CHAPTER 6
MRP SYSTEM

6. MRP System

This chapter gives details about the MRP system that was developed within the SME. Details include dataflow within the MRP system, cross functional dataflow when using the system compared to the old method and a comparison with a commercial system.

6.1. System Operation

When firm orders have been received from the sales department, a draft MPS can be drawn up by the production manager. The draft is then input into the MRP system using the MPS input interface, and then the system is run, using the MRP computation programme, to obtain a draft component schedule. Figure 6.2 shows the dataflow within the MRP system.

Once a draft component schedule is produced, it is then checked for production feasibility. This involves checking with ABC Subsidiary to see if they have sufficient capacity in the future to meet the component demand. If production is feasible, then the MPS is set. If production is not feasible, the MPS is re-drafted and re-input into the MRP system. This is done until the output is satisfactory for both the TKM Department and ABC Subsidiary.

When the MPS is set, the stock department can use the MRP system to send a weekly purchasing plan and component orders for that week. The purchasing department will place orders with ABC Subsidiary, and, because the component order schedule allows for leadtimes, the components will arrive in time for production to start on the end items that require them. Figure 6.3(a) and 6.3(b) show the cross-functional dataflow within the company. Figure 6.4 show the dataflow for the old method. The old method did not check for on hand amounts, and if there were not sufficient

components production had to be delayed until the materials had arrived. The length of the delay was dependent on the available capacity of ABC Subsidiary.

6.2. User Interfaces

This section shows the user interfaces that are part of the MRP system. There are two user interfaces; one is the MPS data input interface, which is show in Figure 6.5(a) and 6.5(b), the other is the MRP computation programme, which is shown in Figure 6.6.

The MPS input interface is for the TKM production manager's use only, because it's his task to determine the production schedule. The interface consists of a data grid, where the production schedule data is input directly, buttons to navigate the data on the grid, a delete function to delete unwanted rows on the grid, and a print function to print a hard copy of the MPS. Draft copies of the MPS can be saved and loaded by accessing the 'Save' and 'Open' commands in the 'File' menu.

6.3. Database

The tables in the inventory database that are relevant to the MRP system are shown in Figure 6.1 along with the additional MPS table. The MPS table is required to store production schedule information such as order id ('ORDER_ID'), model code for the product ('MODELCODE'), quantity of the product to be produced ('Qty'), the date for production start and the deadline ('Start_Date' and 'End_Date'). Also, the MPS is required to store quantities of products to be produced in weekly time buckets ('Week_1' to 'Week_8').

The MRP system was required to have a rolling timeline, where, at the beginning of each week the MPS is updated to always show data for the following week as 'Week_1', data for the week after as 'Week_2' and so on. To do this the database required the use of stored procedures. A stored procedure is a routine that are written in Transact-SQL, which is used to automate tasks that need to be carried out on the database. The stored procedure works in the following manner:

1. Check if it is the beginning of the week.
2. Remove all the quantity data stored in 'Week_1', because it has become the current week.
3. Shift the quantity data in the other weeks along by one week.

Check if rows contain any quantity data in 'Week_1' to 'Week_8'; if this is not the case then the row is deleted. This is because each row represents an order, and if the eight week plan no longer contains quantity data it is assumed that the order has been completed.

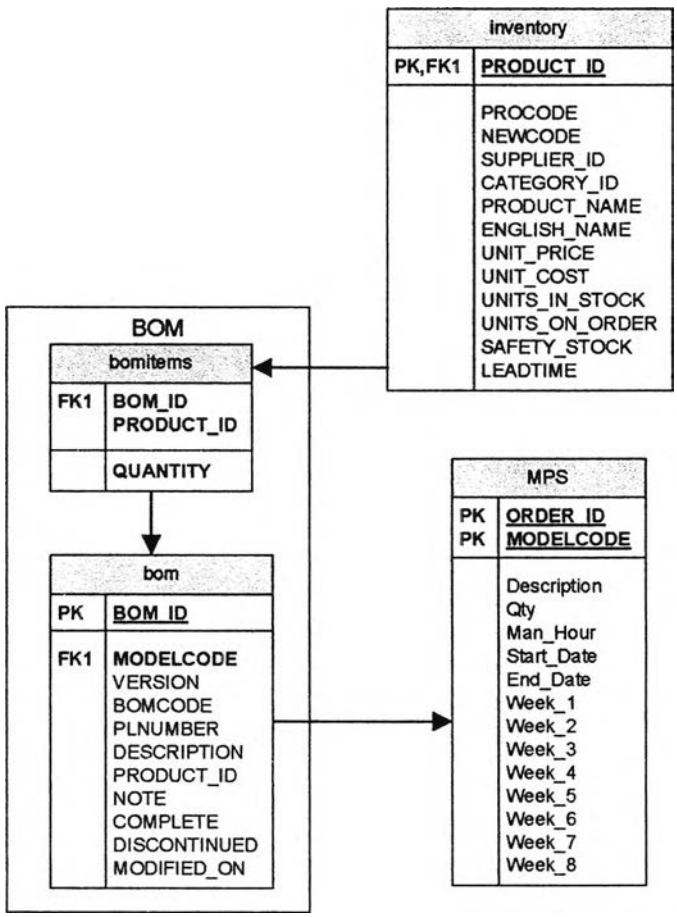


Figure 6.1 Database tables used by the MRP system

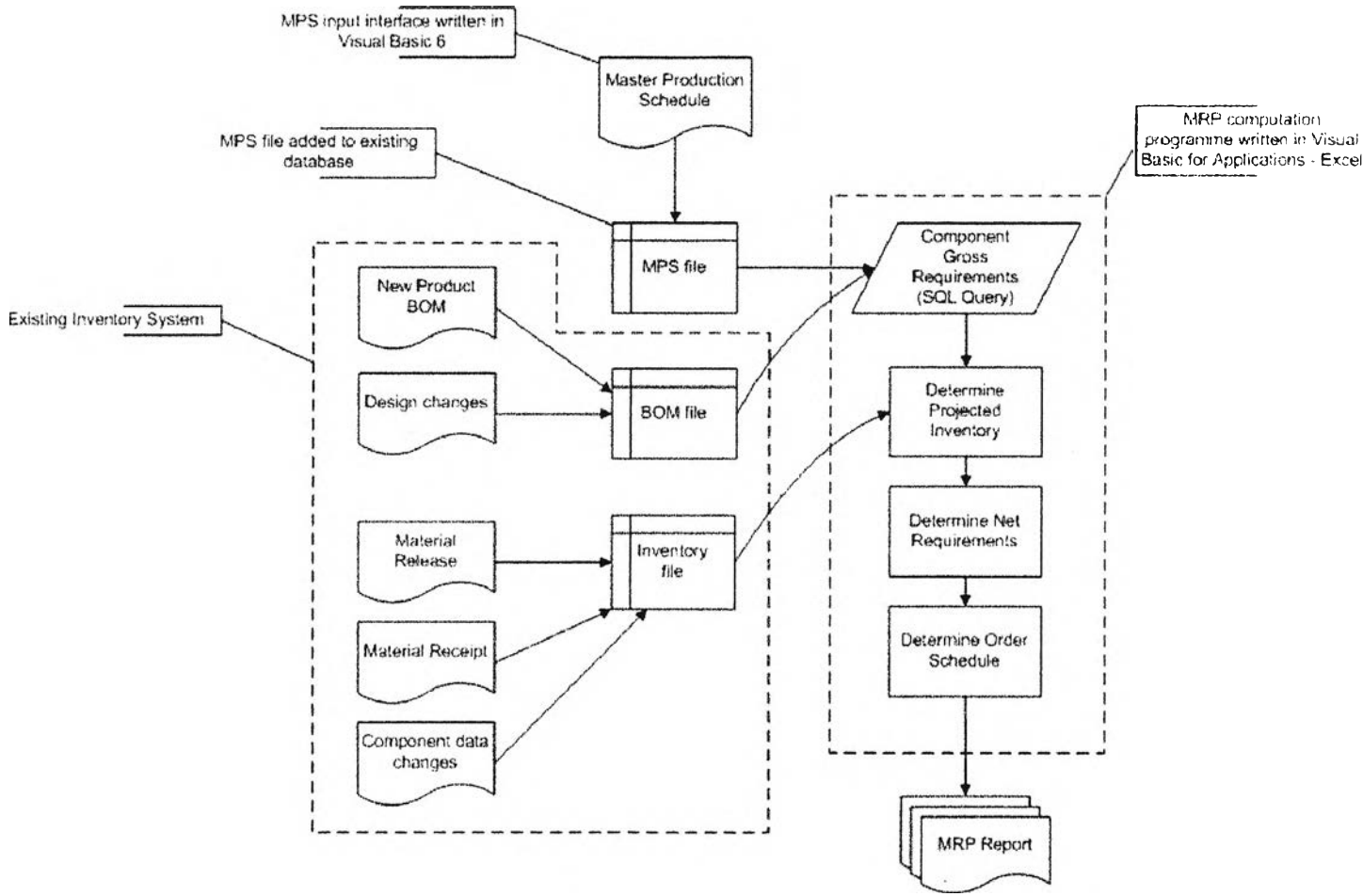


Figure 6.2 Dataflow within MRP system

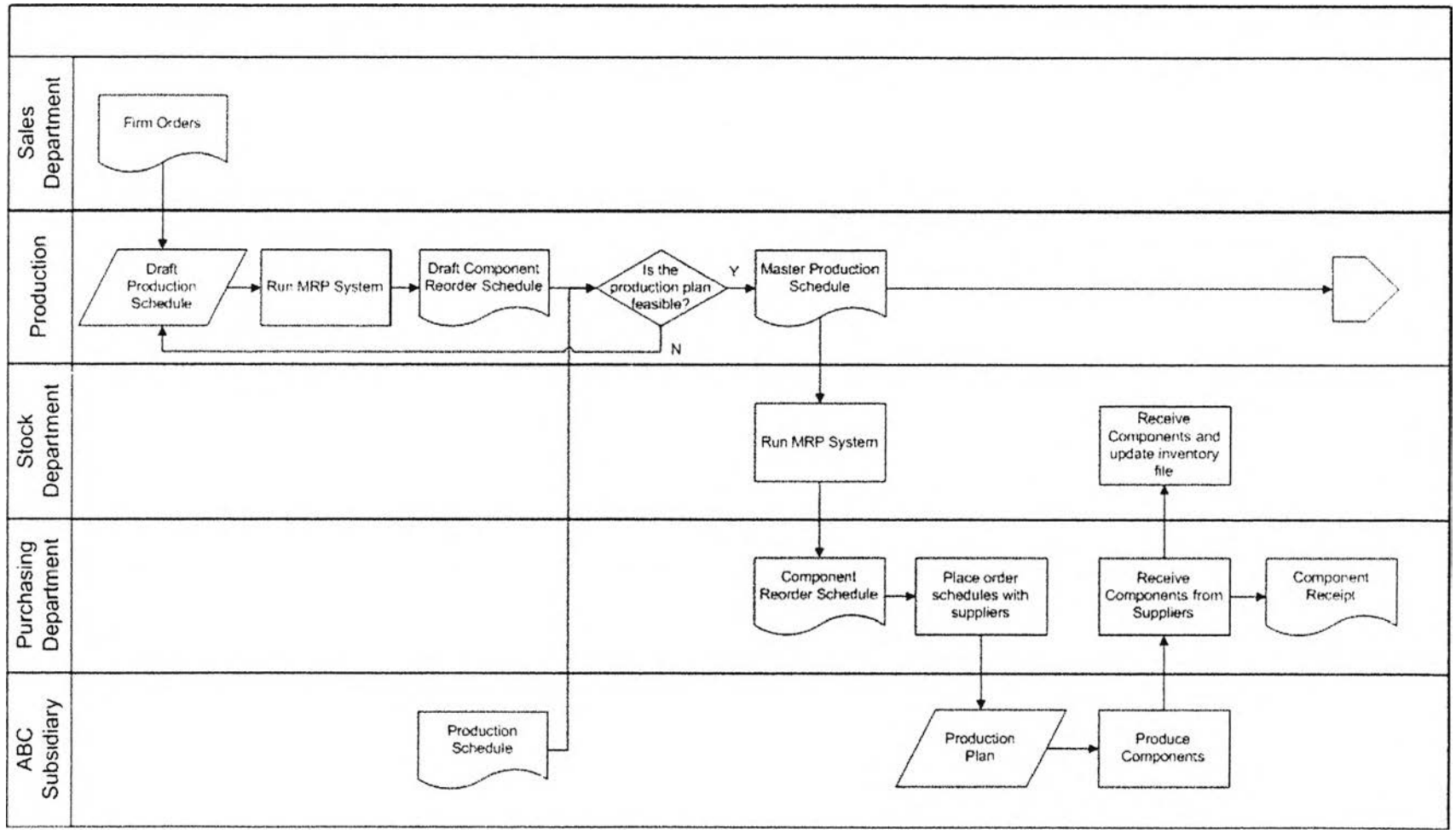


Figure 6.3(a) Cross-functional dataflow within the company using the MRP system

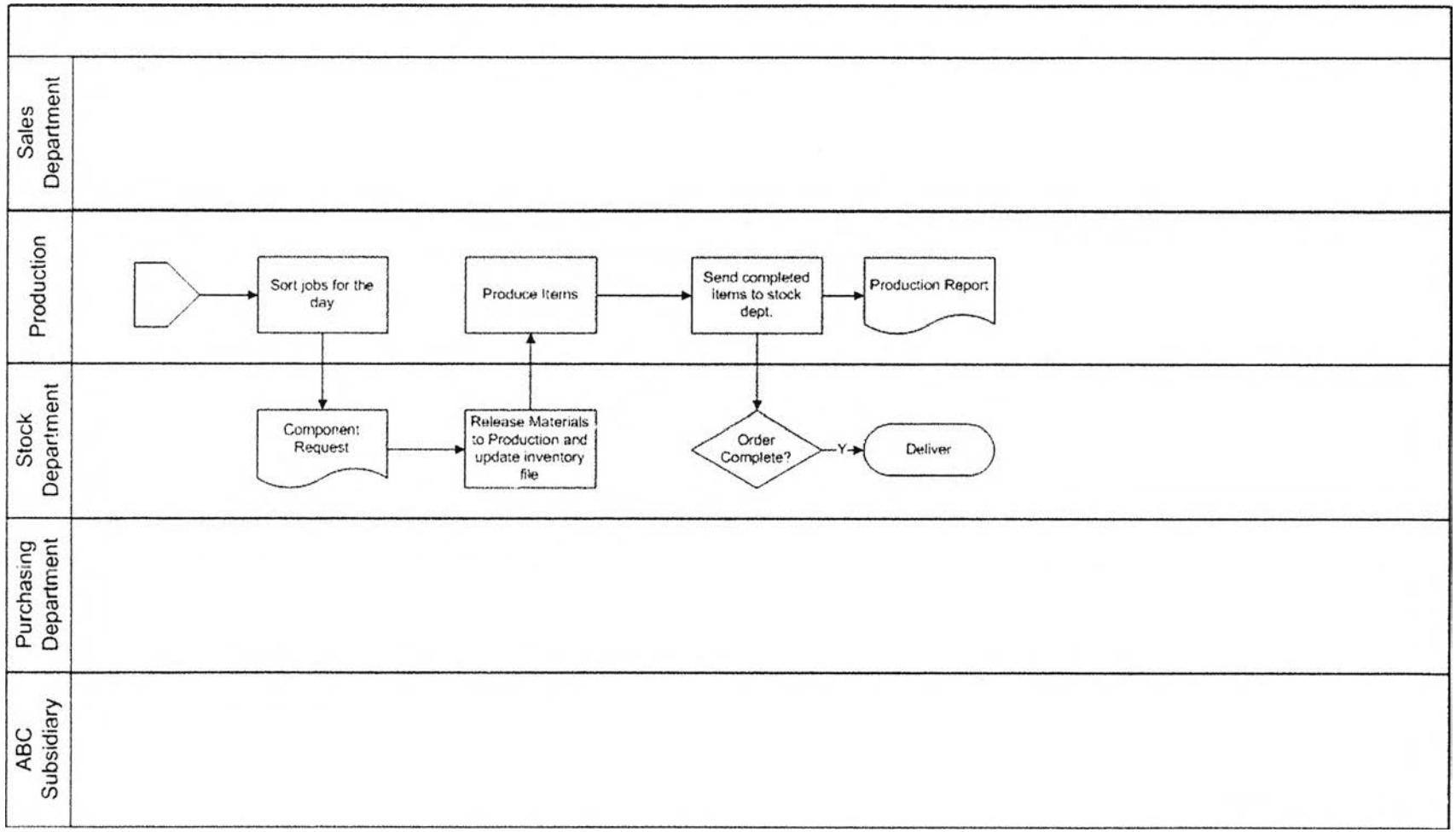


Figure 6.3(b) Cross-functional dataflow within the company using the MRP system (cont)

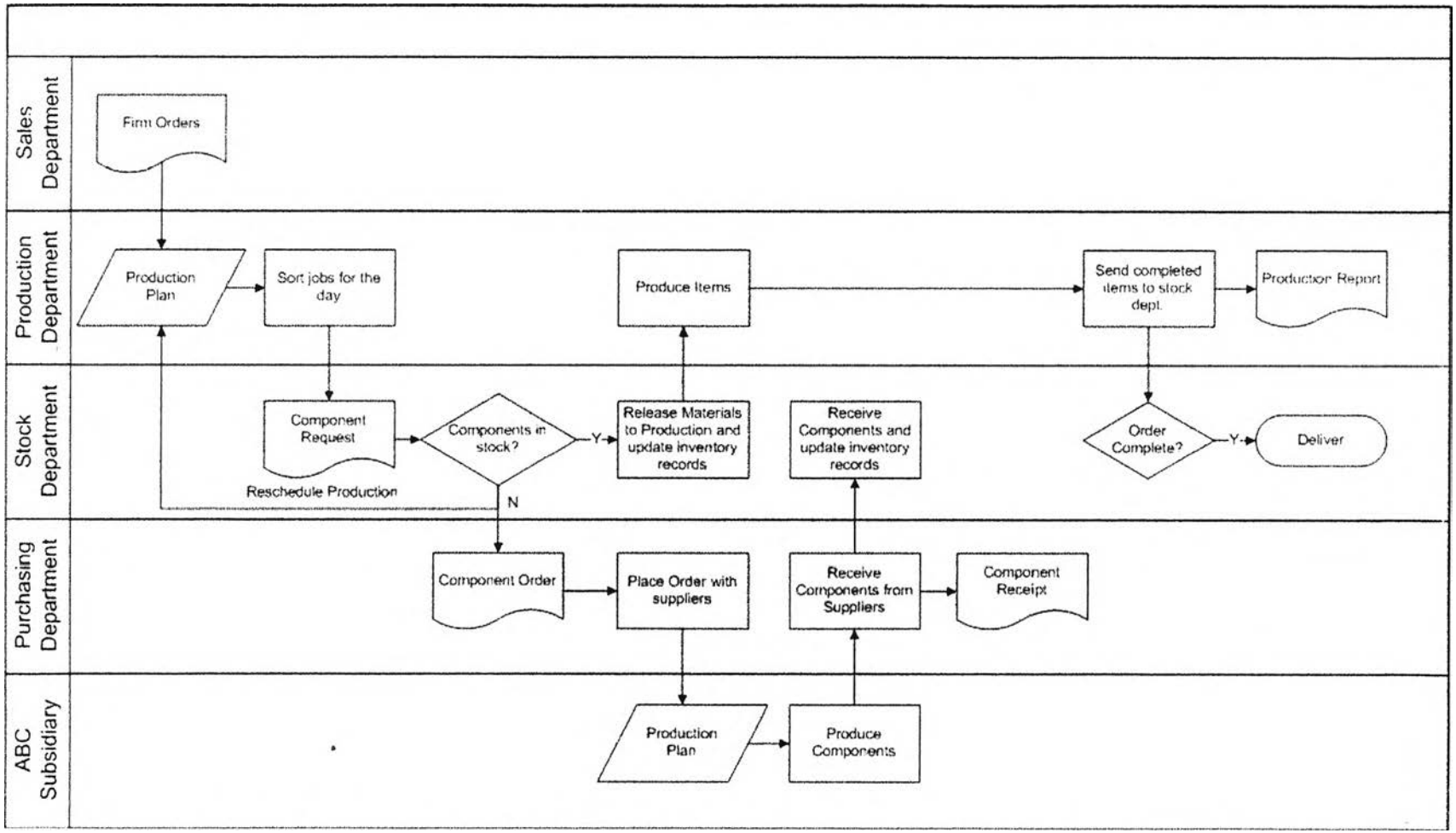


Figure 6.4 Cross-functional dataflow within the company using the old method

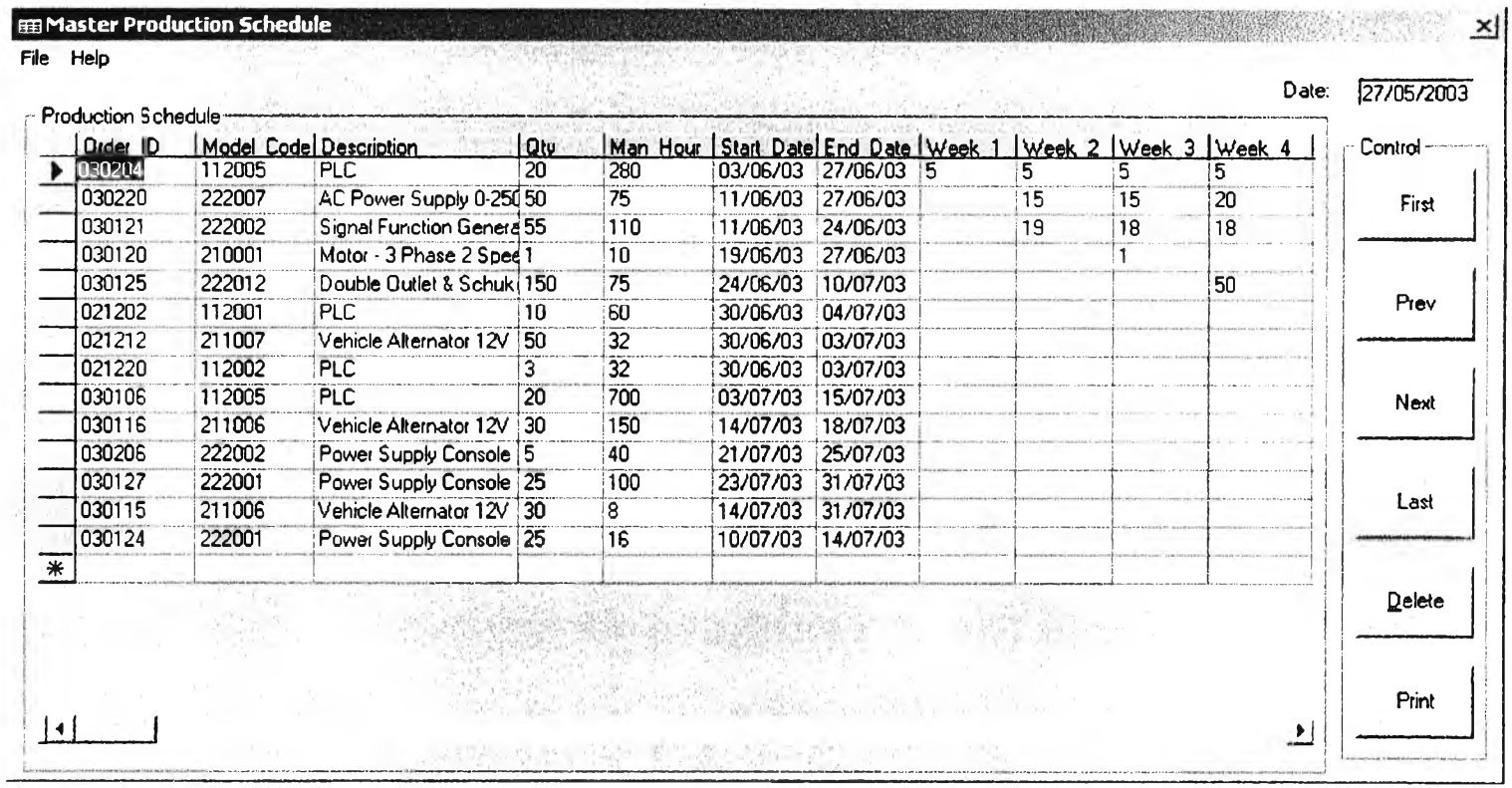
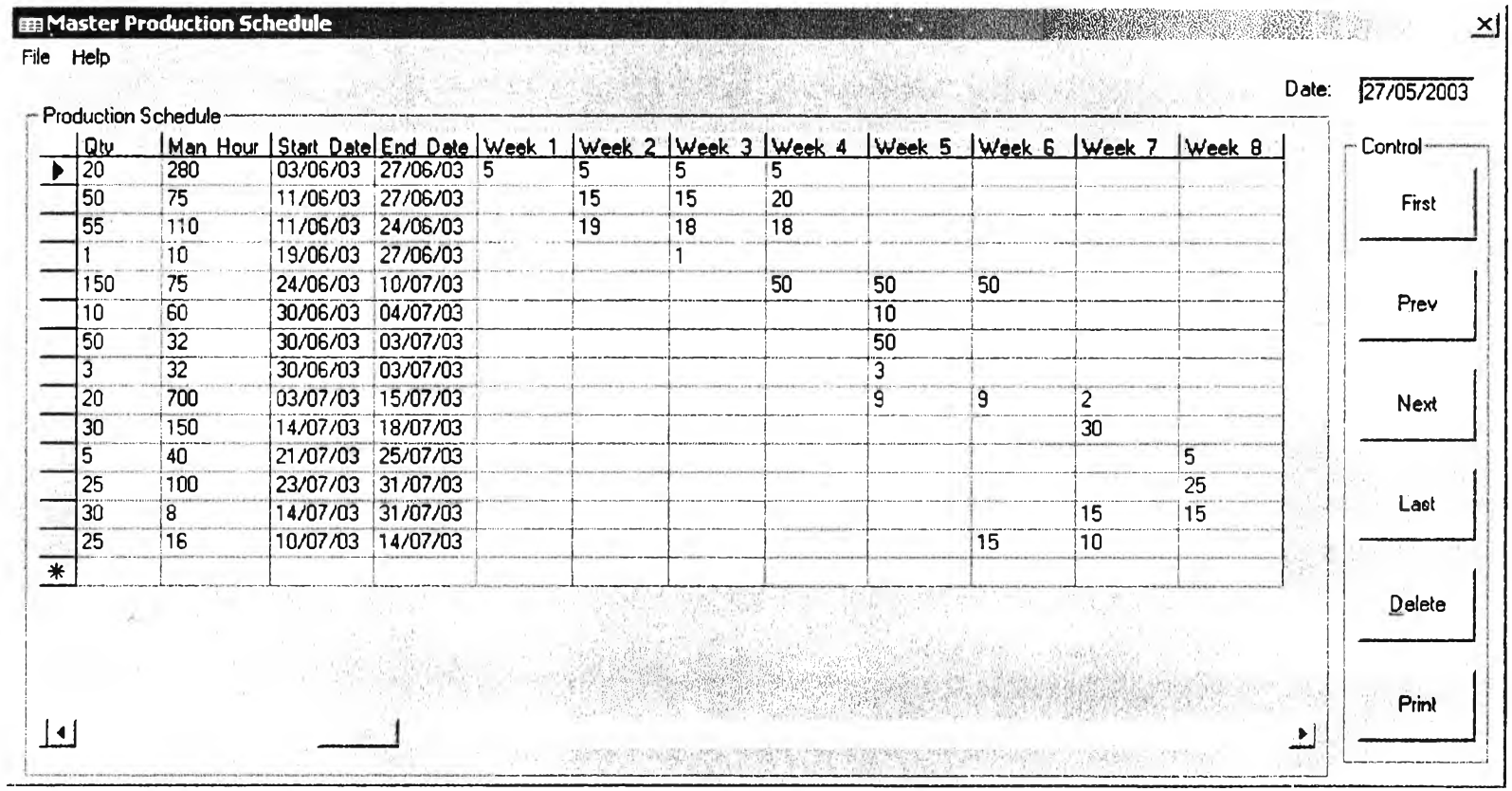
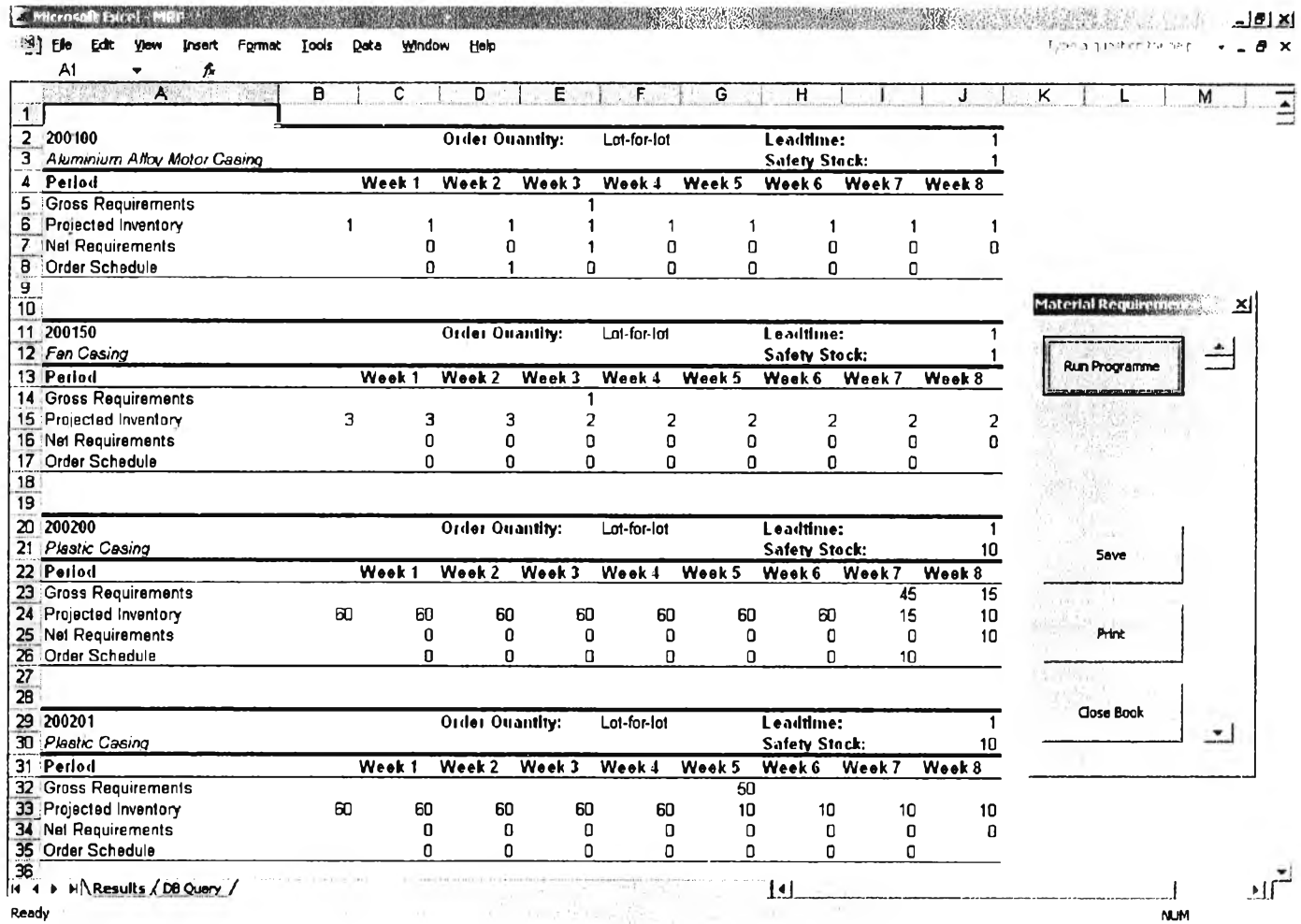


Figure 6.5 (a) Master Production Schedule data input interface



	Qty	Man Hour	Start Date	End Date	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
▶	20	280	03/06/03	27/06/03	5	5	5	5				
	50	75	11/06/03	27/06/03		15	15	20				
	55	110	11/06/03	24/06/03		19	18	18				
	1	10	19/06/03	27/06/03			1					
	150	75	24/06/03	10/07/03				50	50	50		
	10	60	30/06/03	04/07/03					10			
	50	32	30/06/03	03/07/03					50			
	3	32	30/06/03	03/07/03					3			
	20	700	03/07/03	15/07/03					9	9	2	
	30	150	14/07/03	18/07/03							30	
	5	40	21/07/03	25/07/03								5
	25	100	23/07/03	31/07/03								25
	30	8	14/07/03	31/07/03							15	15
	25	16	10/07/03	14/07/03						15	10	
*												

Figure 6.5 (b) Input interface showing time buckets



200100			Order Quantity:		Lot-for-lot		Leadtime:			1
Aluminium Alloy Motor Casing							Safety Stock:			1
Period		**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 7**	**Week 8**	
Gross Requirements				1						
Projected Inventory	1	1	1	1	1	1	1	1	1	
Net Requirements		0	0	1	0	0	0	0	0	
Order Schedule		0	1	0	0	0	0	0		
200150			Order Quantity:		Lot-for-lot		Leadtime:			1
Fan Casing							Safety Stock:			1
Period		**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 7**	**Week 8**	
Gross Requirements				1						
Projected Inventory	3	3	3	2	2	2	2	2	2	
Net Requirements		0	0	0	0	0	0	0	0	
Order Schedule		0	0	0	0	0	0	0		
200200			Order Quantity:		Lot-for-lot		Leadtime:			1
Plastic Casing							Safety Stock:			10
Period		**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 7**	**Week 8**	
Gross Requirements								45	15	
Projected Inventory	60	60	60	60	60	60	60	15	10	
Net Requirements		0	0	0	0	0	0	0	10	
Order Schedule		0	0	0	0	0	0	10		
200201			Order Quantity:		Lot-for-lot		Leadtime:			1
Plastic Casing							Safety Stock:			10
Period		**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 7**	**Week 8**	
Gross Requirements						50				
Projected Inventory	60	60	60	60	60	10	10	10	10	
Net Requirements		0	0	0	0	0	0	0	0	
Order Schedule		0	0	0	0	0	0	0		

Figure 6.6 MRP programme in Visual Basic for Applications, Excel

6.4. Outputs

Table 6.1 shows an example of what information is contained in the output for a single component, and Table 6.2 shows an example of the component order list, which shows what components need to be ordered at the beginning of that week. Table 6.3 shows an example of the MPS output.

Table 6.1 An example of the component order plan for one item (fan casing)

200150			Order Quantity:	Lot-for-lot		Leadtime:		1
Fan Casing						Safety Stock:		1
Period	**Week 1**	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 7**	**Week 8**
Gross Requirements				1				
Projected Inventory	3	3	3	2	2	2	2	2
Net Requirements		0	0	0	0	0	0	0
Order Schedule		0	0	0	0	0	0	

Table 6.2 An example of the component order list for current week

Component ID	Description	Qty	Supplier	Order Date	Expected DoD
300006	*Bakalite Board*	9	ABC	30/05/2003	06/06/2003
300007	*Bakalite Board*	5	ABC	30/05/2003	06/06/2003
301050	*Aluminim Module Case*	18	ABC	30/05/2003	13/06/2003
302055	*PCB*	18	ABC	30/05/2003	20/06/2003
302061	*PCB*	25	ABC	30/05/2003	20/06/2003

Table 6.3 An example of the MPS output showing a production schedule for a period of eight weeks.

Master Production Schedule at 27/5/2003

Order ID	Model Code	Description	Qty	Man Hour	Start Date	End Date	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
030204	112005	PLC	20	280	03/06/2003	27/06/2003	5	5	5	5				
030220	222007	AC Power Supply 0-250V 2A	50	75	11/06/2003	27/06/2003		15	15	20				
030121	222006	Signal Function Generator	55	110	11/06/2003	24/06/2003		19	18	18				
030120	210001	Motor - 3 Phase 2 Speed	1	10	19/06/2003	27/06/2003			1					
030125	222012	Double Outlet & Schuko Socket 16A 220V AC	150	75	24/06/2003	10/07/2003				50	50	50		
021202	112001	PLC	10	60	30/06/2003	04/07/2003					10			
021212	211007	Vehicle Alternator 12V	50	32	30/06/2003	03/07/2003					50			
021220	112002	PLC	3	32	30/06/2003	03/07/2003					3			
030106	112005	PLC	20	700	03/07/2003	15/07/2003					9	9	2	
030116	211006	Vehicle Alternator 12V	30	150	14/07/2003	18/07/2003							30	
030206	222003	Power Supply Console	5	40	21/07/2003	25/07/2003								5
030127	222002	Power Supply Console	25	100	23/07/2003	31/07/2003								25
030115	211006	Vehicle Alternator 12V	30	8	14/07/2003	31/07/2003							15	15
030124	222001	Power Supply Console	25	16	10/07/2003	14/07/2003						15	10	

Signature _____ Date _____

6.5. Comparison with Commercial System

The MRP system developed within the SME Company is simpler than a commercial system, because only elements that the company requires are designed into it. The company's MRP system is only required to compute the component order schedule, and to print out the report detailing the order schedule, while the commercial system shown in Figure 6.7 includes elements for customer orders, numerous reports and functions that are not needed by the company at this time. Elements that deal with inventory transactions and BOM updates, on the developed MRP system, have been included, but they were part of the existing inventory system.

6.6. Company Validation of the System

A committee was formed consisting of senior members of staff at the company, which included the production manager of the TKM Department, the production manager of ABC Subsidiary, a senior member of the stock department, and a senior member of the purchasing department. The committee set out to check if the system met the requirements of the company. The following points were raised:

- The system performs the MRP calculations as expected
- The component order schedule contains sufficient information for both the stock department and the purchasing department
- The MPS output can be used as a substitute for the old paper version of the production schedule
- The feature for inputting drafts of the MPS will be useful for determining production feasibility and will cause less problems for ABC Subsidiary's and TKM Department's production units.
- The user interfaces were very simple, while containing all the necessary functions to run the system.
- No expenditure was made on additional software or hardware for the system.

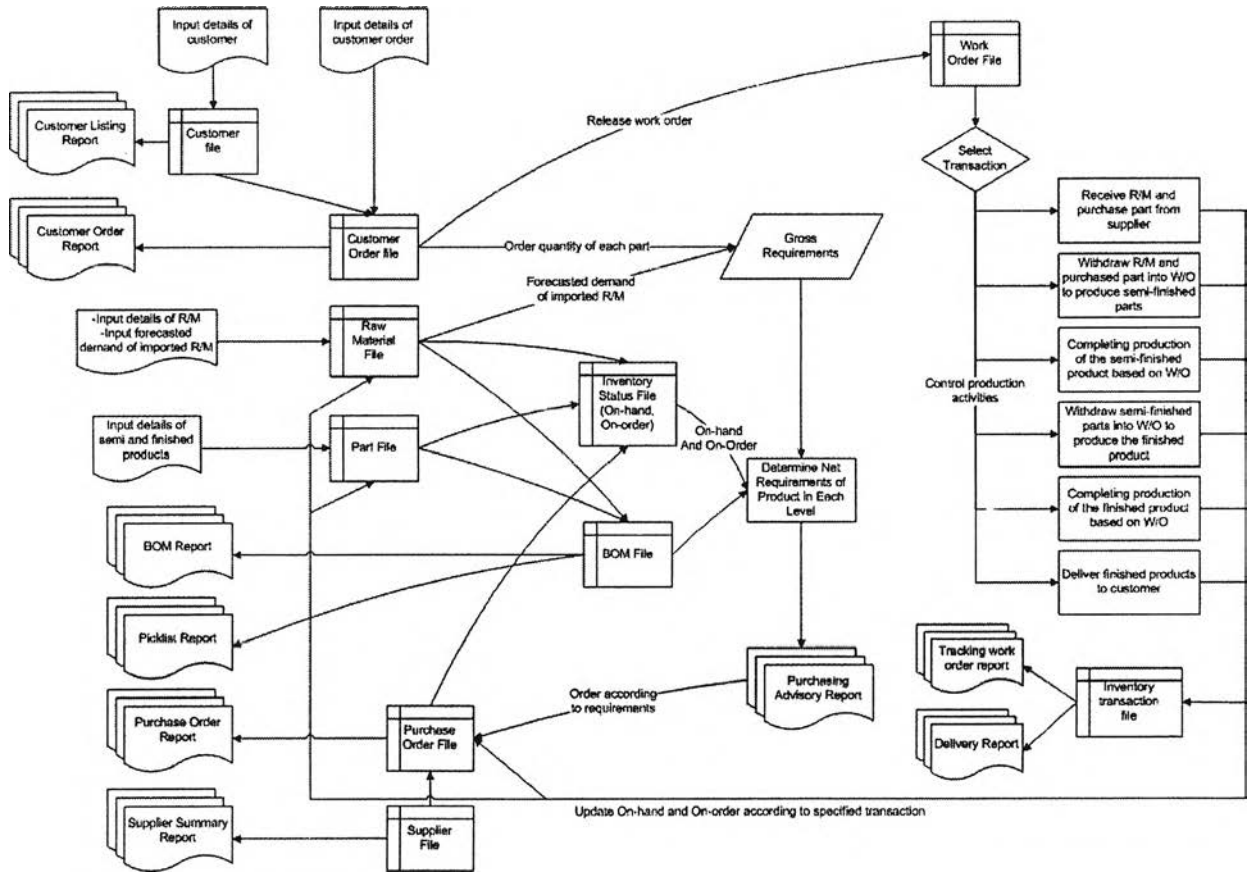


Figure 6.7 Example of a commercial MRP system