

Chapter 6

Program Development

6.1 Introduction

This chapter is to develop computer application or program (in this thesis called *Project Store Management Program*) to use for stock control as an aid in the management and control of inventories. Obviously, when large quantities of numbers have to be kept readily available and be changed time to time, the computer is the direction to go for assistance if its use can be justified.

Computer application to stock control

Benefits sought from computer application are generally to assist towards the reduction in inventory levels, to improve efficiency of recording, to provide a more efficient service to users, to reduce administrative costs. These benefits are derived from computer technology, which provides :

- Speedier storage and retrieval of data
- Ability to handle urgent complex forecasting
- Speedier arithmetical calculations relating to inventory levels
- Prompt updating facility for all users
- Quicker and better decision making from a wider range of options

Computers reduce the volume of documentation and tedious clerical work, freeing staff for more productive and creative work.

Areas of application

There are a number of areas of application, important ones being as follows :

- Forecasting
- Stock status reports
- Stock replenishment signaling
- Obsolescence and slow-moving stock identification
- Standardization and variety reduction investigation
- Reorder point and quantity calculations

Important aspects for consideration are as below :

Suitability of proposed system

The foremost consideration is that it is designed to meet the needs of all users. Another possible requirement is a viable and economic capability for future development.

Selling of proposals to staff

It is vital to win the support of all staff involved in the new proposals, as there will be some natural reluctance to change. Legitimate concern of staff must be anticipated and handled sensibly, with prejudice and inertia being overcome.

Smooth transfer of application

This applies to a change from manual to computer application or further computer development. A realistic time-scale must be set with a clear cut-off point. The viewpoints of all involved should be considered. Temptation to retain major elements of the superseded system as a back-up must be resisted. Failure to do this will result in a costly and inefficient hybrid system being operated. Security of the system includes input and output control authority, confidentiality and avoidance of loss of data. The services of a fully trained and competent systems specialist could be required with particular specialism in materials management.

6.2 Conceptualization

Material handlers still manually record the receiving and shipment transactions of materials. But, the written transactions are keyed and electronically posted to records in side a computer. *There is little or no change in data gathering and material handling procedures.*

The main advantage is the creation of a central database that can be used in a variety of ways by different functions. The computerization also eliminates almost all arithmetic errors. The net effect is that little is done to improve accuracy.

The basic methods of the inventory record in program involve three steps :

1. When material is received (or returned from field work) and added to the inventory, a new inventory balance is calculated by adding the receipt quantity to the prior on-hand balance.
2. When material is withdrawn from the inventory, another new balance is calculated by subtracting the quantity withdrawn from the quantity on hand prior to the withdrawal.
3. From time to time, for a variety of reasons, it may be found that the recorded on-hand balance differs from the quantity actually on hand. In these cases, the records are updated by adding an adjustment to the on-hand balance or subtracting an adjustment from it, as necessary.

These three steps can be combined into a single equation, called the *perpetual inventory equation*. It looks like this :

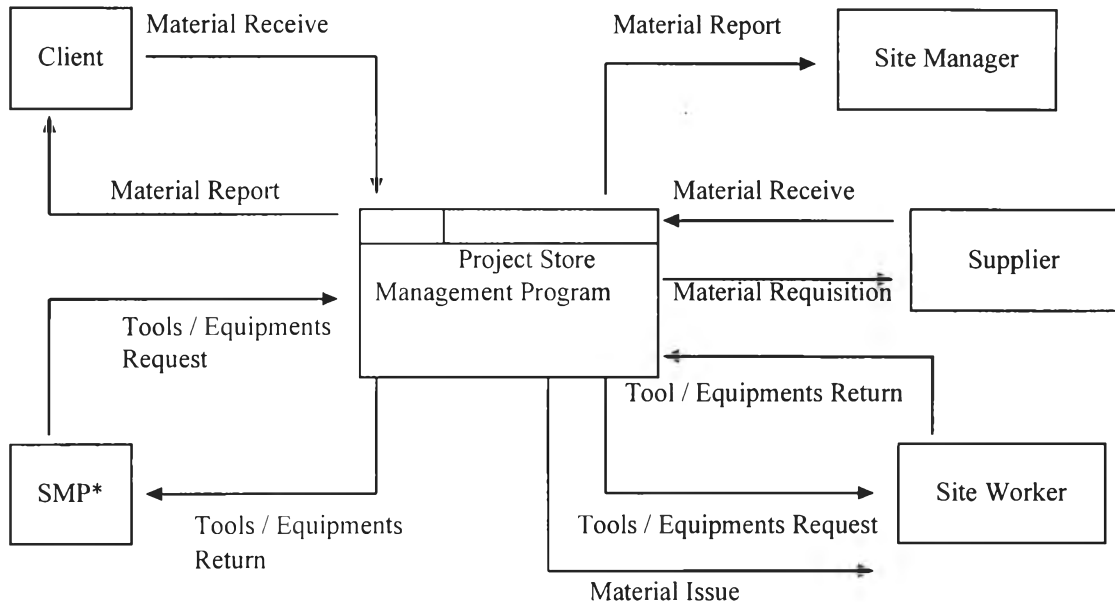
$$\text{COH} = \text{POH} + \text{R} - \text{I} + \text{Re} \pm \text{A}$$

COH	the current on-hand balance
POH	the previous on-hand balance
R	the quantity received
I	the quantity issued
Re	the quantity returned
A	the quantity of the adjustment

Thus, computers can use data on receiving and withdrawals to maintain the amount of stock on hand for all the inventory items controlled by the computer system.

6.3 Program Design and Using

6.3.1 Context diagram



* SMP Supply Management & Procurement Division

Figure 6-1 : Context diagram

As changes in inventory level occur, the computer files are modified to reflect the latest inventory transactions. Managers can query these files and instantaneously determine how much of a material, tool/equipment is in inventory, how much of a material is on order, or other information critical to inventory management.

Project Store Management Program is divided to 3 major parts :

- ***Inventory status recording***
- ***Information updating***
- ***Reporting***

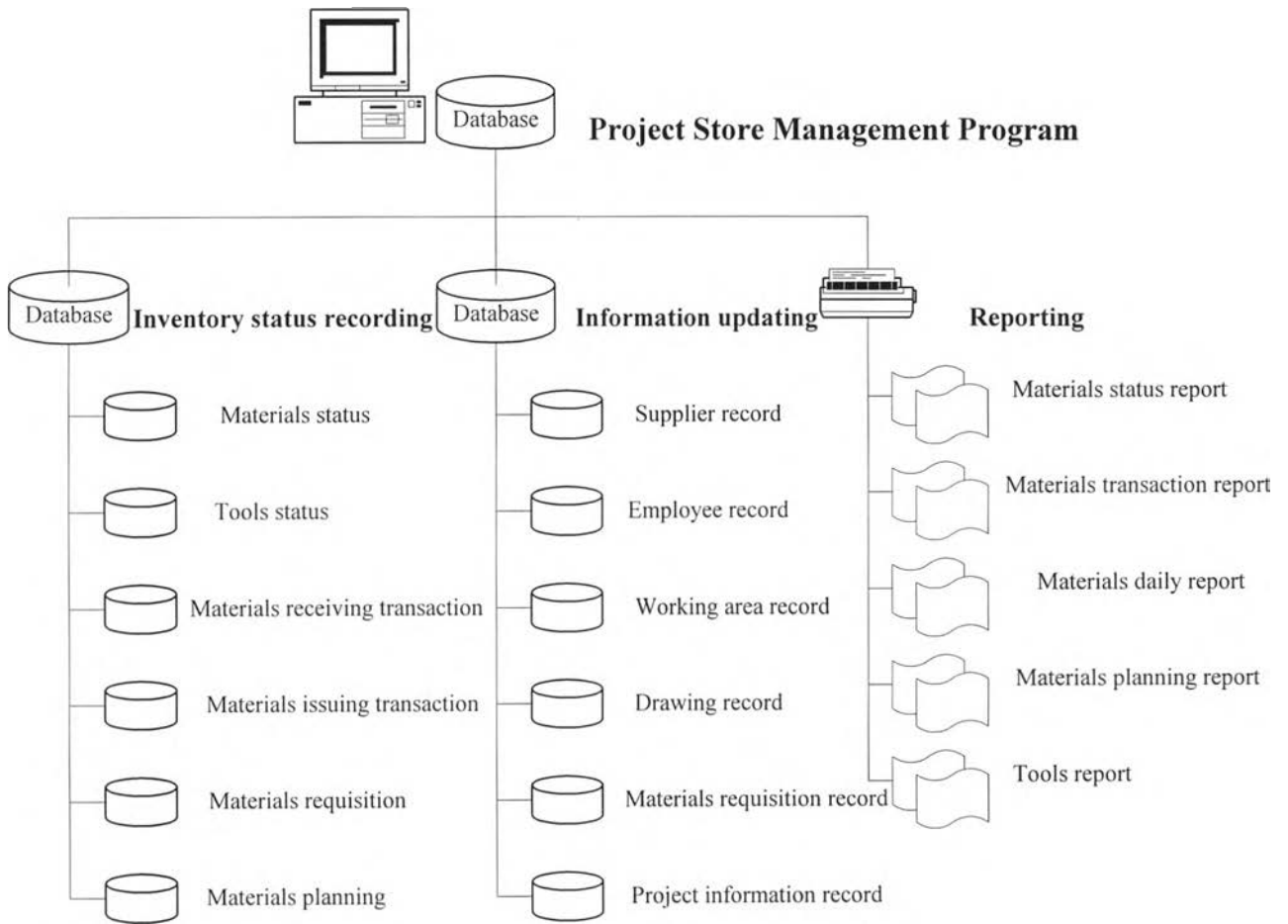


Figure 6-2 : Project Store Management Program Database

6.3.2 Inventory status recording

Materials status

Materials Management

Material code: -

Location:

Unit:

Price/unit: Remaining in Store: 0.00

Material Schedule: Need Remaining: 0.00

Safety stock: Waiting Quantity: 0.00

Purchase quantity:

Remark:

Received			Issued		
Date	Last	Total Received	Date	Last	Total Issued
//	0.00	0.00	//	0.00	0.00

Figure 6-3 : Material Status screen

Material Status screen displays a complete record of each material held in inventory. These records are kept up to date by inventory transactions such as receipts or withdraw (disbursement).

Material code is simplified for computerized application. Symbol, particularly numerical, is suited to computer recording, identification of item with possible common application, and elasticity in catering for expansion of the range and amendments.

Material Schedule is to record the level above or the total quantity plan which the total requisition should not be permitted to rise.

Safety Stock is to record the component of stock which is provided to cover unpredictable contingencies such as unforeseen heavy demands or delays in deliveries.

Remaining in Store is to report the on-hand balance, calculated by adding the total receipt quantity to and subtracting the total quantity withdrawn from the prior on-hand balance.

$$RS = POH + R - I$$

RS	the remaining in store
POH	the previous on-hand balance
R	the total quantity received
I	the total quantity issued

Need Remaining is to report the quantity replenishment required to fulfill the materials schedule (total quantity plan) ,calculated by subtracting the total receipt quantity from the schedule.

$$NR = Sch - R$$

NR	the need remaining
Sch	the total quantity plan
R	the total quantity received

Waiting Quantity is to report the quantity waiting for receipt, calculated by subtracting the quantity currently received from the requisition quantity during delivery

$$WQ = Req - Rc$$

WQ	the waiting quantity
Req	the requisition quantity during delivery
Rc	the quantity currently received

Tools status

Figure 6-4 : Tool Status screen

Tool system is paramount to the effective planning, control and organization of tools in site operation. The efficient storage and retrieval of pertinent tool information enables the successful implementation of tool requirement planning, tool flow strategies, tool allocation and replacement.

The database system can provide such management planning information as

- purchasing of tools
- inventory control of tools
- tool cost control
- scheduling of tool requirement, and
- utilization of tools

The level of tool inventory requirement is affected by the tooling strategy employed, as well as the need for buffer tools (due to tool failure, tools being circulated, and new tools in preparation).

From screen displays, when tool items are replenished from various sites cross-transferring or field work returning, or similarly withdrawn for use or further transferring, every transaction must be identified and the program records will be modified to reflect the actual quantities of items on hand.

Materials transaction

Materials Receive

Report No.: Material from Client **Total:** 0.00
 Report Date: Supplier:

Add Item

Item:

Material No.: -

Quantity:

Price:

Discount:

MR No.: 0.00

For Area:

Remark:

Figure 6-5 : Material receiving transaction record screen

Materials Issue

Report No.:
 Report Date:

#	Mat No.	Description	Q'ty	Area	Employee
<div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p style="text-align: center;">Add Item</p> <p>Item: <input type="text" value="1"/></p> <p>Material No.: <input type="text"/> - <input type="text"/> <input type="button" value="..."/></p> <p>Quantity: <input type="text" value="0.00"/></p> <p>For Area: <input type="text"/> <input type="button" value="..."/></p> <p>Employee No.: <input type="text"/> <input type="button" value="..."/></p> <p>Remark: <input style="width: 100%;" type="text"/></p> <p style="text-align: center;"><input type="button" value="Save"/> <input type="button" value="Cancel"/></p> </div>					

Figure 6-6 : Material issuing transaction record screen

Stock records are updated at the time materials are received into or issued from inventory. The time lag between the last updating of the stock records and the time the records are accessed to determine the inventory balance is practically eliminated.

Materials Requisition

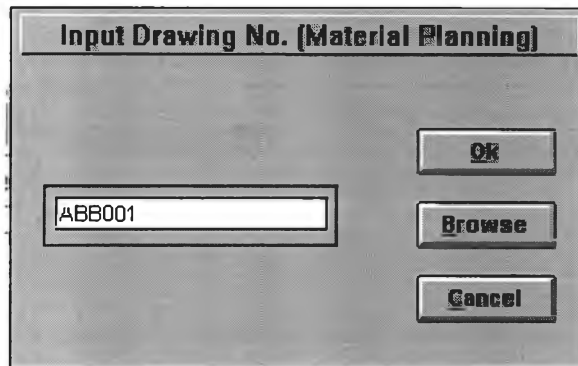
Figure 6-7 : Materials Requisition record screen

Figure 6-8 : Materials Requisition record screen (add item)

Material Requisition (MR) is a request to purchasing department to purchase. Usually these requisitions are used to replace stocks of materials in stores and to be reference in the material control records.

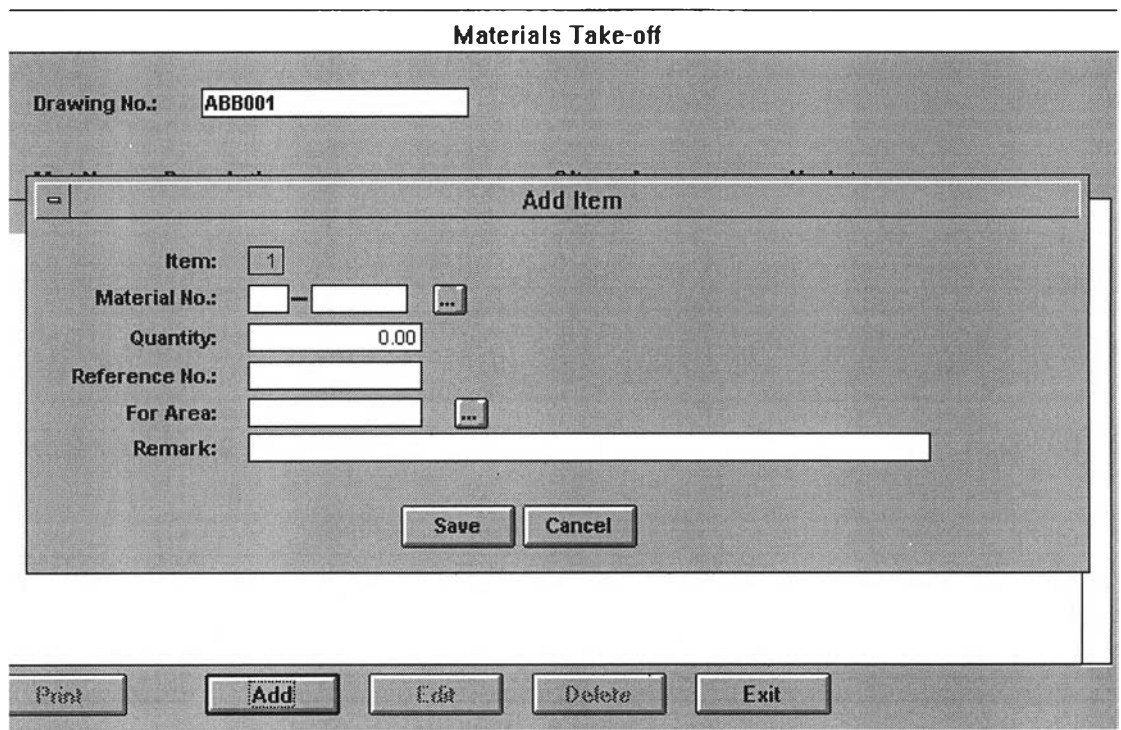
Each requisition is identified by MR number and usually contains the MR date, supplier's name, items list to order, quantity and price etc.

Timing the release of a requisition requires that all segments of lead time be considered. These segments include the planner's time, the purchaser's time, the time required by the supplier to process and ship the order, receipt and inspection of the material, and movement of the order to the required work centre. If quotations are required prior to order placement, additional time is required.

Materials planning

A dialog box titled "Input Drawing No. (Material Planning)". It features a text input field containing "ABB001". To the right of the input field are three buttons: "OK", "Browse", and "Cancel".

Figure 6-9 : Drawing No. record screen



The "Materials Take-off" screen displays the "Drawing No.:" as "ABB001". An "Add Item" dialog box is overlaid on the screen, containing the following fields:

- Item: 1
- Material No.: [] - [] ...
- Quantity: 0.00
- Reference No.: []
- For Area: [] ...
- Remark: []

At the bottom of the dialog box are "Save" and "Cancel" buttons. At the bottom of the main screen are "Print", "Add", "Edit", "Delete", and "Exit" buttons.

Figure 6-10 : Material take off record screen

Monthly materials report

Monthly Material

Mat_gr:

Period: -

Unit:

Total Plan: 0.00

	Receive	Issue	In Store	Report Form
Previous:	<input type="text"/> 0.00	<input type="text"/> 0.00		<input checked="" type="radio"/> Mat0056
This Period:	<input type="text"/> 0.00	<input type="text"/> 0.00		<input type="radio"/> Mat0057
Accumulate:	0.00	0.00	0.00	
Remain from plan:	0.00	0.00		

Figure 6-11 : Monthly materials report screen

6.3.3 Information updating

All needed informations related on completely inventory recording i.e. supplier list, employee list, working area list etc. are continuously updated in data base file and applied throughout the program for reference.

The screenshot shows a window titled "Supplier" with a form for entering supplier information. The form includes the following fields:

- Supplier No.: [Text box]
- Supplier: [Text box]
- Contact: [Text box]
- Address: [Three stacked text boxes]
- Telephone: [Text box]
- Fax: [Text box]

At the bottom of the window is a control bar with the following buttons: Top, Prev, Next, End, Locate, Add, Save, Cancel, Print, Close.

Figure 6-12 : Supplier record screen

The screenshot shows a window titled "Employee" with a form for entering employee information. The form includes the following fields:

- Employee No.: [Text box]
- Name: [Text box]

At the bottom of the window is a control bar with the following buttons: Top, Prev, Next, End, Locate, Add, Save, Cancel, Print, Close.

Figure 6-13 : Employee record screen

Area

Area:

Description:

Start date:

Finish date:

Top Prev Next End Locate Add Save Cancel Print Close

Figure 6-14 : Working area record screen

Installation Drawing

Drawing No.:

Description:

Revise No.: Date:

Void:

Remark:

Take-off status: None
 Complete
 Partial
 Cancel

Top Prev Next End Locate Add Save Cancel Print Close

Figure 6-15 : Drawing record screen

Material Requisition

MR No.:

MR date:

Supplier No.: ...


PO No.:

PO date:

Status: 1. Not yet Receive
 2. MR Cancelled
 3. Partial Receive
 4. Completed

Top Prev Next End Locate Add Save Cancel Print Close

Figure 6-16 : Material requisition record screen



Project Information

Company:

Project Name:

Figure 6-17 : Project information record screen

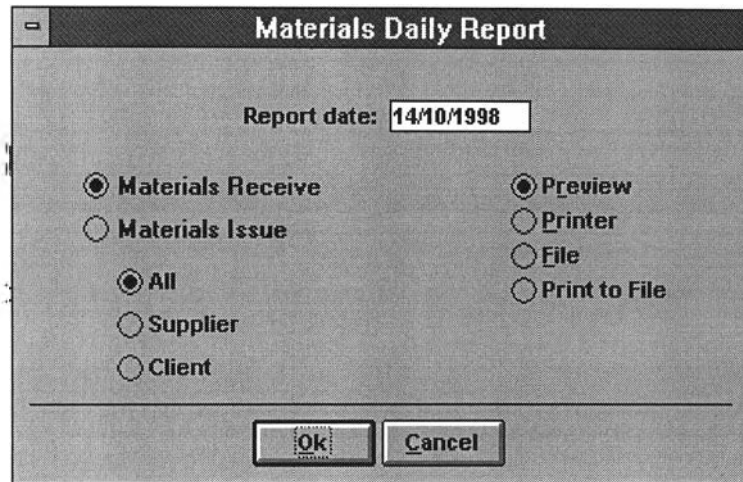
6.3.4 Reporting

Material controller may be responsible for controlling the inventory of hundreds or thousands of items. Under manual systems, the material controller had to devote much time to reviewing data on these items to find the small number that needed action at a given time.

With the program, this search is promptly performed and reported by a wider range of options selected by the computer system. Those items are listed on the reports by the selected condition needing attention, such as report on material shortage items etc. As a result, the material controller can concentrate his time and effort on those few items currently needing attention.

Figure 6-18 : Material status report screen

Figure 6-19 : Material transaction report screen

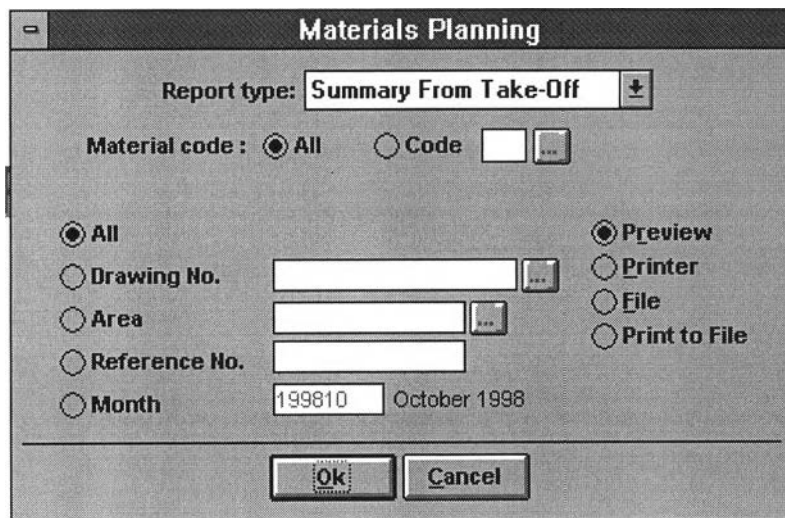


Materials Daily Report

Report date:

Materials Receive Preview
 Materials Issue Printer
 All File
 Supplier Print to File
 Client

Figure 6-20 : Material daily report screen



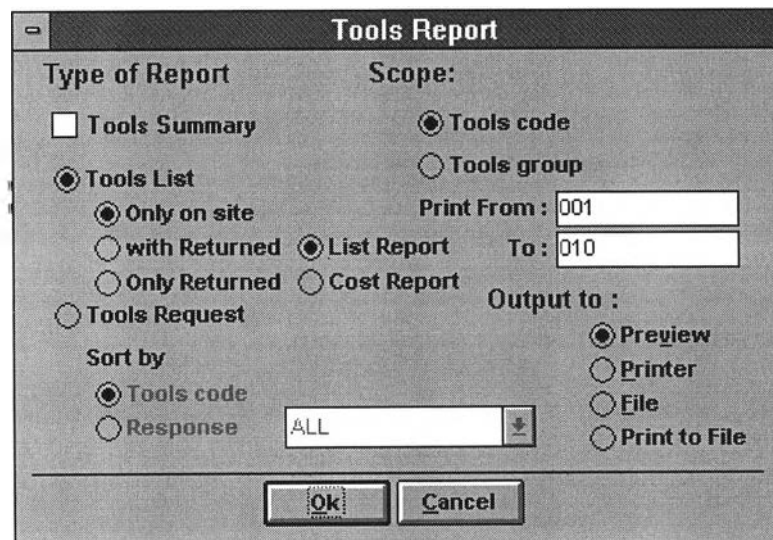
Materials Planning

Report type: ▾

Material code : All Code

All Preview
 Drawing No. Printer
 Area File
 Reference No. Print to File
 Month October 1998

Figure 6-21 : Material planning report screen



Tools Report

Type of Report Scope:

Tools Summary Tools code
 Tools List Tools group
 Only on site Print From :
 with Returned List Report To :
 Only Returned Cost Report
 Tools Request Output to :

Sort by

Tools code Preview
 Response ▾ Printer
 File
 Print to File

Figure 6-22 : Tools report screen

6.4 Program characteristic

6.4.1 Hardware

The Project Store Management program is to be developed and operated on Personnel Computer. The minimum specification requirement of RAM should be 8 MB up (the Microsoft Foxpro 2.6 can be operated at RAM 4 MB up). The space on Hard disk requires 20 MB up and the monitor used should be VGA up.

Hardware	Specification requirement
Microprocessor	80486
RAM	8 MB
Hard disk	20 MB
Monitor	VGA

Table 6-1 : Minimum hardware specification

6.4.2 Software

Operation System (OS)

The development of program used the operating system of Windows 95 and be able to run on Windows for Workgroups 3.11.

Application Software

The application software used for development is Microsoft Foxpro 2.6 for Windows and the developed program can run on PC by standalone, no need Microsoft Foxpro software further but only use library file.

Software Tools

The program is to be developed by the *CASE tools* or the easy case is to be applied for program design.

6.4.3 Program Capability

- ability to use for both multi-user and one user (standalone)
- accurate arithmetical calculations relating to inventory levels
- speedier storage and retrieval of data
- immediate access to inventory data files for status review
- ability to immediately update data files
- maintain data stability
- provide completed form on screen with data fields ; on-screen language easily understood by the user, easy-to-use data entry screens, provide command button use on screen
- ability to access and integrate data from various screens
- generate various reports format from available data
- customize queries and reports
- security access for data protection
- flexibility and ability to upgrade

6.4.4 Commands Button

Commands and functions used for data administration are grouped in the Commands Button, which is located at each screen. Each button's commands are grouped according to their functions



Figure 6-23 : Example of Command Button

The command button used in the program can be summarized as the below table


Button name	Contains Command for
Add	Adding the record
Browse	Invoking a browse on the current table
Cancel	Undoing the currently operation
Close	Closing the screen open in the current work area, leaving that work area selected and available for use by another screen.
Delete	Deleting the currently selected record.
Edit	Selecting and editing text, replace record
End	Viewing the last record
Prev	Viewing the previous record
Top	Viewing the first record
Exit	Exiting a file
File	Exporting data to DBase format file
Goto	Searching the record meeting with the selected data.
Help	Contents, search and technical help
Locate	Viewing the data table of the current work area for searching
Next	Viewing the next record
OK	Condition confirmation
Preview	Previewing the data report prior the printing
Print	Exporting the data report to printer
Save	Save on the updating record
Select	Selecting the interested record
	Viewing the data table relating to the selected field

Table 6-2 : Command Button functions