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BORANG PENGESAHAN STATUS TESIS*

JUDUL: AN ANALYSIS OF MATERIALS MANAGEMENT IN MANUFACTURING INDUSTRY

SESI PENGAJIAN : 2/ 2007/2008

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Alamat Tetap:
9, Jalan Cenderawasih 5, Taman
Segar, 85000 Segamat,
Johor Darul Takzim

Cop Rasmi: **PROF. MADYA DR. ADI SAPTARI**
Pensyarah
Fakulti Kejuruteraan Pembuatan
Universiti Teknikal Malaysia Melaka
Karung Berkunci 1200, Ayer Keroh
75450 Melaka

Tarikh: _____28 APRIL 2008_____

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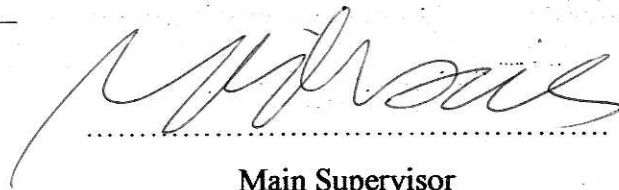
DECLARATION

I hereby, declared this thesis entitled "An Analysis of Material Management in Manufacturing Industry" is the results of my own research except as cited in references.

Signature   :

Author's Name   : LIM TERNG FUI

Date   : 25 MARCH 2008

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APPROVAL

This report submitted to the senate of UTeM and has been accepted as partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Manufacturing Management). The members of the supervisory committee are as follow:

....

Main Supervisor

(Official Stamp & Date)

PROF. MADYA DR. ADI SAPTARI
Pensyarah
Fakulti Kejuruteraan Pembuatan
Universiti Teknikal Malaysia Melaka
Karung Berkunci 1200, Ayer Keroh
75450 Melaka

ABSTRACT

The separate functions that reported to different departments of Ngee Ming Shoe Manufacturer affect the flow of the materials. This Project presents how the analysis of materials management have been carried out in order to overcome the conflicts between marketing, finance, and production department of Ngee Ming Shoe Manufacturer. It emphasizes the forecast demand of the company, the developing of the master production schedule (MPS), the balance of the resources and the capacity, and maintains the desired level of customer service through controlling the finish goods inventory levels. The collection data when industrial visit would lead to forecast demand and draw the master production schedule (MPS). The analysis of the data balances the flow of the materials and identifies the factors affect the materials management. The suggestions are recommended to Ngee Ming Shoe Manufacturer in order to improve the materials management.

ABSTRAK

Beberapa bahagian di kilang Ngee Ming sebagai pembuat kasut mempunyai aliran bahan-bahan pembuatan dengan cara pengurusan yang berlainan antara satu sama lain. Projek ini akan menyatakan analysis pengurusan bahan yang perlu dijalankan untuk menyeimbangkan keliruan antara bahagian kewangan, pengeluaran dan pemasaran. Projek ini menitikberatkan penganggaran terhadap permintaan terhadap kilang ini, membina *Master Production Plan (MPS)*, pelan yang menentukan kuantiti pengeluaran, —menyeimbangkan inventori dengan kapaciti. Pengumpulan data akan mementingkan permintaan sebenar dan inventori yang telah direkodkan semasa lawatan industri dijalankan. Analysis ini akan menyeimbangkan aliran pengurusan bahan dan menentukan faktor-faktor yang telah menpengaruhi keseimbangan aliran bahan-bahan. Cadang-cadangan dan cara-cara yang dapat memperbaiki aliran pengurusan bahan-bahan telah dikemukakan untuk menyempurnakan projek ini.

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DEDICATION

For my beloved family

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1.1   Background

Manufacturing creates wealth by adding value to goods. To improve productivity and wealth, a company must first design efficient and effective system for manufacturing. It must then manage these systems to make the best use of labor, capital, and material. One of the most effective ways of doing this is through the planning and control of the flow of materials into, through, and out of manufacturing. Traditionally, there are conflicts in the objectives of a company and in objectives of marketing, finance, and production. The role of materials management is to balance these conflicting objectives by coordinating the flow of materials so customer service is maintained the resources by of the company are properly used. (Tony Arnold, 1999)

Production planning is the first step in a manufacturing planning and control system. The planning horizon usually extends for a year. The minimum horizon depends on the lead times to purchase materials and make the product. The level of detail is not high. Usually, the plan is made for families of products based on the similarity of manufacturing process or on some common unit.

Three basic strategies can be used to develop a production plan: chase, leveling production, or subcontracting. Each has its operational and cost advantages and disadvantages. It is the responsibility of manufacturing management to select the best

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combination of these basic plans so total costs are minimized and customer service levels are maintained.

A make-to-stock production plan determines how to produce period to achieve the forecast and maintain the required inventory levels. Although demands must be satisfied, the plan must balance the costs of maintaining inventory with the cost changing production levels. A make-to-order production determines how much to produce in each period to achieve the forecast and maintain the planned backlog.

The cost of a backlog that is too large equals the cost of turning away business. If customers have to wait too long for delivery, they might take their business elsewhere. As with a make-to-stock production plan, demand must be satisfied, and t he plan must balance the costs of changing production levels with the cost of backlog is larger than desired.

In the materials management, the master production schedule (MPS) is a plan for the production of individual end items. It must match demand for the product in total, but it is not a forecast of demand. The MPS must be realistic. It must be achievable and reflect a balance between required and available capacity.

The MPS is the meeting ground for sales and production. It provides a plan from which realistic delivery promises can be made to customers. If adjustments have to be made in deliveries or the booking of orders, they are done through the MPS.

Master production schedule's major functions are as follows:

a) To form the link between production planning and what manufacturing builds.
b) To plan capacity requirements. The master production schedule determines the capacity required.
c) To plan material requirements. The MPS drives the material requirement plan.
d) To keep priorities valid. The MPS is a priority plan for manufacturing.

e) To aid in making order promises. The MPS is a plan for what is to be produced and when. As such, it tells sales and manufacturing when goods will be available for delivery.

f) To be contract between marketing and manufacturing. It is an agreed-upon plan.

1.2 Problem Statement

Ngee Ming Shoe Manufacturer has its established production system. However, there are some problems occur among the marketing, production, and the finance departments because each has different responsibilities in these areas. Marketing's objective is to maintain and increase revenue through maintaining high inventories so that goods are always available for the customer. However, marketing always interrupt the production runs in order to maintain customer service level. Finance department must keep investment and costs low by reducing the inventory so inventory investment is at a minimum and manufacturing only to customer order and production department must keep its operating costs as low as possible by making long production runs of relatively few products. Fewer change over will be needed and specialized equipment can be used, thus reducing the cost of making product. Production department must maintain high inventories of raw materials and work in progress so production is not disrupted by shortages. These conflicts among marketing, finance, and production have identified some weakness of the materials management, these include:

a) Overload of plant resources.

b) Unreliable schedules resulting in poor delivery performance.

c) High levels of work-in-progress (WIP) inventory.

d) Poor customer service.

e) Loss of credibility in the planning system.

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1.3   Objectives

The objectives of this Final Year Project are:

a) Identify the materials management in manufacturing industry.
b) Analysis materials management problems.
c) Provide some recommendations for improvement of materials management in manufacturing industry.

1.4   Scope of the Project

The emphasis of the Project is on materials management which contains forecasting, production planning system, master production schedule (MPS), and inventory management. The forecasting techniques are needed to forecast the demand capacity. Two methods of forecasting will be evaluated, once of the method will be chose. Based on the forecast demands, a master production schedule (MPS) will be developed to meet the production planning, in order to balance the resource and the capacity. The cost comparison and justification will be evaluated for the inventory costs.

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CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

The concept of having one department responsible for the flow of materials, from supplier through production to consumer, is relatively new. Although many companies have adopted this type of organization, there are still a number that have not. If companies wish to minimize total costs in this area and provide a better level of customer service, they will move in this direction.(Sven Axsater, 2007)

The name usually given to this function is materials managements, other names include distribution planning and control and logistics management, but the one used in this text is materials managements.

Materials management is the branch of logistics that deals with the tangible components of a supply chain. Specially, this covers the acquisition of spare parts and replacements, quality control of purchasing and ordering such parts, and the standards involved in ordering, shipping, and warehouse said parts. Materials management is a coordinating function responsible for planning and controlling materials flow. Its objectives are as follows:

a) Maximize the use of the firm's resources.

b) Provide the required level of the customer service.

2.2 Forecasting

Forecasting is prelude to planning. Before making planes, an estimate must be made of what conditions will exist over some future period. How estimates are made, and with what accuracy, is another matter, but little can be done without some form of estimation.

Many factors influence the demand for a firm's products and services. Although it is not possible to identify all of them, or their effect on demand, it is helpful to consider some major factors:

a) General business and economic conditions.

b) Competitive factors.

c) Market trends such as changing demand.

d) The firm's own plans for advertising, promotion, pricing, and product changes.

Demand management is the function of recognizing and managing all demands for products. It occurs in the short, medium, and long term. In the long term, demand projections are needed fro strategic business planning of such things as facilities. In the medium term, the purpose of demand management is to project aggregate demand for production planning. In the short run, demand management is needed for items and is associated with master productions scheduling.

If material and capacity resources are to be planned effectively, all sources of demand must be identified. These include domestic and foreign customers, other plants in the same corporation, branch warehouses, service parts and requirements, promotions, distribution inventory, and consigned inventory in customers' locations.

2.2.1 Demand Forecasting

Forecasts depend upon what is to be done. They must be made for the strategic business plan, the production plan, and the master production schedule.

The strategic business plan is concerned with overall markets and the direction of the economy over the next two to ten years or more. Its purpose is to provide time to plan for those things that take long to change. For production, the strategic business plan should provide sufficient time for resource planning: plant expansion, capital equipment purchase, and anything requiring a long lead time to purchase. The level of detail is not high, and usually forecasts are in sales units, sale dollars, or capacity. Forecasts and plans will probably be reviewed quarterly or yearly.

Production planning is concerned with manufacturing activity for the next one to three years. For manufacturing, it means forecasting those items needed for production planning, such as budgets, labor planning, long lead time, procurement items, and overall inventory levels. Forecasts are made for groups or families of products rather than specific end items. Forecasts and plans will probably be reviewed monthly.

Master productions scheduling is concerned with productions activity from the present to a few months ahead. Forecasts are made for individual items, as found on a master production schedule, individual item inventory levels, raw materials and component parts, labor planning, and so forth. Forecasts and plans will probably be reviewed weekly.

2.2.2 Forecasting Techniques

There are many forecasting methods, but they can usually classify into three categories: qualitative, extrinsic, and intrinsic. (Stevenson, 2007)

a) Qualitative Techniques

Qualitative techniques are projections based on judgment, intuition, and informed opinion. By their nature, they are subjective. Such techniques are used to forecast general business trend and the potential demand for large families of products over an extended period of time. As such, they are used mainly by senior management. Production and inventory forecasting is usually concerned with the demand for particular items, and qualitative techniques are seldom appropriate.

When attempting to forecast the demand for a new product, there is no history on which to base a forecast. In these cases, the techniques of market research and historical analogy might be used. Market research is systematic, formal, and conscious procedure for testing to determine customer opinion or intention. Historical analogy is based on a comparative analysis of the introduction and growth of similar products in the hope that the new product behaves similar fashion. Another method is to test market a product.

There are several other methods of qualitative forecasting. One, called Delphi method, uses a panel of experts to give their opinion on what is likely to happen.

b) Extrinsic Techniques

Extrinsic techniques are projections based on external (extrinsic) indicators which relate to the demand for a company's products. Examples of such data would be housing starts, birth rates, and disposable income. The theory is that the demand for a product group is directly proportional, or correlates, to activity in another field.

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Extrinsic forecasting is the most useful in forecasting the total demand for a firm's products or the demand for families of products. As such, it is used most often in business and production planning rather than forecasting of individual end items.

c) Intrinsic Techniques

Intrinsic forecasting techniques use historical data to forecast. These data are usually recorded in the company and are readily available. Intrinsic forecasting techniques are based on the assumption that what happened in the past will happen in the future. This assumption has been likened to driving a car by looking out the review mirror. While there is some obvious truth to this, it is also true that lacking any other "crystal ball", the best guide to the future is what has happened in the pass.

Since intrinsic techniques are so important, the next section will discuss some of the more important techniques. They are often used as input to master production scheduling where end-item forecasts are needed for the planning horizon of the plan.

2.2.3 Tracking The Forecast

Forecasts are usually wrong. There are several reasons for this, some of which are related to human involvement and others to the behavior of the economy. If there were a method of determining how good a forecast is, forecasting methods could be improved and better estimates could be made accounting for the error. There is no point in continuing with a plan based on poor forecast data. Hence, forecast need to be tracked. Tracking the forecast is the process of comparing actual demand with the forecast. (Stephen N. Chapman, 1999)

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2.3 Master Production Scheduling

The master production schedule is a plan for manufacturing. It reflects the needs of the marketplace and the capacity of manufacturing and forms a priority plan for manufacturing to follow. The Master Production Scheduling (MPS) forms a basis for sales and production to determine what is to be manufactured. It is not meant to be rigid. It is a device for communication and a basis to make changes that are consistent with the demands of the market place and the capacity of manufacturing.

The information needed to develop an MPS is provided by:

a) The production plan.
b) Forecasts for individual end items.
c) Actual orders received from customers and for stock replenishment.
d) Inventory levels for individual end items.
e) Capacity restraints.

2.3.1 Developing A Master Production Schedule

The objectives in developing an MPS are as follows:

a) To maintain the desired level of customer service by maintaining finished goods inventory levels or by scheduling to meet customer delivery requirements.
b) To make the best use of material, labor, and equipment.
c) To maintain inventory investment at the required levels.

To reach these objectives, the plan must satisfy customer demand, be within the capacity of manufacturing, and be within the guidelines of the production plan.

There are three steps in preparing an MPS:

1. Develop a preliminary MPS.
2. Check the preliminary MPS against available capacity.
3. Resolve differences between the preliminary MPS and capacity availability.

To show the process of developing an MPS, an example is used that assumes the product is made to stock, an inventory is kept, and the product is made in lots.

A particular item is made in lots of 100, and the expected opening inventory is 80 units. Figure 2.1 shows the forecast of demand, the projected available on hand, and the preliminary MPS.

On hand = 80 units
Lot size = 100 units

Table 2.1: MPS example

Period		1	2	3	4	5	6
Forecast		60	60	60	60	60	60
Projected Available	80	20	60	0	40	80	20
MPS			100		100	100	

Period 1 begins with an inventory of 80 units. After the forecast demand for 60 units is satisfied, the projected available is 20 units. A further forecast demand of 60 in period 2 is not satisfied, and it is necessary to schedule an MPS receipt of 100 for week 2. This produces a projected available of 60 units (20 + 100 − 60 = 60) at the end of period 2. In period 3, the forecast demand for 60 is satisfied by the projected 60 on hand, leaving a projected available of zero. In period 4, a further 100 must be received, and when the forecast demand of 60 units is satisfied, 40 units remain in inventory.

This process of building an MPS occurs for each item in the family. If the total planned production of all the items in the family and the total ending inventory do not agree with the production plan, some adjustment to the individual plans must be made so the total production is the same.

Once the preliminary master production schedules are made, they must be checked against the available capacity. This process is called rough-cut capacity planning.

2.3.2   Master Schedule Decisions

The MPS should represent as efficiently as possible what manufacturing will make. If too many items are included, it will lead to difficulties in forecasting and managing the MPS. In each of the manufacturing environments-make to stock, make to order, and assemble to order-master scheduling should take place where the smallest number of product options exists. Figure 2.2 shows the level at which item should be master scheduled. (Tony Arnold, 1999)
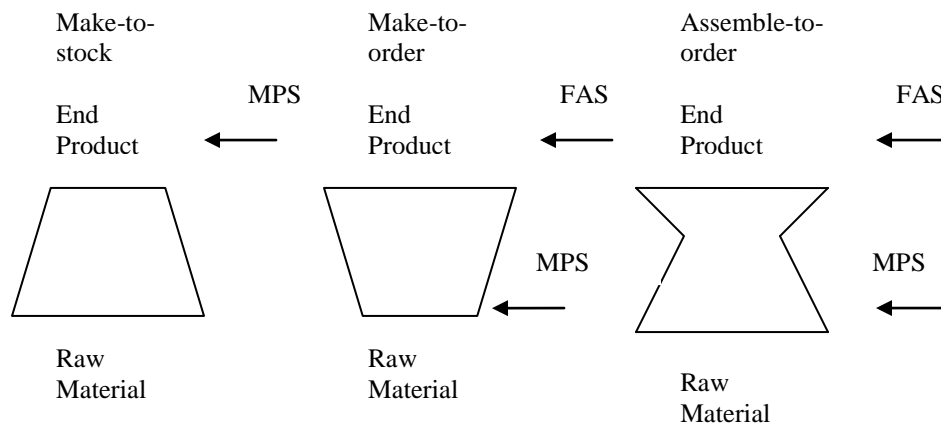

Figure 2.1 Different MPS environments