHASSIS SECC 335mm T=0.8			1.0000	PCE		
71	1 ...	3309012400		CASE COVER SECC 300.1mm T=0.8			1.0000	PCE		
72	1 ...	3350390100		TERMINAL ALUM DEGREASING			1.0000	PCE		FOR NTC

ITEM	LEVEL	PART NO.	MFG PART	DESCRIPTION	ALT.GRP	% QPA	UM	DESIGN NO	ITEM TEXT
73	.2	4041000100		STEEL SHEET AL1100 W=29 T=0.5		0.6200	GRM		
74	1	3350850200	PC187(8)	TAP TOUNG COPPER		1.0000	PCE		FOR L
75	1	... 3350850400	PC-250(8)	TAP TOUNG COPPER TIN PLATED		1.0000	PCE		FOR N
76	1	3350871200		RIVET STEEL ZINC PLATED NPS-330AB A		2.0000	PCE		FOR HANDLE
77	1	... 3421052400		SPRING BE COPPER		6.0000	PCE		FOR CASE GROUND
78	1	... 3421192500	LED3-1	LED HOUSING NYLON 66 94V-2		3.0000	PCE		FOR LED
79	1	3429503500		FAN BRACKET SECC T=0.8mm		1.0000	PCE		FOR DCFAN
80	1	... 3430104700		BUSHING STEEL NPS-330AB A		2.0000	PCE		FOR HANDLE
81	1	... 3470901401		HANDLE PC+ABS 75.4*62.9		1.0000	PCE		
82	1	... 3528004200		PML DPS-500CB A		1.0000	PCE		
83	.2	3508002100		PE FOAM BLOCK 35*72*65		1.0000	PCE		
84	.2	3508002200		PE FOAM BLOCK 50*72*50		1.0000	PCE		
85		.3510116801		TUBE 1142*958*819H		0.0050	PCE		
86	.2	3510180200		PAPER ANGLE 900*55*55		0.0210	PCE		
87	.2	3510402400		TRAY 1200*1000*158H		0.0100	PCE		
88	.2	3510801300		PAD PAPER 1130*940*3H		0.0050	PCE		
89	.2	3518005800		TRAY 470*376*103		0.2500	PCE		
90	.2	3518006000		PARTITION 440*360*96 H		0.2500	PCE		
91	.2	3520031000		PALLET 1200*1000*128H		0.0050	PCE		
92	.2	3520082400		PE FILM t=0.02mm W=500		1.3100	GRM		
93	.2	3520089500		PE SHEET 1800*1600*.1		0.0050	PCE		FOR AIR SHIPMEN
94	.2	3520130100		DRYER		0.2500	PCE		
95	.2	3520142700		PLASTIC STRIP W=12 T.5 BLACK		0.0830	MTR		
96	.2	3520142800		STAPLE WIRE 28*21.5*1.3		0.0210	PCE		
97	1	... 3620611811	AFB0612EH-BF00 80	DCFAN ASSY 0710080411(115/115) 6CM(B)		1.0000	PCE		
98	.2	3200199300		LABEL SHIPPING 60*45		0.0060	PCE		
99	..3	3200196900		LABEL ORIGINAL 60*45		1.0000	PCE		
100	.2	3203309400		LABEL PE OD=29 AFB0612EH-BFOO		1.0000	PCE		
101	.2	3421101400		SPRING SST H:5 DIA:0.45		1.0000	PCE		
102	.2	3430101300		BEARING BALL ISC 693T12AZZM3	AB	100 %	2.0000	PCE	
103	.2	3510022670		CARTON CD-3 AB 498*298*231		0.0060	PCE		
104	.2	3520183400		TRAY PVC 490*290*30 4*13=52		0.0200	PCE		
105	.2	3810649000		PWB SET FOR AFB0612EH-F00		1.0000	PCE		
106	..3	0313000000	2322 711 91032	RES CH 1/4W ZERO J 1206		1.0000	PCE		
107	..3	0313202000	2322 711 61202	RES CH 1/4W 2K J 1206		1.0000	PCE		
108	..3	0313221000	2322 711 61221	RES CH 1/4W 220 J 1206		2.0000	PCE		

ITEM	LEVEL	PART NO.	MFG PART	DESCRIPTION	ALT.GRP % QPA	UM DESIGN NO ITEM TEXT
109	..3	0343202100	2322 730 61202	RES CH 1/8W 2K J 0805	2.0000	PCE
110	..3	1557667131	C0805Y105Z025T	CAP MC CP 25V 1U Z Y5V 0805	1.0000	PCE
1 II	..3	203827680021	SMAJ18	DIO TVS 300W 20-24.4V SMA/D0-214AC	1.0000	PCE
112	..3	204810750136	RLS4148 TE-I I	DIO SW 0.15A 75V MINIMELF	3.0000	PCE
113	..3	205820590021	SIG	DIO SI IA 400V SMA/D0-214AC	1.0000	PCE
114	..3	210522000907	BC817-25,215	TR 45V 0.5A SOT-23 160-400	1.0000	PCE
115	..3	2510012120	LB1663M	IC DRIVER 1.2W 16PIN LB1663M	1.0000	PCE
116	3	2520005433	HW-101A RANK:G	IC HALL 310-370mv 4PIN	1.0000	PCE
117	3	2994005400		PWB XPC 10Z 32.0*10.5*1.2	1.0000	PCE
118	..3	 4090201000	SE4-M952K	SOLDER PASTE SE4-M952K	0.1840	GRM
119	.2	3810710000		ROTOR ASSY AFB06	1.0000	PCE
120	3	3328016600		CASE SPCC OD=30.4 ZINC	1.0000	PCE
121	.4	 4040302100		STEEL SHEET SPCC W=60 T=0.8	23.4000	GRM
122	3	4100049700		IMPELLER PBT+20%GF SQ60*25.4	1.0000	PCE
123	..4	 3350535700		SHAFT SUS420 OD:2.99 L=21 KNURL	1.0000	PCE
124	...4	 4020301100		PLASTIC PBT 30%GF BLK	AA 100 % 0.0110	KGM
125	...4	 4020303718		PLASTIC PBT+30% BLK SHINKONG	AA 0 % 0.0110	KGM
126	..3	4110106500		MAGNET RUBBER 87.4*13.2*2.0	1.0000	PCE
127	.2	3813031800		WINDING ASSY 23.8*8 0.2/138TS	1.0000	PCE
128	..3	3810710100		STATOR ASSY 23.8*9.5*16 PLATE	1.0000	PCE
129	...4	 3170762400		COVER PBT+30%GF 94V-0 BLACK	1.0000	PCE
130	5	... 4020301100		PLASTIC PBT 30%GF BLK	0.6500	GRM
131	..4	 3170762900		COVER PBT+30%GF 94V-0	1.0000	PCE
132	5	.. A020301100		PLASTIC PBT 30%GF BLK	0.6500	GRM
133	...4	 4011600100		WIRE TIN COATED 0.64*0.64	0.0600	GRM
134	...4	 4177108300		SILICON STEEL 23.8*9.3*16 PLATES	1.0000	PCE
135	5	... 4177106500		SILICON STEEL W=47.5 T=0.5 H=23	39.2000	GRM
136	..3	 4010400200		WIRE CU 0.2 2UEW NAT	0.0060	KGM
137	.2	3860928100		CABLE ASSY 1007 #24 3HOLES	1.0000	PCE
138	.2	 4020500400		INK WHITE	0.0030	GRM
139	.2	4090002000		SOLDER WIRE 63/37 0.8mm	0.2800	GRM
140	.2	4100120000		BEARING CR STL OD:8 ID:3 H:4	AB 0 % 2.0000	PCE
141	.2	 4100120001		BEARING OD=8 ID=3 H=4 KOYO	AB 0 % 2.0000	PCE
142	.2	 4100140000		METAL RING 1D:2.66 OD:3.42	1.0000	PCE
143	.2	.. 4100209800		FRAME PBT+30%GF 94V0 SQ60*25 RIB	1.0000	PCE
144	3	4020301100		PLASTIC PBT 30%GF BLK	27.1000	GRM

ITEM	LEVEL	PART NO.	MFG PART	DESCRIPTION	ALT.GRP	%	QPA	UM	DESIGN NO	ITEM TEXT
145	1 ...	3648014001		WIRE WITH TERMINAL 1430 #18 L80			1.0000	PCE	FOR L',N'	
146	1	3678015401		WIRE WITH HOUSING 1007 #18 L122			1.0000	PCE	FOR B+B-	
147	1 ..	3678015500		WIRE WITH HOUSING 1007 # 24 L140			1.0000	PCE	FOR CN6	
148	1 ..	3795001800		LED ASS'Y DPS-500CB A			1.0000	PCE	FOR PS-FAIL	
149	.2	2300070201	LTL-4221	ED RED 3mm	AA	0	1.0000	PCE		
150	.2	2300221531	L-34GD	LED GRN 3mm	AA	100	1.0000	PCE		
151	.2	2301151206	EL-1254HD	LED RED 3mm	AA	0	1.0000	PCE		
152		3227004600	V(818.823) 2*0.15	TUBE HS PVC 2*0.15 CLEAR			0.0400	MTR	L=20mm*2	
153	.2	3227004900	VERSAFIT 4*0.25 BL	TUBE HS POLYOLEFIN 4*0.25 BLACK			0.2120	MTR		
154	.2	3678015600		WIRE WITH HOUSING 1007 # 26 L220			1.0000	PCE		
155	.2	4180000100		COPPER FOIL W=2mm T=0.3mm			0.0030	GRM		
156	1 ..	4020109400		*EPDXY ADHESIVE SC608LV SONY		0.0040	KGM		FOR FIX COMPONE	
157	l ..	4020112900		EPDXY ADHESIVE SCREW 262		0.0030	KGM	R	HSK,FAN BRA	
158	1 ..	5500607300		PWB ASM DPS-500CB A			1.0000	PCE		
159	.2	0133478000		RES MOF IW 4.7 J			1.0000	PCE	R151B	
160	.2	0143159400	RSN2WUC1 J OR15	RES MOF 2W 0.15 J VSK			1.0000	PCE	R12A	
161	.2	0143159400	RSN2WUC1 J OR15	RES MOF 2W 0.15 J VSK			1.0000	PCE	R12B	
162	.2	0143478000	RSN2WT63 J 4R7	RES MOF 2W 4.7 J			1.0000	PCE	R151A	
163	.2	0313102000	2322 711 61102	RES CH $^{1}/_{4}$W 1K J 1206			1.0000	PCE	R659B	
164	.2	0313108000	2322 711 61108	RES CH 1/4W 1 J 1206			1.0000	PCE	R21	
165	.2	0313122000	RM12JT122	RES CH $^{1}/_{4}$W 1.2K J 1206			1.0000	PCE	R152A	
166	.2	0313122000	RMI2JT122	RES CH 1/4W 1.2K J 1206			1.0000	PCE	R152B	
167	.2	0313122000	RM12JT122	RES CH 1/4W 1.2K J 1206			1.0000	PCE	R152C	
168	.2	0313122000	RM12JT122	RES CH 1/4W 1.2K .1 1206			1.0000	PCE	R152D	
169	.2	0313122000	RMI2JT122	RES CH 1/4W 1.2K J 1206			1.0000	PCE	R152E	
170	.2	0313122000	RM12JT122	RES CH 1/4W 1.2K J 1206			1.0000	PCE	R154A	
171	.2	0313122000	RM12JT122	RES CH 1/4W 1.2K J 1206			1.0000	PCE	R154B	
172	.2	0313122000	RM12JT122	RES CH 1/4W 1.2K J 1206			1.0000	PCE	R154C	
173	.2	0313122000	RM12JT122	RES CH 1/4W 1.2K J 1206			1.0000	PCE	R154D	
174	.2	0313122000	RM12JT122	RES CH 1/4W 1.2K J 1206			1.0000	PCE	R154E	
175	.2	0313122000	RM12JT122	RES CH 1/4W 1.2K J 1206			1.0000	PCE	R161A	
176	.2 ..	0313122000	RMI2JT122	RES CH 1/4W I.2K J 1206			1.0000	PCE	R16IB	
177	.2	0313201000	2322 711 61201	RES CH 1/4W 200 J 1206			1.0000	PCE	R159A	
178	.2	0313201000	2322 711 61201	RES CH 1/4W 200 J 1206			1.0000	PCE	R159B	
179	.2	0313271000	2322 711 61271	RES CH 1/4W 270 J 1206			1.0000	PCE	R933	
180	.2	0313338000	RC1206JR-07 3R3	RES CH I/4W 3.3 J 1206			1.0000	PCE	R20	

ITEM	LEVEL	PART NO.	MFG PART	DESCRIPTION	ALT.GRP % QPA	UM DESIGN NO ITEM TEXT
181	.2 ...	0313391000	RC1206JR-07 390R	RES CH I/4W 390 J 1206	1.0000	PCE RI 14A
182	.2	0313391000	RC1206JR-07 390R	RES CH 1/4W 390 J 1206	1.0000	PCE R1 14B
183	.2	0313391000	RC1206JR-07 390R	RES CH 1/4W 390 J 1206	1.0000	PCE R160A
184	.2	0313391000	RC1206JR-07 390R	RES CH 1/4W 390 J 1206	1.0000	PCE R160B
185	.2	0341041100	2322 734 61002	RES CH 1/8W 1K F 0805	1.0000	PCE R650
186	.2	0341043100	2322 734 61502	RES CH 1/8W 1.5K F 0805	1.0000	PCE R951
187	.2	0341049100	RC00805R-07 3K32	RES CH 1/8W 3.32K F 0805	1.0000	PCE R90
188	.2	0341050100	RM1OFT3901	RES CH 1/8W 3.9K F 0805	1.0000	PCE R3ODI
189	.2	0341050100	RM10FT3901	RES CH 1/8W 3.9K F 0805	1.0000	PCE R30D2
190	.2 ..	0341050100	RM10FT3901	RES CH 1/8W 3.9K F 0805	1.0000	PCE R30D3
191	.2	0341050100	RMIOFT3901	RES CH 1/8W 3.9K F 0805	1.0000	PCE R30D4
192	.2	0341059300	ERJ-3EKF 1002V	RES CH 1/10W 10K F 0603	1.0000	PCE R33
193	.2	0341059300	ERJ-3EKF 1002V	RES CH I/10W 10K F 0603	1.0000	PCE R34
194	.2	0341062100	2322 734 61503	RES CH 1/8W 15K F 0805	1.0000	PCE R172
195	.2	0341062100	2322 734 61503	RES CH 1/8W 15K F 0805	1.0000	PCE R91
196	.2	0341084100	RM10FT8202	RES CH 1/8W 82K F 0805	1.0000	PCE R934
197	.2	0341108100	2322 734 61005	RES CH 1/8W 1M F 0805	1.0000	PCE R905
198	.2	0341155100	2322 734 66813	RES CH 1/8W 68.1K F 0805	1.0000	PCE R901
199	.2	0341262100	2322 734 64994	RES CH 1/8W 499K F 0805	1.0000	PCE R824
200	.2	0341272100	2322 734 65113	RES CH 1/8W 51.1K F 0805	1.0000	PCE R906
201	.2	0341282100	RC0805FR-07 5K49	RES CH 1/8W 5.49K F 0805	1.0000	PCE R173
202	.2	0341327100	2322 734 63004	RES CH 1/8W 300K F 0805	1.0000	PCE R957
203	.2	0341333100	RC0805FR-07 825K	RES CH 1/8W 825K F 0805	1.0000	PCE R903
204	.2	0341397100	RC0805FR-07 5K9	RES CH 1/8W 5.9K F 0805	1.0000	PCE R949A
205	.2	0341562100	RC0805FR-07 118K	RES CH 1/8W 118K F 0805	1.0000	PCE R181
206	.2	0343000100	2322 730 91002	RES CH 1/8W ZERO J 0805	1.0000	PCE R97
207	.2	0343000100	2322 730 91002	RES CH 1/8W ZERO .1 0805	1.0000	PCE R98
208	.2	0343100100	2322 730 61109	RES CH 1/8W 10 J 0805	1.0000	PCE R10
209	.2	0343100100	2322 730 61109	ES CH 1/8W 10 J 0805	1.0000	PCE R9
210	.2	0343100100	2322 730 61109	RES CH 1/8W 10 J 0805	1.0000	PCE R972
211	.2	0343100100	2322 730 61109	RES CH 1/8W 10 J 0805	1.0000	PCE R973
212	.2	0343100100	2322 730 61109	RES CH 1/8W 10 J 0805	1.0000	PCE R975
213	.2	0343100100	2322 730 61109	RES CH 1/8W 10 J 0805	1.0000	PCE R976
214	.2	0343100100	2322 730 61109	RES CH 1/8W 10 J 0805	1.0000	PCE R978
215	.2	0343100100	2322 730 61109	RES CH 1/8W 10 J 0805	1.0000	PCE R979
216	.2	0343101100	2322 730 61101	RES CH 1/8W 100 J 0805	1.0000	PCE R18

ITEM	LEVEL	PART NO.	MFG PART	DESCRIPTION	ALT.GRP	% QPA	UM	DESIGN NO	ITEM TEXT
217	.2 ...	0343101100	2322 730 61101	RES CH 1/8W 100 J 0805		1.0000	PCE	R932	
218	.2	0343102100	2322 730 61102	RES CH 1/8W 1K J 0805		1.0000	PCE	R169A	
219	.2	0343102100	2322 730 61102	RES CH 1/8W 1K J 0805		1.0000	PCE	R169B	
220	.2	0343102100	2322 730 61102	RES CH 1/8W IK J 0805		1.0000	PCE	R178	
221	.2	0343102100	2322 730 61102	RES CH 1/8W 1K J 0805		1.0000	PCE	R752	
222	.2	0343102100	2322 730 61102	RES CH 1/8W 1K J 0805		1.0000	PCE	R755	
223	.2	0343102100	2322 730 61102	RES CH I/8W 1K J 0805		1.0000	PCE	R756	
224	.2	0343102100	2322 730 61102	RES CH 1/8W 1K J 0805		1.0000	PCE	R757	
225	.2	0343102100	2322 730 61102	RES CH 1/8W IK J 0805		1.0000	PCE	R831	
226	.2	0343102100	2322 730 61102	RES CH 1/8W 1K J 0805		1.0000	PCE	R929	
227	.2	0343102100	2322 730 61102	RES CH 1/8W 1K J 0805		1.0000	PCE	R930	
228	.2	0343102100	2322 730 61102	RES CH 1/8W 1K J 0805		1.0000	PCE	R944	
229	.2	0343102100	2322 730 61102	RES CH 1/8W 1K J 0805		1.0000	PCE	R945	
230	.2	0343102100	2322 730 61102	RES CH 1/8W 1K J 0805		1.0000	PCE	R946	
231	.2	0343102100	2322 730 61102	RES CH 1/8W 1K J 0805		1.0000	PCE	R952	
232	.2	0343102100	2322 730 61102	RES CH 1/8W 1K J 0805		1.0000	PCE	R953	
233	.2	0343102100	2322 730 61102	RES CH 1/8W 1K J 0805		1.0000	PCE	R954	
234	.2	0343102100	2322 730 61102	RES CH 1/8W 1K J 0805		1.0000	PCE	R960	
235	.2	0343102100	2322 730 61102	RES CH 1/8W IK J 0805		1.0000	PCE	R963	
236	.2	0343103100	2322 730 61103	RES CH 1/8W 10K J 0805		1.0000	PCE	R179	
237	.2	0343103100	2322 730 61103	RES CH 1/8W 10K J 0805		1.0000	PCE	R19	
238	.2	0343103100	2322 730 61103	RES CH 1/8W 10K J 0805		1.0000	PCE	R213	
239	.2	0343103100	2322 730 61103	RES CH 1/8W 10K J 0805		1.0000	PCE	R57	
240	.2	0343103100	2322 730 61103	RES CH 1/8W 10K J 0805		1.0000	PCE	R754	
241	.2	0343103100	2322 730 61103	RES CH 1/8W 10K J 0805		1.0000	PCE	R88	
242	.2	0343103100	2322 730 61103	RES CH 1/8W 10K J 0805		1.0000	PCE	R955A	
243	.2	0343103100	2322 730 61103	RES CH 1/8W 10K J 0805		1.0000	PCE	R96	
244	.2	0343103100	2322 730 61103	RES CH 1/8W 10K J 0805		1.0000	PCE	R970	
245	.2	0343103100	2322 730 61103	RES CH 1/8W 10K J 0805		1.0000	PCE	R971	
246	.2	0343104100	2322 730 61104	RES CH 1/8W 100K J 0805		1.0000	PCE	R669	
247	.2	0343104100	2322 730 61104	RES CH 1/8W 100K J 0805		1.0000	PCE	R753	
248	.2	0343105100	2322 730 61105	RES CH 1/8W 1M J 0805		1.0000	PCE	R174	
249	.2	0343108100	2322 730 61108	RES CH 1/8W 1 J 0805		1.0000	PCE	R184	
250	.2	0343108100	2322 730 61108	RES CH 1/8W 1 J 0805		1.0000	PCE	R185	
251	.2	0343108100	2322 730 61108	RES CH 1/8W 1 J 0805		1.0000	PCE	R186	
252	.2	0343152100	2322 730 61152	RES CH 1/8W 1.5K J 0805		1.0000	PCE	R950	

ITEM	LEVEL	PART NO.	MFG PART	DESCRIPTION	ALT.GRP % QPA	UM DESIGN NO ITEM TEXT
253	.2 ...	0343152100	2322 730 61152	RES CH 1/8W 1.5K J 0805	1.0000	PCE R959
254	.2	0343202100	2322 730 61202	RES CH 1/8W 2K J 0805	1.0000	PCE R949
255	.2	0343203100	2322 730 61203	RES CH 1/8W 20K J 0805	1.0000	PCE R171
256	.2	0343204100	2322 730 61204	RES CH 1/8W 200K J 0805	1.0000	PCE R182A
257	.2	0343204100	2322 730 61204	RES CH 1/8W 200K J 0805	1.0000	PCE R182B
258	.2	0343222100	2322 730 61222	RES CH 1/8W 2.2K J 0805	1.0000	PCE R961
259	.2	0343302100	2322 730 61302	RES CH 1/8W 3K J 0805	1.0000	PCE R873
260	.2	0343332100	2322 730 61332	RES CH 1/8W 3.3K J 0805	1.0000	PCE R948
261	.2	0343335100	RC0805 JR-07 3M3	RES CH 1/8W 3.3M J 0805	1.0000	PCE R947
262	.2	0343392100	2322 730 61392	RES CH 1/8W 3.9K J 0805	1.0000	PCE R183
263	.2	0343471100	2322 730 61471	RES CH 1/8W 470 J 0805	1.0000	PCE R17
264	.2	0343472100	2322 730 61472	RES CH 1/8W 4.7K J 0805	1.0000	PCE R167
265	.2	0343472100	2322 730 61472	RES CH 1/8W 4.7K J 0805	1.0000	PCE R168
266	.2	0343472100	2322 730 61472	RES CH 1/8W 4.7K J 0805	1.0000	PCE R668
267	.2	0343472100	2322 730 61472	RES CH 1/8W 4.7K J 0805	1.0000	PCE R87
268	.2	0343472100	2322 730 61472	RES CH 1/8W 4.7K J 0805	1.0000	PCE R8A
269	.2	0343472100	2322 730 61472	RES CH 1/8W 4.7K J 0805	1.0000	PCE R9A
270	.2	0343473100	2322 730 61473	RES CH 1/8W 47K J 0805	1.0000	PCE R180
271	.2	0343474100	2322 730 61474	RES CH 1/8W 470K J 0805	1.0000	PCE R175
272	.2	0343512100	2322 730 61512	RES CH 1/8W 5.1K J 0805	1.0000	PCE R751
273	.2	0343751100	2322 730 61751	RES CH 1/8W 750 J 0805	1.0000	PCE R16
274	.2	0343753100	RC0805JR-07 75K	RES CH 1/8W 75K J 0805	1.0000	PCE R941
275	.2	0401101000	2322 791 63014	RES CH HI-VOL 1/4W 301K F 1206	1.0000	PCE R958
276	.2	0401103000	2322 791 63924	RES CH HI-VOL 1/4W 392K F 1206	1.0000	PCE R14
277	.2	0401136000	2322 791 64324	RES CH HI-VOL 1/4W 432K F 1206	1.0000	PCE R13
278	.2	0401262000	2322 791 64994	RES CH HI-VOL 1/4W 499K F 1206	1.0000	PCE R823
279	.2	0622020018	OAR-3 2.5MOHM2%	RES JMP 3W 2.5m 2% 1.0mm	1.0000	PCE R153A
280	.2	0622020018	OAR-3 2.5MOHM2%	RES JMP 3W 2.5m 2% 1.0mm	1.0000	PCE R153B
281	.2	0663474000		RES HI-VOL 1W 470K J	1.0000	PCE RI
282	.2	0803241101	5HT10	FUSE TSC 10A 250V UL CSA	IU 100 % 1.0000	PCE Fl
283	.2	0803241102	0215010.M	FUSE TSC 10A 250V UL CSA	IU 0 % 1.0000	PCE Fl
284	.2	0803241106	0001.2514	FUSE TSC 10A 250V UL	IU 0 % 1.0000	PCE Fl
285	.2	0911030000	TDC05C310J	NTC R=10K OHM J 30mA	1.0000	PCE NTC781A
286	.2	0923010718	DSP301N-A21F	SPARK GAP 300VDC N TP	1.0000	PCE GTI
287	.2	0923010718	DSP301N-A21F	SPARK GAP 300VDC N TP	1.0000	PCE GT2
288	.2	0923210111	V14K320	VARISTOR 320VAC 125J 4500A	Z1 100 % 1.0000	PCE Zl

ITEM	LEVEL	PART NO.	MFG PART	DESCRIPTION	ALT.GRP % QPA	UM DESIGN NO ITEM TEXT
289	.2	0923210141	VZ14D5I1KBS	VARISTOR 320VAC 1283 4500A	ZI 0 % 1.0000	PCE ZI
290	.2	1130747800	XC0332KG1	CAP CD 500V 3.3KP K X7R TP5	1.0000	PCE C151A
291	.2	1130747800	XC0332KG1	CAP CD 500V 3.3KP K X7R TP5	1.0000	PCE C15IB
292	.2	1200758000	K104K15X7RF5WH5-XD	CAP MO DP 50V .IU K X7R TP R	1.0000	PCE C74
293	.2	140023311105	CPWOJ331MT6.3*11	CAP AL LD 6.3V 330U M 6.3*11 TP5	89 100 % 1.0000	PCE C939
294	.2	140023311140	ZGROJM331E11A	CAP AL LD 6.3V 330U M 6.3*11 TP5	89 0 % 1.0000	PCE C939
295	.2	140101011103	UPW1AIO1MDHITA	CAP AL LD 1011 100U M 5*11 TP5	T2 0 % 1.0000	PCE C9I9
296	.2	140101011107	LXZI0VB100M5*11.5-	CAP AL LD lOy 100U M 5*I1.5 TP5	T2 0 % 1.0000	PCE C919
297	.2	140101011148	1OYXG100MTA5*11	CAP AL LD 10V 100U M 5*11 TP5	T2 100 % 1.0000	PCE C919
298	.2	140102211140	ZGR1AM221E11A	CAP AL LD 10V 220U M 6.3*11 TP5	Fl 100 % 1.0000	PCE C921
299	.2	140102211148	10YXG220MTA 6.3*11	CAP AL LD 10V 220U M 6.3*11 TP5	Fl 0 % 1.0000	PCE C921
300	.2	140102211167	KY10VB220M6.3*11-F	CAP AL LD 10V 220U M 6.3*11 TP5	Fl 0 % 1.0000	PCE C921
301	.2	140122220003	UHD1C222MHT1CV	CAP AL LD 16V 2.2KU M 12.5*25	VG 100 % 1.0000	PCE C153
302	.2	140122220007	KZE16VB2200M12.5*2	CAP AL LD 16V 2.2KU M 12.5*25	VG 0 % 1.0000	PCE C153
303	.2	140122220008	16ZL2200MCEI2.5*25	CAP AL LD 16V 2.2KU M 12.5*25	VG 0 % 1.0000	PCE C153
304	.2	140123320003	UHD1C332MHT1CV	CAP AL LD 16V 3.3KU M 12.5*35	PP 100 % 1.0000	PCE C152
305	.2	140123320003	UBDIC332MHT1CV	CAP AL LD 16V 3.3KU M 12.5*35	VH 100 % 1.0000	PCE C154
306	.2	140123320008	16ZL3300MCE12.5*35	CAP AL LD 16V 3.3KU M 12.5*35	PP 0 % 1.0000	PCE C152
307	.2	140123320008	16ZL3300MCE12.5*35	CAP AL LD 16V 3.3KU M 12.5*35	VH 0 % 1.0000	PCE C154
308	.2	140123321048	16YXG3300MCEI2.5*3	CAP AL LD 16V 3.3KU M 12.5*35	PP 0 % 1.0000	PCE C152
309	.2	140123321048	16YXG3300MCE12.5*3	CAP AL LD 16V 3.3KU M 12.5*35	VV 0 % 1.0000	PCE C154
310	.2	140141011103	UPW1E101MEH1TA	CAP AL LD 25V 100U M 6.3*11 TP5	88 0 % 1.0000	PCE C73
311	.2	140141011105	CPW1E101MT	CAP AL LD 25V 100U M 6.3*11 TP5	88 0 % 1.0000	PCE C73
312	.2	140141011140	ZGR1EM101E11A	CAP AL LD 25V 100U M 6.3*11 TP5	88 0 % 1.0000	PCE C73

END-OF-REPORT

APPENDIX B

SAMPLE OF MATERIAL REQUIREMENT PLANNING

REPORT : YTRMMRP1
TCODE : YMTD
USERNAME: PSB1-MC03

DELTA ELECTRONICS (THAILAND) PUBLIC CO.,LTD.
« print mrp report »

DATE:08/08/2003
TIME:20:06:18
PAGE: 1

Material.. 3041135400 TERMINAL BRASS T0.3 PSB1 Critical Part
MRP date . 08/04/2003
Mfg part : TO301MRB-2E Vender code.... 400014 Vender name.... JWT
Mrp type..... PD Mrterial type.. ROH Unit..... PCE
Mrp controller. 307 Mrp group..... 0000 Lot size indic. WB
Purchasing group 3AA Processing ind.. Fixed lot size.. 0.000
Planned Delv Lt. 14 Warehouse stock. 0.000 Min. lot size... 0.000
Procurement type F Planned issues. 343,000.000 Max. lot size... 0.000
Sp. Procurement Fixed issues... 64,800.000 Safety stock... 0.000
SpecialSp Type Planned receipts 232,800.000 Reorder level.. 0.000
Coverage..... Firm receipts.. 140,000.000 Max.stock Iv1.. 0.000
Plant Stck 35,000 Insp. Stck 0 Round value.... 0.000
Normal Stck 0 WIP Stck 0 CG Stck 0

	PAST DUE	08/04/03	08/11/03	08/18/03	08/25/03	09/01/03	09/08/03	09/15/03	09/22/03	09/29/03	10/06/03	10/13/03	10/20/03
PROD REQTS:	0	64800	0	0	0	0	0	0	0	0	0	0	0
PLAN REQTS:	0	0	23000	40000	40000	40000	40000	40000	0	40000	40000	40000	0
FIRM ORDERS:	0	70000	0	70000	0	0	0	0	0	0	0	0	0
PLAN ORDERS:	0	0	0	0	0	32800	40000	40000	0	40000	40000	40000	0
NET AVAIL:	35000	40200	17200	47200	7200	32800-	72800-	112800-	112800-	152800-	192800-	232800-	232800-

	10/27/03	11/03/03	11/10/03	11/17/03	11/24/03	12/01/03	12/08/03	12/15/03	12/22/03	12/29/03	01/05/04	01/12/04	01/19/04
PROD REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
FIRM ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
NET AVAIL:	232800-	232800-	232800-	232800-	232800-	232800-	232800-	232800-	232800-	232800-	232800-	232800-	232800-

	01/26/04	02/02/04	02/09/04	02/16/04	02/23/04	03/01/04	03/08/04	03/15/04	03/22/04	03/29/04	04/05/04	04/12/04	Future
PROD REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
FIRM ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
NET AVAIL:	232800-	232800-	232800-	232800-	232800-	232800-	232800-	232800-	232800-	232800-	232800-	232800-	232800-

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PO/PL	VENDOR	QTY	DELI. DATE	OPEN DATE
PO	T3AA37211	400014	10,000.000	08/04/2003 07/21/2003
PO	T3AA37219	400014	70,000.000	08/18/2003 07/29/2003

REPORT : YTRMMRP1
TCODE : YMTD
USERNAME: PSB1-MC03

DT ELECTRONICS PUBLIC CO.,LTD.
« print mrp report »

DATE:08/08/2003
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PAGE: 2

Material.. 3050133134 HOUSING NY66 94V0 2P PSB1 Critical Part

MRP date .. 08/04/2003

Mfg part:	Vender code....	Vender name.... Company	
Mrp type..... PI)	Mrterial type.. ROH	Unit PCE	
Mrp controller. 307	Mrp group..... 0000.....	Lot size indic. WB	
Purchasing group 3M	Processing ind..	Fixed lot size..	0.000
Planned Delv Lt. 30	Warehouse stock. 0.000	Min. lot size...	0.000
Procurement type F	Planned issues. 0.000	Max. lot size...	0.000
Sp. Procurement	Fixed issues .....25.000.....	Safety stock...	0.000
SpecialSp Type	Planned receipts 25.000	Reorder level..	0.000
Coverage.....	Firm receipts.. 0.000	Max.stock Iv1..	0.000
Plant Stck	0 Insp. Stck	0 Round value....	0.000
Normal Stck	0 WIP Stck	0 CG Stck	0

	PAST DUE 08/04/03	08/11/03	08/18/03	08/25/03	09/01/03	09/08/03	09/15/03	09/22/03	09/29/03	10/06/03	10/13/03	10/20/03
PROD REQTS:	0	25	0	0	0	0	0	0	0	0	0	0
PLAN REQTS:	0	0	0	0	0	0	0	0	0	0	0	0
FIRM ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0
PLAN ORDERS:	0	25	0	0	0	0	0	0	0	0	0	0
NET AVAIL:	0	25-	25-	25-	25-	25-	25-	25-	25-	25-	25-	25-

	10/27/03	11/03/03	11/10/03	11/17/03	11/24/03	12/01/03	12/08/03	12/15/03	12/22/03	12/29/03	01/05/04	01/12/04	01/19/04
PROD REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
FIRM ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
NET AVAIL:	25-	25-	25-	25-	25-	25-	25-	25-	25-	25-	25-	25-	25-

	01/26/04	02/02/04	02/09/04	02/16/04	02/23/04	03/01/04	03/08/04	03/15/04	03/22/04	03/29/04	04/05/04	04/12/04	Future
PROD REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
FIRM ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
NET AVAIL:	25-	25-	25-	25-	25-	25-	25-	25-	25-	25-	25-	25-	25-

REPORT : YTRMMRP1
TCODE : YMTD
USERNAME: PSB1-MC03

DT ELECTRONICS PUBLIC CO.,LTD.
« print mrp report »

DATE:08/08/2003
TIME:20:06:18
PAGE: 3

Material.. 3075110528 CONNECTOR MALE LCP 94V0 28PIN PSB1 Critical Part

MRP date .. 08/04/2003

Mfg part : 87631-8008	Vender code.... 40X018	Vender name.... MOLEX	
Mrp type..... PD	Mrterial type.. ROH	Unit PCE	
Mrp controller. 307	Mrp group..... 0000	Lot size indic. WB	
Purchasing group 3AA	Processing ind..	Fixed lot size..	0.000
Planned Delv Lt. 60	Warehouse stock. 0.000	Min. lot size...	0.000
Procurement type F	Planned issues. 209,000.000	Max. lot size...	0.000
Sp. Procurement	Fixed issues 25,200.000	Safety stock...	0.000
SpecialSp Type	Planned receipts 162,522.000	Reorder level..	0.000
Coverage.....	Firm receipts.. 60,000.000	Max.stock Iv1..	0.000
Plant Stck	11,678 Insp. Stck	0 Round value....	0.000
Normal Stck	5,818 WIP Stck	0 CG Stck	0

	PAST DUE	08/04/03	08/11/03	08/18/03	08/25/03	09/01/03	09/08/03	09/15/03	09/22/03	09/29/03	10/06/03	10/13/03	10/20/03
PROD REQTS:	0	0	25200	0	0	0	0	0	0	0	0	0	0
PLAN REQTS:	0	0	15000	16000	17000	10000	13000	13000	10000	10000	10000	10000	34000
FIRM ORDERS:	0	0	0	60000	0	0	0	0	0	0	0	0	0
PLAN ORDERS:	0	0	0	0	1522	10000	13000	13000	10000	10000	10000	10000	34000
NET AVAIL:	11678	11678	28522-	15478	1522-	11522-	24522-	37522-	47522-	57522-	67522-	77522-	111522-

	10/27/03	11/03/03	11/10/03	11/17/03	11/24/03	12/01/03	12/08/03	12/15/03	12/22/03	12/29/03	01/05/04	01/12/04	01/19/04
PROD REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN REQTS:	17000	17000	17000	0	0	0	0	0	0	0	0	0	0
FIRM ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN ORDERS:	17000	17000	17000	0	0	0	0	0	0	0	0	0	0
NET AVAIL:	128522-	145522-	162522-	162522-	162522-	162522-	162522-	162522-	162522-	162522-	162522-	162522-	162522-

	01/26/04	02/02/04	02/09/04	02/16/04	02/23/04	03/01/04	03/08/04	03/15/04	03/22/04	03/29/04	04/05/04	04/12/04	Future
PROD REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
FIRM ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
NET AVAIL:	162522-	162522-	162522-	162522-	162522-	162522-	162522-	162522-	162522-	162522-	162522-	162522-	162522-

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PO/PL	VENDOR	QTY	DELI. DATE	OPEN DATE
PO T3AA37227	40X018	43,180.000	08/18/2003	07/29/2003

REPORT : YTRMMRP1 DT ELECTRONICS PUBLIC CO.,LTD. DATE:08/08/2003
TCODE : YMTD « print mrp report » TIME:20:06:18
USERNAME: PSB1-MC03 PAGE: 4

Material.. 3075111628 CONNECTOR LCP 94V-0 3+24+6P PSB1 Critical Part
MRP date .. 08/04/2003

Mfg part :	Vender code.... 40X018		Vender name.... MOLEX	
Mrp type..... PD	Mrterial type.. ROH		Unit..... PCE	
Mrp controller. 307	Mrp group..... 0000		Lot size indic. WB	
Purchasing group 3M	Processing ind..		Fixed lot size..	0.000
Planned Delv Lt. 30	Warehouse stock.	0.000	Min. lot size...	0.000
Procurement type F	Planned issues.	0.000	Max. lot size...	0.000
Sp. Procurement	Fixed issues	1,455.000	Safety stock...	0.000
SpecialSp Type	Planned receipts	0.000	Reorder level..	0.000
Coverage.....	Firm receipts..	6,192.000	Max.stock Ivi..	0.000
Plant Stck	0 Insp. Stck		0 Round value....	0.000
Normal Stck	0 WIP Stck		0 CG Stck	0

	PAST DUE	08/04/03	08/11/03	08/18/03	08/25/03	09/01/03	09/08/03	09/15/03	09/22/03	09/29/03	10/06/03	10/13/03	10/20/03
PROD REQTS:	0	1455	0	0	0	0	0	0	0	0	0	0	0
PLAN REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
FIRM ORDERS:	6192	0	0	0	0	0	0	0	0	0	0	0	0
PLAN ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
NET AVAIL:	6192	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737

	10/27/03	11/03/03	11/10/03	11/17/03	11/24/03	12/01/03	12/08/03	12/15/03	12/22/03	12/29/03	01/05/04	01/12/04	01/19/04
PROD REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
FIRM ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
NET AVAIL:	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737

	01/26/04	02/02/04	02/09/04	02/16/04	02/23/04	03/01/04	03/08/04	03/15/04	03/22/04	03/29/04	04/05/04	04/12/04	Future
PROD REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
FIRM ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
NET AVAIL:	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737	4737

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PO/PL	VENDOR	QTY	DELI. DATE	OPEN DATE
PO	T3AA36173	40X018	144.000	06/30/2003 06/04/2003
PO	T3AA36173	40X018	4,512.000	07/07/2003 06/04/2003

REPORT : YTRMMRP1 DT ELECTRONICS PUBLIC CO.,LTD. DATE:08/08/2003
TCODE : YMTD « print mrp report » TIME:20:06:18
USERNAME: PSB1-MC03 PAGE: 5
Material.. 3071090228 WAFER NYLON66 94V-0 4PIN PSB1 Critical Part
MRP date 08/04/2003

Mfg part : 39-30-3041 Vender code.... 40X018 Vender name.... MOLEX
Mrp type..... PD Mrterial type.. ROH Unit..... PCE
Mrp controller. 307 Mrp group..... 0000 Lot size indic. WB
Purchasing group 3AA Processing ind.. Fixed lot size.. 0.000
Planned Delv Lt. 60 Warehouse stock. 0.000 Min. lot size... 0.000
Procurement type F Planned issues. 31,530.000 Max. lot size... 0.000
Sp. Procurement Fixed issues 2,000.000 Safety stock... 0.000
SpecialSp Type Planned receipts 6,895.000 Reorder level.. 0.000
Coverage..... Firm receipts 24,400.000 Max.stock Iv1.. 0.000
Plant Stck 2,235 Insp. Stck 0 Round value.... 0.000
Normal Stck 235 WIP Stck 0 CG Stck 0

	PAST DUE	08/04/03	08/11/03	08/18/03	08/25/03	09/01/03	09/08/03	09/15/03	09/22/03	09/29/03	10/06/03	10/13/03	10/20/03
PROD REQTS:	0	2000	0	0	0	0	0	0	0	0	0	0	0
PLAN REQTS:	0	0	4000	3030	0	3000	3000	3000	3000	4000	500	4000	0
FIRM ORDERS:	6400	5000	0	3000	0	0	10000	0	0	0	0	0	0
PLAN ORDERS:	0	0	0	0	0	0	0	0	0	0	0	2895	0
NET AVAIL:	8635	11635	7635	7605	7605	4605	11605	8605	5605	1605	1105	2895-	2895-

	10/27/03	11/03/03	11/10/03	11/17/03	11/24/03	12/01/03	12/08/03	12/15/03	12/22/03	12/29/03	01/05/04	01/12/04	01/19/04
PROD REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN REQTS:	0	4000	0	0	0	0	0	0	0	0	0	0	0
FIRM ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN ORDERS:	0	4000	0	0	0	0	0	0	0	0	0	0	0
NET AVAIL:	2895-	6895-	6895-	6895-	6895-	6895-	6895-	6895-	6895-	6895-	6895-	6895-	6895-

	01/26/04	02/02/04	02/09/04	02/16/04	02/23/04	03/01/04	03/08/04	03/15/04	03/22/04	03/29/04	04/05/04	04/12/04	Future
PROD REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN REQTS:	0	0	0	0	0	0	0	0	0	0	0	0	0
FIRM ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
PLAN ORDERS:	0	0	0	0	0	0	0	0	0	0	0	0	0
NET AVAIL:	6895-	6895-	6895-	6895-	6895-	6895-	6895-	6895-	6895-	6895-	6895-	6895-	6895-

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PO/PL	VENDOR	QTY	DELI. DATE	OPEN DATE
PO	T3AA33072	40X018	2,200.000	04/14/2003	03/03/2003
PO	T3AA36193	40X018	200.000	06/26/2003	06/25/2003
PO	T3AA36193	40X018	5,000.000	08/04/2003	06/23/2003
PO	T3AA37203	40X018	3,000.000	08/18/2003	07/10/2003
PO	T3AA37203	40X018	200.000	08/25/2003	08/07/2003
PO	T3AA37226	40X018	10,000.000	09/08/2003	07/29/2003

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