



# **Manufacturing Management Software**

## **Concepts Overview**

### **Making IT Work**

**Save Time**

**Save Money**

**Improve Performance**

**Comprehenisve - Proven - Affordable**

[www.match-it.com](http://www.match-it.com)





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## **Concepts**

This section very briefly describes the fundamental concepts Match-IT is built around. It will help you learn how to use Match-IT much faster if you understand why it's the way it is.

# 1 The Business Model

The term *Business Model* is used to refer to the day to day activities that any manufacturing business must perform in fulfilling its sales orders. Match-IT models the flow of information from an initial enquiry, through all the stages up to, and including, final invoicing. More significantly, Match-IT knows about the chain of cause and effect, the inter-dependencies and the documents involved. This allows it to guide you on what to do, or expect, next and when, and also automatically produces all the appropriate documents at the appropriate time.

## 1.1 Documents

The following table defines the meaning of the main document types understood by the system. Those marked by ☒ come from your customers and suppliers. The software produces all the rest.

Document	Meaning
Customer Enquiry ☒	A request for information on price and delivery for your products and services. The system does not distinguish between actual customers and potential customers.
Enquiry Acknowledgement Letter	A letter sent to a customer in response to a <i>Customer Enquiry</i> to acknowledge receipt of their enquiry and to confirm its details.
Request for Tender Letter	A request to a supplier asking them to provide prices and delivery dates for their goods and services. This is you asking for a quotation from your suppliers.
Tender Response ☒	A response to your <i>Request for Tender</i> from your suppliers.
Quotation Letter	A letter sent to a customer in response to a <i>Customer Enquiry</i> that specifies your price, delivery and terms for the products and services in the enquiry.
Customer Order ☒	An order for your products and services. From your point of view this is a <i>Sales Order</i> . From your customer's point of view it's their <i>Purchase Order</i> .
Sales Order Acknowledgement Letter	A letter sent to a customer in response to a <i>Customer Order</i> to just acknowledge receipt of their order and to confirm its details.
Sales Order Confirmation Letter	A letter sent to a customer in response to a <i>Customer Order</i> to confirm their order. This is your formal acceptance of the sales contract. It normally confirms your price and commits you to a delivery date.
Purchase Order	A request to a supplier to purchase some of their goods and services. The request normally includes quantities, prices and required delivery dates.
Sub-Contract Purchase Order	This is very similar to a <i>Purchase Order</i> . It is a request to a supplier to perform a specified process. The process is performed on material supplied by you as free issue to them.
Purchase Order Acknowledgement ☒	An acknowledgement from your supplier that they've received and accepted your <i>Purchase Order</i> .

Supplier Delivery Note ☒	A document accompanying goods delivered to you from a supplier that describes the goods delivered. At least one delivery note is normally expected for each <i>Purchase Order</i> and <i>Sub-Contract Purchase Order</i> you raise.
Supplier Invoice ☒	A request from a supplier for payment for goods and services supplied. These usually correspond to one or more <i>Supplier Delivery Notes</i> .
Supplier Credit Note ☒	A document from a supplier to cancel all or a portion of some previous <i>Supplier Invoice</i> .
Goods-In Label	These contain identification information about goods received from your suppliers, including their batch number, your batch number, etc.
Inspection Label	These identify the inspection status of your stock materials. There are two sorts: <i>Pass Labels</i> and <i>Fail Labels</i> .
Batch Label	These identify your stock materials and typically specify the stock code, description and batch number.
Works Order	<p>A request you place on your production staff to do something. There are four variations: a <i>Make Order</i>, a <i>Goods-In Order</i>, a <i>Dispatch Order</i> and a <i>Dis-Assembly Order</i>.</p> <p>A <i>Make Order</i> is an instruction to make something. This may be a complete product, just a sub-assembly, just a single component or just part of the processing to make a single component. There are often multiple <i>Works Orders</i> associated with a single <i>Sales Order</i>. It's very important to appreciate that a works order always makes for stock. Sales are then satisfied from the stock made. In fact, during the life of the works order, the sales order it is allocated to may change to reflect changing priorities.</p> <p>A <i>Goods-In Order</i> is an instruction to perform some action on receiving goods from a supplier to make them ready for use, for example un-packing or re-packing. These are optional.</p> <p>A <i>Dispatch Order</i> is an instruction to perform some action to make some stock ready for dispatching against a <i>Sales Order</i>, for example cutting and packing. These are also optional.</p> <p>A <i>Dis-Assembly Order</i> is an instruction to take something to pieces, typically used to extract useful parts from some bought assembly.</p>
Device Label	These contain identification information for part completed work. They are typically used to identify work as it passes from one process to another on the shop floor.
Dispatch Note	A document to accompany goods sent to your customers to identify the goods being dispatched.
Certificate of Conformance	A document sent to your customers in support of a dispatch to certify the goods meet their specification.

Consignment Note	A document to accompany a dispatch that identifies where the goods are to be sent. This is information useful to the carrier.
Package Label	These identify goods and their destination for the purposes of fixing on the boxes being dispatched.
Sales Invoice	A request to a customer for payment for goods and services supplied. These usually correspond to one or more <i>Dispatch Notes</i> .
Customer Credit Note	A document you send to a customer to cancel all or a portion of some previous <i>Sales Invoice</i> .
Customer Return Note ☒	A document received from a customer in support of goods they received from you that they are returning.
Non Conformance Report (NCR)	<p>A specification of a failure and the intended remedial action. There are three variants of the NCR: a <i>Supplier Reject</i>, an <i>Internal Reject</i> and a <i>Customer Reject</i>.</p> <p>A <i>Supplier Reject</i> is a document that accompanies goods being sent back to a supplier. It identifies the goods being returned and why, and what the supplier is expected to do about them.</p> <p>An <i>Internal Reject</i> is a document you can use to record and track your own production failures.</p> <p>A <i>Customer Reject</i> is a document you send to your customers in response to a <i>Customer Return Note</i>. It acknowledges receipt of their return and specifies what you are going to do about it.</p>

## 1.2 Processes

The following table illustrates the 'through route' processes for an enquiry that leads to an order that requires a single purchase order and a single works order to fulfil it. Notice that the production of most documents involves two stages; stage one 'raises' the document and stage two 'approves' it.

Trigger event	Activity	Result document
Receive Customer Enquiry	Take enquiry	Enquiry Acknowledgement Letter
Diary	Determine enquiry response	
Diary	Send quotation	Quotation Letter
Diary	Follow-up quotation	
Receive Customer Order	Take sales order	Sales Order Acknowledgement Letter
Diary	Schedule and approve sales order	Sales Order Confirmation Letter
Diary	Raise purchase order	
Diary	Approve purchase order	Purchase Order



Receive Supplier Delivery Note	Match delivery to order	Goods-In Labels
Diary	Inspect and book-in delivered goods	Inspection Labels
Receive Supplier Invoice	Match invoice to delivery	
Diary	Approve supplier invoice	
Diary	Approve works order	Works Order
Works order step complete	Log works order progress	Device Labels
Works order output complete	Book-in works order output	Inspection Labels
Diary	Sign-off works order	
Diary	Raise dispatch note	
Diary	Approve dispatch	Dispatch Note, C of C, Consignment Note, Package Labels
Diary	Raise sales invoice	
Diary	Approve sales invoice	Sales Invoice
Diary	Follow-up dispatch	
Diary	Post Invoices to Accounts	

Where the *Trigger event* is specified as *Diary*, it is referring to a reminder automatically placed there. See The Event Diary for more information.

## 2 The Stock Model

Conceptually, most activities involve moving inventory in and out of stock. An understanding of how your stock position is modelled is fundamental to learning to use the system effectively.

### 2.1 What is stock?

The term stock applies to your raw materials, part-finished work (WIP) and finished products. There is a distinction between the description of your stock, part code, name, etc, and actual examples of it. The former is referred to as your *Materials Catalogue*, and the latter as your *Inventory*.

Your inventory is modelled as it is now and also how it will be at any time in the future. It can do this because it knows when your purchase order deliveries are expected and when your sales orders are due for dispatch. This means your inventory of any particular material cannot be described by a single quantity. The following table describes the types of quantity you will see concerning your inventory.

Quantity Type Name	Meaning
In-stock	This is the physical stock on the shelf now that is available for use. If you do a stock take, this is what you should find. It <u>excludes</u> failed, expired, scrapped and dead stock (see below for the meaning of these terms).
Planned	This is stock that is expected to be made or bought in the future. There will be a pair of associated dates; one will define when the order is planned to be raised and the other will define when the stock is planned to arrive. The planned quantities and dates are calculated by <i>the SMART scheduler</i> .
On-order	This is stock that has been ordered, but has not arrived yet. This means a <i>purchase order</i> or a <i>works order</i> has been raised and approved, but not yet completed.
In goods-in	This is stock that has arrived from a supplier, but has not yet been booked-in. The stock is not usable until it has been inspected and booked-in as good stock.
Works demand	This is stock that is allocated to <i>works orders</i> , or <i>sub-contract purchase orders</i> that have not yet started. It is the 'kit' that will be issued to the works orders, or sub-contract purchase orders.
In-works	This is stock that has been issued to <i>works orders</i> that have started but not yet completed. If you did a stock check on the shop-floor you may or may not find this, depending on how far the works orders have progressed.
At sub-con	This is stock that has been issued, as kit, to <i>sub-contract purchase orders</i> that have been approved, but not yet completed.
Expected returns	This is stock that is expected to be returned from <i>works orders</i> that have started but not yet completed. This represents off-cuts and bar-ends left over when 'dimensioned' stock is issued as kit to works orders.
Sales demand	This is stock that is allocated for dispatch against <i>sales orders</i> for dispatches that have not yet been raised.
Un-allocated	This is stock that is not allocated to anything. In a sense, it's stock you shouldn't have! This includes on-order and planned stock, so it may not physically be there yet.

Free stock on-shelf	This is physical stock that is not allocated to anything. This differs from un-allocated in that it actually exists, so it doesn't include on-order and planned stock.
Failed	This is physical stock that is not usable because it has failed an inspection.
Expired	This is physical stock that is not usable because it has become too old. It has passed its expiry date.
Scrapped	This is physical stock that you have thrown away.
Dead	This is physical stock that you, or the scheduler, have marked as not usable. The scheduler will mark empty or very nearly empty stock batches as dead to remove them from further consideration.

These quantities can be shown to you for all batches of a particular material or for a specific batch. The meaning of the term *batch* is given below.

Your inventory is organised on four levels. At the top is the material code or *part code*. Next are *batches*. These have a unique number and are composed of material items with the same code that have a common history. Then there are *instances*. These are part batches that have common dimensions (length, width and height). The instance is the level that is used for scheduling and also for providing all your batch traceability. And, finally, there are *movements*. A movement is inventory being taken out of stock or put into stock. They relate to instances. There is a date associated with each movement. These movements and dates are scanned when calculating your future stock position.

## 2.2 What is a batch?

A batch is a set of instances that have the same material code and the same batch number. The batch number here is the one allocated automatically by the system. This is distinct from your suppliers' batch numbers. It is important to appreciate that a batch is not a single thing. It might start off as a single delivery from a supplier, for example, but it can become split through use. This is especially true for bars, extrusions and sheets where their use involves cutting it up. When looking at your inventory list it is common to see multiple entries with the same batch number.

## 2.3 What is a batch instance?

At a visual level an instance is a single line in your inventory list. It represents a quantity of stock that has the same dimensions and the same history. Any item within an instance is considered to be equally suitable as any other from the same instance. This is the level that provides your batch traceability and the level from which stock allocations are made by the scheduler.

The system knows where your batch instances came from and where they went. Each instance has a source that is one of:

Invented	This is used to indicate the instance was 'invented' by direct entry to the inventory list. This means the system does not know where it came from. This is mostly used to load your existing stock when you first start using the system.
Bought	This indicates the instance was purchased from a supplier. The system can show you the <i>purchase order</i> raised to buy these instances.
Made	This indicates you made the instance. The system can show you the <i>works order</i> raised to make these instances.
Returned	This indicates the instance was returned as excess kit from a works order or a sub-

	contract purchase order. This most often happens when a bar, extrusion or sheet is cut up to do a job and some is left over. The left over pieces will be a different size to the original so they are returned to a different instance. The system can show you the <i>works order</i> or <i>purchase order</i> that returned the stock.
Sub-contracted	This indicates a sub-contractor produced the instance. The system can show you the <i>sub-contract purchase order</i> raised to make these instances.
Transferred	This indicates the instance is a stock transfer from another instance. This is mostly used to correct book-in errors or to re-work failed stock. The system can show you the original <i>instance</i> the stock came from.

Each instance also has a state. This can be either *reserved* or *committed* or *done*.

A *reserved instance* is one that has been planned, but no works order or purchase order has yet been raised. Reserved instances are created by the scheduler when it examines your order book. In a sense, a reserved instance represents an intention to acquire the stock. This stock is not real; you can't go and count it because it doesn't exist.

A *committed instance* is one where the works order or purchase order has been raised, but the stock has not yet arrived. In a sense, a committed instance represents work in progress. This stock is not real; you can't go and count it because it doesn't exist in its finished condition yet.

A *done instance* is stock that does exist now or did in the past. Done stock that is still on the shelf can be either good or failed or dead or expired (see What is stock?). Only good stock is available for use to fulfil orders.

## 2.4 What is a stock movement?

All stock movements made from or to stock instances are recorded. The date, quantity and type of each movement are recorded. For the most part, these records are created and maintained automatically as you do things. The table below describes each of the movement types.

Book-in	This represents stock being added to the instance from a <i>works order</i> or a <i>purchase order</i> . The system can show you the associated works order or purchase order and, in the case of a completed purchase, the supplier's delivery note.
Issue	This represents stock being taken out of the instance and issued to a <i>works order</i> or a <i>sub-contract purchase order</i> . The system can show you the associated works order or purchase order.
Dispatch	This represents stock being taken out of the instance and dispatched to a customer against a <i>sales order</i> . The system can show you the associated sales order and, in the case of a completed dispatch, your dispatch note.
Demand	This represents stock being allocated from an instance against a <i>sales contract</i> . The system can show you the associated sales contract.
Supplier reject	This represents stock being taken out of the instance and sent back to the supplier. The stock will have been originally added via an earlier book-in movement on the same instance. This is usually done as a result of an inspection failure. The system can show you the original <i>purchase order</i> used to buy the returned stock.
Customer return	This represents stock being added to the instance as a result of a customer return. The stock will have been originally taken out via an earlier dispatch movement on the same instance. The system can show you the original <i>sales order</i> and your original dispatch note.

Fail	This represents stock being taken out of the instance because it has failed an inspection. You can record the location to where it was moved.
Un-fail	This represents stock being added to the instance as a result of re-working some previously failed stock from the same instance.
Adjust In	This represents stock being added to the instance to correct errors, as a result of a stock take, for example. It is treated like an 'un-issue'.
Adjust Out	This represents stock being taken out of the instance to correct errors, as a result of a stock take, for example. It is treated as an anonymous 'issue'.
Scrap	This represents stock being taken out of the instance because you have thrown it away.
Defective	This is used to record failures within the instance that were not discovered until after the stock was used. In this situation, you cannot fail the stock because it is no longer there to fail. The significance of marking part of the instance as defective is that it allows you to raise a <i>Supplier Reject</i> note.

The book-in, issue, demand and dispatch movement types also have a state that is either *reserved* or *committed* or *done*. The state of all the other movement types is always done.

A *reserved movement* is one that has been planned. It represents an intention. The associated date defines when the movement is planned for.

A *committed movement* on a book-in indicates the order that will create the stock has been raised, but not yet completed. It represents work in progress. The associated date defines when the order is expected to complete.

A *committed movement* on an issue indicates the stock is being issued to an order that has been started 'early'. This means the kit was not available, but the order was approved anyway. The associated date defines when the issue is expected to actually happen. It will be upgraded to *done* when the stock being issued arrives.

A demand or dispatch movement is never given the committed state.

A *done movement* indicates the stock movement has actually taken place. The associated date defines when it happened.

## 2.5 Example

Summary stock position for one material code:

Our Part Num:  —(( SHEET ALLOY 1. RMS —(( Raw Materie

1 View | 2 Explain | 3 Options

Free Stock On Shelf:	<input type="text" value="109 Sheets of 1 Mtrs x 1 Mtrs"/>	£697.60	<input type="button" value="H"/>
In-Stock [+]:	<input type="text" value="110 Sheets of 1 Mtrs x 1 Mtrs"/>	£704.00	<input type="button" value="H"/>
Planned [+]:	<input type="text"/>		<input type="button" value="H"/>
On-Order [+]:	<input type="text" value="90 Sheets of 1 Mtrs x 1 Mtrs"/>	£576.00	<input type="button" value="H"/>
In Goods-In [+]:	<input type="text"/>		<input type="button" value="H"/>
Works Demand [-]:	<input type="text" value="1 Sheets of 125 mm x 1 Mtrs"/>	£0.80	<input type="button" value="H"/>
In-Works:	<input type="text"/>		<input type="button" value="H"/>
At sub-con:	<input type="text"/>		<input type="button" value="H"/>
Expected Returns [+]:	<input type="text"/>		<input type="button" value="H"/>
Sales Demand [-]:	<input type="text"/>		<input type="button" value="H"/>
Un-allocated Stock [-]:	<input type="text" value="199.875 Sheets of 1 Mtrs x 1 Mtrs"/>	£1,279.20	<input type="button" value="H"/>
Failed/Expired/Dead:	<input type="text" value="200 Sheets of 1 Mtrs x 1 Mtrs"/>	£1,280.00	<input type="button" value="H"/>
Min Stock Level:	<input type="text" value="25 Sheets"/>	Max: <input type="text"/>	
Re-Order Quantity:	<input type="text" value="200 Sheets"/>		

Batch list for one material code:

Batches of 55157G ---(( SHEET ALLOY 1.2MM ))

1 By Our Part# 2 By Batch# 3 By Item# 4 By Ordered 5 By Arrived 6 By Expires

S	Q	M	C	Our Part#	Tech Spec	Batch#	On Shelf	Un-alloc'd
r	R			55157G	---( SHEE	0000000008		
d	B			55157G	---( SHEE	0000000008		
c	B			55157G	---( SHEE	0000000029		90 Sheets of 1 Mtrs x 1 Mtrs
d	B			55157G	---( SHEE	0000000029	10 Sheets of 1	10 Sheets of 1 Mtrs x 2 Mtrs
d	B			55157G	---( SHEE	0000000029	20 Sheets of 1	20 Sheets of 1.5 Mtrs x 2 Mtrs
d	B			55157G	---( SHEE	0000000029	30 Sheets of 1	29 Sheets of 1 Mtrs x 1 Mtrs

3 instances of batch 29

Summary  
Structure  
Detail  
Remove  
Invent  
Adjust  
Re-Inspect  
Book-In  
Non-Moving  
Close

Batch List Options Tools

Batch movement detail for one batch instance:

Batch Detail

Our Part Num: 5157G —(( SHEET ALLOY 1.2MM)) Issue: ...

Batch: 0000000029  Consumable  Dead

State: Done Source: Bought Expires: Never

1 Summary 2 Moves 3 Ident/Size 4 Cost 5 Analysis 6 Actions 7 Audit 8 Qualifiers

State	Date	Type	Move Qty	Location	Source
Done	28/01/09	PO-BookIn	30 Sheets of 1 Mtrs x 1 Mtrs	RMS	
Reserved	29/01/09	WO-Kit	1 Sheets of 1 Mtrs x 1 Mtrs	RMS	

**2 movements on batch 29**

Detail  
Goods-In  
Pline  
Sup Return  
Cys Return  
Remove  
Un-Book-In  
Issue Some

S = State - (R)eserved, (C)ommitted, (D)one

<Back Next Save Close



## 3 The Product Model

Match-IT is a manufacturing control system. The things you manufacture are referred to as your *products*. The description of the parts or raw materials required to make a product is referred to as a *product structure*. The description of how you process the parts to turn them into a product is referred to as a *method*. The *scheduler* plans your production by interpreting these methods in the context of your stock position and shop floor loading. Collectively, all of this is referred to as the *Match-IT Product Model*.

The method description can be very detailed, very vague or anything in between. Somewhere within this spectrum will be 'right' for each of your products; where is a matter of judgement. An understanding of how your methods are interpreted will help you make this judgement.

### 3.1 What is a product structure?

A *product structure* is just the assembly, sub-assembly and part, or raw material, hierarchy of a product.

You don't have to define your product structures explicitly. They are deduced by analysing your product methods and, in turn, the methods of the assemblies they call up.

There is no limit to the number of assembly levels in your structure, and there is no limit to the number of components and processes in any level.

Here is an example of a partially exploded product structure:

Code	Use	Usage	
		To Make	Use
C1254K (MODULE KIT 6U 21HP XH0S 05 ISS 4)		1 Each	
METHOD(make):Issue 4			
STEP:Assemble		1 Each	
PART(buy):	66232X (SCREW M3 12 P		4 Each
PART(buy):	66239G (SCREW M3 12 C		4 Each
PART(buy):	66253X (SCREW M2.5 X		2 Each
PART(buy):	66267X (NUT M2.5 FULL		4 Each
PART(buy):	66475E (WASHER M2.5 F		2 Each
PART(buy):	66840F (SCREW M2.5 X 6		18 Each
PART(buy):	67201H (BUSH RETENTII		4 Each
PART(make)(subcon):	67249R (MOD TOP/BOT I		2 Each
67249R (MOD TOP/BOT COVER)		1 Each	
METHOD(make):			
STEP(logged):01-PUNCH		[1 cycle]	
STEP(logged):02-LINISH		[1 cycle]	
STEP(subcon logged):03-SAT ANOD		1 Each	
PART(make)(subcon):	67257R (MOD SIDE COVE		2 Each
67257R (MOD SIDE COVER)		1 Each	
METHOD(make):			
STEP(logged):01-PUNCH		[1 cycle]	
STEP(logged):02-LINISH		[1 cycle]	
STEP(subcon logged):03-SAT ANOD		1 Each	
PART(buy):	67473D (BLOCK SPACER		2 Each
PART(make):	67476R (MODULE RAIL)		4 Each
67476R (MODULE RAIL)		1 Each	
METHOD(make):			
STEP(logged):01-SAW		[1 cycle]	
STEP(logged):02-REMOVE SWARF		[1 cycle]	
STEP(logged):03-FLYPRESS		[1 cycle]	
STEP(logged):04-FLYPRESS		[1 cycle]	
STEP(logged):05-DEBURR		[1 cycle]	
STEP(logged):06-LINISH		[1 cycle]	
STEP(subcon logged):07-SAT ANOD		1 Each	
Contractors			
ACTION ELECTRO		1 Each	
STEP(logged):08-TAP		[1 cycle]	
STEP(logged):09-TAP		[1 cycle]	
STEP(logged):10-DEGREASE		1 Each	
PART(buy):	68942A (SCREW PANEL I		4 Each
PART(make)(subcon):	C1234P (REAR PANEL)		1 Each
C1234P (REAR PANEL)		1 Each	
METHOD(make):			
STEP(logged):01-PUNCH		[1 cycle]	
STEP(logged):02-LINISH		[1 cycle]	
STEP(logged):03-FLYPRESS		[1 cycle]	
STEP(subcon logged):04-SAT ANOD		1 Each	
PART(make)(subcon):	C1255P (FRONT PANEL M		1 Each
PART(make)(subcon):	C1329P (HANDLE)		1 Each
RESOURCE:	Assembly Worker [SHARA		30 Mins cy

### 3.2 What is a method?

A *method* is the description of how you transform your parts and materials into products. At its simplest level, a method consists of a series of *steps*, where each step consists of a *part list* and a *resource list* or a *supplier list*. The scheduler uses the information in the method to estimate costs, estimate delivery dates and to allocate stock and resources to a job.

Each *step* represents a single 'operation'. Performing, in turn, each step in its method makes the product. A method can have as many steps as you like. The minimum is one. The processing for the step can either be performed by you or by a sub-contractor. When done by you, the step has a *resource list* to specify the machines, tools, people, etc. you need. When a sub-contractor is being used, the step has a *supplier list* to specify the suppliers you normally use for the process.

A *part list* consists of a list of parts and their dimensions and quantities needed for a step. You can have any number of parts in the list, including none, except on the first step, which normally has at least one. Usually, the raw material is added to step one and then processed by each step thereafter. When there are multiple parts, you would normally add each extra part to the first step that needs it. This gives you the maximum opportunity to start work early in the event that not all the parts you need for the whole product are ready. A part may call up a raw material (i.e. something you buy) or another product (i.e. a sub-assembly you make). You can have sub-assemblies within sub-assemblies to any depth you like. The part information is used to allocate stock to your jobs and to calculate your buying requirements. It's also used in the calculation of estimated production costs.

A *resource list* consists of a list of the machines, tools, gauges, people, etc. and the amount of time needed of each for the step. A fixed set-up part and a variable cycle part specify the time. The set-up part is independent of the quantity to be made. The cycle part is multiplied by the quantity to be made to calculate the time needed. This information is used by the scheduler to allocate time to your jobs. If you specify a running cost for each of your resources, the time information in the step is also used in the calculation of estimated production costs.

A *supplier list* is associated with each sub-contracted step and also with each raw material. It consists of a list of suitable suppliers, along with their charges and standard delivery lead times. This information is used by the scheduler to allocate suppliers and to calculate production lead-times. The charge information is used to calculate estimated costs. You can specify a batch charge, that is independent of quantity, and a per unit charge for each of your supplied parts and services. When there is a choice of suppliers, the scheduler will normally pick the cheapest for the quantity required.

### 3.3 Piece part method example

In this simple *piece part* example, there is a single raw material part that is processed through six steps. It's first punched on an Amada, then re-cut using a power press, then finished using a Spedfam, then counter sunk by hand, then satin anodised by a sub-contractor and finally silk screen printed by another sub-contractor.

Production Method

Method For: ... C1255P --(( FRONT PANEL MODULE )) Structure

Item	Name	Use	Of This
C1255P --(( FRONT PANEL MODULE ))			
[-] METHOD(make)			
[-] STEP(logged)	01-PUNCH	1 Sheets of 125 mm x 475 mm 80*0.5 Secs cycle & 30 Mins setup	55004E (SHEET ALLOY AMADA)
[-] PART(buy)			
[-] RESOURCE			
[-] STEP(logged)	02-RECUT	4*15 Secs cycle & 2 Mins setup	PWRPRESS
[-] RESOURCE			
[-] STEP(logged)	03-LINISH	80*0.2 Secs cycle & 5 Mins setup	SPEDFAM
[-] RESOURCE			
[-] STEP(logged)	04-CSINK	4*9 Secs cycle & 5 Mins setup	WORKER (SHARABLE)
[-] RESOURCE			
[-] STEP(subcon logged)	05-SAT ANOD	3 days	Stoffold Plating
[-] CONTRACTOR			
[-] STEP(subcon logged)	06-SILK SCREEN	3 days	PREMIER SCREENPR
[-] CONTRACTOR			
MADE	C1255P --(( FRONT PANEL MODULE ))		

Hide disabled items     Hide qualifiers  
 Auto collapse assemblies     Use D&D

Via Library

### 3.4 Assembly method example

In this simple assembly example, there are sixteen parts that are assembled by hand into the product. Notice part number 14 (code C1255P) is the piece part example given above.

Item	Name	Use	Of This
C1254K	---(( MODULE KIT 6U 21HP XH0S 05 IS		
[-] METHOD(make)	Issue 4		
[-] STEP	Assemble		
- PART(buy)	#1	4 Each	66232X (SCREW M3 12
- PART(buy)	#2	4 Each	66239G (SCREW M3 12
- PART(buy)	#3	2 Each	66253X (SCREW M2.5 X
- PART(buy)	#4	4 Each	66267X (NUT M2.5 FULL
- PART(buy)	#5	2 Each	66475E (WASHER M2.5
- PART(buy)	#6	18 Each	66840F (SCREW M2.5 X
- PART(buy)	#7	4 Each	67201H (BUSH RETEN1
- PART(make){subcc	#8	2 Each	67249R (MOD TOP/BO1
- PART(make){subcc	#9	2 Each	67257R (MOD SIDE COV
- PART(buy)	#10	2 Each	67473D (BLOCK SPACE
- PART(make)	#11	4 Each	67476R (MODULE RAIL
- PART(buy)	#12	4 Each	68942A (SCREW PANEL
- PART(make){subcc	#13	1 Each	C1234P (REAR PANEL)
- PART(make){subcc	#14	1 Each	C1255P (FRONT PANEL)
- PART(make){subcc	#15	1 Each	C1329P (HANDLE)
- RESOURCE		30 Mins cycle & 5 Mins setup	Assembly Worker (SHAR
- MADE	C1254K	---(( MOD	

## 4 The Production Model

Many small manufacturers operate procedures where all the necessary purchase and works order paperwork are produced as soon as a sales order is accepted. In a manual system there are benefits to this as it makes progressing the job easier and more visible. **In a Match-IT system such an 'up-front' procedure has no benefit, and in fact is a major hindrance to efficient operation.** To gain the most benefit from Match-IT, or any similar system, some discipline is required by your production staff. In particular, it is important that no work is done without an approved works order to cover it. Also, they must either use the material batches allocated or tell the system what actual batches they used. This discipline is critical to a successful implementation.

Match-IT is a *lazy* system. It does all the planning to determine what purchase and works orders are required when a sales order is accepted, but does not commit to them. Instead it leaves them in a *reserved* state. The significance of this is that while they are just reserved, your plans can be changed very easily to meet changed circumstances by manipulating these reservations. When you approve a purchase or works order, only that order becomes *committed*, the rest stay reserved. Any subsequent planning will then make use of these committed orders instead of creating new reservations.

Another crucial concept is the relationship between sales orders, purchase orders and works orders. Your requirements for purchase and works orders are produced by analysing the *methods* attached to the products in your sales orders. When doing this, it's looking at your stock and your order book as a whole. This means purchase and works orders can be shared between sales orders in very complex ways. Also, if you've got stock to partially fulfil a sales order or any step within it, your requirement for new purchase and works orders will be just for the shortfall.

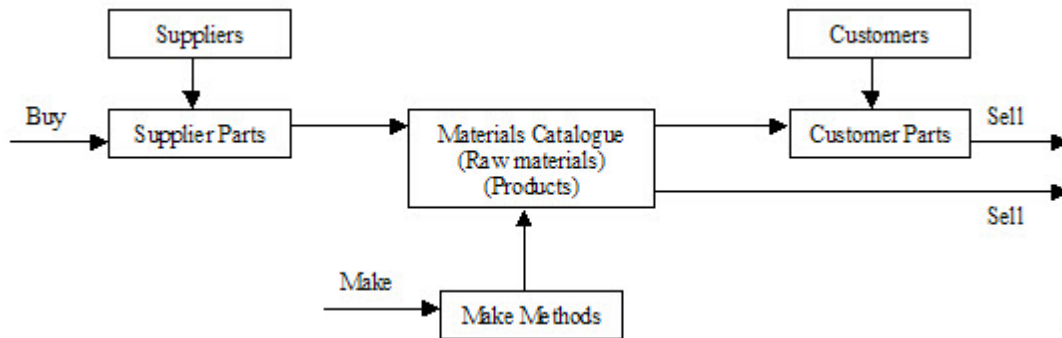
The system knows at all times why a purchase or works order is required and can show you that reason. However, the requirement can change, or even disappear, as a result of re-planning. This is why the system is *lazy*. If a requirement disappears, due to re-planning for example, and it's only been *reserved* then nothing is lost. However, if you'd committed to everything up-front and the requirement subsequently disappeared, you would be incurring costs that cannot be recovered easily.

An understanding of the relationship between your *method* descriptions and the resultant purchase and works orders is also important. The complete production description for one of your products may involve assemblies containing sub-assemblies requiring raw materials, encompassing many individual method descriptions. Purchase requirements for the raw materials are produced as necessary. This relationship is straightforward and self-evident. However, the relationship to the works orders may not be straightforward. A works order may span many methods, a single method or only part of a single method. The works order 'boundaries' within your overall structure are referred to as *modules*. The position of these *module* boundaries is controlled by the *method*. This means you can choose to have a works order cover as much, or as little, of the overall job as you wish.

The important point here is that you can design your methods and module boundaries in a way that gives you the most efficient and flexible production options. The system keeps track of everything for you no matter what, so you don't need to compromise your procedures in any way, as you may have needed to in a manual system.

## 5 The Buy/Make/Sell Model

The system is largely about selling products that you either buy or make. It provides very flexible links between your suppliers, your products and your customers. For example, you can have multiple suppliers for a particular material, with each supplier having a different name for the material and each providing different quantity/price breaks. And likewise, you can have multiple customers for a particular product, with each customer having their own name for the product and each being offered a different price. When defining a new material or product, it will help if you understand how these links are managed. The diagram below illustrates the links between the various types of record involved:



The *Materials Catalogue* contains the descriptions of all the materials you deal with. No distinction is made between the parts you buy, the things you make and the products you sell.

To be able to buy a material, there must be a materials catalogue record for it with at least one attached *supplier part* record. The supplier part record defines the supplier, their price and their normal delivery lead time (in days).

To be able to make something, there must be a materials catalogue record for it with a *method* attached. The method defines how you make it, both in terms of the raw materials required (the BoM) and the resources required (the Ops).

When it comes to selling something, there only need be a material catalogue record for it. A *customer part* record is optional. However, you would usually define a customer part record because it provides a convenient way to select products when entering sales orders.

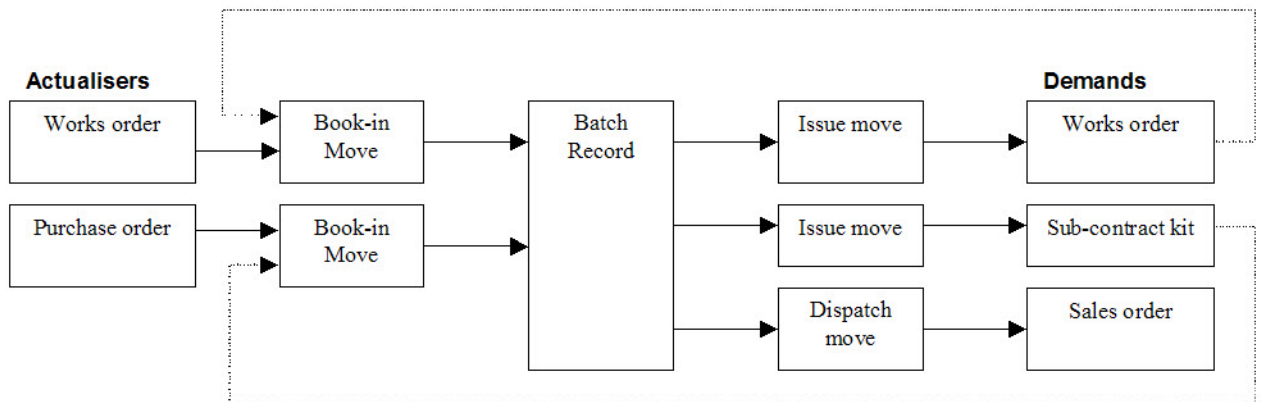
Customer part records are also useful when responding to a customer enquiry for a job you've never done before. This is because you can create the customer part record before you've created its materials catalogue record and before you've decided how you are going to do the job.

## 6 The Stock Allocation Model

Stock allocation is totally automatic. Under normal circumstances the system will find appropriate stock and automatically allocate it to works orders and sales orders as necessary. This allocation is done as soon as the sales order is approved. The allocation may be from physical stock or WIP or planned purchases or planned works orders. The allocated stock is also automatically issued to a job when you approve the job and also automatically taken away when you approve a dispatch. The stock control system will never over allocate stock and it will automatically detect shortages. Shortages will trigger appropriate purchase order and works order suggestions to cover them. Provided you keep the system up to date, you will never run out of stock and you will never buy or make more than you need to cover your commitments.

The key to understanding how this is achieved is by understanding the importance of stock *moves*. Every stock transaction is modelled by a movement record attached to a batch record. These movement records either increase the stock level or decrease it or note some other condition (e.g. a write-off). But also, crucially, they provide the connection between a *demand* and an *actualiser*. A *demand* is something that requires the use of stock, be it a sales order or kit for a works order or just a minimum stock requirement. An *actualiser* is something that satisfies the demand by creating stock, e.g. a purchase order for bought things or a works order for made things. The planning system examines the demands, calculates stock shortages, then makes purchase order and works order suggestions to fulfil the shortages.

The 'glue' for all this are the batch records and their associated movement records. The diagram below shows a simplified view of how they are connected:



By following these connections you can find everything that is related to anything, either forwards or backwards. For example, to find out where a purchased item went, just follow the book-in move from the purchase into its batches, then follow the issue records from there to the demands. If that is a works order, just keep going by following its book-in moves to the batches created from that and on into the issues from there, and so on until you arrive at the sales order. The *trace forward* facility does this for you automatically. Similarly, to find out how a sales order is being satisfied, follow its dispatch moves back to the batch, and then out through its book-in moves to the source of the batch. If that's a works order, just continue through the works order kit until you arrive at a purchase order. The *trace backward* facility does this for you automatically.



## 7 The SMART Scheduler

The scheduler is the core of the planning system. It is responsible for allocating stock and resources to your sales orders according to the specifications given in the production methods. It is also responsible for determining your buying requirements and maintaining the event diary.

The scheduler was developed with the aid of a SMART award from the DTI. These awards are given by the DTI in support of projects involving **innovation**.

If you are familiar with the ideas of MRP (Materials Requirement Planning) and MRPII (Manufacturing Resource Planning), you might ask: "*Is Match-IT an MRP (or MRPII) system?*". Well, the answer is that it's both and neither! It's both in that it performs material planning actions and resource planning actions. It's neither in that it does this in a novel way and more usefully than in traditional systems.

One novelty is that it considers your materials requirements and your resource requirements **simultaneously**; rather than one after the other. This means it produces buying requirements for only what's needed for the work about to be started. It will not insist you buy all the raw materials required up front. Instead, it produces a time ordered schedule of what is needed and when it must be ordered. The material required date and the supplier's lead-time are used to determine the order dates.

Another novelty is that it knows about the inter-dependencies of your orders. This means if you ask it to re-schedule just one order for some reason, it can find all the other orders that may be impacted by it and re-schedule those too. This is referred to as *incremental scheduling* and means you can quickly re-schedule individual orders as necessary without the need to perform a long 'MRP run'.

A final novelty to mention here is the ability to work with a mixture of ASAP (as soon as possible) and JIT (just in time) orders. You can specify which mode the scheduler should use on an order-by-order basis.

### 7.1 What do ASAP and JIT mean?

An order marked as ASAP is scheduled starting from today and works forward until it is completed. This means it will allocate or buy stock first, then allocate resources when the stock is available. This is useful when you want to know when work on an order would finish if you started now. By contrast, an order marked as JIT is scheduled starting from the required completion date, and works backwards until it finds when it should start. In this case, resources are allocated first to find out when the stock is required, and then stock is allocated or bought for that date. If the start date is found to be earlier than today, it means you cannot meet the required completion date.

In addition to these two basic strategies, an order can also be marked as *urgent*. Normally, the scheduler will make use of work in progress, even if that work is late. When an order is marked as urgent, the scheduler will try to beat late work by using whatever alternative suppliers, materials and resources it's been given. If it succeeds, it will use the alternative it found instead of waiting for the late work in progress.

### 7.2 How is stock allocated?

It would not be appropriate to expose you to the full sophistication of the stock allocation mechanism here. Instead, just a few key ideas will be mentioned to give you a flavour of what it can do.

Firstly, there are three types of stock: physical, WIP and planned. Physical actually exists. This is referred to as *done* stock. WIP is stock that is on order but either hasn't arrived from the supplier yet or hasn't been made yet. This is referred to as *committed*. Planned stock is stock you expect to need in the future but hasn't been ordered yet. This is referred to as *reserved*. When looking for stock to allocate to a job, the scheduler will use free physical before WIP, and WIP before planned. Only when all three of these options are exhausted will the scheduler try to make up the shortfall by buying or making more.

Secondly, the system is aware of the dimensions of your bars, extrusions and sheets and calculates yields for their use when making things. The process of calculating these yields is referred to as *tessellation*. When allocating stock that is a bar, extrusion or sheet, it calculates what must be issued and expects the excess to be returned. For example, if you are making one widget that requires a panel 6" by 6", and you have in stock 9" by 6", the scheduler will issue the whole sheet to the job and expect an off-cut of 3" by 6" as a return.

Consideration of tolerances, cutting losses, parting-off losses, bar ends and clamping areas can all be specified when tessellating.

Next, when presented with a choice of stock that could be allocated, it will choose the soonest-to-expire stock first, then the smallest that will fit the requirement, then the oldest.

And finally, you can specify that a job is not allowed to mix batches of raw material. In this case, only stock from a single batch is allocated to a job. If a job requires more than is available in a single batch, it can be split into separate works orders, with a single batch being allocated to each one. This is useful if your customer requires that their finished batches are not made from a mixture of raw material batches.

### 7.3 How are resources allocated?

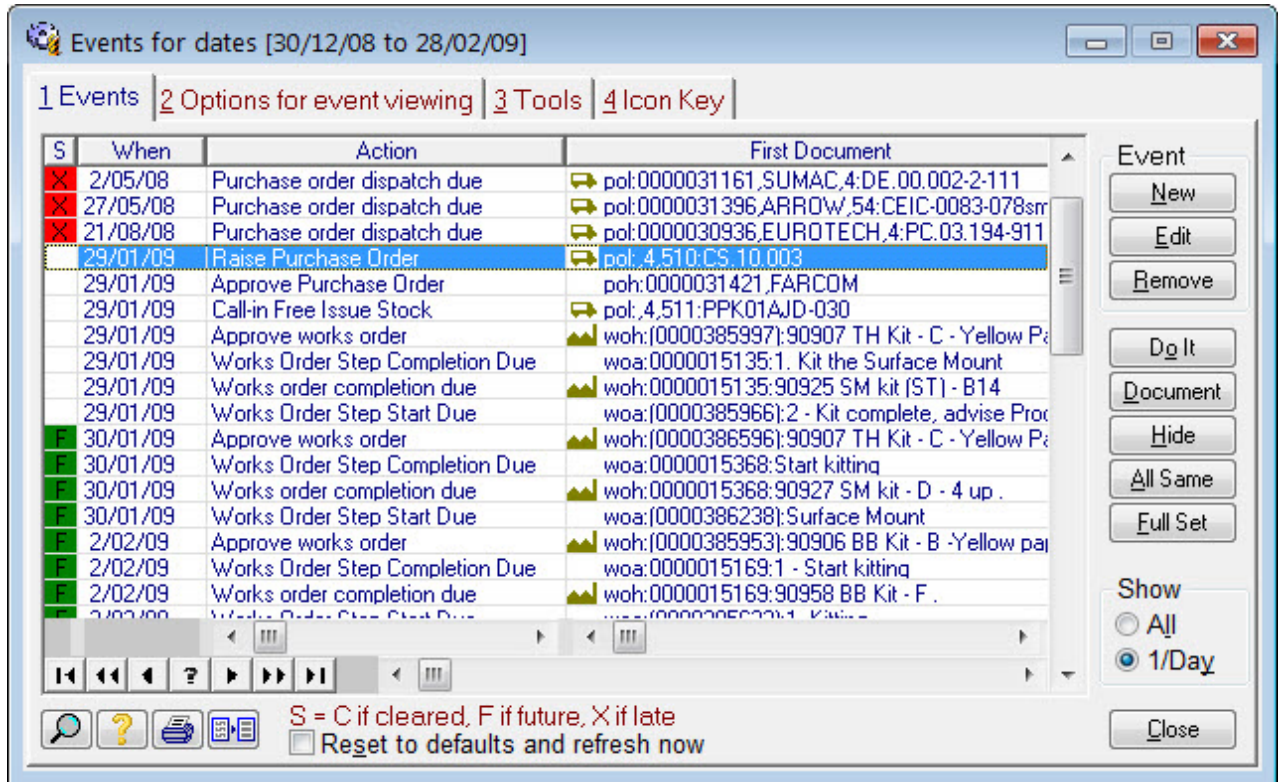
Resources are the machines, tools and people required to do a job. The scheduler is a finite capacity one. This means it will only allocate time from the available time for a resource. It will not permit a resource to become overloaded. Instead, it will wait for the resource to become available, stretching the job out as necessary. The only exception to this is when allocating time to a sub-contractor. The system assumes sub-contractors have infinite capacity. However, it does take the sub-contractor's lead-time into account, and that lead-time can be dependent on the quantity involved.

Also, if a production step requires more than one resource at once (a lathe, a tool and an operator for example), the scheduler will only allocate time when all are available. Again, it will stretch the job out as necessary to wait for all required resources to be available.

When a choice of suitable resources is available, it will choose the one(s) that will do the job the cheapest.

## 8 The Event Diary

The event diary is a categorised time ordered *To-Do* list. Entries, referred to as tickles, are placed into the diary and removed from it automatically as you do things within the system. The diary will remind you what tasks need to be done or started on any particular date, and it will also remind you when a task is expected to finish. Examples of categories, referred to as event types are: Follow-up Quote, Raise Purchase Order, Start Works Order, Dispatch Sales Order. Altogether, there are over 400 event types recognised.

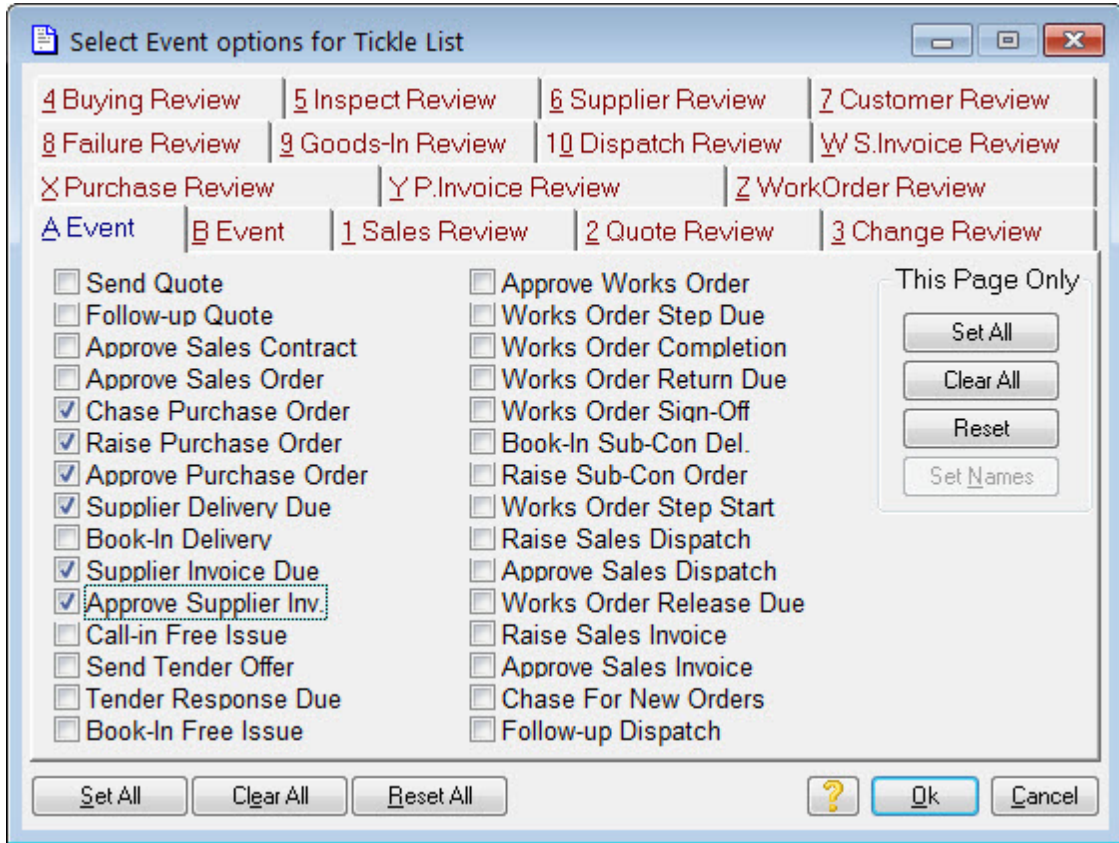


The example above is a diary page showing purchasing and works order related events.

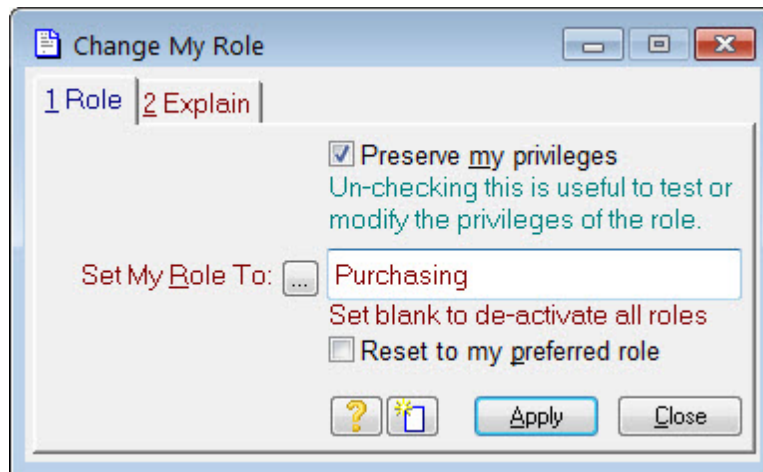
The diary can also be used to navigate the system. The **Do It** button will take you to the appropriate part of the system to action the event, and with the appropriate document selected. The **Document** button will show you the detail of the document related to the event, be it a purchase order, sales order, works order or whatever.

In a typical manufacturing company, the total events in the diary for a particular day is likely to be quite large. This would be overwhelming for one person to deal with. It is also inappropriate as individuals are usually only interested in events that are relevant to their role in the company. To cater for this, individuals (or their supervisor) can specify which event categories they are interested in and which ones they don't want to see. The event diary will then only show those event categories to that individual. For example, your sales staff might only want to know about new enquiries and following-up outstanding quotes, and your purchasing staff might only want to know about raising purchase orders and expected supplier deliveries.

The example below shows the event categories selected for purchasing related events.



In smaller companies, individuals or supervisors are often concerned with more than one role within the organisation. In this situation you can define which event categories each role needs to know about, and then by changing your role, the diary will show you the events relevant to that role.



See Setting up the diary for more information.

## 9 The Default System

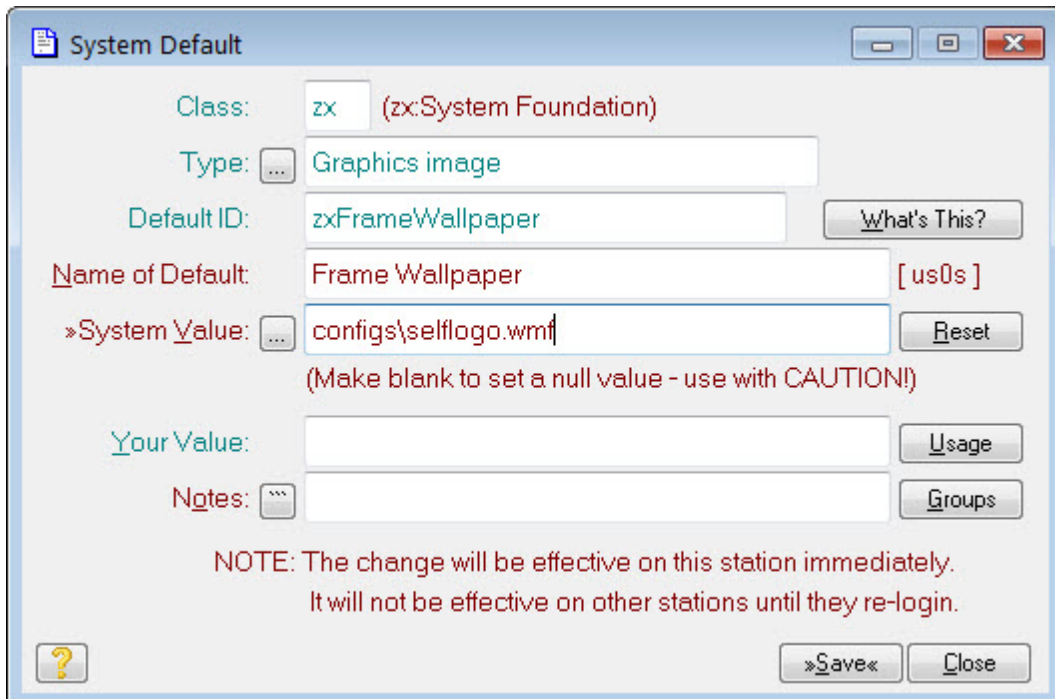
Match-IT is a very flexible system. Nearly every aspect of its operation can be tailored to your preferences through its system of *defaults*. There are over 1000 defaults that you can change. All will be set to their most usual value when the system is first installed. Most of them will be appropriate for you and will not need to be changed. However, to help you get the best out of the system, it is important to understand how the default system works.

Defaults are used to set your system preferences, and also to set the standard, or most usual, value for fields in forms. For example, the image you want to use as your desktop wallpaper is a preference, but a default nominal account code is a standard value for a field. Both types of default are treated in the same way.

Each default has a system value that is automatically set when you start the software. However, this value can be overridden depending on the context. There are five levels of 'contexts' that can successively override the base level default. The contexts start at the broadest level, the whole system, and gradually become more specific. The levels are:

- The whole system
- The site the system is operating at
- The station you are working at
- The user who is logged in (you)
- The role you are currently using
- The customer or supplier you are currently dealing with

The most significant level is the last one, the customer or supplier. By associating appropriate defaults to specific customers and suppliers, the system can change its behaviour to suit the customer or supplier you are dealing with. For example, if you specify the currency used by a foreign supplier, then when you place an order on that supplier, the system will use their currency on the purchase order.



**System Default**

Class:  (zx:System Foundation)

Type:

Default ID:

Name of Default:  [ us0s ]

»System Value:

(Make blank to set a null value - use with CAUTION!)

Your Value:

Notes:

NOTE: The change will be effective on this station immediately.  
It will not be effective on other stations until they re-login.

See Setting your default preferences for more information.



## 10 The Document System

Match-IT can produce all your business documents for you automatically. There are more than 18 different types of document it can produce, including quotation letters, order acknowledgements, purchase orders, works orders (or route cards), dispatch notes, C of C's, invoices, as well as many types of label, including goods-in labels, inspection labels, dispatch labels, product identification labels.



All these documents can be tailored to your precise requirements, both in terms of the document content and its format.

Samples of simple designs for the most common documents types are provided. Many aspects of the standard documents can be tailored just by changing a few defaults. The defaults control the logos, your address details, the header and footer text and your company and VAT registration numbers. The procedure for changing these defaults is in Setup your documents.

### 10.1 Sample Quotation Letter



		<h2 style="color: blue;">Your Company Name</h2> <p style="color: blue;">Your Company Address (8 lines)</p>			
Quote to: Roger Woodward HoneyComb International Products PLC Unit 1 Heathrow Business Park Near M4		Tel: Your Company Telephone      Fax: Your Company FAX		<b>Quote No: 1</b>  Page: 1 of 1  Date: 23/07/08  Our Contact: Manager	
Terms: Standard Sales		Your Ref:			
Quotation					
Product Code	Product Description	Quantity Required	Unit	Unit Price	Delivery
1877	Short Ring	100 Each	1 Each	£1.61	19/08/08
C1254K	6U Module Kit	1 Each	1 Each	£294.13	22/08/08
IMPORTANT: The delivery dates quoted have been calculated by our scheduling system. They are only valid if your order is placed within 48 hours of receipt of this quotation.					
We thank you for your enquiry and take pleasure in quoting you as follows:					
Reg. office: Your Company Registered Office Company Reg. No. Your Company Registration# VAT Reg No. Your Company VAT#					

## 10.2 Sample Sales Order Acknowledgement





		<h1 style="color: blue;">Your Company Name</h1> <p>Your Company Address (8 lines)</p>			
		Tel: Your Company Telephone      Fax: Your Company FAX			
Order from: Roger Woodward HoneyComb International Products PLC Unit 1 Heathrow Business Park Near M4				<b>Order No: 1</b>  Page: 1 of 1  Date: 23/07/08	
Terms: Standard				Your Ref: 123	
<b>Order Confirmed Acknowledgement</b>					
<b>Product Code</b>	<b>Product Description</b>	<b>Quantity Required</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Delivery</b>
1877	Short Ring	100 Each	1 Each	£1.61	19/08/08
C1254K	6U Module Kit	1 Each	1 Each	£294.13	22/08/08
We acknowledge, with thanks, receipt of your order. Please check the details given below are correct. If not, contact us immediately. IMPORTANT : The delivery dates quoted have been calculated by our scheduling system. If they are later than the date specified on your order and this is unacceptable please contact us immediately. If the date is acceptable, please amend your records accordingly and we will deliver on that date.					
Reg. office: Your Company Registered Office Company Reg. No. Your Company Registration# VAT Reg No. Your Company VAT#					




### 10.3 Sample Purchase Order



 <b>Match-IT</b> <small>SMARTER SOLUTIONS FOR MANUFACTURING</small>		<h2 style="color: blue;">Your Company Name</h2> <p>Your Company Address (8 lines)</p>		 <b>Smart</b> <small>100% Award Winner</small>			
Order to: Sally Howse HOOGGOVENS ALUMINIUM SWALLOWDALE LANE HEMEL HEMPSTEAD HERTS HP2 7PU		Tel: Your Company Telephone      Fax: Your Company FAX		P/O No: <b>1</b>			
Quote ref:		Phone No: 01442 260133 FAX No: 01442 262522		Page: 1      Of: 1 Date: 23/07/08			
Ordered by: Manager		Authorised: .....					
Purchase Order							
CofC	Product Code	Product Description	Quantity Req'd	Unit	Unit Price	Deliver	Nett Price
Please supply the items detailed below.							
	68891D	*EXT EURO PANEL HANDLE 2.2M (2.2 Mtrs)	420 Bars of 2.2 Mtrs	1 Bars	£1.55	6/08/08	£651.00
	55079X	EXTR ITT57 VERSI RAIL 2.0M SC1097 SR2 (2 Mtrs)	10 Bars of 2 Mtrs	1 Bars	£0.35	11/08/08	£3.50
	55157G	SHEET ALLOY 1.2MM (1 Mtrs x 1 Mtrs)	200 Sheets of 1 Mtrs x	1 Sheets	£6.40	12/08/08	£1,280.00
Please notify us as soon as possible if you cannot meet any of the delivery dates.							
<b>Total Order Value:</b>						<b>£1,934.50</b>	
Reg. office: Your Company Registered Office Company Reg. No. Your Company Registration# VAT Reg No. Your Company VAT#							

10.4 Sample Works Order



<b>Your Company Name</b>				
		<b>Works Order: 00000001</b>		Page 1 of 2
<u>Our Part No.</u> <b>1877</b>	<u>Quantity</u> 1,000 Each	<u>Our Description/Issue</u> Short Ring		
<u>Customer Order</u> HoneyComb PLC (1/1) 100 Each of 1877 by 14/08/08 <<123/Item 1>> {{1877}}...	<u>Start On</u> 23/07/08	<u>Finish By</u> 29/07/08	<u>Approved By</u> Manager	<u>Our Drawing No.</u>
<u>Customer Part Description</u>				
1877 (Short Ring)  Iss:  Dwg:				
<b>KIT LIST (stock required)</b>				
Material	Description Location	Quantity Size	Batch Identification	
STB01518	St/Stl 3/8" Dia 304 S11 RMS	3 Bars 3 Mtrs	000000001	
<b>STEP/OPERATION LIST (what to do)</b>				
Operation	Resource	Setup Time	Running Time	1st-off checked?
 <b>Turn Complete</b>				
1877 [Turn Complete]	Citizen M1/2 [Citizen LN20 M1]	9 Hrs	16.4 Hrs	
<p>Obtain a First-Off Inspection by an authorized individual, and then carry out In-Process SPC using STATPAK programme. STATPAK Prog No:</p> <p>Use BS6001 level S-4 to determine sample size</p> <p>During manufacture use:- 6.05/6.10 1.87/1.92 plug gauges to check bore.</p> <p>During this process it is MANDATORY that the parts are passed to inspection for a cursory visual inspection.</p>				
 <b>Ultrasonic Clean</b>				
1877 [Ultrasonic Clean]	Ultrasonic Tank		50 M ins	
Clean in Ultrasonic tank using standard cleaning procedure.				
 <b>Visual Inspect</b>				
1877 [Visual Inspect]	Visual Inspector		2.783 Hrs	
<p>Visual inspect a minimum qty as determined by BS6001 level G-2 zero AQL Check components for:</p> <p>All burrs removed Sharp Corners present and not distorted Radius's present General machined appearance - no discolouration or scoring</p>				
 <b>Clean &amp; Pack</b>				
1877 [Clean & Pack]	Ultrasonic Tank	30 Mins	1.667 Hrs	
<p>Clean in Ultrasonic tank using standard cleaning procedure.</p> <p>Pack in self sealing plastic bags. Max 250 components per bag. A printed quantity ticket should be included in each bag.</p>				

<b>Your Company Name</b>				
		<b>Works Order: 00000001</b>		Page 2 of 2
<u>Our Part No.</u> <b>1877</b>	<u>Quantity</u> <b>1,000 Each</b>	<u>Our Description/Issue</u> <b>Short Ring</b>		
<u>Customer Order</u> HoneyComb PLC (1/1) 100 Each of 1877 by 14/08/08 <<123/Item 1>> {1877}...	<u>Start On</u> <b>23/07/08</b>	<u>Finish By</u> <b>29/07/08</b>	<u>Approved By</u> <b>Manager</b>	<u>Our Drawing No.</u>
<u>Customer Part Description</u>				
1877 (Short Ring)  Iss:  Dwg:				
<b>KIT RETURNS (excess stock)</b>				
<u>Part No.</u>	<u>Description Location</u>	<u>Expected Return Amount Size</u>	<u>Actual ret.</u>	
STB01518	St/Stl 3/8" Dia 304 S11 RMS			
<b>OUTPUT LIST (stock created)</b>				
<u>Part No.</u>	<u>Description Location</u>	<u>Expected Amount Size</u>	<u>Batch Number Actual Amount</u>	
1877	Short Ring FGS	1,000 Each	0000000002	



### 10.5 Sample Dispatch Note

		<h2 style="color: blue;">Your Company Name</h2> <p>Your Company Address (8 lines)</p>			
		Tel: Your Company Telephone      Fax: Your Company FAX			
Deliver to: Roger Woodward HoneyComb International Products PLC Unit 1 Heathrow Business Park Near M4		<b>Delivery Note No: 2</b>		Page: 1 of 1 Date: 23/07/08	
<b>Delivery Note</b>					
Product Code	Product Description	Quantity Delivered	Notes		
Sales Dispatch Header Text					
1877	Short Ring Your Order: 35643	100 Each	Our C of C no.: 4 Our Batch: 2 100 Each		
Sales Dispatch Footer Text					
Reg. office: Your Company Registered Office Company Reg. No. Your Company Registration# VAT Reg No. Your Company VAT#					

10.6 Sample C of C

		<h2 style="color: blue;">Your Company Name</h2> <p>Your Company Address (8 lines)</p>			
		Tel: Your Company Telephone      Fax: Your Company FAX			
Delivery to: Roger Woodward HoneyComb International Products PLC Unit 1 Heathrow Business Park Near M4			<b>Our Ref:</b> 0000000004  Page: 1 of 1  Date: 23/07/08 Delivery No.: 2  Your Ref: 35643		
<b>CERTIFICATE OF CONFORMITY</b>					
<b>Product Code</b>	<b>Product Description</b>	<b>Quantity Certified</b>	<b>Notes</b>		
1877	Short Ring Your Order: 35643	100 Each	Batch: 2 100 Each Raw Materials/Sub-Con RM STB01518      Supplier UGINE-Savoie UK      GRN ( 1)		
This certificate confirms that the products detailed hereon have been inspected/tested and unless otherwise stated conform in all respects to the drawings, specifications and contract details relative thereto, in accordance with the appropriate Inspection and/or Testing standard agreed.					
Reg. office: Your Company Registered Office Company Reg. No. Your Company Registration# VAT Reg No. Your Company VAT#					
			Authorisation Signature and/or stamp:		

10.7 Sample Invoice

 <p><b>Match-IT</b> SMARTER SOLUTIONS FOR MANUFACTURING</p>	<h2 style="color: blue;">Your Company Name</h2> <p>Your Company Address (8 lines)</p> <p>Tel: Your Company Telephone      Fax: Your Company FAX</p>	 <p><b>Smart</b> Award Winner</p>					
Invoice To: Roger Woodward HoneyComb International Products PLC Unit 1 Heathrow Business Park Near M4		<b>Our Ref:</b> 0000000001  Page: 1 of 1  Date: 3/07/09 Due Date: 2/08/09  Your Ref: 123					
<b>INVOICE</b>							
Product	Description	Del Note	Qty	Unit	Price	VAT	Nett
1877	Short Ring	2	100 Each	1 Each	£1.61	£28.17 (17.50%)	£161.00
Your Order:123							
Sales Invoice Footer Text							
Terms: Standard Sales					Total Nett £161.00		
					VAT £28.17		
					Amount Due £189.17		
Reg. office: Your Company Registered Office Company Reg. No. Your Company Registration# VAT Reg No. Your Company VAT#							

## 11 The Printing System

Once set-up, the printing of documents is automatic. However, to help you in the set-up, it is important to appreciate how printing is organised. The printing system is designed to be robust, even in the presence of hardware and printer failures. The native *Windows* printing system can lose documents if a printer fails at a critical moment. Match-IT will never lose a document like this.

Printing takes place in two phases. The first phase is to prepare the information that is to be printed on the document. During this phase, the relevant parts of the databases are extracted and placed in a special holding area called the *report stack*. This phase is always performed immediately you do some action that will produce a document. It is done on the station you are working at. The second phase is to actually format and print the document using the information extracted in phase one. This phase is done by the *reporter*. This is a special function that processes the print requests in the *report stack*. The *reporter* is a background task that is run on a nominated station. It is usually not the station you are working on, but instead either a dedicated print station or an infrequently used station. If the *reporter* is not running, the document will stay in the *report stack* and will not be printed automatically. In this case you can print them manually.

This two-phase system provides the robustness because the information to be printed will stay in the report stack for, usually, 90 days. So, if the document is lost or mangled by the printer, it can be re-selected from the report stack and printed again.

The separation of the information extraction from its formatting and printing also means that printing is less intrusive. The actual formatting and printing can absorb all the processing power of a station for a significant period of time. This would stop you working on that station. By delegating this task to another station, you can continue working while the printing is being done elsewhere.

### 11.1 Printing Sequence

The steps in the sequence from an action in the system to a document being printed are:

1. You perform some action requiring a document; approve a dispatch note for example.
2. The system gathers all the information required for the document, associates it with a Layout, a Paper and a Print Queue, and places the information in the Report Stack as a 'ToDo' item.
3. The Reporter notices the new 'ToDo' entry in the report stack and, provided the print queue is enabled, passes the information to the associated Report Generator, along with the name of the Layout, Paper and Printer to use. The Report Stack entry is marked as 'Doing' to show that it is in progress.
4. The Report Generator translates the information into the printed image, according to the instructions contained in the Paper, and passes it to the Printer for printing. (The print preview, when enabled, happens at this stage.)
5. The Reporter notes the success or failure of the Report Generator and marks the Report Stack entry as either 'Done' or 'Error'.

Entries remain in the report stack even after they've been printed. This means they can be selected for re-printing in the event of loss or damage or printer failure.

Entries in the report stack are grouped into print queues; these can be turned on and off. When turned off (disabled), entries just build up in the queue and will not be printed until the queue is turned on (enabled). This is useful for documents that need special stationary. They can be held in the queue until the stationary is loaded in the printer. The system installs with a few pre-defined queues. You can add more of your own as described in Creating print queues.

Print queues are 'attached' to printers. A printer can be anywhere on your network. It does not have to be a network printer, and it does not even have to be 'shared'. All that's necessary, for you to be able to use it, is the ability to run Match-IT on the workstation it is physically connected to.

The reporter does not have to be running on the workstation that is creating the document request. It only needs to run on the one that can 'see' the printer the document is destined for. This may be multiple workstations or just a single 'print-server'.

Keep in mind this set of associations:

- The context defines the Layout to use.

- The Layout defines the Paper to use.
- The Layout defines the Print Queue to use.
- The Print Queue defines the Printer to use.

The term *printer* is used for historical reasons but nowadays is a more general *output-media* concept. The output-media could be any of:

- physical paper sheets
- text files
- spreadsheets
- word documents
- web pages
- XML documents
- PDF documents
- TIFF images
- emails
- FAXes

## 11.2 Printing Terminology

**Layout** In this context, a layout is the term used to refer to the control information used when printing a document. It provides the associations between the document information, the design of the paper, and the print queue to be used.

**Print Queue** A logical grouping of documents that require similar print capabilities or stationary.

Print queues can be turned on and off; when 'off' documents are held in the queue until it's turned on again.

You can have any number of queues. You can direct any document to any queue. You can associate any printer with any queue.

**Printer** Any device that is accessible via the normal Windows print selection, this could be real printers or Fax cards.

**Shared Printer** A shared printer is one that you have told your network operating system is to be made available across the network. These can be 'seen' from any station on the network and behave as if they were connected to each station.

**Non-shared Printer** A non-shared printer cannot be 'seen' across the network. It can only be used on the station it is physically connected to. This can still be used from any station provided Match-IT is also running on the station the printer is connected to.

**Station** This term is used to refer to the computers you do your work from. All stations are assigned a name for identification purposes. These names are used for, among other things, defining where your printers are.

**Report Stack** The repository for all print requests.

Print requests can be manipulated from here, you can:

- re-assign the printer associated with a queue
- re-assign the layout associated with a document
- re-assign the paper associated with a document
- request that a document is re-printed
- find when a document was last printed



**the Reporter** A background activity that detects print requests to printers that are accessible from the station the reporter is running on.

This can be run within your normal sessions or as a stand-alone program on a 'print-server' machine (as an agent), the latter will be less intrusive to you as the processing load of report generation will be on a different station.

**Report Generator** A programme that translates your information into the form needed for printing according the instructions in a *Paper* design.

**Paper** The instructions that translate the information to be printed into the printed image.

**the Agent** This is a special session that just allows the running of automated background processes. This would normally be run on your server. To start Match-IT as an agent place the /agent switch on the command line. When run as an agent the system will:

- automatically start the reporter
- disable print preview
- disable all interactive access

## 12 The Units of Measure System

The unit of measure system is used for all quantities. The quantities can be engineering quantities; metres, bars, sheets, etc., or currencies; sterling, dollars, euros, etc. The unit of measure system always knows what the units of a quantity are, as well as the quantity itself. It also knows how to convert to and from the most common units of measure. This means you don't have to worry about conversions, the system will do it for you automatically. This is particularly significant when dealing with currencies. If you are dealing with foreign customers and suppliers, it can convert to and from their currencies in the appropriate places. All you have to do is update the conversion rates from time to time.

Most of the time, the units of measure system just works away in the background and you will not be aware of it. The only time you are likely to be made aware of it is if you define a new unit of measure and don't tell the system how to convert other units to and from it. If it finds it needs to make a conversion and doesn't know how, you will receive a notification message and/or the result of the conversion will be *undefined*.

It's critically important to realise that units of measure have a meaning; they are not just numbers. This is significant if you try to specify quantities in meaningless or nonsense ways. If you're lucky the system will notice straight away and give you an error message that will point you at the problem. More likely, the error will not be noticed until the system comes to use it, while planning an order for example. This may be some time later and from the immediate 'effects' of the error it may not be obvious where the root of the problem is. Be careful and responsible when defining quantities.

When the system performs arithmetic involving different units of measure it is very fussy about being able to convert between them. If it cannot the result is always a special number referred to as *undefined*. The result of any arithmetic involving undefined is also always *undefined*. So, for example, if you have a complex product structure that uses a screw that costs 10p per 1000 and you haven't assigned a cost to that screw, then the total cost of your multi-million pound project will be calculated as *undefined*!

### 12.1 What is a unit of measure?

The term *unit of measure* is used to refer to a *number* **and** the *units* of that number. For example, 2.4 kilogrammes, £3.20, 20 minutes. These units of measure are used for general units, time durations and currencies.

Whenever you supply a value for something, you must also supply the units of that value. This is necessary so that the system knows when it needs to convert between units to do arithmetic.

Whenever the system needs to do some arithmetic on two measures, it examines their units. If they are both the same, it just does the arithmetic, e.g. 2kg plus 2kg is 4kg. If they are different, first one is converted to the other, then the arithmetic is done, e.g. 2kg plus 200g is the same as 2kg plus 0.2kg which is 2.2kg.

The philosophy is to provide facilities to allow you to express numbers in whatever units are 'natural' to the circumstances. Provided you define appropriate conversion expressions, the system will convert to and from your units as necessary, automatically. This means that once appropriate units and their conversions are set-up, you can forget it. However, the initial set-up requires a little thought.

### 12.2 What is a conversion expression?

A *conversion expression* specifies how to convert a number from one unit to another. For example, to convert a length in metres to millimetres, you must multiply the metres length by 1,000. A conversion expression is what is used to do this.

Conversion expressions can be used in five different ways: to just convert a number from one unit to another, to add two numbers, to subtract two numbers, to multiply two numbers and to divide two numbers. Sometimes, the necessary arithmetic can be done without a conversion. For example, if you don't define a specific 'conversion' for adding two numbers, the system will just convert one to the units of the other and do a normal add. The full rules are shown in the table below. In this table A represents any unit of measure and B represents any unit of measure with different units to A. Where rules are given, one of them must be available. If not, the operation will be abandoned and the result will be *undefined*.

First units	Second units	Operation	Rule
A	A	A=A (Assign)	No conversion required.
A	B	A=B (Assign)	1. If an A=B conversion exists, B is converted to units of A. 2. If an A=C and a C=B conversion exists, convert B to C, then C to A
A	A	A+A (Add)	No conversion required.
A	B	A+B (Add)	1. If an A+B conversion is defined, use it. 2. If an A=B (Assign) is possible, convert B to A, then do a normal add.
A	A	A-A (Subtract)	No conversion required.
A	B	A-B (Subtract)	1. If an A-B conversion is defined, use it. 2. If an A=B (Assign) is possible, convert B to A, then do a normal subtract.
A	A	A*A (Multiply)	1. An A*A conversion must exist.
A	B	A*B (Multiply) B*A (Multiply)	1. If an A*B conversion exists, use it 2. If an B*A conversion exists, use it 3. If an A=B (Assign) is possible, convert B to A, then try A*A 4. If a B=A (Assign) is possible, convert A to B, then try B*B.
A	A	A / A (Divide)	1. If an A/A conversion is defined, use it. 2. Do a normal divide mark the result as unit-less.
A	B	A / B (Divide)	1. If an A/B conversion is defined, use it. 2. If an A=B (Assign) is possible, convert B to A, then try A / A 3. If a B=A (Assign) is possible, convert A to B, then try B / B.

By far the most common situation is a simple scaling factor to allow an *assign* operation. However, considerable flexibility is provided to cater for other situations too. For example, to convert from Fahrenheit to Celsius temperatures cannot be done with a simple scaling operation.

Any mathematically valid expression can be used, with any mathematical operation, including trigonometric functions. Within these expressions the units to be converted have special names. For the assign operation, the name *Value* is used to denote the units to be converted from. For all other operations, the name *Value* is used to denote the 'first units' in the table above, and the name *OtherValue* is used to denote the 'second units'.

For example, the expression

```
Value * OtherValue / 1,000,000
```

would convert two millimetre lengths to a square metres area.

### 12.3 What is a unit-less measure?

A *unit-less* measure is just a number. The system never tries to convert a unit-less measure, it just uses it. These are created automatically when a divide of two measures of the same units is performed. E.g. 2.6 metres divided by 1.3 metres is just 2, and not 2 of something.

### 12.4 What is an undefined measure?

An *undefined* measure is one that has not been given a value. The value of any expression involving an undefined measure is itself also undefined. For example, if a product is made from a raw material whose cost is undefined, then any cost calculations done on that product will yield the result *undefined*.

### 12.5 What is a conversion variable?

The system uses the units of measure system to convert currencies as well as general units. Currency exchange rates tend to change quite often. To make it easier to handle this you can define conversion expressions that reference variables. A *variable* is a number that you give a name to. You can reference these named numbers by their name from within any conversion expression.

For example, say you had a pair of conversion expressions to convert between *Pounds Sterling* and *US Dollars*. You could define a variable called *DollarRate*, and the conversion expressions as:

```
Pounds = Dollars / DollarRate
Dollars = Pounds * DollarRate
```

Then if the exchange rate changes, all you have to do is change the value of *DollarRate* and both conversions change automatically.

### 12.6 Where are measures used?

Units of measure are used wherever general units are needed for material quantities, wherever resource usage and capacity times are required and wherever monetary values are needed.

The following are some of the areas where the system makes use of units of measure.

#### General units

- Material quantities for:
  - quoting
  - buying
  - selling
  - issuing to works orders
  - component quantities to make something
  - receiving from a supplier
  - inspecting
  - dispatching
  - stock quantities
- Unit quantities for costs
- Measurements for inspecting.

#### Time units

- Resource set-up and run times
- Resource capacities
- Resource usage

## Monetary units

- Material unit costs
- Credit limits
- Carriage charges
- Resource running costs
- Invoice values
- VAT

### 12.7 What is a unit Picture?

A *picture* allows you to define how you want values in a unit of measure to be shown to you. This applies when you see them on the screen and when they are printed in your documents. A picture is associated with every unit of measure, so they can be shown to you in a form that is appropriate to the value.

The picture includes settings for:

- representing negative numbers, for example: £(100) or £-100 or £100
- showing, or not, leading zeroes, for example: 1 or 0001
- the number of decimal places, for example: 1.0 or 1.00 or 1.001
- the unit symbol, for example: 1Kg, 1Mtr, 1Sec.

and others.

It's important to realise that the way the unit of measure values are shown to you is totally independent of the way they are stored internally. You will not damage your measures by setting an inappropriate picture. If a measure cannot be expressed properly in the picture you have set it will be shown as ##### instead. Just change the picture as necessary and the value that was previously shown as ##### will be shown correctly.

### 12.8 What is a Noise Level?

The system stores numbers internally in a form called floating point. This is a very efficient format that can be used to express numbers across a huge range (from  $10^{-300}$  to  $10^{+300}$ ). It is also the format the underlying computer hardware understands, so they can be manipulated very fast too.

That's the up-side. The down-side is that floating point numbers are not exact. There is always a small error inherent in them. For example, the number 3 may be represented internally as 2.9999999999. Most of the time this does not matter because the number will be rounded before it is shown to you, so you will see 3.

However, it can cause problems when two numbers are compared. If you ask the computer: "Is 3 the same as 2.9999999999?" it will say: no, when for all practical purposes they are the same. This type of comparison is performed in many places within the system, for example when allocating stock to a job.

The *Noise Level* allows you to define a range of values that are to be considered as zero. Any value, or difference between two values, that is less than the noise level is considered to be zero. Thus if the noise level is 0.0001 and we ask "Is 3 the same as 2.9999999999?" the result is: yes, because the difference between the two numbers is 0.0000000001, which is less than the noise level of 0.0001.

The noise level is set globally by a default. The usual value is  $10^{-9}$ . This should not be changed except under exceptional circumstances.

This mechanism is used to prevent 'sillies', like having an on-hand stock quantity of 0.0000000001 litres.

### 12.9 We buy in kilos, use in feet, how can I handle this?

The situation here, is that you use bars of material, for example, and you want to use them in units of length (metres, say). But, your supplier wants you to buy in terms of weight (kilos, say).

You can arrange things so all the necessary conversion are done for you automatically.

To do this you just define the usual length of the material in its material record and specify the weight of a unit length of that material. For example, if you buy stainless steel bars in 3 metre lengths, specify the usual

length as 3 Metres and specify the weight of 1 Metres. The system then has enough information to convert between length and weight whenever needed.

## 13 The Accounts System Interface

This topic describes the Match-IT philosophy and benefits with regard to connecting to an external accounting system.

Match-IT is not itself an accounting system but instead can be connected to any accounting system that can accept transaction information from an external source. Nearly all modern accounting systems can do this. To connect to an accounting system is optional. Match-IT will operate perfectly without doing so.

The standard installation provides a number of interfaces to popular accounting systems (see Setting up your accounting system for details) but you can write a script to add your own (see Accounting Software Interfaces under Scripting) if it's not available as a standard, or you can commission your Match-IT supplier to write it for you.

### Why connect Match-IT to my accounting system?

There are two main reasons why a connection to your accounting system will help you.

Firstly, it means Match-IT can directly transfer your sales, purchase invoice and stock movement information to your ledgers. This means you do not need to re-key information. This saves time and removes the possibility of introducing errors.

Secondly, it means Match-IT can perform credit checks for you when you take orders from your customers. This prevents you from unknowingly taking orders from bad or slow payers.

You will usually use the above information transfers on a regular basis to keep your accounts system and Match-IT in step. When first starting to use Match-IT you can also transfer all your supplier and customer details from your accounts system to Match-IT. This ensures your account codes are the same in both systems and that invoices are posted to the correct accounts.

### What can Match-IT give to my accounting system?

The following information can be passed to your accounting system:

New customer accounts	Customer details are entered into Match-IT the first time you take an enquiry or sales order from them. The first time you raise a sales invoice for a new customer Match-IT can instruct your accounting system to open a new account and give it all the necessary information
New supplier accounts	Supplier details are entered into Match-IT as you perform actions that require a supplier. For example, for an invitation to tender, for a purchase order, etc. The first time you receive a purchase invoice from a new supplier Match-IT can instruct your accounting system to open a new account and give it all the necessary information.
New stock codes	Stock codes are entered into Match-IT as you perform actions that require them. For example, as a raw material or a saleable product, etc. The first time you perform an action that creates a stock movement Match-IT can instruct your accounting system to open a new stock code account and give it all the necessary information.
Purchase invoices received	Match-IT can pass all your purchase invoice information to your accounting system after they have been approved by you. Your accounting system will then make all the necessary entries in your ledgers automatically.
Sales invoices produced	Match-IT can pass all your sales invoice information to your accounting system after they have been approved by you. Your accounting system will then make all the necessary entries in your ledgers automatically.
Stock movements	Match-IT can pass all your stock movement information to your accounting system. Your accounting system will then make all the necessary entries in your ledgers automatically.

### What can Match-IT use from my accounts?

The following information from your accounting system can be used by Match-IT:

Customer accounts	You can import all your existing customer account information directly into Match-IT. This is useful when you first start using Match-IT to get all the information without having to re-key it.
Supplier accounts	You can import all your existing supplier account information directly into Match-IT. This is useful when you first start using Match-IT to get all the information without having to re-key it.
Customer credit position	Match-IT can use your customer credit information to perform credit checks when you take orders from them and when you are about to dispatch goods to them. The credit information that Match-IT can use is their credit limit, their current outstanding debt and their aged debts across four time periods (usually 30, 60, 90 and 120+ days).

In addition, a number of scripts are available for specific accounting systems to transfer 'start-up' information, e.g. nominal account codes, VAT codes, etc. These are described with that interface (see Setting up your accounting system).

## What connection options are available?

Match-IT usually connects to your accounting systems through the use of CSV files of a format specified by your accounting system. However, the scripting system can handle any type of interface, e.g. XML, COM, etc.

Match-IT imports and exports information to and from your accounts system by a simple action from you. This is usually done daily or weekly, but it can be at any frequency you like (including never). CSV files are simple text files that can be easily manipulated. Most accounting systems provide a means to accept information in this form and to produce information in this form.

## How is the interface controlled?

In most cases the interface is controlled by a script that is driven from parameters defined against an *Accounts Centre*. There can be any number of accounts centres (but only one is usual). This is useful if you are running more than one business through a single Match-IT system. By assigning accounts centres to customers and suppliers you can segregate their transactions into separate accounting systems. Each accounts centre can be attached to a different accounting system, or the same system with different parameters.

An accounts centre called *Main* is pre-installed. You can access that via [Favourites](#) | [Functions](#) | [Standing Data](#) | [Accounts](#) | [Accounts Centres](#).




## 14 The Security System

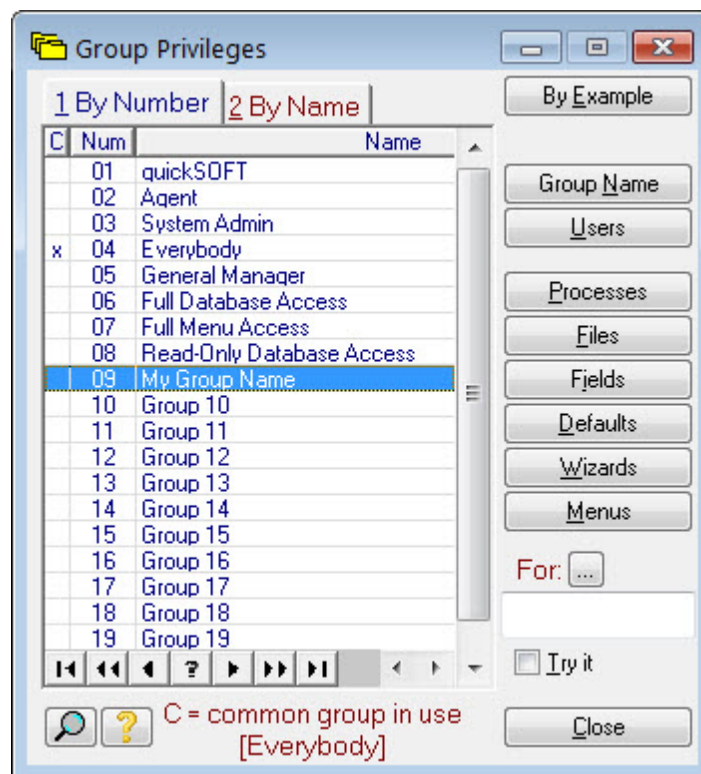
Match-IT is a multi-user system that is intended to be accessible to all your staff to help them fulfil their role within your organisation. The security system has been designed to allow specific users to perform their designated functions but not allow them to access parts of the system that are not relevant to them. The way this is achieved is through the notion of user *groups*. There are 30 user groups, one is reserved, but the rest are available to you. Assigning group membership to your users and then specifying which groups are allowed to access specific functions controls access to those functions. For access to be granted the user must be a member of the group assigned to the part of the system they are trying to access.

The names of the groups would typically reflect some role in your organisation, e.g. purchasing, sales, production, etc. Users can be members of any number of groups. They will have access to everything associated with each group.

The parts of the system whose access can be controlled are: *Menus, Processes, Files, Fields, Defaults* and *Wizards*. In the case of *Files*, there are four types of access that can be controlled: *Select, Insert, Change* and *Delete*.

In addition to the group-based access, you can also apply user specific overrides. These overrides can either deny or grant access to specific parts of the system. They take priority over the users groups.

Setting up the security system is straightforward and can be accessed from most places just by pressing the **F9** key or the  icon.



See Setting up your security scheme for more information.

## 15 Date representation

### How does Match-IT display dates?

There are several forms you will see dates in the system:

- dd/mm/yy This is the conventional day, month, year notation. The year is always shown as two digits. The correct century is implied (see later).
- ASAP As Soon As Possible. This is a date that is always today.
- TBD To Be Defined. This is a marker for a date that is required but you don't know what it is yet.
- +N days N days after today.
- N days N days before today.
- blank A blank date means the date is not known. It has no value.

### How does Match-IT recognise 20xx dates?

The date system operates over a 100 year span. The reference date for this span is always today (whatever that may be). The span is considered to stretch back in time for 80 years and forwards 20 years, relative to today. For example, in 1997, two digit years in the range 17 to 99 are interpreted as 19xx, and years in the range 00 to 16 are interpreted as 20xx.

### How does Match-IT store dates internally?

It is important to appreciate that the way dates are shown (as given above) is very different to how they are actually stored internally. Internally they are stored as the number of days that have elapsed since December 28th 1800. The allowable date range for internal computation purposes is January 1st 1801 (day number 4) to December 31st 2099 (day number 109,211).

### Does Match-IT use any special 'marker' dates?

Match-IT uses day numbers that are negative to have special meaning. When you define a date as ASAP, TBD, or +/-N days, they are stored internally as a negative day number. This makes them easily distinguishable from normal dd/mm/yy dates. The date system automatically distinguishes these types.

### How can I verify correct operation for 20xx dates?

You can easily verify the handling of the year 2000 issues using the calendar shown to you on any date field. Just go to any date field and press the associated  button. A calendar will pop up for the month containing the date. Type in any date you wish to test in the entry field and the calendar will change to show you the month of that date. For example, type in 1/2/0 and you'll get February 2000, which you'll see is a leap year.