



A Production Cost Accounting System  
for a Valve Manufacturer Company

by

Mr. Pichai Leeludach

Final Report of the Three - Credit Course  
CS 6998 System Development Project

Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Master of Science  
in Computer Information Systems  
Assumption University

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Project Title                      A Production Cost Accounting System for a Valve  
Manufacturer Company

Name                                Ms. Pichai Leeludach

Project Advisor                  Dr. Suphamit Chittayasothorn

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The Graduate School of Assumption University has approved this final report of the three-credit course, CS6998 System Development Project, submitted in partial fulfillment of the requirement of the degree of Master of Science in Computer Information Systems.

Approval Committee:



( Dr. Suphamit Chittayasothorn )  
Advisor



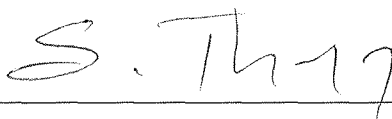
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November 1999

## ABSTRACT

Since nearly the end of 20<sup>th</sup> century, information is the very important weapon for all kinds of organization, and also it is important for individual. What has been taking place in managing information is the computerized system.

The Information implied by the software is the factor that differentiates. The completeness and timeliness of information provided by the software (and related databases) differentiate one company from its competitors. The intelligence and function provided by the embedded software often differentiate two similar industrial or consumer products. It is the software that can make the difference.

The Production Cost Accounting System for a Valve Manufacturer Company, which is presented in the report, was analyzed and designed as the Master Project of CIS (CS 6998 System Development Project). This system was designed for Nagayama Co., Ltd. It is a computerized business system which is developed to increase the organization's potential and the reduce problems. It was basically designed for data controlling in two major fields (Inventory control and Cost of production Calculation). It was developed to replace the current manual system in order to solve many problems as are shown in this report.

This report defined the details of the system and the trend how the Cost and Inventory Control System is programming. This would be useful in later development and maintenance.

## ACKNOWLEDGEMENTS

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He would like to thank all his kindness friends. During their study together in the CIS program, they made him love in this course more.

His company, CSI (Thailand) Co., Ltd. is the source of his up-to-date knowledge. So he would like to say that he is glad to be working in the company, though it always makes him feel very tired.

Finally, he thanks himself for having worked hard until this project is completed.

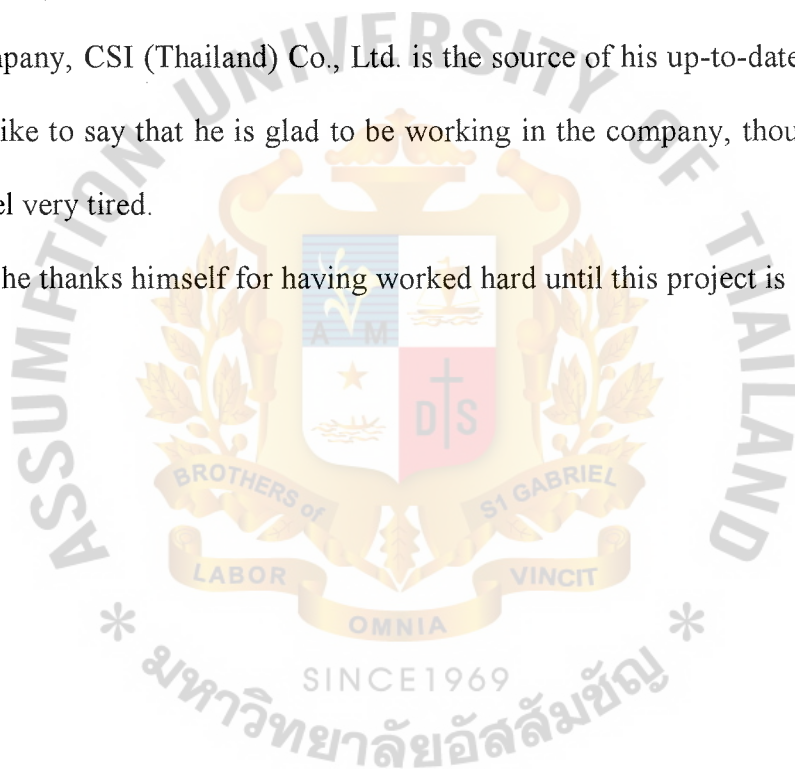


TABLE OF CONTENTS

<u>Chapter</u>	<u>Page</u>
ABSTRACT	i
ACKNOWLEDGEMENTS	ii
LIST OF FIGURES	v
LIST OF TABLES	viii
I. INTRODUCTION	1
1.1 Background of the Project	1
1.2 Objectives of the Project	1
1.3 Scope of the Project	2
1.4 Project Plan	2
II. THE EXISTING SYSTEM	4
2.1 Background of the Company	4
2.2 The Existing Business Functions	7
2.3 The Existing Computer System	8
2.4 Current Projects and Areas for Improvement	10
III. THE PROPOSED SYSTEM	11
3.1 User Requirements	11
3.2 The Functions of the Proposed System	11
3.3 Hardware and Software Requirements	13
3.4 Security and Controls	15
3.5 Cost / Benefit Analysis	16
IV. SYSTEM DESIGN	22
4.1 Database Designing Concept	22

<u>Chapter</u>	<u>Page</u>
4.2 User Interface Designing Concept	23
4.3 Prototyping Technique	30
V. PROJECT IMPLEMENTATION	32
5.1 Programming the System	32
5.2 Testing the System	32
5.3 Installing the System	33
VI. CONCLUSIONS AND RECOMMENDATIONS	34
6.1 Conclusions	34
6.2 Recommendations	35
APPENDIX A THE EXISTING SYSTEM DATA FLOW DIAGRAM	36
APPENDIX B THE PROPOSED SYSTEM DATA FLOW DIAGRAM	38
APPENDIX C STRUCTURE CHART	44
APPENDIX D PROCESS SPECIFICATION	48
APPENDIX E ENTITY-RELATIONSHIP DIAGRAM	59
APPENDIX F DATABASE DESIGN	60
APPENDIX G DATA DICTIONARY	74
APPENDIX H MODULE SPECIFICATION	92
APPENDIX I SCREEN DESIGN	122
APPENDIX J REPORT DESIGN	136
BIBLIOGRAPHY	149



## LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1.1 Project Plan	3
2.1 Nagayama Co., Ltd.'s Organization Chart	6
3.1 Hardware Configuration	14
3.2 The Proposed System Cost vs the Existing System Cost	19
4.1 4 Main Part of Screen Design	25
4.2 Banner	25
4.3 Tool Bar	26
4.4 Data Grid	26
4.5 Report Design	29
A.1 The Existing System Context Diagram	36
A.2 The Existing System Data Flow Diagram	37
B.1 The Proposed System Context Diagram	38
B.2 DFD Level 0 - Production Costing System	39
B.3 DFD Level 1 - 2.0 Handle Stock Movement	40
B.4 DFD Level 1 - 4.0 Calculate Production Cost	41
B.5 DFD Level 2 - 4.1 Control Stock Summary	42
B.6 DFD Level 2 - 4.2 Control Cost Summary	43
C.1 Structure Chart - Production Costing System	44
C.2 Structure Chart - Maintain Master Data	45
C.3 Structure Chart - Handle Stock Movement	46
C.4 Structure Chart - Calculate Production Cost	47
E.1 Entity-Relationship Diagram	59



<u>Figure</u>	<u>Page</u>
I.1 Main Menu Screen	122
I.2 Main Menu Screen (Full View)	123
I.3 Item Screen	124
I.4 Item Part Screen	125
I.5 Item Structure Screen	126
I.6 Account Type Screen	127
I.7 Account Screen	128
I.8 Section Screen	129
I.9 Production Expense Screen	130
I.10 Purchase Screen	131
I.11 Item Transfer Screen	132
I.12 Item Production Screen	133
I.13 Item Production Screen (Full View)	133
I.14 Sale Screen	134
I.15 Cost Calculation Screen	135
J.1 Item Detail Report	136
J.2 Item List Report	137
J.3 Product Structure Report	138
J.4 Item Stock Movement Report	139
J.5 Stock Adjusting Report	140
J.6 Goods and Stock Finished Goods Report	141
J.7 Unfinished Casting Goods Monthly Summary Report	142
J.8 Machining Goods Monthly Summary Report	143
J.9 Machining Manufacturing Cost Report	144

<u>Figure</u>	<u>Page</u>
J.10 Outside Machining Manufacturing Cost Report	145
J.11 Casting Manufacturing Cost of Goods Produced Report	146
J.12 Casting Goods Calculation Cost Sheet Report	147
J.13 Casting Raw Material Consumption Cost Report	148



## LIST OF TABLES

<u>Table</u>	<u>Page</u>
3.1 Cost of Existing System	16
3.2 Cost of the Proposed System	17
3.3 Comparison Cost of the Existing System and the Proposed System	17
3.4 Discounted Payback Matrix	20
6.1 Comparison of Time Using for Operation	20
D.1 Process 1.0.0 Maintain Master Data	48
D.2 Process 2.0.0 Handle Stock Movement	49
D.3 Process 2.1.0 Handle Item Transfer	50
D.4 Process 2.2.0 Handle Item Transform	51
D.5 Process 3.0.0 Handle Production Expense	52
D.6 Process 4.0.0 Calculate Production Cost	53
D.7 Process 4.1.0 Control Stock Summary	54
D.8 Process 4.1.1 Summarize Transfer	55
D.9 Process 4.1.2 Summarize Transform	56
D.10 Process 4.1.3 Summarize Stock Balance	57
D.11 Process 4.2.0 Control Cost Summary	58
F.1 Table Account	60
F.2 Table AccountType	60
F.3 Table CostItemSummary	61
F.4 Table CostSectionSummary	62
F.5 Table Expense	63
F.6 Table Item	64

<u>Table</u>	<u>Page</u>
F.7 Table Item (Continue)	65
F.8 Table ItemPart	65
F.9 Table ItemStatus	66
F.10 Table ItemStucture	66
F.11 Table ItemType	67
F.12 Table Section	67
F.13 Table StockSummary	68
F.14 Table StockSummary (Continue)	69
F.15 Table SystemControl	70
F.16 Table TransactionType	70
F.17 Table Transfer	71
F.18 Table Transform	72
F.19 Table TransformDetail	73
G.1 Data Dictionary	74
G.2 Data Dictionary (Continue)	75
G.3 Data Dictionary (Continue)	76
G.4 Data Dictionary (Continue)	77
G.5 Data Dictionary (Continue)	78
G.6 Data Dictionary (Continue)	79
G.7 Data Dictionary (Continue)	80
G.8 Data Dictionary (Continue)	81
G.9 Data Dictionary (Continue)	82
G.10 Data Dictionary (Continue)	83
G.11 Data Dictionary (Continue)	84



<u>Table</u>	<u>Page</u>
G12 Data Dictionary (Continue)	85
G13 Data Dictionary (Continue)	86
G.14 Data Dictionary (Continue)	87
G.15 Data Dictionary (Continue)	88
G.16 Data Dictionary (Continue)	89
G.17 Data Dictionary (Continue)	90
G.18 Data Dictionary (Continue)	91



## **I. INTRODUCTION**

### **1.1 Background of the Project**

Nagayama Co., Ltd. is one of the leading manufacturers of valve products, which was found in October 1898. The functions of Nagayama Co., Ltd. are producing both air and water valve for supplying to organizations over the world in the form of material and ready to use products. Nagayama Co., Ltd. will produce products by job order with the zero stock concept.

The current computerized systems in Nagayama Co., Ltd.; mostly are used for documentation. However, they are not standardized in their documentation system, and then this led to many problems in production control as the firm grows. All of the current computerize operations were not connected to other systems then they found that there were repeated work in different departments, less efficiency of data control, lack of timely and accurate information, and many other problems. The computerized system that Nagayama Co., Ltd. urgently needs is the system that controls the inventory and production cost.

### **1.2 Objectives of the Project**

This project will mainly present the analysis and design of The Production Cost Accounting System for a Valve Manufacturer Company. This System has been set up to serve the Production Cost Calculation and Controlling of Nagayama Co., Ltd. The Cost Controlling is necessary for the company finance in order to maintain the products' quality with minimum cost. The Inventory Controlling of this company needs the integrity system to take care of the several warehouses of several products at several production stages.

### Expected Result:

This project will be developed from the old system, which is inconvenient and has less data integrity. The objective of the project is to provide the system that can produce correctness, report standard, etc. for the concerned department. And to manage the data within the inventory system to be the same format, not redundant, etc. and to provide the report within a short time.

### 1.3 Scope of the Project

The purpose of this project is to develop the preliminary design package which include the detailed design package, the coding and testing package, and maintenance package for serving the Cost Controlling and Inventory Controlling of Nagayama Co., Ltd. The Cost Controlling is necessary for the company's finance in order to maintain the product's quality with a minimum cost. The inventory Control of this company is needed for the integrity of the system to take care of the several warehouses for several products at several production stages.

Nagayama Costing System (NCS) will focus on the cost calculation of production. In addition to the cost control, other subsystems are required such as Inventory Control. Purchasing and Accounting are also of concern to complete the cost calculation.

### 1.4 Project Plan

This project was set up for one year development starting from system analysis, system design, developing, testing, implementation and finally maintenance.

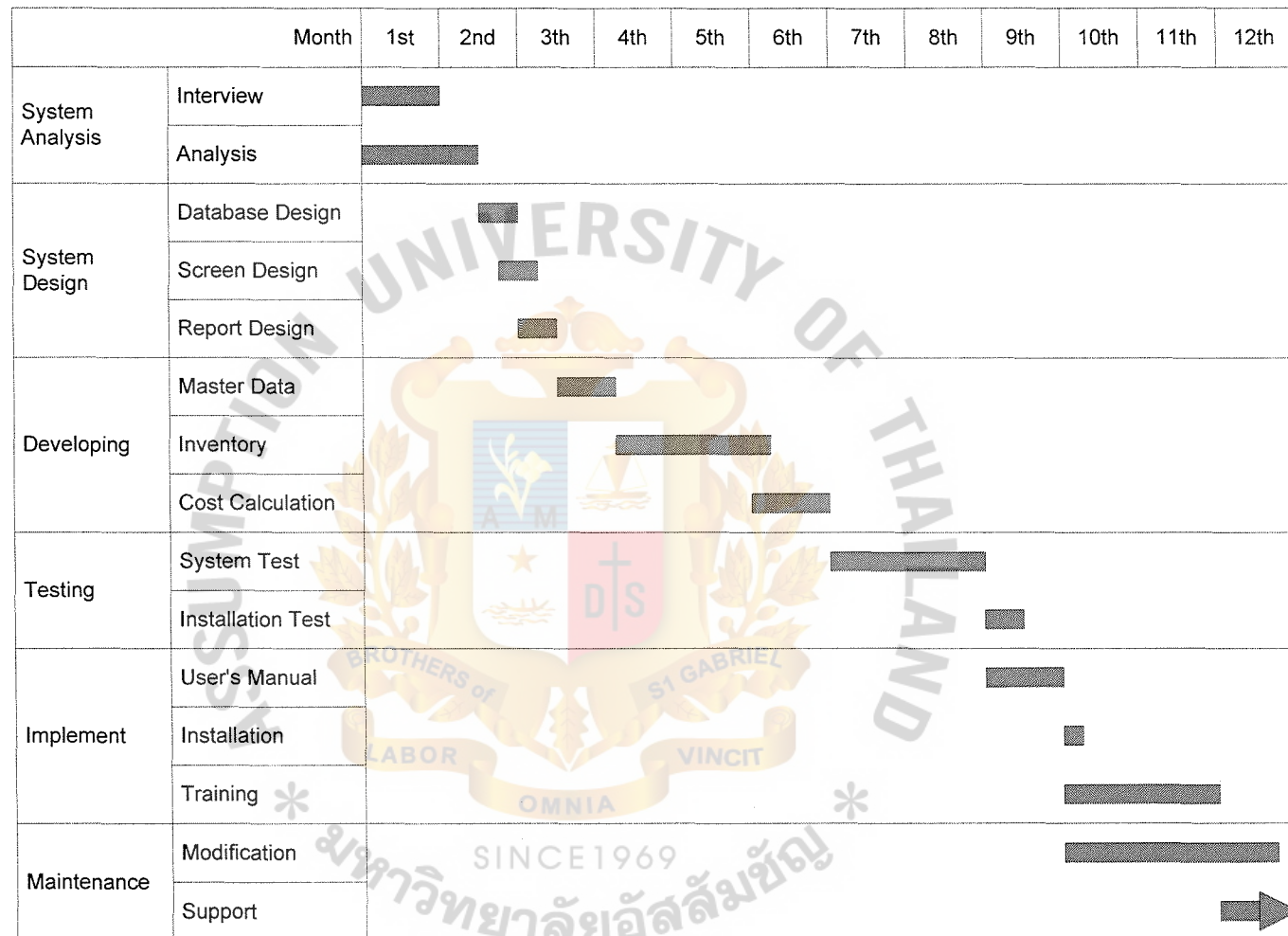


Figure 1.1. Project Plan.



## II. THE EXISTING SYSTEM

### 2.1 Background of the Company

Organization:	Nagayama Co., Ltd.
Found in:	October, 1988
Type of Business:	Valve manufacturing
Functions:	Produce both air and water valves for supplying to organizations all over the world
Operation:	Some computerized systems in document controlling, mainly manual operation
Scope:	Product Quality Checking System, Customer Tracking System and Invoice Form
Problems:	less efficiency of data control, lack of timely and accurate information, etc.

Nagayama Co., Ltd. is a Japanese Industry that has been set up in Thailand for more than 10 years but more than 30 years experience in Japan. This company's products are major valve parts and completed valve. The company has contributed to a wide field of industrial development, from housing to nuclear energy. The company has its own factories for produce the valve in various types and sizes for water and gas. The number of white collar employees of Nagayama is about 30 officers, blue collar 80, and 10 for others.

The current system of the company is a manual system from which occurs so many problems. There are the problems of incorrect typing, duplication of data entry,

not linking data and different format files by different programs, not correct data, hard to find data history, duplicate report information and no report standard.

#### Company's Trend:

Nagayama Co., Ltd. wanted to expand the production. That means if it still uses the manual system, more employees would be needed, and then more space is needed for them. Using the computerized system can solve this point, with the same number of employees but gaining more productivities and efficiency.



## Nagayama's Organization Chart

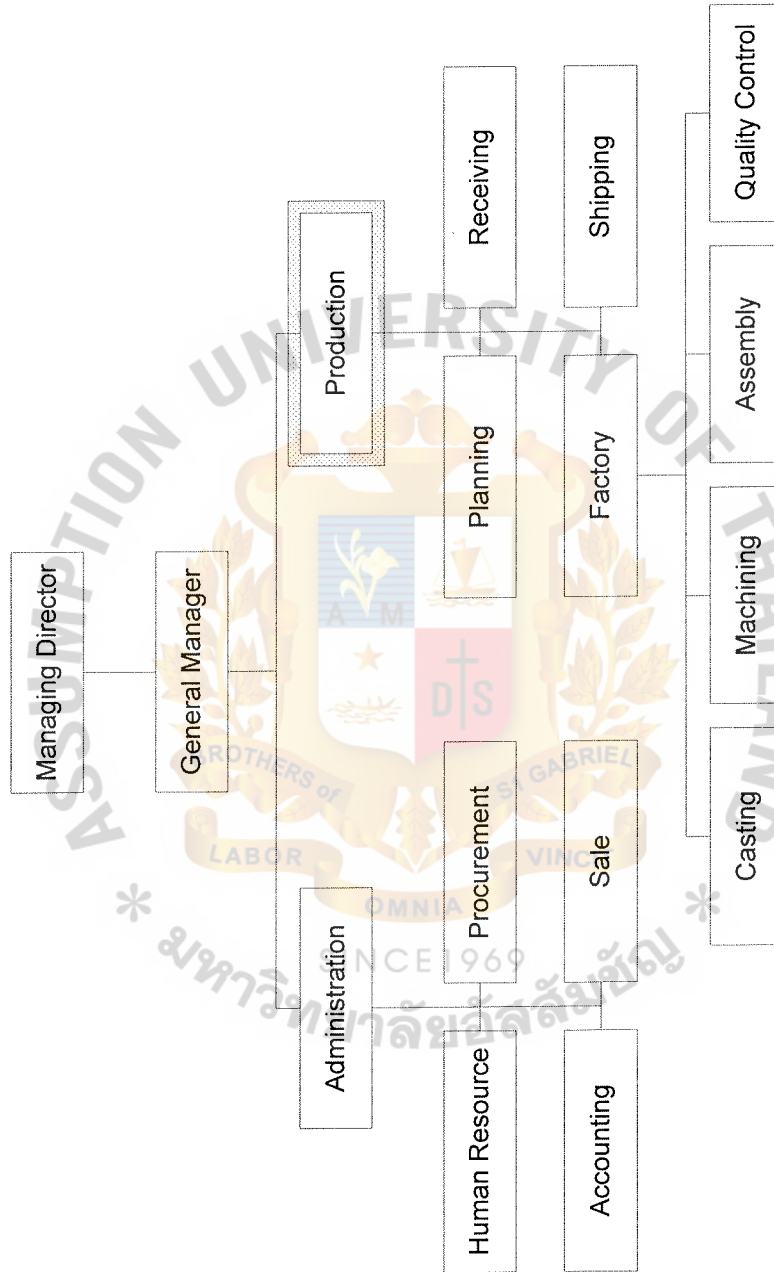


Figure 2.1. Nagayama Co., Ltd.'s Organization Chart.

## 2.2 The Existing Business Functions

### Inventory Concept:

For Nagayama, the starting point of the flow of inventory system is Purchasing Department. All purchased items must first occur in the Purchasing Department. There are three Production Sections in Nagayama, which are Casting, Machining and Assembly Section. The flow of inventory system is mainly transfer of items and production which are always fixed such as: from Purchasing to Casting, to Machining, and finally to Assembly Section. However, sometimes the flow may change for some cases such as:

- selling the casted or machined items
- buying cast items for machining or buying machined items for assembly
- defective item occurred
- etc.

Every section has its own stock control. The final stage of the inventory system of Nagayama's Inventory system is Selling. The Selling process for this system means shipping out the items to the customer and it must take place only at the Shipping Department. Therefore every item that is ready for sale has to move to the Shipping Department.

### Flow of Costs in Manufacturing Firms:

Manufacturing costs consist of direct material, direct labor, and manufacturing overhead. The product costing systems used by the manufacturing firms involve several manufacturing accounts. As production takes place, all manufacturing costs are added to the Work-in-Process Inventory account. Work in process is a partially completed inventory. A debit to the account increases the cost-based valuation of the asset represented by the unfinished products. As soon as products are completed, their



product costs are transferred from Work-in-Process Inventory to Finished-Goods Inventory. This is accomplished with a credit to Work in Process and a debit to Finished Goods. During the time period when products are sold, the product cost of the inventory sold is removed from Finished Goods and added to Cost of Goods Sold, which is an expense of the period during which the sale occurred.

## **2.3 The Existing Computer System**

The existing hardware and software components in the concerned department are as following.

### **2.3.1 The Specification of the Existing Hardware**

Computers:

- (1) IBM Compatible 286 At  
20 Mb Harddisk  
9 years usage
- (2) IBM Compatible 386 - 25 Mhz  
200 Mb Harddisk  
4 years usage
- (3) IBM Compatible 386 - 25 MHz  
42 Mb Harddisk  
8 years usage
- (4) IBM Compatible Pentium – 133 MHz  
1.2 Gb Harddisk  
2 years usage
- (5) IBM Compatible Pentium – 166 MHz  
2 Gb Harddisk  
2 years usage

(6) IBM Compatible 486 – 66 MHz

150 Mb Harddisk

6 years usage

(7) IBM Compatible 486 – 66 MHz

150 Mb Harddisk

7 years usage

(8) IBM Compatible 386 – 25 MHz

180 Mb Harddisk

8 years usage

(9) IBM Compatible 486 – 66 MHz

160 Mb Harddisk

7 years usage

(10) IBM Compatible Pentium – 133 MHz

1.2 Gb Harddisk

2 years usage

Printers:

(1) Dot Matrix A3 size 3 sets

(2) Laser A4 size 3 sets

LAN System:

Not exist

### 2.3.2 The specification of the existing software

Operating System Software:

- MS-DOS version 3.3
- Microsoft Windows 3.11
- Microsoft Windows 95

Application Software:

- Microsoft Office 4.3
- Microsoft Office 95
- Microsoft Office 97
- Lotus 1-2-3

#### **2.4 Current Problems and Areas for Improvement**

We have set the interviewing of the General Manager, Accounting Department's manager and staff, Production Control Department's manager and staff, and the other concerned persons for collecting the necessary information and knowledge. From this interview, we have studied, analyzed, and summarized the problems of users as follows:

- Incorrect typing
- Duplication of data entry
- Not linking data and different format file by different program
- Report requirement within a short time
- Not correct data
- Hard to find history data
- Duplicated Report information
- No report standard

The main causes of the existing problem come from working without the efficiency data sharing system. No networking system and no standard report format setting up make these problems occur.

### III. THE PROPOSED SYSTEM

#### 3.1 User Requirements

After interviewing and summarizing the problems of the current system, and collecting requests from the users, we can conclude the requirements of the new system to be developed as follows:

- Ability to find out the correct production cost.
- Ability to find out the production cost as fast as possible.
- Ability to prepare documents and submit to the government sector on time.
- Ability to finish the urgent case of process in time.
- Ability to predict the situation of inventory.
- Ability to reduce the cost of operation.
- Ability to control the documents and filing system with efficiency.
- Ability to use the same format of documents.
- Ability to apply the security control to overall system.
- Ability to confirm the correction of input data.
- Efficient memory management.
- Ability to apply both the hardware, software and data sharing.
- Better performance of hardware.

#### 3.2 The Functions of the Proposed System

##### (1) Item

Items are fixed into 5 types: purchased, casting, machining, assembly and other. Item part is the one attribute of items that can be modified by the user. Some of the attributes are for some items, then user has to know the nature of each item. The attributes of item will help in the calculation or grouping of the report.



## (2) Section

The section information will collect the information of each section or department in Nagayama Co., Ltd. For the specific manner of Nagayama's Inventory Controlling System, the starting point is Purchase Department and the ending point is Shipping Department. Then the Purchase and Shipping Department have to be fix the Section No. not to be allowed to change by user for it is used in cost calculation.

## (3) Account

Account Code is necessary for the Accounting Department for calculation and analysis. Account Type is the portion that this system needs to specify into each account code for grouping the type cost that will occur with each item. This is necessary for the organization that wants to calculate the production cost with different method for each type of expenses.

## (4) Transfer

Transfer transaction (may be called "Move") is the records of inventory movement from one place to another place of stock. This function will control the quantity of the items in each stock place.

## (5) Transform

Transform transaction (may be called "Make") is the records of the production or changing of item status that occurred in each stock place. This function will control the change in quantity of the items in each stock place.

## (6) Cost Calculation

Cost calculation is the final stage of the system, which will gather all necessary data for finding out the cost of each item following the cost formula that set by the customer.

### 3.3 Hardware and Software Requirements

#### 3.3.1 Hardware Requirements

Some existing hardware can be reused, which some of them may need upgrading. The following will show the designed hardware with the minimum requirement of the system.

- (1) Server 1 unit
  - (a) Pentium 2 – 200 MHz
  - (b) Ram 128 Mb
  - (c) Hardisk ultrawide SCSI 2
  - (d) CD-Rom Driver
  - (e) Intel Network Interface card 10/100
- (2) Client 6 units
  - (a) Pentium 133
  - (b) Ram 64 Mb
  - (c) Hardisk 1 Gb (IDE)
  - (d) Intel Network Interface card 10/100
- (3) Printer
  - (a) Laser Printer A4 size – 3 unit
  - (b) Dot Matrix A3 size – 1 unit
- (4) Others
  - (a) Hub 8 ports – 2 Units
  - (b) Modem 33.6 Kbps – 1 unit

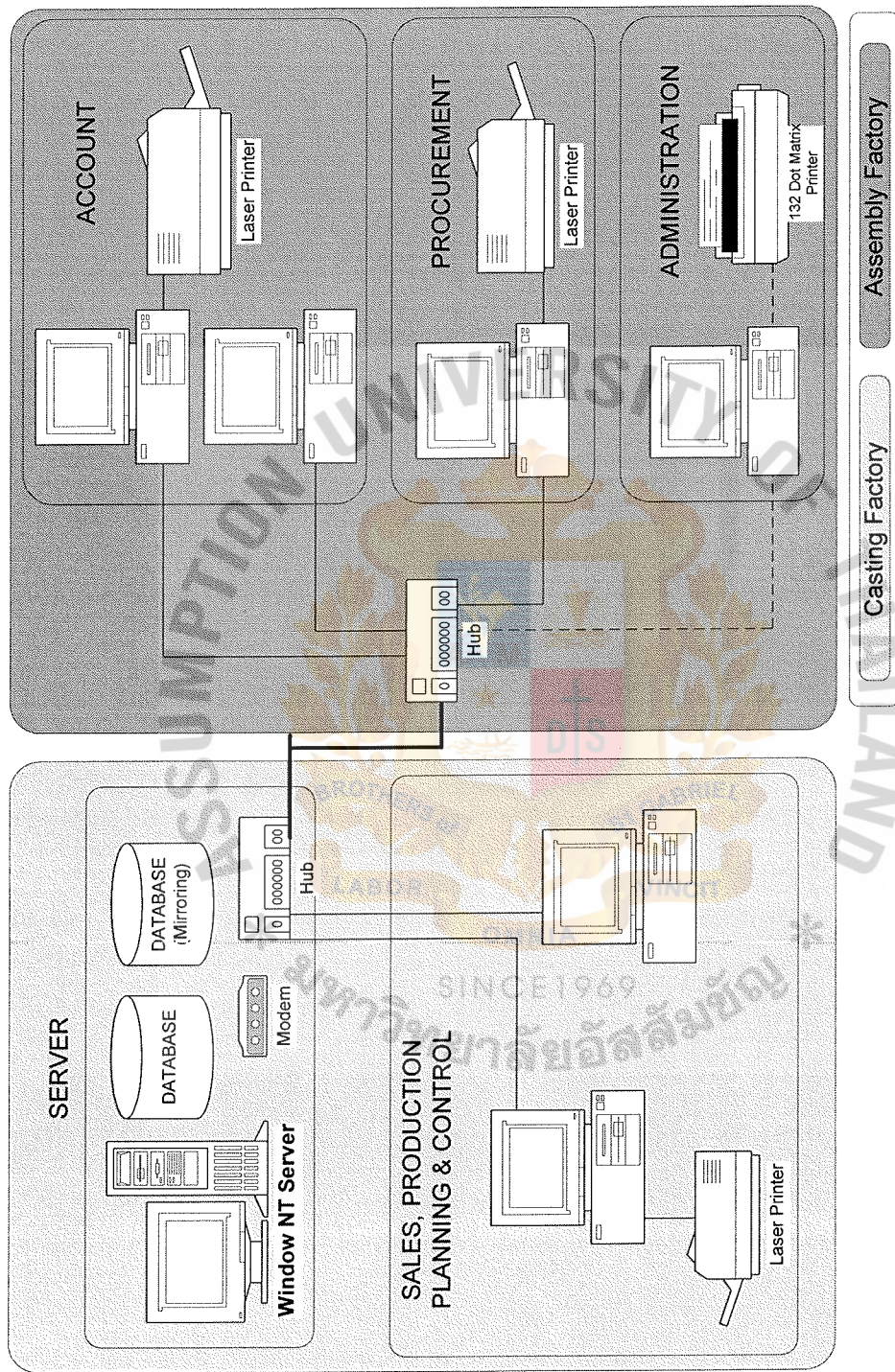


Figure 3.1. Hardware Configuration.



### 3.3.2 Software Specification

- Microsoft Windows NT 4.0
- Microsoft SQL Sever 5.0
- Microsoft Windows 95
- Microsoft Office 97

## 3.4 Security and Controls

The security of information is very important for the organization. It is necessary to apply the security control which is suitable for the organization. The common security control can be divided into 2 methods: physical security and logical security. For Nagayama Co., Ltd. both methods will be applied as follows:

### 3.4.1 Physical Security

Physical security means preventing the use of hardware. It may be applied by setting the computer center room to allow only the authorized persons. In the case of Nagayama that has just started the computer system and still is not ready for the security room, physical security cannot really be applied. The computers are in the open area which the person without permission can use without being seen by the others. However, more security control will be set up soon.

### 3.4.2 Logical Security

Logical security means preventing the accessing of the data. It may be applied by setting up the permission system. In the case of Nagayama Co., Ltd., we set up 3 levels of security. For the first level, the network security was set up under the service of MS Windows NT. For the second level, the database security was set up under the service of MS SQL Server. For the final level, the application security was set up by our application that allows the user to assign the authorized persons to access some screens of the application.



### 3.5 Cost/Benefit Analysis

A comparison between the cost of the existing system and that of the proposed system is needed whether or not the project is feasible and reasonable to continue to develop the proposed system.

#### 3.5.1 Cost Analysis

Table 3.1. Cost of the Existing System.

Cost Items	Year 1 (Baht)	Year 2 (Baht)	Year 3 (Baht)	Year 4 (Baht)	Year 5 (Baht)	Total (Baht)
Labor	480,000	840,000	960,000	1,080,000	1,080,000	4,440,000
Hardware	40,000	200,000	60,000	80,000	100,000	480,000
Stationary	20,000	30,000	50,000	70,000	90,000	260,000
Total	540,000	1,070,000	1,070,000	1,230,000	1,270,000	5,180,000

Table 3.2. Cost of the Proposed System.

Cost Items	Year 1 (Baht)	Year 2 (Baht)	Year 3 (Baht)	Year 4 (Baht)	Year 5 (Baht)	Total (Baht)
Labor	480,000	480,000	600,000	600,000	600,000	2,760,000
Stationary	20,000	25,000	30,000	35,000	40,000	150,000
System Development	500,000	-	-	-	-	500,000
Hardware	200,000	-	50,000	-	-	250,000
Software	80,000	-	-	-	-	80,000
Training course	-	5,000	5,000	5,000	5,000	20,000
Maintenance	-	15,000	15,000	15,000	15,000	60,000
Total	1,280,000	525,000	700,000	655,000	660,000	3,820,000

Table 3.3. Comparison Costs of the Existing System and the Proposed System.

Cost Items	Year 1 (Baht)	Year 2 (Baht)	Year 3 (Baht)	Year 4 (Baht)	Year 5 (Baht)
Existing system	540,000	1,070,000	1,070,000	1,230,000	1,270,000
Cumulative Cost	540,000	1,610,000	2,680,000	3,910,000	5,180,000
Purposed system	1,280,000	525,000	700,000	655,000	660,000
Cumulative Cost	1,280,000	1,805,000	2,505,000	3,160,000	3,820,000
Difference	-740,000	-195,000	175,000	750,000	1,360,000

### 3.5.2 Benefit Analysis

#### Tangible Benefits

From the previous section, the cost analysis, we find that that cost will decrease in the long-run operation. The tangible benefits that we can gain from the system are as follows:

- Reducing volume of paper produced and handled.
- Reducing staffs cost.
- Reducing the cost of hardware that can be shared and those that will increase as the number of staffs increases
- Increasing sales order

#### Intangible Benefits

Not only are the above benefits provided by the system, some benefits that are hard to measure we also provided. The followings are the intangible benefits from the system are as follows:

- Expansion of staffs' performance
- Providing fast and correct useful information
- Reducing redundant routine work
- Increasing company's image
- Easier management

### 3.5.3 Break-Even Analysis

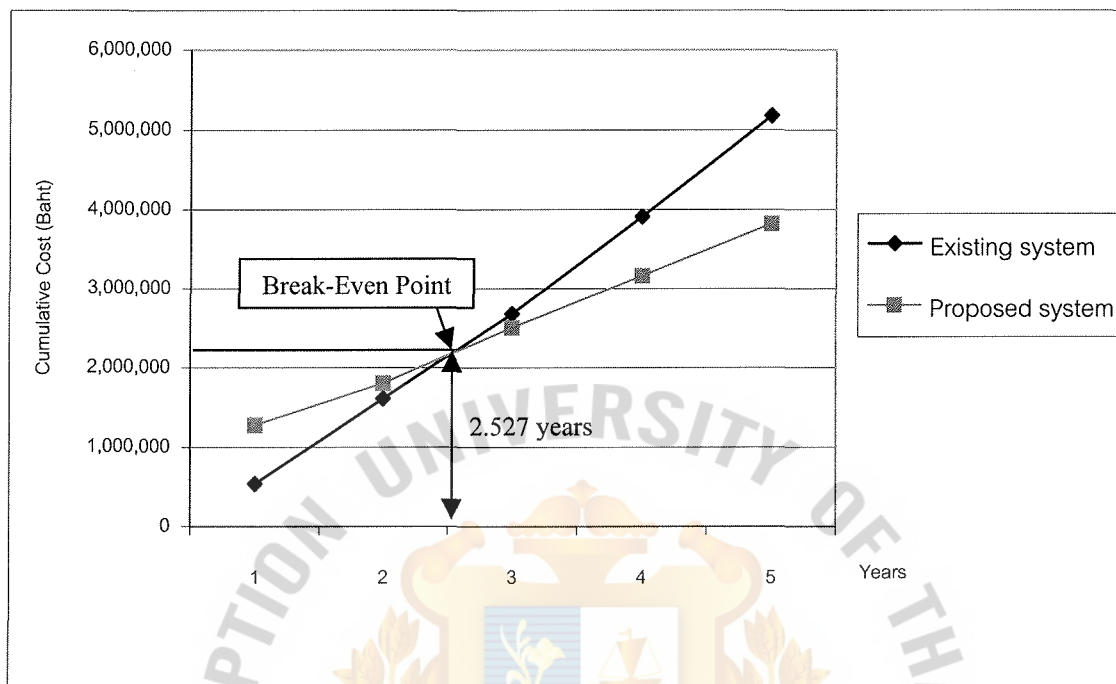


Figure 3.2. The Proposed System Cost vs The Existing System Cost.

### 3.5.4 Payback Period

We have to analyze the payback of the proposed system with the existing system to compare the budget cost with the actual cost when it will be recovered.

Discounted payback period is calculated from the baht currency no matter whether the future value of a baht will depreciate or appreciate.

The present value formula is equal to:  $1 / (1+i)^n$ , with which  $i$  is the rate of interest,  $n$  is the number of years.

Table 3.4. Discounted Payback Matrix.

Cost Items	Year 1 (Baht)	Year 2 (Baht)	Year 3 (Baht)	Year 4 (Baht)	Year 5 (Baht)
Existing System	540,000	1,070,000	1,070,000	1,230,000	1,270,000
Proposed System	1,280,000	525,000	700,000	655,000	660,000
Difference	-740,000	545,000	370,000	575,000	610,000
Cumulative Difference	-740,000	-195,000	175,000	750,000	1,360,000
Discount	0.91	0.83	0.75	0.68	0.62
Discount Difference	-673,400	452,350	277,500	391,000	378,200
Cumulative Discount Difference	-673,400	-161,850	131,250	510,000	843,200

Payback Period formula

$$\begin{aligned}\text{Payback Period} &= \text{Last\_Year\_of\_Negative\_cash\_flow\_difference} + \\ &\quad (\text{Cumulative\_difference\_last\_negative\_year} / \\ &\quad \text{Absolute\_value\_of\_cumulative\_difference}) \\ &= 2 + (195,000 / 370,000) \\ &= 2.527 \text{ Years}\end{aligned}$$



Discounted Payback Period formula

$$\begin{aligned}\text{Payback Period} &= \text{Last\_Year\_of\_Negative\_cash\_flow\_discount\_difference} + \\ &\quad (\text{Absosult\_Cumulative\_discount\_difference\_last\_negative\_year} / \\ &\quad \text{Discount\_difference\_value\_of\_the\_first\_Positive\_year}) \\ &= 2 + (161,850 / 277,500) \\ &= 2.583 \text{ Years}\end{aligned}$$

Payback period for the project is 2.527 years and Discounted Payback period for the project is 2.583 years so it is feasible even the value of baht is lower.

$$\begin{aligned}\text{Return on investment} &= 1 / \text{Payback} \\ &= 1 / 2.583 \\ &= 0.387 \%\end{aligned}$$

Net Present value (the sum of the discounted difference) is 843,200 baht.

## IV. SYSTEM DESIGN

### 4.1 Database Designing Concept

Relational database is applied to this system with control by MS-SQL Server. The relational DBMS is suitable for middle size organization. This system is designed to separate the database tables into 3 types depending on their functions as follows:

- Data Tables
- Summary Tables
- System Control Tables

#### (1) Data Tables

The common tables that are applied in general database application. These tables will collect the data of objects and events that are necessary for the system. The user has to input data into these table through the system's user interface. For more reliability of long term running of the system, some flags will be added into the object tables for controlling the data that had been used but are not wanted currently. The system will allow the unwanted data to be deleted.

#### (2) Summary Tables

The tables that will be created for collect the summarized data for 2 main purposes. One is for collecting the result of the long time batch processing that will be later shown in reports. This will help to increase speed in report generating and also some data validation. The other purpose is for saving of memory space in the long run. In the case that the system has been running for many years, the transaction data can be deleted from the system and just keep the summary data for history monitoring. The data in these tables cannot directly be added, edited or deleted by user, but will be controlled by the system.

### (3) System Control Tables

The tables which collect data that are necessary for controlling the system. The concept is that, instead of hard coding in the source code, the data of these tables may be variables or constant. The use of this concept is when some constants in the source code need to be changed depending on the situation of changing customer, the application is no longer needed to be recompiled and then installed in each terminal, but just change the data in these tables. Some types of data may be controlled by the user in order to increase the flexibility of the system. And some types of data will be generated by the system for some purposes.

## 4.2 User Interface Designing Concept

This system's user interface was designed with the standardization concept. All screens and all reports were designed to be in the same appearance.

### 4.2.1 Screen Design

Custom Control is the user created object that is practiced in almost Visual Programming Tool such as Visual Basic or Visual C++. Using custom controls for front-end programming will help to save time and be easy to maintain. The custom controls which is created in the system is the "Banner" (header section that shows logo, form name and standard criteria, and the "NCSToolBar" (the standard tool bar designed for this system).

Screen Mode:

The screen will be in 3 modes of operation:

#### (1) View mode

All screens will start with this mode. In this mode, the data cannot be changed or added. User can only view or delete the data. The viewing utility command will allow change record, filter, search and print.

(2) Edit mode

If the user wants to change any data, he/she has to switch into this mode by clicking at the "Edit" button. In this mode, only "Save" and "Cancel" command can be selected.

(3) Add mode

If the user wants to add new data, he/she has to switch into this mode by clicking at the "Add" button. In this mode, only "Save" and "Cancel" command can be selected.



The standard screen of this system will be divided into 4 main parts as shown in the following figure.

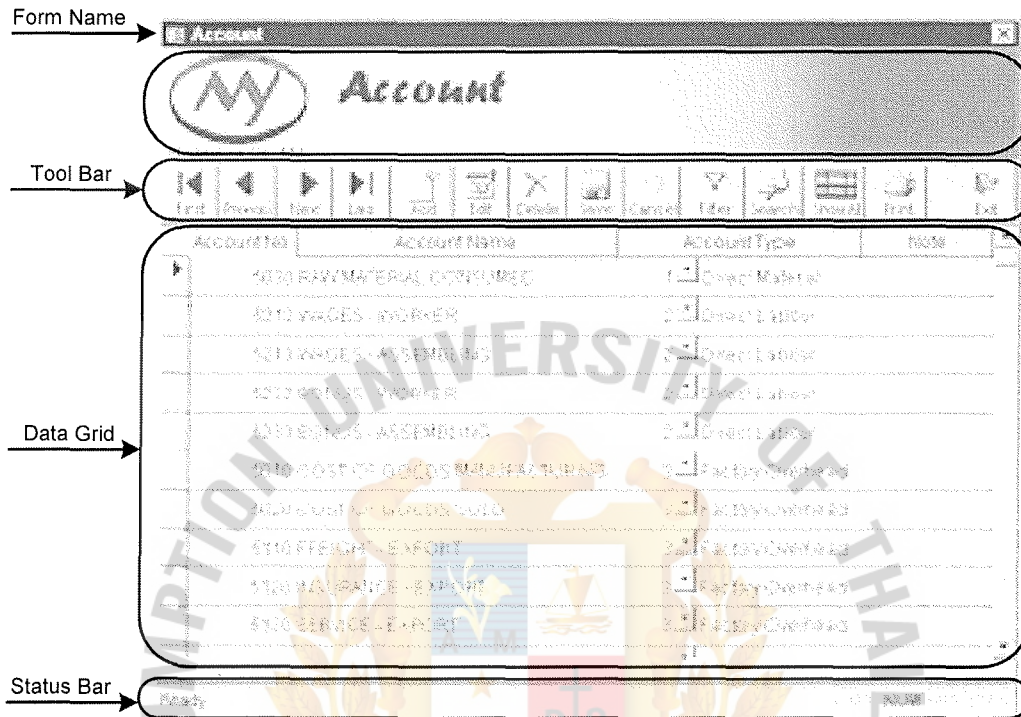


Figure 4.1. 4 Main Part of Screen Design.

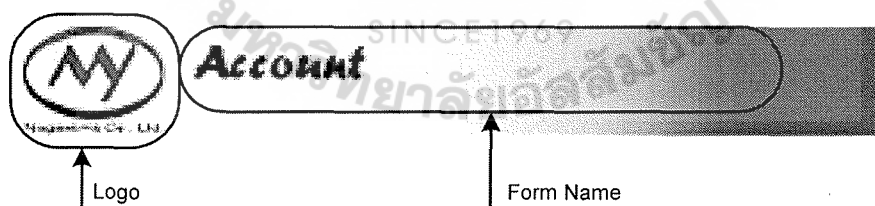


Figure 4.2. Banner.



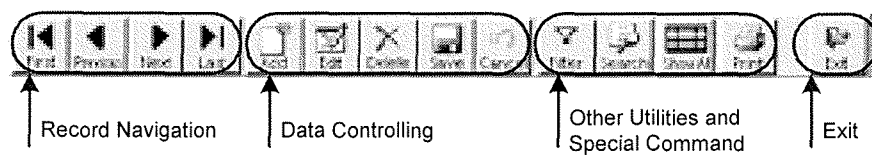


Figure 4.3. Tool Bar.

Column Name

Account No	Account Name	Account Type	Note
5020	RAW MATERIAL CONSUMED	1	Direct Material
5012	WAGES - WORKER	2	Direct Labour
5013	WAGES - ASSEMBLING	2	Direct Labour
5023	BONUS - WORKER	2	Direct Labour
5023	BONUS - ASSEMBLING	2	Direct Labour
5010	COST OF GOODS MANUFACTURING	2	Factory Overhead
5020	COST OF GOODS SOLD	3	Factory Overhead
5110	FREIGHT - EXPORT	3	Factory Overhead
5120	INSURANCE - EXPORT	3	Factory Overhead
5130	SERVICE - EXPORT	3	Factory Overhead

Record Selector

Data Area

Scroll Bar

Figure 4.4. Data Grid.

## Screen Design Structure

### (1) Form Name

Show the name of the screen.

### (2) Banner

The custom control that acts as the header of each screen

#### (a) Logo

Shows the logo of the company.

#### (b) Form Name

Shows the name of the screen as appearing in the first part.

### (3) Tool Bar

The “NCSToolBar” custom control that placed the command for any action

#### (a) Navigation

The most left zone of the tool bar shows the buttons for moving along the records in the view mode.

#### (b) Data Controlling

The second zone of the tool bar shows the buttons that control the data. These buttons will change the screen mode and apply the changed data.

#### (c) Other Utilities and Special Command

The third zone of the tool bar shows the buttons that include the data viewing utilities such as filter, print and search, and other commands. The other commands may be batch processes that will appear in some screen.

#### (d) Exit

The most right zone of the tool bar shows the exit button for closing the current screen and then returns to the previous screen.

(4) Data Grid

The control that represents the data under the operation.

(a) Column Name

The header of data grid shows the name of data in each column.

(b) Data Area

This area will show the data that have been retrieved and the inputting data.

(c) Record Selector

At the left of data area is the pointer showing the focused record. The user can also click this area for changing the focused record.

(d) Scroll Bar

According to the table style of data viewing, sometimes the data may be shown in more than one screen. The scroll bar will represent the position of data screen and allow user to move the data screen.

(5) Status Bar

The status of the running process and the keyboard status will be shown here.

4.2.2 Report Design \*

Most of the reports of this system will list the data in the form of a table. The header of each report was set to be in the same format as you can see in Appendix J. The standard report of this system will be divided into 2 main parts as shown in the following figure.

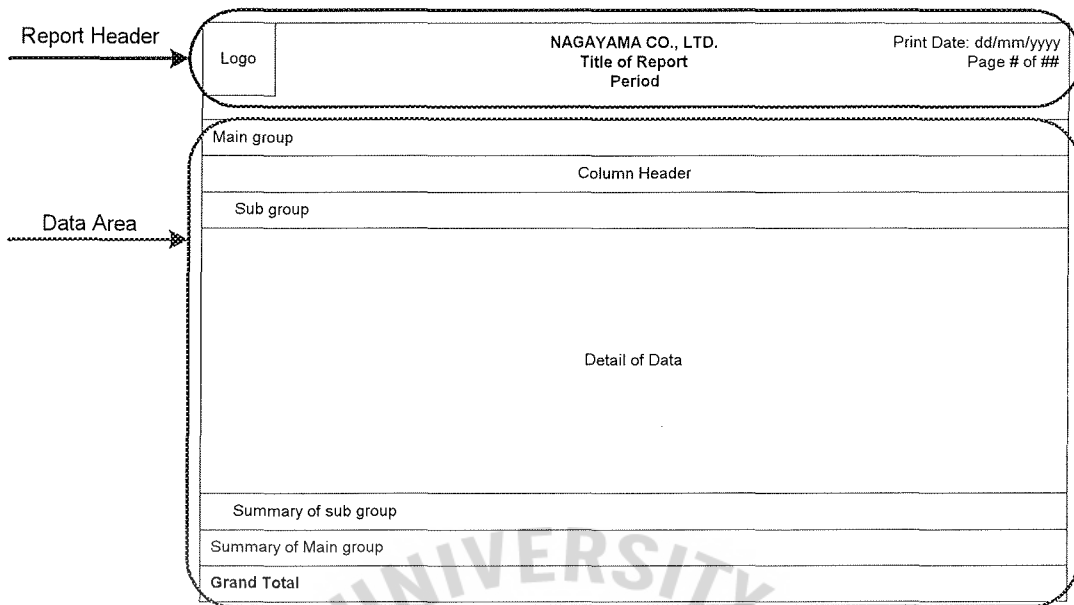


Figure 4.5. Report Design.

## Report Design Structure

### (1) Report Header

The header of the report represents the main information of the report.

#### (a) Logo

Shows the logo of the company.

#### (b) Company Name

Shows the name of the company.

#### (c) Report Title

Shows the name of the report.

#### (d) Period

Shows the period of date interval or month interval criteria of the data in the report.

#### (e) Print Date

Shows the printing date as document reference.

(f) Page

Shows the current page number and total pages of the report.

(2) Data Area

The area that represents the data selected by user.

(a) Main Group

Shows the name of the main grouping of data (if have).

(b) Column Name

Shows the name of each column of data.

(c) Sub Group

Shows the name of sub grouping of data (if have).

(d) Detail of Data

This area will show the detail data that have been retrieved from the database.

(e) Summary of Sub Group

Shows the summary data of sub grouping of data (if have).

(f) Summary of Main Group

Shows the summary data of the main grouping of data (if have).

(g) Grand Total

Shows the summary data of the overall data.

### 4.3 Prototyping Technique

Prototyping technique was introduced for this project. By this technique, the system developers will meet and discuss with users more often than other technique.

Microsoft Access 97 was used in creating the prototype of screen following the design and then submitted the interface design by prototyping to customer. From this



action, we can adjust the position of all objects and decorations before actual development. Some database portion also may be adjusted as the designing and changing of interface.



## **V. PROJECT IMPLEMENTATION**

### **5.1 Programming the System**

Microsoft Visual Basic 5 (VB5) was used as the main tool in developing the program. Microsoft SQL Server 6.5 is used in the database management, and Crystal Report 5 in generating reports. Using Microsoft Access 97 for creating the roughly interface design and testing the data relationship, we can rapidly create the application in the actual development phase. Some user's controls (the objects that can be created by programmer in almost visual tools) were created and used in this project for the standardization and ease of maintenance.

### **5.2 Testing the System**

Testing is one of the very important steps in system development. For this system, we will practice two main groups of testing as follows:

#### **5.2.1 Testing by Developers**

The system will be tested by the programmers and software auditors. The programmers have to test their own finished modules before sending it to the software auditors for testing again. In this situation, the programmers always use white-box testing, while the software auditors will use black-box testing. Here we will call it "System Testing". The next step is that we have to test the environment, installation and integration test to see the overall correctness and reliability. This step of testing we will call "Installation Test".

#### **5.2.2 Testing by Users**

Two groups of users will perform the testing. The first group will attend the training before letting them use as the actual operation. The second group will start using the system without training and let them try anything that they want.

### **5.3 Installing the System**

#### **5.3.1 Installation Method**

Parallel method of installation was selected for this project. By this method, the manual operation will be worked together with the computerized system for the correctness checking. This parallel period will be taken for one or two months depending on the customer. This period should not be too long due to operation cost, but it will ensure that our system is really working.

#### **5.3.2 Data Conversion**

For reducing time of input of all master data such as Items, Account, etc, we will convert the data from the excel file that users have used for a long time. However, for this data conversion, we will convert just about 80% of the data. The rest of the users have to input by themselves, to be familiar with our system. After the conversion and input by users, the responsible persons have to check all the data again. This cause us not to be able to guarantee the correctness of the data that we have converted from some random data files.

## VI. CONCLUSIONS AND RECOMMENDATIONS

### 6.1 Conclusions

The purpose of this system development project is to analyze, design, implement and develop database software application for finding out the production cost of Nagayama Co., Ltd. This application is developed for getting better, faster performance, accurate processing and reducing the routine work of accounting and production controlling staff.

Microsoft Visual Basic 5.0 is used for front-end application for this project. The DBMS that we select is Microsoft SQL Server 6.5. In addition, Microsoft Access 97 is used as the tool for developing the prototype interface. Finally, Crystal Report 5.0 is used for generating reports.

Many communication problems exist during the system development. The unclear communication between Japanese manager and the developer team makes misunderstanding in the concept of inventory and formula. The other problems come from the managers who do not really understand the actual operation of their staffs.

Table 6.1. Comparison of Time Using for Operation.

Process	The Existing System	The Proposed System
Input Data	1 minute	1 minute
Search Data	5 minutes / 1 transaction	1 seconds / 1 transaction
Update Data	30 minutes / 1 transaction	30 seconds / 1 transaction
Create Monthly Report	1 hour / 1 commont report	1 minute / 1 report
Montlhy Cost Calculation	1 day	30 minutes

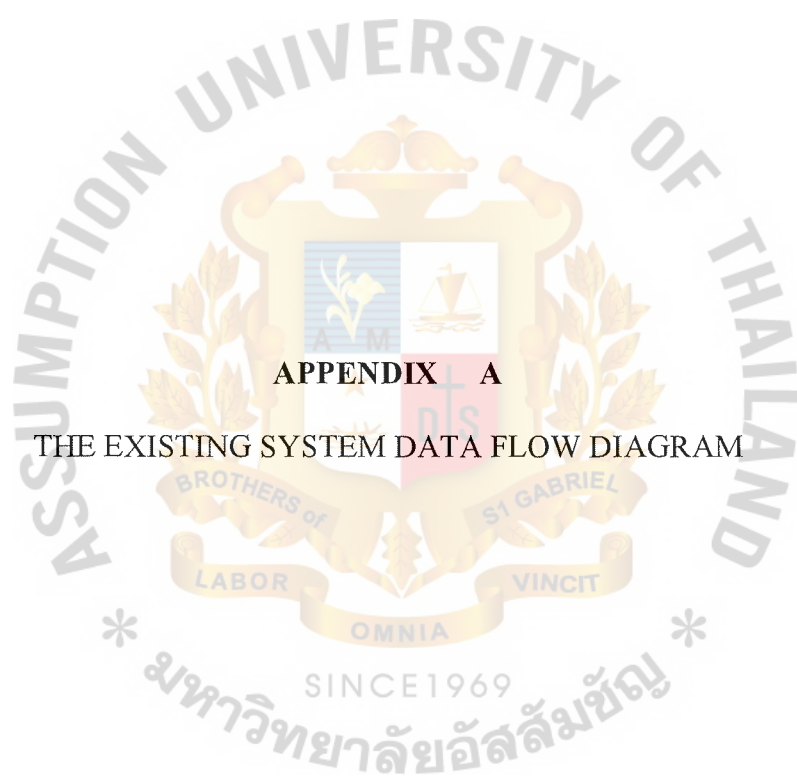


## 6.2 Recommendations

This system will be developed for finding out the cost of each item for Nagayama Co., Ltd. It is developed to be the standard system for being reusable in any company. However, the cost judgement of each company is always different. The formula in the cost calculation module has to be adjusted depending on the company.

Maintenance is a very important part of the post-install phase so that it will be good for persons who have responsibility to maintain the system if the system was developed with the standard method and/or introduce new method that can efficiently control the core objects of the system. By using the concept of system control tables and custom controls, this system will be easier to maintain.

Finally, this system may not be complete for it has still not been actually applied. There always are some conditions that developer, customer or both have never known. This means the requirements and scope of the system may be changed, added or cut out after the implementation.



## APPENDIX A

### THE EXISTING SYSTEM DATA FLOW DIAGRAM

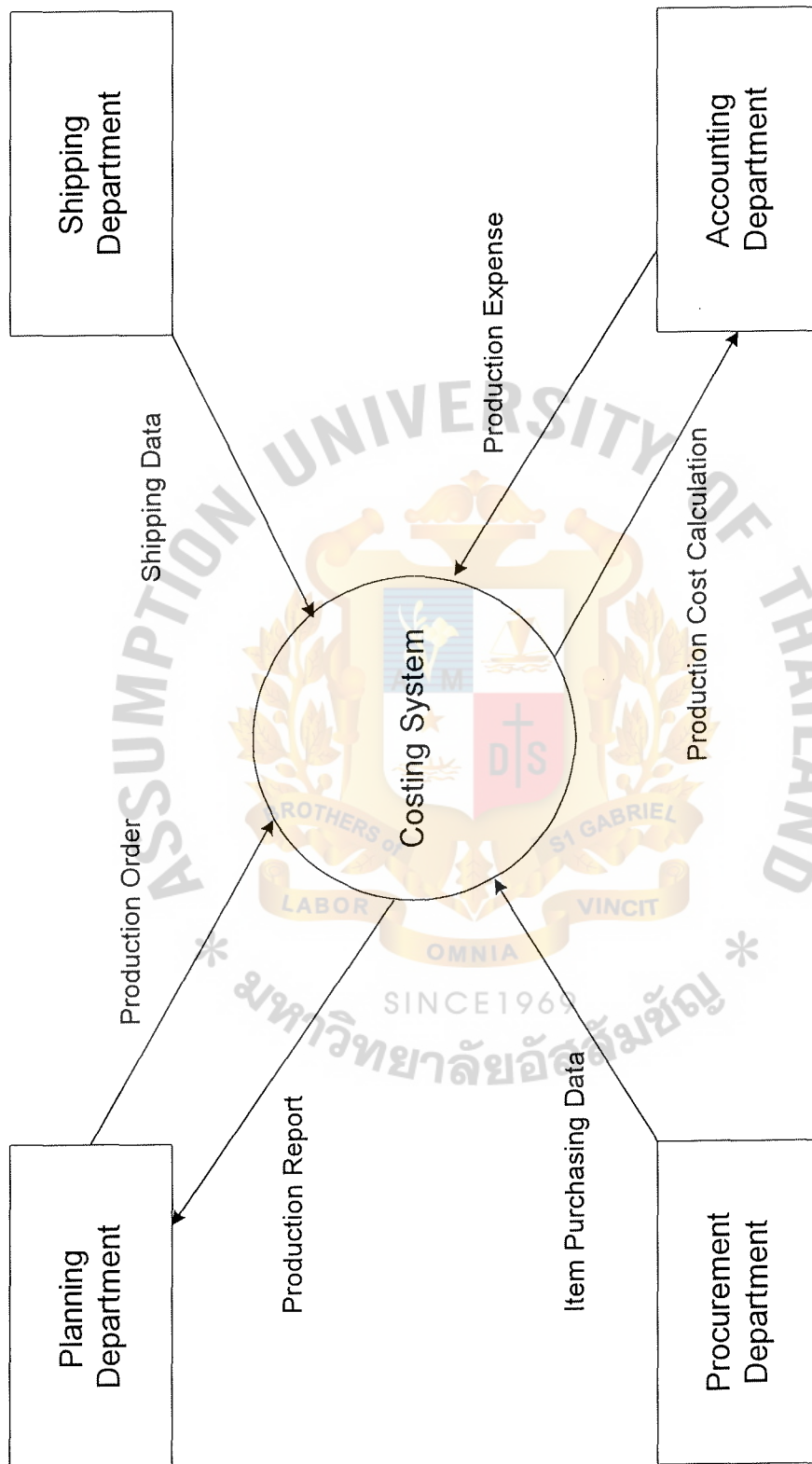


Figure A.1. The Existing System Context Diagram.

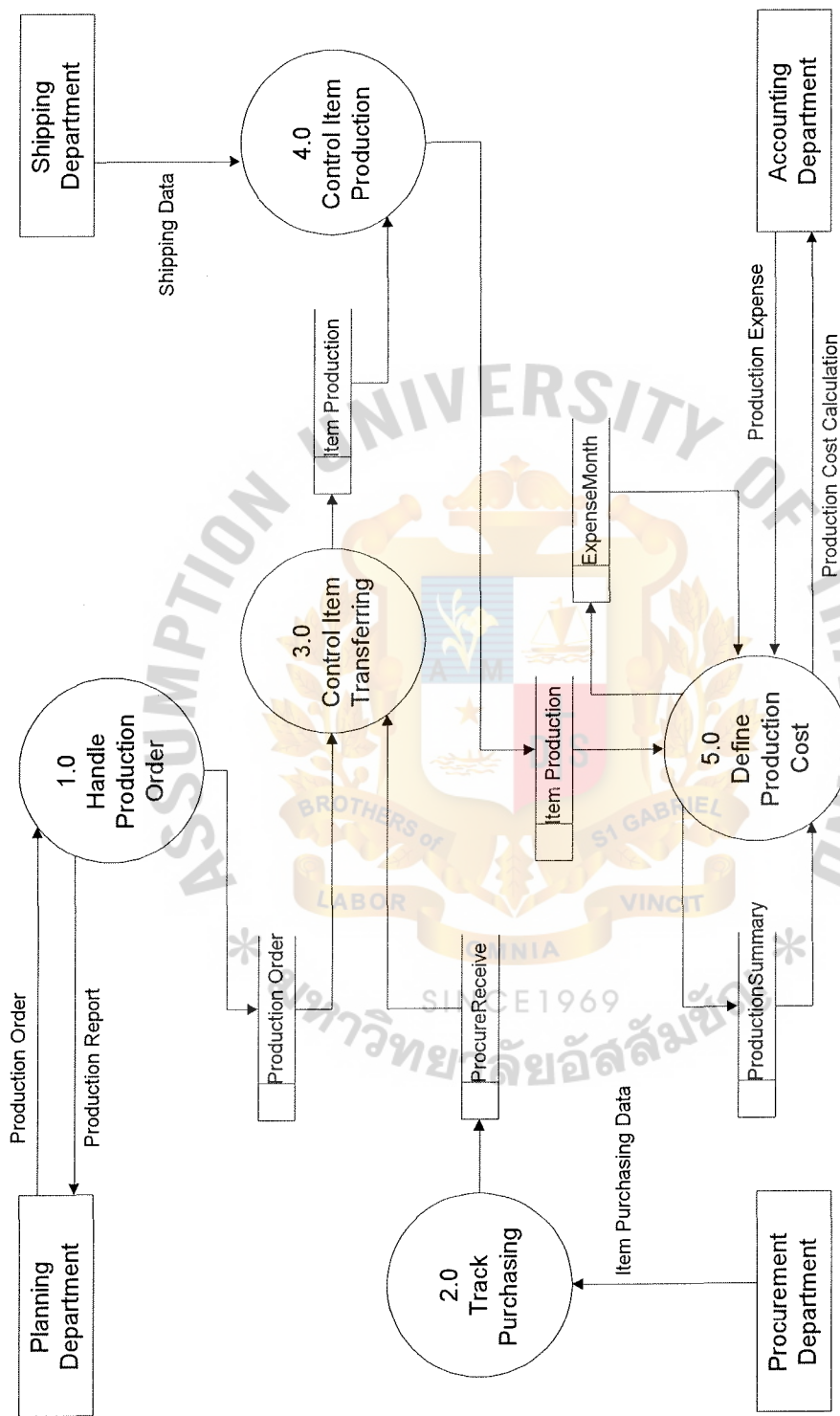


Figure A.2. The Existing System Data Flow Diagram.



## APPENDIX B

THE PROPOSED SYSTEM DATA FLOW DIAGRAM



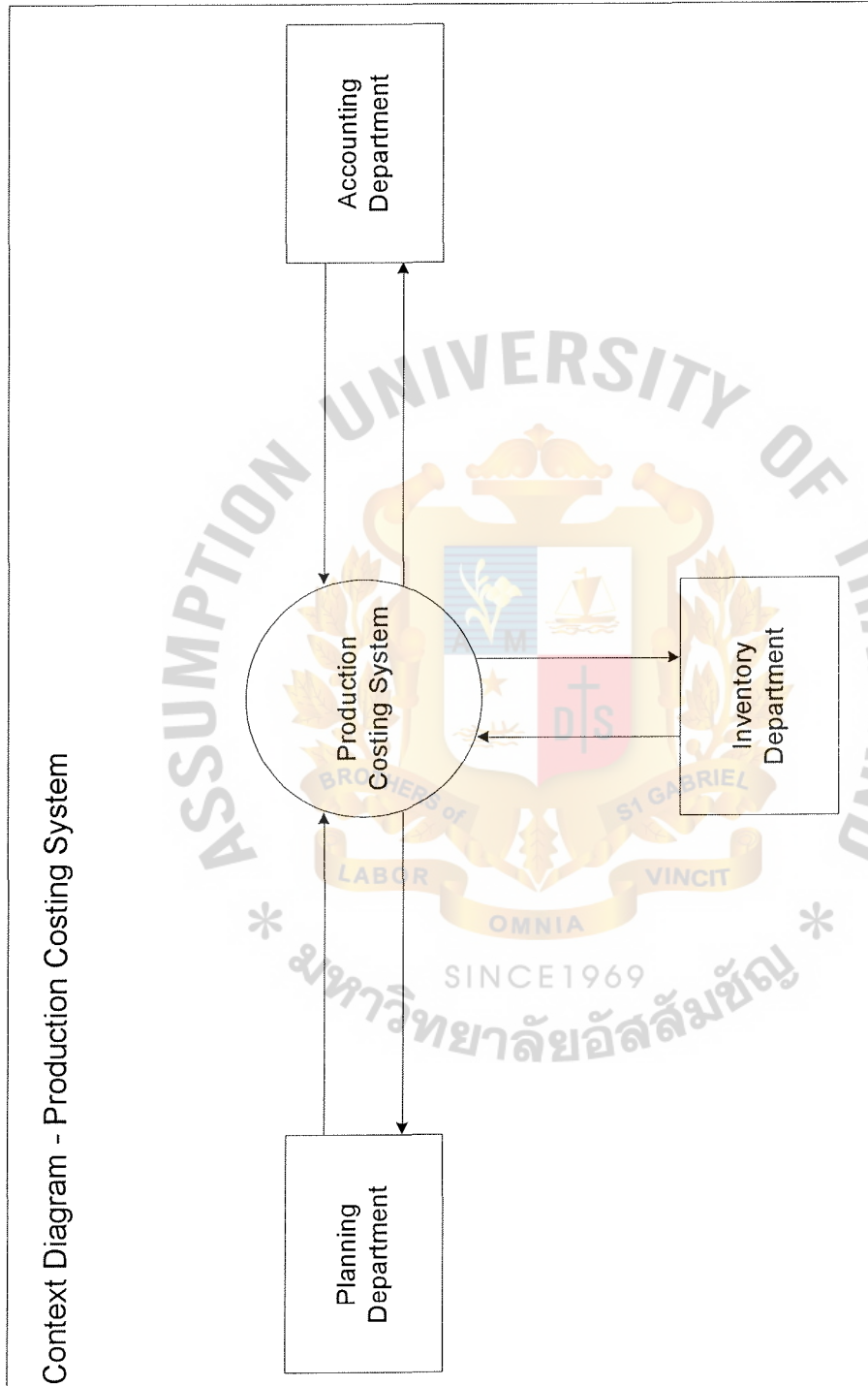


Figure B.1. The Proposed System Context Diagram.

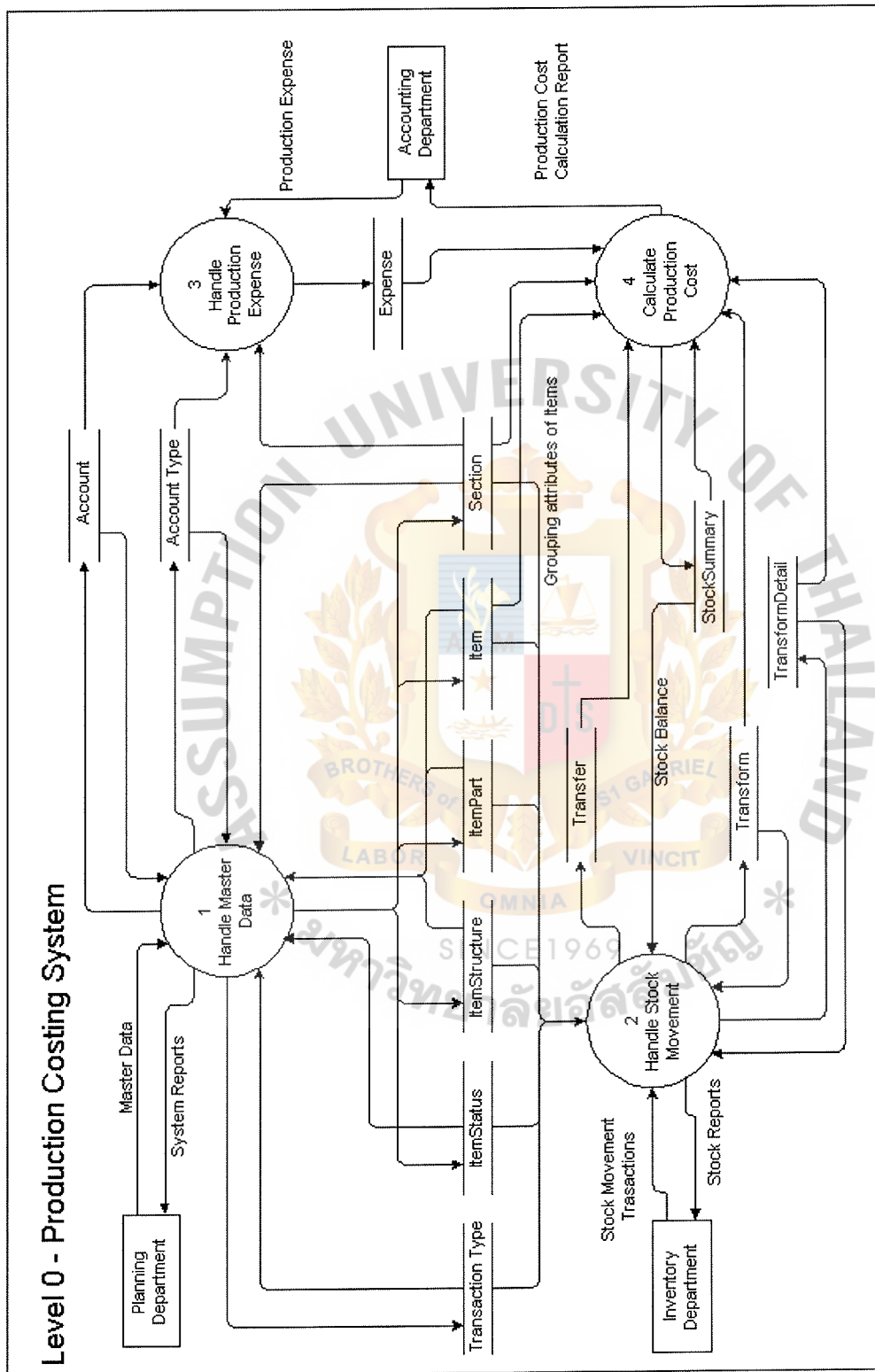


Figure B.2. DFD Level 0 - Production Costing System.

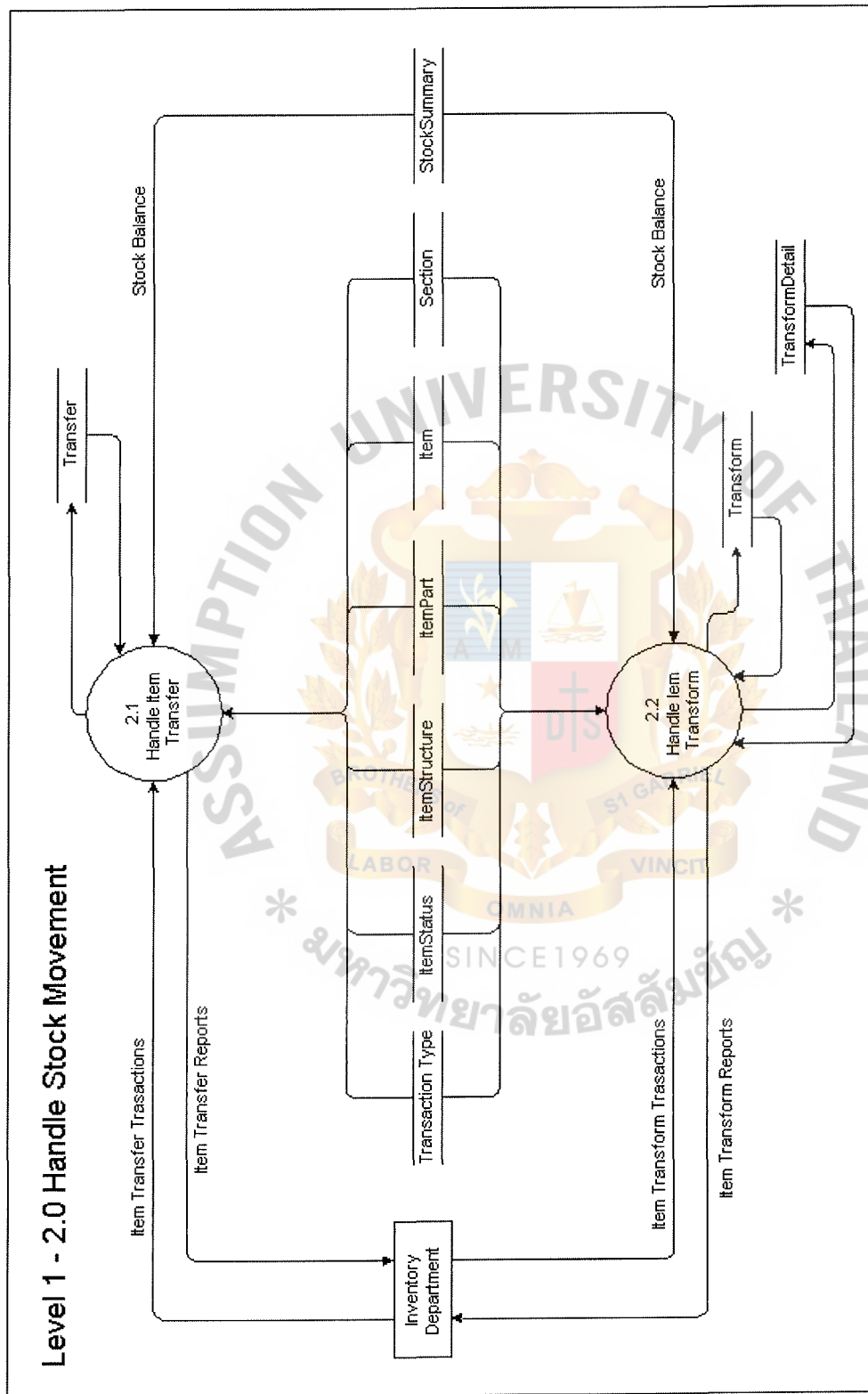


Figure B.3. DFD Level 1 - 2.0 Handle Stock Movement.

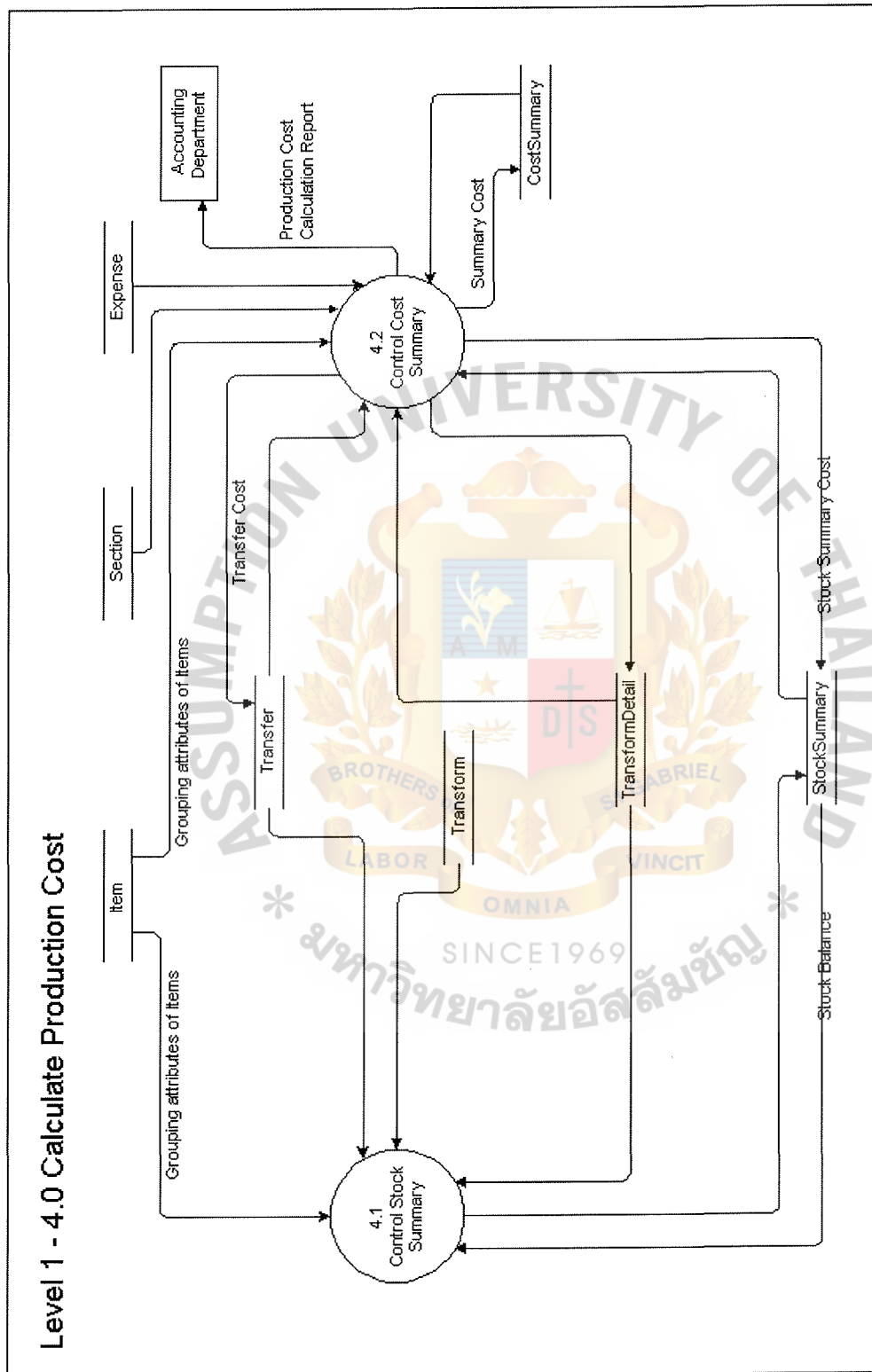


Figure B.4. DFD Level 1 - 4.0 Calculate Production Cost.

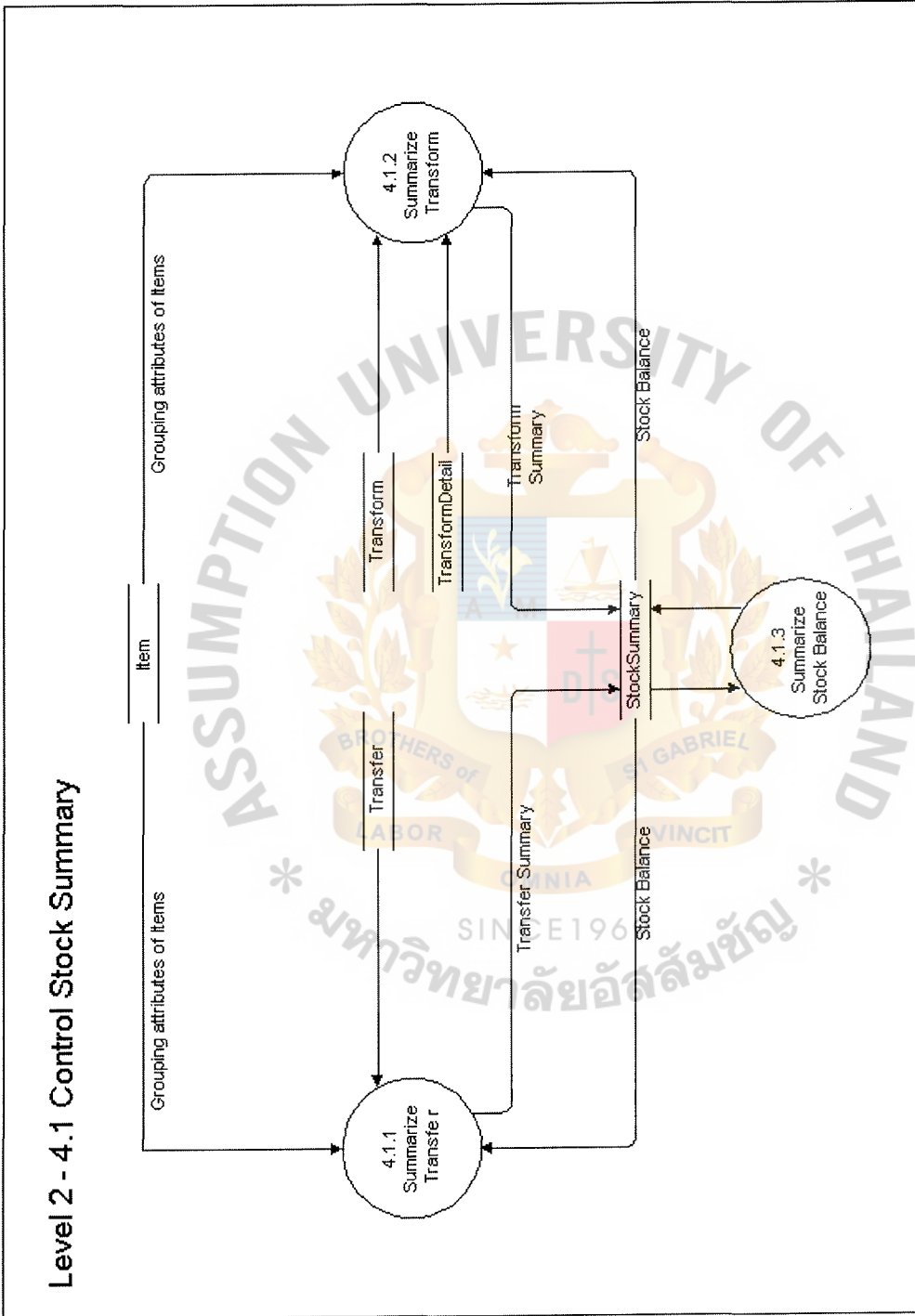


Figure B.5. DFD Level 2 - 4.1 Control Stock Summary.



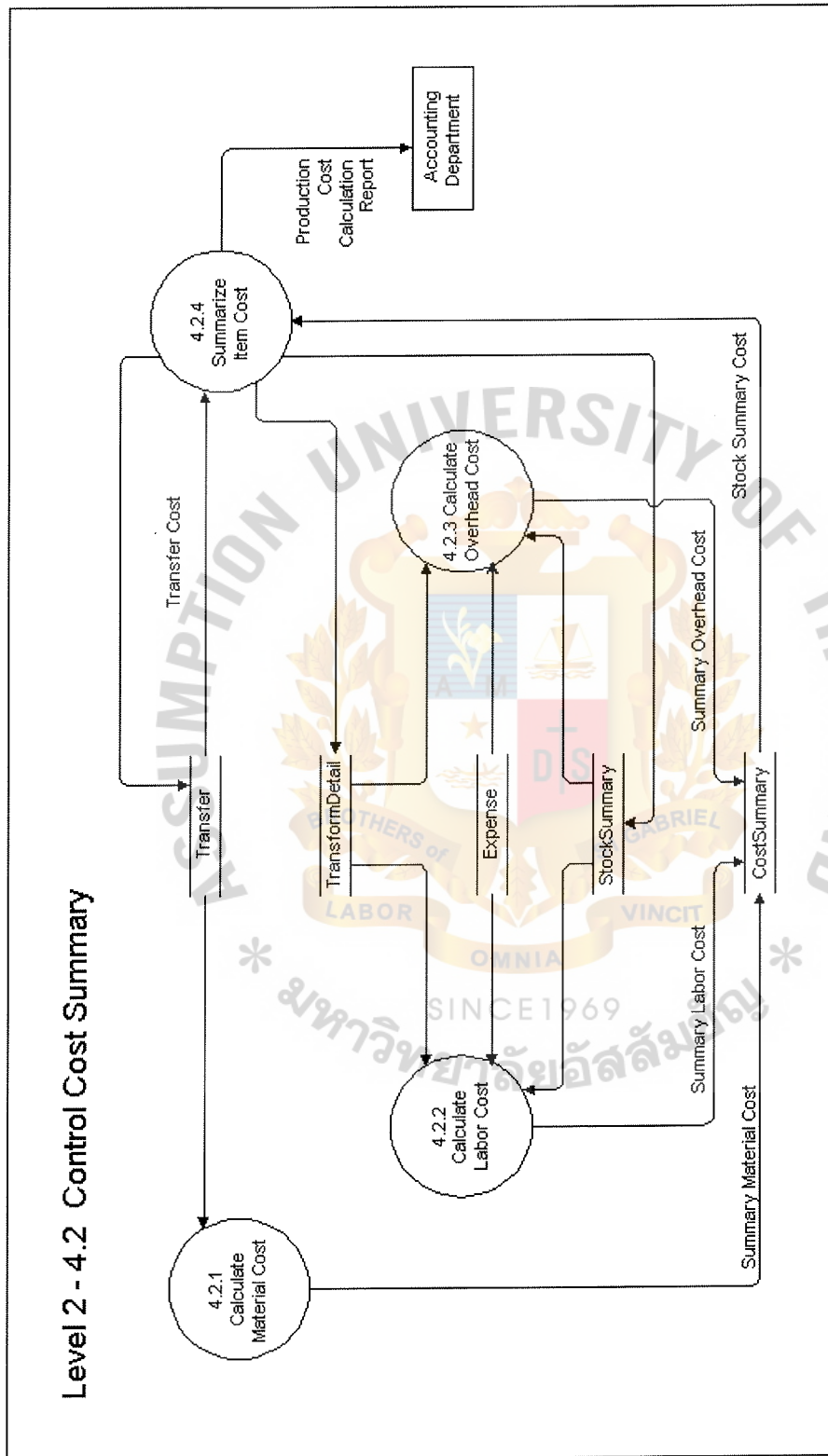
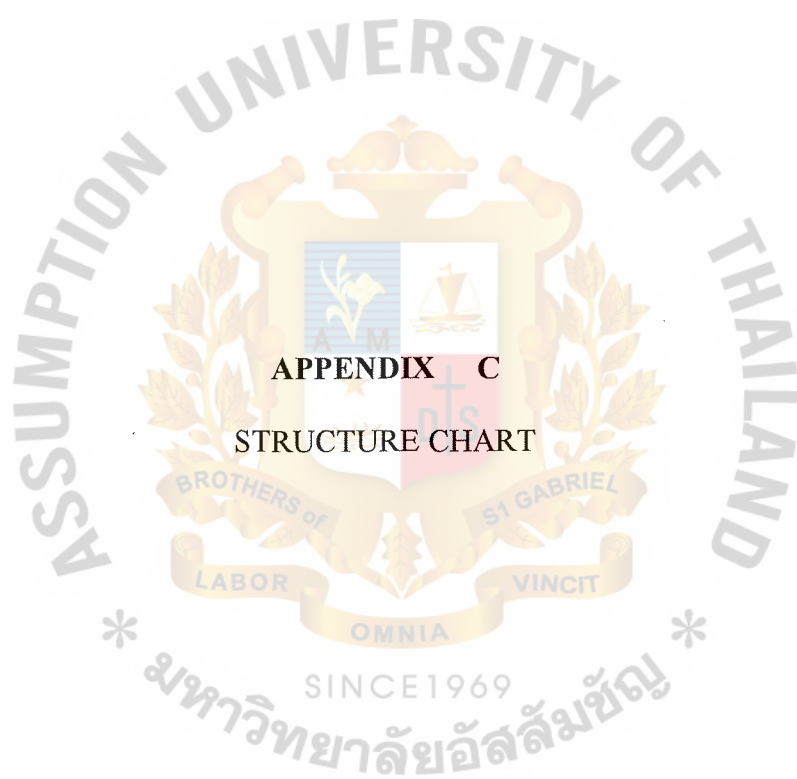


Figure B.6. DFD Level 2 - 4.2 Control Cost Summary.



## APPENDIX C

### STRUCTURE CHART

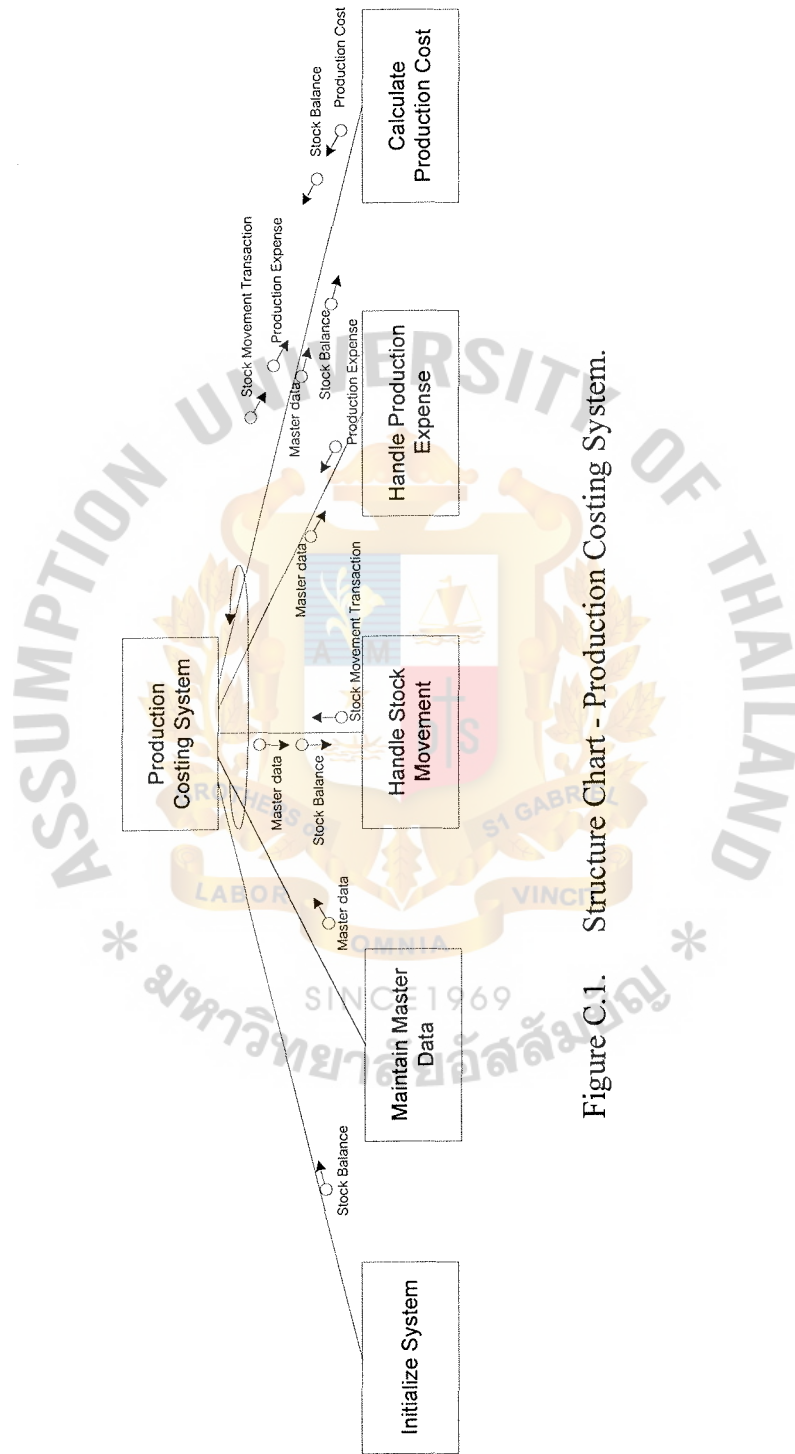


Figure C.1. Structure Chart - Production Costing System.

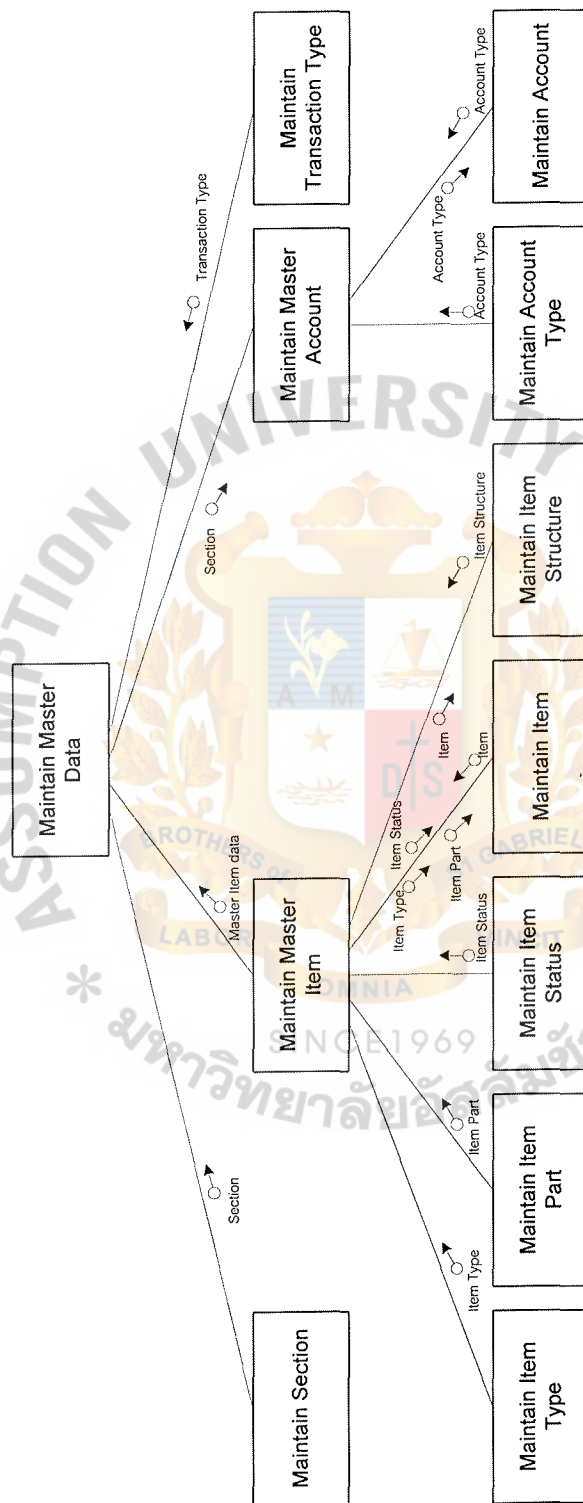


Figure C.2. Structure Chart - Maintain Master Data.

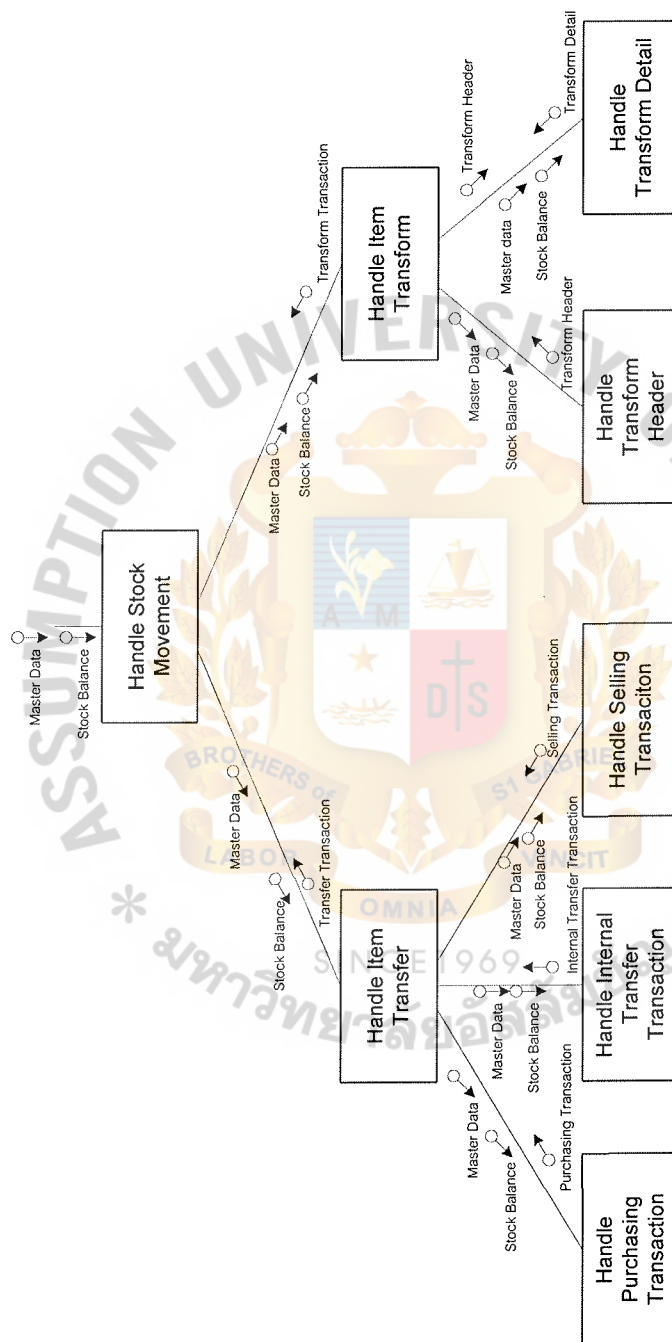


Figure C.3. Structure Chart - Handle Stock Movement.



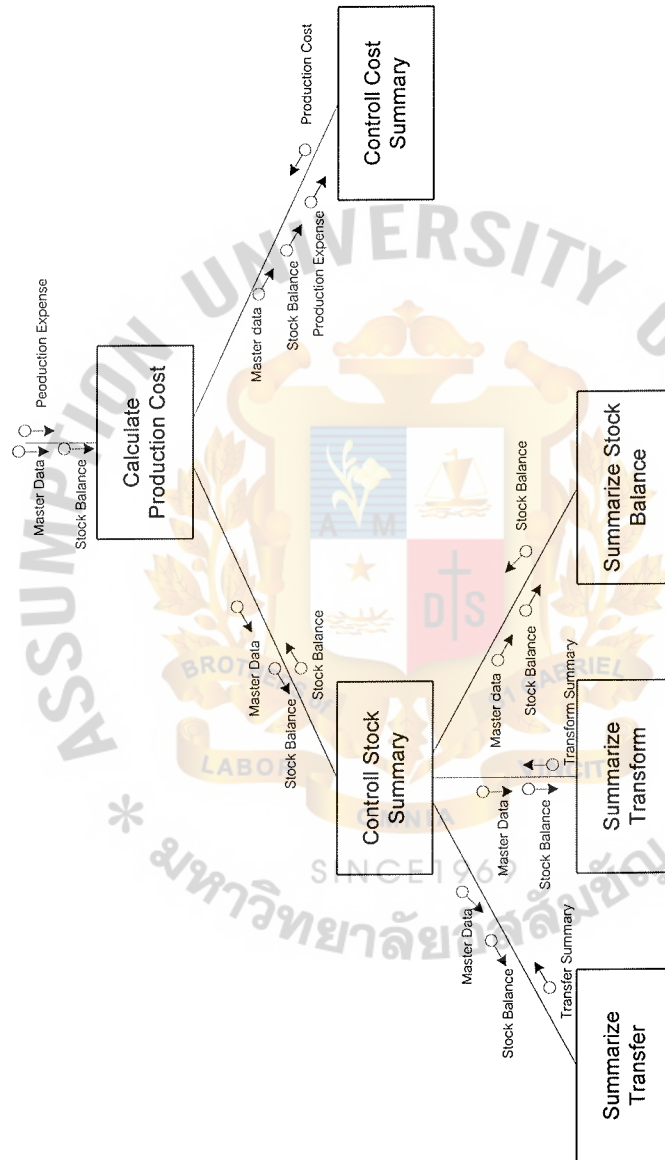


Figure C.4. Structure Chart - Calculate Production Cost.



## APPENDIX D

### PROCESS SPECIFICATION

Table D.1. Process 1.0.0 Maintain Master Data.

Process 1.0.0	Maintain Master Data
Description	<p>The process for maintains the master data that will be used as the foreign keys of the transaction data. The master for this system include the data concerning about Item, Item Type, Item Part, Item Status, Section, Account and Account Type. Some of master data such as Item Type and Transaction Type will maintain by developer, so it will not be include in this process.</p>
Input	<ul style="list-style-type: none"> <li>- Attributes of Items</li> <li>- Attributes of Item Parts</li> <li>- Attributes of Item Structures</li> <li>- Attributes of Item Statuses</li> <li>- Attributes of Sections</li> <li>- Attributes of Accounts</li> <li>- Attributes of Account Types</li> </ul>
Output	<ul style="list-style-type: none"> <li>- Master Items data and reports</li> <li>- Master Item Parts data and reports</li> <li>- Master Item Structures data and reports</li> <li>- Master Item Statuses data and reports</li> <li>- Master Sections data and reports</li> <li>- Master Accounts data and reports</li> <li>- Master Account Types data and reports</li> </ul>

Table D.2. Process 2.0.0 Handle Stock Movement.

Process 2.0.0	Handle Stock Movement
Description	The process for controlling all transactions that will make the stock balance be changed. Two main types of transactions that the system focuses on are Transfer (or can be called “Move”) transactions and Transform (or can be called “Make”) transactions.
Input	- Stock movement transactions
Process	- Handle Item Transfer - Handle Item Transform
Output	- Stock movement transaction reports - Transfer transaction data and reports - Transform transaction data and reports

Table D.3. Process 2.1.0 Handle Item Transfer.

Process 2.1.0	Handle Item Transfer
Description	The process for controlling the transactions of items transferring from one place to another.
Input	<ul style="list-style-type: none"> <li>- Beginning stock balance</li> <li>- Item transfer transactions</li> <li>- Item transform transactions</li> </ul>
Process	<p>Gather data of item transfer transactions with checking the stock quantity validation. The source place cannot be the same as the destination place which is set up for this process. The validation is controlled by the beginning stock balance plus or minus the recorded transfer transactions and transform transactions during the period and the recording transaction. The result of this calculation cannot be less than zero. If it is less than zero, the recording transaction will be cancelled.</p>
Output	<ul style="list-style-type: none"> <li>- Transfer transaction data and reports</li> <li>- Ending stock balance</li> </ul>



Table D.4. Process 2.2.0 Handle Item Transform.

Process 2.2.0	Handle Item Transform
Description	The process for controlling the transactions of item transforming from some item(s) to be other item(s) in the same place.
Input	<ul style="list-style-type: none"> <li>- Item transform transactions</li> <li>- Item Structure</li> <li>- Beginning stock balance</li> <li>- Item transfer transactions</li> </ul>
Process	<p>Gather data of item transform transactions with checking the stock quantity validation. The items whose input must be related to each other within two cases. The first case is that the items were related as recorded in the item structure table. The second case is that the input and output items are the same items but are changed in status. The validation is controlled by the beginning stock balance plus or minus the recorded transfer transactions and transform transactions during the period and the recording transaction. The result of this calculation cannot be less than zero. If it is less than zero, the recording transaction will be cancelled.</p>
Output	<ul style="list-style-type: none"> <li>- Transform transaction data and reports</li> <li>- Ending stock balance</li> </ul>

Table D.5. Process 3.0.0 Handle Production Expense.

Process 3.0.0	Handle Production Expense
Description	The process for controlling the expenses of production that will include as cost of items.
Input	- Production expenses transactions
Process	The simple operation will be done by just receiving the expenses and keeping into the expense table for being executed in the next process.
Output	- Production expenses data and reports

Table D.6. Process 4.0.0 Calculate Production Cost.

Process 4.0.0	Calculate Production Cost
Description	The process for calculating the cost of each items from gather all related cost from the stock movement transaction and production expenses.
Input	<ul style="list-style-type: none"> <li>- Beginning cost balance</li> <li>- Cost form Transfer Transaction</li> <li>- Cost from Transform Transaction</li> <li>- Cost from Production expenses transactions</li> </ul>
Process	<ul style="list-style-type: none"> <li>- Control Stock Summary</li> <li>- * Control Cost Summary *</li> </ul>
Output	<ul style="list-style-type: none"> <li>- Production expenses data and reports</li> <li>- Ending cost balance</li> <li>- Summary of production cost</li> </ul>

Table D.7. Process 4.1.0 Control Stock Summary.

Process 4.1.0	Control Stock Summary
Description	The process for controlling the summary of item stock quantity in each place. This summarized data can be gathered from the stock movement transactions. The summarized data will help in fast calculation for the summarize reports and data validation during the real-time process.
Input	<ul style="list-style-type: none"> <li>- Beginning stock balance</li> <li>- Transform transactions</li> <li>- Transfer transactions</li> </ul>
Process	<ul style="list-style-type: none"> <li>- Summarize Transfer</li> <li>- Summarize Transform</li> <li>- Summarize Stock Balance</li> </ul>
Output	<ul style="list-style-type: none"> <li>- Ending stock balance</li> <li>- Stock summary data and reports</li> </ul>

Table D.8. Process 4.1.1 Summarize Transfer.

Process 4.1.1	Summarize Transfer
Description	The process for summarize the stock movement occurred from transfer transaction for easy to track the movement of cost of each item through the flow of the operation. These data also help in ease of showing the summarized report without recalculating the bulk of the data.
Input	<ul style="list-style-type: none"> <li>- Beginning stock balance</li> <li>- Transfer transactions</li> </ul>
Process	The summation of all transfer transactions during the period will be found out for the summary of each transaction types.
Output	<ul style="list-style-type: none"> <li>- Transfer summary data and reports</li> </ul>



Table D.9. Process 4.1.2 Summarize Transform.

Process 4.1.2	Summarize Transform
Description	The process for summarizing the stock movement occurred from transform transaction for ease of tracking the value added cost of each item through the conversion process. These data also help with the ease of showing the summarized report without recalculating the bulk of data.
Input	<ul style="list-style-type: none"> <li>- Beginning stock balance</li> <li>- Transform transactions</li> </ul>
Process	The summation of all transform transactions during the period will be found for the summary of each transaction type.
Output	<ul style="list-style-type: none"> <li>- Transform summary data and reports</li> </ul>

Table D.10. Process 4.1.3 Summarize Stock Balance.

Process 4.1.3	Summarize Stock Balance
Description	The process for summarizing the ending stock quantity of each item in each place calculated from the summary of transfer and transform transactions.
Input	<ul style="list-style-type: none"> <li>- Beginning stock balance</li> <li>- Transfer summary</li> <li>- Transform summary</li> </ul>
Process	The beginning stock balance at the begin of the current period will be added with the summarized data of both transfer and transform transactions during the period for finding out the ending stock balance of each item.
Output	<ul style="list-style-type: none"> <li>- Ending stock balance data and reports</li> </ul>

Table D.11. Process 4.2.0 Control Cost Summary.

Process 4.2.0	Control Cost Summary
Description	The process for controlling the summary of item cost. This summarized data can be gathered from the stock movement transactions and production expenses, and then take them to calculate for finding out the cost of each item. The summarized data will help in fast calculation for summary reports.
Input	<ul style="list-style-type: none"> <li>- Beginning cost balance</li> <li>- Summarized transform transactions</li> <li>- Summarized transfer transactions</li> </ul>
Process	All summarized data will be gathered for calculating the production cost of each items by the formula that is set by the organization. In this case, Nagayama uses the average cost method. So that after finding out the average cost of each item, these cost will also be summarized together with the prepared data of the summary that still has only the quantity.
Output	<ul style="list-style-type: none"> <li>- Ending cost balance</li> <li>- Cost summary data and reports</li> </ul>



## APPENDIX E

### ENTITY-RELATIONSHIP DIAGRAM

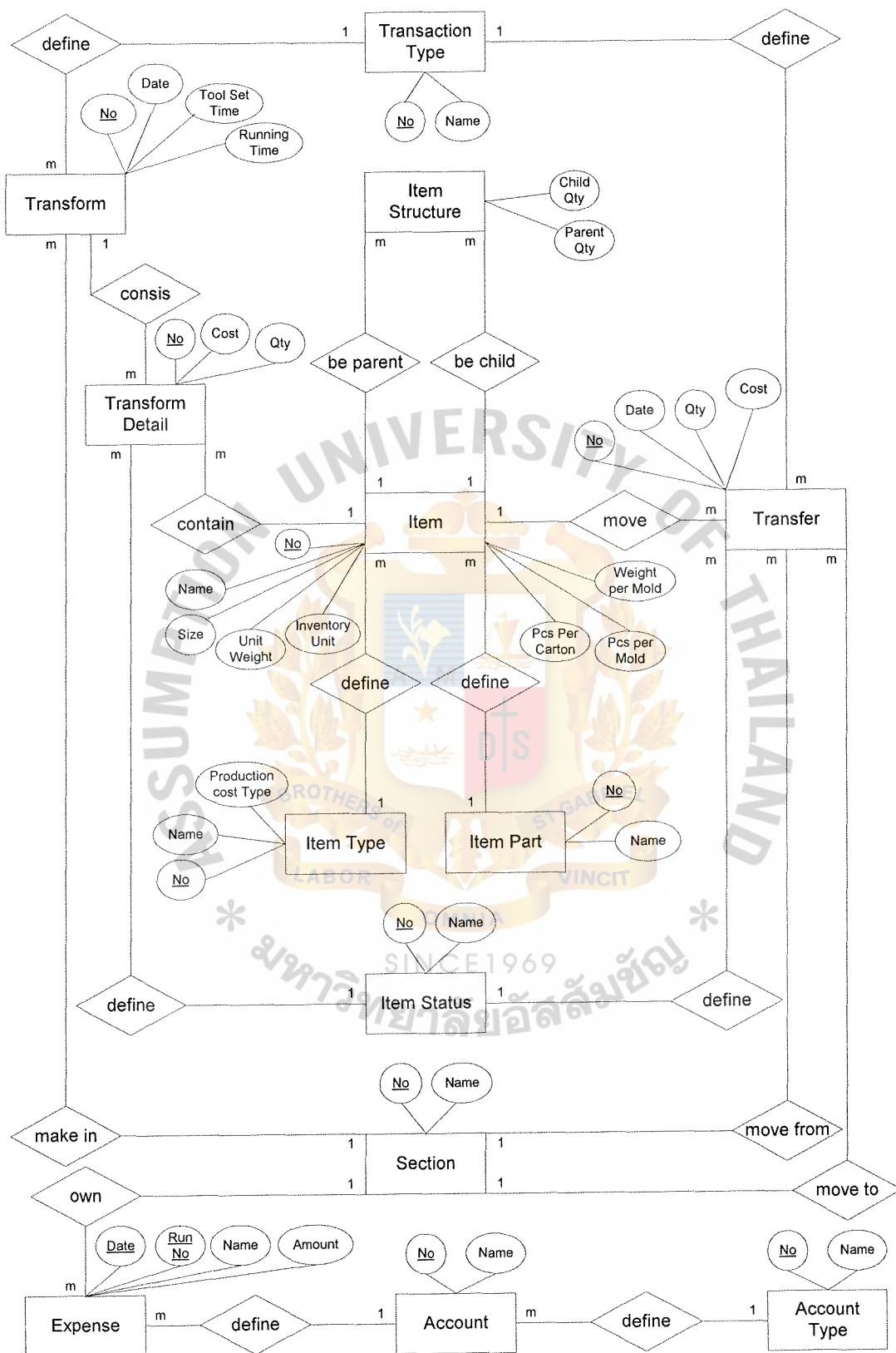


Figure E.1. Entity-Relationship Diagram.





Table F.1. Table Account.

Key	Field Name	Data Type	Size	Description
*	AccountNo	Long	4	Code of Account No
	AccountName	Text	40	Name of each Account No
	AccountTypeNo	Byte	1	Code of Type of Account No
	AccountNote	Text	255	Remark
	DeleteFlag	Byte	1	Whether the Account No is canceled from the current operation

Table F.2. Table AccountType.

Key	Field Name	Data Type	Size	Description
*	AccountTypeNo	Byte	1	Code of Type of Account Type
	AccountTypeName	Text	20	Name of Account Type
	AccountTypeNote	Text	255	Remark
	DeleteFlag	Byte	1	Whether the Account Type is canceled from the current operation

Table F.3. Table CostItemSummary.

Key	Field Name	Data Type	Size	Description
*	CostSummaryDate	Date	8	Date of making the summary of cost calculation
*	SectionNo	Byte	1	Code of Section
*	ItemStatusNo	Byte	1	Code of Status of Item
	TotalItemWeight	Double	8	Total weight of produced item in a section within the month
	TotalMaterialCost	Double	8	Total material cost of produced item in a section within the month
	TotalLaborCost	Double	8	Total labor cost of produced item in a section within the month
	TotalOverHeadCost	Double	8	Total overhead cost of produced item in a section within the month
	CostPerTime	Double	8	Cost of operation per a second of time in produce the item
	CostPerWeight	Double	8	Cost item averaged by weight of the item

Table F.4. Table CostSectionSummary.

Key	Field Name	Data Type	Size	Description
*	CostSummaryDate	Date	8	Date of making the summary of cost calculation
*	SectionNo	Byte	1	Code of Section
	TotalItemWeight	Double	8	Total weight of produced item in a section within the month
	TotalMaterialCost	Double	8	Total material cost of produced item in a section in the month
	TotalLaborCost	Double	8	Total labor cost of produced item in a section in the month
	TotalOverHeadCost	Double	8	Total overhead cost of produced item in a section in the month
	CostPerTime	Double	8	Cost of operation per a second of time in produce the item
	CostPerWeight	Double	8	Cost item averaged by weight of the item

Table F.5. Table Expense.

Key	Field Name	Data Type	Size	Description
*	ExpenseDate	Date	8	Date of Expense Transaction
*	AccountNo	Long	4	Account No of Expense Transaction
*	RunNo	Byte	1	Running No of Expense Transaction
	ExpenseName	Text	40	Description of Expense Transaction
	SectionNo	Byte	1	Section that be owner of the Expense
	ExpenseAmount	Currency	8	Amount of Expense
	ExpenseNote	Text	255	Remark



Table F.6. Table Item.

Key	Field Name	Data Type	Size	Description
*	ItemNo	Text	15	Code of Item
	ItemName	Text	40	Name of Item
	ItemTypeNo	Byte	1	Type of Item
	ItemPartNo	Byte	1	The Item which is Part of the Finish Goods
	Size	Text	10	Alpha-Numeric data that indicate size/dimension of Item
	UnitWeight	Single	4	Numeric data that indicate weight per one Inventory unit
	InventoryUnit	Text	10	Name of unit that hold in the inventory and production
	PcsPerCarton	Long	4	Number of pieces that can contain in one carton (for some items)
	PcsPerMold	Byte	1	Number of pieces that can be produced from one mold (for casting items)

Table F.7. Table Item (Continue).

Key	Field Name	Data Type	Size	Description
	WeightPerMold	Single	4	Number of weight of material will be used in one mold (for casting items)
	ItemNote	Text	255	Remark
	DeleteFlag	Byte	1	Whether the Item is canceled from the current operation

Table F.8. Table ItemPart.

Key	Field Name	Data Type	Size	Description
*	ItemPartNo	Byte	1	Code of Component Part of the Finish Goods
	ItemPartName	Text	20	Name of Component Part of the Finish Goods
	ItemPartNote	Text	255	Remark
	DeleteFlag	Byte	1	Whether the Part is canceled from the current operation

Table F.9. Table ItemStatus.

Key	Field Name	Data Type	Size	Description
*	ItemStatusNo	Byte	1	Code of Status of Item
	ItemStatusName	Text	50	Description of Status of Item
	ItemStatusNote	Text	255	Remark
	DeleteFlag	Byte	1	Whether the Status is canceled from the current operation

Table F.10. Table ItemStructure.

Key	Field Name	Data Type	Size	Description
*	ItemNo	Text	15	Parent/Output Item
*	ItemMaterialNo	Text	15	Child/Material/Input Item
	ItemQty	Long	4	Number of unit that Parent/Output Item will get from production
	ItemMaterialQty	Long	4	Number of unit that Child/Material/Input Item will be used for the production
	DeleteFlag	Byte	1	Whether the Structure Formula is canceled from the current operation

Table F.11. Table ItemType.

Key	Field Name	Data Type	Size	Description
*	ItemTypeNo	Byte	1	Code of Type of Item
	ItemTypeName	Text	40	Name of Type of Item
	ProductionCostType	Byte	1	How Production Cost will be calculated
	ItemTypeNote	Text	255	Remark
	DeleteFlag	Byte	1	Whether the Item Type is canceled from the current operation

Table F.12. Table Section.

Key	Field Name	Data Type	Size	Description
*	SectionNo	Byte	1	Code of Section
	SectionName	Text	30	Name of Section
	SectionNote	Text	255	Remark
	DeleteFlag	Byte	1	Whether the Section is canceled from the current operation
	CanUpdate	Byte	1	Whether the Section can is updated by the user

Table F.13. Table StockSummary.

Key	Field Name	Data Type	Size	Description
*	SummaryDate	Date	8	Date of making the summary of Inventory
*	SectionNo	Byte	1	Code of Section
*	ItemNo	Text	15	Code of Item
*	ItemStatusNo	Byte	1	Code of Item Status
	TransferInQty	Double	8	Total quantity of item that is transferred into a section within the month
	TransferInCost	Double	8	Total cost of item that is transferred into a section within the month
	TransferOutQty	Double	8	Total quantity of item that is transferred out from a section within the month
	TransferOutCost	Double	8	Total cost of item that is transferred out from a section within the month



Table F.14. Table StockSummary (Continue).

Key	Field Name	Data Type	Size	Description
	InputQty	Double	8	Total quantity of item that is transferred in or are made in a section within the month
	InputCost	Double	8	Total cost of item that is transferred in or are made in a section within the month
	OutputQty	Double	8	Total quantity of item that is transferred out or are used for production in a section within the month
	OutputCost	Double	8	Total cost of item that is transferred out or are used for production in a section within the month
	AdjustQty	Double	8	The adjusted quantity
	AdjustCost	Double	8	The adjusted cost
	ToolSetTime	Double	8	Time used in setting machine and material for production
	RunningTime	Double	8	Time used during the production process

Table F.15. Table SystemControl.

Key	Field Name	Data Type	Size	Description
*	SystemControlName	Text	30	Name of System Control Parameter
	SystemControlValue	Text	30	Value of System Control Parameter

Table F.16. Table TransactionType.

Key	Field Name	Data Type	Size	Description
*	TransactionTypeNo	Byte	1	Code of Type of Transaction
	TransactionTypeName	Text	30	Description of Type of Transaction
	TransactionTypeNote	Text	255	Remark
	DeleteFlag	Byte	1	Whether the Transfer Type is canceled from the current operation

Table F.17. Table Transfer.

Key	Field Name	Data Type	Size	Description
*	TransferNo	Text	12	Code of Transfer Transaction
	TransferDate	Date	8	Date of Transfer Transaction
	TransactionTypeNo	Byte	1	Type of Transfer Transaction
	ItemNo	Text	15	Code of Item that is transferred
	ItemStatusNo	Byte	1	Status of Item that is transferred
	FromSectionNo	Byte	1	Item is transferred from which Section
	ToSectionNo	Byte	1	Item is transferred to which Section
	TransferItemQty	Double	8	Number of Item that is transferred
	TransferItemCost	Double	8	Cost of Item that is transferred
	TransferNote	Text	50	Remark

Table F.18. Table Transform.

Key	Field Name	Data Type	Size	Description
*	TransformNo	Long	4	Code of Transform Transaction
	TransformDate	Date	8	Date of Transform Transaction
	TransactionTypeNo	Byte	1	Type of Transfer Transaction
	SectionNo	Byte	1	Section that Transform Transaction is occurred
	ToolSetTime	Double	8	Time used in setting machine and material for production
	RunningTime	Double	8	Time used during the production process

Table F.19. Table TransformDetail.

Key	Field Name	Data Type	Size	Description
*	TransferormNo	Long	4	Code of Transform Transaction
*	ItemNo	Text	15	Input/Output Item from production process
*	ItemStatusNo	Byte	1	Status of Item
	TransformItemQty	Double	8	Number of Item changed from the production process
	TransformItemCost	Long	4	Cost of Item changed from the production process





**APPENDIX G**  
**DATA DICTIONARY**

Table G.1. Data Dictionary.

Object Name	Object Type	Description
Account	Data Store	*Account code bases on Accounting concept* =AccountNo + AccountName + AccountTypeNo + AccountNote + DeleteFlag
AccountName	Field	*Name of each Account No* =0{Character}40
AccountNo	Field	*Account No of Expense Transaction* =5{Number}5
AccountNote	Field	*Remark of Account* =0{Character}255
AccountType	Data Store	*Type of account concerning with cost* =AccountTypeNo + AccountTypeName + AccountTypeNote+ DeleteFlag
AccountTypeName *	Field	*Name of Account Type* =0{Character}20
AccountTypeNo	Field	*Code of Type of Account No* =1{Number}1
AccountTypeNote	Field	*Remark of Account Type* =0{Character}255

Table G.2. Data Dictionary (Continue).

Object Name	Object Type	Description
AdjustCost	Field	*The adjusted cost* =Number
AdjustQty	Field	*The adjusted quantity* =Number
Calculate Production Cost	Data Process	*The process for calculating the cost of each items from gathering all related costs from the stock movement transaction and production expenses*
CanUpdate	Field	*Whether the Section can be updated by user* =Boolean
Character	Data Type	** =["a-z" "A-Z" "0-9" Symbol]
Controll Cost Summary	*Data Process	*The process for controlling the summary of item cost. This summarized data can be gathered from the stock movement transactions and production expenses, and then take to calculate for finding out the cost of each item. The summarized data will help in fast calculation for summary reports*

Table G.3. Data Dictionary (Continue).

Object Name	Object Type	Description
CostItemSummary	Data Store	<p>*Monthly summary data of cost of each item*</p> <p>=CostSummaryDate + SectionNo + ItemStatusNo + TotalItemWeight + TotalMaterialCost + TotalLaborCost + TotalOverHeadCost + CostPerTime + CostPerWeight</p>
CostPerTime	Field	<p>*Cost of operation per one second of time in producing the item*</p> <p>=Number</p>
CostPerWeight	Field	<p>*Cost item averaged by weight of the item*</p> <p>=Number</p>
CostSectionSummary	Data Store	<p>*Monthly summary data of cost of each section*</p> <p>= CostSummaryDate + SectionNo + TotalItemWeight + TotalMaterialCost + TotalLaborCost + TotalOverHeadCost + CostPerTime</p>
CostSummaryDate	Field	<p>*Date of making the summary of cost calculation*</p> <p>=Date</p>

Table G.4. Data Dictionary (Continue).

Object Name	Object Type	Description
Currency	Data Type	*Number with not exceed 4 digits after decimal point*
Date	Data Type	** =dd/mm/yyyy
DeleteFlag	Field	*Whether the Account No is canceled from the current operation* =Boolean
Expense	Data Store	*Expenses from any activities of the firm* = ExpenseDate + AccountNo + RunNo ExpenseName + SectionNo + ExpenseAmount + ExpenseNote
ExpenseAmount	Field	*Amount of Expense* =Number
ExpenseDate	Field	*Date of Expense Transaction* =Date
ExpenseName	Field	*Description of Expense Transaction* =0{Character}40
ExpenseNote	Field	*Remark Expense* =0{Character}255



Table G.5. Data Dictionary (Continue).

Object Name	Object Type	Description
FromSectionNo	Field	*Item transferred from which Section* =Number
Handle Item Transfer	Data Process	*The process for controlling the transactions of item transferred from one place to another*
Handle Item Transform	Data Process	*The process for controlling the transactions of item transformed from some item(s) to be other item(s) in the same place*
Handle Production Expense	Data Process	*The process for controlling the expenses of production that will be included as cost of items*
Handle Stock Movement	Data Process	*The process for controlling all transactions that will make the stock balance changed. Two main types of transactions that the system focuses on are Transfer (or can be called “Move”) transactions and Transform (or can be called “Make”) transactions*
InputCost	Field	*Total cost of item transferred or are made in a section within the month* =Currency

Table G.6. Data Dictionary (Continue).

Object Name	Object Type	Description
InputQty	Field	*Total quantity of item transferred in or are made in a section within the month*  =Number
InventoryUnit	Field	*Name of unit held in the inventory and production*  =0{Character}10
Item	Data Store	*The controlled item in the system*  = ItemNo + ItemName + ItemTypeNo + ItemPartNo + Size + UnitWeight + InventoryUnit + PcsPerCarton + PcsPerMold + WeightPerMold + ItemNote + DeleteFlag
ItemMaterialNo	Field	*Child/Material/Input Item*  =0{Character}15
ItemMaterialQty	Field	*Number of unit that Child/Material/Input Item will be used for the production*  =Number
ItemName	Field	*Name of Item*  =0{Character}40
ItemNo	Field	*Code of Item*  =0{Character}15

Table G.7. Data Dictionary (Continue).

Object Name	Object Type	Description
ItemNote	Field	*Remark of Item* =0{Character}255
ItemPart	Data Store	*Group of part that identify what the component is that each item as in finished goods* = ItemPartNo + ItemPartName + ItemPartNote + DeleteFlag
ItemPartName	Field	*Name of Component Part of Finish Goods* =0{Character}20
ItemPartNo	Field	*Code of Component Part of Finish Goods* =Number
ItemPartNote	Field	*Remark of Item Part* =0{Character}255
ItemQty	Field	*Number of unit that Parent/Output Item will get from production* =Number
ItemStatus	Data Store	*Status of Item* = ItemStatusNo + ItemStatusName + ItemStatusNote + DeleteFlag

Table G.8. Data Dictionary (Continue).

Object Name	Object Type	Description
ItemStatusName	Field	*Description of Status of Item* =0{Character}50
ItemStatusNo	Field	*Code of Status of Item* =Number
ItemStatusNote	Field	*Remark of Item Status* =0{Character}255
ItemStructure	Data Store	*Hierarchical structures of items composed to be a finished goods* = ItemNo + ItemMaterialNo + ItemQty + ItemMaterialQty + DeleteFlag
ItemType	Data Store	*Types of item concerning with source of item* = ItemTypeNo + ItemTypeName + ProductionCostType + ItemTypeNote + DeleteFlag
ItemTypeName	Field	*Name of Type of Item* =0{Character}40
ItemTypeNo	Field	*Code of Type of Item* =Number

Table G.9. Data Dictionary (Continue).

Object Name	Object Type	Description
ItemTypeNote	Field	*Remark* =0{Character}255
Maintain Master Data	Data Process	*The process for maintaining the master data that will be used as the foreign keys of the transaction data. The master for this system includes the data concerning Item, Item Type, Item Part, Item Status, Section, Account and Account Type. Some of the master data such as Item Type and Transaction Type will be maintained by the developer*
Master Data	Data Flow	*Data of the facts that represent the object concerning with the system. In this system, it consists of the data of Item, Item Part, Item Status, Item Type, Item Structure, Section, Account, Account Type and Transaction Type*
Number	Data Type	** =0-9



Table G.10. Data Dictionary (Continue).

Object Name	Object Type	Description
OutputCost	Field	*Total cost of item transferred out or are used for production in a section within the month* =Currency
OutputQty	Field	*Total quantity of item transferred out or are used for production in a section within the month* =Number
PcsPerCarton	Field	*Number of pieces that can be contained in one carton (for some items)* =Number
PcsPerMold	Field	*Number of pieces that can be produced from one mold (for casting items)* =Number
Production Cost Calculation	Data Flow	*Data of result from the production cost calculation process*
Production Expenses	Data Flow	*Data of expenses those occurred and charged as costs of production activities*
ProductionCostType	Field	*How Production Cost will be calculated* =Number

Table G.11. Data Dictionary (Continue).

Object Name	Object Type	Description
RunningTime	Field	*Time used in during the production process* =Number
RunNo	Field	*Running No of Expense Transaction* =Number
Section	Data Store	*The production sections of the firm* = SectionNo + SectionName + SectionNote + DeleteFlag + CanUpdate
SectionName	Field	*Name of Section* =0{Character}30
SectionNo	Field	*Code of Section* =Number
SectionNote	Field	*Remark* =0{Character}255
Size	Field	*Alpha-Numeric data that indicate size/dimension of Item* =0{Character}10
Stock Movement Transaction	Data Flow	*Data of transaction concerning any activities making the quantity of the stock changed*

Table G.12. Data Dictionary (Continue).

Object Name	Object Type	Description
Stock Reports	Data Flow	*Reports showing the data of transaction and status of stock*
Stock Summary Controlling	Data Process	*The process for controlling the summary of item stock quantity in each place. This summary data can be gathered from the stock movement transactions. The summarized data will help to increase speed in calculation for summarized reports and data validation during the real-time process*
StockSummary	Data Store	<p>*Monthly summary of ending stock status of each item in each section*</p> <p>= SummaryDate + SectionNo + ItemNo + ItemStatusNo + TransferInQty + TransferInCost + TransferOutQty + TransferOutCost + InputQty + InputCost + OutputQty + OutputCost + AdjustQty + AdjustCost + ToolSetTime + RunningTime</p>

Table G.13. Data Dictionary (Continue).

Object Name	Object Type	Description
Summarize Stock Balance	Data Process	*The process for summarizing the ending stock quantity of each item in each place calculated from the summary of transfer and transform transactions*
Summarize Transfer	Data Process	*The process for summarizing the stock movement occurred from transfer transaction for easy to track the movement of cost of each item through the flow of operation. These data also help with ease in showing the summarized report without recalculating a bulk of the data*
Summarize Transform	Data Process	*The process for summarizing the stock movement occurred from transform transaction for ease in tracking the value added cost of each item through the conversion process. These data also help in provide ease in showing the summary report without recalculating a bulk of the data*
SummaryDate	Field	* Date of making the summary of Inventory* =Date
System Reports	Data Flow	*Reports those are generated by the system*

Table G.14. Data Dictionary (Continue).

Object Name	Object Type	Description
SystemControl	Data Store	*Constants and variables that used for control the system process* = SystemControlName + SystemControlValue
SystemControlName	Field	*Name of System Control Parameter* =1{Character}30
SystemControlValue	Field	*Value of System Control Parameter* =0{Character}30
ToolSetTime	Field	*Time used in setting machine and material for production* =Number
ToSectionNo	Field	*Item be transferred to which Section* =Number
TotalItemWeight	Field	*Total weight of produced item in a section within the month* =Number
TotalLaborCost	Field	*Total labor cost of produced item in a section within the month* =Currency

Table G.15. Data Dictionary (Continue).

Object Name	Object Type	Description
TotalMaterialCost	Field	*Total material cost of produced item in a section within the month* =Currency
TotalOverHeadCost	Field	*Total overhead cost of produced item in a section within the month* =Currency
TransactionType	Data Store	*Type of transfer and transform transaction* = TransactionTypeNo + TransactionTypeName + TransactionTypeNo + DeleteFlag
TransactionTypeName	Field	*Description of Type of Transaction* =0{Character}30
TransactionTypeNo *	Field	*Code of Type of Transaction* =Number
TransactionTypeNote	Field	*Remark of Transaction Type* =0{Character}255



Table G.16. Data Dictionary (Continue).

Object Name	Object Type	Description
Transfer	Data Store	<p>*The transactions of moving one item from one section to another*</p> <p>= TransferNo + TransferDate + TransactionTypeNo + ItemNo + ItemStatusNo + FromSectionNo + ToSectionNo + TransferItemQty + TransferItemCost + TransferNote</p>
TransferDate	Field	<p>*Date of Transfer Transaction*</p> <p>=Date</p>
TransferInCost	Field	<p>*Total cost of item that is transferred into a section within the month *</p> <p>=Currency</p>
TransferInQty	Field	<p>*Total quantity of item that is transferred into a section within the month*</p> <p>=Number</p>
TransferItemCost	Field	<p>*Cost of Item that is transferred*</p> <p>=Currency</p>
TransferItemQty	Field	<p>*Number of Item that is transferred*</p> <p>=Number</p>

Table G.17. Data Dictionary (Continue).

Object Name	Object Type	Description
TransferNo	Field	*Code of Transfer Transaction* =Number
TransferNote	Field	*Remark of transfer Transaction* =0{Character}255
TransferOutCost	Field	*Total cost of item that is transferred out from a section within the month* =Currency
TransferOutQty	Field	*Total quantity of item that is transferred out from a section within the month* =Number
Transform	Data Store	*The transactions of changing item(s) to be another item(s) at a section* = TransformNo + TransformDate + TransactionTypeNo + SectionNo + ToolSetTime + RunningTime
TransformDate	Field	*Date of Transform Transaction* =Date

Table G.18. Data Dictionary (Continue).

Object Name	Object Type	Description
TransformDetail	Data Store	<p>*The detail of transform transaction that specifies the item(s) changed from and be changed to*</p> <p>= TransferormNo + ItemNo + ItemStatusNo + TransformItemQty + TransformItemCost</p>
TransformItemCost	Field	<p>*Cost of Item changed from production process*</p> <p>=Currency</p>
TransformItemQty	Field	<p>*Number of Item changed from production process*</p> <p>=Number</p>
TransformNo	Field	<p>*Code of Transform Transaction*</p> <p>=Number</p>
UnitWeight	Field	<p>*Numeric data that indicate weight per one Inventory unit*</p> <p>=Number</p>
WeightPerMold	Field	<p>*Number of weight of material that will be used in one mold (for casting items)*</p> <p>=Number</p>



## APPENDIX H

### MODULE SPECIFICATION

Module: Main

Purpose: Start program and initialize the system application

Form: -

Input: -

Output: -

Sub Main()

On Error ErrorHandler

Dim wait As clsWaitCursor

Dim lngWindowHandle As Long

Set wait = New clsWaitCursor

frmSplash.Show

lngWindowHandle = FindWindow(vbNullString, \_

"Nakayama Production Costing System - frmMain (Form)")

If lngWindowHandle = 0 Then

lngWindowHandle = FindWindow(vbNullString, \_

"Nakayama Production Costing System - frmODBCLogon (Form)")

End If

If lngWindowHandle <> 0 Then ' if already open

BringWindowToTop lngWindowHandle

Else

gsReportDir = GetApplicationSetting("gsReportDir")

If gsReportDir = "" Then

gsReportDir = "\\TV\_SERVER\TvCostReport\"

SaveApplicationSetting "gsReportDir", gsReportDir

End If

frmSplash.Refresh

RegisterSQLServerDatabase "NY", "NY\_SERVER", "NY", "Nagayama Database"

Set wait = Nothing

If Not LogOn Then

End

End If

Set wait = New clsWaitCursor

ExecuteSQL "EXEC pAutoExec"

frmMain.Show

End If

Exit Sub

ErrorHandle:

ErrorMsgBox "Sub Main"

End Sub



Module: ItemStructure - Form\_Load

Purpose: Initialize the form control variable and show the data of Item Structure

Form: Item Structure

Input: -

Output: ItemStructure Form

Private Sub Form\_Load()

On Error GoTo ErrorHandler

Dim wait As clsWaitCursor

Set wait = New clsWaitCursor

tvTreeView.Height = Me.Height - 7 \* sbStatusBar.Height / 3 - tvTreeView.Top

On Error Resume Next

FillCombo cboItem, gcItemInStructureSQLSelect, gcALL

cboItem = GetApplicationSetting(Me.Name & "Item")

OnCommandRefresh 'simulate that user press command refresh

Exit Sub

ErrorHandler:

ErrorMsgBox "Sub Form\_Load"

Unload Me

End Sub

Module: ItemStructure - OnCommandRefresh

Purpose: Show the data of Item Structure as the current data

Form: Item Structure

Input: -

Output: View of current Item Structure data

Private Sub OnCommandRefresh()

On Error GoTo ErrorHandler

Dim strSQL As String

Dim wait As clsWaitCursor

Set wait = New clsWaitCursor

tbToolBar.Buttons("Refresh").Enabled = False

cboItem.Enabled = False

ExecuteSQL \_

"BEGIN TRAN" \_

& " SELECT \*" \_

& " FROM tItemStructure(TABLOCKX)" \_

& " EXEC pBuildItemStructure '" & StrTextBeforeDash(strItem) & "'"

FillTreeView

ExecuteSQL "ROLLBACK TRAN"

tbToolBar.Buttons("Refresh").Enabled = True

cboItem.Enabled = True

Exit Sub

ErrorHandle:

ErrorMsgBox "Sub OnCommandRefresh"

ExecuteSQL "ROLLBACK TRAN"

End Sub



Module: ItemStructure - FillTreeView

Purpose: Show the data of Item Structure in the tree view control

Form: Item Structure

Input: -

Output: View of Item Structure data

Private Sub FillTreeView()

On Error GoTo ErrorHandler

Dim iIndex(2) As Long

Dim nodeItem As Node

Dim wait As clsWaitCursor

Dim rs As Recordset

Dim liLevel As Long

Dim liNextLevel As Long

Dim liRelationship As Long

Dim strItemText As String

Dim liImageNumber As Long

Dim strMaterialPerItem As String

Set wait = New clsWaitCursor

Set rs = dbMain.OpenRecordset( \_

"SELECT \*" \_

& " FROM tItemStructure" \_

& " ORDER BY L00Code, L01Code, L02Code" \_

)

tvTreeView.Visible = False

tvTreeView.Nodes.Clear

' For the first item, we must initialize the tree view

If Not rs.EOF Then

liNextLevel = rs(3) 'CurrentLevel

strItemText = RTrim(rs(liNextLevel)) & " - "

& rs(5) 'CurrentItemDescription

liImageNumber = rs(4) 'CurrentItemTypeCode

Set nodeItem = tvTreeView.Nodes.Add(, , strItemText, "Type" &  
liImageNumber)

nodeItem.Tag = strItemText

iIndex(liNextLevel) = nodeItem.Index

liLevel = liNextLevel

rs.MoveNext

End If

While Not rs.EOF

liNextLevel = rs(3) 'CurrentLevel

liRelationship = tvwNext

If liNextLevel > liLevel Then

liRelationship = tvwChild

Else

```

        liLevel = liNextLevel

    End If

    If liNextLevel <> 0 Then

        strMaterialPerItem = frmItemExplorer.StrFormattedItemToMaterialRatio(rs(6))

        'CurrentItemQtyPerMaterialQty

    Else

        strMaterialPerItem = ""

    End If

    strItemText = RTrim(rs(liNextLevel)) & " - " & rs(5) 'CurrentItemDescription
    liImageNumber = rs(4) 'CurrentItemTypeCode

    Set nodeItem = tvTreeView.Nodes.Add(iIndex(liLevel), _
        liRelationship, , _
        strMaterialPerItem & strItemText, "Type" & liImageNumber)

    nodeItem.Tag = strItemText
    iIndex(liNextLevel) = nodeItem.Index

    liLevel = liNextLevel

    rs.MoveNext

Wend

tvTreeView.Visible = True

rs.Close

```



If tvTreeView.Nodes.Count > 0 Then

Set tvTreeView.SelectedItem = tvTreeView.Nodes(1)

End If

Exit Sub

ErrorHandle:

tvTreeView.Visible = True

ErrorMsgBox "Sub FillTreeView"

End Sub



## St. Gabriel's Library

Module: Account - OnCommandFind

Purpose: Find record that user wants and focus at that row

Form: Account

Input: Search key

Output: Data of record that user wants to find

Private Sub OnCommandFind()

On Error GoTo ErrorHandler

Dim frm As frmFindSpreadText

Set frm = New frmFindSpreadText

Load frm

frm.StartFindText vaSpread1

SpreadRow2StringArray astrOriginal, vaSpread1

Exit Sub

ErrorHandler:

ErrorMsgBox "Sub OnCommandFind"

End Sub

Module: Account - OnCommandRefresh

Purpose: Show the data of Account as the current data

Form: Account

Input: -

Output: View of current Account data

Private Sub OnCommandRefresh()

On Error GoTo ErrorHandler

Dim wait As clsWaitCursor

Set wait = New clsWaitCursor

rsPrimary.Requery

RefreshSpread rsPrimary, vaSpread1

SpreadRow2StringArray astrOriginal, vaSpread1

Exit Sub

ErrorHandler:

ErrorMsgBox "Sub OnCommandRefresh"

End Sub

Module: Account - OnCommandNew

Purpose: Change the form mode into adding mode

Form: Account

Input: -

Output: Blank row waiting for user to input new data

Private Sub OnCommandNew()

On Error GoTo ErrorHandler

Dim lngButtonValue As Long

Dim wait As clsWaitCursor

Set wait = New clsWaitCursor

lngButtonValue = tbToolBar.Buttons("New").Value

If vaSpread1.EditModePermanent Then

vaSpread1.Row = vaSpread1.ActiveRow

vaSpread1.Action = SS\_ACTION\_DELETE\_ROW

bAddNewMode = False

vaSpread1.Row = vaSpread1.ActiveRow - 1

vaSpread1.Col = vaSpread1.ActiveCol

vaSpread1.Action = SS\_ACTION\_ACTIVE\_CELL

vaSpread1.MaxRows = vaSpread1.MaxRows - 1

LockSpread vaSpread1

SpreadRow2StringArray astrOriginal, vaSpread1

Else

InsertNewSpreadRow vaSpread1

bAddNewMode = True

SpreadRow2StringArray astrOriginal, vaSpread1

vaSpread1.Row = vaSpread1.ActiveRow

vaSpread1.Col = 3

If vaSpread1.TypeComboBoxCount > 1 Then

vaSpread1.TypeComboBoxCurSel = 1

End If

vaSpread1.Col = vaSpread1.ActiveCol

vaSpread1.Col = 4

vaSpread1.Value = 0

vaSpread1.Col = 5

vaSpread1.Value = 0

vaSpread1.Col = 6

vaSpread1.Value = 0

vaSpread1.Col = 7

vaSpread1.Value = 0

LockSpread vaSpread1, False

End If

Exit Sub

ErrorHandle:

ErrorMsgBox "Sub OnCommandNew"

tbToolBar.Buttons("New").Value = lngButtonValue

End Sub





Module: Account - OnCommandEdit

Purpose: Change the form mode into editing mode

Form: Account

Input: -

Output: Unlock data and ready for user to change data

Private Sub OnCommandEdit()

On Error GoTo ErrorHandler

Dim lngButtonValue As Long

Dim wait As clsWaitCursor

Set wait = New clsWaitCursor

lngButtonValue = tbToolBar.Buttons("Edit").Value

If vaSpread1.EditModePermanent Then

LockSpread vaSpread1

StringArray2SpreadRow vaSpread1, astrOriginal

Else

SpreadRow2StringArray astrOriginal, vaSpread1

LockSpread vaSpread1, False

End If

Exit Sub

ErrorHandler:

ErrorMsgBox "Sub OnCommandEdit"

tbToolBar.Buttons("Edit").Value = lngButtonValue

End Sub

Module: Account - OnCommandSave

Purpose: Save data from adding new or editing existing record

Form: Account

Input: -

Output: -

Private Sub OnCommandSave()

On Error GoTo ErrorHandler

Dim wait As clsWaitCursor

Dim strSQL As String

Dim bConfirmed As Boolean

Set wait = New clsWaitCursor

strSQL = ""

If bAddNewMode Then

strSQL = SQLInsertWithSpread("sAccount", rsColumnInfo, vaSpread1)

ExecuteSQL strSQL

bAddNewMode = False

RefreshSpreadRow vaSpread1.ActiveRow

LockSpread vaSpread1

SpreadRow2StringArray astrOriginal, vaSpread1

tbToolBar.Buttons("New").Value = tbrUnpressed

SetStatusText gcStatusTextAfterSaveNewRecord

Else

```

SetStatusText gcStatusTextSaveRecordWithoutChange

If SpreadRowIsChanged(vaSpread1, astrOriginal) Then
    strSQL = SQLUpdateWithSpread("sAccount", rsColumnInfo, vaSpread1, _
        astrOriginal)

    If strSQL <> "" Then
        ExecuteSQL strSQL

        RefreshSpreadRow vaSpread1.ActiveRow
        SpreadRow2StringArray astrOriginal, vaSpread1
        SetStatusText gcStatusTextAfterSaveEditedRecord
    End If
End If
End If

If>ErrorRow = 0

Exit Sub

ErrorHandle:

    MsgBox "Sub OnCommandSave"

End Sub

```

Module: Account - OnCommandDelete

Purpose: Delete the focus data

Form: Account

Input: -

Output: -

Private Sub OnCommandDelete()

On Error GoTo ErrorHandler

Dim wait As clsWaitCursor

Dim bOldRetainSelBlock As Boolean

Set wait = New clsWaitCursor

bOldRetainSelBlock = vaSpread1.RetainSelBlock

vaSpread1.RetainSelBlock = True

If ConfirmDeleteRecord Then

ExecuteSQL \_

"DELETE FROM sAccount" \_

& " WHERE AccountCode=" & astrOriginal(1) & ""

vaSpread1.Row = vaSpread1.ActiveRow

vaSpread1.Action = SS\_ACTION\_DELETE\_ROW

vaSpread1.MaxRows = vaSpread1.MaxRows - 1

SpreadRow2StringArray astrOriginal, vaSpread1

End If

vaSpread1.RetainSelBlock = bOldRetainSelBlock

Exit Sub

ErrorHandle:

ErrorMsgBox "Sub OnCommandDelete"

vaSpread1.RetainSelBlock = bOldRetainSelBlock

End Sub



Module: Account - OnCommandPrint  
Purpose: Set the report to show data of Account  
Form: Account  
Input: -  
Output: Preview of report of Account

Private Sub OnCommandPrint()

On Error GoTo ErrorHandler

Dim wait As clsWaitCursor

Set wait = New clsWaitCursor

PreviewReport "AccountMaster"

Exit Sub

ErrorHandler:

ErrorMsgBox "Sub OnCommandPrint"

End Sub



Module: pBuildItemStructure  
Purpose: Create Item Structure Temporary Table  
Form: SQL Sever  
Input: Item data and Item Structure data  
Output: Item Structure Temporary Table

```
CREATE PROCEDURE pBuildItemStructure @strItemCode varchar(255)
```

```
AS
```

```
/* -----
```

```
    This stored-procedure is used by frmItemExplorer.
```

```
    It assumes that the tItemStructure is used exclusively.
```

```
----- */
```

```
IF @strItemCode = '< ALL >'
```

```
    AND EXISTS(
```

```
        SELECT *
```

```
        FROM tItemStructure
```

```
    )
```

```
    RETURN(0)
```

```
CREATE TABLE #tblLevel00
```

```
(
```

```
    L00Code          char(15)  NOT NULL,
```

```
    L01Code          char(15)  NULL,
```

```
    L00Qty           smallint  NULL,
```

```
    L00MaterialQty   smallint  NULL
```

```
)
```

```
CREATE INDEX #X_tblLevel00_L00Code
```

```
ON #tblLevel00 (L00Code)
```

```
WITH FILLFACTOR = 75
```

```
CREATE INDEX #X_tblLevel00_L01Code
```

```
ON #tblLevel00 (L01Code)
```

```
WITH FILLFACTOR = 75
```

```
CREATE TABLE #tblSource
```

```
(
```

```
    L00Code          char(15)  NOT NULL,
```

```
    L01Code          char(15)  NULL,
```

```
    L00Qty            smallint  NULL,
```

```
    L00MaterialQty    smallint  NULL,
```

```
    L02Code          char(15)  NULL,
```

```
    L01Qty            smallint  NULL,
```

```
    L01MaterialQty    smallint  NULL
```

```
)
```

```
CREATE INDEX #X_tblSource_L00Code
```

```
ON #tblSource (L00Code)
```

```
WITH FILLFACTOR = 75
```

```
CREATE INDEX #X_tblSource_L01Code
```

```
ON #tblSource (L01Code)
```

```
WITH FILLFACTOR = 75
```

```
CREATE INDEX #X_tblSource_L02Code
```

```
ON #tblSource (L02Code)
```

WITH FILLFACTOR = 75

CREATE TABLE #tblTarget

(  
    L00Code          char(15)  NOT NULL,  
    L01Code          char(15)  NULL,  
    L00Qty           smallint  NULL,  
    L00MaterialQty   smallint  NULL,  
    L02Code          char(15)  NULL,  
    L01Qty           smallint  NULL,  
    L01MaterialQty   smallint  NULL  
)

CREATE INDEX #X\_tblTarget\_L00Code

ON #tblTarget (L00Code)

WITH FILLFACTOR = 50

CREATE INDEX #X\_tblTarget\_L01Code

ON #tblTarget (L01Code)

WITH FILLFACTOR = 50

CREATE INDEX #X\_tblTarget\_L02Code

ON #tblTarget (L02Code)

WITH FILLFACTOR = 50

INSERT INTO #tblLevel00

SELECT  ItemCode AS L00Code,

        NULL AS L01Code,

```

        NULL AS L00Qty,

        NULL AS L00MaterialQty

FROM      sItem

INSERT INTO #tblLevel00

SELECT    ItemCode AS L00Code,

        ItemMaterialCode AS L01Code,

        ItemQty AS L00Qty,

        ItemMaterialQty AS L00MaterialQty

FROM      sItemStructure AS asItemStructure00

WHERE     NOT EXISTS(

        SELECT *

        FROM sItemStructure AS asItemStructure01

        WHERE asItemStructure01.ItemMaterialCode =

asItemStructure00.ItemCode

        )

INSERT    INTO #tblSource

SELECT    #tblLevel00.L00Code,

        #tblLevel00.L01Code,

        #tblLevel00.L00Qty,

        #tblLevel00.L00MaterialQty,

        NULL AS L02Code,

        NULL AS L01Qty,

        NULL AS L01MaterialQty

FROM      #tblLevel00

UNION ALL

```

```

SELECT  #tblLevel00.L00Code,

        #tblLevel00.L01Code,

        #tblLevel00.L00Qty,

        #tblLevel00.L00MaterialQty,

        ItemMaterialCode AS L02Code,

        ItemQty AS L01Qty,

        ItemMaterialQty AS L01MaterialQty
FROM    #tblLevel00

        INNER JOIN sItemStructure

        ON #tblLevel00.L01Code = sItemStructure.ItemCode
INSERT  INTO #tblSource(L00Code, L01Code, L00Qty, L00MaterialQty)

SELECT  DISTINCT L01Code, L02Code, L01Qty, L01MaterialQty

FROM    #tblSource

WHERE   L02Code IS NOT NULL

IF @strItemCode = '< ALL >'

BEGIN

    INSERT  INTO #tblTarget

    SELECT  DISTINCT *

    FROM    #tblSource

END

ELSE

BEGIN

    INSERT  INTO #tblTarget

    SELECT  *

```

## St. Gabriel's Library

```
FROM      #tblSource

WHERE     L00Code = @strItemCode

        OR      L01Code = @strItemCode


        OR      L02Code = @strItemCode

DELETE    FROM #tblSource

WHERE     L00Code = @strItemCode

        OR      L01Code = @strItemCode

        OR      L02Code = @strItemCode

INSERT    INTO #tblTarget

SELECT    DISTINCT #tblSource.*

FROM      #tblSource

        INNER JOIN #tblTarget

        ON #tblSource.L00Code = #tblTarget.L00Code

        AND (

                #tblSource.L01Code IS NULL AND #tblTarget.L01Code IS NOT

NULL

                OR #tblSource.L01Code <> #tblTarget.L01Code

                OR

                #tblSource.L02Code IS NULL AND #tblTarget.L02Code IS NOT

NULL

                OR #tblSource.L02Code <> #tblTarget.L02Code

        )

END
```



DELETE FROM tItemStructure

INSERT INTO tItemStructure

SELECT L00Code,

ISNULL(L01Code, '') AS L01Code,

ISNULL(L02Code, '') AS L02Code,

CASE WHEN L02Code IS NOT NULL THEN 2

WHEN L01Code IS NOT NULL THEN 1

ELSE 0

END AS CurrentLevel,

CASE WHEN L02Code IS NOT NULL THEN asItem02.ItemTypeCode

WHEN L01Code IS NOT NULL THEN asItem01.ItemTypeCode

ELSE asItem00.ItemTypeCode

END AS CurrentItemTypeCode,

CASE WHEN L02Code IS NOT NULL THEN asItem02.ItemDescription

WHEN L01Code IS NOT NULL THEN asItem01.ItemDescription

ELSE asItem00.ItemDescription

END AS CurrentItemDescription,

CASE WHEN L02Code IS NOT NULL THEN

CONVERT(varchar, L01Qty) + '.' + CONVERT(varchar, L01MaterialQty)

WHEN L01Code IS NOT NULL THEN

CONVERT(varchar, L00Qty) + '.' + CONVERT(varchar, L00MaterialQty)

ELSE ''

```

END AS CurrentItemQtyPerMaterialQty

FROM    #tblTarget AS asResult

LEFT JOIN sItem AS asItem00

ON asResult.L00Code = asItem00.ItemCode

LEFT JOIN sItem AS asItem01

ON asResult.L01Code = asItem01.ItemCode

LEFT JOIN sItem AS asItem02

ON asResult.L02Code = asItem02.ItemCode

GO

Create Procedure pBuildProductStructure

AS

IF EXISTS(

    SELECT *

    FROM    tProductStructure

)

RETURN(0)

BEGIN TRAN

DELETE

FROM tProductStructure

/* Level 0 */

INSERT INTO tProductStructure(ItemLevel, L0Code, L1Code, L2Code,

```

```

ItemCode, ItemDescription, SizeValue, SizeUnit, UnitWeight)

SELECT 0,

    sItem.ItemCode, ", ",

    sItem.ItemCode, sItem.ItemDescription,

    sItem.SizeValue, sItem.SizeUnit, sItem.UnitWeight

FROM sItem

WHERE (sItem.ItemTypeCode = 3)

/* Level 1 */

INSERT INTO tProductStructure(ItemLevel, L0Code, L1Code, L2Code,

    ItemCode, ItemDescription, SizeValue, SizeUnit, UnitWeight,

    ItemQtyPerMaterialQty)

SELECT 1, sItemStructure.ItemCode AS Parent,

    sItem.ItemCode, ", ", sItem.ItemCode AS Child,

    sItem.ItemDescription,

    sItem.SizeValue, sItem.SizeUnit, sItem.UnitWeight,

    RTrim(convert(char,ItemQty)) + ':' + RTrim(convert(char,ItemMaterialQty))

FROM tProductStructure INNER JOIN sItemStructure ON

    tProductStructure.ItemCode = sItemStructure.ItemCode

INNER JOIN sItem ON

    sItemStructure.ItemMaterialCode = sItem.ItemCode

WHERE (sItem.ItemTypeCode = 2)

AND (tProductStructure.ItemLevel = 0)

```

/\* Level 2 \*/

INSERT INTO tProductStructure

(ItemLevel, L0Code, L1Code, L2Code,  
ItemCode, ItemDescription, SizeValue, SizeUnit,  
UnitWeight, ItemQtyPerMaterialQty)

SELECT 2, tProductStructure.L0Code, sItemStructure.ItemCode AS Parent,  
sItem.ItemCode,

sItem.ItemCode AS Child, sItem.ItemDescription,

sItem.SizeValue, sItem.SizeUnit, sItem.UnitWeight,

RTrim(convert(varchar,ItemQty)) + ':' +

RTrim(convert(varchar,ItemMaterialQty))

FROM tProductStructure INNER JOIN sItemStructure ON

tProductStructure.ItemCode = sItemStructure.ItemCode INNER JOIN

sItem ON sItemStructure.ItemMaterialCode

= sItem.ItemCode

WHERE (tProductStructure.ItemLevel =1)

COMMIT TRAN



**APPENDIX I**  
**SCREEN DESIGN**

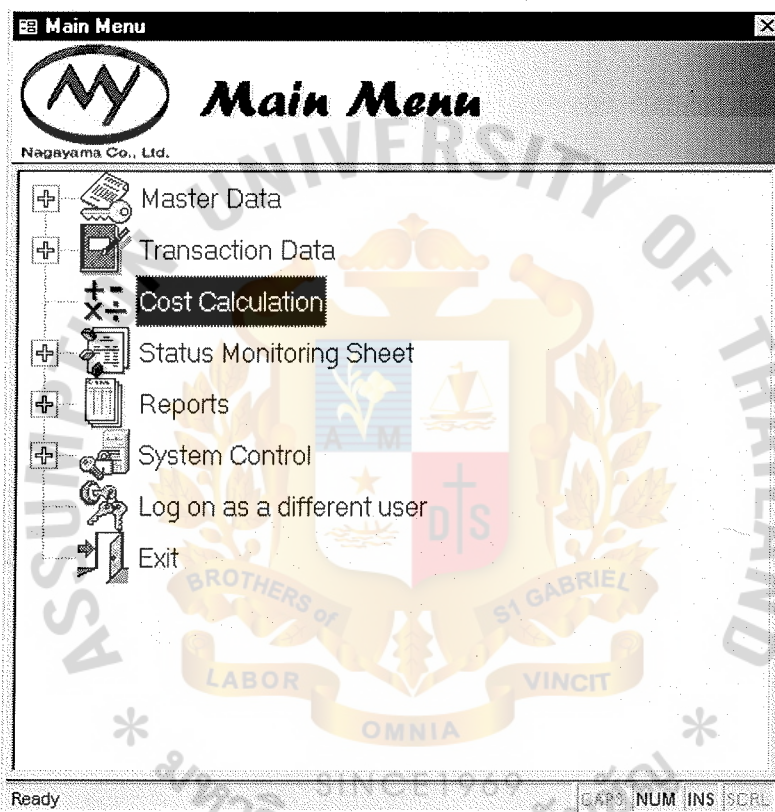


Figure I.1. Main Menu Screen.



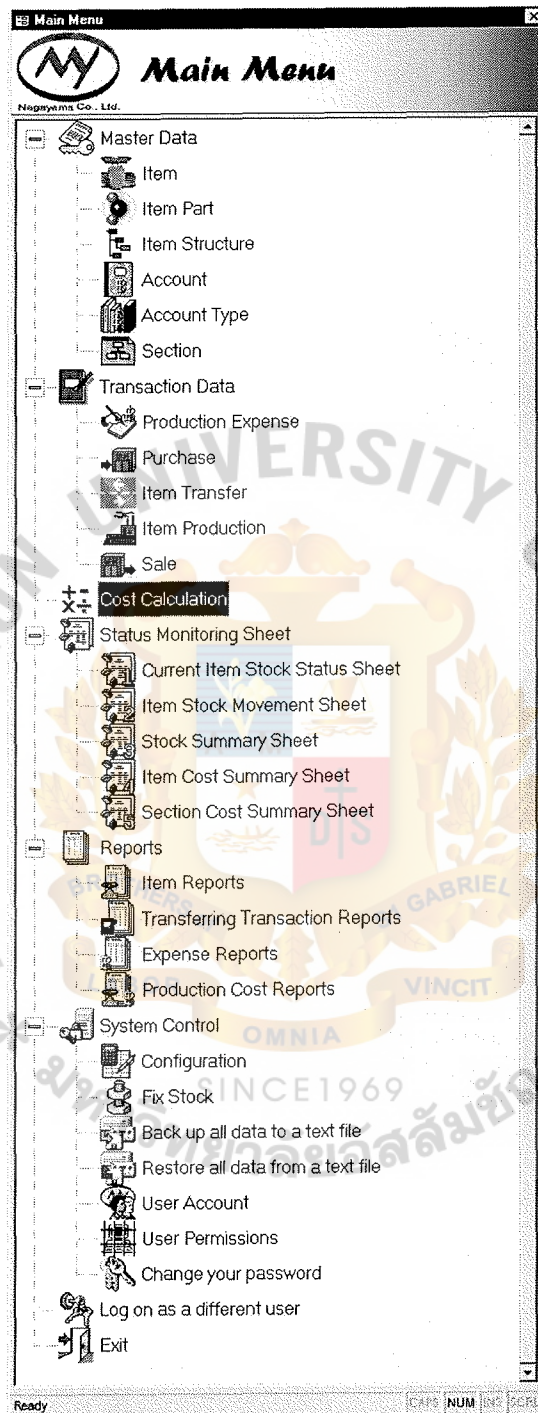



Figure I.2. Main Menu Screen (Full View).

Item



Item

Nagayama Co., Ltd.

First

Previous

Next

Last

Add

Edit

Delete

Save

Cancel

Filter

Search

Show All

Print

Exit

Item No:

GWTC0003W

Item Name:

IMPELLER 100W

Item Type:

1

Casting Goods

Item Part:

99

Other

Size:

100 H

Unit Weight:

0.22

Inventory Unit:

pcs

Pcs Per Carton:

100

Pcs Per Mold:

22

Weight Per Mold:

11.43

ItemNote:

Ready

CAPS


NUM

INS

SCRL

Figure I.3. Item Screen.

**Item Part**

 **Item Part**

Nagayama Co., Ltd.

First Previous Next Last Add Edit Delete Save Cancel Filter Search Show All Print Exit

Item Part No.	Item Part Name	Note
1	Body	
2	Bonnet	
3	Disc	
4	Stem	
5	Lock Nut	
6	Packing Nut	
7	Gland	
8	Gland Packing	
9	Handwheel	
10	Name Plate	

Ready CAPS NUM INS SCRL

Figure I.4. Item Part Screen.

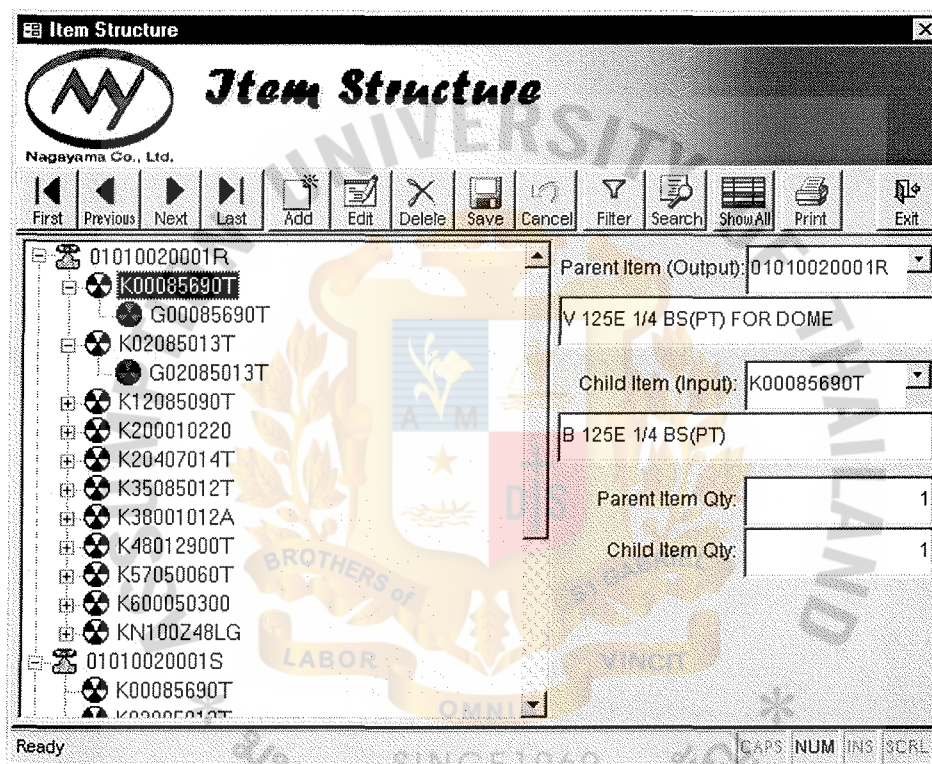



Figure I.5. Item Structure Screen.



**Account Type**

 **Account Type**

Nagayama Co., Ltd.


First Previous Next Last Add Edit Delete Save Cancel Filter Search ShowAll Print Exit

A/C Type No.	Account Type Name	Note
▶	1 Direct Material	
	2 Direct Labour	
	3 Factory Overhead	
*		

Ready CAPS NUM INS SER

Figure I.6. Account Type Screen.

**Account**

 **Account**

Nagayama Co., Ltd.

First Previous Next Last Add Edit Delete Save Cancel Filter Search Show All Print Exit


Account No.	Account Name	Account Type	Note
5030	RAW MATERIAL CONSUMED	1 Direct Material	
5212	WAGES - WORKER	2 Direct Labour	
5213	WAGES - ASSEMBLING	2 Direct Labour	
5232	BONUS - WORKER	2 Direct Labour	
5233	BONUS - ASSEMBLING	2 Direct Labour	
5010	COST OF GOODS MANUFACTURING	3 Factory Overhead	
5020	COST OF GOODS SOLD	3 Factory Overhead	
5110	FREIGHT - EXPORT	3 Factory Overhead	
5120	INSURANCE - EXPORT	3 Factory Overhead	
5130	SERVICE - EXPORT	3 Factory Overhead	

Ready CAPS NUM INS SCRL

Figure I.7. Account Screen.



**Section**

 **Section**

Nagayama Co., Ltd.

First Previous Next Last Add Edit Delete Save Cancel Filter Search Show All Print Exit

Section No.	Section Name	Note
0	Admin	
1	Purchase	
2	Casting	
3	Machining	
4	Assembly	
5	Outside Production	
6	Shipping	
99	Other	
*		

Ready CAPS NUM INS SCRL

Figure I.8. Section Screen.

**Production Expense**

**Production Expense**

Date From: 01/02/1999 To: 28/02/1999

Navigation: First, Previous, Next, Last, Add, Edit, Delete, Save, Cancel, Filter, Search, Show All, Print, Exit

Date	A/C No.	Description		Section	Amount	Note
01/02/99 5222		K.S. APPLICATION	0	Admin	704.00	A990430
01/02/99 5222		MR.PHAIROJ	0	Admin	420.00	PC.0087
01/02/99 5222		MR.ANOTHAI	0	Admin	390.00	PC.0088
01/02/99 5222		MR.TAKENO	0	Admin	6,155.00	PC.0089
01/02/99 5222		MR.ICHIKAWA	0	Admin	4,058.00	PC.0090
01/02/99 5222		MR.YODKEAW	0	Admin	200.00	PC.0091
01/02/99 5330		MR.PHAIROJ	1	Purchase	940.00	PC.0087
01/02/99 5330		MR.ANOTHAI	1	Purchase	966.00	PC.0088
01/02/99 5510		OFFICE MATE	0	Admin	1,706.00	4203559
01/02/99 5520		MR.ICHIKAWA	1	Purchase	3,300.00	PC.0090

Ready

CAPS NUM INS CTRL

Figure I.9. Production Expense Screen.

**Purchase**

**Purchase**

Date From: 01/02/1999 To: 28/02/1999

Nagayama Co., Ltd.

First Previous Next Last Add Edit Delete Save Cancel Filter Search Show All Print Exit

Date	Trans. No.	Item	Status	Qty	Amount
03/02/1999	P00011	ABD0130T BAR C#3771BD, 13.0X4000	OK	121.00	33,728.00
03/02/1999	P00021	ABD0150T BAR C#3771BD, 15.0X4000	OK	80.00	29,698.00
16/02/1999	P00071	K3200001T PL M5	OK	30,000.00	27,600.00
25/02/1999	TVJ0011	ABT0100J BAR TCA721, 10.0X4000MM	OK	1,591.00	383,811.62
25/02/1999	TVJ0021	ABT0130J BAR TCA721, 13.0X4000MM	OK	338.00	135,007.03
25/02/1999	TVJ0031	ABT0140J BAR TCA721, 14.0X4000MM	OK	923.00	427,953.55
25/02/1999	TVJ0041	ABT0150J BAR TCA721, 15.0X4000MM	OK	570.00	297,328.50
25/02/1999	TVJ0051	ABT0170J BAR TCA721, 17.0X4000MM	OK	47.00	31,517.33
25/02/1999	TVJ0061	ABT0240J BAR TCA721, 24.0X4000MM	OK	20.00	26,555.43
25/02/1999	TVJ0071	ABT0260J BAR TCA721, 26.0X4000MM	OK	59.00	92,201.98

Ready CAPS NUM INS SCRL

Figure I.10. Purchase Screen.



**Item Transfer**

**Item Transfer**

Nagayama Co., Ltd.

Date From: 01/02/1999 To: 28/02/1999

First Previous Next Last Add Edit Delete Save Cancel Filter Search Show All Print Exit

Date	Trans. No.	Item	Status	From Section	To Section	Q
01/02/1999	1999022368	G12002081T D 125E 2-1/2 BS	OK	2 Casting	3 Machining	
02/02/1999	1999022456	G3P1JB46079 IMPELLER 100H	OK	2 Casting	3 Machining	4,
02/02/1999	1999022457	G02085034T BN 125E 3/4 BS	OK	2 Casting	3 Machining	11,
02/02/1999	1999022458	G00085725T B 125E 3/4 BS	OK	2 Casting	3 Machining	17,
02/02/1999	1999022459	G00085435T B 125E 3/4 BSSE	OK	2 Casting	3 Machining	7,
02/02/1999	1999022460	G00085725T B 125E 3/4 BS	OK	2 Casting	3 Machining	
02/02/1999	1999022461	G04216210TM CA 125H 1/2 BNS(USA)	OK	2 Casting	3 Machining	
02/02/1999	1999022462	G04216210T CA 125H 1/2 BNS	OK	2 Casting	3 Machining	16,
02/02/1999	1999022463	G04216230T CA 125H 3/4 BNS	OK	2 Casting	3 Machining	5,
02/02/1999	1999022464	G12015894T D 125H 3 BNS	OK	2 Casting	3 Machining	

Ready CAPS NUM INS SCRL

Figure I.11. Item Transfer Screen.

**Item Production**

Nagayama Co., Ltd.

Date From: 01/02/1999 To: 28/02/1999

First Previous Next Last Add Edit Delete Save Cancel Filter Search Show All Print Exit

Date	Trans. No.	Section	Tool Set Time	Run Time	In/Output	Item
08/02/1999	19990244133	Machining	600	1439.76	In	01140061004C V 125E 1 BSSE
					Out	K00085445T B 125E 1 BSSE
					Out	K02085043T BN 125E 1 BS
					Out	K12085041T D 125E 1 BS
					Out	K20001031B PN 125E 1 BS BRASS
					Out	K20407024T LN 125E 1 BS
					Out	K35085041T S 125E 1 BS
					Out	K38001022T G 125E 1 BS
					Out	K48010580T NAPT 207A R-20
					Out	K57050060T N M6

Ready

CAPS NUM INS SCRL

Figure I.12. Item Production Screen.

**Item Production**

Nagayama Co., Ltd.

Date From: 01/02/1999 To: 28/02/1999

First Previous Next Last Add Edit Delete Save Cancel Filter Search Show All Print Search Show All Print Exit

Date	Trans. No.	Section	Tool Set Time	Run Time	In/Output	Item	Status	Qty
08/02/1999	19990244133	Machining	600	1439.76	In	01140061004C V 125E 1 BSSE	OK	84.00
					Out	K00085445T B 125E 1 BSSE	OK	84.00
					Out	K02085043T BN 125E 1 BS	OK	84.00
					Out	K12085041T D 125E 1 BS	OK	84.00
					Out	K20001031B PN 125E 1 BS BRASS	OK	84.00
					Out	K20407024T LN 125E 1 BS	OK	84.00
					Out	K35085041T S 125E 1 BS	OK	84.00
					Out	K38001022T G 125E 1 BS	OK	84.00
					Out	K48010580T NAPT 207A R-20	OK	84.00
					Out	K57050060T N M6	OK	84.00

Ready

CAPS NUM INS SCRL

Figure I.13. Item Production Screen (Full View).

**Sale**

**My Sale**

Nagayama Co., Ltd.

Date From 01/02/1999 To 28/02/1999

First Previous Next Last Add Edit Delete Save Cancel Filter Search Show All Print Exit


Date	Trans. No.	Item	Status	Qty	Note
22/02/1999	1999022365	G00086232T B 125S 1/2 BS	OK	735.00	
22/02/1999	1999022366	G00086241T B 125S 3/4 BS	OK	216.00	
22/02/1999	1999022367	G00086251T B 125S 1 BS	OK	720.00	
22/02/1999	1999022369	G00086321T B 150 1/2 BS	OK	210.00	
22/02/1999	1999022370	G00086330T B 150 3/4 BS	OK	864.00	
22/02/1999	1999022371	G00086340T B 150 1 BS	OK	630.00	
22/02/1999	1999022372	G00026130T B 150 3/4 BSU(BSRU)	OK	240.00	
22/02/1999	1999022373	G00026140T B 150 1 BSU(BSRU)	OK	225.00	
22/02/1999	1999022374	G00090860T B 100N 1-1/4 BG	OK	360.00	
22/02/1999	1999022375	G00089640T B 150E 3/4 BG	OK	1,584.00	

Ready CAPS NUM INS SCRL

Figure I.14. Sale Screen.



Cost Calculation



Cost Calculation

Nagayama Co., Ltd.

Last Fixed Month

December, 1998

Last Cost Calculation Month

January, 1999

Please select month that you want to (re)calculate stock balance and cost.

Cost Calculation Month

February, 1999

If you press [OK] button, system will start the following operations:

- Summarize stock balance quantity of all items in each section.
- Summarize total expenses of all that have been recorded in the system.
- Summarize cost of all transferring transactions
- Summarize cost of all items in each section at the end of month

OK

Cancel

Ready

CAPS

NUM

INS

SCRL

Figure I.15. Cost Calculation Screen.



**APPENDIX J**  
**REPORT DESIGN**

Logo	NAGAYAMA CO., LTD.	Print Date: 01/06/1999
Item Detail		Page 1 of 10
Item Type: Assembly Goods		
Item Code: 01010020001R	Description: V 125 E 1/4 GS(PT)	
Item Part:	Size: 1/4"	Unit Weight: 0.281 per pcs
Pcs per carton: 42		
Item Code: 01010020001S	Description: V 125 E 1/4 S(PT)	
Item Part:	Size: 1/4"	Unit Weight: 0.281 per pcs
Pcs per carton: 42		
Item Code: 01010020001T	Description: V 125 E 1/4 BS(PT)	
Item Part:	Size: 1/4"	Unit Weight: 0.281 per pcs
Pcs per carton: 42		
Item Code: 01010030001R	Description: V 125 E 3/8 BS(PT)	
Item Part:	Size: 3/8"	Unit Weight: 0.281 per pcs
Pcs per carton: 42		
Item Code: 01010030001S	Description: V 125 E 3/8 S(PT)	
Item Part:	Size: 3/8"	Unit Weight: 0.281 per pcs
Pcs per carton: 42		

Figure J.1. Item Detail Report.

Logo		NAGAYAMA CO., LTD.				Print Date: 01/06/1999		
		Item List				Page: 1 of 10		
Item Code	Description	Size	Unit Weight	Part	Pcs/ Carton	Pcs/ Mold	Source Zone	Destination
01010020001R	V 125E 1/4 BS(PT)	1/4"	0.281		42		Assembly	
01010020001S	V 125E 1/4 BS(PT)	1/4"	0.281		42		Assembly	
01010020001T	V 125E 1/4 BS(PT)	1/4"	0.281		42		Assembly	
01010030001R	V 125E 3/8 BS(PT)	3/8"	0.231		42		Assembly	
01010030001S	V 125E 3/8 BS(PT)	3/8"	0.231		42		Assembly	
01010030001T	V 125E 3/8 BS(PT)	3/8"	0.231		42		Assembly	
01010030002R	V 125E 3/8 BS(PT)	3/8"	0.231		42		Assembly	
01010030002S	V 125E 3/8 BS(PT)	3/8"	0.231		42		Assembly	
01010030002T	V 125E 3/8 BS(PT)	3/8"	0.231		42		Assembly	
01010040001S	V 125E 1/2 BS(PT)	1/2"	0.293		72		Assembly	
01010040001R	V 125E 1/2 BS(PT)	1/2"	0.293		72		Assembly	
01010040001T	V 125E 1/2 BS(PT)	1/2"	0.293		72		Assembly	
01010040002S	V 125E 1/2 BS(PT)	1/2"	0.293		72		Assembly	
01010040002R	V 125E 1/2 BS(PT)	1/2"	0.293		72		Assembly	
01010040002T	V 125E 1/2 BS(PT)	1/2"	0.293		72		Assembly	
01010050001T	V 125E 1 BS(PT)	1"	0.396		48		Assembly	

Figure J.2. Item List Report.

Logo		NAGAYAMA CO., LTD.			Print Date: 01/06/1999
		Product Structure			Page 1 of 10
Level	Item Code	Item Description	Size	Unit W't (kg)	Item : Material Ratio
0	01010020001S	V 125E 1/4 BS(PT)	1/4"	0.281	
1	K00085690T	B 125 E 1/4 BS(PT)	1/4"	0.112	1:1
2	G00085690T	B 125E 1/4 BS	1/4"	0.150	1:1
1	K02085013T	BN 125E 3/8 BS	3/8"	0.050	1:1
2	G02085013T	BN 125E 3/8 BS	3/8"	0.080	1:1
1	K12085090T	D 125E 3/8 BS	3/8"	0.020	1:1
2	G12085090T	D 125E 3/8 BS	3/8"	0.030	1:1
1	K20001022T	PN 125E 3/4 BS ATACO	3/4"	0.013	1:1
2	G20001022T	PN 125E 3/4 BS ATACO	3/4"	0.015	1:1
1	K20407014T	LN 125E 3/4 BS	3/4"	0.003	1:1
2	ABT0100J	BAR TCA721 14.0x4000mm DR ALLOY	14 mm.	5.170	302:1
1	K38001012T	S 125E 3.8 BS	3/8"	0.020	1:1
2	ABT0100J	BAR TCA721 10.0x4000mm DR ALLOY	10 mm.	2.640	54:1
1	K38001012T	G 125E 3.4 BS	3/4"	0.003	1:1
2	ABD0130T	BAR C#3771BD 130x4000mm	13 mm	4.520	465:1
1	K48012900T	NAPT TOYO R-20	R-20 mm	0.001	1:1
1	K57050060T	N M6	6 mm	0.002	1:1
1	K600050300	GP P#150 FOR 125E 3.4 BS	3/4"	0.001	1:1
1	KN10Z48LG	HL 48 LG	48	0.028	1:1
2	GN100Z48A	HL 48(ZN) AZM	48	0.028	1:1
0	01010030001R	V 125E 3/8 BS(PT)	3/8"	0.231	
1	K000857030T	B 125 E 1/4 BS(PT)	3/8"	0.098	1:1
2	G000857030T	B 125E 1/4 BS	3/8"	0.150	1:1
1	K02085013T	BN 125E 3/8 BS	3/8"	0.050	1:1
2	G02085013T	BN 125E 3/8 BS	3/8"	0.080	1:1
1	K12085090T	D 125E 3/8 BS	3/8"	0.020	1:1
2	G12085090T	D 125E 3/8 BS	3/8"	0.030	1:1
1	K20001022T	PN 125E 3/4 BS ATACO	3/4"	0.013	1:1
2	G20001022T	PN 125E 3/4 BS ATACO	3/4"	0.013	1:1
1	K20407014T	LN 125E 3/4 BS	3/4"	0.003	1:1
2	ABT0100J	BAR TCA721 14.0x4000mm DR ALLOY	14 mm.	51.70	302:1
1	K38001012T	S 125E 3.8 BS	3/8"	0.020	1:1
2	ABT0100J	BAR TCA721 10.0x4000mm DR ALLOY	10 mm.	2.640	54:1
1	K38001012T	G 125E 3.4 BS	3/4"	0.003	1:1
2	GN100Z48A	HL 48(ZN) AZM	48	0.028	1:1

Figure J.3. Product Structure Report.



Logo	NAGAYAMA CO., LTD.				Print Date: 01/06/1999		
Item Stock Movement Report				Page 1 of 10			
From 01/03/1999 To 31/03/1999							
Section : C001							
Item	Date	Transfer No	Transfer Type	In	Out	Balance Qty	Balance Cost
GY11000621Y - GP-1000 Cylinder 1A	01/03/1999		0-Balance			3.00	1,427.25
	16/03/1999	1999030633	3-Finished Goods	24.00		27.00	13,721.25
		1999031025	5-Slaes		25.00	2.00	1,024.50
GY11000628Y -GHP-1000 Piston 65A	01/03/1999		0-Balance			10.00	456.70
	11/03/1999	1999030494	3-Finished Goods	53.00		63.00	3,280.22
	16/03/1999	1999031006	5-Slaes		50.00	13.00	692.56
GY11000629 - GP-1000 Piston 80A	01/03/1999		0-Balance			13.00	940.03
	11/03/1999	1999030495	3-Finished Goods	48.00		61.00	4,677.41
	16/03/1999	1999031017	5-Slaes		50.00	11.00	856.48
GY11000630Y - GP-1000 Piston 100A	01/03/1999		0-Balance			6.00	776.40
	11/03/1999	1999030496	3-Finished Goods	24.00		30.00	4,120.37
	16/03/1999	1999031018	5-Slaes		30.00	0.00	0.00

Figure J.4. Item Stock Movement Report.



# St. Gabriel's Library

Logo		NAGAYAMA CO., LTD.		Print Date: 01/06/1999	
		Stock Adjusting Report		Page 1 of 10	
		From 01/03/1999 To 31/03/1999			
Transfer No	Date	Item Code	Description	Qty	Cost
Section: M001					
1999035073	30/03/1999	01140060002R	V 125E 1BSSE	-212.00	-23275.32
1999030575	30/03/1999	K200010310	PN 125E 1 BS	-212.00	-758.27
1999035087	30/03/1999	K24800950T	O-RING G95 FOR 150 3BT	-1.00	0.00
1999035086	31/03/1999	K24800800T	O-RING G80	-1.00	0.00
1999020308	31/03/1999	K48013012T	NAPT 206A_USA R25	-1460.00	0.00
1999020309	31/03/1999	K48013013T	NAPT 207A_USA R25	-219.00	0.00
1999032094	31/03/1999	K48013022T	PN 37 PRESS	5,000.00	96,534.17
Section: P001					
ST03000001	01/03/1999	K4801314T	NAPT 207A-USA	100.00	81.00
SL999046	12/03/1999	AAS1020C	SLAG OTHERS	-6,470.00	0.00
RE01583	30/03/1999	AAS1010C	SLAG PLATE	-4,300.00	-369,193.08
SL19982	31/03/1999	AAD1011M	CHIP& DEFECTIVE DRALLOY	-6771.00	-36,213.05
1999035198	31/03/1999	ABD0130T	BAR C#3771BD 13.0x4000mm	2.00	0.00
1999035247	31/03/1999	ABT00581J	BAR TCA721 8.4x2000mm DR ALLOY	1.00	0.00
1999035155	31/03/1999	ABT0150J	BAR TCA721 1.4x2000mm DR ALLOY	4.00	0.00

Figure J.5. Stock Adjusting Report.

Logo		NAGAYAMA CO., LTD.				Print Date: 01/06/1999			
		Goods and Stock Finished Goods				Page 1 of 10			
		March 1999							
Item Code: G04276431T		Description: CA 150 I BT (W/PL)				Section: M001 - Machining			
Date	Transfer Type	Received No	Issued No	Received		Issued		Balance	
				Qty	@	Total Qty	Receive No	Qty	@
01/03/1999	0-Balance							0.00	0.00
23/03/1999	2-Transfer	1999030984		3,730.00	21.51			3,730.00	
24/03/1999	4-Used		1999032095			283.00	1999030984	283.00	21.51
26/03/1999	4-Used		1999032005			1,082.00	1999030984	1,082.00	21.51
29/03/1999	4-Used		1999032007			292.00	1999030984	292.00	21.51
30/03/1999	4-Used		1999032009			1,075.00	1999030984	1,075.00	21.51
31/03/1999	4-Used		1999032011			948.00	1999030984	948.00	21.51
								50.00	
								1,075.72	

Figure J.6. Goods and Stock Finished Goods Report.

Logo		NAGAYAMA CO., LTD.				Print Date: 01/06/1999						
Unfinished Casting Goods Monthly Summary											Page 1 of 10	
March 1999												
Item Code	Description	Beginning Balance		In		Out		Ending Balance				
		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Cost/ Pcs		
G0002093T	B 125E 3 BS	32	10,456.91	616		647		1	346.28	346.28		
G00002105T	B 125E 4BS	0	0.00	250		250		0	0.00	0.00		
G00010401T	B 125H 1/2 BD	135	2,218.81	0		0		135	2,351.23	17.42		
G00010411T	B 125H 3/4 BD	18	452.46	0		0		18	479.47	26.64		
G0013303T	B 150 1/2 BTSE	0	0.00	800		789		11	281.74	25.61		
G00013332T	B 150 1-1/4 BTSE	45	4,046.06	0		35		10	952.79	95.28		
G00013342T	B 150 1-1/2 BTSE	0	0.00	380		327		53	7,004.51	132.16		
G00015704T	B 125H 1/4 BNS	18	330.65	0		0		18	350.38	19.47		
G00015714T	B 125H 3/8 BNS	143	2,350.29	0		0		143	2,490.56	17.42		
G00015725T	B 125H 1/2 BNS	0	0.00	1,664		1,631		33	777.60	23.56		
G00015735T	B 125H 3/4 BNS	0	0.00	1,850		1,850		0	0.00	0.00		
G00015745T	B 125H 1 BNS	16	850.78	2,200		2,216		0	0.00	0.00		
G00015745TF	B 125H 1 BNS(PF)	9	478.57	0		0		9	507.13	56.35		
G00015764T	B 125H 1-1/2 BNS	666	72,759.43	0		647		19	2,199.60	115.77		
G00015774T	B 125H 2 BNS	155	27,573.14	220		358		17	3,204.64	188.51		
G00016115T	B 125H 4 BNS	0	0.00	88		70		0	0.00	0.00		
G00020012T	B 100 1/2 BDR	56	1,028.68	0		0		56	1,090.07	19.47		
G00020022T	B 100 3/4 BDR	16	433.13	0		0		16	458.98	28.69		
G00020033T	B 100 1 BDR	3	133.42	0		0		3	141.38	47.13		
G00020111T	B 100 1/2 BDRL	45	609.08	0		0		45	645.44	14.34		
G00020132T	B 100 1 BDRL	35	1,150.49	0		0		35	1,219.16	34.83		

Figure J.7. Unfinished Casting Goods Monthly Summary Report.

Logo		NAGAYAMA CO., LTD.				Print Date: 01/06/1999				
		Machining Goods Monthly Summary				Page 1 of 10				
		March 1999								
Item Code	Description	Beginning Balance		In		Out		Ending Balance		
		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Cost / Pcs
K12015865A	D 125H 1-1/2 BNS AZM	0	0.00	540	7,921.85	540	7,921.85	0	0.00	0.00
K12015873A	D 125H 2 BNS AZM	0	0.00	550	11,059.59	550	11,059.59	0	0.00	0.00
K12070180A	D 125H 1/2 BNS AZM	0	0.00	323	1,059.49	323	1,059.49	0	0.00	0.00
K12071100A	D 125H 3/4 BNS AZM	0	0.00	218	967.04	218	967.04	0	0.00	0.00
KN1000063W	HL 63 RW	0	0.00	4,994	37,778.04	4,994	37,778.04	0	0.00	0.00
KN1000063Y	HL 63 RY	0	0.00	5,500	43,805.77	5,500	43,805.77	0	0.00	0.00
KN1000070W	HL 70 RY	0	0.00	999	10,724.98	999	10,724.98	0	0.00	0.00
KN1000080Y	HL 80 RY	0	0.00	1,000	11,942.58	1,000	11,942.58	0	0.00	0.00
KN100Z48RY	HL 48 RY	0	0.00	11,000	52,140.00	11,000	52,140.00	0	0.00	0.00
KN100Z55RW	HL 55 RW	0	0.00	1,760	10,507.20	1,760	10,507.20	0	0.00	0.00
KN100Z55RY	HL 55 RY	0	0.00	8,500	54,400.00	8,500	54,400.00	0	0.00	0.00
K00015895A	B 125H 3 BNS (NPT)	0	0.00	324	8,792.87	324	8,792.87	0	0.00	0.00

Figure J.8. Machining Goods Monthly Summary Report.

Logo		NAGAYAMA CO., LTD.					Print Date: 01/06/1999		
		Machining Manufacturing cost					Page 1 of 10		
		March 1999							
Item	Material	Raw Material Cost			Expected Chip Cost	Total Raw Material Cost	Direct Labor Cost	Factory Overhead Cost	Total Product Cost
		Cost per Pcs	Qty	Cost					
K02002085T	G02002085T	65.66	76,954.51	1,359	89,237.82	76,954.51	5,370.86	27,073.63	109,399.00
K02002094T	02002094T	99.43	61,310.71	707	70,294.60	99,118.63	5,312.27	26,778.29	131,209.19
		104.03	37,807.92	414	43,068.64	5,260.50			
K02002105T	G02002105T	108.14	14,542.04	170	18,383.40	14,542.04	983.88	4,959.56	20,485.47
K02085024T	G02085024T	8.70	31,024.14	4,571	39,773.19	181,441.82	7,721.64	38,923.54	228,086.99
		9.04	7,970.81	1,119	10,112.62	2,144.95			
		9.22	142,446.87	19,496	179,762.87	37,306.25			
K02085034T	G02085034T	11.66	54,715.53	5,771	67,295.57	54,715.54	2,049.50	10,331.22	67,096.26
K02085043T	G02085043T	17.40	5,914.26	410	7,134.98	5,914.26	457.04	2,303.86	8,675.16
K02085053T	G02085053T	23.01	21,372.26	1,108	25,495.94	21,372.26	429.59	2,165.47	23,967.32
K02085063T	G02085063T	32.80	85,317.85	3,080	101,038.44	85,317.86	1,314.76	6,627.51	93,260.14
K04212132T	G04212132T	99.90	8,808.41	97	9,690.30	8,808.41	0.00	0.00	8,808.41

Figure J.9. Machining Manufacturing Cost Report.



Logo		NAGAYAMA CO., LTD.			Print Date: 01/06/1999	
		Outside Machining Manufacturing Cost			Page 1 of 10	
		March 1999				
Item	Material Cost			Wage	Cost	Total Production
	Material	Cost per pcs	Qty (pcs)			Cost
Section: Azuma						
K12015865A	G12015865A	11.75	540	1,579.27	7,921.85	7,921.85
K12015873A	G12015873A	16.62	580	1,920.66	11,059.59	11,059.59
K12070180A	G12070180A	1.94	323	431.48	1,059.49	1,059.49
K12071100A	G12071100A	2.92	218	330.48	967.04	967.04
KN100063RW	GN100063RW	6.11	4,994	7,241.30	37,778.04	37,778.04
KN100063RY	GN100063RY	.611	5,500	10,175.00	43,805.77	43,805.77
KN100070RY	GN100070RY	8.44	999	2,297.70	10,724.98	10,724.98
KN100080RY	GN100080RY	9.39	1,000	2,550.00	11,942.58	11,942.58
KN100Z48RY	GN100Z48RY	3.20	11,000	16,940.00	52,140.00	52,140.00
KN100Z55RW	GN100Z55RW	4.70	1,760	2,235.20	10,507.20	10,507.20
KN100Z55RY	GN100Z55RY	4.70	8,500	14,450.00	54,400.00	54,400.00
Total						242,306.53

Figure J.10. Outside Machining Manufacturing Cost Report.



Logo	NAGAYAMA CO., LTD.		Print Date: 01/06/1999	
Casting Manufacturing Cost of Goods Produced			Page 1 of 10	
March 1999				
Direct Material Expenses:				
New Raw Material Consumed	49,642.81 kg.	3,185,232.75		
Returned Raw Material Consumed	99,287.00 kg.	5,304,481.05		
Beginning Unfinished Goods	16,121.21 kg.	1,071,407.51		
Returned Material Out	-85,179.00 kg.	-4,528,967.43		
Total Raw Material Consumed	79,872.02 kg.	5,032,153.87		
Total Production Weight	82,470.24 kg.	76,143.68 kg.	6,326.56 kg.	
Total Material Cost of Production		4,646,121.00	386,032.87	
Cost of Raw Material per Kg.		61.02	61.02	
Direct Labor Expenses:				
Wages - Worker		484,308.00		
Wages - Worker - Tech		12,022.88		
Wages - Worker - QC		40,604.10		
Wages - Worker - production		24,875.20		
Bonus - Worker		82,539.00		
Beginning Unfinished Goods		110,285.92		
Total Direct Labor Expenses		754,617.10		
Total Finished Goods Weight	82,470.24 kg.	76,143.68 kg.	6,326.56 kg.	
Total Cost of Production		696,727.97	57,889.13	
Cost of Direct Labor per Kg.		9.15	9.15	

Figure J.11. Casting Manufacturing Cost of Goods Produced Report.

Logo		NAGAYAMA CO., LTD.				Print Date: 01/06/1999		
Casting Goods Calculation Cost Sheet							Page 1 of 10	
March 1999								
Cost per Weight : Raw Material Cost = 61.02 Baht/kg    Labor Cost = 9.15 Baht/kg    Factory Overhead = 32.28 Baht/kg								
Item Code	Description	Production (pcs)	Unit Weight (kg)	Cost per Pes			Total Cost per Pcs	Total Cost
				Material cost	Labor Cost	Factory Overhead		
Section :                      Casting								
G00002093T	B 125E 3 BS	569.00	3.38	206.24	30.93	109.11	346.28	197,033.90
G00002105T	B 125E 4 BS	235.00	7.91	482.65	72.38	255.34	810.38	190,439.19
G000133503T	B 150 1/2 BTSE	735.00	0.25	15.25	2.29	8.07	25.61	19,286.21
G00013332T	B 150 1-1/4 BTSE	35.00	0.93	56.75	8.51	30.02	95.28	3,334.75
G00013342T	B 150 1-1/2 BTSE	243.00	1.29	78.71	1.80	41.64	132.16	32,115.00
G0001575T	B 125H 1/2 BNS	1,485.00	0.23	14.03	2.10	7.42	23.56	34,991.80
G00015735T	B 125H 3/4 BNS	1,778.00	0.37	22.58	3.39	11.94	37.91	67,397.76
G00015745T	B 125H 1 BNS	2,163.00	0.55	33.56	5.03	17.75	56.35	121,879.65
G00015764T	B 125H 1-1/2 BNS	580.00	1.13	68.95	10.34	36.48	115.77	64,145.73
G00015774T	B 125H 2 BNS	340.00	1.84	112.27	16.84	59.40	188.51	64,092.72
G00016115T	B 125H 4 BNS	56.00	9.02	550.38	82.53	291.17	924.10	51,749.55
G00025342T	B 150 1/2 BT	5,083.00	0.29	17.70	2.65	9.36	29.71	151,018.46
G00025352T	B 150 3/4 BT	3,101.00	0.46	28.07	4.21	14.85	47.13	146,140.83
G00025383T	B 150 1-1/2 BT	692.00	1.59	97.02	14.55	51.33	162.90	112,723.69
G00025392T	B 150 2 BT	1,345.00	2.66	162.31	24.34	85.87	272.52	366,535.37
G00026140T	B 150 1 BSU	135.00	0.54	32.95	4.94	17.43	55.32	7,468.61
G00026160T	B 150 1-1/2 BSU	24.00	1.04	63.46	9.52	33.57	106.55	2,557.15
G00076320T	B 150 3 BT	300.00	5.73	349.63	52.43	184.97	587.04	176,111.56
G00085435T	B 125E 3/4 BSSE	2,636.00	0.26	15.86	2.38	8.39	26.64	70,215.13
	Total							1,820,079.28

Figure J.12. Casting Goods Calculation Cost Sheet Report.

Logo		NAGAYAMA CO., LTD.				Print Date: 01/06/1999					
Casting Raw Material Consumption Cost										Page 1 of 10	
March 1999											
Item Code	Description	Beginning Balance		In		Ending Balance		Raw Material Used			
		kg	Baht	kg	Baht	kg	Baht	kg	Baht		
Casting Raw Material:											
AAB0010	Ingot BC-1	0.00	0.00	3,461.00	240,868.49	0.00	0.00	3,461.00	240,868.49		
AAB0060	Ingot BC-6	0.00	0.00	43,121.00	2,743,951.79	0.00	0.00	43,121.00	2,743,951.79		
AAB0100	Copper Scrap	0.00	0.00	1,370.00	76,599.50	0.00	0.00	1,370.00	76,599.50		
AAB0120	Tin	0.00	0.00	134.50	29,589.71	0.00	0.00	134.50	29,589.71		
AAB0130	Lead	0.00	0.00	322.60	11,291.00	0.00	0.00	322.60	11,291.00		
AAB0140	Zn	0.00	0.00	778.20	34,271.93	0.00	0.00	778.20	34,271.93		
AAB0160	P-Copper	0.00	0.00	455.51	48,660.33	0.00	0.00	455.51	48,660.33		
AAB0140	ZN	0.00	0.00	76.80	3,382.27	0.00	0.00	76.80	3,382.27		
	Sub Total	0.00	0.00	49,719.61	3,188,615.02	0.00	0.00	49,719.61	3,188,615.02		
Return Material:											
AAB1020C	Runner BC-2	0.00	0.00	4,624.00	254,164.80	0.00	0.00	4,624.00	254,164.80		
AAB1021M	Defective BC-2	0.00	0.00	200.00	10,634.00	0.00	0.00	200.00	10,634.00		
AAB1022C	Chip BC-2 DRY	0.00	0.00	600.00	35,262.00	0.00	0.00	600.00	35,262.00		
AAB1060C	Runner BC-6	0.00	0.00	74,018.00	3,942,310.52	0.00	0.00	74,018.00	3,942,310.52		
AAB1061C	Defective BC-6	0.00	0.00	6,103.00	326,013.31	0.00	0.00	6,103.00	326,013.31		
AAB1061M	Defective BC-6	0.00	0.00	3,141.00	167,367.21	0.00	0.00	3,141.00	167,367.21		
AAB1062M	Chip BC-6 Dry	0.00	0.00	9,761.00	519,930.89	0.00	0.00	9,761.00	519,930.89		
AAD1010M	Bar Scrap DR-Alloy	0.00	0.00	840.00	48,798.32	0.00	0.00	840.00	48,798.32		
	Sub Total	0.00	0.00	99,287.00	5,304,481.05	0.00	0.00	99,287.00	5,304,481.05		
	Grand Total			149,006.61	8,493,096.07			149,006.61	8,493,096.07		

Figure J.13. Casting Raw Material Consumption Cost Report.

## BIBLIOGRAPHY

1. Alan L. Elaison, Systems Development: Analysis, Design, and Implementation, HarperCollins Publishes, 1990.
2. Charles P. Pfleeger, Security in Computing, Prentice Hall International, Inc, 1997.
3. Dr. Chittayasothorn Suphamit, Relational Database Design, Institute of Thai Information Technology, 1994.
4. Elmasri/Navathe, Fundamentals of Database System, The Benjamin/Cummings Publishing Company, Inc. 1994.
5. Kenneth E. Kendal and Julie E Kendall, System Analysis and Design, Prentice Hall International Editions, 1995.
6. Roger S. Pressman, Software Engineering: A Practitioner's Approach, 3<sup>rd</sup> Edition, McGraw-Hill International Editions, Singapore: International Edition 1992.

