Order Processing System

Introduction (Seminar 9)

The primary purpose of this seminar is to examine the Order Processing System for generating both purchase and manufacturing orders within ManuDyn and what steps need to be taken to activate the Manufacturing Inventory Control (MIC) system generally.

I will not be examining in any great detail the manual purchasing and sales order operations which have been done extensively in various Video Tutorials.

Order Generation System

The Order Generation routine is activated from the "Inventory Control/Order Processing" menu item selection and a screen display similar to that shown below will result if this option is selected.
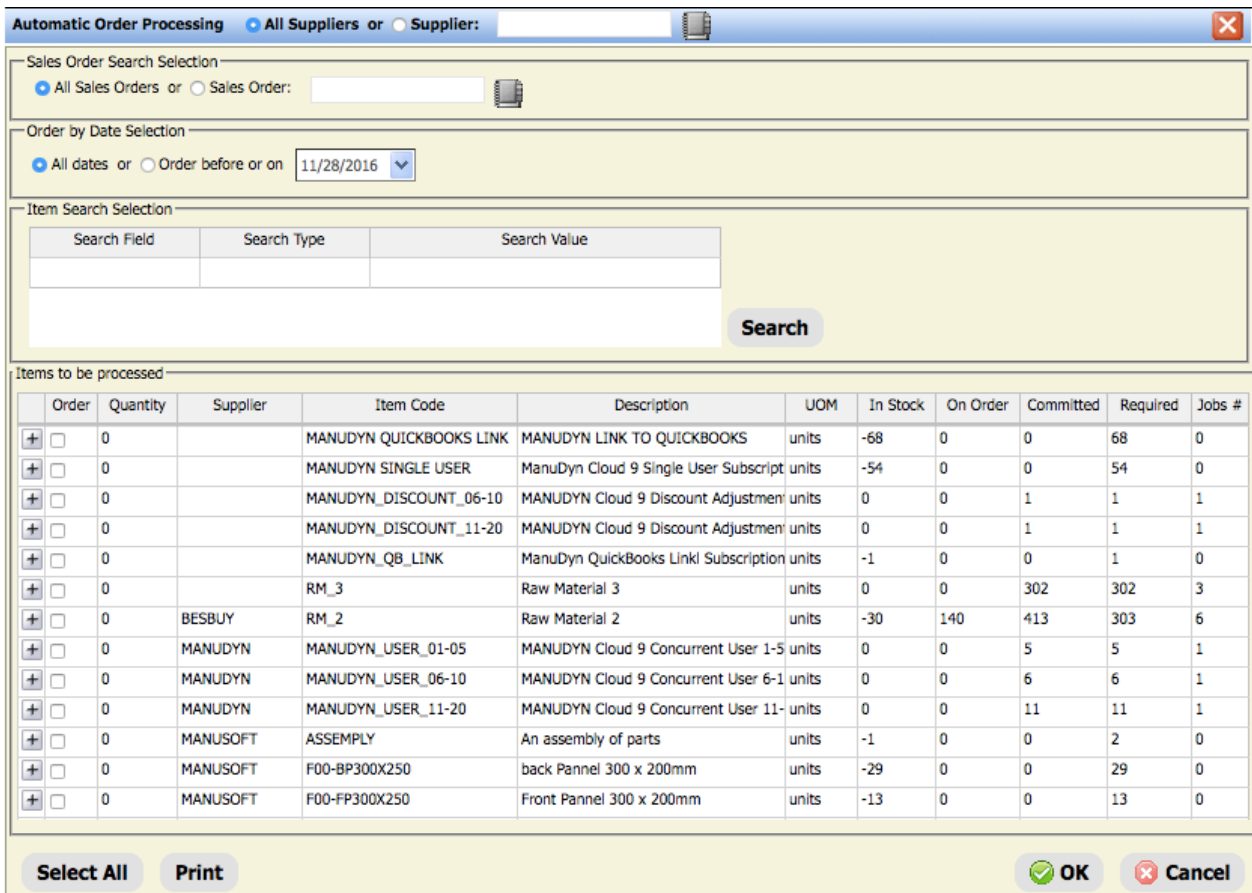
Figure 1- Automatic Order Preview

This display indicates what orders the system "needs" to generate as a result of requirements brought about by various inventory stock settings and customer order requirements.

The first thing to note about figure 1 is that an order will need to be raised when there is an outstanding Quantity Committed (QC) against the stock item. That is, where QC is not covered by the Quantity in Stock (QS) and/or the Quantity on Order (QO).

Where do these commitments come from?

The commitments arise when a customer order or Sales Order is raised for a Manufactured Item which has a Bill-Of-Material (which is a list of material requirements). If you did not follow the answer to this question then I suggest you stop this seminar now and review the video tutorials concerning the creation of Manufactured Items (or Parts).

You should also note that figure 1 above shows that orders can also be generated when QS is negative. More specifically an order will be processed if QS is less than the Re-order Point (RP).

How did quantity in stock become negative and what does it mean?

A negative QS represents a situation where material has been recorded as issued to the job at a time when there was insufficient in stock. Generally, when a Job is "Issued to Production" the QC for the bill-of-material Items (for the job) is relieved and at the same time the QS is also reduced. If there is no stock then the QS register becomes negative, effectively transfering the QC requirement to the QS register in the Stock file. This is not an aberration. Yes this is real and

negative stock is allowed. If you didn't know the answer to these questions then you should review the video tutorials concerning Job Issue and Processing.

Some of the items in figure 1 indicate that an order will be generated if there is insufficient in stock or on order to cover the requirements. It makes no difference whether the goods are in your store (QS) or they are on order (QO) – that is they are still in your suppliers store, on back order, or in transit, they are still considered to be "available".

Other items in figure 1 indicate that an order will be generated even where there are no commitments. That is, if the quantity in stock and on order (QS + QO) falls below the Re-order Point (RP), there does not need to be a requirement in this case.

From these examples you can see that a order will be generated if the Net Quantity in Stock (NQS), after all commitments are satisfied, is less that the Re-order Point (RP). That is where:

$$NQS = QS + QO - QC < RP$$

Once it is determined that an order needs to be raised the system then has to "decide" how much to order and what type of order it is going to be – that is either a Purchase Order or a Manufacturing Order. Manufacturing Orders (placed on the Sales Order file) will be raised if YOU are the primary supplier – We will come back to this shortly for now let's first look at orders that are raised as Purchase Orders.

In general the quantity to be purchased will be at least sufficient to bring the Net Quantity in Stock (NQS) up to the level of the Re-order Point (RP). That is:

$$RP - NQS$$

The Re-order Quantity (RQ), comes into play if the quantity which is sufficient to bring the NQS up to the RP is actually less than RQ. This can be summarized as follows:

If the equation RP–NQS <= RQ is true then the quantity purchase is RQ.

If RP-NQS > RQ then the quantity purchased is the value of RP-NQS.

> **Note i.** Setting a Re-order Quantity (RQ) for a stock item sets a minimum order quantity when a purchase order is to be raised. It also has another effect in the ManuDyn system. If the Re-order quantity is set greater than zero (0) then the stock item is classed as an "Inventory Item". We will discuss this shortly.

You can see from this that there are two distinct stages associated with the operation of the purchase order generation facility. The first stage is concerned with determining whether or not a purchase order needs to be generated for a specific Stock item. The second stage deals with determining what quantity needs to be purchased when the order is raised.

Before I leave the subject of purchase order generation I would like to examine some of the most common "problems" associated with automatic order processing. The first "problem" concerns the supplier.

It should be noted that the Stock item must have a supplier in order for it to be processed by the automatic purchase order generation routine.

This is perhaps the most common query received from clients where the automatic routine appears not to be working. You should also note that the supplier assigned to an automatic purchase order is the primary supplier. You can see this from an examination of figure 1 where the supplier is displayed.

The last column in figure indicates the number of Jobs that has given rise to the order requirement. You can view these jobs by selecting the plus(+) symbol at the start of the row as shown below:

At this point the operator has some options as to how the order is to be raised. If they select one of the specific job requirements then the order is raised just for that requirement. Alternatively if they select the "total" row then one order is raised for the total requirement and is not job specific.

Clearly, if you raise an order for just the specific job requirement then the balance of the total requirement will continue to show up whenever this routine is launched.

There may also be a Re-order Quantity or Re-order point set, which causes the automatic purchase order prompt to appear even when there is no requirement. Once again the order prompt will continues to occur until such time as the quantity on order and in stock is sufficient to cover the total requirements and satisfy the Re-order Point setting.

Now let's look at the automatic generation of Manufacturing Orders.

Automatic Manufactured Order Generation

This is a very special type of automatic order. It is one where the supplier is YOU.

We have come across these "orders" as sub-assembly jobs raised as a result of a Parts Explosion during Sales order entry. You can also create a "Sales order" for yourself by simply raising an order where you are the Customer.

This is a very special type of Sales Order – it is one that you cannot invoice and as such it is finished when the last operation is done. That is, the finished goods will go into stock.

So Sales Orders for you are Stock orders.

What happens with automatic order processing?

In automatic order processing, a purchase order is raised where you are not the supplier, and a manufacturing order (Sales Order) is raised when you are the supplier.

For a Manufactured Item to show up in the Order Processing display (figure 1) it will usually have to be a sub-assembly of some other part and it would have to be marked as an "Inventory item". What do I mean by this?

In ManuDyn an "Inventory Item" is defined as one where the Re-order Quantity (RQ) is set greater than zero and a Manufactured Item where this is the case is usually an Inventory Sub-assembly Item.

Such sub-assemblies are usually (but not always) common parts, used in a variety final assembly parts, and rather than getting the system to generate a sub-assembly job for each unique final assembly order (as would normally happen during Sales Order entry), it would be better to generate one order for the total requirement.

For this to occur we have to "allow" the requirements for the sub-assembly to accumulate during Sales Order entry (rather than generating a sub-assembly job) and the trigger which causes this to happen is when the sub-assembly RQ is set greater than zero.

Setting a RQ greater than zero is done from the "Database Entry/Manufactured Items" menu selection. Once you recall the Manufactured Item you set the RQ on the Attributes tab as shown below and doing so will cause the following prompt will occur.

You should note also that usually the Standard Cost of a Manufactured Item is set to zero so that when the item is drawn into a Bill-Of-Material of a final assembly part its default cost in the BOM is also zero. This causes the system to perform a parts explosion to determine the cost of labour and material for sub-assembly during Quoting and Estimating.

This is fine if the sub-assembly is unique to the parent job. If however the sub-assembly is common (and an Inventory Item), then it is not made in small quantities and it has a fixed cost based on a large production run quantity. In this case we don't want a parts explosion during Quoting and Estimating as the unit cost would be much higher than what it should be based on how we usually make this part.

So there is one other thing you should do when setting a sub-assembly part as an Inventory item and that is to set a non-zero Standard Cost for the Manufactured Item.

Once these things are done the "cost" of the sub-assembly will be fixed during quoting and estimating AND a sub-assembly job will not be raised during Sales Order entry.

Essentially the Inventory Manufactured Item (sub-assembly) is treated like any other raw material item (that are usually purchased). It has a fixed cost and does not generate a sub-assembly job at Sales Order entry.

All of this raises one more issue in regard to Automatic Order Processing related to what happens when a Manufacturing Order is raised via this routine and added to the "Sales Order" list. Well, the NEW order will generate additional material requirements.

This means that the sequence or order in which items are processed is important.

If for example the Manufactured Item contains raw materials that are common to other Sales Orders then it may be a good thing to raise the purchase orders for the raw materials last so that a total requirement can be determined.

Clearly, the Manufactured Items (those where you are the supplier) should be processed first. More-over because the Part may intern contain other sub-assemblies that are Inventory Manufactured Items then we should run this process until no such items appear in the Order Processing list.

During automatic order processing, process the Manufacturing Items first and repeat the operation until no Manufactured Items appear in the Order Processing List.

Let's examine the example below which may help you understand this completely.

Inventory Manufactured Items

Setting the Re-order Quantity (RQ) to something greater than zero, defines the Item as an Inventory Item. Any stock item may be classed as an Inventory Item. The general effect, apart from setting a minimum order quantity, is to cause the system to accumulate requirements during Sales order entry.

With regard to the Manufactured Items (supplier is YOU), there is also something else that happens during the Parts explosion, namely, that the explosion stops when an Inventory Manufactured Item is encountered. Accordingly, if a parts explosion was occurring for a sub-assembly list similar to that shown in figure 2 below, the explosion would stop at F00-SUB2 and F00-SUB6, on the first processing run (as they are Inventory Items), but continue for the rest of the BOM list. That is, Jobs for F00-SUB1 and F00-SUB3 would be raised.

Inventory Stock/Part Explosion

F00-FINALASSY

F00-SUB1   F00-SUB2 (I)

F00-SUB3   F00-SUB4   F00-SUB5 (I)

F00-SUB6(I)   F00-SUB7 (I)   F00-SUB8

F00-SUB9   **Where (I) is an inventory Stock/Part**
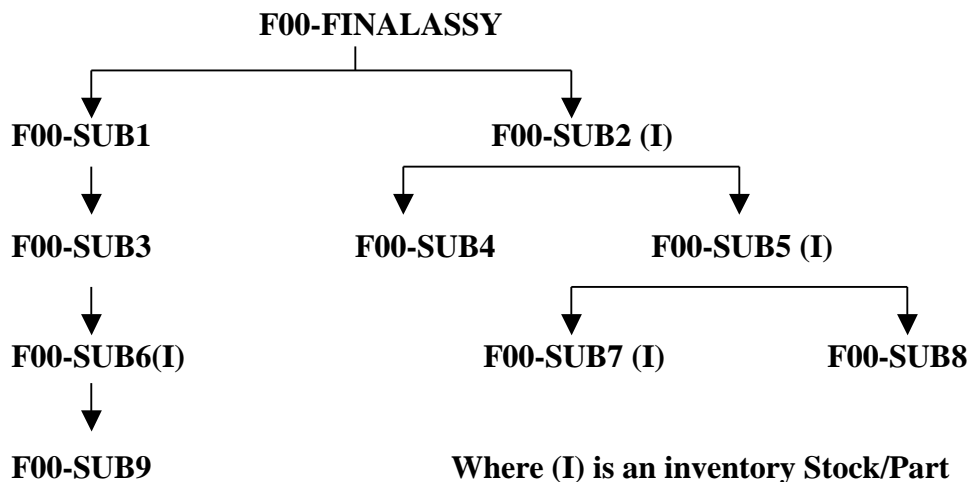
Figure 2 - Subassembly Schematic

On the second run through the automatic order generation routine the Jobs would be raised for F00-SUB2 and F00-SUB6, and their associated sub-assembly jobs would then be raised for F00-SUB4 and F00-SUB9, but stop again at F00-SUB5 (inventory item).

It would not be until the third run of the automatic order processing routine that the final sub-assemblies (F00-SUB8 and F00-SUB7) would be generated. The purchase orders could then be generated for the raw material requirements once all sub-assembly Jobs had been raised.

One final thing to note about Inventory Manufactured Item processing is that the Sales Order is for stock. It is not for any one customer order and is likely to represent an accumulation of requirements from many different jobs, each of which has its own due date. The Due Date of the "Stock Sales Order" will be in accordance with the Stock Item Lead Time. That is, the earliest date when the goods can be obtained which is "to days" date plus the lead time.

This may not satisfy every job requirement and as such additional orders, with specific order-related due dates, may need to still be generated.

Commissioning the Inventory Control System

You can see from the discussion above that automatic order processing can be complex. The system is running however on a set of rules so all we need to do is set it up in accordance with the rules and let it do the processing.

The steps needed to achieve this, and in general to commission the ManuDyn Inventory Control system are as follows:

Step 1. Create the necessary Material Items and enter the basic information.

At this stage the information required for each Item is only the basic information needed to perform the purchasing function (manually), namely:

- The Material Item Code.
- The Item Description.
- The Units of Measure both for Stock Holding and Purchasing and, where the two are different, the Units Conversion Factor.
- The Standard Cost (for Quoting & Estimating)
- The Supplier and the Suppliers Purchase Price.

Note i. This information will be needed for each supplier if the second supplier is nominated.
ii. The Price for Quoting purposes (Standard Cost) is also an important variable that needs to be set for the operation of the ManuDyn system generally.

Initially both the Re-order Point (RP) and Re-order Quantity (RQ) registers should be set to zero (0) for **ALL** Material items. You will need to do this until such time as the operational aspects of the system, and the accompanying disciplines, are in place. The danger at this point is that if

these variables are set inappropriately, you may inadvertently raise orders for goods that you do not need.

Step 2. Use the System to raise *ALL* purchase orders manually (initially).

In this stage you will need to define your purchase order operational procedures.
Who can raise orders, who is responsible for confirmation and who is responsible for generating the Purchase Order Advice and making sure it gets to the Supplier.

For the purchasing function to work effectively you will need to do two key things, namely:

    i.   Do not purchase by any other means outside of the ManuDyn system.
   ii.   All purchase orders should contain an agreed price in addition to an agreed quantity and delivery date.

ManuDyn requires that all things being purchased have an assigned Material Item Code. This includes consumable items such as oils and solvents and even stationery and staff amenities such as tea, coffee and even toilet paper.

To raise individual Stock Codes, in order to cover all such miscellaneous items, is not a smart thing to do. You only need to raise general Stock Code to cover consumables and amenities, such as:

        R99-FTYCONSUMABLE
        R99-STAFFAMENITIES

The descriptive fields, associated with the purchase order, should then be used to describe the precise nature of the purchase. These stock codes should also be set as "Null Stores" items so that the goods are immediately removed from stock at the goods received operation ("Purchase Orders/Receive Purchases"). The "Null Stores" option is located on the Attributes tab of stock item data entry routine ("Datebase Entry/Material Items").

The requirement that only ManuDyn be used for purchasing is an important point. Firstly, if you fail to do this you will have difficulty in determining what your potential creditor commitments are tied up in outstanding purchase orders. You will have more than one purchasing system to maintain, requiring more work and potentially more overhead expense.

Also, if you have numerous methods for purchasing you can guarantee that the operator will use the method that suits them at the time. The application of "Murphy's Law" will also guarantee that the method they use is precisely the opposite of the one you want them to use. All-in-all you plant the seeds which ensure you harvest confusion.

All procurement should be made through the one system, preferably ManuDyn.

Purchasing only through ManuDyn may require the removal of other means of purchasing notably purchase requisition books, particularly if they had been used previously as the actual purchase order.

The recommended requirement is to ensure that **ALL** purchase orders, when they are raised, have an agreed price. This is essential for the efficient operation of the ManuDyn system, in addition to simply removing a potential conflict between you and your supplier.

ManuDyn requires a purchase price primarily because it is the purchase price that is used as the default cost, at the point where goods are received. The goods received price is used to determine the Average Waited Purchase Price

Avoid "do and charge" purchase orders.

But…I may need to raise "do and charge" orders sometimes, I hear you say. The argument is you don't know what needs to be done and banning "do and charge" job may tie staff up in red tape, causing delays in organizing urgent procurement.

Well…even if the latter point may sometimes be true, it would be preferable than providing the supplier with a license to print money. In any case there is nothing that is so urgent that a few minutes thought and effort to determine a price can't be done. If the extent of the service to be provided is in-determinant, then raise an order for that part of the service that can be determined.

For example, the supplier has to "pull down" the engine in order to find out what's wrong before it can be fixed (all at some unknown price). Raise an order for the first part only and when they quote you the price to fix the machine raise an order for that.

All purchase orders raised must contain an agreed price.

The requirement to have an agreed price may also stop the practice of raising purchase orders over the phone.

Once again, this does not have to be the case. It takes less than 15 seconds to raise a ManuDyn purchase order. It can be done while you are talking with your supplier. In any case new operating procedures will need to be defined, not just for raising purchase orders but also the confirmation and advice generation functions.

Step 3. Receive goods only against a purchase order reference and record the goods received details immediately.

In this step the receipt of goods becomes a critical function for the successful operation of the ManuDyn system. It will have to be done by a responsible adult.

Clearly the appropriate documentation must accompany the goods received, and in particular, it must contain a reference to your purchase order number to enable the goods receipt to be processed. You should not accept goods without a purchase order number reference.

The best result is to get your suppliers to provide the invoice with the goods.

Now…There is an "argument" that states that this is not possible and it can't be done. The Supplier would not do it even if we ask them. I have heard such negative and defeatist statements many times. There is one thing however that I know for sure. You will never know until you try.

Let's look at this rationally. Firstly, it makes sense for you to dispatch your goods with the invoice. In the first place you would not have accepted the order without an agreed price, and in ManuDyn it's so easy to raise the dispatch advice and invoice at the same time. If you invoice with the goods you will not send out any goods without an invoice (have you ever done this?), and you are likely to get paid sooner. So if it's good for you surely this also applies to your suppliers.

Secondly, the purchase price is confirmed at the point where goods are received and this information is used to process the average purchase price (for the stock item) and also the reconciliation of the Purchase Order with the Supplier Invoice.

There is no doubt and it is almost certain that you will not be unable to achieve this with every supplier. Those suppliers for example where you have no influence will simply continue to do their own thing. However, for most of your suppliers (by number not value), you do have influence and they will actually try to do what you want.

Perhaps as much as 80% of your creditor transactions can be handled in the desired way. That is, those suppliers where you have influence will provide an invoice with the goods. This will cut down the creditor transaction processing task considerably which will result in overhead cost efficiencies.

At this point the pre-requisites have been put in place for manual purchase order processing. The next steps are designed to facilitate automatic processing and complete stock control.

Step 4.   Set the Re-order Point and Re-order Quantity variables.

The first thing to note is that a re-order points and Quantities do not need to be set for each and every stock item. You only need to do this for those stock items where you wish to actually hold stock, that is, where it is inconvenient to run out of stock. If the goods can be obtained on a same day delivery basis there should be no need to hold stocks and purchasing can proceed on the basis of specific material requirements. If a re-order point is set then you are saying that you wish to hold stock for the material even though there may be no immediate requirement.

The Re-order Point for such stock items may be determined on the basis of the estimated usage rate and the lead time. That is:

$$RP = Usage\ Rate\ (units/day) * Lead\ Time\ (days)$$

The Re-order Quantity should be set to at least the Re-order Point amount (otherwise a profusion of small quantity purchase orders would result. That is:

$$RQ >= RP$$

An Economic purchasing Quantity (EQ) can also be determined, such that the unit cost of holding the excess stock (SHcost), is offset by the reduced unit price (because the Purchase Quantity is larger than the Re-order Quantity). That is:

$$RQ <= EQ$$

$$where\ (EQ-RP)*SHcost = EQ*EQprice - RP*RPprice$$

This last formula may be simplified to determine EQ as follows:

$$EQ = RP * (SHcost – RPprice) / (SHcost – EQprice)$$

The Re-order Quantity should be set somewhere between these two limits.

Once these RP and RQ variables have been determined they need to be entered into the system.

Step 5. Perform a Stock Take and enter the Stock Take information

The penultimate step in commissioning automatic purchase order processing is to actually do a stock count and set the Quantity in Stock (QS) register. This is not as easy for a dynamic manufacturing situation as you may first expect.

If you have followed the recommended practices associated with the manufacturing procedures of the Dynamic Resource Control system, then stock for example, will have been relieved at the point of job issue. The physical quantity in stock may be different to the actual quantity recorded by the computer system.

Doing a Stock Take is not just a matter of performing a physical count. You also have to examine the Job Status to account for raw materials that have been allocated but not yet consumed.

The "allocation" of stock material takes a number of forms. A negative quantity in stock (-QS), for example can represent commitments (QC) that have been relieved, and for which there is still goods on order (QO) that have not yet been received. If this is the case then the negative quantity in stock is correct and should not be changed.

In general, it is those jobs with a status of *"ISSUED"* that are most likely to have "allocated" resources still not consumed. That is, the quantity in stock, as determined from a physical count, needs to be reduced in accordance with the BOM of the part, in order to reconcile the physical count with the computer system Quantity in Stock.

Once the Stock Take it done it needs to be entered into the system. This can be done via the Stock Take Entry routine ("Inventory Control/Stock Take Entry") which allows for the results of a stock take to be recorded in a spreadsheet and then imported.

One final point to note with regard to Stock Take and a dynamically operating manufacturing control system is that in general a "Rolling Stock Take" should be in operation. That is, each week a stock checking process should occur for 1/52 of the Stores Items that are in the Stock file. This in effect audits the system and removes the necessity for a Stock Take altogether.

Step 6. Inventory Control/Order Processing

It is likely that the first time you allow automatic processing it is likely to generate a significant number of purchase orders (and Stock Orders in the case of Inventory Manufactured Items). At this point the system is generating orders in response to the requirements and your setting for the Re-order Point and Re-order Quantity.

You should either proceed with the purchase (because the materials are required), or alter the conditions that cause the system to raise the order. That is, remove the requirement or change your Re-order Points and/or Re-order Quantities. The automatic order will keep on appearing until you do one of these things.

Once the initial round of orders has been generated the system will settle down and subsequent automatic purchasing operations will pick up only the changes that result from customer order entry.

Concluding Remarks

The Manufacturing Inventory Control system has been specifically designed for automatic order processing. The material requirements are known, through the operation of the manufacturing modules, and as such the role of the purchasing officer is likely to change under an automatic processing régime.

Where manual purchasing is in operation the major task for the purchasing officer is to determine what to purchase. In automatic purchasing this function is automatically performed by the system. The purchasing officers' role becomes more one of managing the purchases to obtain the best price and delivery.