การจัดการวัสดุคงคลังในอุตสาหกรรมผลิตตู้แช่เย็น

นางสาว ศุภลักษณ์ พรศิริอนันต์

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิศวกรรมศาสตรมหาบัณฑิต
สาขาวิชาการจัดการทางวิศวกรรม ศูนย์ระดับภูมิภาคทางวิศวกรรมระบบการผลิต
คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2549

ISBN 974-14-2002-1

INVENTORY MANAGEMENT IN COMMERCIAL REFRIGERATION MANUFACTURING

Miss Subhaluk Pornsirianant

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Engineering Program in Engineering Management
The Regional Centre for Manufacturing Systems Engineering
Faculty of Engineering
Chulalongkorn University
Academic Year 2006

ISBN 974-14-2002 -1

Thesis Title	INVENTORY MANAGEMENT IN COMMERCIAL REFRIGERATION MANUFACTURING
By	Miss Subhaluk Pornsirianant
Field of study	Engineering Management
Thesis Advisor	Assistant Professor Paveena Chaovalitwongse, Ph.D.

Accepted by the Engineering, Chulalongkorn University in Partial Fulfillment of the Requirements for the Master 's Degree

..... Dean of the Faculty of Engineering

(Professor Direk Lavansiri, Ph.D.)

THESIS COMMITTEE

..... Chairman

(Professor Sirichan Thongprasert, Ph.D.)

..... Thesis Advisor

(Assistant Professor Paveena Chaovalitwongse, Ph.D.)

..... Member

(Assistant Professor Manop Reodecha, Ph.D.)

ศุภลักษณ์ พรศิริอนันต์ : การจัดการวัสดุคงคลังในอุตสาหกรรมผลิตตู้แช่เย็น. (INVENTORY MANAGEMENT IN COMMERCIAL REFRIGERATION MANUFACTURING) อ. ที่ปรึกษา : ผศ.ดร. ปวีณา เชาวลิตวงศ์, 176 หน้า. ISBN 974-14-2002-1.

วิทยานิพนธ์ฉบับนี้เป็นการศึกษาเกี่ยวกับการจัดการวัสดุคงคลังในอุตสาหกรรมผลิตตู้แช่เย็นซึ่งมีรูปแบบการผลิตเป็นลักษณะการประกอบตามคำสั่งซื้อ ในการศึกษามีจุดประสงค์เพื่อพัฒนาระบบการจัดการวัสดุคงคลังที่เหมาะสม โดยการกำหนดนโยบายการควบคุมวัสดุคงคลังที่เหมาะสมสำหรับวัสดุคงคลังแต่ละกลุ่ม รวมถึงการสร้างเครื่องมือที่ใช้ในการกำหนดแนวทางในกระบวนการจัดซื้อ ลักษณะการจัดซื้อและการควบคุมวัสดุคงคลังในโรงงานตัวอย่างที่ทำการศึกษานั้น ไม่มีกฎเกณฑ์ตายตัว และอาศัยการใช้ประสบการณ์ของบุคลากรในหน่วยงาน เป็นผลให้มูลค่าวัสดุคงคลังสูง ในขณะเดียวกันความสามารถในการตอบสนองความต้องการของลูกค้าไม่ดี และมีค่าใช้จ่ายในการดำเนินงานสูงกว่าที่ควรสืบเนื่องจากปัญหาวัสดุคงคลัง นอกจากนั้นขาดการประสานงานและการสื่อสารข้อมูลที่ดีระหว่างฝ่ายวางแผนการผลิตและฝ่ายจัดซื้อเนื้อทำให้เกิดปัญหาด้านวัสดุคงคลังตามมา

การดำเนินงานวิจัยเริ่มจากศึกษาและรวบรวมข้อมูลการทำงานในระบบปัจจุบัน และทำการวิเคราะห์สาเหตุของปัญหา จากนั้นทำการการแบ่งกลุ่มวัตถุดิบ ซึ่งมีสองแหล่ง คือ วัตถุดิบที่จัดซื้อจากต่างประเทศและวัตถุดิบที่จัดซื้อภายในประเทศ และทำการศึกษาเงื่อนไขการจัดซื้อที่แตกต่างกันของวัตถุดิบในแต่ละกลุ่ม เพื่อเลือกนโยบายการจัดการวัสดุคงคลังที่เหมาะสมสำหรับและสอดคล้องกับเงื่อนไขในการใช้งานจริง โดยในการเลือกนโยบายที่เหมาะสมได้พิจารณาข้อจำกัดของโรงงานตัวอย่างที่ทำการศึกษา ได้แก่ ข้อจำกัดด้านพื้นที่การจัดเก็บ, ข้อจำกัดในการสั่งซื้อ และความถี่ในการตรวจสอบระดับวัสดุคงคลัง นโยบายที่นำมาจัดการวัสดุคงคลังแบ่งเป็น 3 กลุ่ม ได้แก่ ช่วงสั่งซื้อ-ระดับสั่งซื้อ, จุดสั่งซื้อ-ระดับสั่งซื้อ และ จุดสั่งซื้อ-ปริมาณสั่งซื้อ ขั้นตอนสุดท้ายคือการสร้างเครื่องมือตรวจวัดระดับสินค้าคงคลังซึ่งใช้ในการรวบรวมข้อมูลที่สร้างขึ้นใหม่และข้อมูลในระบบที่มีอยู่เดิมเพื่อนำมาทำรายงานวัตถุดิบในการทำงานจริง และยังใช้เป็นเครื่องมือในการเตือนเมื่อระดับสินค้าคงคลังลดลงจนถึงจุดที่ต้องสั่งซื้อ รวมถึงจำนวนที่ต้องสั่งซื้อแต่ละครั้ง รวมถึงสามารถเป็นตัวกลางสื่อสารข้อมูลที่นำมาใช้ร่วมกันระหว่างสองฝ่ายวางแผนวัตถุดิบและฝ่ายจัดซื้อโดยการพัฒนาฐานข้อมูลในโปรแกรม Microsoft Access Version 2002 ซึ่งเป็นระบบจัดการฐานข้อมูลและ Microsoft Excel Version 2002 เป็นการออกรายงาน

เมื่อเปรียบเทียบผลการดำเนินงานระหว่างระบบที่ใช้ปัจจุบันและระบบที่เสนอแนะ พบว่าระบบใหม่สามารถปรับปรุงความสามารถในการตอบสนองความต้องการของลูกค้าได้ดีขึ้น ลดการขาดวัสดุในสายการผลิต โดยมีมูลค่าสินค้าคงคลังลดลง

สาขาวิชา การจัดการทางวิศวกรรม ลายมือชื่อนิสิต.....

ปีการศึกษา 2549 ลายมือชื่ออาจารย์ที่ปรึกษา.....

46716256 21 : MAJOR ENGINEERING MANAGEMENT

KEY WORD: INVENTORY MANAGEMENT SYSTEM / INVENTORY POLICY

SUBHALUK PORNSIRIANANT : INVENTORY MANAGEMENT IN COMMERCIAL REFRIGERATION MANUFACTURING. THESIS ADVISOR : ASST. PROF. PAVEENA CHAOVALITWONGSE, PH.D., 176 pp. ISBN 974-14-2002-1.

This thesis focuses on developing the inventory management system for a commercial refrigeration manufacturing with assembly-to-order environment. The propose system encompass establishing appropriate inventory policies for all items, improving work flow and information flow, and establishing an inventory monitoring tool. The major problem of a case study company is on inappropriate inventory level. The analysis focuses on internal inventory management practices which are non-uniform and manually intensive. The company under study has no certain policy on inventory management which resulted in high inventory levels, low customer service, and high operational costs. In addition, the lacking information shared between material planning and purchasing sections resulted in double-buffer stock, unrealistic supplier lead-time, too much replenishment quantity, and non-integrated replenishment quantity.

The research starting from analysing the existing inventory management system, identifying the causes of the problem. In the proposed system, a wide variety of materials are classified into group according to source of supply and purchasing quantity constraint. Then, appropriate inventory policies for each group are selected based on storage area constraint, purchasing constraint, and material reviewing frequency. Materials are classified into three groups and managed with (R,S), (S,s), and (S,Q) policies. Finally, the inventory level monitoring tool is established integrate new information with existing information and to remind replenishment time for purpose of order fulfillment. This monitoring tool serves as an information sharing between material planning and purchasing sections. This tool is developed through using Microsoft Access version 2000 as the database management system, and Microsoft Excel version 2002 as reporting tool.

The comparison between the existing system and proposed system shows the significantly improve on customer service level, part availability once production need, and inventory level.

Field of study Engineering Management Student's signature .....

Academic year 2006 Advisor's signature Paveena Chaovalitwongse

ACKNOWLEDGEMENTS

I would like to thank my thesis supervisor, Assistant Professor Paveena Chaovalitwongse, for her guidance and helping me carry out this research. I greatly appreciate the contributions of the other committee members, Assistant Professor Sirichan Thongprasert and Assistant Professor Manop Reodecha for their helpful recommendation and suggestions.

Several friends made my years at Linde more enjoyable. My sincerest thanks go to every colleague for their support and providing all data and resources for me to develop my solution. Among them, there was one who always found time to listen, who offered help before I asked for it, Mr. Anucha Kittisupornpong, thank you. P' Lek, I would like to thank heartily for a great encouragement and support during my study. The undertaking and completion of my thesis would have been impossible without their guidance and support.

Finally, my eternal gratitude goes to my beloved family for always being there for me and for keeping me in their minds and hearts. They have been constant sources of inspiration to me through life, and this thesis is dedicated to them. Deeply thanks to my mom for always believing in me, my dad who supporting me for all things, and my brother who always stand by my side.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

1.1. Background and Motivation

A case study is a commercial refrigeration cabinet manufacturer that is Job Shop type. Its production plant is assembly line that orders in raw materials from suppliers. There are two groups of raw materials: (1) imported materials and (2) local materials. This results the raw materials control plan divided into two levels i.e. (1) Medium-Term Planning which is made 75 days in advance for imported raw materials, and (2) Short-Term Planning which is for raw materials ordered locally. The manufacturer supplies a sort of 'assemble-to-order' products whose number of product is varied, depending up on the customer's requirement.

Since the last two years, the sale figure has increased by 120% compare to year 2002 due to a trading expansion of supermarkets in many countries in the Asia Pacific region including Thailand. In addition, international refrigerator companies from the western countries in both Europe and North America have considered Thailand to be a production base supplying a fast growing demand in refrigerator market of the region. Consequently a competition between the existing refrigerator manufacturers and new comers is hardly avoided.

Among a rising tension of the competition in Thailand, refrigerator businesses have realised that they need to find a business strategy to improve their efficiency for effectiveness and competitiveness. The main purpose of this is to increase productivity with less cost and delivery lead time consumed. One of the significant factors to help achieve this purpose is 'inventory'.

Generally, in a complex manufacturing company, materials related cost constitutes the largest single expenditure. For the manufacturer with assemble-to-order environment, raw materials need to be kept as buffers between fluctuation demand and supply to ensure continued production. Therefore, materials management plays as an important role in a company.

Carrying too high a stock of usable but idle materials may tie up a great deal of sink cost, while non-availability of materials leads to production shortfalls and loss of company goodwill. To achieve maximum efficiency in inventory management, it means a high inventory turnover rate and a well and quick response to the customers' demand need to be met. Therefore manufacturer necessarily has to set up an accurate plan for material stocking in advance. To store appropriate level of materials by considering availability, demand forecasts, inventory model selections and inventory cost measurement have to be considered.

This study is concerned with an inventory system for a commercial refrigeration manufacturing company which carries a high amount of various materials to serve customers in a highly competitive market.

1.2. Statement of the Problem

The problems faced by the commercial refrigeration manufacturing company under study are that they stock wide variety of items. The company also encounters demand fluctuations in the market situation. Due to the dramatically increasing on sale results, the inventory increased in the last two years. As inventory of raw material increased by 60% from 40 million baht to 100 million baht from year 2003 to 2004, the manufacturer recognised the need to examine order fulfilment and inventory management processes. As the products have high value and variety, they also reasonably require varied raw materials. And these come to affect the manufacturer who has got a limitation on storage area. The manufacturer has found a very hard time to handle a large number of raw materials within its site to make a high inventory. Everybody in the company thinks that inventory level at present is too high since some items can be used for a whole year.

The reason why the manufacturer has to hold inventory because the supplier lead time is longer than lead time committed with customer. Without appropriate inventory management system, the company also falls to stock out situation which is one of the major problems they have faced. It is hard to answer to management on these contrasts. With large expenditures for materials, how come the stock out always occur? Therefore, an appropriate inventory management is required to minimise the inventory cost, while at the same time, ensuring the customer service level.

There are three factors effect on inventory level consisting of customer demand, internal inventory management, and supplier delivery performance. This project focuses on internal inventory management since an effective inventory management can against fluctuating on customer demand and delay on delivery from suppliers. The customer's demand of company under study is stochastic and highly fluctuated, buffer stock at appropriate level is required to against lost sale. In addition, the demand forecast predicted by customer is highly deviate from actual demand. Limitation of number of supplier faced by organisation under study leads to over capacity when demand arrives. Consequently, the materials can not be delivered on promised leads to fluctuation on production. The effect of two factors on inventory management mentioned previously can be abated by having good management on inventory to serve the fluctuation on demand and delivery.

This project was initiated to answer several questions including "How can we lowering the inventory level while satisfy the customer demand?" As the company control inventory as a complete knock down type or calling as 'kits'. The question followed is "what is the appropriate level of the inventory?". The last but most important that we have got to find the answer is "Is there a more efficient way to manage inventory?"

It is hard to control both type and volume of raw materials for assemble because the characteristic of products is 'assemble-to-order' and there is a variety of additional accessories. Material planning section calls for incoming material on basic of their experience since there is no certain policy is made to control the number of incoming raw materials. This results an important data for managing and controlling of inventory volume is missing. Material planners try to order material as much as they can and ask supplier to send as soon as possible to ensure that all materials are available when customer place order on any type of product since they do not have appropriate method to manage the inventory.

Whenever the new order from customer is placed, material planning department has to check for all material availability totally 1,008 items. This process takes very long time and lots of efforts. So the tools for inventory management system are required.

1.3. Objectives of the Research

The main aim of this research is to find some solutions to material acquisitions for a specific commercial refrigeration manufacturing company, and in particular to develop a suitable inventory management system for controlling raw materials.

1.4. Expected Benefits

The expectation from this research is that its outcome will implement:

1.) To increase the efficiency of managing inventories especially on material replenishment process. It will reduce time and effort of material planning and purchasing sections to work on checking material availability and ordering incoming materials.
2.) Improvement of customer service level and less material shortage once production need.
3.) Reduce sunk costs of inventory.

1.5. Scope of the research

1. The research studies the inventory of both imported and local raw materials used to manufacture the refrigerator cabinets only. Spare parts, installation materials, and finished goods are not covered. There two categories of the cabinets: (1) multideck cabinet that includes Methos model, and Monaxis model, consisting of the sub-model totally 33 types; and (2) Island cabinet that includes Irios model consisting of the sub-model totally 4 types.
2. Type of inventory control in medium term planning for imported material is classified as the 'CKD' type that has to balance one time per month in every month. And this can be assumed as a demand forecast made 3 month in advance equals to supplier lead time.
3. The existing information and data from company under study will be used in this research. The existed system and data are Bill Of Material (BOM), prices, supplier information, demand, supplier lead time, inventory status, month end data, etc.
4. Performance Measures in the inventory control in this research are:
   (1) Customer service level which collected from statistical data of achieve in serving customer demand; and
   (2) The percentage of material availability when transfer to production line; and

(3) The inventory value remained after the stock ends in every month.

1.6. Research Procedure

1.) Undertake a literature review to capture the theory and methodology for the previous and current study of inventory control and management and other relevant studies.

2.) Study existing material management procedure and identify the problem.

3.) Propose solution for the identified problem.

4.) Data gathering from the existing system by analyse the inventory management process, collecting historical data of demand from customers and supply from suppliers, and collect required data and parameter of each item.

5.) Study constraint of each item and classify material group according to source of supply and purchasing constraint.

6.) Identify suitable inventory policy and inventory management system to each group of material.

7.) Develop standard working procedure to be a direction of new inventory management system.

8.) Establish tools to link the newly developed inventory policy to the existing system.

9.) Evaluate the result of developed system by comparing result of actual system to proposed system.

10.) Arrange the thesis note presenting the research methodology and the results, study analysis, conclusion, discussion and recommendation made for a further study.

11.) Thesis examination.

CHAPTER II

THEORETHICAL CONSIDERATIONS AND LITERATURE REVIEW

2.1. Theoretical Consideration

2.1.1. Introduction

Inventory is the list of goods, raw material or resource held available in stock. In services, inventory generally refers to the tangible goods to be sold and the supplies necessary to administer the service. Manufacturing inventory refers to items that contribute to or become part of a company's product output. Manufacturing inventory is typically classified into raw materials which are materials and component parts scheduled for use in making product, work in process (WIP) which is materials and components that have begun their transformation to finished goods, and finished products which are goods ready for sale to customers.

Inventory can also be seen as evil since it is a resource that has value in economical so managing inventory is a crucial task in business management for any organisation. Everyone wants to reduce it since inventory is what we have already paid but waiting for use. It can be seen as an asset with little return. Thus organisations have always been faced with dealing with the two conflicting objectives of inventory management, to provide maximum parts availability while keeping inventory low. Companies looking to target perfect order fulfilment need to follow good inventory management practices to avoid excessive inventories and missed customer orders due to inventories deployed in the wrong places. Many organisations face problem of too much inventories, yet they experience stock-outs and shipment delays at the same time.

2.1.2. Purpose of Inventory

Stock is kept to maintain stable production operations, provide customers with adequate service, and keep investment in stocks and equipment at reasonable levels.

1.) To maintain independence of operations: A supply of materials at a work centre allows that centre flexibility in operations. For example, there are costs for

making new production setup. This inventory allows management to reduce the number of setups.

2.) To meet variations in product demand: The demand for the products may be possible to produce the product to exactly meet the demand if it is known precisely. However, demand is not completely known and a safety stock must be maintained to absorb variation.

3.) To allow production schedule flexibility: A stock of inventory relieves the pressure on the production system to get the goods out. This cause longer lead times allowing production planning for smoother flow and lower-cost operation through lot-size production.

4.) To provide a safeguard for variations in raw materials deliveries: When material is ordered from supplier, delays can occur for several reasons such as a normal variation in shipping time, shortage of material at the supplier's plant causing backlogs.

5.) To take advantage of economic purchase order size: There are costs to place an order. So the larger the size of each order, the fewer the number of orders that need be written.

Inventory management has been a topic of considerable and widespread interest for a long time. The core of efficient inventory management is having appropriate level of inventory volume without shortage that cause the discontinuous system and do not lose chance of financial too much i.e. have enough material to be used with any purpose by do not keep it too much. Good inventories are needed to cover supply and demand needs, as well as account for uncertainties in both.

An inventory system is the set of policies and control monitoring levels of inventory and determining what levels should be maintained, when stock should be replenished, and how large orders should be.

One approach for getting to more efficient inventories is 'Improve inventory replenishment processes'- Reduce inventory waste by using formal scientific-based methods to manage inventories for all types of inventories, including raw materials/components, work-in-process, and finished goods.

Scientific inventory management started with the derivation of the economic order quantity (EOQ) system. The model is treated by many standard books on inventory management, e.g., Hadley and Whitin (1963), Johnson and Montgomery (1974), and Riggs (1970). One of fundamental assumptions inherent in the derivation of the basic economic order quantity is that the items are maintained under independent control. This assumption is likely to be inappropriate under any of the following circumstances:

1.) Several items are produced on the same equipment, in which case coordination of run quantities may significantly reduce set-up costs.
2.) Several items are purchased from the same supplier, in which case coordination may allow use of 'group' quantity discounts.
3.) Several items share the same transportation facility, in which case coordination may result in transportation economies (e.g., full car loads).

By sharing a common supplier or common production facility of a family, there is a major setup cost to make a replenishment of the family and a minor cost for each item included in the replenishment. It makes senses to coordinate replenishments of the various item of the family.

2.1.3. Inventory Costs

In almost any business analysis involving inventory must be converted to inventory costs. Inventory control is concerned with minimizing the total cost of inventory. The three main factors in inventory control decision making process are:

1.) Holding costs: The cost of maintaining inventory in a company's warehouse. This cost depends on the amount of space required, and how much that space costs. This includes things like rent, utilities, insurance, taxes, employees costs, and also the opportunity cost of having capital tied up in. storage, insurance, investment, pilferage, etc.

Holding cost = Interest on capital invested in inventory + Ratio of average carrying cost

Where;

Interest on capital invested in inventory= Internal rate of return= Money Loan rate

$$\text{Ratio of Average holding cost} = \frac{StorageCost}{AverageInventoryLevel}$$

2.) Ordering costs: cost involved in placing an order or setting up the equipment to make the product. Ordering costs include things like cost of order preparation,

communication, transportation according purchase order, receiving, handling, administration cost over the purchasing.

$$\text{Ordering cost} = \frac{OrderingExpense}{NumberOfItemInPurchaseOrder}$$

3.) Shortage cost: This element concerns what is lost if the stock is insufficient to meet all demand. This factor is the most difficult to measure and is often handled by establishing a "service level" policy. e.g., certain percentage of demand will be met from stock without delay.

2.1.4. Factor in Inventory Decisions

To help manage the inventory there are three factors that affect policies and strategies.

1.) Type of Demand

The nature of the demand pattern has an effect greater than any other possible factor on the appropriateness of the when-to-order decisions rules and, thus, on the design of the inventory management system. There are two types of demand impact production organisations. There are independent demand and dependent demand. It is important to understand the difference of these two demands for managing inventory because entire inventory systems are predicted on whether demand is derived from an end item or is related to the item itself.

(1.) Independent demand: external demand for end items or services which is uncertain and we predict it using forecasting methods. This demand may be affected by trends and seasonal patterns. Inventory models used in managing independent demand items generally determine how many units need to be ordered, and how many extra units should be carried to provide a specified service level that the company would like to satisfy immediately from stock on hand. The statistical stock control systems such as Reorder point system, Reorder level or two bin control system can be used for this demand pattern. These systems can be operated manually at very low cost or using computer systems. Batch sizes can be set qualitatively, based on historic usage patterns and the management's experience, or they can be set using statistical techniques. However, they generally involve holding stock in anticipation of unknown demand.

(2.) Dependent demand: demand for items used to produce the final product or service. Once we know demand for the final product we can predict this demand exactly. The control systems available for this type of demand pattern are

Materials Requirements Planning (MRP), Manufacturing Resource Planning (MRPII), Optimised Production Technology (OPT) or Just In Time (JIT). These dependent demand systems are best suited to certain environments as shown in Figure 2.1.

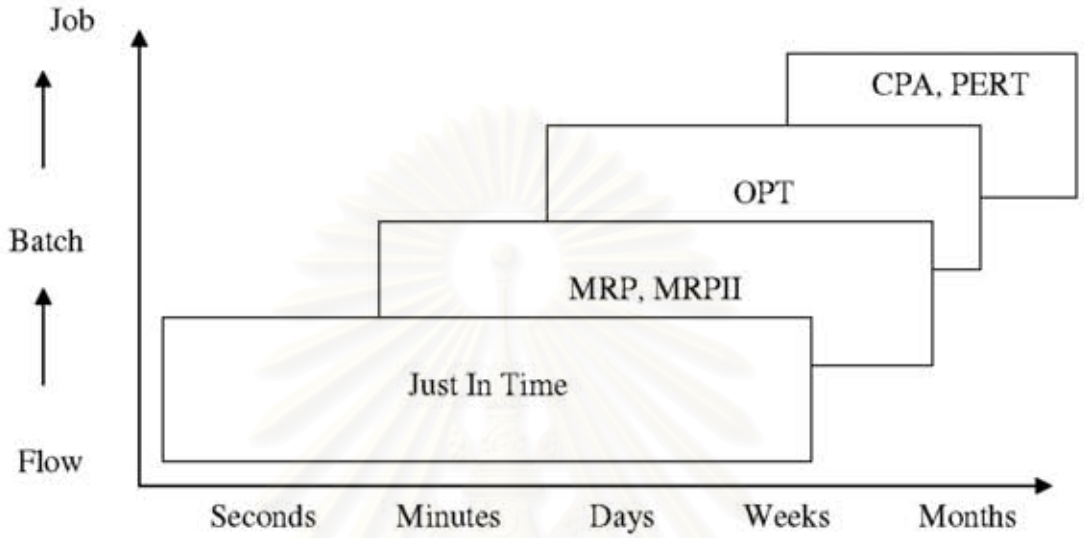


Figure 2.1: Inventory control systems and environments

(Warwick Manufacturing Group, 2004)

Inventory management for independent demand needs to answer two basic questions

- When to replenish the inventory
- How much to order for replenishment

To determine the order quantity may use fixed quantity or order up to level. To determine when to order can consider the level of inventory on hand or define the time to order.

2.) Manufacturing environments

The degree of control differs significantly based on the company's manufacturing processes, volumes, rates, and ability to eliminate handling. Manufacturing environments highly relate to the product positioning strategy of the firm so they have a significant effect on overall inventory policy and planning functions. It affects how a company manages and plans inventory levels, investment, timing, and availability. The integration of all of aspects within the business must be accommodated and facilitated by the inventory, material requirements planning, master schedule, and final assembly schedule systems. Bernard (1999) has compared the difference of inventory policies between the

three manufacturing environment as shown in table 2.1. There are three different types of manufacturing environment;

(1.) Make- or Engineer-to-order environment: Company in this environment typically stocks a certain number of parts or raw materials which can be used to fabricate and assemblies upon customer order. The balance of the assemblies and parts are designed or manufactured only when an order is received. The final product is usually a combination of standard components and other components custom designed for the customer. The manufacturer often purchases materials after the order is placed. The customer must therefore be willing to tolerate a long lead time.

(2.) Assemble-to-order environment: Company use stocked parts and assemblies, in addition to assemblies which are ordered upon very short notice from suppliers. These environments typically have too many possible combinations of assemblies to make it feasible to stock final assemblies. The product is to supply a large variety of high quality, competitively-priced, final products from standard components and subassemblies within a short lead time. In assemble-to-order environments, potions, subassemblies, and components are either produced or purchased to stock. By stocking a small supply of components and subassemblies, the manufacturer can quickly assemble any one of an almost limitless number of possible configurations. The customer enjoys the benefit of some customisation, yet has a short wait for delivery.

(3.) Assemble/Make-to-stock environment: In this environment a customer is not willing to tolerate a delay in receiving the product. Company typically respond to customer orders in less than the cumulative lead time for the finished goods. Parts are either stocked or ordered specifically for batch production runs. Finished goods inventory becomes a significant percentage of the company's inventory due to the need to provide a variety of sizes, colours, and features.

3.) Manufacturer Type

From an inventory perspective, manufacturer type has a broad impact on all aspects of inventory policies, planning, and control. There may be a significant difference among types with regard to dock-to-dock cycle time (which affects inventory turns), inventory delivery speed due to collapsed or multilevel bills of materials (which affects customer service level), and quantity, cost, and variety of parts (which affects handling, storage,

and inventory accuracy level). Inventory is least complicated for continuous and line manufacturers which tend to have fewer parts and consistent run or batch sizes. It is most complicated for job shops and project companies which tend to have many low volume or one-time parts, low production volumes, and numerous engineering changes.

Area of Comparison	Engineer-to-order	Make/Assemble-to-order	Make/Assemble-to-stock
Usage History	Useful for stocking decisions	Useful for safety stock	Useful for forecasting
Inventory Order Quantity Logic	Use for stock items	Use for floor stock items	Use for floor stock items
Safety Stock Quantity Logic	Any technique (fixed) for independent demand items (none required for dependent demand items)	Any technique (statistical) for independent demand items (either none required or over plan at MS level for dependent demand items)	Any technique (time period) for independent demand items
Planning and Scheduling Module	Final assembly schedule	Master schedule	Master Schedule
Order Status	Customer order number, Item number, and related open purchase or production order	Open purchase or production orders and allocations	Open purchase or production orders Time-phased with requirements

Table 2.1: The comparison of inventory control of different manufacturing environment

Manufacturing environment is really a combination of manufacturer type and manufacturing focus. The general relationship among these areas is studied by Bernard (1999) and illustrated in figure 2.2.

(1.) Project manufacturer: The majority part are fabricated and assembled per the project schedule. Parts are typically purchased or manufactured on an order-for-order basis (lot-for-lot order quantity techniques), without needing any special safety stock or forecasting logic. Once received, parts are allocated directly to the order. For all practical purposes, these parts are not transferable among orders. Order quantities are small and order frequently have custom design features. Cycle counting is typically not performed on customer order parts because there is no ongoing issue or receipt activity to cause inventory inaccuracies.

(2.) Job shop manufacturer: The objective of job shop manufacturer is making unique or low-volume products with high quality. There may be a periodic nature to orders, thus eliminating or at least reducing the engineering element of lead time on repeat orders. Many different products are run in lots or batches through the plant, and many lots are usually being processed at a given time. Low demand per product usually des not justify flow production. From an inventory perspective, job shops are more similar to project manufacturers than to batch manufacturers. If there is some confidence in repeat orders, job shops will stock certain long lead time components or basic raw materials and component parts. The processing of orders requires detailed planning and control due to the variety of flow patterns and the separation of work centres. They may purchase in larger lot sizes than are required for booked orders to obtain price breaks. Where this is done, these items are not allocated to orders when they are stocked but are added to raw material inventory. The amount of work-in-process tends to be high relative to that in a flow process due to queues and long in-process time.

(3.) Batch manufacturer: The batch flow process overlaps the line flow and job shop classifications. Batch flow is used when the cost of a line process is justified, even though the item is not produced continuously. Marketing lead time is usually a function backlog. This means that production cycle times may be considerably less than elapsed time from order receipt to order shipment. This is the portion of lead time which Just in Time philosophies specifically target for the greatest reduction. The decision to produce in batches is usually the result of setup times which inhibit mixed model scheduling or having processes which are not balanced in terms of cycle times from one to the next. Orders must typically be produced in less than cumulative lead time (i.e., longest lead time purchased part plus manufacturing cycle time). This means that end-items must be forecasted at the master schedule level so the component parts can be stocked. The order quantity technique set by inventory is then executed through MRP explosions. Independent demand is additionally forecasted and added to the MRP order quantity to establish a stocking quantity.

(4.) Line manufacturer: Machining and assembly lines are used in repetitive manufacturing where process times are balanced from one operation to the next or can be balanced by redistributing workload among team members on the line. From an inventory perspective, line manufacturers are similar to batch

manufacturers at the product line and product family levels. The differences become more pronounced as lines become dedicated to products. Inventory planning and control is driven by the rate of flow. The continuous availability of materials and parts is critical.

(5.) Continuous process manufacturer: Lines may be dedicated to a single product or configured for changeover within a product family or line. Setup speed for a new product may require equipment cleaning and process parameter resetting and test prior to production. There may be a logical production sequence to minimise the effect of changes, such as a progressive colour, or dimension change. This affects scheduling and inventory timing. The number of finished goods may well exceed the number of component materials, especially where packaging creates the primary complexity differences. This lends increased importance to packaging materials and finished goods warehousing than may be encountered with project and job shop manufacturers. Materials have to be continuously supplied to the line without any interruption.

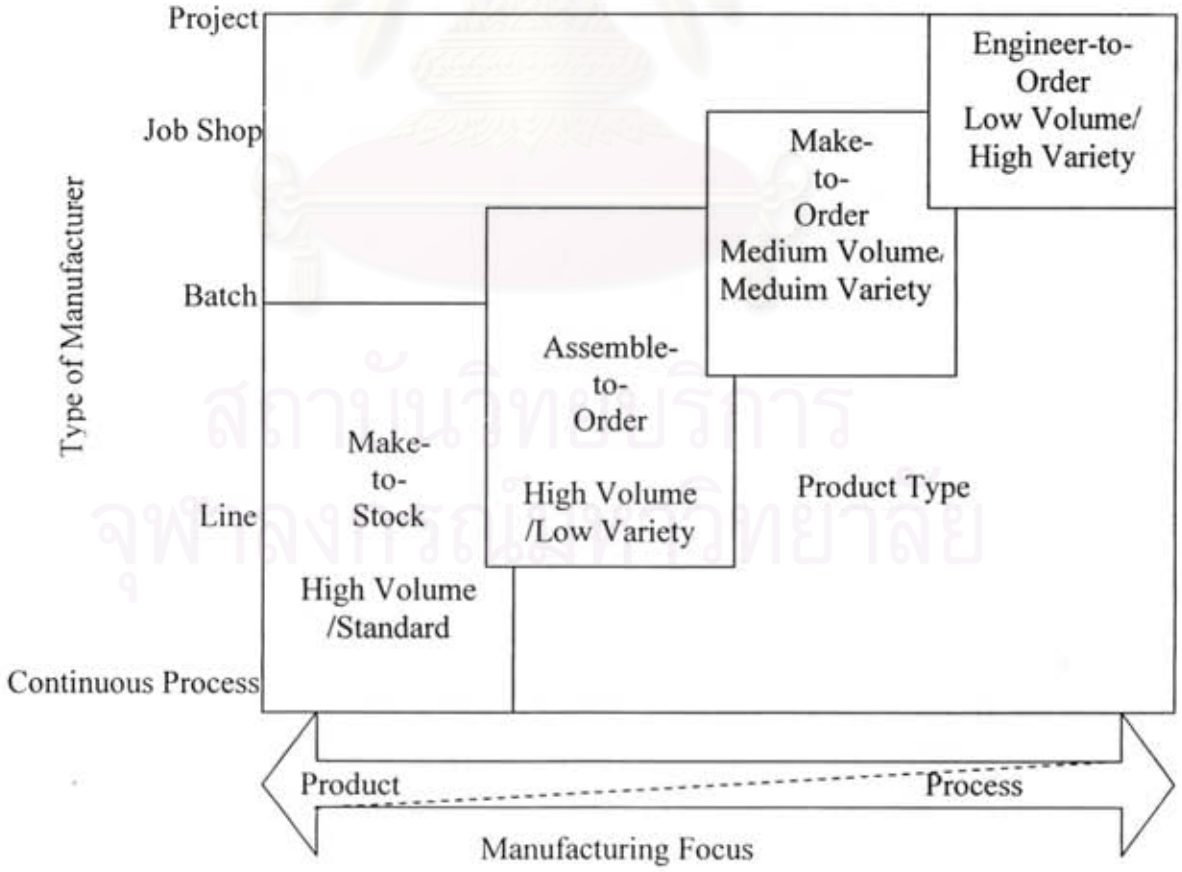


Figure 2.2: The relationship between manufacturing environment and manufacturing type

2.1.5. Inventory Systems

To answer the question of how much to order, there are different approaches to how much and when to order. In general there are two general types of inventory systems, based on when the inventory levels are reviewed. The two types are Continuous Review and Periodic Review. The basic distinction is that continuous review models are event trigger and periodic review model is time trigger.

1.) Continuous Review Inventory Systems (Q Systems)

Under any continuous review system, the reorder point and order are fixed, but the time an order is placed is allowed to vary with fluctuations in usage. This system needs to be constantly monitored the level of inventory and it replenishes when the stock drops to a certain level. The objective is to place an order whenever the amount on hand is just sufficient to meet a "reasonable" maximum demand over the course of lead time which must be allowed between placement of the replenishment order and receipt of the material. The key to setting the safety stock is the "reasonable" maximum. The fixed-order of material replenishment is commonly used for seasonal demand items. So as not to stock a full supply of this material all year round, it is necessary to program the systems to flag this material on a fixed-order basis. With this method, material will not keep showing up on the reorder reports but would appear only at the time the order must be placed. The continuous system is completely defined by knowing the order size and the minimal stock level which signals the placing of an order.

2.) Periodic Review Systems (P Systems)

Under any periodic review system, the time between orders is fixed but the order quantity, demand rate, and reorder point are variable. The lead-time can be fixed or variable. The level of inventory is periodically monitored and reorder points occur at fixed-time intervals. With the periodic system, the number of units remaining is not reviewed each time a unit is issued from stock. The size of the replenishment order is variable and depends on the number of units in stock. The order quantity varies from period to period and depends upon demand. The new order must be such that the resulting inventory position will large enough to satisfy demand until the next review. This system generally has higher level of inventory to account for abnormal demand behaviour during

the period between reorder points. This category includes materials for projects and frequently used materials.

Comparison of Q Systems and P Systems:

Q System

- This system requires continual monitoring of inventory levels.
- Less safety stock is required because demand during only the lead time must be covered.
- Fixed order quantities are desirable or, in some case, mandatory.
- Review and replenishment intervals can be set on an item-by-item basis.

P System

- It is easier to combine orders to same supplier, which may reduce per unit purchase/ transportation costs.
- Reordering at fixed intervals often is convenient.
- Inventory position must be known only at review time; thus, a perpetual inventory system is not required.

The major advantage of continuous review is that, it provides the same level of customer service while requiring less safety stock than does periodic review. Disadvantages of this continuous review system are in terms of expensive reviewing costs and reviewing errors, especially for fast-moving items where there are many transactions per unit of time. However, for extremely slow-moving items very little costs are incurred by continuous review because updates are only made when a transactions occurs.

Routine inventory decision

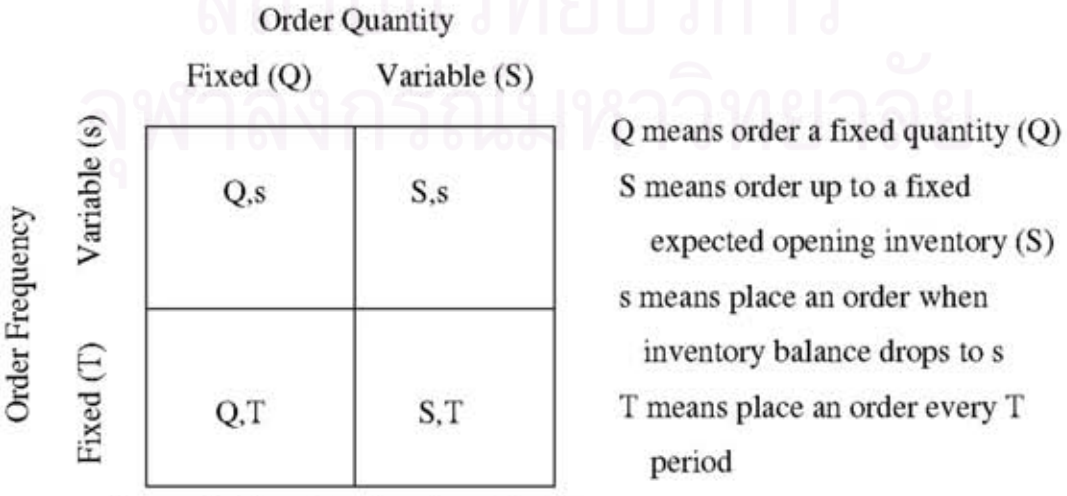


Figure 2.3: Routine inventory decision

3.) Other Replenishment Methods

There are many methods available for replenishing inventory material. In this thesis, four of the most commonly used are discussed.

Dependent Demand	Independent Demand
- Fixed Schedule (P System)	- Two Bin System
- Fixed Order (Q System)	- Reorder Point/EOQ
	- Min/Max
	- Fixed Period Quantity

(1) Two bin system: The two bin method is often used for low-value frequently used material that can be planned for exact requirements or usage. Material frequently used with the two bin system includes nails, nuts, bolts, and other low-value, high-usage items. As shown in Table 2.2, methods for replenishing such material are easy to implement and equally easy to track usage.

Part A	
Bin Section 1	Bin Section 2
- Use from this bin only - When empty, use Bin 2 and reorder	- Order Point Quantity

Table 2.2: Two bin system

(2) Order point, Order Quantity (s,Q) system: A fixed-order quantity model initiates an order when the event of reaching a specified point, s, at which an order will be placed and the size of that order, Q. The order point, s, is always a specified number of units. An order of size Q is placed when the inventory available (currently in stock and on order) reaches the point s. The purpose of the EOQ formula is to determine the order quantity that will minimise the sum of ordering and holding costs per unit time. EOQ is a model that defines the optimal quantity to order that minimises total variable costs required to order and hold inventory.

Underlying assumptions

- The demand for the item is constant and known.
- Supply is certain, and lead time is fixed and known.

- Items are ordered in lot (batches), and complete orders are received.
- Ordering decisions for one item can be made independently of other items.
- Quantity discounts are not calculated as part of the model.
- Stock out and shortages can be completely avoided.

Because the requirements for using a ROP/EOQ system may be difficult to achieve (constant and known demand and lead time, instantaneous replenishment, and zero shortage allowance) a more appropriate method for determining material requirements with irregular usage patterns would be Min/Max System.

(3) Order Point, Order-up-to-level (s,S) system: This system is also called min/max system. It is used for items where material demand is constantly changing so it involves continuous review. It is based on the maximum and minimum amounts of material that the user (not a system calculation) determines. In this type, maximum and minimum numbers of units to be stocked are determined plus the amount of safety stock required until the next order is filled. Whenever the inventory on hand reaches this minimum stocking level or reorder point s or lower, an order is placed for the number of items necessary to reach the maximum stocking level or order-up-to-level S. The advantage of a min/max system is that different minimum and maximum levels can be set for each class of items or for individual items if necessary. If all demand transactions are unit-sized, the (s,Q) and (s,S) systems are the same because the replenishment requisition will always be made when the inventory position is exactly at s; that is, in this case, S = s+Q. The replenishment quantity in the min/max system becomes variable as soon as the transactions can be larger than unit size. The major difference between the (s,Q) and (s,S) systems is that the size of each order can be varied based on need. The EOQ system assumes a stable and independent demand.

(4) Fixed Period, Order-up-to-level (R,S) system: This system is known as a replenishment cycle system. The control procedure is that every R units of time enough is ordered to raise the inventory position to the level S.

2.2. Literature Review

Inventory control and management is in widespread use in order to perform the appropriate inventory volume in each organisation.

Widiarta and Berghen (2004) presented inventory policies for a Make-to-Stock and Make-to-order (MTO) environment. For the raw materials of the MTO items, three inventory systems are proposed and being applied simultaneously to fine the most optimal policy that provide the lowest possible total costs while achieving the targeted fill rate. Three inventory systems are MRP, standard (s,Q) inventory system and modified (s,Q) system. The differences between standard and modified (s,Q) inventory system is that reorder level of standard system depends on the inventory level while the modified system depends on customer demand excess. It is revealed that a modified (s,Q) inventory system is preferred among the others.

Bitran, Hax, and Sabatier (1981) introduced a statistical approach to estimate the performance of inventory systems. They stated briefly on the existing methods, present a stratified sampling methodology, and describe a new technique to estimate seasonal factors and safety stocks.

Anderson (2002) studied the inventory management practices in a communication equipment and services company where buyers used their own intuition and rules-of-thumb to decide order quantity and the level of buffer stock which leads to high inventory level but low customer service. The author described the design and implementation of an automation inventory management system that optimises inventory levels and decreases manual effort. Quantitative analysis was used to develop an inventory management simulator.

Graban (1999) studied on the development and implementation of a data-driven inventory and production planning methodology for the semiconductor manufacturer. The major causes of the need to hold inventory are buffer against long and variability cycle times, and uncertain demand. The research builds upon extensions of the base stock model to recommend target finished inventory and work-in-process levels, as well as material release decisions. The model also allows prediction expected customer service levels under their actual inventory situation.

Jayaraman (1981) used an (S,c,s) policy which is a practical procedure for selecting the order-up-to-levels, can-order points and reorder-points of a coordinated control system. The model is appropriate for cases where there are a variety of suppliers and a large number of items supplied.

Group ordering inventory management system has been conducted by **Tanan Kraikosol (2000)**, applied to a construction material distributor. A wide variety of items is grouped by suppliers for the purpose of truck loading capacity study. The Minimum-Maximum inventory system (s,S) is used for each item. Values of order quantity (EOQ), order point (s), order-up-to level (S) of each item are calculated. The demands are assumed constant and deterministic. One purchase order is considered from inventory system to truck loading algorithm.

Ratanamaethanon (1991) studied the coordination of replenishment in consumer product manufacturing plant. The study deals deterministic demand assumption. Raw material groups are classified according to ABC analysis and supplier. Different policies are applied to each material group. The study uses a coordinated replenishment with periodic review for selecting the order quantity, order interval in combination with safety stock consideration.

Jirapat Rasree (1996) used work study to develop the production planning and inventory management in the Polyethylene Pipe Factory. The objective of this thesis is to study problem and propose suggestions or solution in order to improve the production planning and inventory management process in the case study factory. The result of this study lead to review the under organisation chart and create the cooperation. The thesis propose suggestions of solution of improving the organisational structure and job description and inventory management system by classifying code of product, setting up storage system, inventory control system and improving production planning and scheduling.

Somchan Vuthipadadon (1997) addressed a development of a shelf-space allocation and inventory model of goods in retail store. The model is considered under space limitation. To determine an optimised policy, the profitability of the assignment shelf-space allocation and inventory policy is maximised.

Inventory management and storing design has been studied by **Duangkhae Vetchasart (1997)**, applied to the telephone organisation of Thailand. Cumulative graph is employed for analysing the collected data. The data required for the cumulative graph are the incoming-inventory quantities and the outgoing-inventory quantities. Forecasting by time-series analysis is employed to find the projected demand for 1 year. To find the optimum inventory level, safety stock and the number of order placed that give the lowest total costs are calculated.

Suksan Laorakkitchakarn (1999) studied on the improvement of inventory control of parts that supply from outside supplier in car remodelling plant. The result of the study lead to the improvement method as firstly, to reduced lot size to order part. Especially parts with low demand. Secondly is to change the order method from order as model to order by part item. Thirdly is applying KANBAN philosophy to adjust part order volume to support uncertainty. Fourthly is using computer to support new system by making database from Microsoft Access 97.

Terdphan Stienswasdi (2001) has explored the problems for a switch factory and developed material inventory control system as well as established review procedure for checking inventory level. By using MRP and ABC technique, the efficiency of material inventory control can be improved significantly.

Hartanto (2000) revealed about inventory position control having Poisson process generate the customer's arrival. The inventory position is taken from on-hand inventory. Lead time of procurement is zero. A mathematical model, Expected Path approach is developed to describe two situations under the condition that only one emergency replenishment is allowed in a cycle. One is the situation, when the inventory position does not reach zero until the cycle ends. Another is the situation, when the inventory position reaches zero before the cycle ends. There are two decision variables are considered. One is order-up-to-level and the other one is cycle length.

CHARPTER III

DISCUSSION OF THE SYSTEM UNDER STUDY

This chapter discussed about an existing inventory management system of the company under studied. The study includes identifying function and criteria decision on inventory management, inventory management activities, and information flow. After that the causes of inventory management problem is defined.

3.1. Overall View of the Company

The company under study is a manufacturing and distribution centre of refrigeration equipment used in supermarkets and hypermarkets in Asia Pacific and Oceania zone.

There are two main categories commercial refrigeration cabinets that company under study produce: (1) Multideck cabinet that includes Methos model and Monaxis model, consisting of the sub-model totally 33 types; and (2) Island cabinet that includes Irios model, consisting of the sub-model totally 4 types. The company under study supplies a sort of 'assemble-to-order' products whose detail of product is varied, depending up on the customer requirement. The standard colour of all cabinet types is interior and exterior white (FA0117). Whenever the customer request cabinet painted in other colour, customer has to identify in the purchase order. Exterior parts can be painted in-house. Difference of interior colours effects to stocking items since special interior colour has to be painted from outsource. However, the interior colour that the company can paint is limited. Product descriptions and their available interior colour are represented in Appendix A.

The production plant is assembly line that order in material from two main sources i.e. local materials and imported materials. The imported materials are ordered from headquarter in Germany and controlled as completed know down 'CKD' type. Once customer's demand arrived, refrigeration cabinets are assembled and distributed to customer both local and foreign customer. Overview of company activities can be drawn as a summary in Figure 3.1

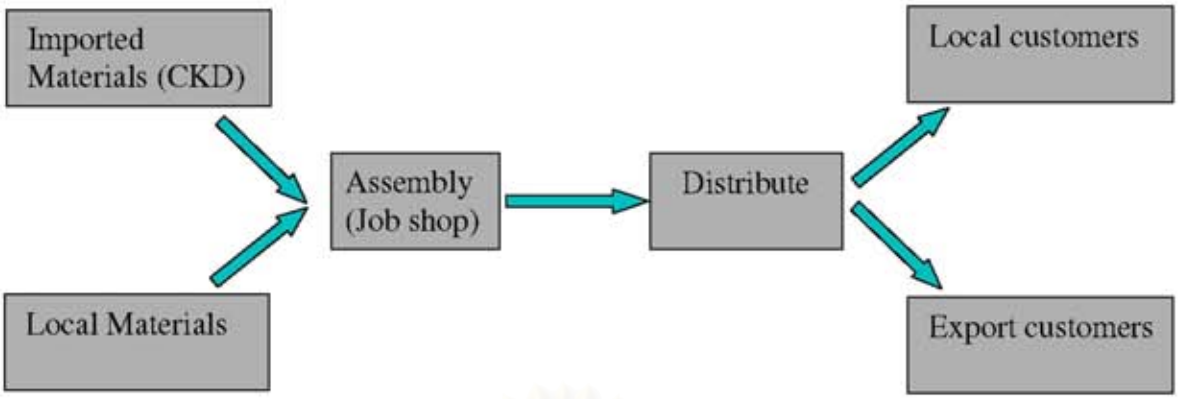


Figure 3.1: Company activities overview

3.2. Current Inventory Management System

The current system diagram is a pictorial summary of the information and images that have been collected in trying to understand the current condition.

3.2.1. Function and Decision Criterion on Inventory Management

Inventories are existed in the company under study because cycle time from receiving customer order is shorter than lead time of ordering materials from suppliers. The committed lead time after receiving order from customer is three weeks while lead time of ordering imported material is three months average and lead time for local material is varied depends on item. Inventory is under the responsibility of logistics department. The logistics department structure is illustrated in Figure 3.2.

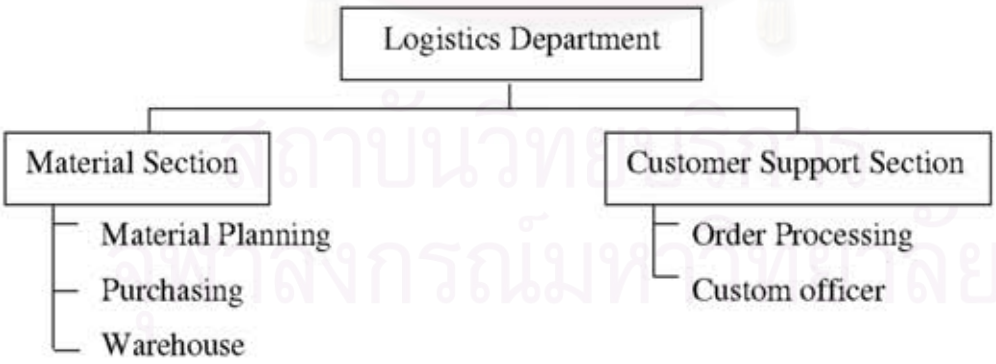


Figure 3.2: Logistics Department Structure

The function, material flow and information flow of the existing inventory management system can be drawn as Figure 3.3.

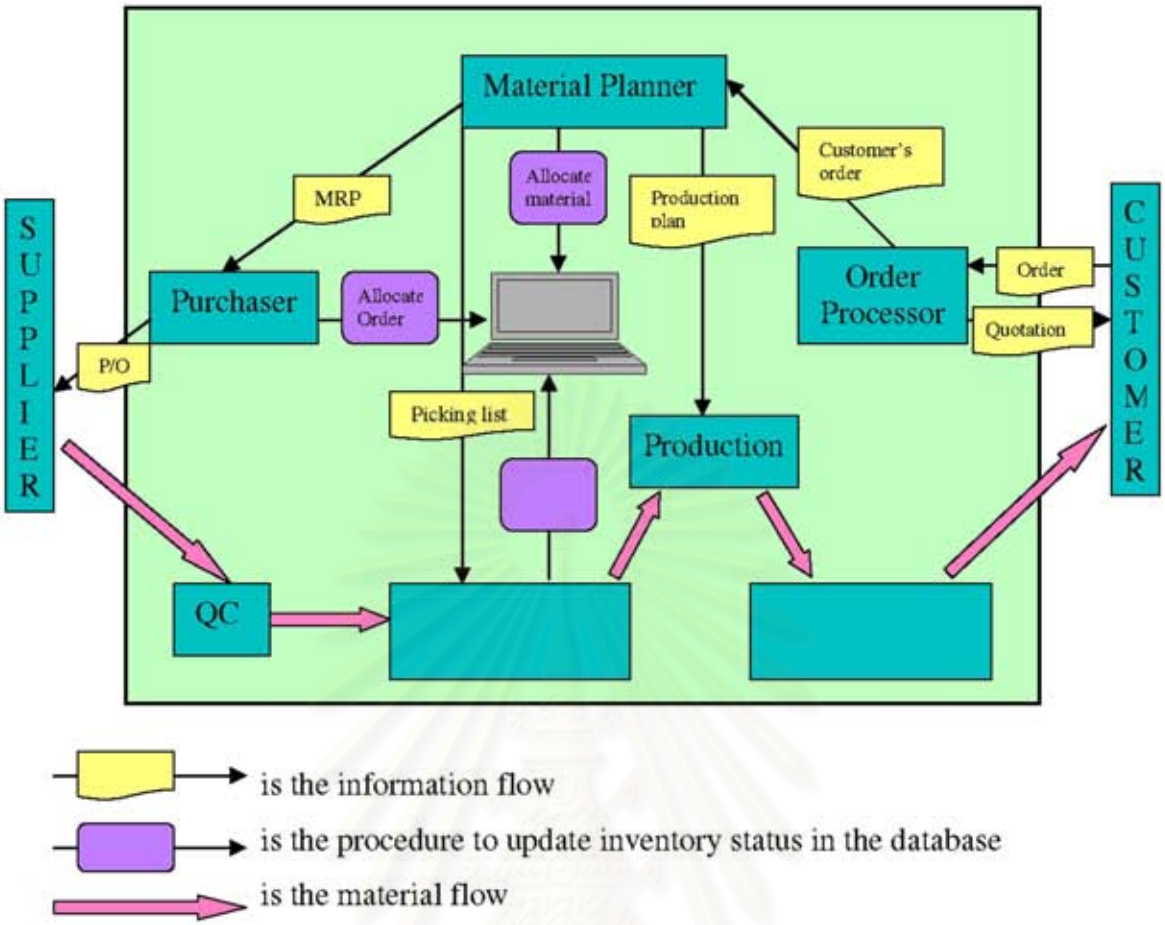


Figure 3.3: Working flow and information flow for existing inventory management

The company under study has divided the responsibility for inventory management among four sections: order processing, purchasing, material planning, and warehousing.

1.) Order processing function: Order processing performs as a liaison between customer and company under study. Once order arrived, order processor has to decide whether or not to accept the order by checking the model and accessories of the order. The decision criterion is the list of available model and accessories that the case study company can produce. After order is confirmed delivery date by material planner, order processor will arrange the quotation to confirm order and feedback to customer.

2.) Material planning function: Material planning is responsible for planning and scheduling when and how many materials are required in the production line. Material planning also arranges the production schedule and capabilities to satisfy customer demand.

Once order processor send customer's order, material planner will check the availability of imported materials which controlled as set. If the set of imported materials are available, the order will be accepted and confirmed week of delivery to customer. In case the set of imported materials are not available to serve customer's order, the order would be denied then material planner has to inform the week that imported material will be available. Customer will then consider whether or not they can wait until the confirmed delivery schedule. The availability of imported material and production capacity is the decision criteria for material planner to decide whether to accept the order and when the finished goods will be available. When receiving the confirmation of customer order, the assistant material manager will generate a production plan which is a master work schedule for every department, and prepare picking list for warehouse in order to transfer material to production line. One planner will generate material requirement plan (MRP) mainly for local material and send to purchaser. Material planner has to decide what material, and how much should be replenished. The decision criterion is inventory level. Requisition from material planner is made whenever the available inventory level (stock on hand plus on order minus backorders) is not sufficient to serve customer demand.

3.) Purchasing function: purchasing is the management of the acquisition process, which includes deciding which suppliers to use, determining the ordering quantity, negotiating contracts, and tracking the order status. Purchasing must satisfy the company's long term supply needs and support the company's production capabilities. This task is crucial for the company since the inputs and outputs of downstream productive processes depend on how well the task is performed. Purchaser has to make decision on two steps. Firstly, purchaser has to select the best supplier on multiple criteria. The decision criterion for purchaser is supplier's potential, price, lead time, replenishment quantity, and payment term. Secondly, purchaser has to decide the replenishment quantity. After receiving the requisition from material planner, there are two constraints affect purchaser decision; (1) purchasing quantity constraint which is the contract between company under study and supplier; (2) actual lead time. Average lead time of local part is two weeks, if items have lead time more than two weeks, purchaser will add up replenishment quantity according to self experience.

4.) Warehousing and distribution function: Warehousing and distribution are the management of the material kept in the case study company who has limited storage area and management flow of materials from company under study to customers, involving the storage and transportation of products. The activities of warehouse include (1) receive the incoming material which warehouse staffs have to check for quantity and quality; (2) material handling starts from receiving material, keep in warehouse until issue to production line; and (3) distribution of finished goods to customer after all cabinets of the same order are completed.

3.2.2. Material Flow

This section discussed on material flow to consider working flow of taking incoming material, the decision criteria, factor that activate outgoing material. The material flow is drawn in Figure 3.4.

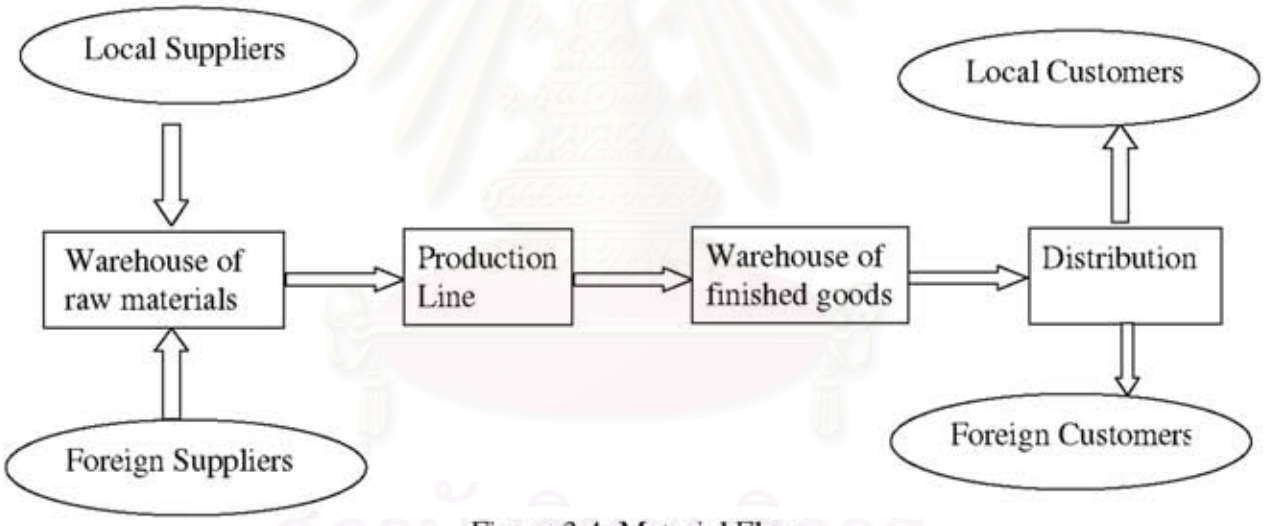


Figure 3.4: Material Flow

Material incoming process starts from the requisition of material planner which can be divided into two cases according to source of supply.

1.) Imported material from foreign supplier which is headquarters of company under study. Imported material requires 90 days lead time so the process of ordering has to be done no later than three months before the arrival of demand. Material planners will decide the level of buffer stock by their experiences. The decision criterion for stocking of each model is based on human judgement based from the

historical demand. The example of purchasing imported parts is shown in Figure 3.5.

Figure 3.5: Planning Horizon of imported materials

At the beginning of the first month, material planner has to order material in advance to use in the forth month. In order to decide how much material to be ordered, material planner has to consider the inventory level at the first month as the beginning level. Next step is to predict by estimating how many cabinets will be supplied in the second month, and third month which resulted in the inventory level at the beginning of the forth month. Material planner has to estimate for the expected supply in the forth month. Finally, material planner will know the replenishment quantity.

At the second month, material planner has to order material in advance to use in the fifth month. If the estimate usage of second month is not equal to the previous predict data, it will be adjust replenishment quantity in this month which will affect the beginning inventory level in the fifth month.

The planning procedure repeats as described above at the beginning of every month which likely to be periodic review with reviewing period at once a month. Company under study has buffer stock of imported material for every model but keeps at different quantity depends on the level of past demand. Material planner manages imported material as group part. A group part means part that assembled to complete one model of cabinet. One group part has every item for each model. Imported material ordering process has to be approved by managing director before order is released.

2.) Local materials require different lead time upon each supplier. Local materials are managed as a group part. The order for local materials is made only after the customer's demand arrived. Local material does not have safety stock available for

every model. Only 15 models listed as Table 3.1 are kept as safety stock. The safety stock for local material is also kept as complete set and the quantity to be kept in stock is determined by material planner's experience of past customer's order. In addition, the safety stock for the above models include only standard materials not include accessory items.

E-No.	Product Description	Interior colour	Safety stock Qty	Customer
380033	MONAXIS 73.188 B3 D	White	4	Hong Kong
380034	MONAXIS 73.250 B3 D	White	8	Hong Kong
380035	MONAXIS 73.375 B3 D	White	3	Hong Kong
380039	MONAXIS 73.188 B4 D	White	3	Hong Kong
380040	MONAXIS 73.250 B4 D	White	6	Hong Kong
380041	MONAXIS 73.375 B4 D	White	2	Hong Kong
380228	METHOS 74.188 A3	White	6	All, except Australia
380229	METHOS 74.250 A3	White	15	All, except Australia
380230	METHOS 74.375 A3	White	45	All, except Australia
380473	METHOS 74.188 A4 LZ	Black	4	Australia
380474	METHOS 74.250 A4 LZ	Black	15	Australia
380475	METHOS 74.375 A4 LZ	Black	30	Australia
820368	IRIOS SG3.250 B8	White	10	All
820369	IRIOS SG3.375 B8	White	25	All
820370	IRIOS SG3.CE183 B8	White	6	All

Table 3.1: List of Safety Stock Available for Local Material

Once a supplier delivers the raw material according to purchasing order, QC will check the conformity of material specification and then material will be kept in the raw material warehouse. At this point, the accepted raw materials become inventory and are stored in the warehouse. When there occurs a customer demand, raw materials are withdrawn from the stock. This means that customer's demand is a trigger of material outgoing from the raw material warehouse. Generally customer places order as project which makes a lumpy demand pattern. Materials are then transferred from warehouse in bulk to production assembly line. When production process is finished, finished goods will be gradually transferred to finished goods warehouse and will be kept in the warehouse until all cabinets of the project are completed. Distribution process will be done only after all cabinets are completed. In the company under studied, finished goods are not appeared in the accounting book at the end of every month since all finished goods have to be loaded in the week production complete. The logistics department takes responsibility for this material flow excluding the materials in production line (WIP).

3.2.3. Information Flow

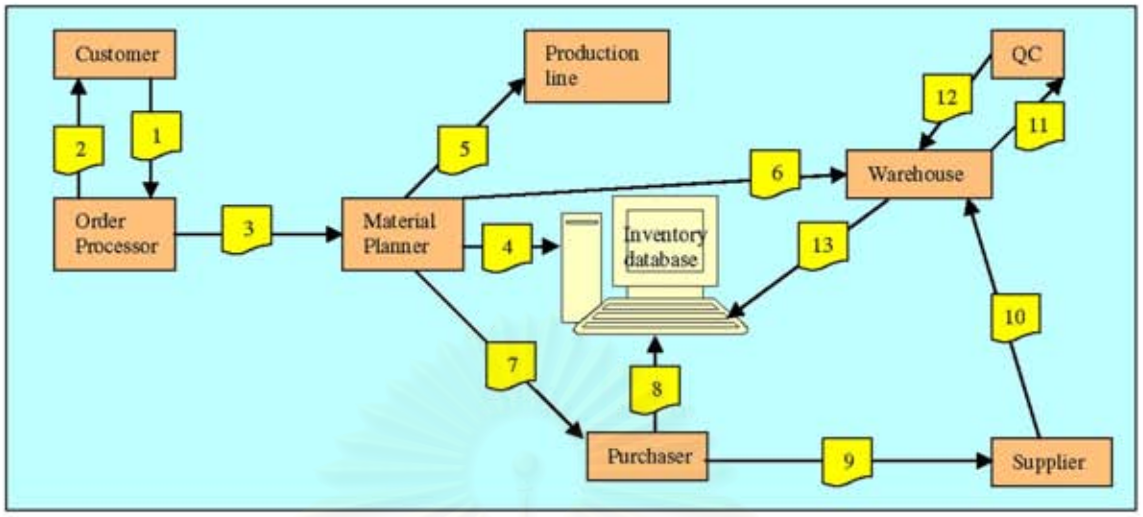


Figure 3.6: Information Flow

Information of material starts from customer's demand which activates issuing of materials. After receive customer's order, order processor will send the demand information to material planner in order to allocate the demand in the plan. In the same time, order processor will feedback customer by offering quotation as an order confirmation. Material planner will allocate material in the inventory database and the list of material will be automatically generated from the system. Customer's demand information will be transformed to be production plan by material planner and send to other function as a master schedule. Customer's demand information will be changed to list of material required by material planner and send to warehouse as a picking list. Material which is insufficient to supply will be listed by material planner and send to purchaser to make replenishment. Incoming material starts at this stage. Purchaser then key in purchase order in database and sends purchase order to supplier to order in material. After that materials will be sent to warehouse with invoice which is information from supplier to company under study. Warehouse will send the invoice to QC and request for material inspection. After inspection process, QC will send invoice back to warehouse. Key operator at warehouse will update the material incoming in the system. Purchaser knows the receiving of material through the inventory database, then informs material planner to update material status.

According to the flow, it is obviously seen that the most information between each party flows only one direction so information sharing among them is limited.

3.3. Analysis of the Current Inventory Management System

In recent years, the company has incurred large expenditures for materials and a number of stock outs. The major problem of the organisation under studied is the "inventory level is not appropriate". Some items are too much and cause the excess stock while some items are not enough to smooth the production line which causes shortage materials in production line.

3.3.1. Factors Effect on Inventory Level

The factors effect the result of inventory management can be classified into two types; (1) external factor which is uncontrollable factor, consisting of customer's demand and supplier delivery performance; (2) internal factor which is controllable factor, consisting of internal inventory management. In order to define the major problem causes the inventory inappropriate, the root cause of problems of every factor should be analysis.

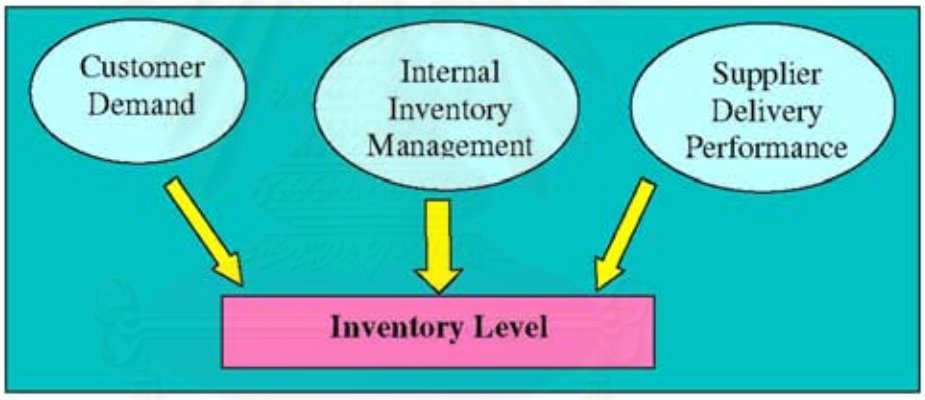


Figure 3.7: Factor of Inventory Level

1. Customer Demand

Analysing the sale figure of each year, customer's demand is stochastic and highly fluctuated as shown in the Figure 3.8.

In addition, the information of sale forecast is highly deviated from actual forecast as shown in the Table 3.2. So material planning sections never used this information for planning purpose. Material Planning section order material according to their experience.

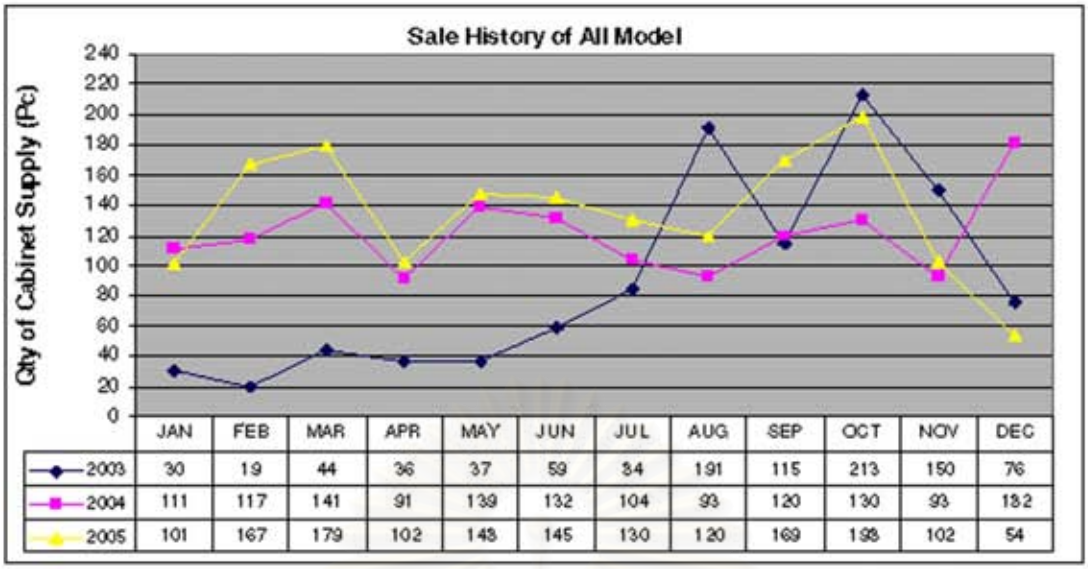


Figure 3.8: Total Sale History of 2003-2005

	Quantity of Forecast/Actaul (Piece)															
	June		July		August		September		Octcber		November		December		Total	
Product	Fcst	Act	Fcst	Act	Fcst	Act	Fcst	Act	Fcst	Act	Fcst	Act	Fcst	Act	Fcst	Act
Methos 74	15	80	75	91	74	91	66	98	50	100	23	44	78	31	381	535
Monaxis 73	12	41	9	3	27	2	24	8	18	25	0	20	9	18	99	117
Irios SG3	0	24	28	36	47	27	48	63	52	73	2	38	52	5	229	266
Total	27	145	112	130	148	120	138	169	120	198	25	102	139	54	709	918
Accuracy (%)		437		16		-19		22		65		308		-61		29

Table 3.2: Example of Forecast Accuracy of June-December 2005

As shown in historical demand and forecast data, the demand is highly fluctuated and forecast from customer is not reliable. The problems generated from demand are resulted from customer which is a given factor which can be abated by having buffer stock to against unexpected demand.

2. Supplier Delivery Performance

Due to assemble-to-order product has low volume but variety. The quantity of replenishment each time is relatively small but contains many items. The reason of having limited number of fabricated supplier is the replenishment volume of each item is low. The case study company has to group the part to order from common supplier using some characteristics, for example thickness of sheet metal, powder painting. Moreover, some parts need special tooling, mould which force organisation to have the selective supplier.

According to the assemble-to-order environment, materials are ordered once the demand arrives. Product with varieties of part ordered from same supplier is difficult to receive the part in the same time. If there is no certain policy for stocking material, shortage problem will repeat. The problem from delivery of supplier has can be abated by having appropriate buffer stock to serve long lead time of delivery.

2.) Internal Inventory Management

Inventories are existed in the company under study because cycle time from receiving customer's order is shorter than lead time of ordering materials from suppliers. There are three major internal procedures involve in the inventory management process i.e. material planning, purchasing and warehousing. However, warehousing is related more in output of inventory level and more concern in physical. So focus should be made on material planning, and purchasing functions. The replenishment will be done only demand arrives. The internal procedure is controllable and adjustable factor which value to focus.

In conclusion, two of these factors which are causes of inventory level, customer demand and delivery from supplier are given factors since they are factors that involves with external environment. In order to improve the inventory management process, this study will focus on internal inventory management. In addition, the company can abate the effect of these given factors by having appropriate level of safety stock which has to be controlled at internal inventory management.

3.3.2. Problem Analysis on Working Flow of Logistics Department

According to the inventory management procedure which mentioned previously, the problems of internal inventory management should be focused on two sections which are material planning and purchasing. The study should start on the working procedure of material planning and purchasing section. The flowchart procedure of both functions on inventory management is shown in Figure 3.9.

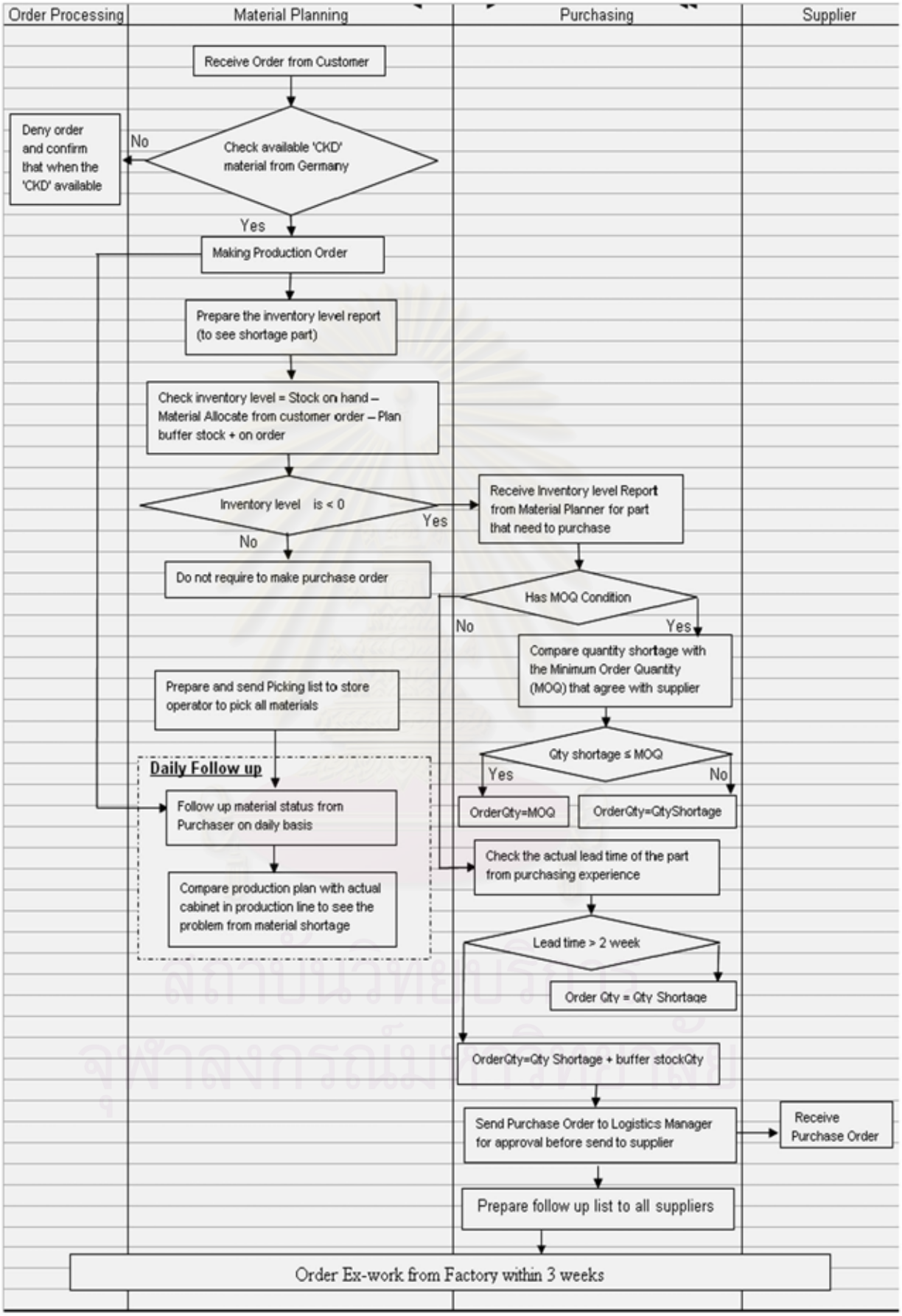


Figure 3.9: Working Procedure of Material Planning and Purchasing Sections

There are two points of existing work flow lead to inventory management problem which listed below;

1. Some sets of local materials are ordered as stock before the arrival of demand as described previously. The number of buffer stock can be supplied only 3 weeks average since average lead time of local materials is 3 weeks. However, the demand from customer is not exactly like what available in stock. It is too risky to prepare materials equals to the average lead time of supplier. In addition, for the fabrication items which usually need longer lead time than 3 weeks, stock out can not avoid. The stock out event when demand arrive also effects to the supply of other materials since urgent purchase order has to interrupt supplier's schedule. In contrast, for items with shorter lead time than 3 weeks, ordering the complete set of local material is one reason of high inventory level. Some items used commonly in many models, controlling materials as group of parts leads to unnecessary inventory problem. To solve this problem, it is necessary to collect the actual lead time of supplier to determine the stocking policy and replenishment quantity of each item.
2. After material planner finished on preparing inventory level report, purchaser knows what item and how much to order from this report. Anyhow, purchaser makes replenishment on items shown in the report with different replenishment quantity. The reasons from purchaser on changing order quantity are listed:
   1.) There are purchasing contracts between company under study and its vendor to place each order not less than minimum quantity defined in contract.
   2.) Some materials have packing standard size, for example wire which packed in roll, nut which packed in a carton. These parts do not slit to sale.
   3.) Lead time that material planner used is less than actual lead time. This resulted in the urgency of purchase order many times when the demand excesses the buffer stock. The urgency of order which always interrupt supplier's production schedule, other parts that already scheduled will be delayed and cannot deliver on the committed date.

Briefly, the replenishment process of a case study company is highly based on experience of material planner and purchaser. The stocking policy and stocking level is not appropriate. The ordering policy is not established. Information sharing between two sections who mainly involve in inventory management is missed. Non-appropriate

inventory level then occurs as a result and transforms to high inventory level, low customer service level, and shortage materials when production need. Consequently company has to effort higher cost, for example, operational costs to management inventory, production cost on waiting for shortage materials, etc.

CHAPTER IV

PROPOSED INVENTORY MANAGEMENT SYSTEM DEVELOPMENT

This chapter focuses on the development of the proposed system. First, the conceptual design is discussed. Then the detailed design discusses three major components of the proposed inventory management system.

4.1. Conceptual Design of Proposed System

4.1.1. Solution Concept

According to the causes of inappropriate inventory level due to lacking of inventory policy and information sharing presented in the previous chapter, they can be grouped into two problems that require improvement. So two strategies are proposed as a solution concept:

1) Establishing the inventory policy since the company under studied lacks of inventory policies to be guidelines of inventory management. The company need guideline to determine how much to stock, when to release a purchase order, and how much to order.
2) Develop tools for sharing material information between material planning section and purchasing section. Due to lacking of information flow between material planning section and purchasing section. Many important data are not shared between the two sections. So the tools to share information between two sections will help better communication on inventory system of firm.

4.1.2. Constraint of Proposed Inventory Management System

Ideally every organisation expects to serve customer at 100 percent service level with zero expenditure on inventory. In reality, company under study faces many constraints on managing inventory. In general, organisations hold inventory to serve customer's demand. However, there are many constraints effect the decision on inventory policy.

1.) Limitation of storage area of inventory
2.) Deterioration of inventory value especially obsolescence
3.) Cycle time of imported materials and fabrication items from local are shorter than supplier's lead time

4.) Customer's demand has project based characteristic which consume materials as bulk, this leads to fluctuation on customer's demand

5.) Delivery uncertainty of raw material supply from supplier

6.) Purchasing quantity constraint which is agreement between company under study and supplier for not to replenish less than minimum order quantity or lot size quantity.

4.1.3. Key Success Factors in the Proposed Inventory Management System

The key factors to measure the success of proposed system are:

1. Appropriateness of inventory level: These data indicate the efficiency of managing inventory level which can be measure in three aspects:
   (1) Customer service level: This data is measured to indicate how well imported material is managed against the demand fluctuation to serve customer's requirement.
   (2) The availability of material when transfer to production line: This data indicate the level of local inventory management in order to improve productivity of production line.
   (3) Inventory level at month end: At the end of each month, inventory level has to be measured to show the performance of inventory management and calculate the inventory turn over for the duration that inventory sufficient to supply.
2. Improvement of information sharing between each party: The newly developed tools for sharing inventory information should be indicated the benefits that users get from the tool.

4.2. Detailed Design of Proposed System

Detail of developing proposed inventory management system is considered in three parts as described below:

1.) Developing inventory policy by study the current inventory policy, analyse the existing procedure, define the problems, and propose the solutions for establish new inventory policy.

2.) Establishing working procedure for proposed developed model. The working procedure should identify responsible person, time frame, and criteria.

3.) Establishing tools to monitor inventory level and be the central data for material planning section and purchasing section.

4.2.1 Inventory Policy Development

Establishing production plan, material planner has to consider the availability of material, capacity, and manufacturing constraint. Company under study has assemble-to-order environment so the production plan is arranged from the demand of customer order which is independent demand. Thus, production plan is an important input of the inventory management flow. Material planner has to prepare raw materials to serve production plan since

4.2.1.1. Current Inventory Policy

The demand in production plan shows a rolling schedule which material planner has to update data weekly. The rolling production plan is normally released every Friday evening when all orders of the week are concluded. Material planner will then generate Material Requirement Plan (MRP) on Monday morning. All materials which are not sufficient to support the plan have to be realised and purchaser has to issue purchase order within Monday afternoon. Between these processes, there will be a manual adjustment by purchaser due to purchasing quantity is not in line with purchasing quantity constraint. In addition, experience and feeling of purchaser on each item also effects the adjustment. On Tuesday, purchase orders will be released to each supplier after got approval from Logistics manager. Materials will be transferred to production line one week before delivery date. Delivery commitment between company under study and its customers is 3 weeks after receiving order. This means that supplier has lead time only 12 days to produce materials which unrealistic for most of materials. This is the main reasons why company under study has to hold inventory. From the study, the inventory level of company under study is not appropriate due to problem of high inventory but always short of materials.

The major problems can be identified after analysis the current procedure. The company under studied does not have appropriate inventory policy to have stock to serve customer's demand. The safety stock is not available for every model. The company reserve stock only for major customer who place order frequently.

When there is any requirement from customer, material planner will check the availability of imported material set and confirm to produce only when imported materials available.

The local materials are not checked the availability at the beginning step. If imported material is not sufficient to serve the demand, material planner has to check when the material will be available and customer will decide whether to confirm the order or not. Some sets of materials are ordered as stock before the arrival of demand. In addition, the safety stock includes only standard materials not includes accessory items. The number of buffer stock can be supplied only 3 weeks average since average lead time of local materials is 3 weeks. However, the demand from customer is not exactly like what available in stock. It is too risky to prepare materials equals to the average lead time of supplier. In addition, for the fabrication items which usually need longer lead time than 3 weeks, stock out can not avoid. The stock out event when demand arrive also effects to the supply of other materials since urgent purchase order has to interrupt supplier's schedule. In contrast, for items with shorter lead time than 3 weeks, ordering the complete set of local material is one reason of high inventory level. Some items used commonly in many models, controlling materials as group of parts leads to unnecessary inventory problem. To solve this problem, it is necessary to collect the actual lead time of supplier to determine the stocking policy and replenishment quantity of each item.

It is important to establish a policy as guideline for everyone who involve in managing inventory go to the same direction. Data has to be reliable and commonly used.

4.2.1.2. Proposed Solution for Establishing Inventory Policy

From the current situation and problem of inventory management of company under studied. Classifying group of inventory according to ordering characteristic and find the appropriate inventory level to control for each item is a proposed solution for effective inventory management. Since each item has different ordering constraint, analysing ordering condition of them and classifying them to control in suitable way is better and more effective than control them as a group of materials.

Managing inventory as individual item will improve ordering time not to order too early or too late. Currently, the replenishment will be done only when demand arrives. In addition, for the fabrication items which usually need longer lead time than 3 weeks, stock out usually happens. The stock out event when demand arrive also effects to the supply of other materials since urgent purchase order has to interrupt supplier's production schedule. In contrast, for items with shorter lead time than 3 weeks, ordering

the complete set of local material is one reason of high inventory level. Some items used commonly in many models, controlling materials as group of parts leads to unnecessary inventory problem. The company under studied has to hold item with short lead time for too long duration while part with long lead time always short of supply.

4.2.2. Procedure for Developing Inventory Policy

4.2.2.1. Classification of Materials

The inventories under study have several items with different source of supply. The source of supply can be divided into two main suppliers: foreign supplier, and local suppliers. The inventory management of items for these two sources are different since ordering characteristic and part supply performance is different. In addition, managing imported items will affect to the agreement of ordering between inter-company which already set to use the same regulations and can not be changed. Local materials can be divided into three sub-groups regarding the purchasing constraint on order size of local material since it affects to inventory policy. The details of material management are described below:

1.) Imported material: Imported materials are materials that order from headquarters located in Germany. Materials in this group are managed as group part. A group part means all parts that assembled to complete one model of cabinet. One group part has every item for each model of cabinet. All imported materials can be managed as group parts since all materials are ordered under the same conditions. It is reasonable to apply the same inventory policy to all imported items.

2.) Local material: Materials in this group is managed by individual item. Local materials have different supplier, different lead time, and different purchasing constraint. Under the different order conditions, the local materials have to be managed by individual item. The conditions of purchasing constraint on order size also affects to the inventory policy of local materials. This means that local material can be classified into three sub-groups on basis of purchasing quantity constraint:

   - Local materials without order size constraint: Materials in this group can be ordered at any quantity more than zero.

- Local materials with minimum order quantity constraint: All materials under this condition are fabrication items. Materials in this group have the contract between the firm and its vendor to place each order at least not less than the minimum quantity agreed on contract.
- Local materials with standard packing size: Materials in this group have to be ordered as lot size.

4.2.2.2. Inventory Policy Selection

Inventory management under stochastic demand situation unless two basic questions about order point order quantity need to be considered, when to replenish is another question to consider. Under probabilistic demand situation, reviewing period plays an important role. Too short reviewing period leads to high expense while too long reviewing period may leads to stock out. In this system, safety stock should be set in order to against late reviewing action. The company under study has limited storage area; the order-up-to-level model should be considered in setting up the inventory policy first. The support reason is the that with order-up-to-level policy, information of the maximum inventory level of each item is determined, planning for storage area of each item is possible.

1) Imported Materials

Imported material has the following constraint on reviewing status and ordering process:

1) The replenishment process is complex since managing director has to approve the inventory level of imported materials at the end of every month.
2) Cut off all transactions and backorder to monitor the inventory level will be done at the end of every month. Thus, the time between orders is constant, but the size of the order is up to the quantity used in that month.
3) The purchase order should be placed once a month for the reason on transportation cost.

According to the above reasons, continuous review is not suitable since it will cause high cost in reviewing inventory level. Periodic review is more practical for this material group. Order-up-to-level is selected for imported material due to the storage area is limited. Additionally, material planners confirm customer's order by using the availability

of imported material, so imported material is a vital factor to serve the customer demand. By this nature policy, it requires higher safety stock than continuous review because the period over which safety protection is required is longer, the stock level has the opportunity to drop appreciably between review instants without any reordering action being possible in the interim. It is reasonable to control them to always be at maximum level to sufficient enough to serve unexpected demand. Additionally, the lead time of imported material is relatively long with high cost of shortage. The urgency of order to serve customer demand is rarely possible except airfreight case. So, the purchase order should be placed instantaneously when the inventory level drops from maximum level.

In conclusion, the system in consideration involves periodic review and a variable replenishment quantity is placed of sufficient magnitude to raise the position to the order-up-to-level (maximum) S. Order-up-to-level policy is to bring the inventory up to the target level with each shipment.

2) Local Materials

Materials in this group are managed by individual item. According to the working method of company under study which the allocation of material for new order will be concluded at the end of every week. Then, material planners will allocate material for all order and check the availability status of all materials weekly that is likely to have a continuous situation. Order-up-to-level policy is applicable for limited storage area constraint. The major policy selected for local material with stochastic features is reorder point, order-up-to-level (s,S). This part is propose the calculation to determine the appropriate minimum and maximum inventory level (s,S). The system that is considered involves continuous review and replenishment is made whenever the inventory position drops to the order point (minimum) s or lower. A variable replenishment quantity is placed of sufficient magnitude to raise the position to the order-up-to-level (maximum) S. The (s,S) system is referred to as a min-max system because the inventory position, except for possible momentary drop below the reorder point, is always between a minimum value of s and a maximum value of S. In addition, this system is to control quantity of inventory. It is better than system that is to control quantity of inventory in periodic review. That is it provides the same level of customer service while requiring less safety stock. Even though continuous review system are in terms of expensive reviewing costs and reviewing errors, but lower opportunity to have shortage cost.

The (s,S) policy is applicable for all local materials without order quantity constraint. Local materials under the different purchasing conditions on order size should be managed by different inventory policies. Local materials can be divided into three subgroups according to the purchasing agreement between the company under study and its suppliers. The purchasing quantity constraint is applicable only for local material. Some items have the minimum order quantity constraint while some items do not. Some local items have standard packing size and the quantity of order have to multiply by the size of standard packing. The purchasing constraint effects to the quantity of order placing each time. This means that local material can be classified into three sub-groups;

(1) Local material without order size constraint

The (s,S) policy is applicable for all local materials without order quantity constraint.

(2) Local material with minimum order quantity constraint

Materials under this constraint has conditions that the quantity of order each time is not less than minimum order agreed with supplier. The system that is considered involves continuous review and a minimum replenishment quantity is placed whenever inventory level drops to reorder level, s. Whenever the order desired order quantity is less than minimum order quantity, then the replenishment has to be raised to minimum order quantity. This case, the inventory policy applicable reorder point and fixed order quantity (s,Q).

(3) Local material with standard packing size

Materials under this constraint have conditions that materials have to be ordered equals to an integer multiply by standard packing size or lot size. The System that is considered involves continuous review and a standard lot size of replenishment is placed whenever inventory level drops to reorder level, s. The policy suitable for materials in this group is (s,Q).

4.2.2.3. Model Development

There are many aspects that might be uncertain including the lead time, the quantity that is actually received given the amount ordered, or the amount demanded in any time

interval. It is impossible to provide analytical results for the most general case. Here only uncertainty in demand and lead time will be taken into consideration.

Order-up-to-level = Base stock or Reorder point + Order quantity

Where;

Base stock or Reorder point = cycle stock + safety stock

The base stock equation is provided for the sake of completeness. The base stock equation has two terms: (1) cycle stock; and (2) safety stock. The cycle stock is the amount of inventory that must held during the reorder period plus the lead time of the part in order to service average daily demand. The safety stock is the amount of inventory that needs to be held to buffer against daily demand fluctuation about the average and supplier lead time is variability.

Assuming normally distributed daily demand, the Z value determines the number of standard deviations of protection that the safety stock will cover. The Z value corresponds to a desired customer service level, where "customer service level" refers to the probability that any given customer order can be filled from inventory on any given day. For example, a customer service level of 95%, which corresponds to Z value of 1.64 means safety stock protection of one standard deviation above the average (μ).

In general, the safety stock equation is appropriate under only certain conditions. For example, when daily demand is very unpredictable and forecasting is extremely difficult, the reorder point equation works very well. If demand forecasts are accurate, there is no reason to employ the base stock model. Also, when a high customer service level is desired, the base stock model is applicable.

The company under studied fit these criteria. Demand forecasts for these items have been inaccurate. Also, a high customer service level is required to prevent a cabinet from not shipping on time due to a shortage material. Thus, the reorder point equation was chosen as the inventory decision engine behind the inventory management model. However the reorder point for periodic review differs from continuous review so the model which developed for imported and local materials have different safety stock model.

1.) Imported Materials

The inventory control system used is one that involves Periodic Review, and Order-up-to-level (R,S). Every R days the inventory is reviewed, and an order is placed to raise the inventory position to S. This order is available for consumption L (a random variable) days following the review.

According to Silver, Pyke, and Peterson 1998;

$$s = (\mu_L + R)\mu_D + Z\sqrt{(\mu_L + R)\sigma_D^2 + \mu_D^2\sigma_L^2} \qquad (4.1)$$

Where μ_D is the mean of monthly demand

μ_L is the mean of lead time in monthly basis

σ_D is the standard deviation of monthly demand

σ_L is the standard deviation of lead time in monthly basis

Z is the customer service level

R is the period of inventory reviewed in month

Safety stock in periodic review

(1) Probability of stock out is the probability demand in R+L exceeds the order up to level, S.

(2) Assume demands in different periods are independent.

2.) Local Materials

All three groups of local materials use common stocking policy;

$$s = \mu_L\mu_D + Z\sqrt{\mu_L\sigma_D^2 + \mu_D^2\sigma_L^2} \qquad (4.2)$$

Where μ_D is the mean of monthly demand

μ_L is the mean of lead time in monthly basis

σ_D is the standard deviation of monthly demand

σ_L is the standard deviation of lead time in monthly basis

Z is the safety factor at desired service level

Safety stock in continuous review

3.) Probability of stock out is the probability demand in L exceeds the order up to level, S.

4.) Assume demands in different periods are independent.

According to Silver E.A. and Peterson R. (1985), when all transactions are of unit size then every order is of size (S-s) and is placed when the inventory position is exactly at the level s. Thus an order point can be

$$Q = S\text{-}s \qquad (4.3)$$

Where Q is order quantity

S is order-up-to-level

S is reorder point

S and s are computed in a sequential procedure as follows:

(1) The Q expression of Equation (4.3) is set equal to the economic order quantity (EOQ)

(2) Reorder point,s, is calculated from equation (4.2)

(3) Finally, the order-up-to-level (S) value is given by S = s + Q

The Concept of EOQ

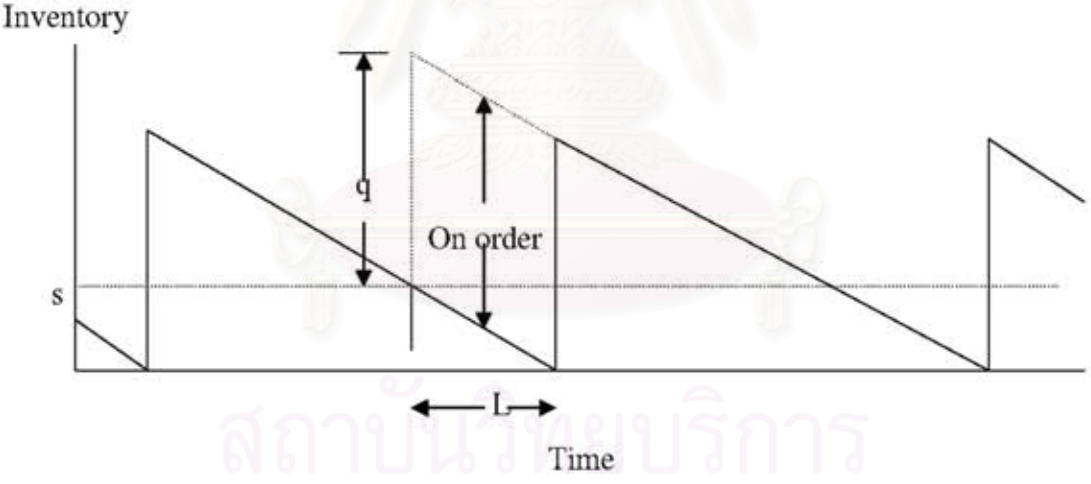


Figure 4.1: Basic Fixed Order Quantity Model

Economic Order Quantity (EOQ) Model: EOQ is a model that defines the optimal quantity to order that minimises total variable costs required to order and hold inventory. The purpose of the EOQ formula is to determine the order quantity that will minimise the sum of ordering and holding costs per unit time. Figure 4.1 shows that when inventory position drops to point s, an order quantity (q) is placed. This order is received at the end of time period L, which does not vary in this model.

$$Q^* = \sqrt{\frac{2CR}{PF}} = \sqrt{\frac{2CR}{H}}$$

Where Q* = optimal order quantity

C = cost per order event (not per unit)

R = monthly demand of the product

P = purchase cost per unit

F = holding cost factor; the factor of the purchase cost that is used as the holding cost (this is usually set at 10-15%, though circumstances can require any setting from 0 to 1)

The inventory policies for local materials under different purchasing constraint are different and can be classified as flowchart shown in Figure 4.2;

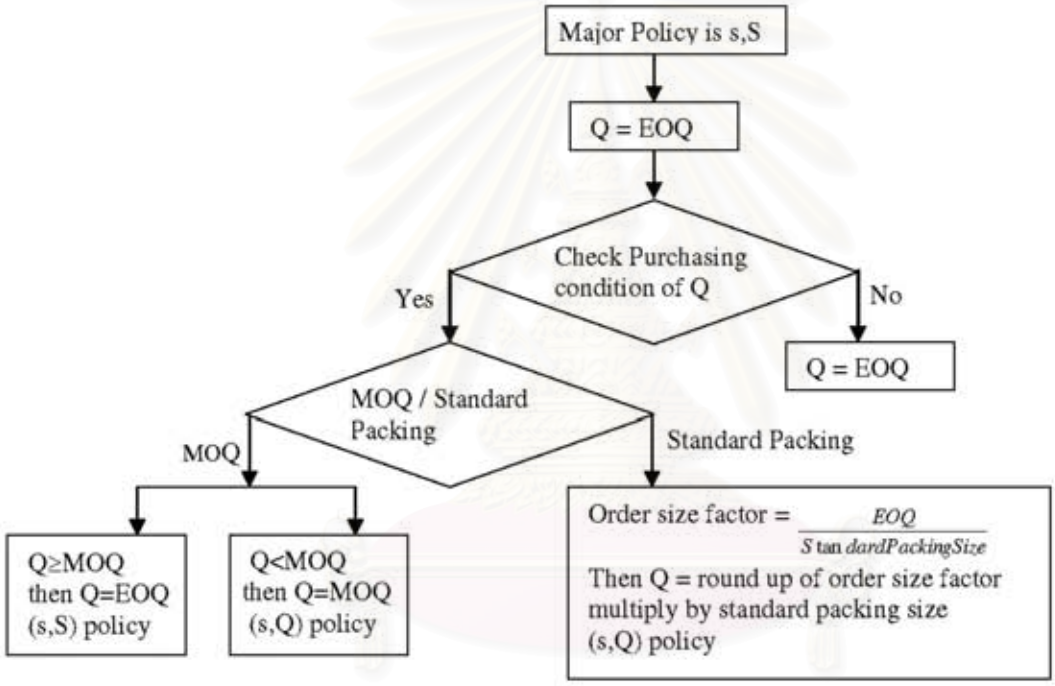


Figure 4.2: Flowchart of inventory policy for local material classified by ordering constraint

4.2.2.4. Input Parameters for Inventory Model

1.) Company's desired service level: This service level against a stock out is specified. Currently, the service level of company under studied is 93% measured from shortage value. The purpose of this study is to improve service level, so the service level is determined to be 95%. This means that the company under studied admits to be out of stock 5 percent.

2.) Lead time (L): Lead time, in this study, is the interval time after the order is placed for the raw materials, reached the plant, passed quality checking and ready

for manufacturing. This value can be downloaded from Macola under Inventory Transaction module.

3.) Monthly demand: Monthly demand is the monthly usage of each item. The monthly demand data are collected from January 2005 to December 2005. The information of monthly demand can be downloaded from Macola under Inventory Transaction module.

4.) Standard cost: The standard cost of the items is used in this study. The standard cost of each item can be loaded from Macola under Inventory Location module.

5.) Purchasing contract: The contract on order quantity and standard packing size of order are used in the model. The information of purchasing contract can be loaded from Macola under Item Vendor module.

6.) Carrying cost: Carrying cost can be corrected from actual pay which accounting department can provide this cost. In general, carrying cost includes cost of the capital invested; the costs of deterioration, obsolescence, pilferage, insurance, and taxes; and the storage costs due to handling, security, space, and record-keeping requirements. The company under studied does not have the cost of taxes on inventory. Materials can keep in so long time and they always have issuing transaction. Loss cost (pilferage and breakage) is relatively low. The costs of deterioration and obsolescence are also not included. In this study, only three cost are considered, storage cost is take into consideration because the company under studied has to rent premise to store material, holding cost is included since material has to be managed while stored in the warehouse, and interest on capital is added to take into account the money that is required to maintain the investment in inventory. The detail of inventory carrying cost is listed below:

   a. Storage cost and handling cost: Storage and handling costs were determined from the following information.

   - Insurance
   - Premise rent
   - Operator in warehouse
   - Instrument and transportation
   - Security personnel

(2.) Interest on capital: Interest charge is added to take into account the money that is required to maintain the investment in inventory.

7.) Ordering cost: Ordering costs include the costs of all activities required in issuing a purchase order. They include the cost of writing the order, preparing specifications, recording the order, order follow-up, processing of invoices, and preparation of payment. In this study, ordering costs are composed of communication cost, supply cost, stationary, automation repair, traveling, and administration cost.

4.2.3. Work Flow of the Proposed Inventory Management System

4.2.3.1. Work Flow for Set up Inventory Policy

Inventory policy is an important part of inventory management since users of the system have to know that at what level the stock should be and how to control stock at the satisfied level. In order to control inventory effectively, there are three input data must be considered, customer's demand, suppliers lead time, and purchasing constraint. The inventory control policy has to be considered annually since at the end of each year there is a reviewing process which will review the company's result of each year and expected result for the coming year. Sale department, engineering, material planning, and purchasing play an important role for inventory control process as shown in figure 4.4. The inventory policy process which is newly developed can be concluded as below.

1. Sale has to provide the demand plan and propose to company's management for the coming year.

2. Management will set the company expected growth rate according to the demand plan of coming year offset by actual demand of current year and deployed as a company's policy.
3. Engineering has responsible to provide the part list that they will do localize for the coming year.
4. Material planner has to classify new group of material according to source of supply by refer to the proposed local part list from engineering.
5. Material planner has to arrange the forecast data of all material according to actual demand data of current year multiply by company's expected growth from management's policy.
6. Material planner will send the demand information of every item to purchasing by classifying source of supply.
7. For imported material, purchaser will send demand information to Germany as forecast. For local material, purchaser will sort type of material and send the list of each type including desired quantity to potential suppliers who have capability to produce the part in order to get the quotation. Each part has to be sent to at least two suppliers for comparison in further process.
8. Purchaser has to negotiate with suppliers and compare the quotation among all suppliers to get the best purchasing condition.
9. Purchaser will conclude all purchasing price and conditions and offer to Logistics manager to get approval.
10. After getting approval from Logistics manager, purchaser will update purchasing price and conditions to database.
11. Material planner will then classify local material according to purchasing condition regarding to information in database that purchaser updates.
12. Material planner will select and apply suitable policy for each material group.
13. Material planner will download all transactions of actual supplier lead time and demand from order received which happen in the current year.
14. Material planner will determine the average and standard deviation of customer's demand and supplier's lead time from the downloaded data of current year in order to calculate reorder point for the coming year of each material.

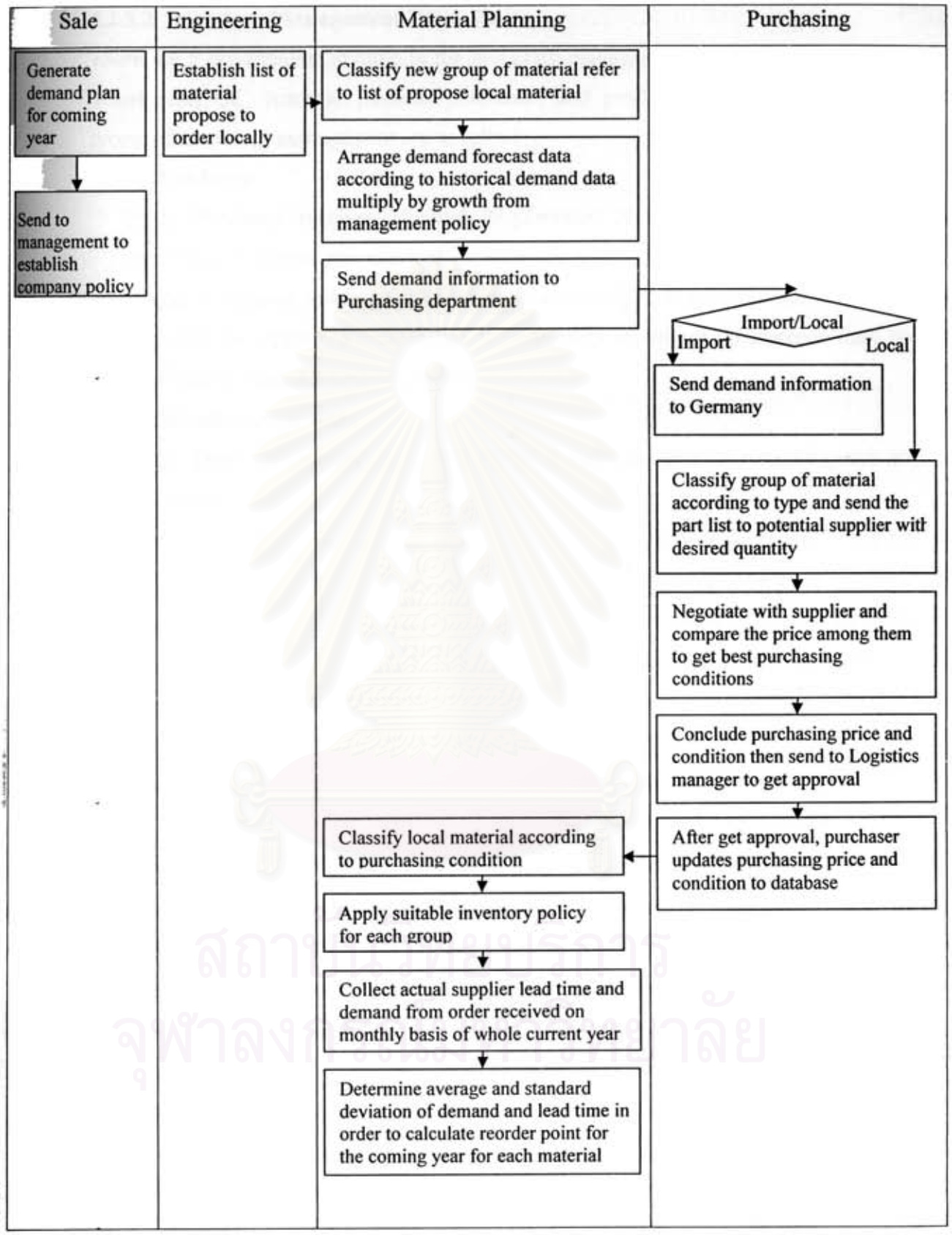


Figure 4.3: Work Flow for Set up Inventory Policy

4.2.3.2. Inventory Management Work Flow

There are 5 departments involve in the inventory management process flow which are Warehouse, QC, material planner, purchaser, and production. The procedures for proposed inventory management are as follow:

1. Purchaser

Input: Purchaser receives Material Requirement Plan from material planner to purchase insufficient raw material.

Output: Purchaser will issue purchase order according to Material Requirement Plan and send to supplier. Purchase has responsibility to follow up material until the conforming materials arrive warehouse.

2. Warehouse operator

Input: There are two inputs of raw material and one input of finished goods for warehouse

1.) Receiving material from supplier with invoice. Store operator has to check the item and quantity refers to purchase order then send the invoice to QC in order to check the specification of material before receive them into database. After QC check material and accept it, warehouse operator will then update material receiving into database and issue receiving report. After that warehouse operator will keep the material in stock.

2.) Material return from production with material return form which QC already checked condition of material. Warehouse operation will then update receipt in the database and keep the material in stock.

3.) Receiving finished product from production line after the product is completed. The warehouse operator will then update receiving into finish goods stock.

Output: There are two outputs of raw material and one output of finished goods from warehouse

1.) Transfer material to production line according to picking list from material planner. The picking list is the list of material from bill of material used in manufactured the refrigerator. After transfer to production line, warehouse operator will then update issuing of material into database.

2.) Transfer material to production line according to material issue form which is the material requisition from production line. After transfer the requested material to production line, warehouse operator will update the material issue into database.

3.) Load finish goods and send to customer's site or port. Warehouse operator will update issuing of finished goods into the database and generate delivery order form.

3. Quality control (QC)

Input: There are two input of raw materials for QC

1.) Receiving invoice of incoming material from warehouse operator in order to check the conformity of material. If the material specification conforms to standard specification, QC will stamp accept on the invoice. If the material is not conformed to standard specification, QC will stamp reject to the invoice. The invoice with stamp will then return to warehouse operator for further process.

2.) Receiving material return form from production request in order to check the condition of returned material that whether it conform to standard specification to keep in stock.

Output: After check material from supplier, QC will issue incoming report and inform material planner and purchaser for information and action for further process.

4. Production line

Input: Production will receive raw material from warehouse to produce the refrigerator. After production receives raw material from warehouse, production starts the production process according to production plan that they have received from material planner.

Output: Finished goods would be the output of production process.

5. Material Planner

Input: There are two types of input for material planner:

1.) Demand from customer

2.) Inventory level from store and material status from purchaser

Output: Material planner utilizes the data from all functions to generate the material requirement plan and picking list.

The difference between existed and proposed inventory management procedure is that the proposed process will abate the complex of replenishment process. The proposed system contains all necessary information for ordering process and these data are shared between relevant function as shown in Figure 4.5 that the information will flow in two ways. There are 6 new information paths generated for the proposed system. Material

planner and purchaser will share information of inventory policy together as shown in path A and B. The inventory policy will be deployed to warehouse section in order to plan storage area and QC section in order to determine the standard sampling quantity for inspection process. Purchaser will update the purchasing quantity constraint to inventory database. This information is used to determine the inventory policy and shared between material planner and purchaser. Lastly, QC will send inspection information to purchaser once complete inspection process for promptly action.

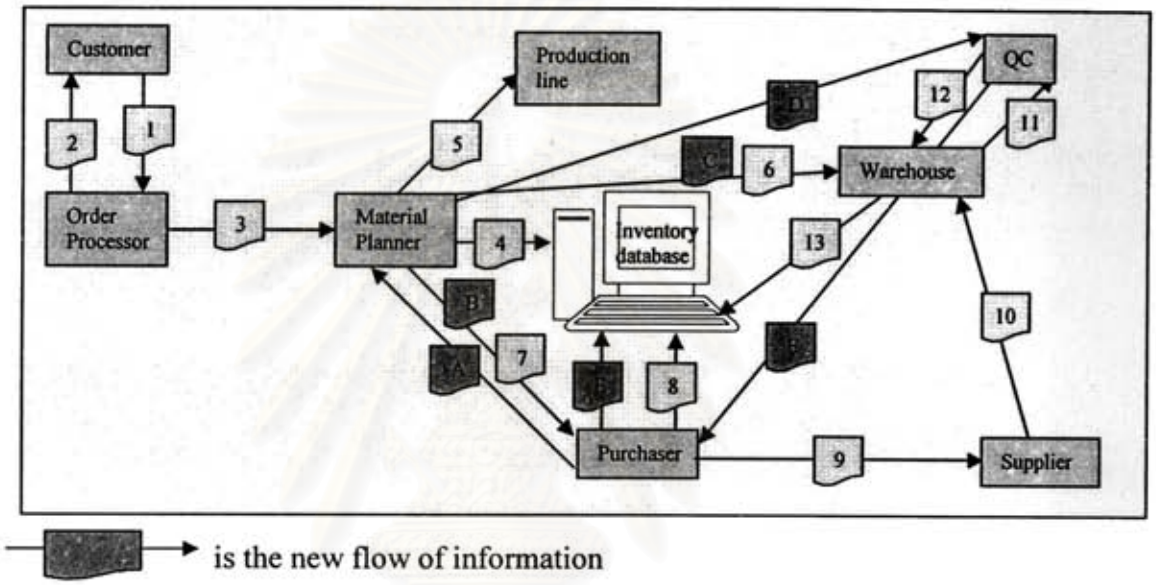


Figure 4.4: New Inventory Management Information Flow

The direct benefits go to material planner and purchaser. Material planner releases the requisition at appropriate time with reasonable quantity which already considered the order size constraint. Purchaser can release purchasing order at the requested quantity. The existing replenishment process, purchaser has to manually check information from quotation contract which is complex and high risk of error. Purchaser can not rely on the requested quantity from material planner and has to resort to self experience while developed process purchaser can rely on requested quantity. The information replenishment are completely provided and do not have to be re-checked. The determination process on lead time and replenishment quantity is standard and reliable.

The indirect benefit of the developed system goes to both warehouse and QC. Warehouse can plan the storage area for each material since maximum inventory level of each item is determined. QC will have the information of replenishment quantity, so they can calculate figure of quantity to random check material while the present process QC has to calculate every time for the quantity to random check in each lot.

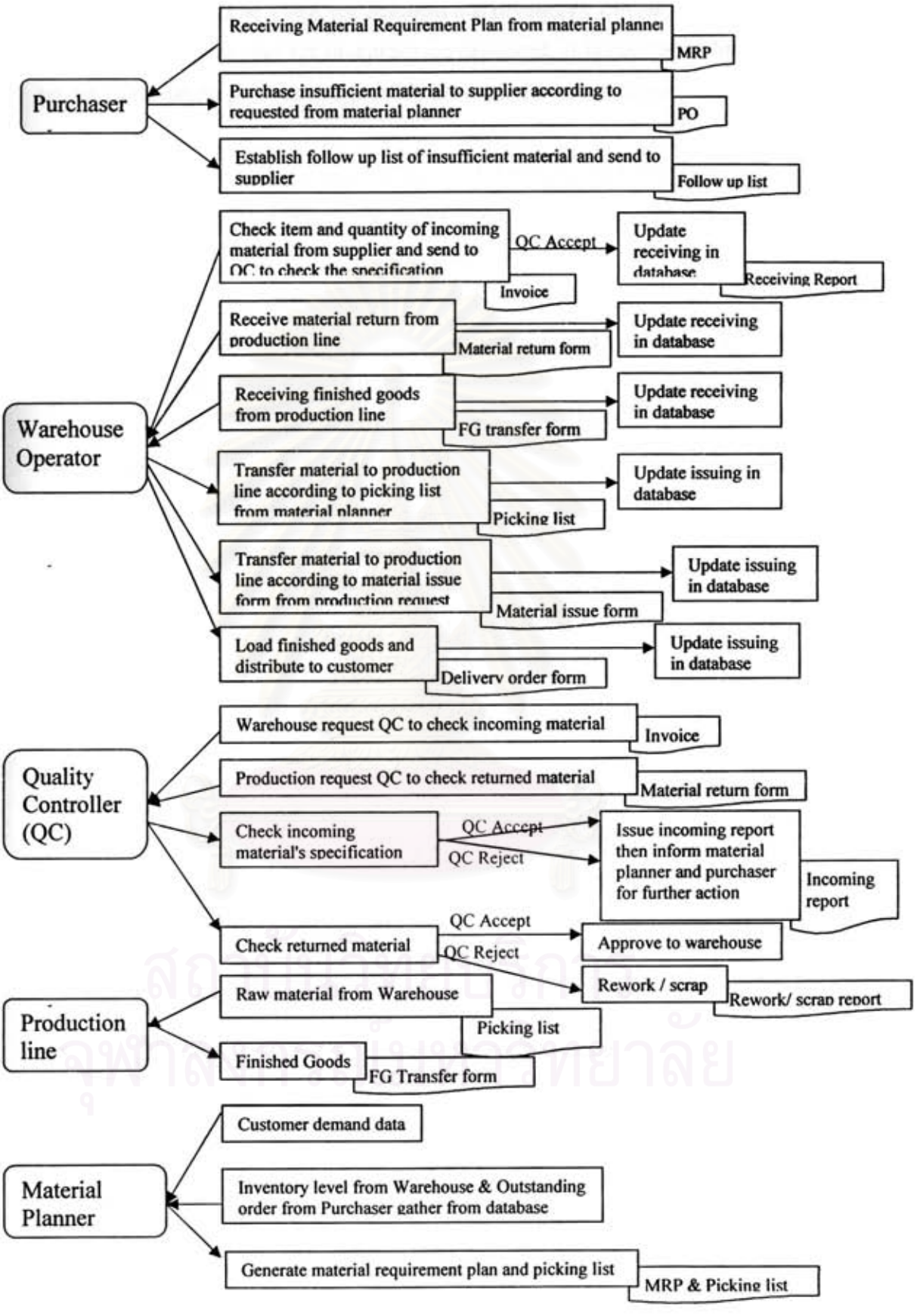


Figure 4.5: Inventory Management Process Flow

4.2.4. Development of Tools for Monitoring Inventory Levels

After develop the model for inventory management, it is crucial to link the developed process to existing process and provide the tools for users to integrate the existing data and developed data. Inventory levels monitoring tool is developed on Microsoft Access Version 2000 and will be commonly used between material planning section and purchasing section. The purpose to develop this tool is to monitor the inventory level and remind users when to release the replenishment and how much to replenish. In addition, this tool will contain data for sharing between two sections as guidelines of material replenishment. Material planner, purchaser, and warehouse key operator play important role for this tool since input data has to be updated by these three parties.

The inventory monitoring tool is weekly arranged by material planner by processing data which gathered from inventory database. The input of inventory database are from material planner in allocation material according to customer's order, inventory policy which calculated by material planner at the set up stage, purchasing quantity constraint which set up by purchaser at the beginning stage, inventory status which warehouse key operator has to update the item transactions.

4.2.4.1. Designing Database Management

In general, completed tool for monitoring inventory level consists of input, process, and output. The input data will be gathered from the existing system that used in current working day. Process to get output has to be carefully desired from expected output. What we want to get as an output and how we can transfer input to be desired output.

1.) Input data

The input data concerning in inventory management is specific data of each item or item master, demand from customer, inventory status, item purchasing condition, inventory status. These data can be gathered from existing system. These data has to keep updated by material planner, purchaser and warehouse key operator. The additional requirement from out put is inventory policy to remind replenishment to users. Thus inventory policy data has to be added in the new table.

2.) Procedure to output

The expected output is the report represent item need to be replenished and how much to order. The time to replenish is determined by inventory level versus reorder point. Inventory level means inventory available on hand plus outstanding order offset by demand. If inventory level of any item is equal or lower than reorder point, the report will represent the status of that item with expected order quantity. Since there are various inputs which can be downloaded from database, the important step is to integrate all input into same table by using the application of Microsoft Access Version 2000. The details of integrating all input data are shown in Appendix F.

3.) Database output

The output database is the tool to measure inventory level so the result should represent the inventory status of what current inventory level is, what is expected to be ordered, how much the order should be, and when it should be arrived the plant. These data should show in the inventory report to be the shared information for users to work in the same direction.

4.2.4.2. Description of the Model

The inventory level monitoring model was written as a Microsoft Access version 2002 and applicable for local material management. As the simulator walks to the existing current data for each item, it performs the following tasks:

1.) Use the master and transaction files loaded from Macola.
2.) The shared information which material planner and purchaser need to know as guidelines for inventory level will be shown in the report including reorder point, replenishment quantity, maximum inventory level, and average usage of previous year.
3.) If the inventory level of any part is lower than reorder point, the part will be existed in the report and suggest the appropriate replenishment quantity.

For example, assume the current inventory level for an item was 20 pieces on-hand and 5 pieces on-order. The quantity allocated for backorder is 15 pieces. The reorder point is 10 pieces and maximum inventory level is 25 pieces. The inventory level of this item reached reorder point. The report would then show this part as the parts need to be replenished with quantity of 15 pieces.

CHAPTER V

EVALUATION OF THE PROPOSED SYSTEM

In this chapter, the evaluation of the proposed model from previous chapter is discussed. The input data and source of data are defined. The proposed solution and strategy are inventory policy, inventory management, and tools for monitoring inventory level. Finally, this chapter shows the output of the developed system.

5.1. Inventory Management for Refrigeration Manufacturing

There are three processes to developed inventory management system for refrigeration manufacturing as follow:

1. Development and construction of inventory policy for establishing inventory control method and inventory level:
2. Development of inventory management process for establishing material flow in order to improve inventory efficiency.
3. Tool for monitoring inventory level is considered to implement as one of inventory management components as a common database in order to work in same directions.

5.2. Establishing Inventory Policy

The purpose of inventory policy is to control inventory at the appropriate level. The inventory policy requires the attention and commitment of high level management, since the policy directly affect to the customer's satisfaction. The plan to implement inventory policy is by following steps:

1. Explain cause and effect: There are many causes that effect on inventory problem, one significant cause is inventory policy, as explain in chapter four that the stocking policy of company under studied is not appropriate. The following are effects:
    (1.) Part supply shortage
    (2.) Low inventory turn over ratio
    (3.) Missing commitment with customer
    (4.) Low efficiency of production

2. Proposed solution: The solution is to establish appropriate inventory policy as a guideline for everyone who involves in inventory management process follow to the same direction.
3. Illustrate the Benefit: This is the most important part to attract the attention of company's management. The benefits are as follows:
    (1.) Effective supply management both for company and supplier
    (2.) Increase customer satisfaction
    (3.) Increase inventory turn over which means high return of investment
    (4.) Increase production efficiency

5.3. Inventory Management Construction

5.3.1. Classification Items

This study considers raw materials based on ordering characteristics and defined them according to source of supply into two groups which are imported material and local material. It means that ordering costs of materials in the same group are the same. The two groups are discussed and applied the different inventory policy.

The study considers raw materials which are supplied from both foreign and local vendors. These two major groups of materials are defined into family groups according to the purchasing contract. The steps of defining parts into the group are as follow;

1.) There are 15,580 parts existed in the computer system but only 1,008 items are used at present. These 1,008 items are listed from bill of material from 37 models used at present both standard parts and accessories. The rest are installation materials, service materials, and items that used in old models. So only 1,008 items are selected to verify the transactions of 2005.
2.) According to the transactions history of the 1,008 items listed, there are 123 items with no issuing movement. This means that there are only incoming transaction from purchase order since the models were launched at the first time but there are no outgoing transactions from stock list. After analyse the reason of non-movement, it was found that 123 items are the specific parts used in 11 models (from 37 models listed) which customer never required and 23 items are accessories which never sole. The 11 models which will be taken out of control list are listed below:

i. 380036 MONAXIS 73.188 B3 DL
ii. 380037 MONAXIS 73.250 B3 DL
iii. 380038 MONAXIS 73.375 B3 DL
iv. 380042 MONAXIS 73.188 B4 DL
v. 380043 MONAXIS 73.250 B4 DL
vi. 380044 MONAXIS 73.375 B4 DL
vii. 380296 MONAXIS 73.188 B4 DLZ
viii. 380297 MONAXIS 73.250 B4 DLZ
ix. 380298 MONAXIS 73.375 B4 DLZ
x. 380263 METHOS 74.188 A4 L
xi. 820367 IRIOS SG3.188 B8

Next step is to reconfirm with salesperson of every account that these models will not have requirement from customer in the future. It is reasonable to take these 145 items out of the final inventory control list. Finally there are only 862 items in the inventory control list.

3.) The listed 862 items can be divided according to source of supply into two groups, imported material with 350 items and local material with 512 items. List of imported and local material are shown in Appendix B, table B1 and B2 respectively.

4.) Local materials can be divided into three groups according to purchasing constraint:

(1.) Local materials without minimum order quantity constraint: Materials in this group can be ordered at any quantity more than zero. This group has 411 items.

(2.) Local materials with minimum order quantity constraint: Materials in this group have the contract between the firm and its vendor to place an order at least not less than the minimum quantity. This group has 50 items.

(3.) Local materials with order multiple quantity constraint: Materials in this group have standard packing size. This group has 51 items.

5.3.2. Input to the Inventory Management System

The output of inventory management system is order quantity (Q), reorder point (s), and order-up-to-level which needs many input parameter to achieve these data.

5.3.2.1.Usage Rate of Item

Usage data of each item can be collected from historical demand. After collecting the demand data, it is necessary to find average usage and standard deviation of them. These data are needed to determine the safety stock level of assemble-to-order environment. There are two kinds of raw materials, one is imported materials, and the other is local materials. The materials have to be classified by source of supply because these two groups apply different management policy.

1.) Imported material: Imported materials are controlled as group. Even though there are 27 models but it can be divided into 9 groups since some models have same bill of materials of imported parts. The details of each group are shown in Table 5.1. Monthly demand, standard deviation of usage, and maximum demand of imported materials control as product group is shown in Appendix C table C1. The demand data of imported material is collected from Macola database by gathering data of cabinet supply in the transaction history. The data should be classified by month.

Product Group	Product_Code	Product_Description
MONAXIS 73.188 B3/B4 D	380033	MONAXIS 73.188 B3 D
	380034	MONAXIS 73.188 B4 D
MONAXIS 73.250 B3/B4 D	380035	MONAXIS 73.250 B3 D
	380039	MONAXIS 73.250 B4 D
MONAXIS 73.375 B3/B4 D	380040	MONAXIS 73.375 B3 D
	380041	MONAXIS 73.375 B4 D
METHOS 74.188	380228	METHOS 74.188 A3
	380232	METHOS 74.188 A3 L
	380259	METHOS 74.188 A4
	380473	METHOS 74.188 A4 LZ
	380469	METHOS 74.188 A4 Z
METHOS 74.250	380229	METHOS 74.250 A3
	380233	METHOS 74.250 A3 L
	380260	METHOS 74.250 A4
	380264	METHOS 74.250 A4 L
	380474	METHOS 74.250 A4 LZ
	380470	METHOS 74.250 A4 Z
METHOS 74.375	380230	METHOS 74.375 A3
	380234	METHOS 74.375 A3 L
	380261	METHOS 74.375 A4
	380265	METHOS 74.375 A4 L
	380475	METHOS 74.375 A4 LZ
	380471	METHOS 74.375 A4 Z
IRIOS SG3.250 B8	820368	IRIOS SG3.250 B8
IRIOS SG3.375 B8	820369	IRIOS SG3.375 B8
IRIOS SG3.CE183 B8	820370	IRIOS SG3.CE183 B8

Table 5.1: Product Group of Imported Materials

2.) Local material: Local materials are controlled as individual item since each of them has different ordering characteristics. The usage data of each item is collected from Macola database in transaction history of item and classified by month from 1/1/05 to 31/12/05. Standard deviation of usage, and maximum demand of local material without order size constraint, with minimum order quantity constraint, and with standard packing size constraint are shown in Appendix C table C2.

Table 5.2 shows a sample of the first set of data for four items. The part numbers for each item are listed as the row headers. The number of items shipped on each business month is contained in the cells of the table. For the study, there were 875 items and 12 business months.

Part No	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
848778	2	12	13	17	17	13	0	0	0	8	6	6
856488	94	33	63	36	44	69	56	81	62	35	24	0
882053	30	19	29	49	6	16	29	46	35	41	0	12
373119	167	76	92	60	136	131	75	82	23	30	21	24

Table 5.2: Sample of Monthly Demand Data for Inventory Management Model

The monthly demand data extracted from the Macola databases is actually the monthly shipment quantity for each item. Because of stock-outs and other problems, shipments are occasionally missed, which means that daily shipment quantity is not equal to monthly customer demand for a given item. However, because the records of shortage materials which need to be shipped follow the cabinets are available. These records can be used to adjust the raw data from Macola. In addition, actual customer demand data was not available. Thus, the monthly demand data is an approximation; however, it is an accurate and unavoidable approximation.

5.3.2.2.Lead Time

Lead time, in this study, is the interval time after the order is placed for the raw materials, reached the plant, passed quality checking, and ready for manufacturing. Raw materials are supplied from two major locations: Germany (foreign supplier), and Thailand (local).

Lead time data is gathered from Macola database by counting lead time of each item. After having lead time of each item, the next process is to solve average lead time and standard deviation of lead time in order to calculate safety stock level. The average lead time of foreign supplier is 85.011 with standard deviation of 14.437 days or average lead time equals 2.834 with standard deviation of 0.481 month. The average lead time and standard deviation of lead time for foreign supplier is applied to all imported items. The lead time of local materials is specific value for individual item and shown in Appendix C table C2.

Table 5.3, which is a table containing sample of the purchase order transactions in 2005.

Part No	Description	Std cost	P/O date	Receive dt	Lead time (day)
868913	Bracket Upper	32.00	10/1/2005	9/2/2005	31
868913	Bracket Upper	32.00	12/2/2005	15/3/2005	31
868913	Bracket Upper	32.00	24/4/2005	14/5/2005	20
868913	Bracket Upper	32.00	8/8/2005	17/9/2005	40
861843	Fan Panel-03 26	838.5	25/6/2005	31/7/2005	36
861843	Fan Panel-03 26	838.5	1/9/2005	3/10/2005	32

Table 5.3: Sample of Purchasing Transaction in 2005

5.3.2.3.Probability of No Stock Out (P) or Customer Service Level

Probability of no stock out in a cycle is specified by improving from historical data. The probability of no stock out in 2005 is collected from counting number of time that company under study received the customer's inquiry. Then counting on the number of time that customer's orders are refused or postponed delivery according to imported material is not available. The customer service level of 2005 is 93%. In this study the purpose is to improve service level, so P is assumed to be 95%. This means that the company admits to be out of stock 5%. A customer service level of 95%, which corresponds to Z value of 1.64 means safety stock protection of one standard deviation above the average (μ).

5.3.2.4.Standard Cost

Standard cost is the cost of raw materials at the manufacturing process. The most recent cost is used in the model. This cost includes unit price of each item at the time of

purchase, and landed cost for imported materials. The unit price is collected from Macola database which purchaser has to update purchasing price whenever the new agreement between company under study and supplier is approved by Logistics manager. In general, both imported and local materials are updated once a year.

Standard cost = Landed cost factor X Purchase cost

Landed cost consists of transportation and freight cost, duty, insurance, and clearing expense. Landed cost of imported materials can be classified according to material types which have different duty rate into 5 groups:

1.) Duty rate 1%, landed cost factor equals to 1.198288
2.) Duty rate 10%, landed cost factor equals to 1.301986
3.) Duty rate 15%, landed cost factor equals to 1.359596
4.) Duty rate 20%, landed cost factor equals to 1.417206
5.) Duty rate 30%, landed cost factor equals to 1.532426

5.3.2.5.Purchasing Contract

Purchasing contract is the agreement of purchasing condition between a case study company and its suppliers. Purchasing contract contains lots of information which existed in the quotation. Here only the constraint on order size is considered. The constraint on replenishment quantity can be divided into two characteristics. First, the minimum order quantity which usually is a constraint on fabrication items which have to consider the set up cost. Second is standard packing size or lot size which is a constraint on small parts such as nut, screw. These data are collected from the quotation which available in purchasing department. The detail of purchasing contract is shown in Appendix D.

5.3.2.6.Bill of Material

Bill of material (BOM) information includes usage of each model. The materials are classified by usage into two groups which are standard and accessories. Standard materials are part that have to be assembled in the refrigerator with a fixed item and fixed quantity. Without standard parts, the refrigerator may not work properly. Accessory materials are part that customer has to inform when need them. Accessories are added for many reasons, for example, characteristics, performances, capacity area, etc. Even without accessories, the refrigerator can work properly. BOM data can be gathered from

Macola database and may be updated whenever engineering sends the changing note. BOM of 26 controlled models are shown in Appendix B table B1 and B2 for imported and local material.

5.3.2.7.Carrying cost

According to Smith S.B. (1989), holding costs are the costs that increase with the size of inventory. In this study, the ration of average carrying cost will be calculated by average storage and holding cost of inventory per year is divided by average inventory level of whole year.

The expenses due to storage and holding cost of inventory occurred in 2005 is described below:

- Insurance = 186,203.72 Baht
- Premise = 1,540,800 Baht
- Operator in warehouse = 1,336,320 Baht
- Instrument and transportation = 147,000 Baht
- Security personnel = 480,000 Baht

Total of storage and holding cost = 3,690,323.72 Baht

Average inventory level of whole year = 54,447,927.20 Baht

$$\text{Ratio of Average holding cost} = \frac{StorageCost}{AverageInventoryLevel}$$

$$= \frac{3,690,323.72}{54,447,927.20} = 0.0678 \text{ Baht/Baht/Year}$$

$$= 6.78\%$$

Interest on capital invested in inventory = Internal rate of return

= Money Loan rate =8%

Carrying cost = Interest on capital invested in inventory + Ratio of average carrying cost

= 8% + 6.78% = 14.78% per year = 1.232% per month

5.3.2.8.Ordering cost

Ordering costs are the costs that increase with the number of ordering. In this study, ordering cost includes:

- Communication cost: Cost of communication between company under studied and supplier for example, telephone cost, facsimile cost. Communication cost is 580,678.96 Baht
- Supply cost: Supply cost is cost for material used in preparing the order which can be used only once for example, papers, stickers. Supply cost is 121,322.55 Baht.
- Stationary cost: For example pen, CD-Rom. Stationary cost is 86,012.76 Baht.
- Automation repair: Cost of maintenance and repair the automation which used in ordering process for example, computer, folk lift. Automation repair is 377,757 Baht.
- Traveling cost: This cost includes cost for employees of the company travel to supplier's plant for outsourcing purposes. This cost does not include material carry cost from supplier's plant to company under studied since all materials supplier will absorb the delivery cost. Traveling cost is 122,631 Baht.
- Administration cost: This cost includes wages of everybody involves in purchasing process. Administration cost is 2,456,000 Baht

In 2005, there are 60,661 items issuing in the purchase order.

$$\text{Ordering cost} = \frac{OrderingExpense}{NumberOfItemInPurchaseOrder} = \frac{3,744,402.27}{60,661} = 92.589 \text{ Baht/item}$$

5.3.3. Model developed to the Inventory Management System

5.3.3.1.Imported materials

Inventory policy for manage the imported materials is periodic review on monthly basis. The order-up-to-level for imported materials can be calculated by the following equation:

$$s = (\mu_L + R)\mu_D + Z\sqrt{(\mu_L + R)\sigma_D^2 + \mu_D^2\sigma_L^2}$$

Example of order-up-to-level calculation for product group: MONAXIS 73.250 B3/B4 D is shown below:

From Appendix C table C1, Demand for MONAIXS 73.250 B3/B4 D in 2005 is shown as the Table 5.4 below which were taken from Appendix C table C1:

Product Group	Demand (pieces/ month)

Product Group	Demand (pieces/ month)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MONAXIS 73.250 B3/B4D	2	10	15	8	27	13	0	0	0	8	2	10

Table 5.4: Example of demand in 2005 for MONAXIS 73.250 B3/B4 D

Average monthly demand: $\mu_D = 7.917$ pieces/month

Average monthly lead time: $\mu_L = 2.834$ month

Standard deviation of monthly demand: $\sigma_D = 8.017$ pieces/month

Standard deviation of monthly lead time: $\sigma_L = 0.481$ month

Customer service level at 95%: $Z = 1.64$

Period of inventory review: $R = 1$ month

$$S = (2.834 + 1)7.917 + 1.64\sqrt{(2.834 + 1)(8.017)^2 + (7.917)^2(0.481)^2}$$

$$= 56.845 \approx 57 \text{ pieces}$$

In conclusion; MONAXIS 73.250 B3/B4 D will be controlled at the maximum level 57 pieces and review period is once a month. Whenever the inventory level drops to or below this figure, the order should be placed to raise the inventory level to order-up-to-level.

5.3.3.2.Local Materials

1.) Local Materials with order size constraint

Inventory policy for manage the local materials without order size constraint is continuous review and order-up-to-level. The reorder point for local materials can be calculated by the following equation:

$$s = \mu_L \mu_D + Z\sqrt{\mu_L \sigma_D^2 + \mu_D^2 \sigma_L^2}$$

Example of reorder point calculation of AS FOAM BODY 375 METHOS 74, part no: 856488 is shown below:

From Appendix C table C2, Demand for 856488 AS FOAM BODY 375 METHOS 74 in 2005 is shown as the Table 5.5 below which was taken from appendix C table C2:

Item_No	Des	StdCost	Demand (pieces/month)											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
856488	AS FOAM-BODY 375 METHOS 74	7945.630	94	33	63	36	44	69	56	81	62	35	24	0

Table 5.5: Example of demand in 2005 for 856488 AS FOAM BODY 375 METHOS 74

Average monthly demand: $\mu_D = 49.750$ pieces/month

Average monthly lead time: $\mu_L = 1.658$ month

Standard deviation of monthly demand: $\sigma_D = 26.161$ pieces/month

Standard deviation of monthly lead time: $\sigma_L = 0.872$ month

Customer service level at 95%: $Z = 1.64$

$$s = (1.658)49.750 + 1.64\sqrt{(1.658)(26.161)^2 + (49.750)^2(0.872)^2}$$

$$= 172.562 \approx 173 \text{ pieces}$$

$$\text{EOQ} = \sqrt{\frac{2CR}{H}} = \sqrt{\frac{2x92.589x49.75}{7945.63x0.012}} = 9.83 \approx 10 \text{ pieces}$$

Order-up-to-level, S = s + Q = 173 + 10 = 183 pieces.

In conclusion; 856488 AS FOAM BODY 375 METHOS 74 will be controlled at the maximum level 183 pieces and whenever the inventory level drops to 173 pieces or below this figure, the order should be placed to raise the inventory level to order-up-to-level.

2.) Local material with minimum order constraint

Inventory policy for manage the local materials with minimum order constraint is continuous review. The policy applied for this material type can be divided into two cases. The reorder point for local materials can be calculated by the following equation:

$$s = \mu_L \mu_D + Z\sqrt{\mu_L \sigma_D^2 + \mu_D^2 \sigma_L^2}$$

Example of reorder point calculation of AS PLUG W/CABLE MALE, part no: 866407 and AS PLUG W/CABLE, part no: 866408 are shown below:

From Appendix C table C2, Demand for 866407 AS PLUG W/CABLE MALE and 866408 AS PLUG W/CABLE in 2005 are shown as the Table 5.6 below which was taken from Appendix C table C2:

			Demand (pieces/month)											
Item_No	Des	StdCost	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
866407	AS PLUG W/CABLE MALE	46.00	623	537	623	579	633	613	465	616	589	475	464	476
866408	AS PLUG W/CABLE	47.84	0	0	45	49	0	35	0	0	32	45	29	25

Table 5.6: Example of demand in 2005 for 866407 AS PLUG W/CABLE MALE and 866408 AS PLUG W/CABLE

(1.) Case of order quantity not less than minimum order quantity (Q≥ MOQ)

866407 AS PLUG W/CABLE MALE

Average monthly demand: $\mu_D = 557.75$ pieces/month

Average monthly lead time: $\mu_L = 1.283$ month

Standard deviation of monthly demand: $\sigma_D = 69.677$ pieces/month

Standard deviation of monthly lead time: $\sigma_L = 0.118$ month

Customer service level at 95%: $Z = 1.64$

Minimum order quantity: $MOQ = 100$ pieces

$$s = (1.283)557.75 + 1.64\sqrt{(1.283)(69.677)^2 + (557.75)^2(0.118)^2}$$

$$= 884.126 \approx 884 \text{ pieces}$$

$$EOQ = \sqrt{\frac{2CR}{H}} = \sqrt{\frac{2x92.589x557.75}{46x0.012}} = 432.559 \approx 433 \text{ pieces}$$

Order quantity: Q = 433 pieces which is more than minimum order quantity (MOQ).

Order-up-to-level, S = s + Q = 884 + 433 = 1,317 pieces.

In conclusion; 866407 AS PLUG W/CABLE MALE will be controlled at the maximum level 1,317 pieces and whenever the inventory level drops to 884 pieces or below this figure, the order should be placed at quantity at least 433 pieces to raise the inventory level to order-up-to-level.

(2.) Case of order quantity less than minimum order quantity (Q< MOQ)

866408 AS PLUG W/CABLE

Average monthly demand: $\mu_D = 21.667$ pieces/month

Average monthly lead time: $\mu_L = 0.900$ month

Standard deviation of monthly demand: $\sigma_D = 20.299$ pieces/month

Standard deviation of monthly lead time: $\sigma_L = 0.153$ month

Customer service level at 95%: $Z = 1.64$

Minimum order quantity: MOQ = 100 pieces

$$s = (0.900)21.667 + 1.64\sqrt{(0.900)(20.299)^2 + (21.667)^2(0.153)^2}$$

$$= 51.545 \approx 52 \text{ pieces}$$

$$\text{EOQ} = \sqrt{\frac{2CR}{H}} = \sqrt{\frac{2x92.589x21.667}{47.84x0.012}} = 83.6 \approx 84 \text{ pieces}$$

Order quantity: Q = 84 pieces which is less than minimum order quantity (MOQ). So order quantity in purchase order each time is 100 pieces.

Order-up-to-level, S = s + Q = 52 + 100 = 152 pieces.

In conclusion; 866408 AS PLUG W/CABLE has at the maximum level 152 pieces and whenever the inventory level drops to 52 pieces or below this figure, the order should be placed at fixed quantity 100 pieces.

3.) Local materials with standard packing size

Inventory policy for manage the local materials with standard packing size is continuous review and order quantity. The reorder point for local materials can be calculated by the following equation:

$$s = \mu_L \mu_D + Z\sqrt{\mu_L \sigma_D^2 + \mu_D^2 \sigma_L^2}$$

Example of reorder point calculation of HX NUT M8 DIN 934 IN 934, part no: 101937 is shown below:

From Appendix C table C2, Demand for 101937 HX NUT M8 DIN 934 IN 934 is shown as the Table 5.7 below which was taken from appendix C table C2:

			Demand (pieces/month)											
Item_No	Des	StdCost	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
101937	HX NUT M8 DIN 934 IN 934	0.6	493	816	868	468	744	726	609	543	774	850	476	283

Table 5.7: Example of demand in 2005 for 101937 HX NUT M8 DIN 934 IN 934

Average monthly demand: $\mu_D = 637.50$ pieces/month

Average monthly lead time: $\mu_L = 0.178$ month

Standard deviation of monthly demand: $\sigma_D = 185.634$ pieces/month

Standard deviation of monthly lead time: $\sigma_L = 0.051$ month

Customer service level at 95%: $Z = 1.64$

Standard packing quantity: $SPQ = 1000$ pieces

$$s = (0.178)637.5 + 1.64\sqrt{(0.178)(185.634)^2 + (637.5)^2(0.051)^2}$$

$$= 252.297 \approx 252 \text{ pieces}$$

$$\text{EOQ} = \sqrt{\frac{2CR}{H}} = \sqrt{\frac{2x92.589x637.5}{0.6x0.012}} = 4{,}049.194 \approx 4{,}049 \text{ pieces}$$

Order quantity: Q = 4,049 pieces

$$Orderfactor = \frac{OrderQuantity}{S\,\text{tan}\,ardPackingQuantity} = \frac{4049}{1000} = 4.049$$

Order quantity = round up of order factor multiply by standard packing size

= 5 x 1000 = 5000 pieces.

Order-up-to-level, S = s + Q = 252 + 5000 = 5,252 pieces.

In conclusion; 101937 HX NUT M8 DIN 934 IN 934 has maximum inventory level at 5,252 pieces and whenever the inventory level drops to 252 pieces or lower, the order should be placed at fixed quantity 5,000 pieces.

5.3.4. Output of the Inventory Management System

After classified the product group and select the suitable inventory control policy for each group, the output can be classified into three groups according to the different inventory

control policy. In Appendix D, table D1-D3 show the output of (R,S), (s,S), and (s,Q) management control policy respectively.

The maximum inventory level of all materials is 63,671,416.77 baht. Average cost for material assembled in one cabinet is 143,096.791 baht. This means that with maximum inventory level 444.953 cabinets can be produced. The total expected demand in 2006 is 1,809 cabinets. The average demand rate is 150.75 units per month. The maximum inventory is enough to produce cabinets for 2.952 months.

5.3.4.1.Inventory Management System of Imported Materials Under (R,S) Policy

The output of inventory management system for imported material will consider two factors: Order-up-to-level (S) and Maximum inventory cost. The inventory level of imported materials at maximum is 792 sets. The average demand rate is 150.75 units per month. This means that at the maximum inventory level, it enough to supply for 5.254 months. The maximum inventory cost of imported materials is 30,970,299.62 baht. The average cost of materials per cabinet is 36751.131 baht.

5.3.4.2.Inventory Management System of Local Materials Under (s,S) Policy

The output of inventory management system for local material under (s,S) policy has to consider three factors: reorder point (s), order-up-to-level (S), and maximum inventory cost. There are 417 items managed under this policy. The maximum inventory cost of material applied this policy is 29,047,574.4 baht.

5.3.4.3.Inventory Management System of Local Materials Under (s,Q) Policy

The output of inventory management system for local material under (s,Q) policy has to consider four factors: reorder point (s), order-up-to-level (S), order quantity (Q), and maximum inventory cost. There are 95 items managed under this policy. The maximum inventory cost of material applied this policy is 3,653,542.75 baht.

5.4. Result Evaluation Method

The method for evaluation the result of inventory management system is to compare the output of the actual system and proposed system. The simulation outputs from proposed system are compared with actual data.

5.4.1.Input Data

Input data will be gathered from two sources. For actual system, input data can be gathered from historical data from existing system. For proposed system, input data which have to be assumed and run the system under controlled conditions. Since the two system will be compared the result under same conditions, the input data between actual system and purposed system have to be the same. The beginning inventory level data should be noted:

1.) Beginning inventory level

The input data is the actual year end inventory of 2005 submitted by accounting department. The beginning inventory level will consider three factors:

(1) Stock on hand: The value selected is the stock on hand of year end 2005 minus quantity shortage from project 2005 which has not been sent to customer.

i. Quantity on order: Every purchase order which not been closed must be included in the system.

ii. Quantity allocated: This value is gathered from year end report of 2005. All quantity allocation is zero

2.) The effect of using beginning inventory level of actual system

Since the inventory level of actual system is not appropriate and not yet be managed, the consequences effect to proposed system can be listed as follow:

(1) Some items are too high, which is higher than maximum desired inventory level. In addition, these items have low demand rate from customer so the inventory level can not reduce as much as it should be. The total excess inventory value 18,136,556.29 Baht on 318 items both imported and local materials.

(2) Some items are too low, which is lower than reorder point so after these items are listed, replenishment has to be done to raise the inventory level of these items to maximum inventory level. Total inventory less than reorder point is 236 items and value at 16,760,445.94 Baht.

5.4.2.Evaluation Condition

Since the proposed system is established for testing the data, there are some different points from the actual system which should be noted.

(1) The demand data is taken from actual customer orders and collected in form of weekly demand not separate by project. This data is used to consider the availability of materials once production need.
(2) Inventory level of imported materials is monthly reviewed and assumed that the replenishment would be issued to supplier at the first date of every month.
(3) Inventory level of local materials is reviewed on weekly basis and assumed the purchase order would be placed on every Monday.
(4) Lead time from replenishment date until material available is average lead time.
(5) If the set of imported material is not sufficient to respond customer's order, the order will be denied.
(6) If the local material is not enough to complete the cabinet, the will be considered as urgent order and the part will arrive before cabinet ship out. This event is count as shortage materials.
(7) The month end of inventory will be measured at the end of every month to conclude the inventory level.

5.4.3.Duration of Testing

The duration of testing is 6 months in year 2006 since the demand is stochastic. The simulation should be taken to observe half year result.

5.4.4.Performance Indicator

1.) The customer service level: This data is measured from the event of imported material sets are sufficient to serve customer. The statistic data of failure in serving the customers demand i.e. refusing made to the customer order or postpone delivery schedule is the events that decrease the customer service level. In actual system, airfreight imported material set will be taken into account.

2.) The percentage of material availability when transfer to production line: This figure relates to the percentage of stock out.

$$\% \text{ stock out} = \frac{\text{Number of item shortage}}{\text{Number of all item supply}} \times 100$$

% of material availability = 100% - % stock out

3.) The inventory value remained after month end: The month end inventory level will measure only material available on hand but not include outstanding order. Inventory turnover is one parameter used to measure an inventory performance. In a case study company, inventory turnover means number of days that inventory available on hand is sufficient to supply. The inventory turnover is the result of inventory level which can achieve from the following equation:

$$\text{Inventory turnover} = \frac{\text{Inventory level}}{\text{Cost of sale per day}}, \text{ the figure is measured in day}$$

5.4.5. Comparison of the Results

The effective of inventory management both imported and local materials in year 2006 are tested in comparing between actual system and proposed system. There are three criteria which reflect the inventory management efficiency.

5.4.5.1.Comparison of the results on Customer service level

The demand in 2006 is fluctuated and relatively high compared to demand in year 2005. The quantity of cabinet supply is shown in Figure 5.1.

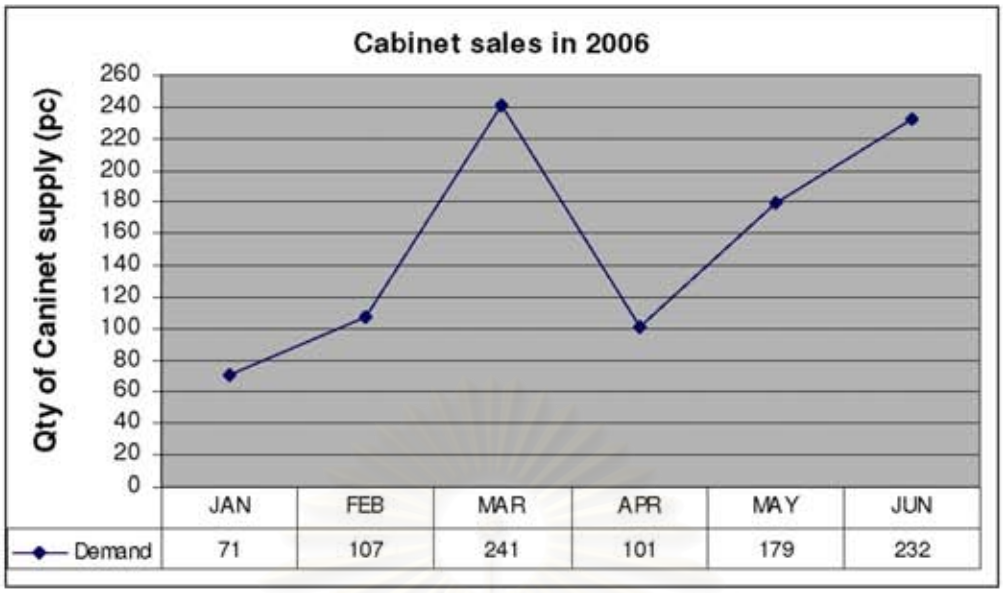


Figure 5.1: Cabinet sales in 2006

Month	Actual System	Proposed System	Difference
Jan	100.00%	100.00%	0.00%
Feb	100.00%	100.00%	0.00%
Mar	88.78%	88.78%	0.00%
Apr	71.54%	99.72%	28.18%
May	80.60%	100.00%	19.40%
Jun	94.06%	97.83%	3.77%

Table 5.8: Customer service level comparison

Figure 5.2: Customer Service level Comparison

From Table 5.8 and Figure 5.2, the customer service levels performance of the proposed system is higher than the result from existing system. The result of proposed inventory

management system shows significantly improvement on customer service levels compare to existing material management system. The failure in serving customer demand of proposed system occurs two times.

In March, customer service level is lower than the desired value which is 95% due to the beginning inventory level is lower than desired level. In addition, imported set of materials required 3 months lead time. The following models are short of supply, Monaxis 73.250, Monaxis 73.375, Methos 74.250, Methos 74.375, and Irios SG3.375 B8 which have high demand from customers since February and affect to the supply availability in March. In April, the situation of proposed system is better since the imported materials already arrived at the end of March so in April and May the supply company under studied can supply cabinets according to customer's demand. In June, the customer service level drops again since there is an unexpected demand from customer in Europe who never placed the order to company under studied. There are some accessories which have to be airfreight since it is not appeared in stock.

The main reason of failure in serving customer demand in March is the actual beginning inventory level is lower than desired level results in long lead time items is not sufficient to supply for demand during lead time.

5.4.5.2.Comparison of the results on material availability when production line needed

Month	Actual System	Proposed System	Difference
Jan	95.00%	96.88%	1.88%
Feb	93.97%	96.47%	2.50%
Mar	93.54%	97.65%	4.11%
Apr	94.47%	99.60%	5.13%
May	92.08%	99.46%	7.38%
Jun	93.60%	99.02%	5.42%

Table 5.9: Material availability on assemble date comparison

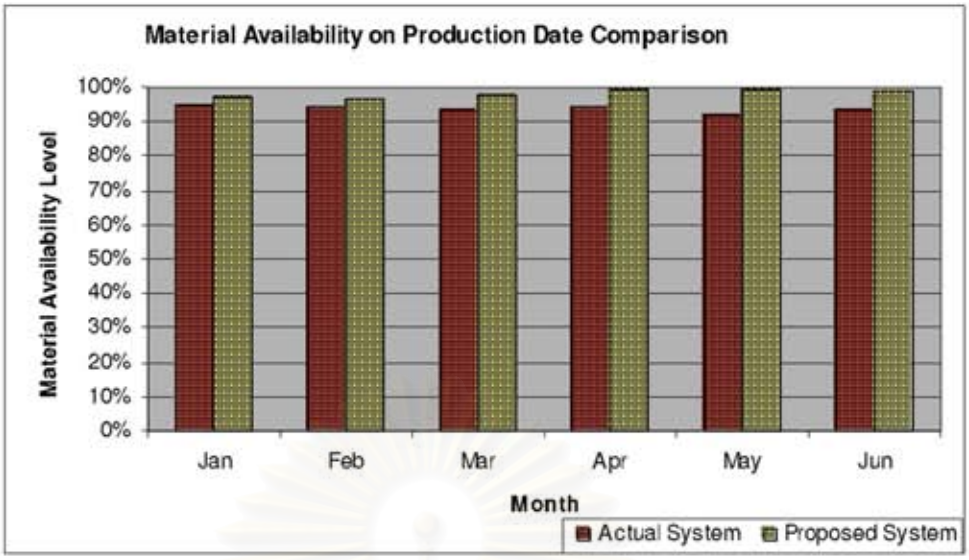


Figure 5.3: Material availability on production date comparison

From Table 5.9 and Figure 5.3, the data shown that material availability result of the proposed system is significantly higher than the result from existing system. The result of proposed inventory management system shows significantly improvement. The availability of material before production is directly increase the production efficiency since operating time is dramatically decreased. Operating time includes time the material planner and purchaser have to follow up the shortage materials, time that store operators spend on transferring shortage material to production line, and time that production operators waste waiting for shortage materials.

At the beginning stage, material availability on production date of both systems is low since the beginning inventory level is not appropriate. However, in January and February the material availability of proposed system is a bit better than actual system since there are some materials which have shorter lead time than 3 weeks arrived to serve production's demand in January, materials with lead time less than 8 weeks arrived to serve production's demand in February, and materials with lead time less than 12 weeks arrived to serve demand in March. In April, May, and June, the material availability results are dramatically increased since all materials which ordered since the beginning of system and between running system are already arrived.

5.4.5.3.The comparison of the results on inventory level at month end

The inventory level at the month end is measured to compare between actual and proposed systems are presented in Table 5.10.

Month	Actual system (Baht) All materials	Actual System (Baht) Only selected materials			Proposed System (Baht)			Diff (%)
		Month end of Imported material	Month end of local material	Month end of total material	Month end of Imported material	Month end of local material	Month end of total material	
Beginning	85,325,886.14	23224132.61	23,741,819.66	46,965,952.26	23224132.61	23,741,819.66	46,965,952.26	0.00%
Jan	83,873,429.06	23428042.28	23,317,593.54	46,745,635.82	22828042.28	23,145,281.79	45,973,324.07	1.65%
Feb	81,521,919.16	22762744.34	21,461,414.72	44,224,159.06	22,481,291.20	21,329,292.27	43,810,583.47	0.94%
Mar	72,094,244.63	23445589.79	21,591,059.74	45,036,649.53	14,449,529.75	23,941,564.94	38,391,094.69	14.76%
Apr	75,120,785.35	27517216.93	19,334,304.86	46,851,521.79	21,255,091.35	17,385,760.64	38,640,851.99	17.52%
May	74,919,174.24	26,130,761.20	15,376,206.09	41,506,967.29	18,564,462.13	16,300,806.11	34,865,268.24	16.00%
Jun	62,479,344.95	24492859.77	15,630,160.68	40,123,020.45	19,032,464.21	15,215,385.37	34,247,849.58	14.64%

Table 5.10: The Month End Inventory Level Comparison

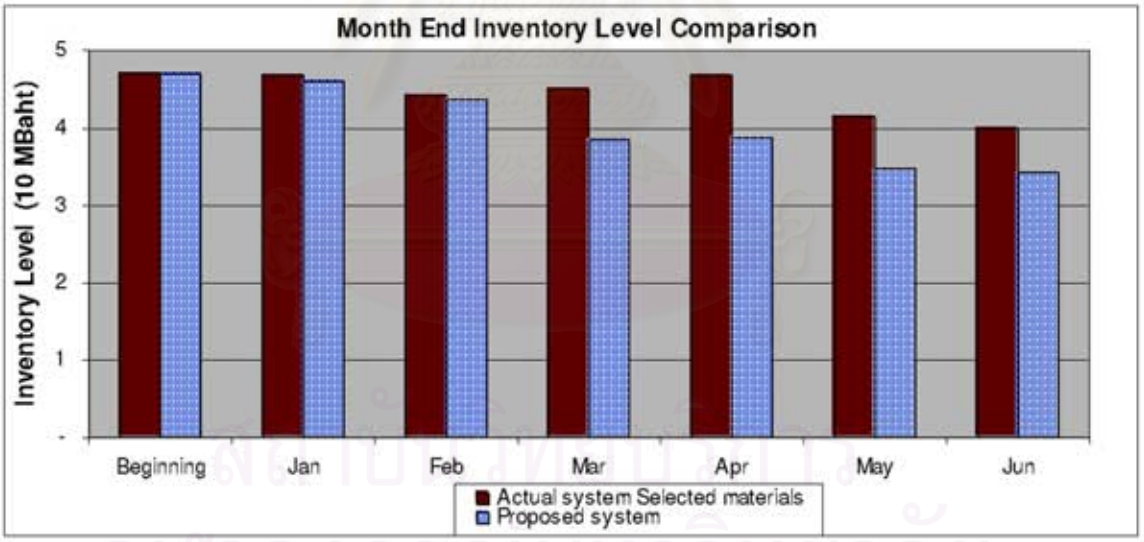


Figure 5.4: The Month End Inventory Level Comparison

The inventory turnover rate which the company under study measure in meaning of the duration in days that inventory on hand is available to supply. So the lower inventory turnover rate means the more efficient inventory management system. The comparison of inventory turnover between actual system and proposed system is shown in Table 5.11.

Month	Inventory turn over (days)	Difference

	Actual System	Proposed System	
Beginning	65.316	65.316	0.00%
Jan	65.009	63.935	-1.65%
Feb	61.503	60.927	-0.94%
Mar	62.633	53.391	-14.76%
Apr	65.156	53.738	-17.52%
May	57.724	48.487	-16.00%
Jun	55.799	47.629	-14.64%

Table 5.11: The Inventory Turnover Comparison

The result of inventory level at month end of proposed system is significantly improved comparing to existing system in both terms of inventory level and inventory turnover rate. The inventory can be reduced in the proposed system because the stock are controlled and managed by using the transaction history of each item and replenishment is made at suitable timeframe. Slow-moving items are kept at low level only to against unexpected demand and items with short lead time are not kept in stock for long time.

5.5.The Inventory Level Monitoring Tool

5.5.1. Data Source

The program created to be a tool to monitor the inventory level named "Inventory level.mdb". Source of data is Macola which is the operation system existing at the company under study. In order to link the data from Macola database to program there are two ways available. One is directly link the Macola database to the program and the other is load data from database to program. These two ways have both advantages and disadvantages and compared in table 5.12.

Even though directly link data from database is easier and faster way but the disadvantage of this method is very dreadful since the data on "inventory level.mdb" has affect on database. In case of any error, the database in system can be changed or mistaken without any trail. In addition, inventory level is monitored weekly and before monitoring the inventory level, material planner should ensure value loaded from system is cut off at the same project. Due to material level is control as per project but the part is issue per unit of refrigerator. Material planner has to check and reconfirm with key operator that all units of refrigerator already issue from stock

Direct link to Macola database	Load data from Macola database
Advantages: 1.) Data in the program is updated and promptly to use. 2.) Do not have to spend time to load data. Disadvantages: 1.) The data on "inventory level.mdb" affect to data on Macola database. If there is any change at the "inventory level.mdb", data on Macola database will be changed without trial.	Advantage: (3) Users are free to audit data at the "inventory level.mdb" file without affect on Macola database. Disadvantages: 1) Spend more time than directly link. Loading data from Macola database takes 5-10 minutes. 2) The process is more complicated. 3) Data cannot be used promptly. It has to be loaded update date.

Table 5.12: Comparison Advantage and Disadvantage Between Two Methods of Gathering Data from Macola Database

5.5.2.Input data

Input data to establish the inventory level monitoring tool have two sources. One is gathered from Macola database including master file and transaction file. The other is the new created file which uses data from inventory management system.

1.) Input from Macola database

a. Master file: There are two files which should be loaded only when there is any change in master data, for example, new item added, change primary vendor.

i. Product file: IMITMIDX_SQL

ii. Item vendor file: POITMVND_SQL

(2) Transaction file: There are three files which have to load whenever inventory level is monitored since the record of transaction files are always updated.

(i) Item Inventory Location: IMINVLOC_SQL

(ii) Production Order: POPORDLN_SQL

(ii) Purchase Order: POORDLIN_SQL

2.) New Created file: There is only one file which establish as Microsoft Access table in the inventory level tool. The data in this file contains information which material planning section and purchasing section want to share.

(1) Share information: inventory system (table)

5.5.3.Work Procedure for the Developed Inventory Management Tool

Step 1: After open the file Inventory Level Monitoring.mdb, the screen will be appeared as Figure 5.5.

Figure 5.5: The First Screening of the Program

From the first screen, there will be three parts for user to choose. The first part is for set up the inventory data which will be used only at the first set up of system and whenever there is a change on item inventory conditions. The second part is the process for user to input the demand data and select the project. Users will go to this part only when they want to change conditions of demand. The third part is report which is the part for user to generate the inventory report.

Step 2: Set up inventory data

When implement the proposed system, inventory set up data has to be filled as input data. These data need to be determined by material planner at the initial step before the system can start except for the Fixed_ord_qty field which purchaser has responsibility to review.

Inventory System : Table

Item_no	Item_desc_1	Reorder Point	Max_inv_lev	Avg_used	Fixed_ord_qty
848777	AIR BAFFLE PLATE CANOPY -03 AR	11	22	4	
848778	AIR BAFFLE PLATE CANOPY -04 AR	26	46	13	
848779	AIR BAFFLE PLATE CANOPY -06 AR	23	42	7	
861880	AIR BAFFLE PLATE LH BACK ARM/F	65	115	23	
861881	AIR BAFFLE PLATE MI BACK ARM/F	26	46	7	
861882	AIR BAFFLE PLATE RH BACK ARM/F	9	20	4	
861879	AIR BAFFLE PLATE RH BACKWALL A	28	64	17	
851507	AIR DUCT WALL LWR -02	184	299	41	
LM0529	AIR DUCT WALL LWR -02 (851507)	18	35	7	
851508	AIR DUCT WALL LWR -03	28	46	3	
LM0179	AIR DUCT WALL LWR -03 (851508)	3	5	0	
LM0530	AIR DUCT WALL LWR -03 (851508)	1	3	1	
855256	AIR GRID -02	221	400	85	
LM0141	AIR GRID -02 (855256) BLACK	85	172	26	
LM0533	AIR GRID -02 (855256) GREEN	14	31	6	
855257	AIR GRID -03	182	320	84	
LM0142	AIR GRID -03 (855257) BLACK	159	282	47	
LM0534	AIR GRID -03 (855257) GREEN	6	12	2	
857824	AIR-BAFFLE-WALL -02 ARM/F/S	118	200	35	
LM0531	AIR-BAFFLE-WALL -02 ARM/F/S (857824)	17	34	7	
857828	AIR-BAFFLE-WALL -03 ARM/F/S	17	49	3	
LM0532	AIR-BAFFLE-WALL -03 ARM/F/S (857828)	4	10	1	
874012	AIR-BAFFLE-WALL 125 LOWER METH	371	682	125	
LM0157	AIR-BAFFLE-WALL 125 LOWER METH (874012)	318	567	111	
LM0158	AIR-BAFFLE-WALL 125 MONAX/METH	78	137	14	
877067	AIR-BAFFLE-WALL 125 MONAX/METH (877067)	454	775	119	

Record: 1 of 512

Figure 5.6: Example of Inventory Set Up Data

Step 3: Process to select demand

- The first process: Import data all project

When there is demand from customer, material planner has to load data out from Macola system as excel file, then paste all data to the table shown in Figure 5.7 which is the summary of demand per project. This table will contain data of all projects. If users want to focus only on some projects, user can go to the next button.

T) ImportData_All_Project : Table

Modal	ProjNo	ProjName	ItemNo	Description	Uom	Loc	Bin	Qty
Monaxis	05J00092	Wellcome Hong Kong_165	101325	HX SCREW M 8X 90 8.8 DIN 931	PC	100		99
Monaxis	05J00092	Wellcome Hong Kong_165	101920	HX NUT M 4 DIN 934 IN 934	PC	100		972
Monaxis	05J00092	Wellcome Hong Kong_165	101935	HX NUT M 5 DIN 934 IN 934	PC	100		33
Monaxis	05J00092	Wellcome Hong Kong_165	101937	HX NUT M 8 DIN 934 IN 934	PC	100		198
Monaxis	05J00092	Wellcome Hong Kong_165	102103	WASHER 4,3 DIN 125 N 125	PC	100		477
Monaxis	05J00092	Wellcome Hong Kong_165	102105	WASHER 8,4 DIN 125 N 125	PC	100		330
Monaxis	05J00092	Wellcome Hong Kong_165	116125	WIRE H05V-U 1,00 BLACK	MT	100		72
Monaxis	05J00092	Wellcome Hong Kong_165	132032	WIRE H07V-K 1,5 GREE N/YELLOW	MT	100		33
Monaxis	05J00092	Wellcome Hong Kong_165	134646	CABLE CLAMP 470 0026	PC	100		66
Monaxis	05J00092	Wellcome Hong Kong_165	134655	LABEL PROTECTIVE GRO UND	PC	100		843
Monaxis	05J00092	Wellcome Hong Kong_165	135164	OVAL HEAD SC M4X10 4 .8DIN 7985	PC	100		9
Monaxis	05J00092	Wellcome Hong Kong_165	135166	SOCKET-HEAD SM SCREW 3,9X12 W/WASHER	PC	100		1783
Monaxis	05J00092	Wellcome Hong Kong_165	135167	PAN HEAD TAPPING SC 3,9X16DIN 7981	PC	100		0
Monaxis	05J00092	Wellcome Hong Kong_165	135169	PAN HEAD TAPPING SC 3,9X9,5DIN 7981	PC	100		0
Monaxis	05J00092	Wellcome Hong Kong_165	135176	SERRAT LOCK WASHER A 4,3 A2FDIN 6798	PC	100		1710
Monaxis	05J00092	Wellcome Hong Kong_165	135473	OVAL HEAD SC M4X16 4 .8DIN 7985	PC	100		33
Monaxis	05J00092	Wellcome Hong Kong_165	136034	OVAL HEAD SC M4X6 4. 8DIN 7985	PC	100		84
Monaxis	05J00092	Wellcome Hong Kong_165	136035	OVAL HEAD SC M4X12 4.8DIN 7985	PC	100		765
Monaxis	05J00092	Wellcome Hong Kong_165	137276	IDENTIFICATION STRIP -13-	PC	100		18
Monaxis	05J00092	Wellcome Hong Kong_165	138634	TEROSTAT TYPE XI-D	KG	100		45.69
Monaxis	05J00092	Wellcome Hong Kong_165	138780	RIVET 4,0 2,2-3,8	PC	100		1509
Monaxis	05J00092	Wellcome Hong Kong_165	139006	PAN HEAD TAPPING SC 3,9X16DIN 7981	PC	100		90
Monaxis	05J00092	Wellcome Hong Kong_165	139048	ALU-FOIL 30 W/ADHESI VE 9 MY	MT	100		23.13
Monaxis	05J00092	Wellcome Hong Kong_165	142475	HOLDER W/STARTER SUP PORT	PC	100		414
Monaxis	05J00092	Wellcome Hong Kong_165	142476	HOLDER 1.01.017	PC	100		414
Monaxis	05J00092	Wellcome Hong Kong_165	142831	WIRE H05V-U 1,00 (0, 75) BROWN	MT	100		43.35

Record: 1 of 5342

Figure 5.7: Example of demand data

- The second process: Select project

Select Project : Table

ProjName
Wellcome Hong Kong_165
Australia 36

Record: 1 of 2

Figure 5.8: Example of Project Selection

When users want to focus on some projects, users have to select the project by key in the project name as shown in Figure 5.8. The project name has to be exactly the same as project name in table ImportData_All_Project.

<u>Step 4</u>: Report of inventory monitoring

There are two reports available in the developed system. These reports need to be shared between material planner and purchaser in order to work in the same direction since the report contains all required inventory data.

- The first report: Project shortage report

Q) Project shortage report

ItemNo	Description	uom	OnHand	OnOrd	Allocated	vend	ord_no	Q_remain	req_dt	loc	SumUsage	ROP	Maxlevel	AvgUsed	FixedOrdQ	Q_Order
P_vend:	A0001															
834833	SHROUND 4,4 KLEBER P.B.	MT	84	0	0					100	9	9	45	7		46.5
P_vend:	C0001															
375777	MIRROR HOLDER 1047 (021021)	PC	10	0	0					100	4	6	14	2		14
857304	LIGHTING-RAIL-02 (022042)	PC	1407	331	0	C0001	4021530	331	20050901	100	300	1490	2044	574		2914
443254	BRACKET 500 20DEGREE	PC	945	1950	13	C0001	4021720	500	20050922	100	404	3219	5484	1513		6414
443254	BRACKET 500 20DEGREE	PC	945	1950	13	C0001	4021023	1200	20050707	100	404	3219	5484	1513		6414
443254	BRACKET 500 20DEGREE	PC	945	1950	13	C0001	4021074	100	20050704	100	404	3219	5484	1513		6414
443254	BRACKET 500 20DEGREE	PC	945	1950	13	C0001	4021021	150	20050427	100	404	3219	5484	1513		6414

Figure 5.9: Example of Project Shortage Report, Tool for Monitoring Inventory Level

This report is generated by material planner and sends the information to purchaser in order to make the replenishment of insufficient items. This report can be exported to analyze in excel format.

- The second report: Follow up report

This report is generated by material planner and sends to purchaser in order to follow up the status of insufficient items with supplier. The table will show quantity need in each project. Purchasers do not have to rework on the report as existing process but can use this report and send to supplier. The report is shown in Figure 5.10.

P_vend	ItemNo	Description	uom	OnHand	OnOrd	Allocated	vend_no	ord_no	qty_remaining	loc	request_dt	Welcome Hong Kong 165	Australia 36	Carrbour Issraapap	Lot SH_149 Ta Chalom	Reorder Point	Max_inv_lev	Avg_used	Fixed_ord_qty	Diff	Order Qty
C0001																					
	857824	AIR-BAFFLE-WALL -02 ARM/F/S	PC	30	56	0	C0001	481722	30	100	20050923	46				118	200	30		40	160
	LM0533	AIR GRID -02 (855256) GREEN	PC	10	0	0				100		8				14	31	2		2	29
G0001																					
	851507	AIR DUCT WALL LWR -02	PC	31	38	0	C0001	481454	8	100	20050817	46				184	299	42		23	276
	851507	AIR DUCT WALL LWR -02	PC	31	38	0	C0001	481454	8	100	20050817	46				184	299	42		23	276
H0016																					
	101325	HX SCREW M 8X 90 8.8 DIN 931	PC	4379	0	0				100		99	4	12	8	317	817	170	500	188	629
H0018																					
	101937	HX NUT M 8 DIN 934 IN 934	PC	1780	0	0				100		198	10	30	20	295	2295	638	2000	-101	2396
S0009																					
	LM0157	AIR-BAFFLE-WALL 125 LOWER METH	PC	115	113	0	S0009	481695	100	100	20050930		5			318	567	112		223	344

Figure 5.10: Example of inventory follow up report

5.5.4.Output

The proposed of output of inventory level monitoring is to be common information for material planner and purchaser to monitor and control the inventory level. This report is arranged by material planning section. Purchasing section can use this information as a guideline whenever the replenishment is made. The output data consist of following information:

1.) Replenishment items: The items which inventory level drop to reorder point or lower will be shown in the report as item needed to be replenished.

2.) Primary Vendor: The recommended supplier which the order should be placed.

3.) Inventory detail: This information includes inventory available on hand, quantity on order, and quantity allocated for sale.

4.) Outstanding order information: This information includes the number of outstanding order for each item, quantity outstanding, supplier code, and request date of outstanding order which stored as year_month_date as the general format stored in Access file.

5.) Project backorder: The demand of each item will be allocated per project. The sequence of project is sort by the delivery date.

6.) Output inventory level: This figure calculated from stock on hand plus quantity on order minus quantity allocated for sale and quantity allocated for project backorder. If the output inventory level of item drops to reorder point or lower, the item that needed to be replenished will show in the report. If the output inventory level of item is higher than reorder point, the item will not show in the report.

7.) Reorder point: This information shows to both material planning and purchasing section. The users can see how far output inventory level drops from reorder point and can predict the urgency of item required.

8.) Average usage: This information is provided for purchasing section to be guideline of order replenishment

9.) Maximum inventory level: This figure is a guideline for purchasing section to not order the item over the maximum inventory level.

10.) Fixed order quantity: This information is provided for convenience for purchasing section in case that the item has purchasing order constraint.

After the report are generated in Microsoft Access format, it is better to change the format to excel since it is more convenience to analyse the data in report and set up the report format.

5.5.5.Evaluating the Advantage and Disadvantage of Inventory Level Monitoring Tool Compare With the Existed System

The inventory level monitoring tool can provide user the guideline to control the inventory level. Since the existing working procedure, information provided to material planner and purchaser is not enough. Order fulfilment and inventory management practices in a case study company are non-uniform and manually intensive. Material planner and purchaser used their own experiences to decide quantity of replenishment and level of buffer inventory held against unexpected demand fluctuations. Now-uniform, manual inventory management practices resulted in higher inventory levels, low customer service, and higher operational costs than can be achieved with uniform, formal management practices.

Advantage

1. After all parameters involve in inventory management are determined, it is necessary to provide these information to users. This established tool contains important ordering information when users require. Purchasers can place orders with the help of order quantity and the reorder point for each item.
2. The established inventory level monitoring tools can break through the limitation of number of project including in consideration which is the

limitation in the existing system. The existing inventory level report has a limitation on number of project includes in consideration, not more than 10 projects can included when running each time.

3. Less number of items included in the list. The inventory level report will contain all materials which existed in the selected project while the established tool will show only the items which need to be replenishment.
4. User able to audit the data while the existing report does not allow.

Disadvantage

1.) The procedure of this tool is complicated for users since it has to go through many steps for loading the database before getting the final result.
2.) It spends longer time to generate the result compare to existing system. Since it is not process from the system directly, data has to be loaded before running program.
3.) Manually intensive since user has to select project by key-in project name, there is high risk to error.

CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

This thesis focuses on developing the inventory management system for an industrial refrigeration industry with assemble-to-order environment. The proposed system encompass establishing appropriate inventory policies for all parts, improving work flow and information flow, and establishing an inventory monitoring tool.

The major problem of the company under study is on inappropriate inventory level. There are three factors effect on inventory management. Firstly customer's demand, order fulfilment is project base which is stochastic highly fluctuated. Secondly supplier's delivery performance is not reliable. Thirdly, internal inventory management practices are non-uniform and manually intensive. Currently there is no certain policy on inventory management for material planner and purchaser. They have made decision regarding their own experiences to decide quantity of replenishment and safety stock level. Non-uniform, manual inventory management practices resulted in high inventory levels, low customer service, and high operational costs. In addition, lacking information shared between material planning and purchasing sections resulted in double-buffer stock, unrealistic supplier lead-time, too much replenishment quantity, and non-integrated replenishment quantity.

The research started with analysing the existing inventory management system, identifying the causes of the problem and then proposed the solution concepts in order to improve the performance of inventory management system. In the proposed system, material control is established to show items under control. These items are listed from BOM of current models. The list has 862 items under control. These wide variety of materials is then classified into group according the source of supply i.e. imported material and local material. Imported material has only one supplier, so common ordering conditions and lead time can be applied to all items in this group. Thus, it is reasonable to manage them as group of materials. Local materials are provided by various suppliers which have different ordering constraint and different lead time. Thus, items in this group should be individually managed.

Then, appropriate inventory policies for each item group are selected by based on storage area constraint, purchasing quantity constraint, and material reviewing frequency. Suitable inventory policies both ordering and stocking policies are applied to each material group. The major policy selected is order-up-to-level since the case study company has limited storage area. Knowing maximum inventory level information will help warehouse operator to plan storage area. In addition, the safety stock is set to accompany with customer demand fluctuation and supplier unreliable delivery performance. Imported materials have complex ordering process which periodic review is more practical for them. The (R,S) system is applied to imported material with inventory review period once a month. The materials supplied from local supplier should be classified by different purchasing constraint since it effects to ordering policy. The local materials can be divided into three groups which are local material without minimum order quantity constraint, local material with minimum order quantity constraint, and local material with standard packing size constraint. The (s,S) system is chosen for all local materials since local materials are reviewed continuously. Order quantity for local material is equal to economic order quantity. However, there are some items have constraint on minimum order quantity and some items have constraint on standard packing size which economic order quantity model is not applicable. Thus items with ordering quantity constraint are managed under (s,Q) system since the quantity at each order is fixed. The model implemented is a practical procedure for computing the values of an ordering system, i.e. order quantity, order-up-to-level, and reorder level.

After the suitable inventory policies are selected, the new working flow is proposed in order to improve information flow between each section. The new working flow for inventory policy is used at the set up stage. The new working flow of inventory management which applied with the routine tasks is drawn in order to guide users to follow new instruction.

Finally, the inventory level monitoring tool is established to integrate new information with existing information and to remind replenishment time. This tool contains inventory information for purpose of order fulfillment. Basically, this monitoring tool serves as an information sharing tool between material planning and purchasing sections who play important role in inventory management. This tool is developed through using Microsoft

Access version 2000 as the database management system, and Microsoft Excel version 2002 as reporting tool. Major activities of the tool are designed to collect relevant data about customer order, inventory status, stocking policy, ordering policy, and selected supplier, and to convert these data into the report shows what item need to be replenished and how much to replenish.

Customer service level, percent of material availability when transfer to production line, and inventory value remained after month end are key factors used to evaluate the performance of proposed system. The comparison between the proposed system and the actual system bases on data of year 2006. The proposed system shows that there is an improvement on all indicators. The result of achieve to response customer's demand or customer service level is 8.56% on average better than actual system. The result of part availability to supply once transfer to production line is 4.40% on average improving from actual system. The result of inventory level at month end and inventory turnover is 10.92% on average decreasing from actual system. These results show significantly improvement on inventory management efficiency compared to the actual system.

6.2. Recommendations

For the model to be useful, the following recommendations may prove beneficial:

1.) The available data which are used in this study is calculated based on year data. The results should be retained for one year only. Validation of the model may be improved by more updated data. The data should be reviewed at least once a year.
2.) Selecting the inventory management system has to consider not only the possibility of the model but also have to concern the implementation which may need to adjust the calculated value to be appropriate in practical.
3.) The non-movement items should be marked in the system to against the mistake of ordering in material in the future.
4.) The stocking policy which involves reorder level has to be carefully applied especially for fluctuated items. The stochastic items normally have high reorder level. In practice, both distribution of demand and unusually outgoing inventory of these items should be considered.

5.) If there is a significant change in the market, the historical data should be carefully considered since reorder point and order quantity may have to be adjusted.

REFERENCES

Anderson , James Robert (2002). Automation of Inventory Management, Master's Thesis. Department of electrical engineering and computer science and the Sloan School of Management, Massachusetts institute of Technology.

Bitran, Arnoldo C. Hax, Josep Valor-Sabatier (1981). Diagnostic analysis of inventory systems: a statistical approach, Sloan School of Management

Bernard, Paul (1999). Integrated inventory management. Wiley

Chitralada Ratanamaethanon (1991). Inventory management of incoming materials in a consumer product manufacturing plant, Master's Thesis. Department of engineering, Asian Institute of technology

Dobler, Donald W. and Burt, David N. (1996). Purchasing and Supply Management, McGraw-Hill companies, Inc.

Duangkhae Vetchasart (1997). Inventory control and storing equipment design: A case study of the telephone organisation of Thailand, Master's Thesis. Department of Engineering Management, Chulalongkorn University

Fogarty, Donald W., Blackstone, John H. and Hoffmann, Thomas R. (1991). Production & Inventory Management, South Western Publishing Co.

Graban, Mark R. (1999). An Inventory Planning Methodology for a Semiconductor Manufacturer with Significant Sources of Variability, Master's Thesis. Department of Mechanical engineering, Massachusetts institute of technology

Hartanto, Liliana E Y (2000). An inventory control system with emergency replenishment, Master's Thesis. Department of engineering, Asian Institute of technology

Hax, A.C. and Candea, D (1984). Production and Inventory Management, Prentice-Hall Inc., 1984

Jayaraman, Radhakrishnan (1981). Application of a coordinated replenishment inventory model in a departmental store, Master's Thesis. Department of engineering, Asian Institute of technology

Jirapat Rasree (1996). Production Planning and Inventory Management of a Polyethylene Pipe Factory, Master's Thesis. Department of industrial engineering, Chulalongkorn University.

Johnson, James C. and Wood, Donald F. (1996). Contemporary Logistics. 6th edition, Prentice - Hall, Inc.

Kobert, Norman (1992). Managing Inventory for Cost reduction, Prentice Hall

Krajewski, Lee J. and Ritzman, Larry P. (1996). Operations Management Strategy and Analysis, 4th edition, Addison – Wesley Publishing Company, Inc

Monden, Yasuhiro (1994). Toyota Production System, 2nd edition, Chapman & Hall

Phipop Lalitaporn. (2001). Planning System and Production Controlling. 11th edition, Technology promotion association (Thailand- Japan).

Silver, Edward A. and Peterson, Rein (1985). Decision System for Inventory Management and Production Planning, New York, John Wiley Press

Somchan Vuthipadadon (1997). A Shelf-space allocation and inventory management meodel for retail store, Master's Thesis. Department of Industrial Engineering, Chulalongkorn University

Suksan Laorakkitchakarn (1999). Inventory control of parts from a supplier, Master's Thesis. Department of Industrial Engineering, Chulalongkorn University.

Tanan Kraikosol (2000). Group ordering inventory management system: A case study of a construction materials distributor, Master's Thesis. Department of Engineering Management, Chulalongkorn University

Terdphan Steinswasdi (2001). Material inventory control for switch factory, Master's Thesis, Department of Industrial Engineering, Chulalongkorn University

Vonderembse Mark A., White, Gregory P. (1996). Operations Management concepts, methods, and strategies, West publishing company

Waters, Donald (2003). Inventory Control and Management. 2nd edition, John Wiley & Sons Ltd.

Warwick Manufacturing Group (2003). Logistics and Operation Management, Module Note

Widiarta, Handik and Berghen, Ben Vanden (2004). Inventory systems for a Make-to-stock and Make-to-order environment. Journal of The Institution of Engineers. 44:,4: 64-78

APPENDICES

APPENDIX A

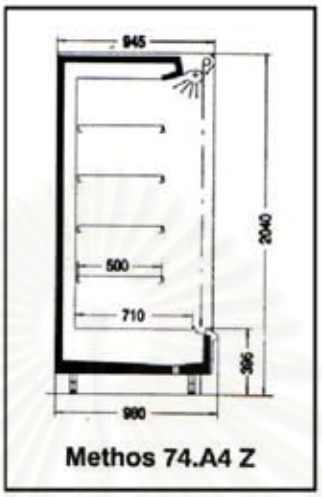
Product Description and Product Knowledge

Product Description and available interior colour

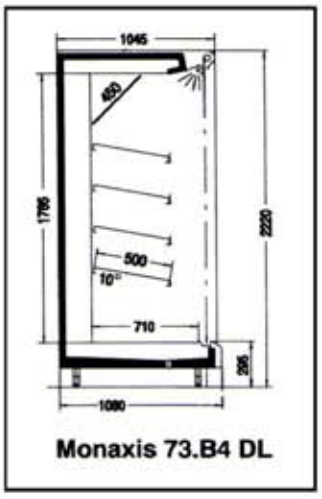
Product Type	Product Code (E-No.)	Product Name	Interior colour available
Multideck	380033	MONAXIS 73.188 B3 D	White, Black, Green
	380034	MONAXIS 73.250 B3 D	White, Black, Green
	380035	MONAXIS 73.375 B3 D	White, Black, Green
	380036	MONAXIS 73.188 B3 DL	White, Black, Green
	380037	MONAXIS 73.250 B3 DL	White, Black, Green
	380038	MONAXIS 73.375 B3 DL	White, Black, Green
	380039	MONAXIS 73.188 B4 D	White, Black, Green
	380040	MONAXIS 73.250 B4 D	White, Black, Green
	380041	MONAXIS 73.375 B4 D	White, Black, Green
	380042	MONAXIS 73.188 B4 DL	White, Black, Green
	380043	MONAXIS 73.250 B4 DL	White, Black, Green
	380044	MONAXIS 73.375 B4 DL	White, Black, Green
	380296	MONAXIS 73.188 B4 DLZ	White, Black, Green
	380297	MONAXIS 73.250 B4 DLZ	White, Black, Green
	380298	MONAXIS 73.375 B4 DLZ	White, Black, Green
	380228	METHOS 74.188 A3	White, Black
	380229	METHOS 74.250 A3	White, Black
	380230	METHOS 74.375 A3	White, Black
	380232	METHOS 74.188 A3 L	White, Black
	380233	METHOS 74.250 A3 L	White, Black
	380234	METHOS 74.375 A3 L	White, Black
	380259	METHOS 74.188 A4	White, Black
	380260	METHOS 74.250 A4	White, Black
	380261	METHOS 74.375 A4	White, Black
	380263	METHOS 74.188 A4 L	White, Black
	380264	METHOS 74.250 A4 L	White, Black
	380265	METHOS 74.375 A4 L	White, Black
	380469	METHOS 74.188 A4 Z	White, Black
	380470	METHOS 74.250 A4 Z	White, Black
	380471	METHOS 74.375 A4 Z	White, Black
	380473	METHOS 74.188 A4 LZ	White, Black
	380474	METHOS 74.250 A4 LZ	White, Black
	380475	METHOS 74.375 A4 LZ	White, Black
Island	820367	IRIOS SG3.188 B8	White
	820368	IRIOS SG3.250 B8	White
	820369	IRIOS SG3.375 B8	White
	820370	IRIOS SG3.CE183 B8	White

The letter shown in product description of each model has meaning and will be described as follow:

Multideck model



Methos 74.A4 Z



Monaxis 73.B4 DL

Model XX XX XXX XXX

Example 1 Methos 74 A3 188 LZ

Monaxis 73 B3 188 DLZ

Meaning Methos, Monaxis is the name of model. Start with M letter means Multideck category.

73, 74 is width of cabinets which has three different sizes:

63, 64 has width inside cabinet equal to 610 mm

73, 74 has width inside cabinet equal to 710 mm

83, 84 has width inside cabinet equal to 810 mm

A is the revision index of design for Methos. This means that when there is a major change in Methos, the version will be changed from A to B version.

B is the series of design for Monaxis

is range of temperature inside cabinet which divided into three ranges.

3 has temperature range between 2 to 4 degree Celsius

4 has temperature range between (-1) to 1 degree Celsius

188 is length of the cabinet which has three lengths

188 has length equals to 1875 mm

250 has length equals to 2500 mm

375 has length equals to 3750 mm

L is height of the cabinet which has two heights available

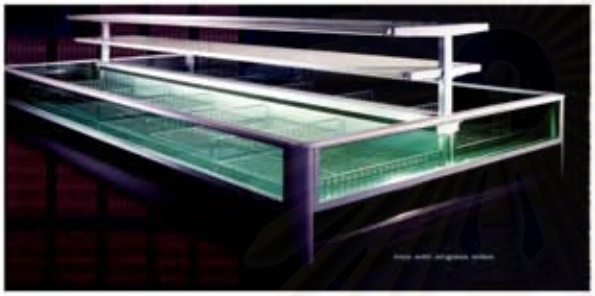
None is Normal height which equals to 2040 mm

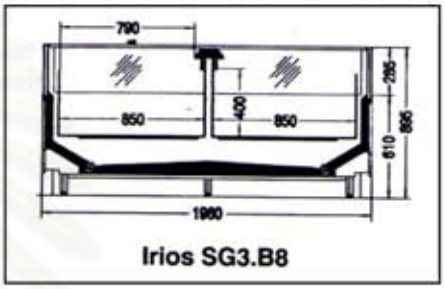
L is Long height which equals to 2220 mm

Z is cabinet with high watt motor that used in Tropical Zone

D is Double Air curtain (specific characteristic only for Monaxis)

Island model





Model XXX. XXX XX

Example 2 IRIOS SG3.188 B8

Meaning Irios is the name of model. Starting with I letter means Island category.

SG3 is depth of cabinets' front glass which has two different depths available for Irios model:

SG3 has depth of front glass equal to 610 mm

SG4 has depth of front glass equal to 710 mm

188 is length of the cabinet which has four different lengths available:

188 has length equals to 1875 mm

250 has length equals to 2500 mm

375 has length equals to 3750 mm

CE has length equals to 1800 mm or called Crown End

B is the revision index of Irios model.

8 is range of temperature inside cabinet which divided into two ranges.

4 has temperature range between 0 to (-2) degree Celsius

8 has temperature range between (-22) to (-24) degree Celsius

APPENDIX B

Bill Of Material (BOM) and Standard Cost

ItemNo	Description	Std Cost (Baht)	UM	Quantity Usage (Unit/cabinet)								
				MONAXIS 73.188 B3/4D	MONAXIS 73.250 B3/4D	MONAXIS 73.375 B3/4D	METHOS 74.188	METHOS 74.250	METHOS 74.375	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
406091	ARMAFLEXBAND 50X3 W/ ADHESIVE	18.140	MT	0	0	0	0	0	0	1	1	0
855629	AS CABLE	46.680	PC	1	1	1	0	0	0	0	0	0
383946	AS CABLE 3700MM R2	84.390	PC	1	1	1	0	0	0	0	0	0
375687	AS CABLE 4400MM R4	92.770	PC	0	0	0	1	1	1	0	0	0
887857	AS CABLE 6800	115.510	PC	0	0	0	0	0	0	1	1	0
878622	AS CABLE H03VV 1200 WITH PLUG	68.313	PC	0	0	0	2	2	2	0	0	0
878623	AS CABLE H03VV 1400 WITH PLUG	68.313	PC	0	0	0	2	2	2	2	2	2
379838	AS CABLE H03VV-F2X0,75	53.899	PC	1	1	1	0	0	0	0	0	0
819952	AS CABLE H03VV-F2X0,75	50.765	PC	2	2	2	0	0	0	0	0	0
879668	AS CABLE H03VV-F2X0,75FOR CASE	79.594	PC	0	0	0	0	0	0	1	1	1
879561	AS CABLE H03VV-F3G0,75	119.700	PC	0	0	0	0	0	1	0	0	0
879563	AS CABLE H03VV-F3G0,75	82.101	PC	0	0	0	1	1	1	0	0	0
879595	AS CABLE H03VV-F3G0,75	134.660	PC	0	0	0	1	0	0	0	0	0
879596	AS CABLE H03VV-F3G0,75	136.460	PC	0	0	0	0	1	0	0	0	0
815717	AS CABLE R1 H03VV-62 00	135.260	PC	0	0	0	1	1	0	0	0	0
815719	AS CABLE R1 H03VV-81 00	168.180	PC	0	0	0	0	0	1	0	0	0
879399	AS CABLE W/PLUG 1200 H03VV-F	95.889	PC	0	0	0	2	2	2	0	0	0
408590	AS CABLE W66	329.180	PC	1	1	1	0	0	0	0	0	0
854183	AS CABLE WITH PLUG	69.567	PC	2	2	2	0	0	0	0	0	0
864222	AS CASE-END-WALL LH GLAZED FA0	3023.150	PC	1	0	0	0	0	0	0	0	0
864198	AS CASE-END-WALL LH MIRROR FA0	3730.806	PC	0	1	1	0	0	0	0	0	0
864221	AS CASE-END-WALL RH GLAZED FA0	3023.150	PC	1	0	0	0	0	0	0	0	0
864197	AS CASE-END-WALL RH MIRROR FA0	3736.215	PC	0	1	1	0	0	0	0	0	0
849996	AS CLIP-IN LEG	55.080	PC	0	0	0	0	0	0	6	9	2
849997	AS CLIP-IN LEG 125	70.630	PC	4	4	6	4	4	6	0	0	2
371758	AS COVER H03VV-F3G 0.75	45.490	PC	2	2	2	0	0	0	0	0	0
859877	AS COVER LH 600	292.882	PC	0	0	0	1	1	1	0	0	0
859875	AS COVER LH 700 ARF/ART	579.974	PC	1	0	0	0	0	0	0	0	0
881422	AS COVER LH GH300 CE	1242.860	PC	0	0	0	0	0	0	0	0	1
859876	AS COVER RH 600 ARS/ARN	292.882	PC	0	0	0	1	1	1	0	0	0
881421	AS COVER RH GH300 CE	1242.860	PC	0	0	0	0	0	0	0	0	1
868212	AS COVER WITH ANGLE RH ARF	842.364	PC	1	0	0	0	0	0	0	0	0
862018	AS EVAPORATOR -03 ARM/F/S 26/4	4292.150	PC	1	0	0	0	0	0	0	0	0
862019	AS EVAPORATOR -04 ARM/F/S 26/4	4812.230	PC	0	1	0	0	0	0	0	0	0
862020	AS EVAPORATOR -06 ARM/F/S 26/4	6581.570	PC	0	0	1	0	0	0	0	0	0
886079	AS EVAPORATOR 188	5408.910	PC	0	0	0	0	0	0	0	0	1
871255	AS EVAPORATOR 188 300X150X6	4499.130	PC	0	0	0	1	0	0	0	0	0
871256	AS EVAPORATOR 250 300X150X6	5710.435	PC	0	0	0	0	1	0	0	0	0
882051	AS EVAPORATOR 250 BACK IRIOS	5837.400	PC	0	0	0	0	0	0	1	0	0
882050	AS EVAPORATOR 250 FRONT	5837.400	PC	0	0	0	0	0	0	1	0	0
871257	AS EVAPORATOR 375 300X150X6	7960.000	PC	0	0	0	0	0	1	0	0	0
882053	AS EVAPORATOR 375 BACK IRIOS	7964.840	PC	0	0	0	0	0	0	0	1	0
882052	AS EVAPORATOR 375 FRONT	7964.840	PC	0	0	0	0	0	0	0	1	0
886257	AS SAFETY-THERMOSTAT	427.210	PC	0	0	0	0	0	0	1	1	1

ItemNo	Description	Std Cost (Baht)	UM	Quantity Usage (Unit/cabinet)								
				MONAXIS 73.188 B3/4D	MONAXIS 73.250 B3/4D	MONAXIS 73.375 B3/4D	METHOS 74.188	METHOS 74.250	METHOS 74.375	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
873514	AS SIDE-WALL CE LH FA0117 SG3	4719.380	PC	0	0	0	0	0	0	0	0	1
873513	AS SIDE-WALL CE RH FA0117 SG3	4654.580	PC	0	0	0	0	0	0	0	0	1
873505	AS SIDE-WALL GLAZED SG3 IRIOS	6621.178	PC	0	0	0	0	0	0	1	1	0
858328	AS TERMINAL STRIP W/O DEFROST-	1663.830	PC	1	1	1	0	0	0	0	0	0
888585	AS UPPER SECTION 250	4406.280	PC	0	0	0	0	0	0	1	0	0
888586	AS UPR SECTION 375 (OLD868916)	5467.210	PC	0	0	0	0	0	0	0	1	0
869461	AS UPR SECTION CE180	3255.840	PC	0	0	0	0	0	0	0	0	1
806609	AS WIRE H07V-K 1,5 GREEN/YELLO	10.028	PC	2	2	2	0	0	0	0	0	0
474337	AS WIRE H07V-K 1,5 GRN/YEL	5.641	PC	25	50	75	33	50	75	0	0	0
465185	AS WIRE H07V-K 1,5GN /GE	7.521	PC	0	0	0	0	0	0	2	2	2
814830	AS WIRE H07V-K 1,5GN /GE	27.576	PC	1	1	1	0	0	0	0	0	0
895032	ASL CIRCUIT-BOARD A24/22	2167.981	PC	0	0	0	0	0	0	1	1	0
877130	ASL CIRCUIT-BOARD A25 MULTIDEC	1647.041	PC	0	0	0	1	1	1	0	0	0
873551	BASE-CLADDING CE RH (873570)	230.636	PC	0	0	0	0	0	0	0	0	2
813775	BLIND RIVET SCREW	13.770	PC	0	0	0	2	2	2	4	4	2
374141	BLIND RIVET SCREW M6	11.281	PC	5	5	6	0	0	0	0	0	0
854412	BOLT	15.560	PC	1	1	1	1	1	1	0	0	0
849537	BRACKET FOR AIR-GRID	37.110	PC	2	3	5	0	0	0	0	0	0
485041	BRAND-LABEL LINDE	18.790	PC	0	0	0	0	0	0	0	0	1
873588	BUMPER-RAIL 250	177.114	PC	0	0	0	0	0	0	2	0	0
873589	BUMPER-RAIL 375	255.152	PC	0	0	0	0	0	0	0	2	0
873593	BUMPER-RAIL CE SIDE-WALL	85.503	PC	0	0	0	0	0	0	0	0	2
873591	BUMPER-RAIL CE180	130.969	PC	0	0	0	0	0	0	1	1	1
437573	CABLE BAND 4,8X200	14.260	PC	1	1	1	0	0	0	0	0	0
445495	CABLE BAND 9X260 HEL LERM.	1.300	PC	0	0	0	0	0	0	6	10	3
464811	CABLE BAND T18R HELL ERM	0.650	PC	0	0	0	0	0	0	4	6	2
408263	CABLE CLAMP	0.650	PC	17	32	47	24	33	48	2	2	2
408501	CABLE CLAMP	0.650	PC	2	2	2	1	1	1	10	10	5
491964	CABLE CLAMP	36.940	PC	0	0	0	0	0	0	1	1	1
408842	CABLE CLAMP 11851	1.200	PC	0	0	0	0	0	0	16	16	8
134646	CABLE CLAMP 470 0026	2.714	PC	4	4	4	4	4	4	0	0	0
454166	CABLE CLAMP 53164	1.940	PC	0	0	0	2	2	2	0	0	0
815629	CABLE EWA-LLF 1X1,0	19.679	MT	3.2	3.2	3.2	0	0	0	0	0	0
407588	CABLE HOLDER CO 232-1276-000	3.890	PC	0	0	0	3	3	4	0	0	0
837776	CABLE SLEEVE	2.590	PC	3	4	6	1	1	1	6	8	2
304314	CABLE STRAP 4,8X302	1.300	PC	2	2	2	0	0	0	0	0	0
467137	CABLE STRAP W/LEG	2.590	PC	13	13	17	13	11	16	26	32	11
861872	CABLE W 3 CONNECTOR FOR FAN-MO	473.410	PC	1	0	0	0	0	0	0	0	0
861874	CABLE W 4 CONNECTOR FOR FAN-MO	711.500	PC	0	1	0	0	0	0	0	0	0
861876	CABLE W 6 CONNECTOR FOR FAN-MO	1034.101	PC	0	0	1	0	0	0	0	0	0
861871	CABLE W2 CONNECTOR	301.050	PC	1	1	0	0	0	0	0	0	0
861873	CABLE W3 CONNECTOR	481.190	PC	0	0	1	0	0	0	0	0	0
858219	CABLE-CONDUIT	3.890	PC	2	2	2	2	2	2	0	0	0
895018	CAP FA0117	6.267	PC	0	0	0	0	0	0	4	4	1

ItemNo	Description	Std Cost (Baht)	UM	Quantity Usage (Unit/cabinet)								
				MONAXIS 73.188 B3/4D	MONAXIS 73.250 B3/4D	MONAXIS 73.375 B3/4D	METHOS 74.188	METHOS 74.250	METHOS 74.375	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
856262	CAP K10 SF-CO	27.530	PC	0	0	0	1	1	1	0	0	0
307226	CAP K12	3.590	PC	1	1	1	1	1	1	1	1	0
292321	CAP K22 FS-CU DIN 2856	10.770	PC	0	0	1	0	0	1	1	1	0
856261	CAP K6 SF-CO	34.110	PC	1	1	1	1	1	1	1	1	0
389891	CAPACITOR 3,0MF	61.697	PC	0	13	19	0	13	28	0	0	0
376111	CAPACITOR 3,4MF	44.750	PC	0	1	1	0	1	1	0	0	0
389892	CAPACITOR 4,8MF	119.966	PC	6	0	0	9	0	0	0	0	0
153505	CLAMP	1.800	PC	0	0	0	0	0	0	4	6	2
409223	CLAMP	1.200	PC	0	0	0	0	0	0	0	0	2
467038	CLAMP	2.990	PC	0	0	0	0	0	0	8	8	4
859766	CORNER SECTION FOR CASE-END-WA	25.108	PC	4	4	4	4	4	4	0	0	0
873602	CORNER-SECTION FA0369 FOR BUMP	63.109	PC	0	0	0	0	0	0	1	1	2
873489	CORNER-SECTION GH300	206.710	PC	0	0	0	0	0	0	0	0	2
873487	CORNER-SECTION HAND-RAIL	23.330	PC	0	0	0	0	0	0	0	0	2
484071	COVER	4.540	PC	2	2	2	2	2	2	4	4	2
486262	COVER	26.570	PC	1	1	1	0	0	0	0	0	0
857770	COVER CABINET JOINT	23.330	PC	1	1	1	0	0	0	0	0	0
847666	COVER (BLACK)	4.750	PC	2	2	2	2	2	2	0	0	0
387705	COVER CAP	2.036	PC	4	4	4	4	4	4	0	0	0
804762	COVER CAP	1.300	PC	0	0	0	0	0	0	8	8	4
487737	COVER CAP AK-12773PP 105S	2.990	PC	0	0	0	0	0	0	4	4	0
862806	COVER CASE-END-WALL GLAZED	365.990	PC	1	0	0	0	0	0	0	0	0
877237	COVER CASE-END-WALL GLAZED MET	793.143	PC	0	0	0	1	1	1	0	0	0
861992	COVER F TERMINAL STRIP	68.230	PC	1	1	1	0	0	0	0	0	0
877658	COVER FOR ENCLOSURE	9.720	PC	0	0	0	0	0	0	2	2	0
878614	COVER FOR ENCLOSURE	6.107	PC	0	0	0	0	0	0	0	0	2
875402	COVER LH GH300	40.820	PC	0	0	0	0	0	0	2	2	1
817179	COVER LIGHTING TUBE	4.072	PC	20	40	2	10	20	30	0	0	0
861711	COVER RAIL 1824 LG FA0369	126.898	PC	1	0	2	1	0	2	0	0	0
875401	COVER RH GH300	40.820	PC	0	0	0	0	0	0	2	2	1
881882	COVER-CAP FA0369	1.300	PC	0	0	0	0	0	0	8	8	4
854292	COVER-CAP FA0370	21.036	PC	0	0	0	8	8	8	0	0	0
861710	COVER-RAIL 2004 LG FA0369	139.112	PC	0	0	0	0	1	0	0	0	0
489206	CSK HEAT SM SCREW 3, 9X16	1.200	PC	0	0	0	0	0	0	8	8	4
431770	DEFROST THERMOSTAT	572.829	PC	1	1	1	1	1	1	2	2	2
878915	DEFROST-HEATER 400W	546.507	PC	0	0	0	0	0	0	2	0	0
879649	DEFROST-HEATER 400W IRIOS 188	493.760	PC	0	0	0	0	0	0	0	0	3
878916	DEFROST-HEATER 600W	695.460	PC	0	0	0	0	0	0	0	2	0
879650	DEFROST-HEATER 600W IRIOS 250	553.610	PC	0	0	0	0	0	0	6	0	0
879651	DEFROST-HEATER 800W IRIOS 375	661.940	PC	0	0	0	0	0	0	0	6	0
149504	DISTANCE SLEEVE	0.650	PC	0	0	0	0	0	0	2	2	1
488434	DISTANCE SLEEVE	0.679	PC	0	0	0	0	0	0	2	2	2
809809	DISTANCE SLEEVE	1.300	PC	0	0	0	0	0	0	4	4	2
484351	DISTANCE STRIP	5.164	PC	0	0	0	0	0	0	4	4	6

ItemNo	Description	Std Cost (Baht)	UM	Quantity Usage (Unit/cabinet)								
				MONAXIS 73.188 B3/4D	MONAXIS 73.250 B3/4D	MONAXIS 73.375 B3/4D	METHOS 74.188	METHOS 74.250	METHOS 74.375	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
855032	DISTANCE STRIP 80X80X20 PE-FOA	5.641	PC	0	0	1	0	0	1	0	0	0
454252	DRAIN BEND HTB-DN 40/87 DEGREE	12.893	PC	0	0	0	0	0	0	4	4	2
454254	DRAIN BENT HTB-DN 40/45 DEGREE	12.893	PC	2	2	2	2	2	2	2	2	1
488462	DRAIN PIPE HTB DN 40 /87	69.980	PC	1	1	1	1	1	1	0	0	0
483919	DRAIN SOCKET BELOW	10.370	PC	1	1	1	1	1	1	2	2	1
432138	DRAIN-OFF STRAINER	11.020	PC	1	1	1	1	1	1	0	0	0
459566	EDGE PROTECTION	83.590	MT	0.5	0.5	0.5	0.8	0.8	0.8	0	0	0
445621	EDGE PROTECTION ICH 461 0028	15.550	MT	0.1	0.2	0.2	0.1	0.2	0.2	0.5	0.5	2
881342	ENCLOSURE LH GH300	107.570	PC	0	0	0	0	0	0	0	0	1
872117	ENCLOSURE LH GH300 IRIOS	66.740	PC	0	0	0	0	0	0	2	2	1
881341	ENCLOSURE RH GH300	107.570	PC	0	0	0	0	0	0	0	0	1
872116	ENCLOSURE RH GH300 IRIOS	66.740	PC	0	0	0	0	0	0	2	2	1
885855	END	23.816	PC	0	0	0	0	0	0	2	2	2
858494	END-CAP LH FOR BUMPER-RAIL FA0	27.144	PC	4	4	4	0	0	0	0	0	0
858493	END-CAP RH FOR BUMPER-RAIL FA0	27.144	PC	4	4	4	0	0	0	0	0	0
445496	FASTENING BASE TYPE TM78	1.940	PC	0	0	0	0	0	0	4	8	2
818650	FIXING DEVICE F. THE RMOMETER	13.572	PC	2	2	2	2	2	2	0	0	0
847403	FIXING DEVICE F.THERMOMETER	14.929	PC	2	2	2	2	2	2	0	0	0
811660	FIXING DEVICE FOR GLAZED	12.893	PC	4	4	4	4	4	4	0	0	0
825922	FIXING DEVICE PRICE TICKET	2.590	PC	24	24	36	30	32	60	0	0	0
893739	FIXING-DEVICE	13.161	PC	0	0	0	0	0	0	0	0	4
893767	FIXING-DEVICE	16.295	PC	0	0	0	0	0	0	8	8	0
876783	FIXING-DEVICE FOR MIRROR CRUDE	3.760	PC	0	0	0	16	16	16	0	0	0
876176	FIXING-DEVICE FOR SECONDARY-GL	10.770	PC	0	0	0	0	0	0	0	0	6
893738	FIXING-DEVICE FOR SECONDARY-GL	8.822	PC	0	0	0	0	0	0	8	12	3
893924	FIXING-DEVICE FOR THERMOMETER	12.215	PC	0	0	0	0	0	0	1	1	1
881389	FIXING-DEVICE LH	50.870	PC	0	0	0	0	0	0	2	2	1
869309	FIXING-DEVICE MI FOR SECONDARY	9.580	PC	0	0	0	0	0	0	0	2	0
464324	FLAT PLUG 6,3 SINGLE -POLE	1.253	PC	16	32	48	24	32	48	0	0	0
858516	FLOOR-CLOSE-OFF SEAL 1075LG	44.060	PC	0	0	0	0	0	0	0	0	2
843080	FLOOR-CLOSE-OFF SEAL 120	14.900	PC	0	0	0	0	0	0	0	0	1
843629	FLOOR-CLOSE-OFF SEAL 190	18.140	PC	0	0	0	0	0	0	0	0	1
866869	FLOOR-CLOSE-OFF SEAL 1922	76.430	PC	0	0	0	0	0	0	0	0	1
837775	FLOOR-CLOSE-OFF SEAL 210LG	18.780	PC	0	0	0	0	0	0	4	4	0
483542	FLOOR-CLOSE-OFF SEAL 2530	62.860	PC	0	1	0	0	1	0	2	0	0
851332	FLOOR-CLOSE-OFF SEAL 330	23.330	PC	2	2	2	0	0	0	0	0	0
483543	FLOOR-CLOSE-OFF SEAL 3930	95.900	PC	0	0	1	0	0	1	0	2	0
851333	FLOOR-CLOSE-OFF SEAL 90	13.610	PC	2	2	2	0	0	0	0	0	0
881969	FOIL CD SIDE-WALL SG3	14.376	PC	0	0	0	0	0	0	0	0	2
885779	FRONT-CLADDING (885783) IRIOS	401.106	PC	0	0	0	0	0	0	0	0	2
874920	FRONT-CLADDING CE FA0370 SIDE-	90.876	PC	0	0	0	0	0	0	0	0	2
874918	FRONT-CLADDING CE180 FA0370	165.456	PC	0	0	0	0	0	0	0	0	1
876201	HAT RAIL FOR MIDDLE-UPRIGHT	83.190	PC	1	1	2	0	0	0	0	0	0
824150	HONEYCOMB 03	475.696	PC	0	0	0	0	0	0	0	0	1

ItemNo	Description	Std Cost (Baht)	UM	Quantity Usage (Unit/cabinet)								
				MONAXIS 73.188 B3/4D	MONAXIS 73.250 B3/4D	MONAXIS 73.375 B3/4D	METHOS 74.188	METHOS 74.250	METHOS 74.375	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
375406	HONEYCOMB AIR BAFFLE	311.551	PC	0	0	0	0	0	0	4	6	0
868992	HONEYCOMB AIR BAFFLE 110X1253	390.871	PC	1	2	3	1	2	3	0	0	0
881099	HONEYCOMB AIR-BAFFLE 110X1253	266.010	PC	0	0	0	1	2	0	0	0	0
145113	HOT CONTACTER K 243	139.134	PC	1	1	1	2	2	2	0	0	0
463898	HX HD SMS 6,3X90 DIN 7976	15.041	PC	0	0	0	0	0	0	2	2	0
375415	HX HD SMS B 6,3X45 D IN 7976	4.790	PC	0	0	0	0	0	0	0	0	2
446676	HX HD SMS B 8X19 DIN 7976	3.590	PC	2	2	2	2	2	2	0	0	0
493005	HX HD SMS B 8X70 DIN 7976	7.180	PC	0	0	0	0	0	0	0	0	2
376442	HX HD SMS B 8X90 DIN 7976	16.922	PC	0	0	0	16	16	16	0	0	0
101935	HX NUT M 5 DIN 934 IN 934	0.600	PC	1	1	1	0	0	0	0	0	0
449319	HX SCREW M 8X70 8.8 DIN 933	4.790	PC	0	0	0	0	0	0	0	0	2
819756	IDENTIFICATION BAND NO5.1	3.760	PC	2	2	2	0	0	0	0	0	0
495075	IDENTIFICATION LABEL 'N1'	0.627	PC	2	2	2	2	2	2	0	0	0
816372	IDENTIFICATION LABEL 'N3'	0.627	PC	2	2	2	2	2	2	0	0	0
857381	INFORMATION LABEL	1.880	PC	0	0	0	0	0	0	1	1	0
868160	INSULATING PIECE	23.157	PC	1	2	3	1	2	3	0	0	0
864394	INSULATING PIECE FOR CASE-END-	9.589	PC	4	4	4	4	4	4	0	0	0
808471	INSULATING PIECE FRO NT	1.940	PC	0	0	0	0	0	0	4	4	2
877008	INSULATING-PIECE	53.780	PC	0	0	0	0	0	0	0	0	2
884290	INSULATING-PIECE	23.330	PC	0	0	0	0	0	0	0	0	2
877007	INSULATING-PIECE IRIOS	48.600	PC	0	0	0	0	0	0	4	4	0
891870	INSULATING-PLATE	268.790	PC	0	0	0	0	0	0	0	2	0
891871	INSULATING-PLATE	371.780	PC	0	0	0	0	0	0	0	4	0
891873	INSULATING-PLATE	247.114	PC	0	0	0	0	0	0	0	0	2
894536	INSULATING-PLATE 1205X401	209.950	PC	0	0	0	0	0	0	4	0	0
153004	INSULATION TAPE 10X1 5	16.200	MT	0	0	0	0	0	0	2.6	2.6	9
806468	INSULATION TAPE 10X3 0X2000	27.220	MT	0	0	0	0	0	0	0.5	0.5	3
443857	INSULATION TAPE 15X5 X2000	12.310	MT	0	0	0	0	0	0	0.2	0.2	0
454506	INSULATION TAPE 40X1 0X2000	33.700	MT	0	0	0	0	0	0	2.2	2.2	3
856257	KIT LIGHTING-SWITCH WITH CONTA	680.627	PC	1	1	1	0	0	0	0	0	0
443373	LABEL -EL CONTROLLED -	1.800	PC	1	1	1	0	0	0	0	0	0
463987	LABEL GLASS-SYMBOL	5.990	PC	1	2	3	1	1	0	0	0	0
828963	LABEL PILE 1.+SUN	6.580	PC	0	0	0	0	0	0	2	2	2
134655	LABEL PROTECTIVE GRO UND	0.600	PC	1	1	1	1	1	1	0	0	0
407571	LABEL SELF-ADH. 40X4 4 TEMP	2.507	PC	2	2	2	2	2	2	1	1	1
472668	LABEL SELF-ADHESIVE	4.190	PC	1	1	1	0	0	0	0	0	0
388855	LABEL SELF-ADHESIVE 60HZ	7.521	PC	6	11	16	7	11	19	0	0	0
473428	LABEL SELF-ADHESIVE -DEFR.	2.507	PC	1	1	1	2	2	2	2	2	2
862292	LABEL SELF-ADHESIVE 'DON`T STE	5.990	PC	1	1	1	1	1	1	0	0	0
819016	LABEL SELF-ADHESIVE LR-36W	1.800	PC	0	2	3	0	2	3	0	0	0
811925	LABEL SELF-ADHESIVE LR-58W	2.390	PC	1	0	0	1	0	0	0	0	0
814114	LABEL SELF-ADHESIVE PILOT	2.507	PC	6	6	6	6	6	6	1	1	1
407858	LABEL SELF-ADHESIVE THERMOSTAT	2.507	PC	0	0	0	0	0	0	1	1	1
813690	LABEL SELF-ADHESIVE -THUNDER	0.600	PC	0	0	0	0	0	0	2	2	1

ItemNo	Description	Std Cost (Baht)	UM	Quantity Usage (Unit/cabinet)								
				MONAXIS 73.188 B3/4D	MONAXIS 73.250 B3/4D	MONAXIS 73.375 B3/4D	METHOS 74.188	METHOS 74.250	METHOS 74.375	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
445484	LEAD END TYP H 0,	0.599	PC	0	0	0	5	5	5	0	0	0
432863	LOAD LIMIT LABEL	11.370	PC	0	0	0	0	0	0	0	0	4
877512	LOAD-LIMIT LABEL	7.180	PC	0	0	0	1	1	1	0	0	0
488787	LOCATING DEVICE FOR CABINET	39.530	PC	0	0	0	0	0	0	1	1	0
484177	LOCATING PIN	18.140	PC	0	0	0	0	0	0	2	2	0
817182	L-TUBE PROTECTION TR+D238ANSP.	66.502	PC	5	0	0	5	0	0	0	0	0
817181	L-TUBE PROTECTION TRANSP.1200	52.931	PC	0	10	15	0	10	15	0	0	0
828482	NIGHT BLIND MANUAL 1 250/28	2260.908	PC	0	2	0	0	2	0	0	0	0
828483	NIGHT BLIND MANUAL 1 875/28	2837.753	PC	1	0	2	1	0	2	0	0	0
888400	NIGHT-COVER 125	2035.924	PC	0	0	0	0	0	0	4	0	0
888401	NIGHT-COVER 188	3014.052	PC	0	0	0	0	0	0	0	4	0
888402	NIGHT-COVER CE180	2947.664	PC	0	0	0	0	0	0	0	0	1
862147	OWA-FORMBAND 60SKX20X2500 77SK	104.930	MT	0	0	0	0	0	0	2.5	3.8	0
139006	PAN HEAD TAPPING SC 3,9X16	0.600	PC	2	3	3	2	3	3	0	0	0
430161	PAN HEAD TAPPING SC 4,8X16	0.600	PC	8	11	11	8	11	11	0	0	0
879772	PHOENIX-PLUG 2X4-2X7 PIN	19.150	PC	0	0	0	0	0	0	2	2	3
458846	PLASTIK RIVET 3,1/1, 5-2,0	1.300	PC	0	0	0	0	0	0	2	2	1
145111	PLATE	2.590	PC	1	1	1	1	1	1	0	0	0
813313	PLATE	16.965	PC	0	0	0	0	0	0	4	6	0
867535	PLUG	63.300	PC	1	1	1	0	0	0	0	0	0
873928	PLUG 12 FA.RAYMOND	7.180	PC	6	6	6	2	2	2	0	0	0
879420	PLUG 5X2 2POL/S	17.960	PC	0	0	0	1	1	1	0	0	0
879421	PLUG 5X3 2POL/S	17.960	PC	0	0	0	1	1	1	0	0	0
879429	PLUG 6X1 3POL/S	26.330	PC	0	0	0	1	1	1	1	1	1
859733	PLUG FOR OPENING FOR EVAPORATO	23.940	PC	0	0	0	1	1	1	0	0	0
456499	POLY SPONGE STRIP 25 X4	18.322	MT	8	8	8	8.8	8	8.8	0	0	0
473577	PRICE TICKET RAIL 40 SCANNER	122.147	PC	0	0	0	0	0	0	2	0	0
473578	PRICE TICKET RAIL 40 SCANNER	183.221	PC	0	0	0	0	0	0	0	2	0
864487	PRICE TICKET RAIL 60SCAN. 1873	227.330	PC	1	0	0	1	0	0	0	0	0
864490	PRICE TICKET RAIL 60SCAN. 2499	223.258	PC	0	1	0	0	1	0	0	0	0
864492	PRICE TICKET RAIL 60SCAN. 3749	334.548	PC	0	0	1	0	0	1	0	0	0
471883	PRICE TICKET RAIL JO INING	1.300	PC	3	8	12	5	10	12	0	0	0
889102	PRICE-TICKET-RAIL 40SCAN CE183	123.505	PC	0	0	0	0	0	0	0	0	1
879456	PROBE R1 W CABLE 3000	223.404	PC	0	0	0	0	0	0	1	0	0
879457	PROBE R1 W CABLE 4500	237.513	PC	0	0	0	0	0	0	1	1	1
879458	PROBE R1 W CABLE 5800	249.859	PC	0	0	0	0	0	0	0	1	0
886373	PROBE R4 W CABLE 3500	229.283	PC	0	0	0	0	0	0	1	1	0
879466	PROBE R4 W CABLE 5200	243.980	PC	0	0	0	0	0	0	1	0	1
879467	PROBE R4 W CABLE 6400	255.150	PC	0	0	0	0	0	0	0	1	0
819375	RECEPTACLES W. HOLE 4,3	1.797	PC	1	1	1	0	0	0	0	0	0
867516	REFLECTOR WIDE 1249LG.	332.166	PC	0	2	3	0	2	3	0	0	0
867517	REFLECTOR WIDE 1874LG.	527.705	PC	1	0	0	1	0	0	0	0	0
877652	RETAINING-RAIL	10.170	PC	0	0	0	0	0	0	2	2	0
873596	RETAINING-RAIL 250	117.825	PC	0	0	0	0	0	0	4	0	0

ItemNo	Description	Std Cost (Baht)	UM	Quantity Usage (Unit/cabinet)								
				MONAXIS 73.188 B3/4D	MONAXIS 73.250 B3/4D	MONAXIS 73.375 B3/4D	METHOS 74.188	METHOS 74.250	METHOS 74.375	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
873597	RETAINING-RAIL 375	179.871	PC	0	0	0	0	0	0	0	4	0
873601	RETAINING-RAIL CE SIDE-WALL	47.005	PC	0	0	0	0	0	0	0	0	4
873599	RETAINING-RAIL CE180	83.982	PC	0	0	0	0	0	0	1	1	2
882344	RETAINING-RAIL FOR CABINET-JOI	20.055	PC	0	0	0	0	0	0	4	4	0
881992	RETAINING-RAIL LOWER 250	1354.410	PC	0	0	0	0	0	0	2	0	0
881993	RETAINING-RAIL LOWER 375	1968.470	PC	0	0	0	0	0	0	0	2	0
881995	RETAINING-RAIL LOWER CE180	1015.650	PC	0	0	0	0	0	0	0	0	1
873451	RETAINING-RAIL UPPER 250	413.310	PC	0	0	0	0	0	0	2	0	0
873452	RETAINING-RAIL UPPER 375	573.360	PC	0	0	0	0	0	0	0	2	0
873454	RETAINING-RAIL UPPER CE180	308.480	PC	0	0	0	0	0	0	0	0	1
139037	RIVET 3,2 1,6-3,2	0.600	PC	0	0	0	0	0	0	16	24	9
432823	RIVET 3,2 2,0-3,6	0.600	PC	8	8	12	1	1	2	0	0	0
445245	RIVET 3,2 4,8-6,4	0.600	PC	0	0	0	0	0	0	0	0	4
143258	RIVET 4,0 0,8-3,2	0.600	PC	0	0	0	0	0	0	4	8	2
138780	RIVET 4,0 2,2-3,8	0.600	PC	6	9	13	6	9	13	0	0	0
153175	RIVET 4,0 7,0-8,6	0.600	PC	1	1	1	0	0	0	0	0	0
432825	RIVET 4,8 0,8-3,2	1.200	PC	0	0	0	0	0	0	20	28	27
438465	RIVET 4,8 3,2-4,8	1.200	PC	0	0	0	0	0	0	22	22	20
445253	RIVET 4,8 3,2-4,8	0.600	PC	32	42	56	16	20	16	0	0	4
438466	RIVET 4,8 6,4-7,9	1.200	PC	30	35	49	0	0	0	4	6	0
811509	RIVET 6,5 5,8-7,8	11.370	PC	0	6	12	0	0	0	0	0	0
317458	ROUND CAP 9,5X 20	1.940	PC	2	2	0	0	0	0	2	2	0
317459	ROUND CAP 11,5X 25	2.590	PC	0	0	2	0	0	0	0	0	0
100770	SCREW	2.990	PC	0	0	0	0	0	0	4	4	0
807378	SCREW THIN SHEET MET AL M4X20	1.200	PC	85	107	140	60	80	108	5	5	35
894141	SEALING-RAIL 154 FA0369	8.143	PC	0	0	0	0	0	0	4	4	2
894143	SEALING-RAIL 626 FA0369	19.001	PC	0	0	0	0	0	0	0	10	0
894144	SEALING-RAIL 655 FA0369	19.001	PC	0	0	0	0	0	0	6	0	0
894145	SEALING-RAIL 668,5 FA0369	26.465	PC	0	0	0	0	0	0	0	0	2
863921	SEALING-TAPE 19X2SW EPDM	14.360	MT	2	2.5	3.8	1.9	2.5	3.8	0	0	0
432837	SHEET METAL NUT B3,9 NR.11347	1.200	PC	17	20	29	16	18	27	30	44	18
386444	SHEET METAL NUT B4,	2.390	PC	4	6	6	4	6	6	0	0	0
457032	SHEET METAL NUT B4,8 NR.11967	1.800	PC	2	3	3	2	3	3	0	0	0
800900	SHEET METAL NUT B429	0.600	PC	3	4	6	0	0	0	0	0	0
376449	SHEET METAL NUT BG B 8	3.590	PC	4	4	4	4	4	4	0	0	0
443799	SHEET METAL NUT M 8 X 0,8-4MM	7.180	PC	0	0	0	0	0	0	0	0	2
464803	SHEET-METAL-NUT B6,3 RAYMOND	2.990	PC	0	0	0	0	0	0	0	0	4
443430	SHIPPING SECURITY DE VICE F.	2.590	PC	8	16	24	8	16	24	0	0	0
435126	SOCKET	3.760	PC	0	0	0	0	0	0	0	0	2
484291	SOCKET	33.843	PC	0	0	0	0	0	0	2	2	1
484321	SOCKET	40.111	PC	0	0	0	0	0	0	2	2	2
811950	SOCKET	1.880	PC	4	4	4	4	4	4	0	0	0
814524	SOCKET	25.696	PC	1	1	1	1	1	1	0	0	0
804783	SOCKET-HEAD SM SCREW 4,2X22	5.390	PC	0	0	0	0	0	0	8	8	6

ItemNo	Description	Std Cost (Baht)	UM	Quantity Usage (Unit/cabinet)								
				MONAXIS 73.188 B3/4D	MONAXIS 73.250 B3/4D	MONAXIS 73.375 B3/4D	METHOS 74.188	METHOS 74.250	METHOS 74.375	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
852852	SPACER	20.740	PC	0	1	2	0	0	0	0	0	0
862995	SPACER FOR CASE-END-WALL ARM/F	9.500	PC	16	16	16	0	0	0	0	0	0
806073	SPACER FOR FRONT	3.890	PC	0	0	0	2	2	2	10	10	9
146216	STYROPOR 12X120X1500	16.850	PC	0	0	1	0	1	1	0	0	0
811611	SWITCH 2POL. WHITE	49.512	PC	2	2	2	2	2	2	0	0	0
859007	SWITCH-PANEL ARM/F/S	82.110	PC	1	1	1	1	1	1	0	0	0
863170	SWITCH-PANEL WITH THERMOMETER	82.110	PC	1	1	1	0	0	0	0	0	0
432137	TAPE 13MM TYPE 40 P.KREFELD	1.800	MT	16	28	40	19	28	49	0	0	0
484087	TAPE 38BR WHITE (LINDE BRAND)	1.300	MT	1	2	3	0	0	0	0	0	2
808313	TAPE 50MM WHITE PE	2.590	MT	20	25	30	20	25	30	20	24	16
135463	TAPE TESA 4170 50 MM 0 BR	12.310	MT	0	0	0	0.6	0.6	0.6	2.5	2.5	2
805205	TAPE TESA 4657-55-50 -30 GREY	12.960	MT	0.3	0.6	0.8	0.5	0.6	0.8	0	0	0
433080	TAPE TESA 4763 6X9 9 NR 761	3.240	MT	3.4	3.4	3.4	3.4	3.4	3.4	2.1	2.1	10
438560	TAPE TESA 4766 12X19 19NR 761	8.852	MT	0	0	0	0	0	0	1.8	1.8	0
433081	TAPE TESA 4964 25MM 4	10.327	MT	0	0	0	0	0	0	9.6	15	4
448574	TAPE TESA 4964 9MM 4	4.426	MT	1.2	1.2	1.2	1.2	1.2	1.2	0	0	0
433004	TAPE TESA 60492 4X12 2 NR 720	11.020	MT	0	0	0	0	0	0	0.5	0.5	0
458543	TEMP CONTROL W/NIGHT CURTAIN	323.830	PC	1	1	1	0	0	0	0	0	0
432136	TERMINAL (PLASTICS CLIP)	0.650	PC	10	18	26	12	18	30	0	0	0
839311	TERMINAL STRIP 4-PIECE	117.198	PC	5	10	15	5	10	15	0	0	0
474815	TERMINAL STRIP W/CAG E ACC.	31.336	PC	0	0	0	1	1	2	0	0	0
808801	TERMINAL STRIP W/CAG E ACC.	79.600	PC	1	1	1	0	0	0	0	0	0
138634	TEROSTAT TYPE XI-D	109.510	KG	1.1	1.1	1.1	1.2	1.2	1.2	0.2	0.2	0
883351	THERMOMETER DIGITAL (SOLAR)	824.829	PC	0	0	0	0	0	0	1	1	1
815267	THERMOMETER DIGITAL W/O	847.170	PC	1	1	1	1	1	1	0	0	0
827382	THERMOSTAT	536.479	PC	1	1	1	1	1	1	0	0	0
138367	THERMOSTAT ANCO B7833-7107	967.668	PC	0	0	0	0	0	0	1	1	1
878886	THERMOSTAT BIMETAL VANTIS	210.581	PC	1	1	1	0	0	0	0	0	0
139055	THERMOSTAT BUTTON	72.700	PC	0	0	0	0	0	0	1	1	1
468728	THERMOSTAT BUTTON BL ACK	17.548	PC	2	2	2	2	2	2	0	0	0
847074	UNIVERSAL TERMINAL B LUE EH	3.134	PC	2	2	2	0	0	0	0	0	0
875410	U-RAIL GH300	6.580	PC	0	0	0	0	0	0	2	2	6
465812	WASHER 5,3 POLYAMIDE DIN 9021	2.390	PC	4	6	6	4	6	6	0	0	0
135173	WASHER 6,4 DIN 125 N 125	0.600	PC	0	0	0	0	0	0	12	12	16
135481	WASHER 6,4 DIN 9021 N 9021	0.600	PC	0	0	0	0	0	0	0	0	2
100891	WASHER B	0.600	PC	0	0	0	0	0	0	8	8	6
132032	WIRE H07V-K 1,5 GREE N/YELLOW	4.750	MT	2.5	2.5	2.5	0	0	0	0	0	0
854929	WIRING DIAGRAM W/O DEFROST-HEA	8.380	PC	1	1	1	0	0	0	0	0	0
854930	WIRING DIAGRAM WITH DEFROST-HE	8.380	PC	1	1	1	0	0	0	0	0	0
879481	WIRING-DIAGRAM A25 MULTIDECKS	1.834	PC	0	0	0	1	1	1	0	0	0
879483	WIRING-DIAGRAM IRIOS	31.120	PC	0	0	0	0	0	0	1	1	0
879482	WIRING-DIAGRAM WALL-SIDES	31.720	PC	0	0	0	0	0	0	0	0	1

Table B1: Cross Tab Table of BOM and standard cost of Imported Material

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
848777	AIR BAFFLE PLATE CANOPY -03 AR	1290	PC	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
848778	AIR BAFFLE PLATE CANOPY -04 AR	1710	PC	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
848779	AIR BAFFLE PLATE CANOPY -06 AR	2420	PC	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
861880	AIR BAFFLE PLATE LH BACK ARM/F	650	PC	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
861881	AIR BAFFLE PLATE MI BACK ARM/F	680	PC	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
861882	AIR BAFFLE PLATE RH BACK ARM/F	521.89	PC	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
861879	AIR BAFFLE PLATE RH BACKWALL A	590	PC	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
851507	AIR DUCT WALL LWR -02	260	PC	0	2	3	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LM0529	AIR DUCT WALL LWR -02 (851507)	260	PC	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
851508	AIR DUCT WALL LWR -03	710	PC	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LM0179	AIR DUCT WALL LWR -03 (851508)	710	PC	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LM0530	AIR DUCT WALL LWR -03 (851508)	710	PC	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
855256	AIR GRID -02	263	PC	0	2	0	0	2	0	0	2	0	0	2	0	0	2	0	0	0	2	0	0	2	0	0	0	0
LM0141	AIR GRID -02 (855256) BLACK	263	PC	0	2	0	0	2	0	0	2	0	0	2	0	0	2	0	0	0	2	0	0	2	0	0	0	0
LM0533	AIR GRID -02 (855256) GREEN	263	PC	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
855257	AIR GRID -03	358	PC	1	0	2	1	0	2	1	0	2	1	0	2	1	0	2	2	1	0	2	1	0	2	0	0	0
LM0142	AIR GRID -03 (855257) BLACK	358	PC	1	0	2	1	0	2	1	0	2	1	0	2	1	0	2	2	1	0	2	1	0	2	0	0	0
LM0534	AIR GRID -03 (855257) GREEN	358	PC	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
857824	AIR-BAFFLE-WALL -02 ARM/F/S	930	PC	0	2	3	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LM0531	AIR-BAFFLE-WALL -02 ARM/F/S (857824)	930	PC	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
857828	AIR-BAFFLE-WALL -03 ARM/F/S	2375	PC	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
LM0532	AIR-BAFFLE-WALL -03 ARM/F/S (857828)	2375	PC	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
874012	AIR-BAFFLE-WALL 125 LOWER METH	191	PC	0	0	0	0	0	0	0	2	3	0	2	3	0	2	3	3	0	2	3	0	2	3	0	0	0
LM0157	AIR-BAFFLE-WALL 125 LOWER METH (874012)	191	PC	0	0	0	0	0	0	0	2	3	0	2	3	0	2	3	3	0	2	3	0	2	3	0	0	0
LM0158	AIR-BAFFLE-WALL 125 MONAX/METH	870	PC	0	0	0	0	0	0	0	2	3	0	0	0	0	2	3	0	0	2	3	0	0	0	0	0	0
877067	AIR-BAFFLE-WALL 125 MONAX/METH (877067)	870	PC	0	0	0	0	0	0	0	2	3	0	0	0	0	2	3	0	0	2	3	0	0	0	0	0	0
877075	AIR-BAFFLE-WALL 125L MONAX/MET	910	PC	0	0	0	0	0	0	0	0	0	0	2	3	0	0	0	3	0	0	0	0	2	3	0	0	0
LM0159	AIR-BAFFLE-WALL 125L MONAX/MET (877075)	910	PC	0	0	0	0	0	0	0	0	0	0	2	3	0	0	0	3	0	0	0	0	2	3	0	0	0
874016	AIR-BAFFLE-WALL 188 LOWER METH	794.21	PC	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
LM0184	AIR-BAFFLE-WALL 188 LOWER METH (874016)	794.21	PC	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
877071	AIR-BAFFLE-WALL 188 MONAX/METH	1430	PC	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
LM0185	AIR-BAFFLE-WALL 188 MONAX/METH	1430	PC	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
LM0186	AIR-BAFFLE-WALL 188L MONAX/MET	1590	PC	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
888746	AIR-BAFFLE-WALL BACK 250	1090	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
888748	AIR-BAFFLE-WALL BACK 375	1208.78	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
888771	AIR-BAFFLE-WALL BACK CE183 (88	575.76	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
893679	AIR-BAFFLE-WALL FRONT 250 (893	596.11	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
893680	AIR-BAFFLE-WALL FRONT 375 (893	765.48	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
893681	AIR-BAFFLE-WALL FRONT CE183 (8	400.4	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
868909	AIR-DISTRIBUTION-SHEET 250	270	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
868910	AIR-DISTRIBUTION-SHEET 375	406.38	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
869450	AIR-DISTRIBUTION-SHEET CE180	144.24	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D 380033	MONAXIS 73.250 B3 D 380034	MONAXIS 73.375 B3 D 380035	MONAXIS 73.188 B4 D 380039	MONAXIS 73.250 B4 D 380040	MONAXIS 73.375 B4 D 380041	METHOS 74.188 A3 380228	METHOS 74.250 A3 380229	METHOS 74.375 A3 380230	METHOS 74.188 A3 L 380232	METHOS 74.250 A3 L 380233	METHOS 74.375 A3 L 380234	METHOS 74.188 A4 380259	METHOS 74.250 A4 380260	METHOS 74.375 A4 380261	METHOS 74.375 A4 L 380265	METHOS 74.188 A4 Z 380469	METHOS 74.250 A4 Z 380470	METHOS 74.375 A4 Z 380471	METHOS 74.188 A4 LZ 380473	METHOS 74.250 A4 LZ 380474	METHOS 74.375 A4 LZ 380475	IRIOS SG3.250 B8 820368	IRIOS SG3.375 B8 820369	IRIOS SG3.CE183 B8 820370
869453	AIR-DISTRIBUTION-SHEET CE180	116	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
886184	AIR-DISTRIBUTION-SHEET CE180	80.8	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
892746	AIR-DISTRIBUTION-SHEET CE183LH	138	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
868912	AIR-DISTRIBUTION-SHEET UP. 250	80	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0
868911	AIR-DISTRIBUTION-SHEET UP. 375	196	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0
892751	AIR-DISTRIBUTION-SHEET UPPER C	116	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
445426	ALU-FOIL 100 W/ADHES IVE 50 MY	7.14	MT	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
139048	ALU-FOIL 30 W/ADHESI VE 9 MY	0.7	MT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
445427	ALU-FOIL 50 W/ADHESI VE 50 MY	1.36	MT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
868880	ANGLE	50	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
886692	ANGLE	29	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
883094	ANGLE CE180	164	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
867438	ANGLE FOR CASE-END-WALL GLAZED	75	PC	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0	0	0
876126	ANGLE LH GH300	44	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1
876125	ANGLE RH GH300	44	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1
848055	AS BACK PANEL -03 ARM/F/S	2222.1	PC	1	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
848059	AS BACK PANEL 04 (L)	2650.34	PC	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
848056	AS BACK PANEL -04 ARM/F/S	2622.1	PC	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
848060	AS BACK PANEL 06 (L)	3500.34	PC	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0
848057	AS BACK PANEL -06 ARM/F/S	3222.1	PC	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
848058	AS BACK-PANEL -03 (L)	2350.34	PC	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
866068	AS CABLE SET 3R. LIGHTING WHIT	785	PC	1	2	3	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
866069	AS CABLE SET 4R. LIGHTING WHIT	840	PC	1	2	3	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
866070	AS CABLE SET 5R. LIGHTING WHIT	900	PC	1	2	3	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
878665	AS CABLE W67	329.77	PC	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
879067	AS CABLE-SET 3R.-LIGHTING WHIT	795	PC	0	0	0	0	0	0	1	2	3	1	2	3	1	2	3	3	1	2	3	1	2	3	0	0	0
879068	AS CABLE-SET 4R.-LIGHTING WHIT	850	PC	0	0	0	0	0	0	1	2	3	1	2	3	1	2	3	3	1	2	3	1	2	3	0	0	0
879069	AS CABLE-SET 5R.-LIGHTING WHIT	905	PC	0	0	0	0	0	0	1	2	3	1	2	3	0	0	0	3	1	2	3	1	2	3	0	0	0
874065	AS CASE-END-WALL LH GLAZED FA0	3436.44	PC	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0
874071	AS CASE-END-WALL LH GLAZED FA0	3578.98	PC	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	1	1	1	0	0	0
874095	AS CASE-END-WALL LH GLAZED FA9	3676.69	PC	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	1	1	1	0	0	0
874113	AS CASE-END-WALL LH MIRROR FA0	5273.89	PC	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0
874119	AS CASE-END-WALL LH MIRROR FA0	5585.72	PC	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	1	1	1	0	0	0
874125	AS CASE-END-WALL LH MIRROR FA9	5273.89	PC	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0
874131	AS CASE-END-WALL LH MIRROR FA9	5585.72	PC	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	1	1	1	0	0	0
874064	AS CASE-END-WALL RH GLAZED FA0	3437.11	PC	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0
874070	AS CASE-END-WALL RH GLAZED FA0	3578.98	PC	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	1	1	1	0	0	0
874094	AS CASE-END-WALL RH GLAZED FA9	3676.69	PC	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	1	1	1	0	0	0
874112	AS CASE-END-WALL RH MIRROR FA0	5273.89	PC	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0
874118	AS CASE-END-WALL RH MIRROR FA0	5585.72	PC	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	1	1	1	0	0	0
874124	AS CASE-END-WALL RH MIRROR FA9	5273.89	PC	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0
874130	AS CASE-END-WALL RH MIRROR FA9	5585.72	PC	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	1	1	1	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
848146	AS CEILING -04 ARF/ART	2300	PC	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
848147	AS CEILING -06 ARF/ART	3000	PC	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
857568	AS CEILING 188 METHOS 74	1400	PC	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
848145	AS CEILING 188 MONAXIS 73 / ME	2100	PC	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
857569	AS CEILING 250 METHOS 74	2120	PC	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0
857570	AS CEILING 375 METHOS 74	2750	PC	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0
862027	AS CO-TUBE 18X1	172.38	PC	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
862026	AS CO-TUBE 22X1	190.82	PC	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
852980	AS COVER RAIL	1034.739	PC	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
871278	AS CU-TUBE	161.62	PC	0	0	0	0	0	0	1	1	0	1	1	0	1	1	0	0	1	1	0	1	1	0	0	0	0
871279	AS CU-TUBE	199.35	PC	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0
882244	AS DISTRIBUTION TUBE	243.52	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
848018	AS FOAM BODY -03 ARF	6815.5	PC	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
848019	AS FOAM BODY -04 ARF	7289.23	PC	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
848020	AS FOAM BODY -06 ARF	8903.27	PC	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
856485	AS FOAM-BODY 188 METHOS 74	6231.59	PC	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
881137	AS FOAM-BODY 250 IRIOS SG3	7628.51	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
856487	AS FOAM-BODY 250 METHOS 74	6731.59	PC	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0
881138	AS FOAM-BODY 375 IRIOS SG3	9952.14	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
856488	AS FOAM-BODY 375 METHOS 74	7945.63	PC	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0
881371	AS FOAM-BODY CE180 SG3	11086.6	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
379179	AS GRID DISPLAY SHEL F	380	PC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0
855180	AS GRID DISPLAY SHELF FA9005 (379179)	495	PC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0
882057	AS HEAT-EXCHANGER	531.4	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
848904	AS LEG	50	PC	4	4	6	4	4	6	4	4	6	4	4	6	4	4	6	6	4	4	6	4	4	6	0	0	0
887467	AS NIGHT-COVER CE SIDE-WALL LH	1493	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
887466	AS NIGHT-COVER CE SIDE-WALL RH	1493	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
887468	AS NIGHT-COVER CE180	1353	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
887465	AS NIGHT-COVER MIDDLE IRIOS	1396	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	30	0
887464	AS NIGHT-COVER SIDE-WALL LH	1493	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0
887463	AS NIGHT-COVER SIDE-WALL RH	1493	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0
869717	AS PEDESTAL IRIOS VAR.3	1138.53	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0
877756	AS PEDESTAL LH	720	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
875234	AS PEDESTAL RH	720	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
866408	AS PLUG W/CABLE	47.84	PC	14	0	0	14	0	0	14	0	0	20	0	0	9	0	0	0	14	0	0	20	0	0	0	0	0
866407	AS PLUG W/CABLE MALE	46	PC	0	28	42	0	28	42	0	28	42	0	40	60	0	18	27	42	0	28	42	0	40	60	0	0	0
LM0521	AS PLUG W/CABLE MALE BLACK	46	PC	0	2	3	0	2	3	0	2	3	0	2	3	0	2	3	3	0	2	3	0	2	3	0	0	0
LM0522	AS PLUG W/CABLEBLACK	47.84	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
894484	AS REINFORCEMENT SG3	132	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
876133	AS SHIPPING-SAFETY IRIOS	95	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
893634	AS SIDE-PANEL LH SG3 IVANDO	740	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
893633	AS SIDE-PANEL RH SG3 IVANDO	740	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
893631	AS SIDE-PANEL SG3 IRIOS	1320	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
869618	AS SUPPORT (869619)	347.2	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
872119	AS THERMOPANE-GLASS 250 GH300	6543.04	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
872120	AS THERMOPANE-GLASS 375 GH300	9647.22	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
872124	AS THERMOPANE-GLASS CE SIDE-	3312.88	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
875467	AS THERMOPANE-GLASS CE SIDE-	3196.31	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
888198	AS THERMOPANE-GLASS CE180 LH	5027.61	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
872122	AS THERMOPANE-GLASS CE180 RH	5027.61	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
LM0161	AS UPRIGHT LH (869139) METHOS	1370	PC	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0
869139	AS UPRIGHT LH (869140) METHOS	1370	PC	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0
LM0164	AS UPRIGHT LH (869143 METHOS L	1550	PC	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	1	1	1	0	0	0
869143	AS UPRIGHT LH (869144) METHOS	1550	PC	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	1	1	1	0	0	0
848632	AS UPRIGHT LH ARF	1370	PC	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LM0175	AS UPRIGHT LH ARF (848632)	1370	PC	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LM0536	AS UPRIGHT LH ARF (848632)	1370	PC	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LM0162	AS UPRIGHT MI (874755)	620	PC	0	0	0	0	0	0	0	1	2	0	0	0	0	1	2	0	0	1	2	0	0	0	0	0	0
874755	AS UPRIGHT MI (874756)	620	PC	0	0	0	0	0	0	0	1	2	0	0	0	0	1	2	0	0	1	2	0	0	0	0	0	0
LM0165	AS UPRIGHT MI (874757) L	650	PC	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	2	0	0	0	0	1	2	0	0	0
874757	AS UPRIGHT MI (874758) L	650	PC	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	2	0	0	0	0	1	2	0	0	0
848653	AS UPRIGHT MIDDLE ARF/ARS	365	PC	1	1	2	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LM0160	AS UPRIGHT RH (869137) METHOS	1370	PC	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
869137	AS UPRIGHT RH (869138) METHOS	1370	PC	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0
LM0163	AS UPRIGHT RH (869141)METHOS L	1550	PC	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	1	1	1	0	0	0
869141	AS UPRIGHT RH (869142) METHOS	1550	PC	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	1	1	1	0	0	0
848631	AS UPRIGHT RH ARF	1370	PC	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LM0176	AS UPRIGHT RH ARF (848631)	1370	PC	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LM0537	AS UPRIGHT RH ARF (848631)	1370	PC	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
853361	BASE COVER CASE-END-WALL	145	PC	8	8	8	8	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
813176	BASE DISPLAY SHELF	370	PC	3	4	6	3	4	6	3	4	6	3	4	6	3	4	6	6	3	4	6	3	4	6	0	0	0
LM0119	BASE DISPLAY SHELF (813176)	370	PC	3	4	6	3	4	6	3	4	6	3	4	6	3	4	6	6	3	4	6	3	4	6	0	0	0
LM0544	BASE DISPLAY SHELF (813176)	370	PC	3	4	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
447262	BASE DISPLAY SHELF 1 250X400	435	PC	0	2	2	0	2	2	0	2	2	0	2	2	0	2	2	2	0	2	2	0	2	2	0	0	0
LB0765	BASE DISPLAY SHELF 1 250X400	435	PC	0	13	17	0	4	4	0	12	16	0	12	16	0	4	4	4	0	12	16	0	12	16	0	0	0
447263	BASE DISPLAY SHELF 1 250X450	460	PC	0	2	2	0	2	2	0	2	2	0	2	2	0	2	2	2	0	2	2	0	2	2	0	0	0
LB0763	BASE DISPLAY SHELF 1 250X450	460	PC	0	13	17	0	4	4	0	12	16	0	12	16	0	4	4	4	0	12	16	0	12	16	0	0	0
447264	BASE DISPLAY SHELF 1 250X500	485	PC	0	8	12	0	6	9	0	8	12	0	10	15	0	6	9	12	0	8	12	0	10	15	0	0	0
LB0734	BASE DISPLAY SHELF 1 250X500	485	PC	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	1	0	1	1	0	1	1	0	0	0
447266	BASE DISPLAY SHELF 1 875X400	870	PC	2	0	0	2	0	0	2	0	0	2	0	0	2	0	0	0	2	0	0	2	0	0	0	0	0
447267	BASE DISPLAY SHELF 1 875X450	1100	PC	2	0	0	2	0	0	2	0	0	2	0	0	2	0	0	0	2	0	0	2	0	0	0	0	0
447268	BASE DISPLAY SHELF 1 875X500	1300	PC	4	0	0	3	0	0	4	0	0	5	0	0	3	0	0	0	4	0	0	5	0	0	0	0	0
LM0208	BASE DISPLAY SHELF 1 875X500	1300	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
378649	BASE DISPLAY SHELF 1250X500 CRNI	3280	PC	0	13	17	0	4	4	0	12	16	0	12	16	0	4	4	4	0	0	0	0	0	0	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
LB0766	BASE DISPLAY SHELF 1875X400	790	PC	0	5	5	0	5	5	0	5	5	0	5	5	0	5	5	5	0	5	5	0	5	5	0	0	0
828526	BASE DISPLAY SHELF CRNI	1480	PC	0	4	6	0	4	6	0	4	6	0	4	6	0	4	6	6	0	0	0	0	0	0	0	0	0
873473	BASE-CLADDING CD180 (873561)	324	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
853359	BASE-COVER CASE-END-WALL (8533	140	PC	0	0	0	0	0	0	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	0	0	0
853365	BASE-PANEL -03 ARM/F/S	292.08	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
853366	BASE-PANEL -04 ARM/F/S	313.47	PC	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	2	0	0
853367	BASE-PANEL -06 ARM/F/S	433.47	PC	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	2	0
868903	BASE-PANEL LOWER	268.27	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	12	2
878409	BASE-PANEL LOWER CE180	230.69	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
868901	BASE-PANEL UPPER (868902)	456.19	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	12	2
878402	BASE-PANEL UPPER (878403)	407.59	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
863596	BEND 90-B6 BAENNINGER 5001A DI	6.29	PC	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
893741	BRACKET	27	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	8	2
LB0726	BRACKET 400 20DEGREE BLACK	87	PC	0	26	34	0	8	8	0	24	32	0	24	32	0	8	8	8	0	24	32	0	24	32	0	0	0
463254	BRACKET 400 20DEGREE WHITE	87	PC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0
463255	BRACKET 450 20DEGREE	90	PC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0
LM0079	BRACKET 450 20DEGREE BLACK	90	PC	0	26	34	0	8	8	0	24	32	0	24	32	0	8	8	8	0	24	32	0	24	32	0	0	0
LM0118	BRACKET 500 20 DEGREE (463256)	90	PC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0
463256	BRACKET 500 20DEGREE	90	PC	8	16	24	6	12	18	8	16	24	10	20	30	6	12	18	24	8	16	24	10	20	30	0	0	0
873981	BRACKET FOR BASE-DISPLAY-SHELF	110	PC	0	0	0	0	0	0	2	3	5	2	3	5	2	3	5	5	2	3	5	2	3	5	0	0	0
LM0166	BRACKET FOR BASE-DISPLAY-SHELF	110	PC	0	0	0	0	0	0	2	3	5	2	3	5	2	3	5	5	2	3	5	2	3	5	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
854900	BRACKET FOR LIGHTING RAIL	110	PC	2	3	3	2	3	3	2	3	3	2	3	3	2	3	3	3	2	3	3	2	3	3	0	0	0
868890	BRACKET LOWER	70	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
868913	BRACKET UPPER	32	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0
457088	BRANCH BOX	79	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
854411	BUMPER-RAIL-CONNECTOR	12	PC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
862046	C0-TUBE 22X1	49.45	PC	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
462970	CABLE BAND 4,8X204 ELLERM.T50R	0.82	PC	8	16	24	6	12	18	8	16	24	10	20	30	6	12	18	24	8	16	24	10	20	30	0	0	0
874307	CABLE W 2 PLUG	202.29	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
874309	CABLE W 4 PLUG	450	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
874310	CABLE W 6 PLUG	570	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
875132	CABLE-ASSEMBLY WITH 2 AMP-CONN	294	PC	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
875133	CABLE-ASSEMBLY WITH 3 AMP-CONN	438	PC	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0	0	1	1	0	1	1	0	0	0	0
875135	CABLE-ASSEMBLY WITH 5 AMP-CONN	657	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	1	0	0	0
LM0554	CANOPY PANEL -03 ARM/F 852981	688.63	PC	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
852981	CANOPY PANEL -03 ARM/F/S	688.63	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
LM0555	CANOPY PANEL -04 ARM/F 852982	827.38	PC	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
852982	CANOPY PANEL -04 ARM/F/S	827.38	PC	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0
852983	CANOPY PANEL -06 ARF	1077.63	PC	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0
LM0556	CANOPY PANEL -06 ARF 852983	1077.63	PC	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
849429	CANOPY-COVER -03 ARF	695	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
LM0198	CANOPY-COVER -03 ARF (849429)	695	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
LM0538	CANOPY-COVER -03 ARF (849429)	695	PC	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
849430	CANOPY-COVER -04 ARF	735.5	PC	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0
LM0171	CANOPY-COVER -04 ARF (849430)	735.5	PC	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0
LM0539	CANOPY-COVER -04 ARF (849430)	735.5	PC	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LM0139	CANOPY-COVER -06 ARF (849431)	980	PC	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0
LM0540	CANOPY-COVER -06 ARF (849431)	980	PC	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
849431	CANPOY-COVER -06 ARF	980	PC	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0
434428	CAP	10.5	PC	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0
292320	CAP K18	7.18	PC	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	0	1	1	0	1	1	0	0	0	0
443070	CARDBOARD 1500MM	5.4	MT	0	0	0	1	2	4	0	0	0	0	0	0	1	2	4	4	0	0	0	0	0	0	0	0	4
LM0363	COIL FOR SOLENOID VALVE 50/60	270.19	PC	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0
LM0298	COPPER REDUCING TEE 1/2"x3/8"	45	PC	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0
862030	CO-TUBE 10X1	48.61	PC	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
862048	CO-TUBE 10X1	38.32	PC	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
862049	CO-TUBE 12X1	48.35	PC	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
862047	CO-TUBE 18X1	40.81	PC	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
814157	COVER	9	PC	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
868845	COVER 250	195.7	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
868846	COVER 375	275.4	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
LM0289	COVER DISPLAY SHELF & BRACKET	36	PC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
851888	COVER DISPLAY-SHELF AND BRACKE	100	PC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
849667	COVER FOR FAN-MOTOR	57	PC	2	2	3	3	4	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
377050	COVER MIRROR LATERAL	145	PC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
377051	COVER MIRROR LATERAL	200	PC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
852978	COVER RAIL 1876LG. FA0370	534.201	PC	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
852979	COVER RAIL 2501LG. FA0370	699.538	PC	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
881751	COVER SHEET 125	184	PC	0	2	0	0	2	0	0	2	0	0	2	0	0	2	0	0	0	2	0	0	2	0	0	0	0
881752	COVER SHEET 188	249	PC	1	0	2	1	0	2	1	0	2	1	0	2	1	0	2	2	1	0	2	1	0	2	0	0	0
859371	COVER STRIP PAINTED ARF	90	PC	8	8	8	8	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
877653	COVER TOP (877654)	116	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
853577	COVER-RAIL 1876LG. FA0370 MAXI	462.67	PC	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
853578	COVER-RAIL 2501LG. FA0370 MAXI	619.6	PC	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0
853579	COVER-RAIL 3751LG. FA0370 MAXI	927.73	PC	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0
139049	CSK HEAD SM SCREW 3,9X13 DIN	0.6	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	8
881631	CSK-HEAD-SCREW M4X6-4.8-H.A2F	0.3	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	6
871276	CU-TUBE 10X1	9.13	PC	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
883724	CU-TUBE 15X1	80.05	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
883725	CU-TUBE 15X1	90.14	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
882055	CU-TUBE 15X1 IRIOS	77.53	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
882056	CU-TUBE 15X1 IRIOS	87.64	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
878914	DEFROST-HEATER 300W	566.78	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
869231	DISTANCE-RAIL FOR AIR-BAFFLE-W	14	PC	0	0	0	0	0	0	4	4	6	4	4	6	4	4	6	6	4	4	6	4	4	6	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D 380033	MONAXIS 73.250 B3 D 380034	MONAXIS 73.375 B3 D 380035	MONAXIS 73.188 B4 D 380039	MONAXIS 73.250 B4 D 380040	MONAXIS 73.375 B4 D 380041	METHOS 74.188 A3 380228	METHOS 74.250 A3 380229	METHOS 74.375 A3 380230	METHOS 74.188 A3 L 380232	METHOS 74.250 A3 L 380233	METHOS 74.375 A3 L 380234	METHOS 74.188 A4 380259	METHOS 74.250 A4 380260	METHOS 74.375 A4 380261	METHOS 74.375 A4 L 380265	METHOS 74.188 A4 Z 380469	METHOS 74.250 A4 Z 380470	METHOS 74.375 A4 Z 380471	METHOS 74.188 A4 LZ 380473	METHOS 74.250 A4 LZ 380474	METHOS 74.375 A4 LZ 380475	IRIOS SG3.250 B8 820368	IRIOS SG3.375 B8 820369	IRIOS SG3.CE183 B8 820370
887423	DIVIDING-GRID INSIDE FA0117	145	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
887424	DIVIDING-GRID OUTSIDE FA0117	130	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
849528	EVAPORATOR COVER -03 400/500	673.31	PC	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
849529	EVAPORATOR COVER -04 400/500	748.89	PC	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
849530	EVAPORATOR COVER -06 400/500	1142.36	PC	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
849531	EVAPORATOR COVER SIDE	170	PC	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
869175	EVAPORATOR-COVER 188 METHOS 74	422	PC	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
868964	EVAPORATOR-COVER 250	358	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
869177	EVAPORATOR-COVER 250 METHOS 74	350	PC	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0
868965	EVAPORATOR-COVER 375	659.55	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
869178	EVAPORATOR-COVER 375 METHOS 74	570	PC	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0
340310	EXPANSION VALVE THER MOSTATIC	1028.69	PC	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0
340311	EXPANSION VALVE THER MOSTATIC	1028.69	PC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
456864	FAN BLADE A 230-28/12	38.88	PC	0	0	0	0	0	0	2	2	3	2	2	3	3	3	5	5	3	3	5	3	3	5	0	0	0
474438	FAN BLADE AO 154-17/ 12	21.55	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	6	2
807675	FAN BLADE AO 254-25/ 12	40.7	PC	2	2	3	3	4	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
884996	FAN MOTOR	552.774	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	5	3	3	5	0	0	0
854261	FAN MOTOR W/FLANGE W/O CABLE	438.7	PC	2	2	3	3	4	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
861843	FAN PANEL -03 26	838.5	PC	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
861846	FAN PANEL -03 ARM/F/S 46	855.86	PC	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
861844	FAN PANEL 04 26	640	PC	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
866115	FAN PANEL -04 ARM/F/S 46	960	PC	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
861845	FAN PANEL 06 26	1160	PC	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
866116	FAN PANEL -06 ARM/F/S 46	1060	PC	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
875130	FAN-MOTOR W/FLANGE AMP-PLUG	425.48	PC	0	0	0	0	0	0	2	2	3	2	2	3	3	3	5	5	0	0	0	0	0	0	0	0	0
878160	FAN-MOTOR W/FLANGE ROUND-CONNE	418.95	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	6	2
869006	FAN-PANEL 188 METHOS A3	231.84	PC	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
869009	FAN-PANEL 188 METHOS A3/A4/A5	231.84	PC	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
868957	FAN-PANEL 250	940.24	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
869007	FAN-PANEL 250 METHOS A3 2FAN	880	PC	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
869010	FAN-PANEL 250 METHOS A4 2FAN	942	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0
868958	FAN-PANEL 375	1180.24	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
869008	FAN-PANEL 375 METHOS A3	947	PC	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
869011	FAN-PANEL 375 METHOS A4	1478	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	1	0	0	0
869515	FAN-PANEL CE180	576.95	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
LM0249	FCK 2,5/8-ST-5,08 (8x2)	164.8	PC	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
LM0520	FEMALE PLUG ASSEMBLY (BLACK)	51	PC	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	3	1	2	3	1	2	3	0	0	0
853371	FIXING DEVICE FOR BASE RAIL	24	PC	2	2	3	2	2	3	2	2	3	2	2	3	2	2	3	3	2	2	3	2	2	3	0	0	0
867437	FIXING DEVICE FOR CASE-END-WAL	75	PC	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0	0	0
LB0730	FIXING DEVICE FOR MIRROR BLACK	10	PC	6	12	18	0	0	0	6	12	18	6	12	18	0	0	0	0	6	12	18	6	12	18	0	0	0
375793	FIXING DEVICE FOR MIRROR WHITE	4	PC	0	0	0	3	6	9	0	0	0	0	0	0	3	6	9	9	0	0	0	0	0	0	0	0	0
LM0154	FIXING DEVICE FOR PRICE TICKET	9	PC	0	0	0	0	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
858353	FIXING DEVICE FOR THERMOSTAT	100	PC	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0	0	0
871664	FIXING DEVICE FOR UPRIGHT ACM-	25	PC	0	1	2	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
849666	FIXING DEVICE FOR UPRIGHT MIDD	60	PC	0	1	2	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
869737	FIXING-DEVICE	53.87	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
878375	FIXING-DEVICE	21	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
893740	FIXING-DEVICE AIR-BAFFLE-WALL	31	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	6	1
887026	FIXING-DEVICE BACK	23.94	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
878257	FIXING-DEVICE FOR BOTTOM-RAIL	8	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
868959	FIXING-DEVICE FOR FAN	27	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	6	0
836283	FIXING-DEVICE FOR LIGHTING TUB	10	PC	0	0	0	0	0	0	4	5	8	4	5	8	4	5	8	8	4	5	8	4	5	8	0	0	0
873575	FIXING-DEVICE RH	32	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	1
LM0359	FKC 2,5/11-ST-5,08(11POSITIONS	240	PC	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
LM0360	FKC 2,5/12-ST-5,08(12POSITIONS	260	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
LM0259	FKC 2,5/5-ST-5,08 (5 POSITIONS	112	PC	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0
LM0358	FKC 2,5/6-ST-5,08 (6 POSITIONS	130	PC	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1
LM0251	FKIC 2,5/5-ST-5,08 (8x5)	120	PC	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
LM0250	FKIC 2,5/8-ST-5,08 (8x1)	190	PC	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
435120	FOIL PE 0,04X4000	5.15	MT	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	6	3
858220	FRONT CLADDING -03	384.91	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
LM0557	FRONT CLADDING -03 858220	384.91	PC	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
853581	FRONT CLADDING -03 FA370 ARM/F	162.19	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
858221	FRONT CLADDING -04	482.16	PC	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0
LM0558	FRONT CLADDING -04 858221	482.16	PC	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
853582	FRONT CLADDING -04 FA370 ARM/F	216.06	PC	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	2	0	0
858222	FRONT CLADDING -06	601.16	PC	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0
LM0559	FRONT CLADDING -06 858222	601.16	PC	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
853583	FRONT CLADDING -06 FA370 ARM/F	323.79	PC	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	2	0
885777	FRONT-CLADDING (885781) IRIOS	425	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
869754	FRONT-CLADDING 250 (869757) GH	626.03	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
869755	FRONT-CLADDING 375 (869758) GH	810.37	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
873501	FRONT-CLADDING CE (873563)SIDE	195	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
873447	FRONT-CLADDING CE180 (873555)	428.98	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
868825	FRONT-PANEL 188 (868826)	280	PC	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
868829	FRONT-PANEL 250 (868830)	252	PC	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0
868831	FRONT-PANEL 375 (868832)	328	PC	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0
407124	GLASS BOARD 100 615M M	140	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
407123	GLASS BOARD 50 615MM	66	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
865313	GLASS DIVIDER	1600	PC	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	1	1	1	0	0	0
817615	GLASS DIVIDER 700X1565MM	920	PC	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0
855188	GRID 50 FA9005	60	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
407122	GRID BOARD 100MM	70	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
858725	GRID BOARD 50 1247LG. FA9005	130	PC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
407121	GRID BOARD 50MM	60	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
887425	GRID CE180 FA0117	200	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
817649	GRID DISPLAY SHELF	260	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
805634	GRID DISPLAY SHELF ADJUSTABLE	700	PC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
855170	GRID FOR GRID DISPLA Y 9005	80	PC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
373119	GRID FOR GRID DISPLA Y SHELF	80	PC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0
872109	HAND-RAIL 250	114.91	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
872110	HAND-RAIL 375	172.37	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
872114	HAND-RAIL CE SIDE-WALL	46.68	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
872112	HAND-RAIL CE180	83.79	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
809522	HAT RAIL	7	PC	2	2	3	2	2	3	2	2	3	2	2	3	2	2	3	3	2	2	3	2	2	3	0	0	0
857735	HAT RAIL -03	246.58	PC	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
857736	HAT RAIL -04	225	PC	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
857737	HAT RAIL-06	315	PC	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
885969	HAT-RAIL IRIOS	97.56	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0
142476	HOLDER 1.01.017	6.48	PC	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	3	1	2	3	1	2	3	0	0	0
875392	HOLDER FOR BASE-DISPLAY-SHELF	38	PC	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
875393	HOLDER FOR BASE-DISPLAY-SHELF	38	PC	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
LM0167	HOLDER FOR BASE-DISPLAY-SHELF	38	PC	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
LM0168	HOLDER FOR BASE-DISPLAY-SHELF	38	PC	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
142475	HOLDER W/STARTER SUP PORT	11.02	PC	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	3	1	2	3	1	2	3	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
432135	HOOK	9	PC	8	16	24	6	12	18	8	16	24	10	20	30	6	12	18	24	8	16	24	10	20	30	0	0	0
498476	HX HD SMS 6,3X22 DIN 7976	1.8	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
448603	HX HD SMS 6,3X60 DIN 7976	5.39	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
455217	HX HD SMS B 4,8X50 D IN 7981	2.39	PC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0
465097	HX HD SMS B 6,	2.5	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	40	0
467533	HX HD SMS B 6,3X32 D IN 7976	2	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	18	0
443459	HX HD SMS B 8X38 DIN 7976	5.99	PC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	2
467238	HX HD SMS B 8X50 DIN 7976	2	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	0
101920	HX NUT M 4 DIN 934 IN 934	0.1	PC	6	6	6	6	6	6	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0
101936	HX NUT M 6 DIN 934 IN 934	0.6	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	0
101937	HX NUT M 8 DIN 934 IN 934	0.6	PC	6	6	6	6	6	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	4	0
101325	HX SCREW M 8X 90 8.8 DIN 931	3.25	PC	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0
439179	HX SCREW M 8X35 8.8 DIN 933	2	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	0
430085	HX SCREW M 8X40 8.8 DIN 933	1.8	PC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	4
445822	HX SMS SUPER TEKS BO 4,8X16	0.9	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	28	9
445542	HX SMS SUPER TEKS BO 4,8X32	1.2	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	28	20
375673	INSULATING PLATE 320X	46	PC	4	4	6	0	0	0	4	4	6	4	4	6	0	0	0	0	4	4	6	4	4	6	0	0	0
375674	INSULATING PLATE 450X	60	PC	0	0	0	2	2	3	0	0	0	0	0	0	2	2	3	3	0	0	0	0	0	0	0	0	0
876009	INSULATING-PIECE	6	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
868904	INSULATING-PLATE	33	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	12	2
878412	INSULATING-PLATE FOR BASE-DIS.	34	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
851593	ISOLATING PLATE LH WITH 2 AIR-	12	PC	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
851592	ISOLATING PLATE RH WITH 2 AIR-	25	PC	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
873042	ISOLATING-PLATE	64.15	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
886116	ISOLATING-PLATE	10	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
886117	ISOLATING-PLATE	15	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
883668	ISOLATING-PLATE LH	16	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
869839	ISOLATING-PLATE LH BACK METHOS	32	PC	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
869837	ISOLATING-PLATE LH METHOS	39	PC	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
883667	ISOLATING-PLATE RH	13	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
869838	ISOLATING-PLATE RH BACK	30	PC	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
869836	ISOLATING-PLATE RH METHOS	38	PC	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
437349	LAMP BALLAST 40W 220 /60	47.75	PC	0	32	48	0	32	48	0	32	48	0	44	66	0	22	33	48	0	32	48	0	44	66	0	0	0
376105	LAMP BALLAST 40W 230 /50	49	PC	0	2	3	0	2	3	0	2	3	0	2	3	0	2	3	3	0	2	3	0	2	3	0	0	0
437351	LAMP BALLAST 65W 220 /60	127.853	PC	16	0	0	16	0	0	16	0	0	22	0	0	11	0	0	0	16	0	0	22	0	0	0	0	0
376106	LAMP BALLAST 65W 230 /50	113.72	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
859066	LIGHTING COVER -03 ARM/F/S	308.61	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
859067	LIGHTING COVER -04 ARM/F/S	408.61	PC	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0
859068	LIGHTING COVER -06 ARM/F/S	513.11	PC	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0
883311	LIGHTING RAIL 250 PLL (883312)	766	PC	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0
883313	LIGHTING RAIL 375 PLL (883314)	1050	PC	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0
836285	LIGHTING TUBE PL-L36/830 2G11	174.77	PC	0	0	0	0	0	0	4	5	8	4	5	8	4	5	8	8	4	5	8	4	5	8	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
857306	LIGHTING-RAIL -02 (822062)	115	PC	0	30	45	0	30	45	0	30	45	0	42	63	0	20	30	45	0	30	45	0	42	63	0	0	0
857307	LIGHTING-RAIL -03 (822063)	172	PC	15	0	0	15	0	0	15	0	0	21	0	0	10	0	0	0	15	0	0	21	0	0	0	0	0
9E+05	LIGHTING RAIL 188 WIDE	952.21	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
9E+05	LIGHTING RAIL 250	727	PC	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0
9E+05	LIGHTING RAIL 375 WIDE	1150	PC	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0
455152	L-TUBE 36W/UW-1200/2 6	43.09	PC	0	2	3	0	0	0	0	2	3	0	2	3	0	0	0	0	0	2	3	0	2	3	0	0	0
455153	L-TUBE 58W/UW-1500/2 6	56.26	PC	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
474700	L-TUBE OSRAM 36W/NTD -1200	120.9	PC	0	0	0	0	2	3	0	0	0	0	0	0	0	2	3	3	0	0	0	0	0	0	0	0	0
474701	L-TUBE OSRAM 58W/NTD -1500	170.57	PC	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
491102	MIRROR 5X 326X1248 48	225	PC	0	4	6	0	0	0	0	4	6	0	4	6	0	0	0	0	0	4	6	0	4	6	0	0	0
446816	MIRROR 5X 454X1248	300	PC	0	0	0	0	2	3	0	0	0	0	0	0	0	2	3	3	0	0	0	0	0	0	0	0	0
482793	MIRROR 5X 454X1873	445	PC	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
877488	MIRROR 5X725X1400 METHOS	662.5	PC	0	0	0	0	0	0	4	4	4	0	0	0	4	4	4	0	4	4	4	0	0	0	0	0	0
859367	MIRROR 5X725X1500 ARF	662.5	PC	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
877489	MIRROR 5X725X1580 METHOS L	785	PC	0	0	0	0	0	0	0	0	0	4	4	4	0	0	0	4	0	0	0	4	4	4	0	0	0
375775	MIRROR HOLDER 1242 (821819)	143	PC	0	0	0	0	2	3	0	0	0	0	0	0	0	2	3	3	0	0	0	0	0	0	0	0	0
LB0700	MIRROR HOLDER 1242 (821819)	172	PC	1	4	6	0	0	0	1	4	6	1	4	6	0	0	0	0	1	4	6	1	4	6	0	0	0
375725	MIRROR HOLDER 1248 (821813)	112	PC	0	0	0	0	2	3	0	0	0	0	0	0	0	2	3	3	0	0	0	0	0	0	0	0	0
LB0743	MIRROR HOLDER 1248 (821813)	191	PC	1	4	6	0	0	0	1	4	6	1	4	6	0	0	0	0	1	4	6	1	4	6	0	0	0
375777	MIRROR HOLDER 1867 (821821)	240	PC	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
LB0762	MIRROR HOLDER 1867 (375777)	240	PC	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
375727	MIRROR HOLDER 1873 (821815)	215	PC	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
LB0714	MIRROR HOLDER 1873 (375727)	215	PC	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
491069	MIRROR HOLDER ABOVE	21	PC	0	0	0	3	4	6	0	0	0	0	0	0	3	4	6	6	0	0	0	0	0	0	0	0	0
861355	MNTG SOCKET FOR LAMP-BALL. CAB	320	PC	5	10	15	5	10	15	5	10	15	6	12	18	4	8	12	15	5	10	15	6	12	18	0	0	0
834899	NOZZLE -01	191.47	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
834900	NOZZLE -02	191.47	PC	1	1	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0
834901	NOZZLE -03	191.47	PC	0	0	1	1	1	1	2	2	1	2	2	0	1	2	0	0	2	1	0	2	1	0	0	1	0
834902	NOZZLE -04	243.95	PC	0	0	0	0	0	1	0	0	1	0	0	2	0	0	2	1	0	1	1	0	1	1	0	0	0
834903	NOZZLE -05	243.95	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0
430281	NUT M 6 2148	1.8	PC	4	4	4	4	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	4	2
488317	OVAL HEAD CSK SC M5X 10	0.5	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	6
135473	OVAL HEAD SC M4X16 4 .8	0.3	PC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
136034	OVAL HEAD SC M4X6 4. 8	0.3	PC	6	6	6	6	6	6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	0	0	0
468341	OVAL HEAD SC M6X40 4 .8	0.6	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	2
430158	PAN HEAD TAPPING SC 3,9X13	0.6	PC	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2
135167	PAN HEAD TAPPING SC 3,9X16	0.15	PC	0	0	0	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	0	3	3	3	18	18	12
135169	PAN HEAD TAPPING SC 3,9X9,5	0.6	PC	0	0	0	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	14	3
430162	PAN HEAD TAPPING SC 4,8X25	0.6	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
828655	PRICE TICKET RAIL 40 1249	81	PC	0	0	0	0	6	9	0	0	0	0	0	0	0	6	9	12	0	0	0	0	0	0	0	0	0
828656	PRICE TICKET RAIL 40 1874	121.18	PC	0	0	0	3	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
471779	PRICE TICKET RAIL 40 SCANNER	43.42	PC	0	8	12	0	0	0	0	8	12	0	10	15	0	0	0	0	0	8	12	0	10	15	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
471780	PRICE TICKET RAIL 40 SCANNER	65.45	PC	4	0	0	0	0	0	4	0	0	5	0	0	0	0	0	0	4	0	0	5	0	0	0	0	0
869691	PRICE TICKET RAIL 40SCAN 1249L	43.42	PC	0	2	2	0	2	2	0	2	2	0	2	2	0	2	2	2	0	2	2	0	2	2	0	0	0
869692	PRICE TICKET RAIL 40SCAN 1874L	65.45	PC	2	0	0	2	0	0	2	0	0	2	0	0	2	0	0	0	2	0	0	2	0	0	0	0	0
149968	PROBE CLAMP	6	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
846161	PROBE CLAMP ARM/ARF/ ARS	10	PC	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
881166	PROBE-CLAMP	7	PC	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
876008	PROBE-CLIP	12	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
874312	PROTECTIVE-DEVICE	37.11	PC	0	0	0	0	0	0	2	2	3	2	2	3	3	3	5	5	3	3	5	3	3	5	0	0	0
888756	RAIL CE183 (888757)	145	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
145112	RETAINING ANGLE	13.17	PC	0	0	0	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	0	0	0
439402	RETAINING ANGLE	26	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
379232	RETAINING ANGLE HOT GALVANIZED	15	PC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0
439401	RETAINING ANGLE HOT GALVANIZED	21	PC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	4	2
893729	RETURN-AIR-GRID 250 (893734)	80	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0
893730	RETURN-AIR-GRID 375 (893735)	123	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
893731	RETURN-AIR-GRID CE183 (893736)	158	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
461309	RIVET 4,8 4,8-6,4	0.6	PC	10	15	19	10	15	19	4	6	8	4	6	8	4	6	8	8	4	6	8	4	6	8	0	0	0
455038	SEALING COMPOUND CLE AR OXIM	370.968	KG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
454233	SEALING COMPOUND WHITE OXIM	370.968	KG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
893719	SECONDARY-GLASS 250 SG3	266.23	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
893720	SECONDARY-GLASS 375 SG3	203.86	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
878455	SECONDARY-GLASS CE SIDE-WALL	95	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	0
893721	SECONDARY-GLASS CE183 SG3	195.76	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
878452	SECONDARY-GLASS SIDE-WALLGH300	85.06	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
888737	SECTIONAL-RAIL 250	171	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
888739	SECTIONAL-RAIL 375	316	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
135176	SERRAT LOCK WASHER A 4,3 A2F	0.15	PC	4	6	8	4	6	8	4	6	8	4	6	8	4	6	8	8	4	6	8	4	6	8	0	0	0
384096	SHEET METAL BRIM NH 30/60	160	PC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0
893596	SHEET-METAL-STRIP IRIOS/IVANDO	18	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
383529	SHIPPING REINFORCEME NT	115	PC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0
834833	SHROUND 6,4 KLEBER P B.	15	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
836284	SOCKET 2G11	38	PC	0	0	0	0	0	0	4	5	8	4	5	8	4	5	8	8	4	5	8	4	5	8	0	0	0
852274	SOCKET-HEAD SCREW M7X29-A2F	2	PC	16	16	24	16	16	24	16	16	24	16	16	24	16	16	24	24	16	16	24	16	16	24	0	0	0
135166	SOCKET-HEAD SM SCREW 3,	0.4	PC	21	26	32	23	30	38	20	22	26	20	22	26	20	22	26	26	20	22	26	20	22	26	36	50	6
382399	SOCKET-HEAD SM SCREW 3,	0.28	PC	2	2	3	2	2	3	2	2	3	2	2	3	2	2	3	3	2	2	3	2	2	3	4	6	6
389780	SOCKET-HEAD SM SCREW 3,	0.8	PC	18	22	31	18	22	31	19	21	28	19	21	28	23	27	36	36	23	27	36	23	27	36	12	16	4
847673	SOCKET-HEAD SM SCREW 3,	0.8	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	8
346846	SOLDER ADAPTER	330.05	PC	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	1
LM0085	STARTER (PHILIPS) 407621	7	PC	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	3	1	2	3	1	2	3	0	0	0
862780	THERMOPANE GLASS COMPL.GLAZED	1645.31	PC	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
876994	THERMOPANE-GLASS GLAZED METHOS	1240.56	PC	0	0	0	0	0	0	4	4	4	0	0	0	4	4	4	0	4	4	4	0	0	0	0	0	0
876995	THERMOPANE-GLASS GLAZED METHOS	1920	PC	0	0	0	0	0	0	0	0	0	4	4	4	0	0	0	4	0	0	0	4	4	4	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
445644	THREADED BOLT M8X200 DIN 976	13	PC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
848656	UPRIGHT MIDDLE	616.68	PC	0	1	2	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LM0177	UPRIGHT MIDDLE (848656) BLACK	616.68	PC	0	1	2	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LM0535	UPRIGHT MIDDLE (848656) GREEN	616.68	PC	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
868899	U-RAIL	24	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	10	2
881876	U-RAIL 700	39	PC	0	0	0	0	0	0	2	3	5	2	3	5	2	3	5	5	2	3	5	2	3	5	0	0	0
866587	U-RAIL LH ARF	38	PC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
866586	U-RAIL RH ARF	38	PC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
102103	WASHER 4,3 DIN 125 N 125	0.6	PC	3	3	3	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8	8	4
102105	WASHER 4,3 DIN 125 N 125	0.15	PC	3	3	3	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8	8	4
430213	WASHER 8,4 DIN 9021 021	0.45	PC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
4E+05	WIRE H05V-U 1,0 VIOL	2.5	MT	2	3	1	1	2	3	1	2	3	1	2	3	1	1	2	1	2	3	3	1	2	3	0	0	0
142831	WIRE H05V-U 1,00 (0, 75) BROWN	2.5	MT	2	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1E+05	WIRE H05V-U 1,00 BLACK	2.5	MT	2	3	4	2	3	4	2	3	4	2	3	4	2	3	4	4	2	3	4	2	3	4	0	0	0
1E+05	WIRE H05V-U 1,00 BLU E	2.5	MT	0	2	3	0	2	3	0	1	6	0	1	6	0	1	6	6	0	1	6	0	1	6	0	0	0
853244	WIRE PIN 2,8X50	2.5	PC	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	0	0	2
861870	Z-RAIL	30	PC	3	4	6	3	4	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
858005	Z-RAIL -3 FOR AIR BAFFLE HONEY	215	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
LM0172	Z-RAIL -3 FOR AIR BAFFLE HONEY	215	PC	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
LM0541	Z-RAIL -3 FOR AIR BAFFLE HONEY	215	PC	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
858006	Z-RAIL -4 FOR AIR BAFFLE HONEY	240	PC	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0

ItemNo	Description	Stadard Cost (Baht)	UM	MONAXIS 73.188 B3 D	MONAXIS 73.250 B3 D	MONAXIS 73.375 B3 D	MONAXIS 73.188 B4 D	MONAXIS 73.250 B4 D	MONAXIS 73.375 B4 D	METHOS 74.188 A3	METHOS 74.250 A3	METHOS 74.375 A3	METHOS 74.188 A3 L	METHOS 74.250 A3 L	METHOS 74.375 A3 L	METHOS 74.188 A4	METHOS 74.250 A4	METHOS 74.375 A4	METHOS 74.375 A4 L	METHOS 74.188 A4 Z	METHOS 74.250 A4 Z	METHOS 74.375 A4 Z	METHOS 74.188 A4 LZ	METHOS 74.250 A4 LZ	METHOS 74.375 A4 LZ	IRIOS SG3.250 B8	IRIOS SG3.375 B8	IRIOS SG3.CE183 B8
				380033	380034	380035	380039	380040	380041	380228	380229	380230	380232	380233	380234	380259	380260	380261	380265	380469	380470	380471	380473	380474	380475	820368	820369	820370
LM0173	Z-RAIL -4 FOR AIR BAFFLE HONEY	240	PC	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0
LM0542	Z-RAIL -4 FOR AIR BAFFLE HONEY	240	PC	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
858007	Z-RAIL -6 FOR AIR BAFFLE HONEY	270	PC	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0
LM0144	Z-RAIL -6 FOR AIR BAFFLE HONEY	270	PC	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0
LM0543	Z-RAIL -6 FOR AIR BAFFLE HONEY	270	PC	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
863522	Z-RAIL FOR AIR-BAFFLE-WALL	8	PC	1	2	3	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
875485	Z-RAIL METHOS 74	86.78	PC	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0
872837	Z-RAIL MIDDLE MONAXIS 73	30	PC	1	1	2	1	1	2	0	1	2	0	1	2	0	1	2	2	0	1	2	0	1	2	0	0	0

Table B2: Cross Tab Table of BOM and standard cost of Local Materials

APPENDIX C

Demand Data, and Lead time

Product Group	Demand (pieces/ month)												Total demand (pcs.)	Average demand (pcs./ month)	SD. (pcs./ month)	Maximum Inv. (pcs.)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
MONAXIS 73.188 B3/B4D	0	2	8	0	9	8	0	1	6	6	3	7	50	4.167	3.512	28
MONAXIS 73.250 B3/B4D	2	10	15	8	27	13	0	0	0	8	2	10	95	7.917	8.017	57
MONAXIS 73.375 B3/B4D	2	21	9	6	14	20	3	1	2	11	15	1	105	8.75	7.387	58
METHOS 74.188	0	1	2	4	1	3	10	10	5	8	3	0	47	3.917	3.63	27
METHOS 74.250	12	19	20	13	21	12	25	22	25	29	8	7	213	17.75	7.175	95
METHOS 74.375	77	62	94	19	30	65	56	59	68	63	33	24	650	54.167	22.886	293
IRIOS SG3.250 B8	1	8	4	19	8	8	4	9	4	14	2	5	86	7.167	5.149	45
IRIOS SG3.375 B8	5	44	20	32	38	12	30	10	55	36	32	0	314	26.167	16.792	158
IRIOS SG3.CE183 B8	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	31

Table C1: Demand Data, Lead time, and Maximum Inventory level of Imported Material Group

Item_No	Demand (pieces/month)												Total (pcs)	Avg Usage (pcs/month)	SD Usage (pcs/month)	Avg Lead time (month)	SD lead time (month)	EOQ (pcs.)	ROP (pcs.)	Max. Inv. Level (pcs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
848777	0	2	8	0	9	8	0	1	6	6	3	7	50	4.167	3.512	0.139	0.117	7	9	16
848778	2	12	13	17	17	13	0	0	0	8	6	6	94	7.833	6.492	0.261	0.216	8	21	29
848779	2	12	8	12	1	12	0	0	2	11	16	0	76	6.333	6.035	0.211	0.201	6	19	25
861880	3	26	28	42	20	23	0	0	8	16	14	11	191	15.917	12.645	0.531	0.422	19	54	73
861881	2	12	8	12	1	12	0	0	2	11	16	0	76	6.333	6.035	0.211	0.201	12	22	34
861882	0	0	9	5	2	6	3	0	7	6	5	5	48	4.000	2.985	0.133	0.100	11	7	18
861879	0	22	26	30	18	17	3	0	2	10	9	6	143	11.917	10.440	0.397	0.348	18	24	42
851507	10	83	57	34	96	86	9	3	6	49	49	23	505	42.083	33.318	1.403	1.111	50	153	203
LM0529	0	0	0	0	14	4	0	0	0	8	3	6	35	2.917	4.461	0.097	0.149	13	15	28
851508	0	2	13	15	7	7	2	0	6	6	5	10	73	6.083	4.795	0.203	0.160	11	23	34
LM0179	0	0	2	2	0	0	0	0	0	0	0	0	4	0.333	0.778	0.011	0.026	3	2	5
LM0530	0	0	0	0	0	1	1	0	0	0	0	0	2	0.167	0.389	0.006	0.013	2	1	3
855256	22	32	54	59	38	44	6	28	24	24	12	6	349	29.083	17.286	0.969	0.576	41	73	114
LM0141	8	32	26	0	46	30	86	46	24	22	10	16	346	28.833	22.827	0.961	0.761	41	83	124
LM0533	0	0	0	0	14	4	0	0	0	8	2	0	28	2.333	4.418	0.078	0.147	12	12	24
855257	124	57	72	71	64	113	70	115	44	38	12	58	838	69.833	33.313	2.328	1.110	55	165	220
LM0142	92	53	89	0	47	120	87	74	42	57	73	2	736	61.333	35.742	2.044	1.191	51	156	207
LM0534	0	0	0	0	0	1	4	2	2	0	1	5	15	1.250	1.712	0.042	0.057	7	5	12
857824	7	56	52	69	33	42	6	0	41	25	19	6	356	29.667	22.725	0.989	0.758	22	98	120
LM0531	0	0	0	0	14	4	0	0	0	8	1	8	35	2.917	4.660	0.097	0.155	7	14	21
857828	0	0	6	5	2	5	0	0	27	6	5	5	61	5.083	7.354	0.169	0.245	6	14	20
LM0532	0	0	0	0	0	1	4	2	2	0	1	5	15	1.250	1.712	0.042	0.057	3	3	6
874012	246	39	61	103	44	149	55	193	145	40	10	0	1085	90.417	77.107	3.014	2.570	85	293	378
LM0157	98	153	155	0	111	178	244	148	78	85	80	16	1346	112.167	68.405	3.739	2.280	95	311	406
LM0158	38	58	0	30	5	31	0	38	0	21	0	0	221	18.417	20.246	0.614	0.675	18	77	95
877067	180	29	64	96	44	147	76	140	5	39	10	0	830	69.167	60.085	2.306	2.003	35	254	289
877075	29	0	9	3	0	18	30	44	55	0	0	0	188	15.667	19.472	0.522	0.649	16	43	59
LM0159	72	69	150	0	102	147	133	110	140	64	80	16	1083	90.250	49.413	3.008	1.647	39	160	199
874016	0	1	0	4	1	1	8	1	5	0	0	0	21	1.750	2.563	0.058	0.085	6	7	13
LM0184	0	0	1	0	1	4	5	6	6	2	1	0	26	2.167	2.406	0.072	0.080	6	7	13
877071	0	1	0	4	1	1	8	1	5	0	0	0	21	1.750	2.563	0.058	0.085	4	7	11

Item_No	Demand (pieces/month)												Total (pcs)	Avg Usage (pcs/month)	SD Usage (pcs/month)	Avg Lead time (month)	SD lead time (month)	EOQ (pcs.)	ROP (pcs.)	Max. Inv. Level (pcs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
LM0185	0	0	0	1	1	1	0	0	1	0	0	0	4	0.333	0.492	0.011	0.016	2	1	3
LM0186	0	0	2	0	0	3	6	6	6	2	1	0	26	2.167	2.517	0.072	0.084	5	7	12
888746	2	16	8	38	16	16	8	18	8	28	4	10	172	14.333	10.299	0.478	0.343	14	48	62
888748	10	88	40	64	76	24	60	20	110	72	64	0	628	52.333	33.584	1.744	1.120	26	168	194
888771	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	11	21	32
893679	2	16	8	38	16	16	8	18	8	28	4	10	172	14.333	10.299	0.478	0.343	19	48	67
893680	60	43	58	101	12	28	72	86	48	99	1	24	632	52.667	32.917	1.756	1.097	33	165	198
893681	6	0	9	0	0	7	0	10	3	19	4	4	62	5.167	5.622	0.172	0.187	14	25	39
868909	2	16	24	22	16	16	19	10	6	26	0	10	167	13.917	8.426	0.464	0.281	28	28	56
868910	60	38	58	98	12	32	56	92	71	82	0	24	623	51.917	31.300	1.731	1.043	44	121	165
869450	8	0	28	4	0	16	8	32	16	92	16	0	220	18.333	25.496	0.611	0.850	44	77	121
869453	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	25	18	43
886184	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	30	20	50
892746	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	23	19	42
868912	4	32	48	44	32	36	32	20	12	52	0	20	332	27.667	16.751	0.922	0.558	73	55	128
868911	180	114	174	294	36	96	223	276	192	246	0	72	1903	158.583	95.014	5.286	3.167	112	323	435
892751	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	25	19	44
445426	33.56	23.5	85.88	16	24.7	98.13	25.1	39	23	175.1	26	22	591.97	49.331	47.527	1.6444	1.5842	400	30	430
139048	0	0	151	0	150	3.72	49	50.69	0	139.8	200	275	1019.2	84.933	94.814	2.8311	3.1605	1400	58	1458
445427	100.2	100	231	0	237.5	78	384.5	356	444	464.1	10	45	2450.3	204.19	171.829	6.8063	5.7276	1600	110	1710
868880	4	0	14	2	0	8	4	16	8	46	8	0	110	9.167	12.748	0.306	0.425	53	37	90
886692	4	0	14	2	0	8	4	16	8	46	8	0	110	9.167	12.748	0.306	0.425	70	39	109
883094	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	21	23	44
867438	19	5	15	4	8	12	15	17	37	50	25	20	227	18.917	13.311	0.631	0.444	62	54	116
876126	14	104	55	103	92	44	70	46	122	123	72	10	855	71.250	38.660	2.375	1.289	158	185	343
876125	14	104	55	103	92	44	70	46	122	123	72	10	855	71.250	38.660	2.375	1.289	158	176	334
848055	0	3	8	4	10	10	8	2	11	6	3	7	72	6.000	3.568	0.200	0.119	6	15	21
848059	0	8	13	3	16	13	18	17	8	25	6	7	134	11.167	7.120	0.372	0.237	8	32	40
848056	14	21	18	21	34	16	10	0	18	10	3	10	175	14.583	9.020	0.486	0.301	9	41	50
848060	45	12	47	9	14	53	48	29	45	23	38	0	363	30.250	18.157	1.008	0.605	12	94	106
848057	63	42	28	46	36	50	11	53	6	24	6	4	369	30.750	20.618	1.025	0.687	12	98	110

Item_No	Demand (pieces/month)												Total (pcs)	Avg Usage (pcs/month)	SD Usage (pcs/month)	Avg Lead time (month)	SD lead time (month)	EOQ (pcs.)	ROP (pcs.)	Max. Inv. Level (pcs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
848058	0	0	2	0	0	1	2	9	0	8	3	0	25	2.083	3.175	0.069	0.106	4	9	13
866068	0	7	0	0	0	2	7	0	20	50	27	0	113	9.417	15.571	0.3139	0.519	50	42	92
866069	0	10	0	0	4	62	9	0	0	18	36	17	156	13	18.882	0.4333	0.6294	50	53	103
866070	0	42	50	74	33	1	9	0	0	8	0	0	217	18.083	25.318	0.6028	0.8439	50	72	122
878665	81	24	61	23	44	81	53	86	30	58	28	3	572	47.667	26.766	1.5889	0.8922	100	114	214
879067	69	0	60	30	0	118	26	66	77	15	0	0	461	38.417	38.918	1.2806	1.2973	50	91	141
879068	123	46	107	36	42	81	118	104	47	33	19	12	768	64	40.12	2.1333	1.3373	50	115	165
879069	15	18	57	0	0	22	63	40	1	0	15	0	231	19.25	22.624	0.6417	0.7541	50	50	100
874065	1	0	4	0	4	12	3	3	5	3	1	0	36	3.000	3.330	0.100	0.111	4	12	16
874071	3	0	0	1	0	0	1	0	3	1	0	0	9	0.750	1.138	0.025	0.038	2	3	5
874095	0	0	0	0	0	2	4	1	0	0	0	0	7	0.583	1.240	0.019	0.041	2	3	5
874113	6	4	9	6	5	14	11	15	2	4	0	2	78	6.500	4.796	0.217	0.160	4	21	25
874119	3	2	6	0	0	1	6	1	8	0	0	0	27	2.250	2.864	0.075	0.096	2	9	11
874125	3	10	0	0	0	5	20	3	1	1	0	0	43	3.583	5.961	0.119	0.199	3	17	20
874131	14	11	23	0	17	19	25	12	19	3	12	5	160	13.333	7.808	0.444	0.260	6	47	53
874064	1	1	4	1	8	1	8	0	9	3	2	0	38	3.167	3.326	0.106	0.111	4	12	16
874070	5	0	1	0	0	2	1	0	3	0	0	0	12	1.000	1.595	0.033	0.053	2	5	7
874094	0	0	0	0	0	0	4	1	0	0	0	0	5	0.417	1.165	0.014	0.039	1	3	4
874112	6	4	9	6	2	15	1	13	5	4	0	0	65	5.417	4.833	0.181	0.161	4	20	24
874118	1	1	3	0	0	0	1	5	4	0	0	0	15	1.250	1.765	0.042	0.059	2	5	7
874124	3	1	0	0	0	9	4	4	0	0	1	0	22	1.833	2.758	0.061	0.092	2	8	10
874130	14	11	24	1	21	21	19	8	21	3	12	5	160	13.333	7.901	0.444	0.263	6	46	52
848146	2	10	15	8	27	13	0	0	0	8	2	10	95	7.917	8.017	0.264	0.267	7	25	32
848147	2	21	9	6	14	20	3	1	2	11	15	1	105	8.750	7.387	0.292	0.246	7	26	33
857568	0	1	2	4	1	3	10	10	5	8	3	0	47	3.917	3.630	0.131	0.121	7	13	20
848145	0	2	8	0	9	8	0	1	6	6	3	7	50	4.167	3.512	0.139	0.117	6	12	18
857569	12	19	20	13	21	12	25	22	25	29	8	7	213	17.750	7.175	0.592	0.239	11	47	58
857570	77	62	94	19	30	65	56	59	68	63	33	24	650	54.167	22.886	1.806	0.763	17	152	169
862027	2	14	20	23	23	19	0	0	0	14	11	15	141	11.750	9.067	0.392	0.302	32	33	65
862026	2	15	8	11	17	16	0	0	3	11	16	7	106	8.833	6.450	0.294	0.215	27	20	47
852980	2	17	17	11	1	12	2	0	4	12	11	5	94	7.833	6.191	0.2611	0.2064	34	30	64

Item_No	Demand (pieces/month)												Total (pcs)	Avg Usage (pcs/month)	SD Usage (pcs/month)	Avg Lead time (month)	SD lead time (month)	EOQ (pcs.)	ROP (pcs.)	Max. Inv. Level (pcs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
871278	13	21	32	0	26	34	23	49	26	27	20	30	301	25.083	11.874	0.836	0.396	49	75	124
871279	108	33	66	26	35	92	56	88	38	34	26	5	607	50.583	31.552	1.686	1.052	63	166	229
882244	41	67	41	60	14	24	40	52	36	45	0	17	437	36.417	19.593	1.214	0.653	48	109	157
848018	0	2	8	0	9	8	0	1	6	6	3	7	50	4.167	3.512	0.139	0.117	3	16	19
848019	2	10	15	8	27	13	0	0	0	8	2	10	95	7.917	8.017	0.264	0.267	4	31	35
848020	1	12	9	17	2	12	0	0	2	12	16	0	83	6.917	6.694	0.231	0.223	3	24	27
856485	0	1	2	4	1	3	10	10	5	8	3	0	47	3.917	3.630	0.131	0.121	3	13	16
881137	2	16	16	30	24	9	16	3	14	22	7	10	169	14.083	8.458	0.469	0.282	5	42	47
856487	12	19	20	13	21	12	25	22	25	29	8	7	213	17.750	7.175	0.592	0.239	6	56	62
881138	60	38	56	106	42	4	60	58	93	51	42	10	620	51.667	28.984	1.722	0.966	9	155	164
856488	94	33	63	36	44	69	56	81	62	35	24	0	597	49.750	26.161	1.658	0.872	10	173	183
881371	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	3	21	24
379179	0	76	133	60	36	109	0	88	17	28	16	24	587	48.917	43.877	1.6306	1.4626	100	133	233
855180	48	90	284	0	16	152	153	37	0	62	90	0	932	77.667	84.615	2.5889	2.8205	100	237	337
882057	31	27	44	60	0	32	36	42	13	48	0	17	350	29.167	18.741	0.972	0.625	29	93	122
848904	708	458	656	290	508	864	515	726	344	378	376	378	6201	516.750	181.769	17.225	6.059	399	1356	1755
887467	4	0	0	0	0	0	0	18	6	2	0	0	30	2.500	5.266	0.083	0.176	5	14	19
887466	4	0	0	0	0	0	0	18	2	2	0	0	26	2.167	5.149	0.072	0.172	5	12	17
887468	4	0	0	0	0	0	4	18	2	2	0	0	30	2.500	5.126	0.083	0.171	5	13	18
887465	10	257	293	378	118	56	369	216	286	141	2	0	2126	177.167	141.352	5.906	4.712	44	557	601
887464	0	19	19	20	16	8	20	12	17	10	0	0	141	11.750	8.081	0.392	0.269	11	33	44
887463	4	20	14	20	10	20	30	12	11	11	0	0	152	12.667	8.907	0.422	0.297	11	36	47
869717	96	66	65	235	61	64	100	148	106	153	0	46	1140	95.000	61.203	3.167	2.040	36	244	280
877756	6	0	3	1	0	16	0	10	6	23	0	4	69	5.750	7.300	0.192	0.243	11	28	39
875234	7	0	5	1	0	16	0	10	7	23	0	4	73	6.083	7.267	0.203	0.242	11	29	40
866408	0	0	45	49	0	35	0	0	32	45	29	25	260	21.667	20.299	0.7222	0.6766	100	52	152
866407	623	537	623	579	633	613	465	616	589	475	464	476	6693	557.75	69.677	18.5917	2.3226	100	884	1317
LM0521	145	122	164	0	86	156	147	176	106	158	104	86	1450	120.833	48.921	4.0278	1.6307	100	296	497
LM0522	0	0	2	0	0	2	2	9	0	8	3	0	26	2.167	3.157	0.0722	0.1052	100	9	109
894484	60	38	58	100	12	28	56	86	64	82	0	24	608	50.667	30.835	1.689	1.028	77	146	223
876133	42	36	65	105	18	36	52	78	78	50	30	18	608	50.667	26.493	1.689	0.883	91	49	140

Item_No	Demand (pieces/month)												Total (pcs)	Avg Usage (pcs/month)	SD Usage (pcs/month)	Avg Lead time (month)	SD lead time (month)	EOQ (pcs.)	ROP (pcs.)	Max. Inv. Level (pcs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
893634	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	10	15	25
893633	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	10	16	26
893631	12	104	48	102	92	40	68	38	118	100	68	10	800	66.667	37.068	2.222	1.236	28	199	227
869618	12	104	48	102	92	40	68	38	118	100	68	10	800	66.667	37.068	2.222	1.236	54	174	228
872119	2	16	8	38	16	16	8	18	8	28	4	10	172	14.333	10.299	0.478	0.343	6	43	49
872120	10	88	40	64	76	24	60	20	110	72	64	0	628	52.333	33.584	1.744	1.120	9	315	324
872124	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	5	19	24
875467	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	5	19	24
888198	20	18	19	20	10	12	29	22	11	33	0	19	213	17.750	8.761	0.592	0.292	7	42	49
872122	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	4	19	23
LM0161	5	19	3	0	5	14	5	15	0	7	0	0	73	6.083	6.543	0.203	0.218	8	14	22
869139	38	36	20	36	18	23	35	16	58	12	4	0	296	24.667	16.494	0.822	0.550	17	42	59
LM0164	37	20	55	34	40	54	59	48	38	31	30	8	454	37.833	14.905	1.261	0.497	19	80	99
869143	8	0	0	0	0	6	5	16	21	0	0	0	56	4.667	7.139	0.156	0.238	7	14	21
848632	4	33	32	14	41	35	3	2	8	21	19	15	227	18.917	13.621	0.631	0.454	15	52	67
LM0175	0	0	0	0	2	3	0	0	0	0	0	0	5	0.417	0.996	0.014	0.033	2	2	4
LM0536	0	0	0	0	7	3	0	0	0	4	1	3	18	1.500	2.276	0.050	0.076	4	7	11
LM0162	7	35	1	5	6	22	0	23	2	14	0	0	115	9.583	11.469	0.319	0.382	15	22	37
874755	97	28	56	75	28	74	26	96	4	40	0	0	524	43.667	35.472	1.456	1.182	33	78	111
LM0165	74	32	95	1	61	106	96	68	48	39	52	8	680	56.667	33.551	1.889	1.118	37	86	123
874757	14	0	5	12	0	11	10	28	35	30	0	0	145	12.083	12.588	0.403	0.420	17	25	42
848653	6	19	30	46	21	43	1	0	11	36	43	11	267	22.250	16.923	0.742	0.564	31	62	93
LM0160	5	20	3	0	5	14	2	15	5	7	0	0	76	6.333	6.583	0.211	0.219	8	14	22
869137	38	36	20	36	18	23	35	16	58	12	4	0	296	24.667	16.494	0.822	0.550	17	42	59
LM0163	37	20	60	0	40	54	61	48	39	25	29	8	421	35.083	19.519	1.169	0.651	19	78	97
869141	8	0	0	0	0	6	5	16	21	0	0	0	56	4.667	7.139	0.156	0.238	7	18	25
848631	4	33	32	14	41	35	3	2	8	21	19	15	227	18.917	13.621	0.631	0.454	15	52	67
LM0176	0	0	0	1	2	3	0	0	0	0	0	0	6	0.500	1.000	0.017	0.033	2	3	5
LM0537	0	0	0	0	7	3	0	0	0	4	1	3	18	1.500	2.276	0.050	0.076	4	7	11
853361	18	9	6	32	0	43	2	0	18	15	24	0	167	13.917	13.879	0.464	0.463	38	43	81
813176	220	207	316	178	66	118	142	93	300	156	22	0	1818	151.500	99.670	5.050	3.322	79	371	450

Item_No	Demand (pieces/month)												Total (pcs)	Avg Usage (pcs/month)	SD Usage (pcs/month)	Avg Lead time (month)	SD lead time (month)	EOQ (pcs.)	ROP (pcs.)	Max. Inv. Level (pcs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
LM0119	290	244	334	0	172	310	295	313	212	328	207	172	2877	239.750	95.855	7.992	3.195	100	573	673
LM0544	0	0	0	0	29	11	27	0	0	16	6	11	100	8.333	10.748	0.278	0.358	19	27	46
447262	25	40	38	64	6	28	0	0	12	8	31	12	264	22.000	19.283	0.733	0.643	28	49	77
LB0765	0	0	14	15	0	0	0	0	1	0	0	0	30	2.500	5.617	0.083	0.187	9	11	20
447263	0	40	48	76	6	28	80	0	12	9	56	12	367	30.583	28.890	1.019	0.963	32	83	115
LB0763	0	0	11	63	0	0	0	0	0	1	0	0	75	6.250	18.146	0.208	0.605	14	37	51
447264	476	624	792	376	526	364	168	188	584	459	128	80	4765	397.083	221.514	13.236	7.384	112	1145	1257
LB0734	580	488	521	0	344	584	586	517	423	607	348	344	5342	445.167	171.835	14.839	5.728	119	1175	1294
447266	0	0	4	0	10	4	0	0	0	12	0	8	38	3.167	4.469	0.106	0.149	7	8	15
447267	0	0	4	20	11	4	0	0	0	12	0	8	59	4.917	6.543	0.164	0.218	8	16	24
447268	0	12	24	9	29	32	32	8	44	12	12	20	234	19.500	12.845	0.650	0.428	15	59	74
LM0208	0	11	11	0	3	11	23	14	29	2	5	0	109	9.083	9.424	0.303	0.314	10	34	44
378649	0	0	32	0	60	40	47	42	40	32	60	0	353	29.417	23.427	0.981	0.781	12	91	103
LB0766	0	0	4	0	0	0	0	0	0	2	0	0	6	0.500	1.243	0.017	0.041	3	2	5
828526	0	0	6	0	12	8	17	24	12	12	10	0	101	8.417	7.669	0.281	0.256	9	28	37
873473	26	18	37	20	10	14	20	38	28	51	1	20	283	23.583	13.554	0.786	0.452	34	54	88
853359	60	26	126	6	54	88	60	88	50	21	28	12	619	51.583	35.842	1.719	1.195	75	152	227
853365	3	10	4	10	11	10	11	11	14	6	7	10	107	8.917	3.232	0.297	0.108	22	19	41
853366	18	45	59	40	58	53	44	47	24	48	12	33	481	40.083	15.318	1.336	0.511	44	143	187
853367	168	91	136	131	65	155	121	181	103	74	96	53	1374	114.500	41.122	3.817	1.371	64	453	517
868903	72	592	286	538	520	216	396	208	700	590	408	40	4566	380.500	215.918	12.683	7.197	148	1021	1169
878409	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	18	18	36
868901	72	592	286	538	520	216	396	208	700	590	408	40	4566	380.500	215.918	12.683	7.197	113	1023	1136
878402	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	13	18	31
863596	74	85	45	1	0	0	0	183	81	112	46	56	683	56.917	55.349	1.897	1.845	374	225	599
893741	50	400	198	372	352	152	268	150	472	418	276	30	3138	261.500	146.293	8.717	4.876	387	629	1016
LB0726	0	0	36	30	0	0	0	0	2	4	0	0	72	6.000	12.735	0.200	0.425	33	24	57
463254	50	80	84	128	32	64	0	0	24	40	62	40	604	50.333	36.530	1.678	1.218	94	100	194
463255	0	80	104	192	34	64	160	0	24	42	112	40	852	71.000	60.995	2.367	2.033	110	130	240
LM0079	0	0	0	52	0	0	0	0	52	0	0	46	150	12.500	22.662	0.417	0.755	46	38	84
LM0118	1160	998	1128	0	814	1270	1312	1146	984	1282	826	688	11608	967.333	364.659	32.244	12.155	407	1951	2358

Item_No	Demand (pieces/month)												Total (pcs)	Avg Usage (pcs/month)	SD Usage (pcs/month)	Avg Lead time (month)	SD lead time (month)	EOQ (pcs.)	ROP (pcs.)	Max. Inv. Level (pcs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
463256	952	1272	1632	770	1110	792	400	392	1256	942	280	200	9998	833.167	447.918	27.772	14.931	378	2130	2508
873981	180	171	263	142	77	106	131	77	253	146	18	0	1564	130.333	81.484	4.344	2.716	135	364	499
LM0166	241	198	271	0	138	261	244	304	172	272	177	141	2419	201.583	83.661	6.719	2.789	168	449	617
854900	279	342	434	146	296	352	272	268	307	361	186	140	3383	281.917	88.855	9.397	2.962	199	644	843
868890	62	54	82	120	28	48	72	102	70	108	0	34	780	65.000	35.136	2.167	1.171	120	155	275
868913	61	46	70	109	20	40	64	97	67	95	0	29	698	58.167	32.860	1.939	1.095	167	130	297
457088	6	52	24	51	46	20	34	19	59	50	34	5	400	33.333	18.534	1.111	0.618	81	41	122
854411	51	62	121	53	72	112	53	94	42	60	55	58	833	69.417	25.579	2.314	0.853	299	111	410
862046	2	21	9	6	14	20	3	1	2	11	15	1	105	8.750	7.387	0.292	0.246	52	25	77
462970	2943	1954	3205	1308	2812	3399	1917	3360	1532	2832	1904	1232	28398	2366.500	808.686	78.883	26.956	6673	1058	7731
874307	2	0	7	1	0	4	2	8	9	13	4	5	55	4.583	4.01	0.1528	0.1337	50	14	64
874309	2	13	12	14	8	8	8	5	9	6	0	0	85	7.083	4.719	0.2361	0.1573	50	18	68
874310	5	44	20	32	38	12	30	10	55	36	32	0	314	26.167	16.792	0.8722	0.5597	50	65	115
875132	9	15	11	3	0	12	16	15	8	3	9	6	107	8.917	5.195	0.2972	0.1732	50	15	65
875133	48	42	87	15	23	63	44	55	52	62	24	16	531	44.25	21.751	1.475	0.725	50	106	156
875135	9	6	17	0	2	4	4	9	16	9	13	13	102	8.5	5.486	0.2833	0.1829	50	22	72
LM0554	0	0	0	0	0	1	4	2	2	0	1	5	15	1.25	1.712	0.0417	0.0571	6	6	12
852981	0	3	10	4	10	10	6	9	9	14	5	2	82	6.833	4.13	0.2278	0.1377	21	23	44
LM0555	0	0	0	0	7	2	0	0	0	4	0	1	14	1.167	2.209	0.0389	0.0736	8	7	15
852982	14	29	35	21	41	23	25	22	25	33	10	16	294	24.5	8.99	0.8167	0.2997	84	64	148
852983	79	83	101	25	44	83	59	59	70	74	47	22	746	62.167	24.188	2.0722	0.8063	105	213	318
LM0556	0	0	2	0	0	2	0	1	0	0	1	3	9	0.75	1.055	0.025	0.0352	4	4	8
849429	0	1	10	8	3	8	7	5	6	6	5	5	64	5.333	2.902	0.178	0.097	11	12	23
LM0198	0	0	1	0	1	4	7	6	6	0	1	0	26	2.167	2.758	0.072	0.092	7	8	15
LM0538	0	0	0	0	0	1	4	2	2	0	1	5	15	1.250	1.712	0.042	0.057	5	5	10
849430	12	13	16	21	24	11	10	0	11	11	3	9	141	11.750	6.621	0.392	0.221	16	26	42
LM0171	2	16	19	0	16	9	15	22	14	22	7	7	149	12.417	7.354	0.414	0.245	16	28	44
LM0539	0	0	0	0	8	7	0	0	0	4	0	1	20	1.667	2.964	0.056	0.099	6	9	15
LM0139	47	30	42	0	18	46	39	44	26	38	30	24	384	32.000	13.744	1.067	0.458	22	66	88
LM0540	0	0	2	0	0	2	0	1	0	0	1	3	9	0.750	1.055	0.025	0.035	3	3	6
849431	32	53	52	25	26	37	20	15	44	36	17	1	358	29.833	15.590	0.994	0.520	22	82	104

Item_No	Demand (pieces/month)												Total (pcs)	Avg Usage (pcs/month)	SD Usage (pcs/month)	Avg Lead time (month)	SD lead time (month)	EOQ (pcs.)	ROP (pcs.)	Max. Inv. Level (pcs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
434428	178	164	232	72	104	160	182	182	196	200	88	62	1820	151.667	55.778	5.056	1.859	472	289	761
292320	14	32	45	25	58	36	35	33	36	51	16	24	405	33.750	13.157	1.125	0.439	269	28	297
443070	1048.5	849.5	1630	944.4	1296	1111	2436	1226	1509	1534	600.7	832.9	15018	1251.467	487.208	41.7156	16.24	2000	883	2883
LM0363	0	0	20	17	57	17	37	47	28	31	0	0	254	21.167	19.479	0.706	0.649	35	51	86
LM0298	6	31	8	0	0	5	51	17	0	7	0	0	125	10.417	15.733	0.347	0.524	60	10	70
862030	4	33	32	14	50	41	3	2	8	25	20	18	250	20.833	15.736	0.694	0.525	81	57	138
862048	4	33	32	14	50	41	3	2	8	25	20	18	250	20.833	15.736	0.694	0.525	92	57	149
862049	4	33	32	14	50	41	3	2	8	25	20	18	250	20.833	15.736	0.694	0.525	82	57	139
862047	2	14	21	23	13	26	20	1	0	14	11	15	160	13.333	8.659	0.444	0.289	71	35	106
814157	1	73	64	68	80	72	49	0	45	50	54	80	636	53.000	27.250	1.767	0.908	301	98	399
868845	1	8	4	19	8	8	4	9	4	14	2	5	86	7.167	5.149	0.239	0.172	24	22	46
868846	30	21	29	49	6	16	28	46	32	36	0	12	305	25.417	15.036	0.847	0.501	38	71	109
LM0289	8	0	0	12	0	0	26	8	0	0	0	0	54	4.500	8.006	0.150	0.267	44	23	67
851888	55	12	16	8	54	46	26	68	39	24	0	0	348	29.000	23.014	0.967	0.767	67	95	162
849667	0	140	108	105	154	143	13	0	24	89	114	191	1081	90.083	65.517	3.003	2.184	156	188	344
377050	14	0	2	0	10	2	4	9	0	4	0	0	45	3.750	4.751	0.125	0.158	20	11	31
377051	0	0	1	0	0	1	8	0	0	0	0	0	10	0.833	2.290	0.028	0.076	8	5	13
852978	0	0	8	5	2	6	0	0	6	6	5	4	42	3.5	2.939	0.1167	0.098	17	11	28
852979	3	10	5	18	17	13	8	0	0	8	6	7	95	7.917	5.854	0.2639	0.1951	37	29	66
881751	28	58	70	42	96	50	50	44	50	74	20	34	616	51.333	21.051	1.711	0.702	66	89	155
881752	158	169	216	54	98	181	128	131	151	162	102	57	1607	133.917	49.083	4.464	1.636	91	253	344
859371	24	18	0	40	0	48	0	0	0	22	32	0	184	15.333	17.814	0.511	0.594	51	48	99
877653	27	18	51	55	9	22	26	49	39	65	2	15	378	31.500	19.975	1.050	0.666	65	115	180
853577	0	1	2	4	1	3	10	10	5	8	3	0	47	3.917	3.63	0.1306	0.121	30	14	44
853578	12	19	20	13	21	12	25	22	25	29	8	7	213	17.75	7.175	0.5917	0.2392	120	54	174
853579	77	62	94	19	30	65	56	59	68	63	33	24	650	54.167	22.886	1.8056	0.7629	161	133	294
139049	64	416	248	416	368	192	288	216	504	584	304	40	3640	303.333	164.746	10.1111	5.4915	3000	687	3687
881631	200	144	262	280	76	132	184	316	220	410	0	124	2348	195.667	111.658	6.5222	3.7219	4000	104	4104
871276	89	82	116	36	52	80	91	91	98	100	44	31	910	75.833	27.889	2.528	0.930	358	228	586
883724	31	27	41	60	14	24	47	52	20	48	21	17	402	33.500	15.442	1.117	0.515	80	87	167
883725	31	27	41	60	14	24	47	52	20	48	21	17	402	33.500	15.442	1.117	0.515	76	90	166

Item_No	Demand (pieces/month)												Total (pcs)	Avg Usage (pcs/month)	SD Usage (pcs/month)	Avg Lead time (month)	SD lead time (month)	EOQ (pcs.)	ROP (pcs.)	Max. Inv. Level (pcs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
882055	31	27	41	60	14	24	47	52	20	48	21	17	402	33.500	15.442	1.117	0.515	82	87	169
882056	31	27	41	60	14	24	47	52	20	48	21	17	402	33.500	15.442	1.117	0.515	77	94	171
878914	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	11	11	22
869231	510	452	652	182	268	450	476	482	528	526	242	172	4940	411.667	155.456	13.722	5.182	674	828	1502
887423	278	267	254	342	128	240	409	625	534	614	93	148	3932	327.667	182.474	10.9222	6.0825	100	526	713
887424	29	36	47	42	26	44	88	44	26	72	6	32	492	41	21.638	1.3667	0.7213	100	61	161
849528	0	0	7	5	3	6	4	0	9	6	5	5	50	4.167	2.918	0.139	0.097	10	11	21
849529	3	10	15	8	25	13	0	0	0	8	3	10	95	7.917	7.465	0.264	0.249	13	24	37
849530	2	21	9	6	14	20	3	1	2	11	15	1	105	8.750	7.387	0.292	0.246	11	24	35
849531	3	17	25	49	20	23	0	0	8	16	15	38	214	17.833	14.850	0.594	0.495	40	58	98
869175	0	1	2	4	1	3	10	10	5	8	3	0	47	3.917	3.630	0.131	0.121	12	11	23
868964	2	16	8	38	16	16	8	18	8	28	4	10	172	14.333	10.299	0.478	0.343	25	47	72
869177	12	19	20	13	21	12	25	22	25	29	8	7	213	17.750	7.175	0.592	0.239	28	40	68
868965	36	38	58	111	32	32	55	62	66	72	42	24	628	52.333	24.039	1.744	0.801	35	128	163
869178	77	62	94	19	30	65	56	59	68	63	33	24	650	54.167	22.886	1.806	0.763	38	118	156
340310	89	74	90	93	84	67	72	84	73	88	31	59	904	75.333	17.437	2.511	0.581	34	97	131
340311	39	46	97	0	83	97	72	89	36	43	42	67	711	59.250	29.726	1.975	0.991	30	108	138
456864	319	278	376	141	169	241	274	264	299	301	151	117	2930	244.167	81.352	8.139	2.712	311	529	840
474438	38	296	150	270	260	112	200	112	354	318	208	20	2338	194.833	109.433	6.494	3.648	374	552	926
807675	17	134	96	46	159	170	18	9	24	89	97	49	908	75.667	57.020	2.522	1.901	169	244	413
884996	498	334	265	110	331	63	426	96	200	85	32	18	2458	204.833	162.704	6.828	5.424	76	616	692
854261	0	132	0	0	78	0	0	0	0	0	14	0	224	18.667	42.128	0.622	1.404	26	119	145
861843	0	0	6	0	3	4	0	0	6	0	3	3	25	2.083	2.392	0.069	0.080	6	7	13
861846	0	2	2	0	6	4	0	1	0	6	0	4	25	2.083	2.353	0.069	0.078	6	9	15
861844	0	7	12	8	21	8	0	0	0	6	2	6	70	5.833	6.250	0.194	0.208	12	17	29
866115	2	3	3	0	6	5	0	0	0	2	0	4	25	2.083	2.151	0.069	0.072	6	7	13
861845	1	8	4	2	5	2	0	0	0	5	1	1	29	2.417	2.539	0.081	0.085	6	8	14
866116	1	13	5	4	9	18	3	1	2	6	14	0	76	6.333	5.883	0.211	0.196	10	18	28
875130	10	0	124	0	0	489	270	452	165	130	120	6	1766	147.167	173.327	4.906	5.778	73	550	623
878160	190	149	259	338	68	132	520	317	220	344	5	100	2642	220.167	143.857	7.339	4.795	90	665	755
869006	0	0	1	0	0	6	2	5	2	0	0	0	16	1.333	2.103	0.044	0.070	9	6	15

Item_No	Demand (pieces/month)												Total (pcs)	Avg Usage (pcs/month)	SD Usage (pcs/month)	Avg Lead time (month)	SD lead time (month)	EOQ (pcs.)	ROP (pcs.)	Max. Inv. Level (pcs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
869009	0	1	4	1	1	4	5	6	6	4	2	0	34	2.833	2.250	0.094	0.075	14	8	22
868957	1	8	12	11	8	3	13	5	3	13	0	5	82	6.833	4.668	0.228	0.156	11	20	31
869007	9	0	2	0	0	6	43	10	15	3	0	0	88	7.333	12.280	0.244	0.409	11	30	41
869010	5	20	24	0	25	18	14	27	81	20	6	8	248	20.667	20.913	0.689	0.697	18	55	73
868958	5	44	20	32	38	12	30	10	55	36	32	0	314	26.167	16.792	0.872	0.560	18	76	94
869008	26	1	17	0	10	31	5	26	81	9	0	0	206	17.167	23.029	0.572	0.768	17	62	79
869011	80	32	49	22	25	63	79	58	131	23	26	0	588	49.000	35.754	1.633	1.192	23	122	145
869515	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	11	24	35
LM0249	6	0	4	0	7	0	1	22	96	19	6	0	161	13.417	27.034	0.4472	0.9011	50	50	100
LM0520	145	122	166	0	86	158	149	185	106	166	107	86	1476	123	50.758	4.1	1.6919	100	281	474
853371	265	313	399	125	248	327	247	246	282	324	176	123	3075	256.250	82.910	8.542	2.764	406	543	949
867437	23	5	15	4	8	12	15	17	25	12	19	9	164	13.667	6.651	0.456	0.222	53	30	83
LB0730	219	147	356	0	180	288	245	217	54	192	171	36	2105	175.417	104.372	5.847	3.479	520	345	865
375793	579	84	225	168	201	336	567	270	18	105	36	48	2637	219.750	191.715	7.325	6.391	921	634	1555
LM0154	2402	2616	2998	1561	2270	3936	3052	3748	1670	1996	2286	272	28807	2400.583	998.366	80.019	33.279	2029	3632	5661
858353	54	84	85	34	85	107	64	107	44	59	56	44	823	68.583	24.526	2.286	0.818	103	139	242
871664	6	52	33	20	55	53	6	2	4	30	32	12	305	25.417	20.079	0.847	0.669	125	74	199
849666	6	52	33	20	55	53	6	2	4	30	32	12	305	25.417	20.079	0.847	0.669	81	74	155
869737	32	45	91	120	28	48	74	102	70	108	0	34	752	62.667	37.286	2.089	1.243	134	158	292
878375	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	58	18	76
893740	36	296	143	269	260	108	198	104	350	295	204	20	2283	190.250	107.959	6.342	3.599	308	371	679
887026	4	0	14	2	0	8	10	16	8	40	8	0	110	9.167	11.101	0.306	0.370	77	32	109
878257	52	38	74	40	20	30	40	72	32	102	0	40	540	45.000	27.029	1.500	0.901	295	123	418
868959	178	146	222	338	68	128	236	296	204	284	1	92	2193	182.750	100.369	6.092	3.346	323	473	796
836283	62	0	0	39	0	0	1	42	0	42	0	0	186	15.500	23.376	0.517	0.779	155	15	170
873575	24	192	95	167	168	68	130	66	232	195	136	10	1483	123.583	71.114	4.119	2.371	244	319	563
LM0359	10	0	35	0	7	0	8	44	72	15	12	5	208	17.333	22.047	0.5778	0.7349	50	45	95
LM0360	4	0	29	0	0	0	51	7	37	15	6	5	154	12.833	17.018	0.4278	0.5673	50	34	84
LM0259	53	50	60	12	52	81	75	102	71	34	35	8	633	52.75	27.703	1.7583	0.9234	100	81	181
LM0358	14	0	52	0	7	0	2	51	105	26	16	10	283	23.583	31.532	0.7861	1.0511	100	61	161
LM0251	47	47	56	0	45	71	67	79	36	34	29	8	519	43.25	23.856	1.4417	0.7952	100	81	181

Item_No	Demand (pieces/month)												Total (pcs)	Avg Usage (pcs/month)	SD Usage (pcs/month)	Avg Lead time (month)	SD lead time (month)	EOQ (pcs.)	ROP (pcs.)	Max. Inv. Level (pcs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
LM0250	47	48	56	0	45	71	65	79	96	47	29	8	591	49.25	27.641	1.6417	0.9214	100	93	193
435120	412	756	749	471	668	600	578	492	782	841	468	216	7033	586.083	183.168	19.5361	6.1056	1400	788	2188
858220	0	3	10	4	10	11	10	11	11	14	6	7	97	8.083	4.1	0.2694	0.1367	21	21	42
LM0557	0	0	0	0	0	1	4	2	2	0	1	5	15	1.25	1.712	0.0417	0.0571	6	5	12
853581	0	3	10	4	10	11	10	11	11	14	6	7	97	8.083	4.1	0.2694	0.1367	30	22	52
858221	14	29	35	21	41	23	25	22	25	33	10	16	294	24.5	8.99	0.8167	0.2997	84	61	145
LM0558	0	0	0	0	7	2	0	0	0	4	0	1	14	1.167	2.209	0.0389	0.0736	8	6	14
853582	16	45	43	59	64	41	33	40	33	65	14	27	480	40	16.831	1.3333	0.561	137	102	239
858222	79	83	101	25	44	83	59	59	70	74	47	22	746	62.167	24.188	2.0722	0.8063	105	191	296
LM0559	0	0	2	0	0	2	0	1	0	0	1	3	9	0.75	1.055	0.025	0.0352	4	4	8
853583	89	171	143	89	120	109	119	80	180	146	112	25	1383	115.25	42.499	3.8417	1.4166	214	296	510
885777	20	18	19	20	10	12	20	26	10	28	0	21	204	17.000	7.758	0.567	0.259	25	54	79
869754	2	16	10	35	16	16	8	18	8	28	4	10	171	14.250	9.593	0.475	0.320	19	39	58
869755	60	40	71	69	44	28	63	87	97	83	2	25	669	55.750	28.429	1.858	0.948	33	124	157
873501	14	0	14	12	0	8	14	16	8	16	8	0	110	9.167	6.235	0.306	0.208	27	22	49
873447	7	0	7	6	0	4	7	8	4	8	4	0	55	4.583	3.118	0.153	0.104	13	10	23
868825	0	1	2	4	1	3	10	10	5	8	3	0	47	3.917	3.630	0.131	0.121	15	10	25
868829	12	19	20	13	21	12	25	22	25	29	8	7	213	17.750	7.175	0.592	0.239	33	41	74
868831	77	62	94	19	30	65	56	59	68	63	33	24	650	54.167	22.886	1.806	0.763	50	140	190
407124	24	0	0	0	0	0	0	0	2	0	0	0	26	2.167	6.900	0.072	0.230	15	15	30
407123	1512	477	1346	1078	998	1275	543	842	964	554	277	135	10001	833.417	437.875	27.781	14.596	441	1191	1632
865313	1	0	0	0	0	0	0	1	0	0	0	0	2	0.167	0.389	0.006	0.013	1	1	2
817615	4	3	18	4	1	9	8	3	0	3	0	0	53	4.417	5.178	0.147	0.173	9	16	25
855188	59	308	530	0	0	120	320	4	0	0	0	0	1341	111.750	177.407	3.725	5.914	170	507	677
407122	0	72	136	26	12	279	66	174	90	0	0	0	855	71.250	87.466	2.375	2.916	125	229	354
858725	0	0	0	0	0	0	0	121	1	96	182	74	474	39.500	63.055	1.317	2.102	68	155	223
407121	0	104	0	0	0	280	64	0	41	0	0	0	489	40.750	82.609	1.358	2.754	102	187	289
887425	4	0	3	0	0	15	7	1	0	12	0	12	54	4.500	5.600	0.150	0.187	19	11	30
817649	60	42	42	8	66	184	1	79	7	230	24	178	921	76.750	77.558	2.558	2.585	67	232	299
805634	69	0	27	0	4	18	138	24	10	10	4	0	304	25.333	40.412	0.844	1.347	24	103	127
855170	48	87	269	0	16	168	265	114	69	70	114	24	1244	103.667	89.548	3.456	2.985	141	234	375

Item_No	Demand (pieces/month)												Total (pcs)	Avg Usage (pcs/month)	SD Usage (pcs/month)	Avg Lead time (month)	SD lead time (month)	EOQ (pcs.)	ROP (pcs.)	Max. Inv. Level (pcs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
373119	167	76	92	60	136	131	75	82	23	30	21	24	917	76.417	48.717	2.547	1.624	121	171	292
872109	2	16	8	38	16	16	8	18	8	28	4	10	172	14.333	10.299	0.478	0.343	44	41	85
872110	10	88	40	64	76	24	60	20	110	72	64	0	628	52.333	33.584	1.744	1.120	68	143	211
872114	14	0	14	12	0	8	14	16	8	16	8	0	110	9.167	6.235	0.306	0.208	55	26	81
872112	26	23	37	25	30	24	40	39	28	32	20	20	344	28.667	7.024	0.956	0.234	73	58	131
809522	265	313	399	125	248	327	247	246	282	324	176	123	3075	256.250	82.910	8.542	2.764	752	401	1153
857735	2	2	8	4	3	6	2	1	6	6	5	5	50	4.167	2.167	0.139	0.072	16	10	26
857736	2	16	13	16	15	13	0	0	0	8	6	6	95	7.917	6.487	0.264	0.216	23	18	41
857737	2	8	8	11	1	12	0	0	2	11	16	0	71	5.917	5.712	0.197	0.190	17	22	39
885969	11	96	44	83	84	32	64	29	109	86	66	10	714	59.500	33.614	1.983	1.121	97	215	312
142476	1002	789	1261	944	840	1347	879	1380	475	792	798	833	11340	945.000	264.938	31.500	8.831	1500	2037	3537
875392	40	34	53	33	17	22	20	15	44	31	4	0	313	26.083	15.957	0.869	0.532	103	70	173
875393	40	34	53	33	17	22	20	15	44	31	4	0	313	26.083	15.957	0.869	0.532	103	71	174
LM0167	49	38	59	42	41	58	61	63	37	34	39	38	559	46.583	10.766	1.553	0.359	138	99	237
LM0168	49	38	59	42	41	58	61	63	37	34	39	38	559	46.583	10.766	1.553	0.359	138	100	238
142475	1002	789	1261	944	840	1347	879	1380	475	792	798	833	11340	945.000	264.938	31.500	8.831	1150	2046	3196
432135	2730	1528	3030	1208	2208	3228	1810	3170	1484	1782	1904	924	25006	2083.833	786.045	69.461	26.202	1890	3437	5327
498476	84	0	238	24	0	30	27	153	186	196	0	56	994	82.833	86.93	2.7611	2.8977	1000	72	1072
448603	24	0	84	12	0	48	24	96	48	276	48	0	660	55	76.489	1.8333	2.5496	400	170	570
455217	186	194	268	162	286	283	190	294	136	160	146	213	2518	209.833	58.108	6.9944	1.9369	1500	344	1844
465097	230	2000	920	1850	1760	720	1320	1070	1920	1860	1340	150	15140	1261.667	652.796	42.0556	21.76	3000	629	3629
467533	96	840	384	690	732	264	564	234	1014	732	588	30	6168	514	309.994	17.1333	10.333	2000	212	2212
443459	190	230	310	102	204	250	192	202	220	296	136	98	2430	202.5	66.966	6.75	2.2322	800	55	855
467238	118	102	170	210	144	75	174	162	124	166	119	36	1600	133.333	47.925	4.4444	1.5975	1500	38	1538
101920	2357	1803	2391	1670	2172	2527	1717	2688	1636	1644	1589	1822	24016	2001.333	398.703	66.7111	13.29	18000	3329	21329
101936	48	416	192	408	368	160	272	152	472	400	272	40	3200	266.667	148.273	8.8889	4.9424	3000	104	3104
101937	493	816	868	468	744	726	609	543	774	850	476	283	7650	637.5	185.634	21.25	6.1878	5000	252	5252
101325	168	134	205	140	164	251	140	188	192	182	125	149	2038	169.833	36.105	5.6611	1.2035	1000	238	1238
439179	24	208	96	204	184	80	136	76	236	200	136	20	1600	133.333	74.137	4.4444	2.4712	1500	82	1582
430085	101	115	176	54	102	137	102	125	122	217	80	49	1380	115	47.284	3.8333	1.5761	1000	485	1485
445822	180	1408	711	1323	1240	548	946	550	1664	1523	976	110	11179	931.583	517.421	31.0528	17.247	4000	1969	5969

Item_No	Demand (pieces/month)												Total (pcs)	Avg Usage (pcs/month)	SD Usage (pcs/month)	Avg Lead time (month)	SD lead time (month)	EOQ (pcs.)	ROP (pcs.)	Max. Inv. Level (pcs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
445542	208	1456	812	1448	1288	640	992	692	1732	1860	1032	140	12300	1025	554.918	34.1667	18.497	4000	508	4508
375673	135	0	13	36	98	15	19	46	18	16	4	6	406	33.833	41.442	1.128	1.381	107	74	181
375674	121	54	167	0	34	197	203	110	18	73	57	12	1046	87.167	71.725	2.906	2.391	150	143	293
876009	12	104	48	102	92	40	68	38	118	100	68	10	800	66.667	37.068	2.222	1.236	414	87	501
868904	72	592	286	538	520	216	396	208	700	590	408	40	4566	380.500	215.918	12.683	7.197	422	406	828
878412	2	4	6	2	0	4	0	6	6	21	0	4	55	4.583	5.664	0.153	0.189	46	8	54
851593	4	33	32	14	50	41	3	2	8	25	20	18	250	20.833	15.736	0.694	0.525	164	77	241
851592	4	33	32	14	50	41	3	2	8	25	20	18	250	20.833	15.736	0.694	0.525	113	59	172
873042	12	104	48	102	92	40	68	38	118	100	68	10	800	66.667	37.068	2.222	1.236	127	118	245
886116	4	0	14	0	0	8	4	16	8	46	8	0	108	9.000	12.863	0.300	0.429	118	30	148
886117	2	0	7	1	0	4	2	8	4	23	4	0	55	4.583	6.374	0.153	0.213	69	15	84
883668	12	104	48	102	92	40	68	38	108	100	68	20	800	66.667	34.581	2.222	1.153	254	149	403
869839	89	82	116	36	52	80	91	91	98	100	44	31	910	75.833	27.889	2.528	0.930	191	186	377
869837	89	82	116	36	52	80	91	91	98	100	44	31	910	75.833	27.889	2.528	0.930	173	181	354
883667	17	104	48	102	92	40	68	38	108	100	68	15	800	66.667	34.542	2.222	1.151	281	164	445
869838	89	82	116	36	52	80	91	91	98	100	44	31	910	75.833	27.889	2.528	0.930	198	177	375
869836	89	82	116	36	52	80	91	91	98	100	44	31	910	75.833	27.889	2.528	0.930	175	161	336
437349	22	78	418	0	0	275	32	603	0	0	0	0	1428	119.000	202.623	3.967	6.754	196	560	756
376105	1204	661	1177	764	767	1227	663	792	369	581	572	170	8947	745.583	326.870	24.853	10.896	485	1468	1953
437351	0	0	0	21	0	9	0	11	14	0	0	0	55	4.583	7.305	0.153	0.244	24	18	42
376106	0	5	44	30	13	77	14	20	58	44	48	48	401	33.417	23.477	1.114	0.783	67	82	149
859066	0	3	10	4	10	11	10	11	11	14	6	7	97	8.083	4.1	0.2694	0.1367	21	13	34
859067	14	29	35	21	48	25	25	22	25	37	10	17	308	25.667	10.526	0.8556	0.3509	99	80	179
859068	79	83	103	25	44	85	59	60	70	74	48	25	755	62.917	24.138	2.0972	0.8046	107	172	279
883311	10	0	0	0	0	0	1	2	0	2	0	0	15	1.250	2.864	0.042	0.096	5	5	10
883313	14	0	0	0	0	0	0	4	0	4	0	0	22	1.833	4.130	0.061	0.138	5	7	12
836285	0	0	0	0	0	0	25	42	0	42	0	15	124	10.333	16.778	0.344	0.559	30	16	46
857306	849	537	944	721	461	813	450	964	375	369	552	374	7409	617.417	228.107	20.581	7.604	288	1387	1675
857307	0	4	55	25	10	69	83	34	42	45	29	25	421	35.083	25.329	1.169	0.844	56	86	142
879491	0	3	10	4	10	11	10	11	11	14	6	7	97	8.083	4.100	0.269	0.137	11	17	28
879497	10	29	35	21	48	25	24	20	25	35	10	17	299	24.917	10.875	0.831	0.363	23	45	68

Item_No	Demand (pieces/month)												Total (pcs)	Avg Usage (pcs/month)	SD Usage (pcs/month)	Avg Lead time (month)	SD lead time (month)	EOQ (pcs.)	ROP (pcs.)	Max. Inv. Level (pcs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
879499	65	83	103	25	44	85	59	56	70	70	48	25	733	61.083	23.512	2.036	0.784	29	115	144
455152	1088	613	1254	570	777	1111	466	938	333	411	358	133	8052	671.000	358.627	22.367	11.954	490	841	1331
455153	0	0	48	18	1	59	60	40	58	8	48	26	366	30.500	24.411	1.017	0.814	91	48	139
474700	68	126	269	144	54	376	91	196	36	132	228	36	1756	146.333	104.283	4.878	3.476	137	162	299
474701	0	0	17	12	12	17	104	0	4	36	0	24	226	18.833	29.098	0.628	0.970	41	37	78
491102	45	30	53	34	42	24	20	47	29	16	24	20	384	32.000	12.151	1.067	0.405	47	54	101
446816	113	61	102	50	59	125	94	106	43	73	57	37	920	76.667	29.901	2.556	0.997	63	146	209
482793	0	0	5	0	2	6	4	2	0	2	0	0	21	1.750	2.179	0.058	0.073	8	7	15
877488	15	29	30	6	4	31	3	38	3	9	1	6	175	14.583	13.507	0.486	0.450	18	23	41
859367	4	12	14	30	0	18	0	0	1	10	6	2	97	8.083	9.229	0.269	0.308	14	17	31
877489	22	28	55	0	42	45	37	36	71	9	24	10	379	31.583	20.394	1.053	0.680	25	47	72
375775	193	28	72	54	65	107	43	80	0	35	12	12	701	58.417	52.759	1.947	1.759	79	151	230
LB0700	73	49	103	0	59	94	86	62	18	64	57	12	677	56.417	32.354	1.881	1.079	71	100	171
375725	193	28	72	54	65	108	147	90	6	35	12	12	822	68.500	57.976	2.283	1.933	97	163	260
LB0743	73	23	129	0	55	55	122	62	18	64	57	12	670	55.833	40.093	1.861	1.336	67	128	195
375777	0	0	3	2	2	7	0	0	0	1	0	4	19	1.583	2.193	0.053	0.073	10	5	15
LB0762	0	0	2	0	1	3	4	2	0	0	0	0	12	1.000	1.414	0.033	0.047	8	2	10
375727	0	0	3	2	2	7	0	0	0	3	0	4	21	1.750	2.221	0.058	0.074	11	6	17
LB0714	0	0	2	0	1	3	4	2	0	0	0	0	12	1.000	1.414	0.033	0.047	8	4	12
491069	532	88	455	114	257	415	239	310	56	204	144	60	2874	239.500	160.411	7.983	5.347	420	539	959
861355	241	125	221	140	97	260	92	210	113	111	100	99	1809	150.750	63.177	5.025	2.106	85	391	476
834899	16	27	26	17	55	24	26	17	31	44	13	17	313	26.083	12.457	0.869	0.415	46	49	95
834900	25	32	28	46	8	27	42	22	52	61	12	29	384	32.000	15.702	1.067	0.523	51	47	98
834901	15	26	39	9	55	54	42	88	78	24	10	22	462	38.500	25.953	1.283	0.865	56	91	147
834902	0	0	0	0	0	0	56	58	33	30	35	17	229	19.083	22.629	0.636	0.754	35	58	93
834903	0	0	0	0	0	4	2	8	6	6	3	29	58	4.833	8.122	0.161	0.271	17	17	34
430281	416	386	536	420	450	504	302	554	364	482	200	316	4930	410.833	104.295	13.6944	3.4765	2000	184	2184
488317	36	208	138	210	184	104	148	124	260	338	160	20	1930	160.833	88.98	5.3611	2.966	3000	88	3088
135473	124	98	184	56	145	167	79	151	80	84	73	107	1348	112.333	41.271	3.7444	1.3757	3000	48	3048
136034	220	314	306	92	310	400	256	396	246	220	202	68	3030	252.5	103.052	8.4167	3.4351	4000	114	4114
468341	28	208	110	206	184	88	140	92	244	246	144	20	1710	142.5	77.319	4.75	2.5773	2000	77	2077

Item_No	Demand (pieces/month)												Total (pcs)	Avg Usage (pcs/month)	SD Usage (pcs/month)	Avg Lead time (month)	SD lead time (month)	EOQ (pcs.)	ROP (pcs.)	Max. Inv. Level (pcs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
430158	194	268	294	176	196	208	254	236	322	346	164	72	2730	227.5	75.78	7.5833	2.526	3000	122	3122
135167	405	1218	884	1046	1026	702	915	715	1408	1504	820	199	10842	903.5	378.728	30.1167	12.624	10000	698	10698
135169	398	438	592	840	316	312	838	636	523	500	0	0	5393	449.417	271.373	14.9806	9.0458	4000	268	4268
430162	128	72	220	80	40	64	80	184	88	296	0	96	1348	112.333	82.831	3.7444	2.761	2000	95	2095
828655	104	128	60	160	15	70	61	0	36	20	40	30	724	60.333	48.393	2.011	1.613	107	165	272
828656	0	4	0	10	10	10	0	0	3	34	0	20	91	7.583	10.405	0.253	0.347	31	28	59
471779	789	322	494	459	546	695	1672	1303	500	518	583	641	8522	710.167	389.931	23.6722	12.998	2674	1758	4432
471780	0	4	28	15	0	39	14	32	153	8	45	29	367	30.583	41.43	1.0194	1.381	243	113	356
869691	763	535	873	0	570	912	666	825	360	442	554	68	6568	547.333	294.335	18.2444	9.8112	930	1290	2220
869692	0	0	31	0	3	18	18	28	27	10	5	0	140	11.667	12.146	0.3889	0.4049	32	41	93
149968	19	17	38	0	56	6	49	40	6	27	0	4	262	21.833	19.835	0.728	0.661	237	51	288
846161	4	33	32	14	50	41	3	2	8	25	20	18	250	20.833	15.736	0.694	0.525	179	47	226
881166	89	82	116	36	52	80	91	91	98	100	44	31	910	75.833	27.889	2.528	0.930	409	170	579
876008	6	52	24	51	46	20	34	19	59	50	34	5	400	33.333	18.534	1.111	0.618	207	84	291
874312	308	290	389	280	253	398	590	518	308	218	286	224	4062	338.500	115.560	11.283	3.852	375	559	934
888756	4	0	7	5	4	4	2	8	4	9	4	4	55	4.583	2.466	0.153	0.082	22	11	33
145112	88	40	114	0	60	116	18	96	33	32	2	4	603	50.250	43.451	1.675	1.448	243	147	390
439402	4	0	14	2	0	8	4	16	8	46	8	0	110	9.167	12.748	0.306	0.425	74	35	109
379232	166	112	177	106	145	233	222	186	84	120	110	107	1768	147.333	48.970	4.911	1.632	389	281	670
439401	536	362	523	346	589	360	348	560	253	412	150	186	4625	385.417	144.947	12.847	4.832	532	917	1449
893729	4	32	38	52	32	32	44	20	12	52	6	20	344	28.667	16.500	0.956	0.550	74	68	142
893730	120	82	116	180	32	64	128	184	132	168	2	48	1256	104.667	59.417	3.489	1.981	115	278	393
893731	4	0	7	5	4	4	2	8	4	9	4	4	55	4.583	2.466	0.153	0.082	21	10	31
461309	1128	1010	1233	908	1324	1714	1572	5276	606	1288	1718	3318	21095	1757.917	1298.214	58.5972	43.274	7000	2622	9622
455038	35.1	62.36	92.47	17.39	94.32	108	64.7	83.9	38.22	70.15	45.88	61.92	774.37	64.531	27.138	2.151	0.905	52	76	128
454233	54.5	32.28	33.52	6.55	36.67	24.65	21.35	47.68	83.36	30.03	7.92	6.9	385.41	32.117	22.244	1.071	0.742	37	46	83
893719	2	16	8	38	16	16	8	18	8	28	4	10	172	14.333	10.299	0.478	0.343	29	35	64
893720	20	176	80	128	152	48	120	40	220	144	128	0	1256	104.667	67.168	3.489	2.239	89	221	310
878455	40	36	38	40	20	25	40	44	20	58	0	32	393	32.750	14.827	1.092	0.494	73	65	138
893721	4	0	7	5	4	4	2	8	4	9	4	4	55	4.583	2.466	0.153	0.082	19	10	29
878452	8	0	14	10	8	8	4	16	8	18	8	8	110	9.167	4.933	0.306	0.164	41	22	63

Item_No	Demand (pieces/month)												Total (pcs)	Avg Usage (pcs/month)	SD Usage (pcs/month)	Avg Lead time (month)	SD lead time (month)	EOQ (pcs.)	ROP (pcs.)	Max. Inv. Level (pcs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
888737	2	16	8	38	16	16	8	18	8	28	4	10	172	14.333	10.299	0.478	0.343	36	53	89
888739	10	88	40	64	76	24	60	20	110	72	64	0	628	52.333	33.584	1.744	1.120	51	190	241
135176	5146	3447	6660	2968	5306	6628	5082	5914	1740	2705	2679	2051	50326	4193.833	1785.887	139.7944	59.53	21000	8282	29282
384096	0	0	54	0	0	39	0	88	0	0	0	0	181	15.083	29.312	0.503	0.977	38	76	114
893596	8	0	14	10	8	8	4	16	8	18	8	8	110	9.167	4.933	0.306	0.164	89	18	107
383529	171	111	194	106	195	223	106	206	99	120	104	93	1728	144.000	49.262	4.800	1.642	139	323	462
834833	0	5.2	19	1.2	5.3	10	30.5	2	1	1.4	3	1	79.6	6.633	9.228	0.221	0.308	83	7	90
836284	0	0	0	0	0	0	25	42	0	42	0	15	124	10.333	16.778	0.344	0.559	65	10	75
852274	2120	2504	3192	1000	1984	2616	1976	1968	2256	2592	1408	984	24600	2050.000	663.278	68.333	22.109	3977	2674	6651
135166	9376	6271	5999	10789	8056	8229	9174	9662	4455	7299	3968	5177	88455	7371.25	2203.351	245.7083	73.445	17000	2810	19810
382399	798	677	1256	799	758	1136	660	1197	1345	377	0	4	9007	750.583	450.778	25.0194	15.026	7000	3505	10505
389780	4121	2760	5375	4189	3164	5224	15552	4898	2680	3300	2405	2743	56411	4700.917	3572.519	156.6972	119.08	10000	4383	14383
847673	256	204	427	300	149	168	585	545	226	495	0	180	3535	294.583	179.976	9.8194	5.9992	3000	172	3172
346846	123	115	155	220	125	180	163	161	135	156	73	86	1692	141.000	40.461	4.700	1.349	81	208	289
LM0085	1246	1041	2332	794	780	1587	619	1376	433	634	750	333	11925	993.750	565.744	33.125	18.858	1480	815	2295
862780	0	0	4	2	0	3	2	0	15	0	8	0	34	2.833	4.529	0.094	0.151	5	11	16
876994	7	3	4	2	8	12	12	15	1	6	3	0	73	6.083	4.833	0.203	0.161	9	12	21
876995	8	0	1	0	0	0	8	2	8	0	0	3	30	2.500	3.451	0.083	0.115	4	6	10
445644	83	56	54	69	72	103	53	94	43	43	54	52	776	64.667	19.718	2.156	0.657	277	50	327
848656	6	52	33	20	46	44	6	2	4	26	30	8	277	23.083	18.048	0.769	0.602	24	65	89
LM0177	0	0	0	0	2	7	0	0	4	0	0	0	13	1.083	2.234	0.036	0.075	5	6	11
LM0535	0	0	0	0	7	2	0	0	0	4	2	4	19	1.583	2.314	0.053	0.077	6	7	13
868899	80	488	238	436	408	176	328	170	512	490	340	100	3766	313.833	157.005	10.461	5.234	449	828	1277
881876	421	369	534	142	215	367	375	381	425	418	195	141	3983	331.917	126.726	11.064	4.224	362	777	1139
866587	93	115	147	50	102	121	94	93	106	125	64	50	1160	96.667	29.904	3.222	0.997	198	151	349
866586	93	115	147	50	102	121	94	93	106	125	64	50	1160	96.667	29.904	3.222	0.997	198	152	350
102103	1448	1050	1951	1264	1229	1817	5796	1748	1142	1149	863	721	20178	1681.5	1349.209	56.05	44.974	7000	3813	10813
102105	856	708	1160	702	1170	1262	11204	1134	617	744	454	570	20581	1715.083	3000.252	57.1694	100.01	14000	4515	18515
430213	620	392	1478	886	416	628	612	487	362	308	320	256	6765	563.75	339.354	18.7917	11.312	5000	440	5440
409795	485.2	263.2	567.7	227.6	586.3	536.2	1186	605.4	225.7	290.9	222.1	129.9	5326.6	443.883	289.439	14.7961	9.648	1700	921	2621
142831	647.99	574.6	980.4	361.9	715.8	771.4	670.3	723.4	287.3	327.6	323.7	322.6	6706.9	558.909	228.086	18.6303	7.6029	1900	960	2860

Item_No	Demand (pieces/month)												Total (pcs)	Avg Usage (pcs/month)	SD Usage (pcs/month)	Avg Lead time (month)	SD lead time (month)	EOQ (pcs.)	ROP (pcs.)	Max. Inv. Level (pcs)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
116125	903	301.7	938.6	40	326.8	664.6	372.1	1152	716.2	487.4	48	558	6508.7	542.392	348.72	18.0797	11.624	1900	1143	3043
142490	549.07	364.1	649.3	399.7	366.1	711.4	353.1	537.2	246.1	276.1	277.6	239.9	4969.5	414.128	160.134	13.8043	5.3378	1600	680	2280
853244	510	300	512	324	360	660	318	584	1727	424	322	256	6297	524.750	399.064	17.492	13.302	1800	661	2461
861870	20	172	138	68	219	196	18	9	30	116	107	67	1160	96.667	72.985	3.222	2.433	223	141	364
858005	0	3	8	4	10	8	4	0	9	6	2	5	59	4.917	3.370	0.164	0.112	19	12	31
LM0172	0	0	3	1	1	4	8	6	6	2	1	0	32	2.667	2.741	0.089	0.091	14	8	22
LM0541	0	0	0	0	0	1	4	2	2	0	1	5	15	1.250	1.712	0.042	0.057	9	5	14
858006	12	13	16	21	25	16	8	0	11	11	3	9	145	12.083	6.973	0.403	0.232	28	45	73
LM0173	2	16	19	0	16	9	15	22	14	22	7	7	149	12.417	7.354	0.414	0.245	28	32	60
LM0542	0	0	0	0	7	0	2	0	0	4	0	1	14	1.167	2.209	0.039	0.074	9	6	15
858007	47	30	40	0	18	44	39	43	26	38	29	21	375	31.250	13.559	1.042	0.452	42	75	117
LM0144	32	53	61	25	26	39	20	16	44	36	18	1	371	30.917	16.839	1.031	0.561	42	83	125
LM0543	0	0	2	0	0	2	0	1	0	0	1	3	9	0.750	1.055	0.025	0.035	7	3	10
863522	10	56	62	74	39	68	20	68	21	55	65	17	555	46.250	23.425	1.542	0.781	299	100	399
875485	4	1	2	4	4	3	6	6	5	5	3	4	47	3.917	1.505	0.131	0.050	26	6	32
872837	172	197	249	71	145	203	143	143	171	191	109	74	1868	155.667	52.967	5.189	1.766	283	322	605

Table C2: Demand Data, Lead time, Economic order quantity, Reorder point, and Maximum inventory level of Local Material

APPENDIX D

Items with Purchasing Quantity Constraint

Item	Des	Standard Price (Baht)	UM	Standard Packing Quantity (SPQ)
445426	ALU-FOIL 100 W/ADHES IVE 50 MY	7.14	MT	100
139048	ALU-FOIL 30 W/ADHESI VE 9 MY	0.7	MT	100
445427	ALU-FOIL 50 W/ADHESI VE 50 MY	1.36	MT	100
443070	CARDBOARD 1500MM	5.4	MT	1000
139049	CSK HEAD SM SCREW 3,9X13 DIN	0.6	PC	1000
881631	CSK-HEAD-SCREW M4X6-4.8-H.A2F	0.3	PC	1000
LM0249	FCK 2,5/8-ST-5,08 (8x2)	164.8	PC	50
LM0359	FKC 2,5/11-ST-5,08(11POSITIONS	240	PC	50
LM0360	FKC 2,5/12-ST-5,08(12POSITIONS	260	PC	50
LM0259	FKC 2,5/5-ST-5,08 (5 POSITIONS	112	PC	50
LM0358	FKC 2,5/6-ST-5,08 (6 POSITIONS	130	PC	50
LM0251	FKIC 2,5/5-ST-5,08 (8x5)	120	PC	50
LM0250	FKIC 2,5/8-ST-5,08 (8x1)	190	PC	50
435120	FOIL PE 0,04X4000	5.15	MT	200
498476	HX HD SMS 6,3X22 DIN 7976	1.8	PC	500
448603	HX HD SMS 6,3X60 DIN 7976	5.39	PC	200
455217	HX HD SMS B 4,8X50 D IN 7981	2.39	PC	500
465097	HX HD SMS B 6,	2.5	PC	500
467533	HX HD SMS B 6,3X32 D IN 7976	2	PC	500
443459	HX HD SMS B 8X38 DIN 7976	5.99	PC	200
467238	HX HD SMS B 8X50 DIN 7976	2	PC	500
101920	HX NUT M 4 DIN 934 IN 934	0.1	PC	1000
101936	HX NUT M 6 DIN 934 IN 934	0.6	PC	1000
101937	HX NUT M 8 DIN 934 IN 934	0.6	PC	1000
101325	HX SCREW M 8X 90 8.8 DIN 931	3.25	PC	500
439179	HX SCREW M 8X35 8.8 DIN 933	2	PC	500
430085	HX SCREW M 8X40 8.8 DIN 933	1.8	PC	1000
445822	HX SMS SUPER TEKS BO 4,8X16	0.9	PC	1000
445542	HX SMS SUPER TEKS BO 4,8X32	1.2	PC	1000
430281	NUT M 6 2148	1.8	PC	500
488317	OVAL HEAD CSK SC M5X 10	0.5	PC	1000
135473	OVAL HEAD SC M4X16 4 .8	0.3	PC	1000
136034	OVAL HEAD SC M4X6 4. 8	0.3	PC	1000
468341	OVAL HEAD SC M6X40 4 .8	0.6	PC	1000
430158	PAN HEAD TAPPING SC 3,9X13	0.6	PC	1000
135167	PAN HEAD TAPPING SC 3,9X16	0.15	PC	1000
135169	PAN HEAD TAPPING SC 3,9X9,5	0.6	PC	1000
430162	PAN HEAD TAPPING SC 4,8X25	0.6	PC	1000
461309	RIVET 4,8 4,8-6,4	0.6	PC	1000
135176	SERRAT LOCK WASHER A 4,3 A2F	0.15	PC	1000
135166	SOCKET-HEAD SM SCREW 3,	0.4	PC	1000
382399	SOCKET-HEAD SM SCREW 3,	0.28	PC	1000
389780	SOCKET-HEAD SM SCREW 3,	0.8	PC	1000
847673	SOCKET-HEAD SM SCREW 3,	0.8	PC	1000
102103	WASHER 4,3 DIN 125 N 125	0.6	PC	1000
102105	WASHER 8,4 DIN 125 N 125	0.15	PC	1000
430213	WASHER 8,4 DIN 9021 021	0.45	PC	1000
409795	WIRE H05V-U 1,0 VIOL	2.5	MT	100
142831	WIRE H05V-U 1,00 (0, 75) BROWN	2.5	MT	100
116125	WIRE H05V-U 1,00 BLACK	2.5	MT	100
142490	WIRE H05V-U 1,00 BLU E	2.5	MT	100

Table D1: Items with Standard Packing Size, Constraint in Purchasing

Item	Des	Std Price (Baht)	UM	Minimum Order Quantity (MOQ)
866068	AS CABLE SET 3R. LIGHTING WHIT	785	PC	50
866069	AS CABLE SET 4R. LIGHTING WHIT	840	PC	50
866070	AS CABLE SET 5R. LIGHTING WHIT	900	PC	50
878665	AS CABLE W67	329.77	PC	100
879067	AS CABLE-SET 3R.-LIGHTING WHIT	795	PC	50
879068	AS CABLE-SET 4R.-LIGHTING WHIT	850	PC	50
879069	AS CABLE-SET 5R.-LIGHTING WHIT	905	PC	50
852980	AS COVER RAIL	1034.739	PC	34
379179	AS GRID DISPLAY SHEL F	380	PC	100
855180	AS GRID DISPLAY SHELF FA9005 (379179)	495	PC	100
866408	AS PLUG W/CABLE	47.84	PC	100
866407	AS PLUG W/CABLE MALE	46	PC	100
LM0521	AS PLUG W/CABLE MALE BLACK	46	PC	100
LM0522	AS PLUG W/CABLEBLACK	47.84	PC	100
874307	CABLE W 2 PLUG	202.29	PC	50
874309	CABLE W 4 PLUG	450	PC	50
874310	CABLE W 6 PLUG	570	PC	50
875132	CABLE-ASSEMBLY WITH 2 AMP-CONN	294	PC	50
875133	CABLE-ASSEMBLY WITH 3 AMP-CONN	438	PC	50
875135	CABLE-ASSEMBLY WITH 5 AMP-CONN	657	PC	50
LM0554	CANOPY PANEL -03 ARM/F 852981	688.63	PC	6
852981	CANOPY PANEL -03 ARM/F/S	688.63	PC	21
LM0555	CANOPY PANEL -04 ARM/F 852982	827.38	PC	8
852982	CANOPY PANEL -04 ARM/F/S	827.38	PC	84
852983	CANOPY PANEL -06 ARF	1077.63	PC	105
LM0556	CANOPY PANEL -06 ARF 852983	1077.63	PC	4
852978	COVER RAIL 1876LG. FA0370	534.201	PC	17
852979	COVER RAIL 2501LG. FA0370	699.538	PC	37
853577	COVER-RAIL 1876LG. FA0370 MAXI	462.67	PC	30
853578	COVER-RAIL 2501LG. FA0370 MAXI	619.6	PC	120
853579	COVER-RAIL 3751LG. FA0370 MAXI	927.73	PC	161
887423	DIVIDING-GRID INSIDE FA0117	145	PC	100
887424	DIVIDING-GRID OUTSIDE FA0117	130	PC	100
LM0520	FEMALE PLUG ASSEMBLY (BLACK)	51	PC	100
858220	FRONT CLADDING -03	384.91	PC	21
LM0557	FRONT CLADDING -03 858220	384.91	PC	6
853581	FRONT CLADDING -03 FA370 ARM/F	162.19	PC	30
858221	FRONT CLADDING -04	482.16	PC	84
LM0558	FRONT CLADDING -04 858221	482.16	PC	8
853582	FRONT CLADDING -04 FA370 ARM/F	216.06	PC	137
858222	FRONT CLADDING -06	601.16	PC	105
LM0559	FRONT CLADDING -06 858222	601.16	PC	4
853583	FRONT CLADDING -06 FA370 ARM/F	323.79	PC	214
859066	LIGHTING COVER -03 ARM/F/S	308.61	PC	21
859067	LIGHTING COVER -04 ARM/F/S	408.61	PC	99
859068	LIGHTING COVER -06 ARM/F/S	513.11	PC	107
471779	PRICE TICKET RAIL 40 SCANNER	43.42	PC	2674
471780	PRICE TICKET RAIL 40 SCANNER	65.45	PC	243
869691	PRICE TICKET RAIL 40SCAN 1249L	43.42	PC	930
869692	PRICE TICKET RAIL 40SCAN 1874L	65.45	PC	32

Table D2: Items with Minimum Order Quantity, Constaint in Purchasing

APPENDIX E

Output of Inventory Management

Table E1: (S,R) system output of imported material

item_description	Standard Cost (Baht/set)	Order-up-to-level (S) in 2005 (set)	Maximum inventory cost (Baht)
MONAXIS 73.188 B3/B4 D	27,864.228	28	780,198.38
MONAXIS 73.250 B3/B4 D	31,896.883	57	1,818,122.33
MONAXIS 73.375 B3/B4 D	38,402.265	58	2,227,331.37
METHOS 74.188	19,958.483	27	538,879.04
METHOS 74.250	24,594.947	95	2,336,519.97
METHOS 74.375	30,972.523	293	9,074,949.24
IRIOS SG3.250 B8	52,754.04	45	2,373,931.80
IRIOS SG3.375 B8	67,513.94	158	10,667,202.52
IRIOS SG3.CE183 B8	37,198.87	31	1,153,164.97

Table E2: (s,S) system output for local material

Item no	Description	Standard Cost (Baht)	UM	Reorder Point (s) (per unit)	Order-up-to-level (S) (per unit)	Maximum inventory cost (Baht)
848777	AIR BAFFLE PLATE CANOPY -03 AR	1290.000	PC	9	16	20640
848778	AIR BAFFLE PLATE CANOPY -04 AR	1710.000	PC	21	29	49590
848779	AIR BAFFLE PLATE CANOPY -06 AR	2420.000	PC	19	25	60500
861880	AIR BAFFLE PLATE LH BACK ARM/F	650.000	PC	54	73	47450
861881	AIR BAFFLE PLATE MI BACK ARM/F	680.000	PC	22	34	23120
861882	AIR BAFFLE PLATE RH BACK ARM/F	521.890	PC	7	18	9394.02
861879	AIR BAFFLE PLATE RH BACKWALL A	590.000	PC	24	42	24780
851507	AIR DUCT WALL LWR -02	260.000	PC	153	203	52780
LM0529	AIR DUCT WALL LWR -02 (851507)	260.000	PC	15	28	7280
851508	AIR DUCT WALL LWR -03	710.000	PC	23	34	24140
LM0179	AIR DUCT WALL LWR -03 (851508)	710.000	PC	2	5	3550
LM0530	AIR DUCT WALL LWR -03 (851508)	710.000	PC	1	3	2130
855256	AIR GRID -02	263.000	PC	73	114	29982
LM0141	AIR GRID -02 (855256) BLACK	263.000	PC	83	124	32612
LM0533	AIR GRID -02 (855256) GREEN	263.000	PC	12	24	6312
855257	AIR GRID -03	358.000	PC	165	220	78760
LM0142	AIR GRID -03 (855257) BLACK	358.000	PC	156	207	74106
LM0534	AIR GRID -03 (855257) GREEN	358.000	PC	5	12	4296
857824	AIR-BAFFLE-WALL -02 ARM/F/S	930.000	PC	98	120	111600
LM0531	AIR-BAFFLE-WALL -02 ARM/F/S (857824)	930.000	PC	14	21	19530
857828	AIR-BAFFLE-WALL -03 ARM/F/S	2375.000	PC	14	20	47500
LM0532	AIR-BAFFLE-WALL -03 ARM/F/S (857828)	2375.000	PC	3	6	14250
874012	AIR-BAFFLE-WALL 125 LOWER METH	191.000	PC	293	378	72198
LM0157	AIR-BAFFLE-WALL 125 LOWER METH (874012)	191.000	PC	311	406	77546
LM0158	AIR-BAFFLE-WALL 125 MONAX/METH	870.000	PC	77	95	82650
877067	AIR-BAFFLE-WALL 125 MONAX/METH (877067)	870.000	PC	254	289	251430
877075	AIR-BAFFLE-WALL 125L MONAX/MET	910.000	PC	43	59	53690
LM0159	AIR-BAFFLE-WALL 125L MONAX/MET (877075)	910.000	PC	160	199	181090
874016	AIR-BAFFLE-WALL 188 LOWER METH	794.210	PC	7	13	10324.73
LM0184	AIR-BAFFLE-WALL 188 LOWER METH (874016)	794.210	PC	7	13	10324.73
877071	AIR-BAFFLE-WALL 188 MONAX/METH	1430.000	PC	7	11	15730
LM0185	AIR-BAFFLE-WALL 188 MONAX/METH	1430.000	PC	1	3	4290
LM0186	AIR-BAFFLE-WALL 188L MONAX/MET	1590.000	PC	7	12	19080
888746	AIR-BAFFLE-WALL BACK 250	1090.000	PC	48	62	67580
888748	AIR-BAFFLE-WALL BACK 375	1208.780	PC	168	194	234503.32
888771	AIR-BAFFLE-WALL BACK CE183 (88	575.760	PC	21	32	18424.32
893679	AIR-BAFFLE-WALL FRONT 250 (893	596.110	PC	48	67	39939.37
893680	AIR-BAFFLE-WALL FRONT 375 (893	765.480	PC	165	198	151565.04
893681	AIR-BAFFLE-WALL FRONT CE183 (8	400.400	PC	25	39	15615.6
868909	AIR-DISTRIBUTION-SHEET 250	270.000	PC	28	56	15120
868910	AIR-DISTRIBUTION-SHEET 375	406.380	PC	121	165	67052.7
869450	AIR-DISTRIBUTION-SHEET CE180	144.240	PC	77	121	17453.04
869453	AIR-DISTRIBUTION-SHEET CE180	116.000	PC	18	43	4988
886184	AIR-DISTRIBUTION-SHEET CE180	80.800	PC	20	50	4040
892746	AIR-DISTRIBUTION-SHEET CE183LH	138.000	PC	19	42	5796
868912	AIR-DISTRIBUTION-SHEET UP. 250	80.000	PC	55	128	10240
868911	AIR-DISTRIBUTION-SHEET UP. 375	196.000	PC	323	435	85260
892751	AIR-DISTRIBUTION-SHEET UPPER C	116.000	PC	19	44	5104
868880	ANGLE	50.000	PC	37	90	4500
886692	ANGLE	29.000	PC	39	109	3161
883094	ANGLE CE180	164.000	PC	23	44	7216
867438	ANGLE FOR CASE-END-WALL GLAZED	75.000	PC	54	116	8700

Item no	Description	Standard Cost (Baht)	UM	Reorder Point (s) (per unit)	Order-up-to-level (S) (per unit)	Maximum inventory cost (Baht)
876126	ANGLE LH GH300	44.000	PC	185	343	15092
876125	ANGLE RH GH300	44.000	PC	176	334	14696
848055	AS BACK PANEL -03 ARM/F/S	2222.100	PC	15	21	46664.1
848059	AS BACK PANEL 04 (L)	2650.340	PC	32	40	106013.6
848056	AS BACK PANEL -04 ARM/F/S	2622.100	PC	41	50	131105
848060	AS BACK PANEL 06 (L)	3500.340	PC	94	106	371036.04
848057	AS BACK PANEL -06 ARM/F/S	3222.100	PC	98	110	354431
848058	AS BACK-PANEL -03 (L)	2350.340	PC	9	13	30554.42
874065	AS CASE-END-WALL LH GLAZED FA0	3436.436	PC	12	16	54982.97936
874071	AS CASE-END-WALL LH GLAZED FA0	3578.975	PC	3	5	17894.87569
874095	AS CASE-END-WALL LH GLAZED FA9	3676.693	PC	3	5	18383.46505
874113	AS CASE-END-WALL LH MIRROR FA0	5273.891	PC	21	25	131847.2869
874119	AS CASE-END-WALL LH MIRROR FA0	5585.718	PC	9	11	61442.8992
874125	AS CASE-END-WALL LH MIRROR FA9	5273.891	PC	17	20	105477.8295
874131	AS CASE-END-WALL LH MIRROR FA9	5585.718	PC	47	53	296043.0598
874064	AS CASE-END-WALL RH GLAZED FA0	3437.115	PC	12	16	54993.83691
874070	AS CASE-END-WALL RH GLAZED FA0	3578.975	PC	5	7	25052.82596
874094	AS CASE-END-WALL RH GLAZED FA9	3676.693	PC	3	4	14706.77204
874112	AS CASE-END-WALL RH MIRROR FA0	5273.891	PC	20	24	126573.3954
874118	AS CASE-END-WALL RH MIRROR FA0	5585.718	PC	5	7	39100.02676
874124	AS CASE-END-WALL RH MIRROR FA9	5273.891	PC	8	10	52738.91476
874130	AS CASE-END-WALL RH MIRROR FA9	5585.718	PC	46	52	290457.3417
848146	AS CEILING -04 ARF/ART	2300.000	PC	25	32	73600
848147	AS CEILING -06 ARF/ART	3000.000	PC	26	33	99000
857568	AS CEILING 188 METHOS 74	1400.000	PC	13	20	28000
848145	AS CEILING 188 MONAXIS 73 / ME	2100.000	PC	12	18	37800
857569	AS CEILING 250 METHOS 74	2120.000	PC	47	58	122960
857570	AS CEILING 375 METHOS 74	2750.000	PC	152	169	464750
862027	AS CO-TUBE 18X1	172.380	PC	33	65	11204.7
862026	AS CO-TUBE 22X1	190.820	PC	20	47	8968.54
871278	AS CU-TUBE	161.620	PC	75	124	20040.88
871279	AS CU-TUBE	199.350	PC	166	229	45651.15
882244	AS DISTRIBUTION TUBE	243.520	PC	109	157	38232.64
848018	AS FOAM BODY -03 ARF	6815.497	PC	16	19	129494.4369
848019	AS FOAM BODY -04 ARF	7289.230	PC	31	35	255123.05
848020	AS FOAM BODY -06 ARF	8903.270	PC	24	27	240388.29
856485	AS FOAM-BODY 188 METHOS 74	6231.590	PC	13	16	99705.44
881137	AS FOAM-BODY 250 IRIOS SG3	7628.514	PC	42	47	358540.1568
856487	AS FOAM-BODY 250 METHOS 74	6731.590	PC	56	62	417358.58
881138	AS FOAM-BODY 375 IRIOS SG3	9952.139	PC	155	164	1632150.868
856488	AS FOAM-BODY 375 METHOS 74	7945.630	PC	173	183	1454050.29
881371	AS FOAM-BODY CE180 SG3	11086.630	PC	21	24	266079.12
882057	AS HEAT-EXCHANGER	531.400	PC	93	122	64830.8
848904	AS LEG	50.000	PC	1356	1755	87750
887467	AS NIGHT-COVER CE SIDE-WALL LH	1493.000	PC	14	19	28367
887466	AS NIGHT-COVER CE SIDE-WALL RH	1493.000	PC	12	17	25381
887468	AS NIGHT-COVER CE180	1353.000	PC	13	18	24354
887465	AS NIGHT-COVER MIDDLE IRIOS	1396.000	PC	557	601	838996
887464	AS NIGHT-COVER SIDE-WALL LH	1493.000	PC	33	44	65692
887463	AS NIGHT-COVER SIDE-WALL RH	1493.000	PC	36	47	70171
869717	AS PEDESTAL IRIOS VAR.3	1138.530	PC	244	280	318788.4
877756	AS PEDESTAL LH	720.000	PC	28	39	28080
875234	AS PEDESTAL RH	720.000	PC	29	40	28800
866407	AS PLUG W/CABLE MALE	46.000	PC	884	1317	60582
LM0521	AS PLUG W/CABLE MALE BLACK	46.000	PC	296	497	22862
894484	AS REINFORCEMENT SG3	132.000	PC	146	223	29436
876133	AS SHIPPING-SAFETY IRIOS	95.000	PC	49	140	13300

Item no	Description	Standard Cost (Baht)	UM	Reorder Point (s) (per unit)	Order-up-to-level (S) (per unit)	Maximum inventory cost (Baht)
893634	AS SIDE-PANEL LH SG3 IVANDO	740.000	PC	15	25	18500
893633	AS SIDE-PANEL RH SG3 IVANDO	740.000	PC	16	26	19240
893631	AS SIDE-PANEL SG3 IRIOS	1320.000	PC	199	227	299640
869618	AS SUPPORT (869619)	347.200	PC	174	228	79161.6
872119	AS THERMOPANE-GLASS 250 GH300	6543.041	PC	43	49	320609.0013
872120	AS THERMOPANE-GLASS 375 GH300	9647.225	PC	315	324	3125700.859
872124	AS THERMOPANE-GLASS CE SIDE-	3312.884	PC	19	24	79509.22733
875467	AS THERMOPANE-GLASS CE SIDE-	3196.313	PC	19	24	76711.51332
888198	AS THERMOPANE-GLASS CE180 LH	5027.612	PC	42	49	246353.0084
872122	AS THERMOPANE-GLASS CE180 RH	5027.612	PC	19	23	115635.0856
LM0161	AS UPRIGHT LH (869139) METHOS	1370.000	PC	14	22	30140
869139	AS UPRIGHT LH (869140) METHOS	1370.000	PC	42	59	80830
LM0164	AS UPRIGHT LH (869143 METHOS L	1550.000	PC	80	99	153450
869143	AS UPRIGHT LH (869144) METHOS	1550.000	PC	14	21	32550
848632	AS UPRIGHT LH ARF	1370.000	PC	52	67	91790
LM0175	AS UPRIGHT LH ARF (848632)	1370.000	PC	2	4	5480
LM0536	AS UPRIGHT LH ARF (848632)	1370.000	PC	7	11	15070
LM0162	AS UPRIGHT MI (874755)	620.000	PC	22	37	22940
874755	AS UPRIGHT MI (874756)	620.000	PC	78	111	68820
LM0165	AS UPRIGHT MI (874757) L	650.000	PC	86	123	79950
874757	AS UPRIGHT MI (874758) L	650.000	PC	25	42	27300
848653	AS UPRIGHT MIDDLE ARF/ARS	365.000	PC	62	93	33945
LM0160	AS UPRIGHT RH (869137) METHOS	1370.000	PC	14	22	30140
869137	AS UPRIGHT RH (869138) METHOS	1370.000	PC	42	59	80830
LM0163	AS UPRIGHT RH (869141)METHOS L	1550.000	PC	78	97	150350
869141	AS UPRIGHT RH (869142) METHOS	1550.000	PC	18	25	38750
848631	AS UPRIGHT RH ARF	1370.000	PC	52	67	91790
LM0176	AS UPRIGHT RH ARF (848631)	1370.000	PC	3	5	6850
LM0537	AS UPRIGHT RH ARF (848631)	1370.000	PC	7	11	15070
853361	BASE COVER CASE-END-WALL	145.000	PC	43	81	11745
813176	BASE DISPLAY SHELF	370.000	PC	371	450	166500
LM0119	BASE DISPLAY SHELF (813176)	370.000	PC	573	673	249010
LM0544	BASE DISPLAY SHELF (813176)	370.000	PC	27	46	17020
447262	BASE DISPLAY SHELF 1 250X400	435.000	PC	49	77	33495
LB0765	BASE DISPLAY SHELF 1 250X400	435.000	PC	11	20	8700
447263	BASE DISPLAY SHELF 1 250X450	460.000	PC	83	115	52900
LB0763	BASE DISPLAY SHELF 1 250X450	460.000	PC	37	51	23460
447264	BASE DISPLAY SHELF 1 250X500	485.000	PC	1145	1257	609645
LB0734	BASE DISPLAY SHELF 1 250X500	485.000	PC	1175	1294	627590
447266	BASE DISPLAY SHELF 1 875X400	870.000	PC	8	15	13050
447267	BASE DISPLAY SHELF 1 875X450	1100.000	PC	16	24	26400
447268	BASE DISPLAY SHELF 1 875X500	1300.000	PC	59	74	96200
LM0208	BASE DISPLAY SHELF 1 875X500	1300.000	PC	34	44	57200
378649	BASE DISPLAY SHELF 1250X500 CRNI	3280.000	PC	91	103	337840
LB0766	BASE DISPLAY SHELF 1875X400	790.000	PC	2	5	3950
828526	BASE DISPLAY SHELF CRNI	1480.000	PC	28	37	54760
873473	BASE-CLADDING CD180 (873561)	324.000	PC	54	88	28512
853359	BASE-COVER CASE-END-WALL (8533	140.000	PC	152	227	31780
853365	BASE-PANEL -03 ARM/F/S	292.080	PC	19	41	11975.28
853366	BASE-PANEL -04 ARM/F/S	313.470	PC	143	187	58618.89
853367	BASE-PANEL -06 ARM/F/S	433.470	PC	453	517	224103.99
868903	BASE-PANEL LOWER	268.270	PC	1021	1169	313607.63
878409	BASE-PANEL LOWER CE180	230.690	PC	18	36	8304.84
868901	BASE-PANEL UPPER (868902)	456.190	PC	1023	1136	518231.84
878402	BASE-PANEL UPPER (878403)	407.590	PC	18	31	12635.29
863596	BEND 90-B6 BAENNINGER 5001A DI	6.290	PC	225	599	3767.71
893741	BRACKET	27.000	PC	629	1016	27432

Item no	Description	Standard Cost (Baht)	UM	Reorder Point (s) (per unit)	Order-up-to-level (S) (per unit)	Maximum inventory cost (Baht)
LB0726	BRACKET 400 20DEGREE BLACK	87.000	PC	24	57	4959
463254	BRACKET 400 20DEGREE WHITE	87.000	PC	100	194	16878
463255	BRACKET 450 20DEGREE	90.000	PC	130	240	21600
LM0079	BRACKET 450 20DEGREE BLACK	90.000	PC	38	84	7560
LM0118	BRACKET 500 20 DEGREE (463256)	90.000	PC	1951	2358	212220
463256	BRACKET 500 20DEGREE	90.000	PC	2130	2508	225720
873981	BRACKET FOR BASE-DISPLAY-SHELF	110.000	PC	364	499	54890
LM0166	BRACKET FOR BASE-DISPLAY-SHELF	110.000	PC	449	617	67870
854900	BRACKET FOR LIGHTING RAIL	110.000	PC	644	843	92730
868890	BRACKET LOWER	70.000	PC	155	275	19250
868913	BRACKET UPPER	32.000	PC	130	297	9504
457088	BRANCH BOX	79.000	PC	41	122	9638
854411	BUMPER-RAIL-CONNECTOR	12.000	PC	111	410	4920
862046	C0-TUBE 22X1	49.450	PC	25	77	3807.65
462970	CABLE BAND 4,8X204 ELLERM.T50R	0.820	PC	1058	7731	6339.42
849429	CANOPY-COVER -03 ARF	695.000	PC	12	23	15985
LM0198	CANOPY-COVER -03 ARF (849429)	695.000	PC	8	15	10425
LM0538	CANOPY-COVER -03 ARF (849429)	695.000	PC	5	10	6950
849430	CANOPY-COVER -04 ARF	735.500	PC	26	42	30891
LM0171	CANOPY-COVER -04 ARF (849430)	735.500	PC	28	44	32362
LM0539	CANOPY-COVER -04 ARF (849430)	735.500	PC	9	15	11032.5
LM0139	CANOPY-COVER -06 ARF (849431)	980.000	PC	66	88	86240
LM0540	CANOPY-COVER -06 ARF (849431)	980.000	PC	3	6	5880
849431	CANPOY-COVER -06 ARF	980.000	PC	82	104	101920
434428	CAP	10.500	PC	289	761	7990.5
292320	CAP K18	7.180	PC	28	297	2132.46
LM0363	COIL FOR SOLENOID VALVE 50/60	270.190	PC	51	86	23236.34
LM0298	COPPER REDUCING TEE 1/2"x3/8"	45.000	PC	10	70	3150
862030	CO-TUBE 10X1	48.610	PC	57	138	6708.18
862048	CO-TUBE 10X1	38.320	PC	57	149	5709.68
862049	CO-TUBE 12X1	48.350	PC	57	139	6720.65
862047	CO-TUBE 18X1	40.810	PC	35	106	4325.86
814157	COVER	9.000	PC	98	399	3591
868845	COVER 250	195.700	PC	22	46	9002.2
868846	COVER 375	275.400	PC	71	109	30018.6
LM0289	COVER DISPLAY SHELF & BRACKET	36.000	PC	23	67	2412
851888	COVER DISPLAY-SHELF AND BRACKE	100.000	PC	95	162	16200
849667	COVER FOR FAN-MOTOR	57.000	PC	188	344	19608
377050	COVER MIRROR LATERAL	145.000	PC	11	31	4495
377051	COVER MIRROR LATERAL	200.000	PC	5	13	2600
881751	COVER SHEET 125	184.000	PC	89	155	28520
881752	COVER SHEET 188	249.000	PC	253	344	85656
859371	COVER STRIP PAINTED ARF	90.000	PC	48	99	8910
877653	COVER TOP (877654)	116.000	PC	115	180	20880
871276	CU-TUBE 10X1	9.130	PC	228	586	5350.18
883724	CU-TUBE 15X1	80.050	PC	87	167	13368.35
883725	CU-TUBE 15X1	90.140	PC	90	166	14963.24
882055	CU-TUBE 15X1 IRIOS	77.530	PC	87	169	13102.57
882056	CU-TUBE 15X1 IRIOS	87.640	PC	94	171	14986.44
878914	DEFROST-HEATER 300W	566.780	PC	11	22	12469.16
869231	DISTANCE-RAIL FOR AIR-BAFFLE-W	14.000	PC	828	1502	21028
887423	DIVIDING-GRID INSIDE FA0117	145.000	PC	526	713	103385
849528	EVAPORATOR COVER -03 400/500	673.310	PC	11	21	14139.51
849529	EVAPORATOR COVER -04 400/500	748.890	PC	24	37	27708.93
849530	EVAPORATOR COVER -06 400/500	1142.360	PC	24	35	39982.6
849531	EVAPORATOR COVER SIDE	170.000	PC	58	98	16660
869175	EVAPORATOR-COVER 188 METHOS	422.000	PC	11	23	9706

Item no	Description	Standard Cost (Baht)	UM	Reorder Point (s) (per unit)	Order-up-to-level (S) (per unit)	Maximum inventory cost (Baht)
	74					
868964	EVAPORATOR-COVER 250	358.000	PC	47	72	25776
869177	EVAPORATOR-COVER 250 METHOS 74	350.000	PC	40	68	23800
868965	EVAPORATOR-COVER 375	659.550	PC	128	163	107506.65
869178	EVAPORATOR-COVER 375 METHOS 74	570.000	PC	118	156	88920
340310	EXPANSION VALVE THER MOSTATIC	1028.690	PC	97	131	134758.39
340311	EXPANSION VALVE THER MOSTATIC	1028.690	PC	108	138	141959.22
456864	FAN BLADE A 230-28/12	38.880	PC	529	840	32659.2
474438	FAN BLADE AO 154-17/ 12	21.550	PC	552	926	19955.3
807675	FAN BLADE AO 254-25/ 12	40.700	PC	244	413	16809.1
884996	FAN MOTOR	552.774	PC	616	692	382519.7049
854261	FAN MOTOR W/FLANGE W/O CABLE	438.700	PC	119	145	63611.5
861843	FAN PANEL -03 26	838.500	PC	7	13	10900.5
861846	FAN PANEL -03 ARM/F/S 46	855.860	PC	9	15	12837.9
861844	FAN PANEL 04 26	640.000	PC	17	29	18560
866115	FAN PANEL -04 ARM/F/S 46	960.000	PC	7	13	12480
861845	FAN PANEL 06 26	1160.000	PC	8	14	16240
866116	FAN PANEL -06 ARM/F/S 46	1060.000	PC	18	28	29680
875130	FAN-MOTOR W/FLANGE AMP-PLUG	425.480	PC	550	623	265074.04
878160	FAN-MOTOR W/FLANGE ROUND-CONNE	418.950	PC	665	755	316307.25
869006	FAN-PANEL 188 METHOS A3	231.840	PC	6	15	3477.6
869009	FAN-PANEL 188 METHOS A3/A4/A5	231.840	PC	8	22	5100.48
868957	FAN-PANEL 250	940.240	PC	20	31	29147.44
869007	FAN-PANEL 250 METHOS A3 2FAN	880.000	PC	30	41	36080
869010	FAN-PANEL 250 METHOS A4 2FAN	942.000	PC	55	73	68766
868958	FAN-PANEL 375	1180.240	PC	76	94	110942.56
869008	FAN-PANEL 375 METHOS A3	947.000	PC	62	79	74813
869011	FAN-PANEL 375 METHOS A4	1478.000	PC	122	145	214310
869515	FAN-PANEL CE180	576.950	PC	24	35	20193.25
LM0520	FEMALE PLUG ASSEMBLY (BLACK)	51	PC	218	411	20961
853371	FIXING DEVICE FOR BASE RAIL	24.000	PC	543	949	22776
867437	FIXING DEVICE FOR CASE-END-WAL	75.000	PC	30	83	6225
LB0730	FIXING DEVICE FOR MIRROR BLACK	10.000	PC	345	865	8650
375793	FIXING DEVICE FOR MIRROR WHITE	4.000	PC	634	1555	6220
LM0154	FIXING DEVICE FOR PRICE TICKET	9.000	PC	3632	5661	50949
858353	FIXING DEVICE FOR THERMOSTAT	100.000	PC	139	242	24200
871664	FIXING DEVICE FOR UPRIGHT ACM-	25.000	PC	74	199	4975
849666	FIXING DEVICE FOR UPRIGHT MIDD	60.000	PC	74	155	9300
869737	FIXING-DEVICE	53.870	PC	158	292	15730.04
878375	FIXING-DEVICE	21.000	PC	18	76	1596
893740	FIXING-DEVICE AIR-BAFFLE-WALL	31.000	PC	371	679	21049
887026	FIXING-DEVICE BACK	23.940	PC	32	109	2609.46
878257	FIXING-DEVICE FOR BOTTOM-RAIL	8.000	PC	123	418	3344
868959	FIXING-DEVICE FOR FAN	27.000	PC	473	796	21492
836283	FIXING-DEVICE FOR LIGHTING TUB	10.000	PC	15	170	1700
873575	FIXING-DEVICE RH	32.000	PC	319	563	18016
LM0557	FRONT CLADDING -03 858220	384.91	PC	5	12	4618.92
885777	FRONT-CLADDING (885781) IRIOS	425.000	PC	54	79	33575
869754	FRONT-CLADDING 250 (869757) GH	626.030	PC	39	58	36309.74
869755	FRONT-CLADDING 375 (869758) GH	810.370	PC	124	157	127228.09
873501	FRONT-CLADDING CE (873563)SIDE	195.000	PC	22	49	9555
873447	FRONT-CLADDING CE180 (873555)	428.980	PC	10	23	9866.54
868825	FRONT-PANEL 188 (868826)	280.000	PC	10	25	7000
868829	FRONT-PANEL 250 (868830)	252.000	PC	41	74	18648
868831	FRONT-PANEL 375 (868832)	328.000	PC	140	190	62320

Item no	Description	Standard Cost (Baht)	UM	Reorder Point (s) (per unit)	Order-up-to-level (S) (per unit)	Maximum inventory cost (Baht)
407124	GLASS BOARD 100 615M M	140.000	PC	15	30	4200
407123	GLASS BOARD 50 615MM	66.000	PC	1191	1632	107712
865313	GLASS DIVIDER	1600.000	PC	1	2	3200
817615	GLASS DIVIDER 700X1565MM	920.000	PC	16	25	23000
855188	GRID 50 FA9005	60.000	PC	507	677	40620
407122	GRID BOARD 100MM	70.000	PC	229	354	24780
858725	GRID BOARD 50 1247LG. FA9005	130.000	PC	155	223	28990
407121	GRID BOARD 50MM	60.000	PC	187	289	17340
887425	GRID CE180 FA0117	200.000	PC	11	30	6000
817649	GRID DISPLAY SHELF	260.000	PC	232	299	77740
805634	GRID DISPLAY SHELF ADJUSTABLE	700.000	PC	103	127	88900
855170	GRID FOR GRID DISPLA Y 9005	80.000	PC	234	375	30000
373119	GRID FOR GRID DISPLA Y SHELF	80.000	PC	171	292	23360
872109	HAND-RAIL 250	114.910	PC	41	85	9767.35
872110	HAND-RAIL 375	172.370	PC	143	211	36370.07
872114	HAND-RAIL CE SIDE-WALL	46.680	PC	26	81	3781.08
872112	HAND-RAIL CE180	83.790	PC	58	131	10976.49
809522	HAT RAIL	7.000	PC	401	1153	8071
857735	HAT RAIL -03	246.580	PC	10	26	6411.08
857736	HAT RAIL -04	225.000	PC	18	41	9225
857737	HAT RAIL-06	315.000	PC	22	39	12285
885969	HAT-RAIL IRIOS	97.560	PC	215	312	30438.72
142476	HOLDER 1.01.017	6.480	PC	2037	3537	22919.76
875392	HOLDER FOR BASE-DISPLAY-SHELF	38.000	PC	70	173	6574
875393	HOLDER FOR BASE-DISPLAY-SHELF	38.000	PC	71	174	6612
LM0167	HOLDER FOR BASE-DISPLAY-SHELF	38.000	PC	99	237	9006
LM0168	HOLDER FOR BASE-DISPLAY-SHELF	38.000	PC	100	238	9044
142475	HOLDER W/STARTER SUP PORT	11.020	PC	2046	3196	35219.92
432135	HOOK	9.000	PC	3437	5327	47943
375673	INSULATING PLATE 320X	46.000	PC	74	181	8326
375674	INSULATING PLATE 450X	60.000	PC	143	293	17580
876009	INSULATING-PIECE	6.000	PC	87	501	3006
868904	INSULATING-PLATE	33.000	PC	406	828	27324
878412	INSULATING-PLATE FOR BASE-DIS.	34.000	PC	8	54	1836
851593	ISOLATING PLATE LH WITH 2 AIR-	12.000	PC	77	241	2892
851592	ISOLATING PLATE RH WITH 2 AIR-	25.000	PC	59	172	4300
873042	ISOLATING-PLATE	64.150	PC	118	245	15716.75
886116	ISOLATING-PLATE	10.000	PC	30	148	1480
886117	ISOLATING-PLATE	15.000	PC	15	84	1260
883668	ISOLATING-PLATE LH	16.000	PC	149	403	6448
869839	ISOLATING-PLATE LH BACK METHOS	32.000	PC	186	377	12064
869837	ISOLATING-PLATE LH METHOS	39.000	PC	181	354	13806
883667	ISOLATING-PLATE RH	13.000	PC	164	445	5785
869838	ISOLATING-PLATE RH BACK	30.000	PC	177	375	11250
869836	ISOLATING-PLATE RH METHOS	38.000	PC	161	336	12768
437349	LAMP BALLAST 40W 220 /60	47.750	PC	560	756	36099
376105	LAMP BALLAST 40W 230 /50	49.000	PC	1468	1953	95697
437351	LAMP BALLAST 65W 220 /60	127.853	PC	18	42	5369.805932
376106	LAMP BALLAST 65W 230 /50	113.720	PC	82	149	16944.28
883311	LIGHTING RAIL 250 PLL (883312)	766.000	PC	5	10	7660
883313	LIGHTING RAIL 375 PLL (883314)	1050.000	PC	7	12	12600
836285	LIGHTING TUBE PL-L36/830 2G11	174.770	PC	16	46	8039.42
857306	LIGHTING-RAIL -02 (822062)	115.000	PC	1387	1675	192625
857307	LIGHTING-RAIL -03 (822063)	172.000	PC	86	142	24424
879491	LIGHTING-RAIL 188 T8 (879492)	952.210	PC	17	28	26661.88
879497	LIGHTING-RAIL 250 T8 (879498)	727.000	PC	45	68	49436
879499	LIGHTING-RAIL 375 T8 (879500)	1150.000	PC	115	144	165600

Item no	Description	Standard Cost (Baht)	UM	Reorder Point (s) (per unit)	Order-up-to-level (S) (per unit)	Maximum inventory cost (Baht)
455152	L-TUBE 36W/UW-1200/2 6	43.090	PC	841	1331	57352.79
455153	L-TUBE 58W/UW-1500/2 6	56.260	PC	48	139	7820.14
474700	L-TUBE OSRAM 36W/NTD -1200	120.900	PC	162	299	36149.1
474701	L-TUBE OSRAM 58W/NTD -1500	170.570	PC	37	78	13304.46
491102	MIRROR 5X 326X1248 48	225.000	PC	54	101	22725
446816	MIRROR 5X 454X1248	300.000	PC	146	209	62700
482793	MIRROR 5X 454X1873	445.000	PC	7	15	6675
877488	MIRROR 5X725X1400 METHOS	662.500	PC	23	41	27162.5
859367	MIRROR 5X725X1500 ARF	662.500	PC	17	31	20537.5
877489	MIRROR 5X725X1580 METHOS L	785.000	PC	47	72	56520
375775	MIRROR HOLDER 1242 (821819)	143.000	PC	151	230	32890
LB0700	MIRROR HOLDER 1242 (821819)	172.000	PC	100	171	29412
375725	MIRROR HOLDER 1248 (821813)	112.000	PC	163	260	29120
LB0743	MIRROR HOLDER 1248 (821813)	191.000	PC	128	195	37245
375777	MIRROR HOLDER 1867 (821821)	240.000	PC	5	15	3600
LB0762	MIRROR HOLDER 1867 (375777)	240.000	PC	2	10	2400
375727	MIRROR HOLDER 1873 (821815)	215.000	PC	6	17	3655
LB0714	MIRROR HOLDER 1873 (375727)	215.000	PC	4	12	2580
491069	MIRROR HOLDER ABOVE	21.000	PC	539	959	20139
861355	MNTG SOCKET FOR LAMP-BALL. CAB	320.000	PC	391	476	152320
834899	NOZZLE -01	191.470	PC	49	95	18189.65
834900	NOZZLE -02	191.470	PC	47	98	18764.06
834901	NOZZLE -03	191.470	PC	91	147	28146.09
834902	NOZZLE -04	243.950	PC	58	93	22687.35
834903	NOZZLE -05	243.950	PC	17	34	8294.3
828655	PRICE TICKET RAIL 40 1249	81.000	PC	165	272	22032
828656	PRICE TICKET RAIL 40 1874	121.180	PC	28	59	7149.62
869692	PRICE TICKET RAIL 40SCAN 1874L	65.45	PC	41	93	6086.85
149968	PROBE CLAMP	6.000	PC	51	288	1728
846161	PROBE CLAMP ARM/ARF/ ARS	10.000	PC	47	226	2260
881166	PROBE-CLAMP	7.000	PC	170	579	4053
876008	PROBE-CLIP	12.000	PC	84	291	3492
874312	PROTECTIVE-DEVICE	37.110	PC	559	934	34660.74
888756	RAIL CE183 (888757)	145.000	PC	11	33	4785
145112	RETAINING ANGLE	13.170	PC	147	390	5136.3
439402	RETAINING ANGLE	26.000	PC	35	109	2834
379232	RETAINING ANGLE HOT GALVANIZED	15.000	PC	281	670	10050
439401	RETAINING ANGLE HOT GALVANIZED	21.000	PC	917	1449	30429
893729	RETURN-AIR-GRID 250 (893734)	80.000	PC	68	142	11360
893730	RETURN-AIR-GRID 375 (893735)	123.000	PC	278	393	48339
893731	RETURN-AIR-GRID CE183 (893736)	158.000	PC	10	31	4898
455038	SEALING COMPOUND CLE AR OXIM	370.968	PC	76	128	47483.87096
454233	SEALING COMPOUND WHITE OXIM	370.968	PC	46	83	30790.32258
893719	SECONDARY-GLASS 250 SG3	266.230	PC	35	64	17038.72
893720	SECONDARY-GLASS 375 SG3	203.860	PC	221	310	63196.6
878455	SECONDARY-GLASS CE SIDE-WALL	95.000	PC	65	138	13110
893721	SECONDARY-GLASS CE183 SG3	195.760	PC	10	29	5677.04
878452	SECONDARY-GLASS SIDE-WALLGH300	85.060	PC	22	63	5358.78
888737	SECTIONAL-RAIL 250	171.000	PC	53	89	15219
888739	SECTIONAL-RAIL 375	316.000	PC	190	241	76156
384096	SHEET METAL BRIM NH 30/60	160.000	PC	76	114	18240
893596	SHEET-METAL-STRIP IRIOS/IVANDO	18.000	PC	18	107	1926
383529	SHIPPING REINFORCEME NT	115.000	PC	323	462	53130
834833	SHROUND 6,4 KLEBER P B.	15.000	PC	7	90	1350
836284	SOCKET 2G11	38.000	PC	10	75	2850
852274	SOCKET-HEAD SCREW M7X29-A2F	2.000	PC	2674	6651	13302

Item no	Description	Standard Cost (Baht)	UM	Reorder Point (s) (per unit)	Order-up-to-level (S) (per unit)	Maximum inventory cost (Baht)
346846	SOLDER ADAPTER	330.050	PC	208	289	95384.45
LM0085	STARTER (PHILIPS) 407621	7.000	PC	815	2295	16065
862780	THERMOPANE GLASS COMPL.GLAZED	1645.310	PC	11	16	26324.96
876994	THERMOPANE-GLASS GLAZED METHOS	1240.560	PC	12	21	26051.76
876995	THERMOPANE-GLASS GLAZED METHOS	1920.000	PC	6	10	19200
445644	THREADED BOLT M8X200 DIN 976	13.000	PC	50	327	4251
848656	UPRIGHT MIDDLE	616.680	PC	65	89	54884.52
LM0177	UPRIGHT MIDDLE (848656) BLACK	616.680	PC	6	11	6783.48
LM0535	UPRIGHT MIDDLE (848656) GREEN	616.680	PC	7	13	8016.84
868899	U-RAIL	24.000	PC	828	1277	30648
881876	U-RAIL 700	39.000	PC	777	1139	44421
866587	U-RAIL LH ARF	38.000	PC	151	349	13262
866586	U-RAIL RH ARF	38.000	PC	152	350	13300
853244	WIRE PIN 2,8X50	2.500	PC	661	2461	6152.5
861870	Z-RAIL	30.000	PC	141	364	10920
858005	Z-RAIL -3 FOR AIR BAFFLE HONEY	215.000	PC	12	31	6665
LM0172	Z-RAIL -3 FOR AIR BAFFLE HONEY	215.000	PC	8	22	4730
LM0541	Z-RAIL -3 FOR AIR BAFFLE HONEY	215.000	PC	5	14	3010
858006	Z-RAIL -4 FOR AIR BAFFLE HONEY	240.000	PC	45	73	17520
LM0173	Z-RAIL -4 FOR AIR BAFFLE HONEY	240.000	PC	32	60	14400
LM0542	Z-RAIL -4 FOR AIR BAFFLE HONEY	240.000	PC	6	15	3600
858007	Z-RAIL -6 FOR AIR BAFFLE HONEY	270.000	PC	75	117	31590
LM0144	Z-RAIL -6 FOR AIR BAFFLE HONEY	270.000	PC	83	125	33750
LM0543	Z-RAIL -6 FOR AIR BAFFLE HONEY	270.000	PC	3	10	2700
863522	Z-RAIL FOR AIR-BAFFLE-WALL	8.000	PC	100	399	3192
875485	Z-RAIL METHOS 74	86.780	PC	6	32	2776.96
872837	Z-RAIL MIDDLE MONAXIS 73	30.000	PC	322	605	18150

Table E.3: (s,Q) system output of local material

Item no	Description	Standard Cost (Baht)	UM	Reorder Point (s) (per unit)	Order Quantity (Q) (per unit)	Order-up-to-level (S) (per unit)	Maximum inventory cost (Baht)
445426	ALU-FOIL 100 W/ADHES IVE 50 MY	7.14	MT	30	400	430	3070.2
139048	ALU-FOIL 30 W/ADHESI VE 9 MY	0.7	MT	58	1400	1458	1020.6
445427	ALU-FOIL 50 W/ADHESI VE 50 MY	1.36	MT	110	1600	1710	2325.6
866068	AS CABLE SET 3R. LIGHTING WHIT	785	PC	42	50	92	72220
866069	AS CABLE SET 4R. LIGHTING WHIT	840	PC	53	50	103	86520
866070	AS CABLE SET 5R. LIGHTING WHIT	900	PC	72	50	122	109800
878665	AS CABLE W67	329.77	PC	114	100	214	70570.78
879067	AS CABLE-SET 3R.-LIGHTING WHIT	795	PC	91	50	141	112095
879068	AS CABLE-SET 4R.-LIGHTING WHIT	850	PC	115	50	165	140250
879069	AS CABLE-SET 5R.-LIGHTING WHIT	905	PC	50	50	100	90500
852980	AS COVER RAIL	1034.739	PC	30	34	64	66223.296
379179	AS GRID DISPLAY SHEL F	380	PC	133	100	233	88540
855180	AS GRID DISPLAY SHELF FA9005 (379179)	495	PC	237	100	337	166815
866408	AS PLUG W/CABLE	47.84	PC	52	100	152	7271.68
LM0522	AS PLUG W/CABLEBLACK	47.84	PC	9	100	109	5214.56
874307	CABLE W 2 PLUG	202.29	PC	14	50	64	12946.56
874309	CABLE W 4 PLUG	450	PC	18	50	68	30600
874310	CABLE W 6 PLUG	570	PC	65	50	115	65550
875132	CABLE-ASSEMBLY WITH 2 AMP-CONN	294	PC	15	50	65	19110
875133	CABLE-ASSEMBLY WITH 3 AMP-CONN	438	PC	106	50	156	68328
875135	CABLE-ASSEMBLY WITH 5 AMP-CONN	657	PC	22	50	72	47304
LM0554	CANOPY PANEL -03 ARM/F 852981	688.63	PC	6	6	12	8263.56
852981	CANOPY PANEL -03 ARM/F/S	688.63	PC	23	21	44	30299.72
LM0555	CANOPY PANEL -04 ARM/F 852982	827.38	PC	7	8	15	12410.7
852982	CANOPY PANEL -04 ARM/F/S	827.38	PC	64	84	148	122452.24
852983	CANOPY PANEL -06 ARF	1077.63	PC	213	105	318	342686.34
LM0556	CANOPY PANEL -06 ARF 852983	1077.63	PC	4	4	8	8621.04
443070	CARDBOARD 1500MM	5.4	MT	883	2000	2883	15568.2
852978	COVER RAIL 1876LG. FA0370	534.201	PC	11	17	28	14957.628
852979	COVER RAIL 2501LG. FA0370	699.538	PC	29	37	66	46169.508
853577	COVER-RAIL 1876LG. FA0370 MAXI	462.67	PC	14	30	44	20357.48
853578	COVER-RAIL 2501LG. FA0370 MAXI	619.6	PC	54	120	174	107810.4
853579	COVER-RAIL 3751LG. FA0370 MAXI	927.73	PC	133	161	294	272752.62
139049	CSK HEAD SM SCREW 3,9X13 DIN	0.6	PC	687	3000	3687	2212.2
881631	CSK-HEAD-SCREW M4X6-4.8-H.A2F	0.3	PC	104	4000	4104	1231.2
887424	DIVIDING-GRID OUTSIDE FA0117	130	PC	61	100	161	20930
LM0249	FCK 2,5/8-ST-5,08 (8x2)	164.8	PC	50	50	100	16480
LM0359	FKC 2,5/11-ST-5,08(11POSITIONS	240	PC	45	50	95	22800
LM0360	FKC 2,5/12-ST-5,08(12POSITIONS	260	PC	34	50	84	21840
LM0259	FKC 2,5/5-ST-5,08 (5 POSITIONS	112	PC	81	100	181	20272
LM0358	FKC 2,5/6-ST-5,08 (6 POSITIONS	130	PC	61	100	161	20930
LM0251	FKIC 2,5/5-ST-5,08 (8x5)	120	PC	81	100	181	21720
LM0250	FKIC 2,5/8-ST-5,08 (8x1)	190	PC	93	100	193	36670
435120	FOIL PE 0,04X4000	5.15	MT	788	1400	2188	11268.2
858220	FRONT CLADDING -03	384.91	PC	21	21	42	16166.22
853581	FRONT CLADDING -03 FA370 ARM/F	162.19	PC	22	30	52	8433.88
858221	FRONT CLADDING -04	482.16	PC	61	84	145	69913.2
LM0558	FRONT CLADDING -04 858221	482.16	PC	6	8	14	6750.24
853582	FRONT CLADDING -04 FA370 ARM/F	216.06	PC	102	137	239	51638.34
858222	FRONT CLADDING -06	601.16	PC	191	105	296	177943.36
LM0559	FRONT CLADDING -06 858222	601.16	PC	4	4	8	4809.28
853583	FRONT CLADDING -06 FA370 ARM/F	323.79	PC	296	214	510	165132.9
498476	HX HD SMS 6,3X22 DIN 7976	1.8	PC	72	1000	1072	1929.6

Item no	Description	Standard Cost (Baht)	UM	Reorder Point (s) (per unit)	Order Quantity (Q) (per unit)	Order-up-to-level (S) (per unit)	Maximum inventory cost (Baht)
448603	HX HD SMS 6,3X60 DIN 7976	5.39	PC	170	400	570	3072.3
455217	HX HD SMS B 4,8X50 D IN 7981	2.39	PC	344	1500	1844	4407.16
465097	HX HD SMS B 6,	2.5	PC	629	3000	3629	9072.5
467533	HX HD SMS B 6,3X32 D IN 7976	2	PC	212	2000	2212	4424
443459	HX HD SMS B 8X38 DIN 7976	5.99	PC	55	800	855	5121.45
467238	HX HD SMS B 8X50 DIN 7976	2	PC	38	1500	1538	3076
101920	HX NUT M 4 DIN 934 IN 934	0.1	PC	3329	18000	21329	2132.9
101936	HX NUT M 6 DIN 934 IN 934	0.6	PC	104	3000	3104	1862.4
101937	HX NUT M 8 DIN 934 IN 934	0.6	PC	252	5000	5252	3151.2
101325	HX SCREW M 8X 90 8.8 DIN 931	3.25	PC	238	1000	1238	4023.5
439179	HX SCREW M 8X35 8.8 DIN 933	2	PC	82	1500	1582	3164
430085	HX SCREW M 8X40 8.8 DIN 933	1.8	PC	485	1000	1485	2673
445822	HX SMS SUPER TEKS BO 4,8X16	0.9	PC	1969	4000	5969	5372.1
445542	HX SMS SUPER TEKS BO 4,8X32	1.2	PC	508	4000	4508	5409.6
859066	LIGHTING COVER -03 ARM/F/S	308.61	PC	13	21	34	10492.74
859067	LIGHTING COVER -04 ARM/F/S	408.61	PC	80	99	179	73141.19
859068	LIGHTING COVER -06 ARM/F/S	513.11	PC	172	107	279	143157.69
430281	NUT M 6 2148	1.8	PC	184	2000	2184	3931.2
488317	OVAL HEAD CSK SC M5X 10	0.5	PC	88	3000	3088	1544
135473	OVAL HEAD SC M4X16 4 .8	0.3	PC	48	3000	3048	914.4
136034	OVAL HEAD SC M4X6 4. 8	0.3	PC	114	4000	4114	1234.2
468341	OVAL HEAD SC M6X40 4 .8	0.6	PC	77	2000	2077	1246.2
430158	PAN HEAD TAPPING SC 3,9X13	0.6	PC	122	3000	3122	1873.2
135167	PAN HEAD TAPPING SC 3,9X16	0.15	PC	698	10000	10698	1604.7
135169	PAN HEAD TAPPING SC 3,9X9,5	0.6	PC	268	4000	4268	2560.8
430162	PAN HEAD TAPPING SC 4,8X25	0.6	PC	95	2000	2095	1257
471779	PRICE TICKET RAIL 40 SCANNER	43.42	PC	1758	2674	4432	192437.44
471780	PRICE TICKET RAIL 40 SCANNER	65.45	PC	113	243	356	23300.2
869691	PRICE TICKET RAIL 40SCAN 1249L	43.42	PC	1290	930	2220	96392.4
461309	RIVET 4,8 4,8-6,4	0.6	PC	2622	7000	9622	5773.2
135176	SERRAT LOCK WASHER A 4,3 A2F	0.15	PC	8282	21000	29282	4392.3
135166	SOCKET-HEAD SM SCREW 3,	0.4	PC	2810	17000	19810	7924
382399	SOCKET-HEAD SM SCREW 3,	0.28	PC	3505	7000	10505	2941.4
389780	SOCKET-HEAD SM SCREW 3,	0.8	PC	4383	10000	14383	11506.4
847673	SOCKET-HEAD SM SCREW 3,	0.8	PC	172	3000	3172	2537.6
102103	WASHER 4,3 DIN 125 N 125	0.6	PC	3813	7000	10813	6487.8
102105	WASHER 8,4 DIN 125 N 125	0.15	PC	4515	14000	18515	2777.25
430213	WASHER 8,4 DIN 9021 021	0.45	PC	440	5000	5440	2448
409795	WIRE H05V-U 1,0 VIOL	2.5	MT	921	1700	2621	6552.5
142831	WIRE H05V-U 1,00 (0, 75) BROWN	2.5	MT	960	1900	2860	7150
116125	WIRE H05V-U 1,00 BLACK	2.5	MT	1143	1900	3043	7607.5
142490	WIRE H05V-U 1,00 BLU E	2.5	MT	680	1600	2280	5700

APPENDIX F

Database and Structure of Newly Develop Inventory Monitoring Tools

Designing Database Management

Input data for monitoring the inventory level have to be gathered from the Macola databases, the operation system existed in current working day. The database system of inventory level monitoring tool was developed by consisting of the following data input and data output.

1.) Database of input

T) Product: Master file: IMITMIDX_SQL		
Field	Type	Description
Item_no	Text	Product Item Number
Item_desc_1	Text	Product Description
Prod_cat	Text	Product Category
Activity_cd	Text	Product Status
Loc	Text	Primary Location
Uom	Text	Unit of Measurement

Table F1: Database of Product

T) Item Vendor: Master file: POITMVND_SQL		
Field	Type	Description
Item_no	Text	Product Item Number
Vend_no	Text	Supplier Number
Curr_cd	Text	Currency Code
Approved_cd	Text	Approved Vendor Code
Contract_no	Text	Reference Quotation Number
Contract_dt	Date	Reference Quotation Date
Po_min	Number	Minimum Order Quantity
Po_mult	Number	Standard Packing Size
Neg_price	Number	Unit Price

Table F2: Database of Item Vendor

T) Item Inventory Location: Transaction Files IMINVLOC_SQL		
Field	Type	Description
Item_no	Text	Product Item Number
Loc	Text	Primary Location
Qty_on_hand	Number	Quantity Available On Hand
Qty_allocated	Number	Quantity Allocated
Qty_on_ord	Number	Quantity On Order
Bin_no	Text	Bin Location

Table F3: Database of Item Inventory Location

T) Production Order: Transaction File: POPORDLN_SQL		
Field	Type	Description
Proj_no	Text	Project Number
Proj_name	Text	Project Name
Item_no	Text	Product Item Number
Item_desc_1	Text	Product Description
Uom	Text	Unit of Measurement
Qty_usage	Number	Quantity used in the Cabinet

Table F4: Database of Production Order

T) Purchase Order: Transaction File: POORDLIN_SQL		
Field	Type	Description
Ord_no	Text	Purchase Order Number
Vend_no	Text	Vendor Number
Ord_status	Text	Status of Order
Ord_dt	Date	Date of Issuing Purchase Order
Line_no	Text	Number of Line in Purchase Order
Item_no	Text	Product Item Number
Item_desc_1	Text	Product Description
Qty_ordered	Number	Order quantity
Uom	Text	Unit of Measurement
Purch_cost	Number	Purchase Price
Request_dt	Date	Request Date
Promise_dt	Date	Promise Date

Table F5: Database of Purchase Order

T) Shared Information Master File: New Created		
Field	Type	Description
Item_no	Text	Product Item Number
Item_desc_1	Text	Product Description
Reorder Point	Number	Reorder Point
Max_inv_lev	Number	Maximum Inventory Level
Avg_Used	Number	Average Usage in 2004
Fixed_ord_qty	Number	Fixed Order Quantity

Table F6: Shared information

2.) Procedure to Output

Since the many input databases are raw data loaded from operating program, the data has not been grouped or pass managed to be ready for used to generate output. These data tables need to be managed as the following steps;

Step 1: Select outstanding project

From table 4.4: Production Order, after loaded the data from system, all projects will be appeared in the table including outstanding project and completed project. This step has to be done for select only outstanding project. To sort only outstanding projects have follow the instructions below;

(1) Create Table to select the outstanding project. In this step, only the outstanding projects are selected and put the name into table.

T) Select Project: New Created		
Field	Type	Description
Proj_name	Text	Project Name

Table F7: Select Project

(2) Create the Query to link data from table 4.4 and table 4.7

Q) Project Select Data: New Created			
Field	Table	Sort	Criteria
Proj_name	T) Select Project		
Proj_no	T) Production Order		
Item_no	T) Production Order		
Item_desc_1	T) Production Order		
Qty_usage	T) Production Order		

Table F8: Structure of Query "Project select data"

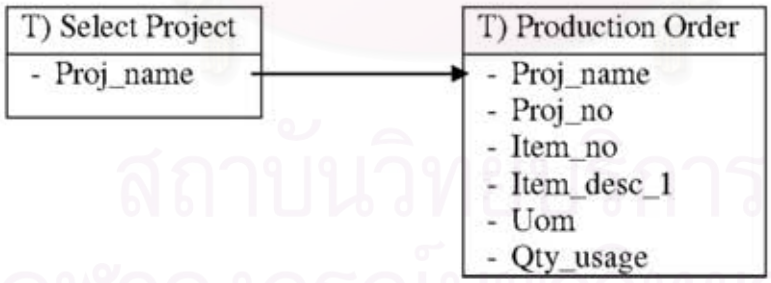


Figure F1: Relationship of selected project and production order query

(3) Integrated item usage of every project. Since the output need to see the project name at the column heading, it is necessary to group the data to management materials by crosstab query.

Q) Project Select Crosstab: New Created			
Field	Table	Total	Crosstab
Item_no	Q) Project Select Data	Group By	Row Heading
Proj_name	Q) Project Select Data	Group By	Column Heading
Qty	Q) Project Select Data	Sum	Value

Table F9: Project Select Crosstab query

Step 2: Filter for primary vendor

In table 4.2: Item Vendor, all records are loaded from database. One item number of local part usually has at least two suppliers which only one of them is primary vendor and the rest are second sources. It is necessary to select only primary vendor from table 4.2 to prevent the error of duplicate records.

1. Create Query to filter only primary vendor by set the criteria of Approved code equals to "P"

Q) Primary Vendor: New Created			
Field	Table	Sort	Criteria
Item_no	T) Item Vendor		
Vend_no	T) Item Vendor		
Approved_cd	T) Item Vendor		"P"

Table 4.10: Primary Vendor query

Step 3: Select purchase order

From table 4.5: Purchase Order, after loaded the data from system, all purchase orders will be appeared in the table including outstanding purchase order and completed purchase order (status =X). This step has to be done for select only outstanding purchase orders.

(1) Create query to select the outstanding purchase order by set the criteria of order status does not equal to "X".

Q) Order Outstanding: New Created			
Field	Table	Sort	Criteria
Ord_no	T) Purchase Order		
Vend_no	T) Purchase Order		
Item_no	T) Purchase Order		
Ord_status	T) Purchase Order		"<>X"
Qty_ordered	T) Purchase Order		
Request_dt	T) Purchase Order		

Table 4.11: Order Outstanding query

3.) Database Output

Q) Inventory Level Monitoring Tools: New Created			
Field	Table	Sort	Criteria
Item_no	Q) Project Select Crosstab		
Item_desc_1	T) Product		
Uom	T) Product		
Qty_on_hand	T) Item Inventory Location		
On_on_ord	T) Item Inventory Location		
Qty_allocated	T) Item Inventory Location		
P_Vend	Q) Primary Vendor		
Vend_no	Q) Order Outstanding		
Ord_no	Q) Order Outstanding		
Reqest_dt	Q) Order Outstanding		
Loc	T) Item Inventory Location		
Project 1	Q) Project Select Crosstab		
Project 2	Q) Project Select Crosstab		
:	Q) Project Select Crosstab		
Project n	Q) Project Select Crosstab		
Max_inv_lev	T) Shared Information		
Reorder Point	T) Shared Information		
Avg_Used	T) Shared Information		
Fixed_ord_qty	T) Shared Information		

Table 4.12: Inventory level monitoring output query

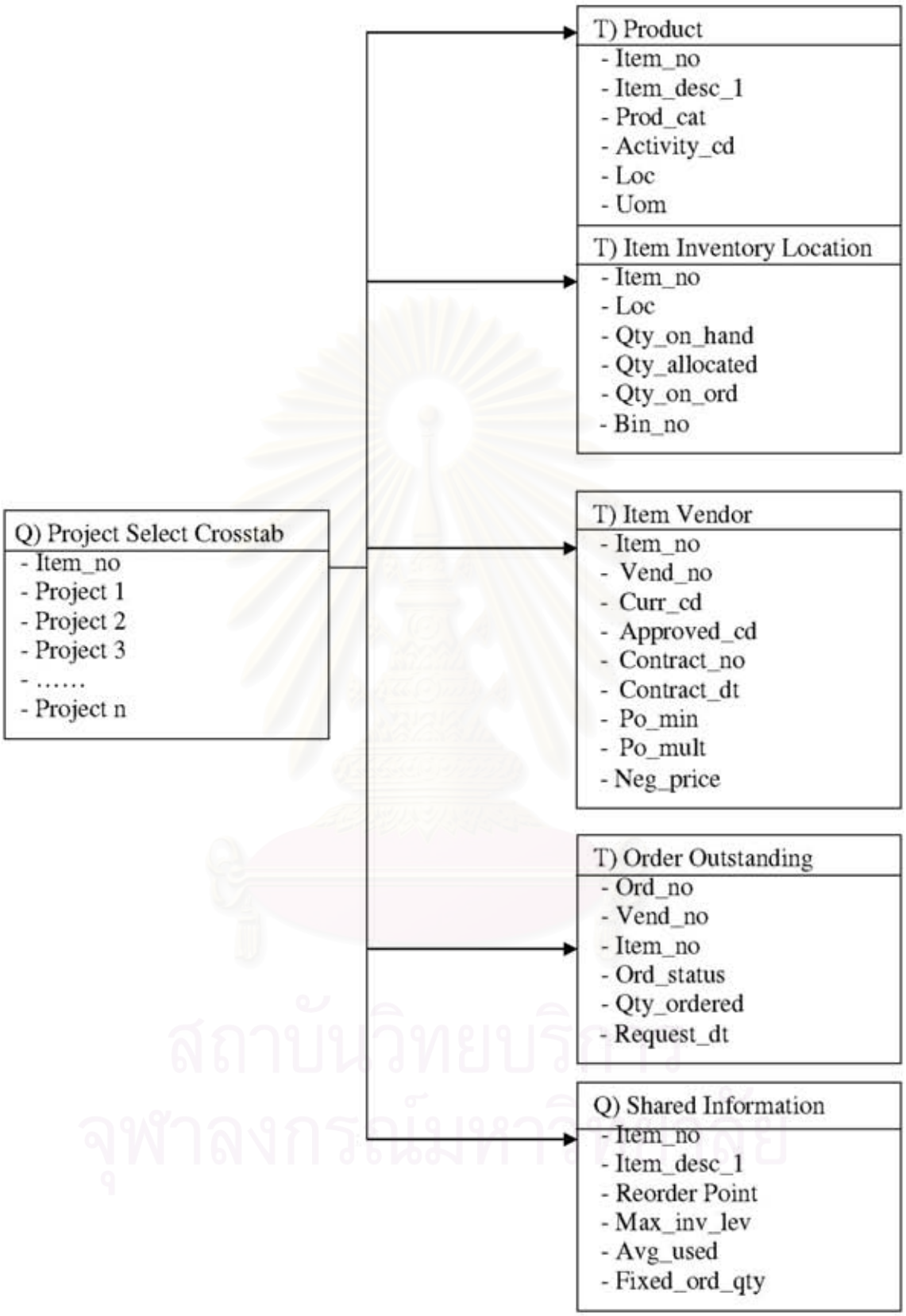


Figure F2: Query relationship of database of inventory level monitoring tool

BIOGRAPHY

Ms. Subhaluk Pornsirianant was born in 1977 in Khonkaen, Thailand. She obtained her bachelor's degree in electrical engineering from Khon Kaen University in 2000. After graduation, she started working as a material planner at Carrier Linde Refrigeration Limited (Thailand) for 5 years. During that, she decided to study for Master of Engineering and Master of Science in Engineering Management jointly offered by Chulalongkorn University and The University of Warwick at the Regional Centre for Manufacturing Systems Engineering. She enrolled as a part-time student and graduated in academic year 2006.