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Achieving and maintaining inventory accuracy in a South African Mrp-ii environment

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3.1 BENEFITS OF INVENTORY MANAGEMENT

The main reasons for inventory to be kept are to:

- Improve delivery to customers.
- Protect against variations in delivery by suppliers.
- Enable the use of lot sizing.

The above points can be achieved with any inventory control system, like manual cardex systems, but not necessarily in the most efficient manner. Typical manual cardex systems usually have numerous problems associated with them. The following points represent some of the problems which existed at Sulzer before the proper introduction of the Inventory Management module.

- Cardex cards registers were too slow and cumbersome for inventories with large numbers of parts in stock (15 000 different part numbers in our case).
- Cardex stock card soon became unreliable.
- Production Control and Sales resorted to physical checks.
- Stock chasers were needed to locate the goods.
- Extra buffer stock was needed.
- Planning became increasingly difficult.
- Physical staging for customer orders was done too soon, so that real shortages could be identified.

- Stockroom was not closed and unauthorised withdrawals took place (to replace scrapped items).

- Inventory accuracy was below 50%.

- Expediting was constant, allowing no time for proper planning and special projects to improve stock control.

- Annual shutdowns were needed to recount stock. This was usually done by inexperienced people and always resulted in lost production and large errors because of incorrect item identification.

- High Materials Manager turnover, due to the difficulty of obtaining control and to the constant pressure exerted on them to solve all of the above-mentioned problems (five managers in the period of two years).

After the proper implementation of Inventory Management and its spin-offs, like SLALOM and Cycle Counting, [illegible] points mentioned above have completely disappeared.

The main difference between the failure of the manual and the success of the fully computerised system, is the level of stock accuracy. One of the many reasons for a high accuracy to be so difficult to achieve, is due to the high volume of paper and goods flow that passes through the warehouse. All purchases and manufacturing orders placed by Sulzer's Planning department are handled at some stage by the warehouse personnel.

The opportunities for errors are great and are not always confined to the warehouse. As shown in figure 3.3, there are many departments interfacing with the Inventory Management module and errors originating there are often carried through to stock, sitting there until they are picked up in the next cycle count.

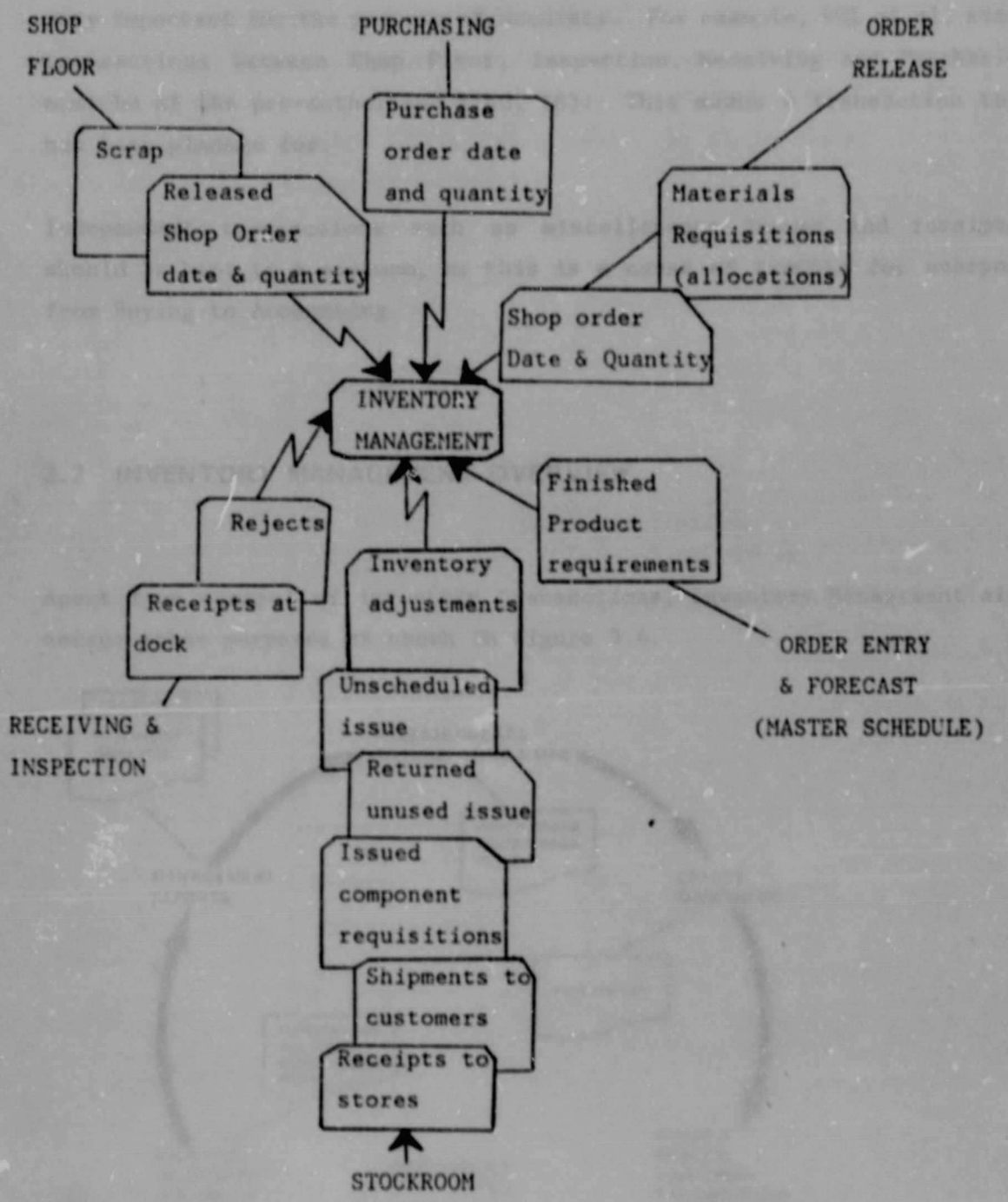


FIGURE 3.3: The Inventory Recording System,(8).

The proper interface between Stores and each of the other departments is very important for the purpose of accuracy. For example, 80% of all stock transactions between Shop Floor, Inspection, Receiving and Purchasing must be of the pre-authorised kind, (8). This means a transaction that has been planned for.

Independent transactions such as miscellaneous issues and receipts, should be kept to a minimum, as this is a cause of trouble for everyone from Buying to Accounting.

3.2 INVENTORY MANAGEMENT OVERVIEW

Apart from control of inventory transactions, Inventory Management also serves other purposes as shown in figure 3.4.

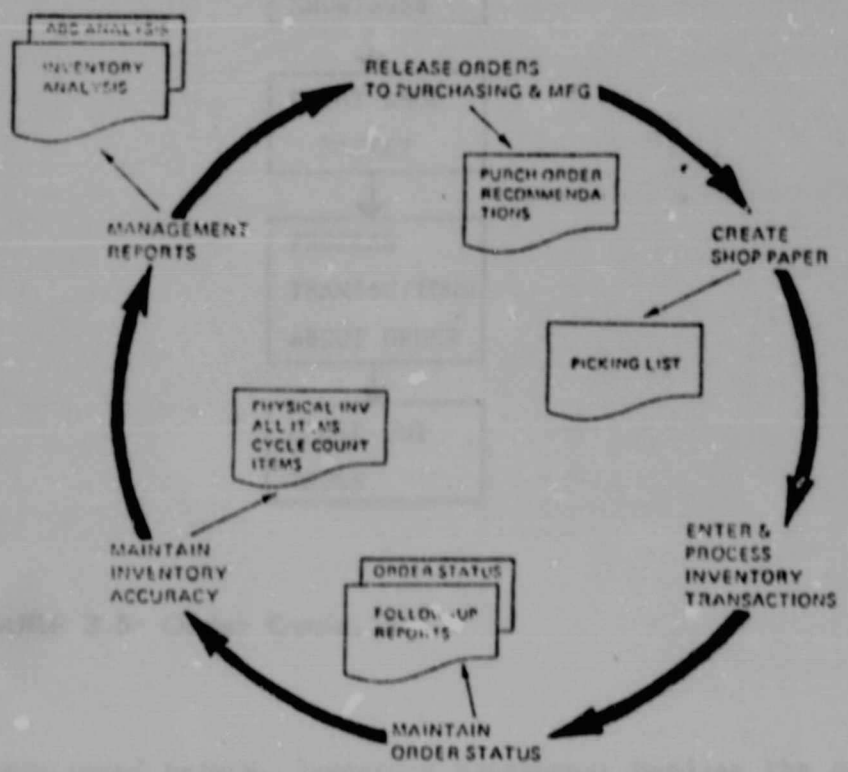


FIGURE 3.4: Function of Inventory Management Module, (8).

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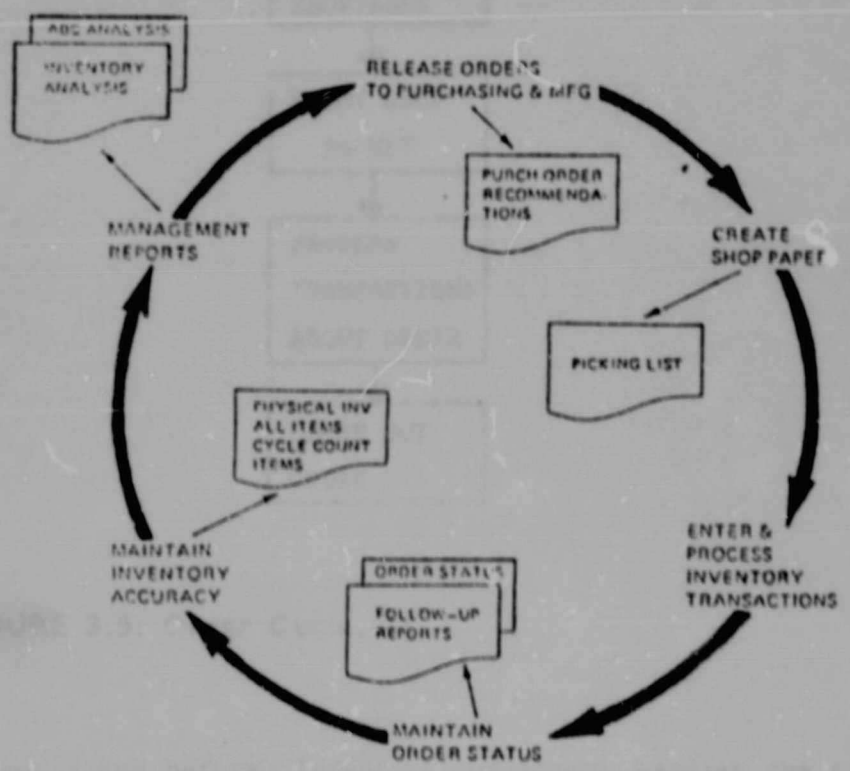
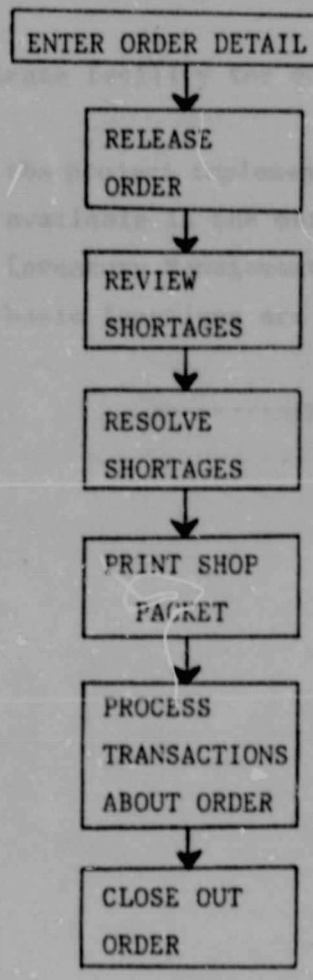


FIGURE 3.4: Function of Inventory Management Module, (8).

The functions of releasing Manufacturing and Purchase orders, creating Shop Papers and maintaining Order Status and Management Reports are well addressed by the system. These are routine procedures which have little impact on stock accuracy. This Order Cycle, as shown below, is quite simple and can be managed by anyone.



RELEASE FREQUENCY

- Purchasing: daily
- Manufacturing: daily

FIGURE 3.5: Order Cycle,(8).

As mentioned before, Inventory Management handles the order processing cycle in a very acceptable manner, but unfortunately the way it handled

inventory transactions was not as efficient. Inventory Management's shortcomings were:

- It allowed balances-on-hand to be negative.

- Only one part number could be packed per location, resulting in inflexibility and poor space utilisation.

- No separate facility for quality control.

Management and the project implementation group then decided to introduce another module available in the market, which excels in precisely those areas in which Inventory Management is inadequate. This module is called SLALOM and its basic functions are explained in the next chapter.

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4.0 SLALOM - THE VITAL ADD-ON SYSTEM TO INVENTORY MANAGEMENT

SLALOM is basically an *ADD-ON* package to the Inventory Management module. It controls and records all types of inventory transactions and then passes this information to Inventory Management twice a day in batch form (see figure 4.1).

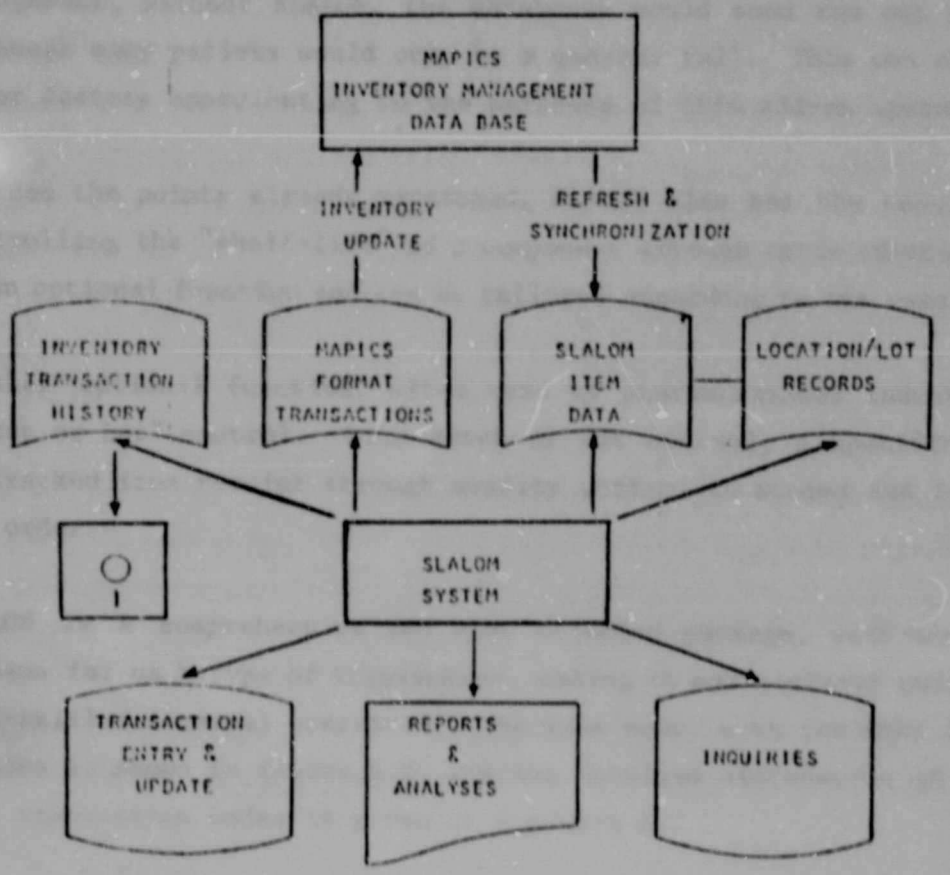


FIGURE 4.1: SLALOM Interfacing with Inventory Management,(8).

SLALOM keeps a complete transaction history per item number, which is most beneficial for cycle count error reconciliation, thus contributing to the improvement of stock accuracy and to determining of the causes of errors.

One of the added advantages of SLALOM over Inventory Management is the facility which allows the storeman to pack goods in any randomly chosen location. This means that there is a greater storage flexibility, although more discipline is needed in accurately recording the storage locations used. This worker discipline also contributes to a greater stock accuracy.

With SLALOM, the packer can accommodate more than one part number in the same location, which unlike Inventory Management, results in much higher space utilisation. In fact, if management were to continue with Inventory Management, without SLALOM, the warehouse would soon run out of space, although many pallets would only be a quarter full. This was one of the major factors contributing to the purchase of this add-on system.

Besides the points already mentioned, SLALOM also has the capability of controlling the "shelf-life" of a component through cycle checking. This is an optional function and can be tailored according to the user's needs.

Another optional function, often used by pharmaceutical industries, is "Batch or Lot" control. With Batch or Lot control, a specific lot can be tracked from receipt through quality control to stores and finally to the order.

SLALOM is a comprehensive and user oriented package, with menu-driven screens for each type of transaction, making it particularly suitable for semi-skilled terminal operators. The main menu, with the most immediate options is shown in figure 4.2, and the detailed explanation of the various transaction codes is given in Appendix A.

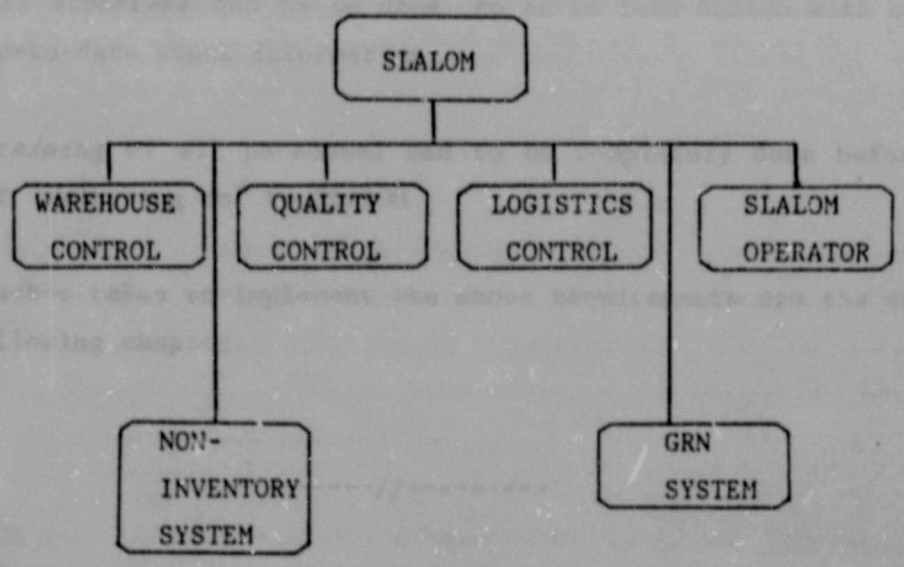


FIGURE 4.2: SLALOM Menu,(8).

Another boost to the higher stock accuracies is the existence of a special option for Quality Control (see figure 4.2). The transaction types available to this option permit a much greater control of data accuracy, since they act as filters for incoming stock originating from Goods Receiving or Production Workshop (see Appendix.A). Only when stock is cleared by inspection, can it be transferred into stores and be made available.

Another advantage over Inventory Management, is that no SLALOM transaction code allows for the stock balance-on-hand to become negative. This is done by aborting the transaction which would produce the negative balance.

Before the Materials Handling Department could benefit from the sophistication of the SLALOM system, a number of things had to be accomplished, namely:

1. The *suitability* of the SLALOM package had to be analyses and tested, so that customised modifications could take place.

2. A total *stocktake* had to be done, so as to feed SLALOM with correct and up-to-date stock information.

3. The *training* of all personnel had to be completely done before the day of "switching on" to SLALOM.

The approaches taken to implement the above requirements are the subject of the following chapter.

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5.0 SLALOM IMPLEMENTATION - THE PROJECT MANAGEMENT APPROACH

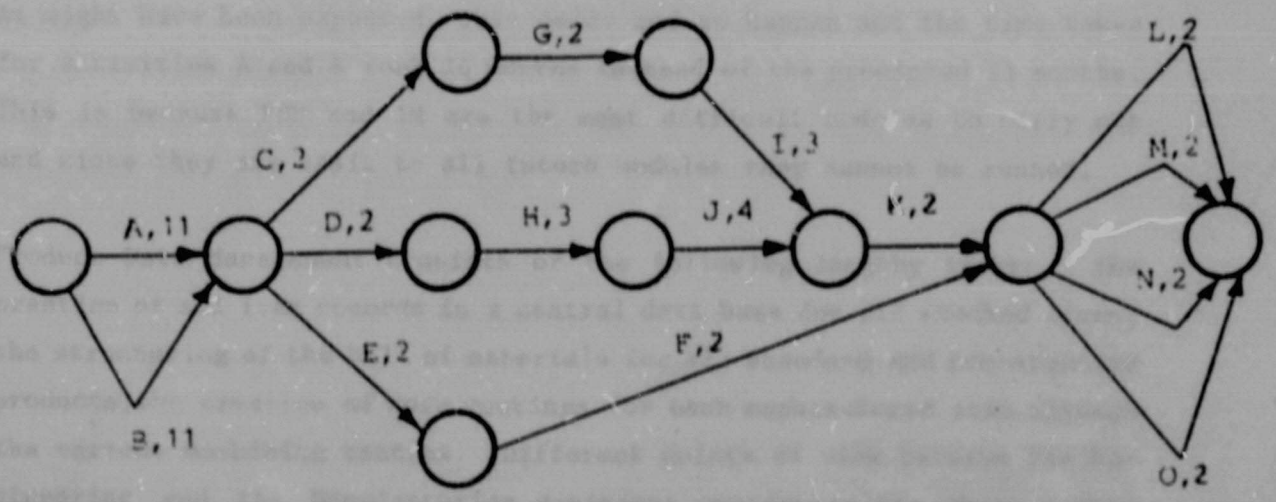
This chapter's aim is to show the reader more than just the implementation techniques for a system which is instrumental in the increase of inventory accuracy and departmental productivity. The *more* refers to the potential pitfalls that managers and project leaders have to be aware of, when implementing any type of computer system.

The analysis given stems out of the author's own experience, although much of it can be considered as true general problems met when one is dealing with the difficult subject of *Project Management* (10).

5.1 THE MRP-II PROGRAMME

Top management has committed itself to introduce the full MRP-II programme in the space of two years. For the purpose of control and monitoring, it was considered to express the entire programme through a CPM (Critical Path Method) network, as shown in figure 5.1.

Note that some of the modules, like PDM and IM, have to be installed prior to the installation of the other modules. Unfortunately, these are also the two activities with the longest lead time, so any delay at these points would eventually delay the entire programme. Since all activity times are static, which is a typical feature of the CPM network, there are great pressures if delays occur.



ACTIVITY	DESCRIPTION	TIME (Months)
A:	Inventory Management (IM)	11
B:	Product Data Management (PDM)	11
C:	Purchase Order Control	2
D:	SLALOM	2
E:	OMAS	2
F:	Order Entry and Invoicing	2
G:	Marketing Management System	2
H:	Materials Requirements Planning	3
I:	Production Control and Costing (Costing)	3
J:	Production Control and Costing (Shop Floor)	3
K:	Capacity Requirements planning	2
L:	Accounts Payable	2
M:	Accounts Receivable	2
N:	General Ledger	2
O:	Wages	2

The critical path takes 24 months to complete.

FIGURE 5.1: MRP-II Program Network

As might have been expected, this delay had to happen and the time taken for activities A and B took 20 months instead of the predicted 11 months. This is because PDM and IM are the most difficult modules to carry out and since they are basic to all future modules they cannot be rushed.

Product Data Management consists of the following lengthy tasks: the creation of all item records in a central data base for all stocked items; the structuring of the bill of materials for all standard and non-standard products;the creation of work routings for each manufactured item through the various machining centres. Different points of view between the Engineering and the Manufactu·ing divisions concerning the above issues further delayed the implementation of P.D.M.. The unfamiliarity with computer based systems and the lack of local expert support was also a major contributing factor to this delay.

Pressure for the next projects started to mount, specially for SLALOM which lies on the critical path and therefore has an enormous influence on the success of all future packages, including MRP. Time meant money and the "opportunity costs" figures of R2000.00 for each day's delay were being quoted. This figure was based on interest alone, which would be generated from profits arising from a successful MRP-II programme. These profits can be attributed to the 25% reduction in work in progress, a 25% reduction in stock and a 10% increase in production (7),(8).

5.2 THE MATRIX STRUCTURE AND ITS PROBLEMS

Another more serious pressure was being exerted on the success of SLALOM. The business was incurring great losses because the prolonged stock inaccuracy, resulting in low customer service levels and deadlines not being met.

Therefore, a matrix structure, as shown in figure 5.2, was put together, where a project manager could be nominated from any of the functional departments. In SLALOM's case, the Information Systems Department Manager was chosen as project leader.

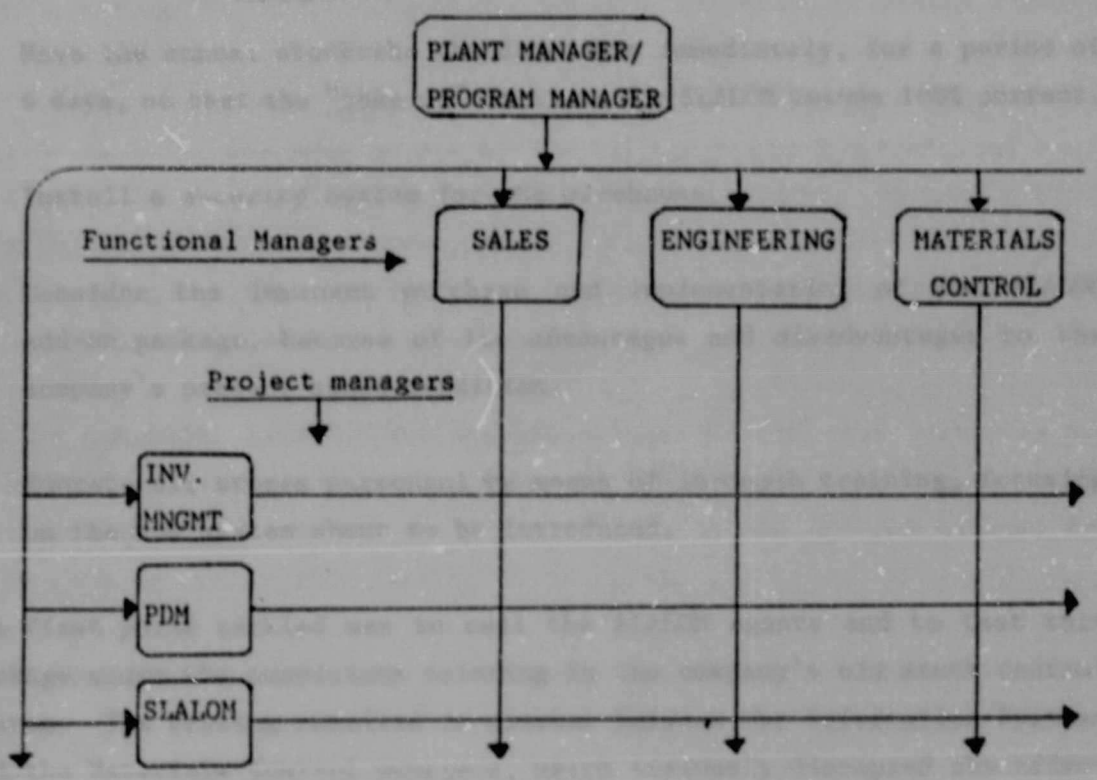


FIGURE 5.2: Matrix Structure for Projects Management

The project was now ready to be started and everyone involved knew that those two months, within which this task had to be completed, were too short. The Information Systems department held a meeting with the Materials Control department to determine the most important points required to achieve the desired accuracy level in the shortest possible time.

The following points formed part of the agenda:

1. Bring in external consultants to analyse and improve the present paperflow system in the stores and other directly related areas, such as Goods Receiving and Inspec .

2. Have the annual stocktake shutdown done immediately, for a period of 6 days, so that the "take-on" balances for SLALOM become 100% correct.

3. Install a security system for the warehouse.

4. Consider the imminent purchase and implementation of the SLALOM add-on package, because of its advantages and disadvantages to the company's present stock condition.

5. Educate all stores personnel by means of in-depth training, focusing on the new system about to be introduced.

The first point tackled was to call the SLALOM agents and to test this package under the conditions existing in the company's old stock control system. The testing resulted in clashes between the Information Systems and the Materials Control managers, which seriously disrupted the effectiveness of the project team.

According to the Materials manager, the package was not suitable for Sulzer's particular environment, since it had been initially designed for the pharmaceutical industry, which is vastly different from a manufacturing and jobbing environment.

The major difference is the very strict movement control for every batch of raw materials or finished products in the pharmaceutical industry. Each batch can never be mixed with another of the same kind even if it comes as part of a split order. This is an industry regulation for all health related products. In the case of Sulzer's manufacturing environ-

ment, this strictness made SLALOM too inflexible as a stock control system, unless it was modified.

The Materials Manager wanted more time for retesting and for modifications to be done, before SLALOM was implemented. But the project leader disagreed, saying that the SLALOM agents would be reluctant to change anything in their package.

Following this, one manager was always trying to stall the project while the other constantly counteracted the other's attempts. Another serious problem was the shutdown count, which having been scheduled too soon, did not allow enough time for the proper training of stores personnel and for a complete pre-stocktake item identification.

By the scheduled date for the stocktake, none of the above problems had been properly addressed. Meanwhile, SLALOM got installed absorbing all the "take-on" balances and was also left running on its own without the old stock control system running in parallel.

Problems continued to appear for a long time after its implementation and the project team was kept occupied in solving a multitude of problems, such as:

- People still needing extensive training on SLALOM.

- SLALOM was eventually being modified in-house to suit the working conditions.

- Working procedures were also being changed, to comply with the new system's demands.

- Errors were being constantly introduced, because of human inexperience and partial module incompatibility between SLALOM and Inventory Management.

5.3 POINTS TO OBSERVE WHEN IMPLEMENTING COMPUTER SYSTEMS ON A PROJECT BASIS

About the Project Team

a. Matrix structures may be well chosen in theory, but in practice it brings about a certain degree of conflict (10).

b. The choice of the project leader must be done cautiously. It works best at times to have as a leader, the person who is going be responsible for the system in the future. In the above case, the best choice could have been the materials manager.

c. The Information Systems department will most likely react defensively to any potential problems that might threaten the introduction of a new computer system of their liking.

d. Be cautious when faced with the decision of having a "job-well-done" or a "job-done-in-time" type of project. Look at all the long term consequences.

About the Systems

a. This type of project is more of a PERT (Program Evaluation and Review Technique) network nature than CPM, where activity times are fixed, because of the uncertainty in the time estimated to complete an activity. This seems to be a characteristic of most projects involving computer technology.

b. There could be a general tendency for many managers to underestimate the implementation of a computer system.

c. Like most projects, the obstacles encountered are about 5% technical and 95% people originated problems (10).

d. Generally, computer sales agents do not know enough about a company's environment or the software they are selling. As so appropriately put by Prof. Woolsey during a Production and inventory Management lecture: "*most computer packages are not delivered to your doorstep, they are abandoned there*".

e. Before buying a new system, get the agents to sign an agreement that includes a clause about post-implementation programme modifications and maintenance. Otherwise, the project costs can be significantly altered.

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6.0 CYCLE COUNTING

With SLALOM now properly installed, debugged and customised to the operations' specific needs, the errors caused by computer failures or faulty logic in its software program are so few as to be negligible. The next step in improving stock accuracy was to create an effective cycle counting programme. This chapter will focus on the objectives and advantages of using the cycle counting technique.

6.1 CYCLE COUNTING VERSUS ANNUAL PHYSICAL INVENTORY

Today's management is perceiving greater advantages resulting from a continuous cycle counting programme as opposed to the traditional annual stocktake. Plossl(1) describes the situation as follows: "*There is no longer any doubt that the Annual Physical Inventory is an expensive farce which should be eliminated. Only as a means for validating the total investment in inventory is it acceptable; as a device for finding and fixing errors in individual item records, it is not only useless, it will generate more errors than it will eliminate*".

From the literature survey such as Plossl(1), (2), Cantwell(3) and IBM's MRP and Cycle Counting course(8), and having experienced both types of counting techniques, the author can best compare these two types by means of table 6.1.

TABLE 6.1: Annual Physical versus Cycle Counting

Annual Physical	Cycle Counting
* Stopped and lost production.	* Eliminates the loss of productive time.
* Week-end work at premium cost.	* Done during normal working hours by one person at low costs.
* Counted by inexperienced personnel without adequate product knowledge thus leading to: i. Items overlooked ii. Items counted twice iii. Errors in counting iv. Identification Errors	* Development of specialists who become efficient in obtaining good counts and good product knowledge.
* Inability to trace causes of error. Errors could be one year old, i.e. introduced since the last annual count.	* Timely detection and correction of conditions causing errors. Most errors are at most 2 to 3 months old, i.e. since they were last cycle counted.
* Large number of errors since last count.	* Few errors which allow for focusing on problem areas.
* Time constraint and haste	* Counting is done according to a pre-scheduled programme, where time is not a constraint.
* Second counts are needed to to verify first person's count.	* No second count is needed.
* Does not assist in the continuous monitoring of accuracy.	* High level of inventory accuracy with continuous monitoring of accuracy.

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