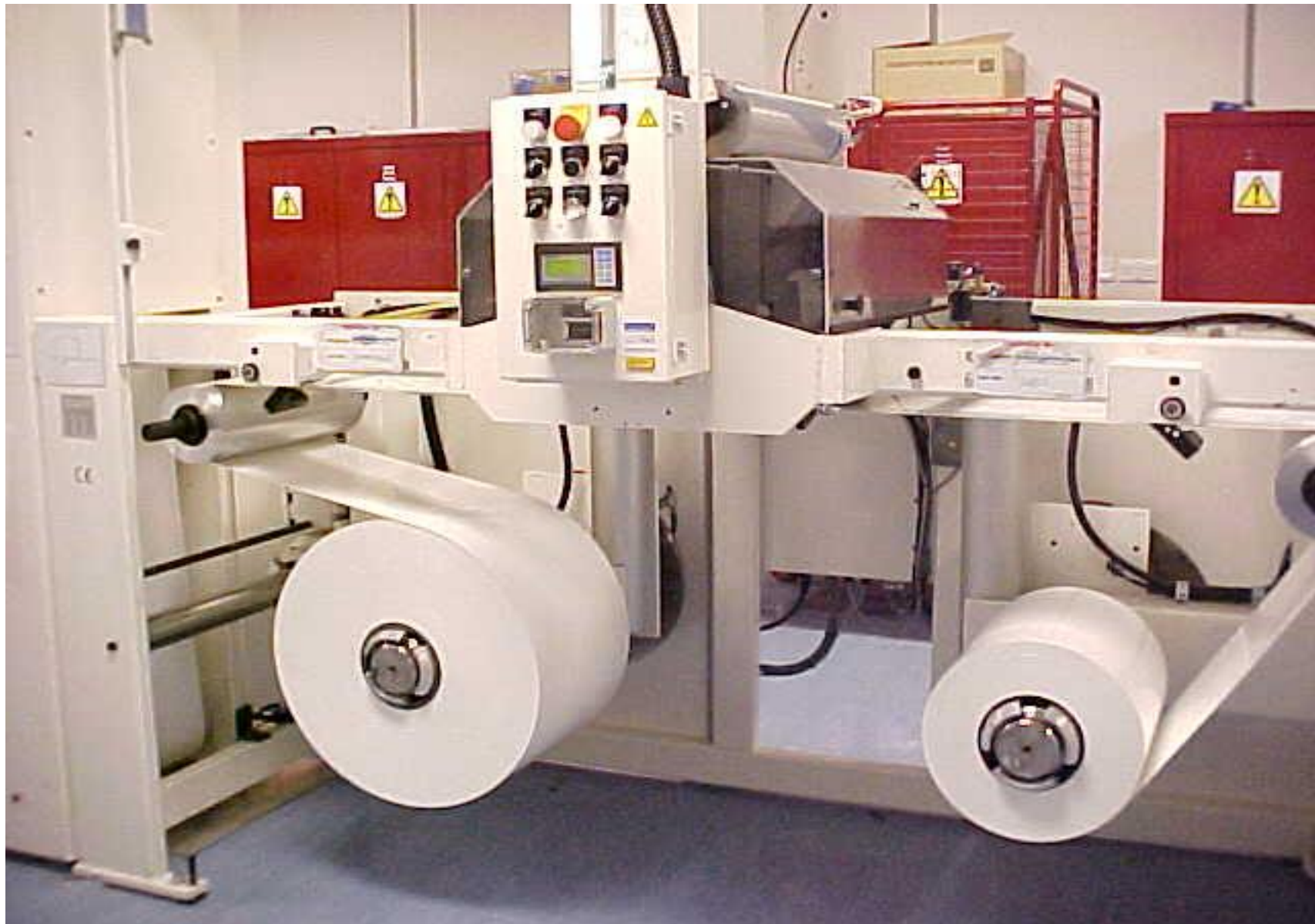


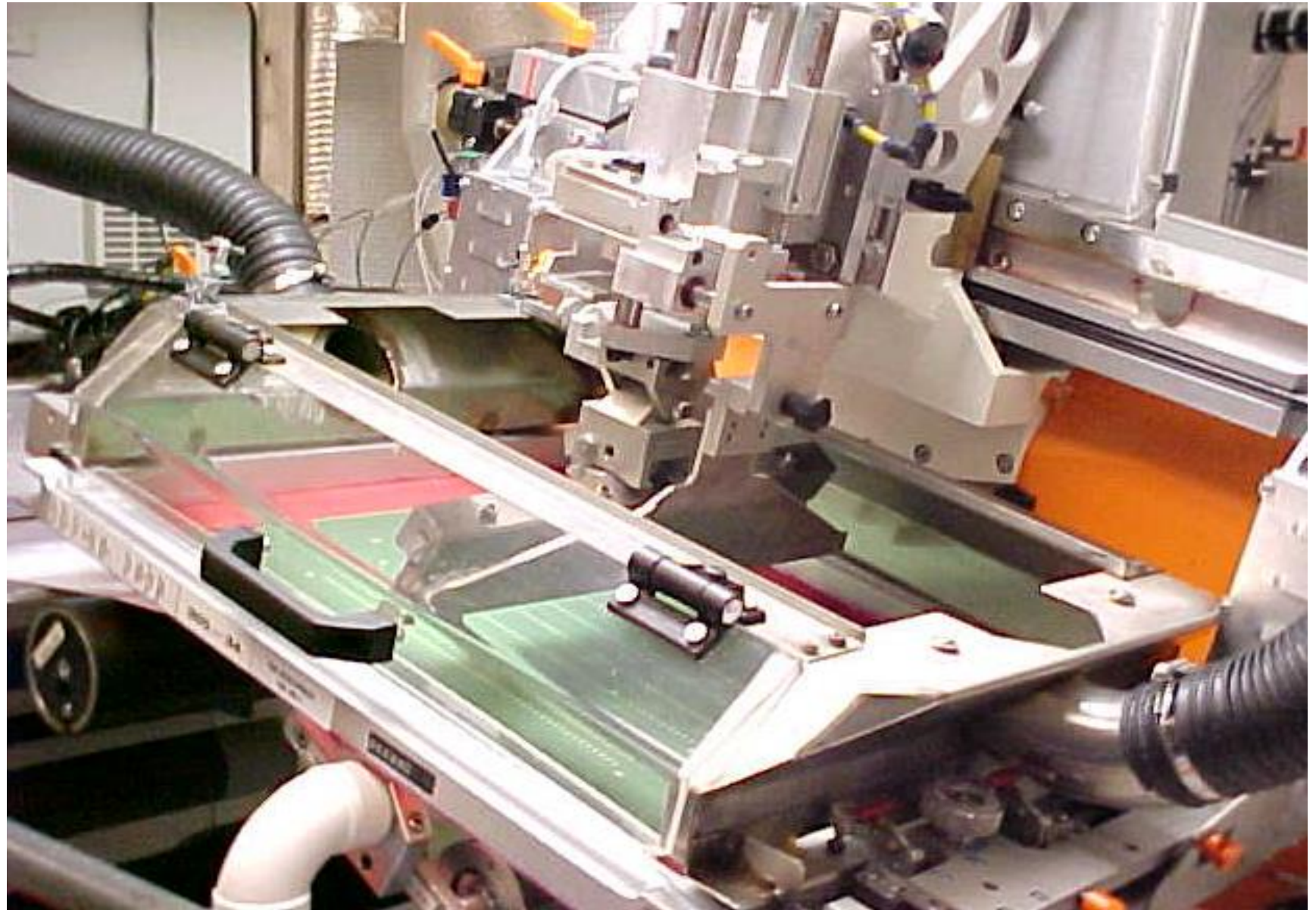
# A Stores Application



My Key Steps of Implementation of a Stores System, starting from a collection of asset components spread around a room

# PRINTING STRIPS OF PRODUCT WHICH FIT INTO A MONITORING DEVICE









## SPARE PARTS STORES - OUT OF CONTROL :

INTENTION – FIRST, TO GET THE BASICS RIGHT, AND OVERCOME:

- SPARES BEING DIFFICULT TO FIND OR NOT THERE
- ENGINEERS BUYING ITEMS DIRECTLY AND 'SQUIRRELING'
- 'ROBBING' SPARES FROM ONE MACHINE FOR ANOTHER
- HAVING NO RECORDS OF USE OR COSTS FOR EACH MACHINE
- HAVING TOO MANY OF SOME ITEMS AND TOO FEW OF OTHERS



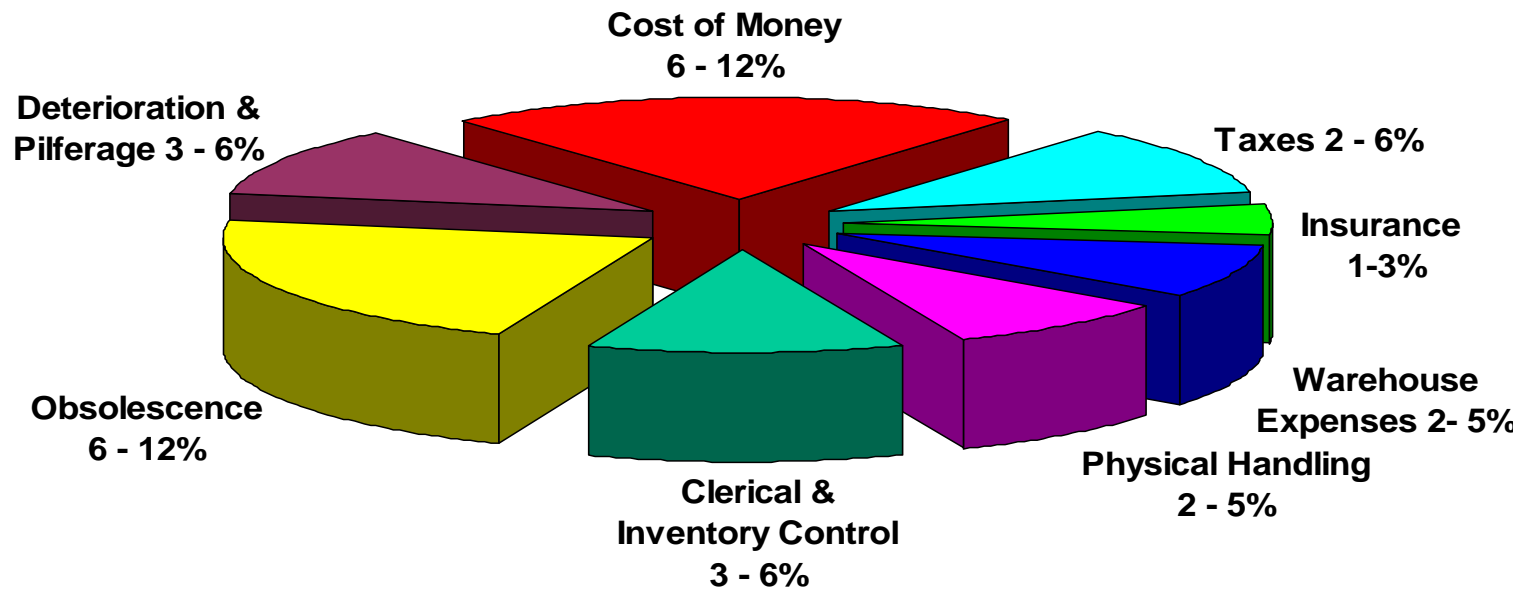
# Stores (Before)



## HOW TO JUSTIFY THE INVESTMENT?

In most situations the costs are key - annual parts holding costs

Annual Inventory Costs = Total 25% - 40% of Inventory Value



► BY REDUCING THE STOCK-HOLDING THE INVENTORY COSTS MAY BE REDUCED BY UP TO 10%?

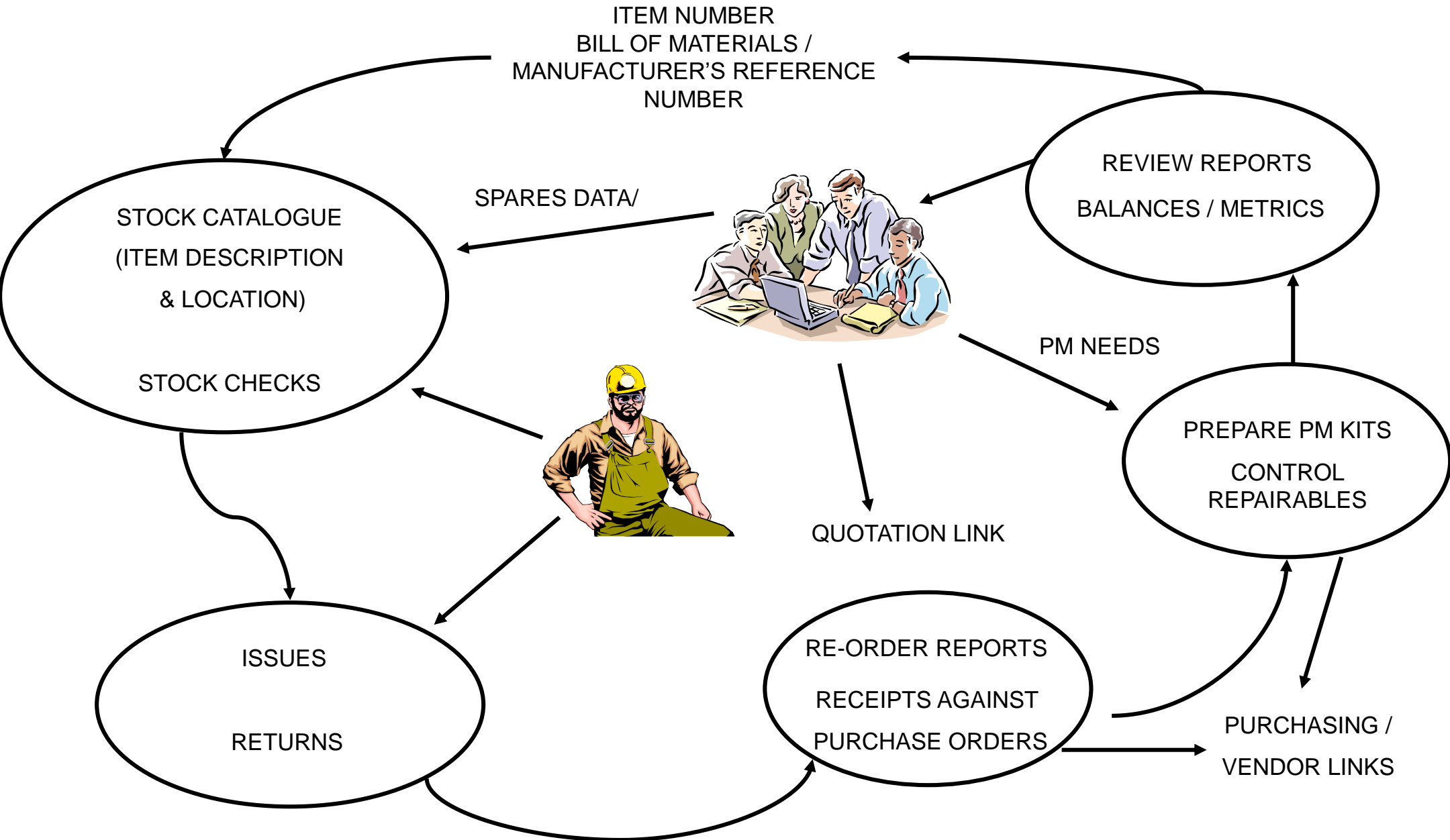


## AIMS - NOT JUST THE COST REDUCTIONS - ALSO

1. TO PROVIDE A MINIMUM RESPONSE TIME FOR GIVING THE SPARE PART(S)
2. TO BE SURE THAT THE SPARE PART IS THE CORRECT ONE – EXACTLY
3. TO PROVIDE A QUALITY PROFESSIONAL APPROACH – WITH SITE EXPANSION
4. TO PROVIDE A LINK BETWEEN ASSET INVENTORY AND STORES CATALOGUE
5. TO KNOW THAT HAVE THE RIGHT SPARES AND THE NUMBER REQUIRED
6. TO IDENTIFY SPARES TO BE REMOVED WHEN PLANT REMOVED
7. TO REDUCE STOCKHOLDING COSTS BY RATIONALISATION, BY 8%



# STEP 1 – Prepare an outline spares handling process

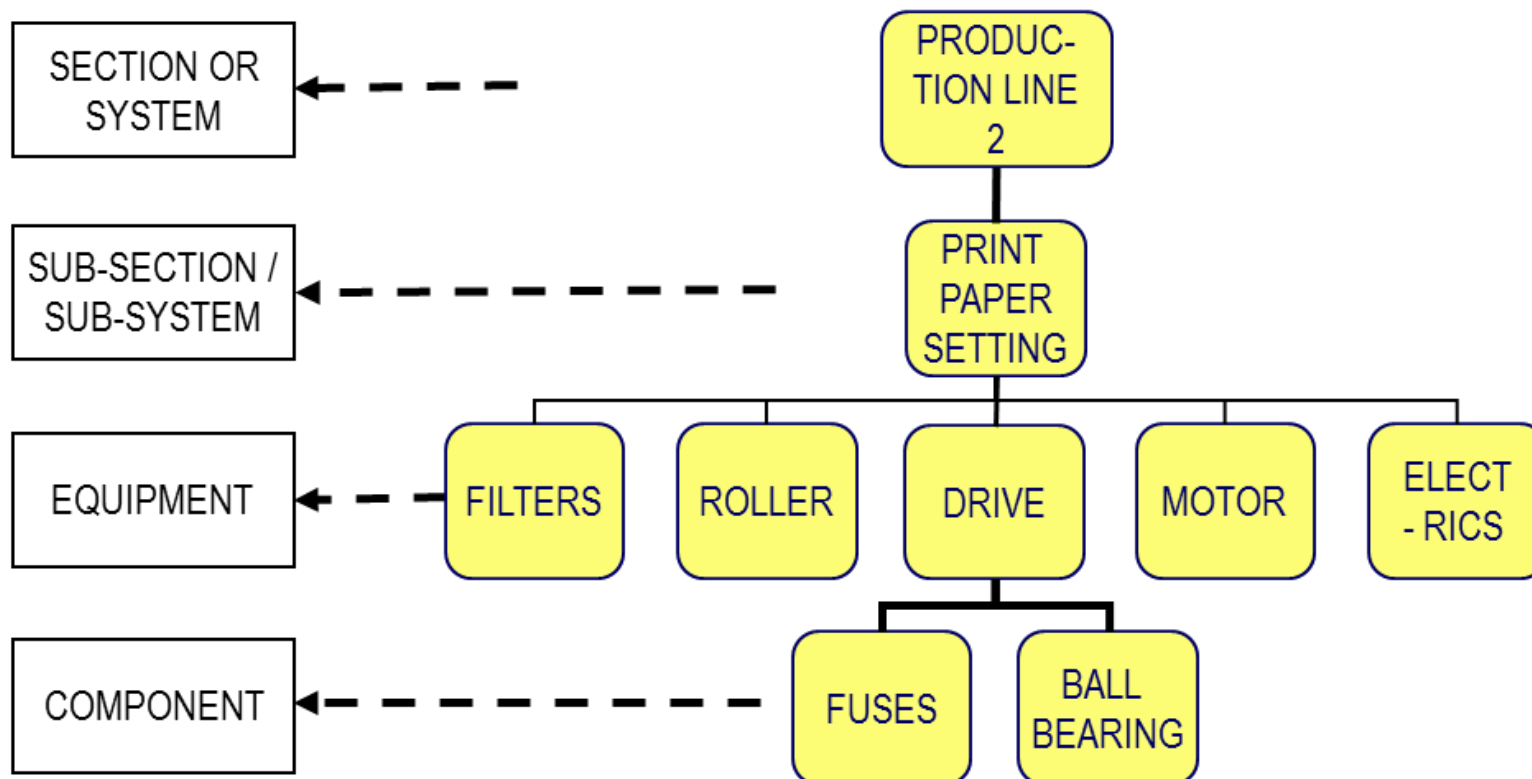


## STEP 2 - DEVELOPMENT OF THE SPARE PARTS IDENTIFICATION

- THE SPARE PARTS ITEMS WERE LISTED ON THE BILL OF MATERIALS RECEIVED FROM THE EQUIPMENT MANUFACTURER
- EACH SPARE PART HAD A DESCRIPTION AND WAS LINKED TO THE ASSET REGISTER OF THE APPROPRIATE PRODUCTION LINE
- THE ENGINEER COULD THEN IN THE FUTURE IDENTIFY THE SPARE PART NEEDED BY LOOKING AT THE EQUIPMENT INVENTORY

## The EQUIPMENT INVENTORY spare part description:

- is from the manufacturer's bill of materials
- is listed as an inventory component with the same description against the relevant equipment item





ACTION ON  
ITEMS  
CATALOGUED

SHELVED  
BY  
OPERATING  
LINE /  
ITEM  
NUMBER



A STOCK NUMBER AND CATALOGUE ENTRY  
WAS GIVEN ON ENTERING EACH ITEM INTO A BIN  
AND ONTO THE SHELF

- THE NEXT NUMBER
- WHAT IT IS – (DESCRIPTION, as shown)
- WHO MADE IT – (MANUFACTURER)
- WHERE DID IT COME FROM – (SUPPLIER)
- *PERHAPS* - WHERE IS IT USED? (A DRAWING REFERENCE)
- AND MOST IMPORTANTLY:
  - WHERE IS IT STORED? (BIN LOCATION NUMBER)

## STEP 3

- the data for each item was entered onto a 'bin' stock control card attached to each bin
- key information for item re-ordering being 'number in stock' and 'minimum stock level'.

STORES ITEM NUMBER _____							
Manufacturer's Specification _____							
SUPPLIER NAME TEL NO				Manufacturer's Number NAME TEL NO			
STOCK CHECK							
DATE	NO. IN STOCK			CHECKED BY			
ISSUES & RECEIPTS							
DATE	ISSUE		RECEIPTS		STOCK LEVEL		
MINIMUM STOCK LEVEL							
ORDERING LEVEL				ORDERING QUANTITY			
ITEM VALUE	\$	\$	\$	\$	\$	\$	\$
REORDERING							
ORDER NO	DATE	QUANTITY		BY WHOM			



**THE BASIC DATA WAS ENTERED ONTO A SPREADSHEET  
READY FOR IMPLEMENTATION INTO THE COMPUTER SYSTEM**

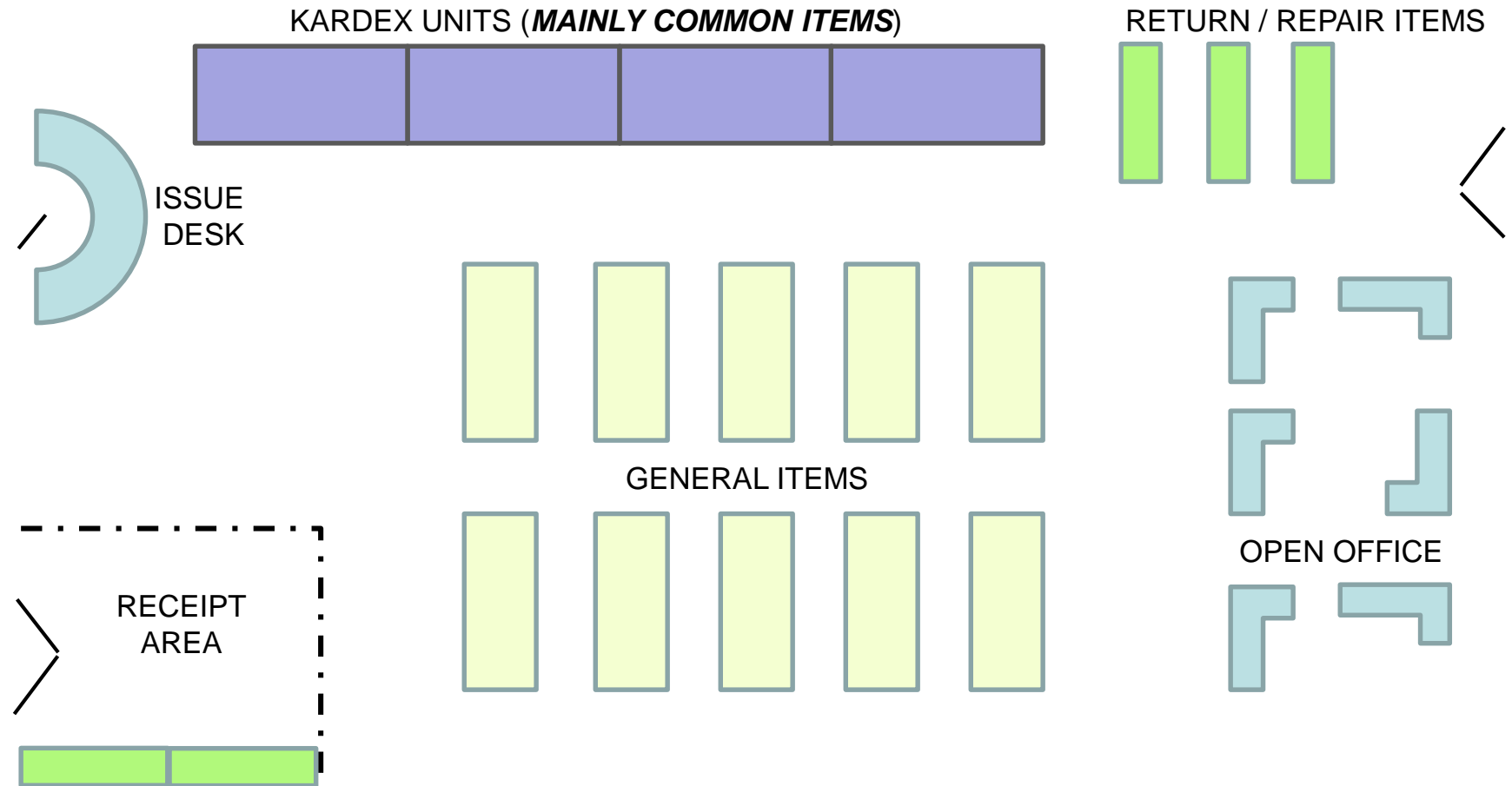
Item	Item Description	Supplier	Vendor Number	Manufacturer Name	Manufacturer Part No	Drawing No.	Bin Location
3623	CABLE SUPPORT OPTIONAL	MATION INC	384101	MATION INC	027836 B	NIK-A-MAH-22-019	NIK40906
3627	FLOATING JOINT, ALIGNMENT	MATION INC	384101	MATION INC	730	NIK-A-MAH-22-016	NIK40907
3630	MOTOR UPGRADE, RIGHT HAND	MATION INC	384101	MATION INC	028916-01	NIK-A-MAH-22-022	NIK40907
3657	BEARING, BALL .625 OD .250 ID	MATICS INC	384101	MATICS INC	24816	NIK-A-MAH-22-016	NIK40909
3822	MINIATURE FUSES (4 A)	TSR COMPS	114272	TSR COMPS.	3-431	BWE-C-CE-04-007	NIK41109
3841	MODULAR POTENTIOMETER	MJC POWER	863799	MJC POWER	6569637	NIK-A-MAH-22-019	BWE 05-22-13
3983	AIR FILTERS, VAC	KYO INDUSTRIAL	224590	KYO INDUSTRIAL	92889	NIK-A-MAH-22-019	NIK41307
4204	FUSE, 2.5A BOARD	TRONIC LTD	333990	TRONIC LTD	B2225HEV	BWE-C-CE-04-007	BWE 05-30-02
4211	NUT, LEADSCREW ELEVATOR	SAT SYSTEMS	104794	SAT SYSTEMS	0210-104-6345	SAT-O-DM-03-027	SAT14103

CLEARLY, DEVISING THE ITEM DESCRIPTIONS / FILLING THE BINS / ENSURING THE DATA QUALITY - ALL REQUIRED SIGNIFICANT EFFORT

THE RESOURCES ALLOWED INCLUDED:

- ON AVERAGE, TWO TECHNICIANS WHO KNOW THE ITEM DESCRIPTIONS
- A NEW LARGER SPACE, & AS MANY STORAGE RACKS AS REQUIRED
- POTENTIAL INVESTMENT IN 'KARDEX' AUTOMATIC STORAGE SYSTEMS WHEN REQUIRED
- A COMPUTER SYSTEM

THE PROPOSED LAYOUT OF RACKS IN THE STORES AREA  
ACCORDING TO THE ESTIMATED NUMBER OF SPARES,  
INCLUDING THE 'COMMON' ITEMS

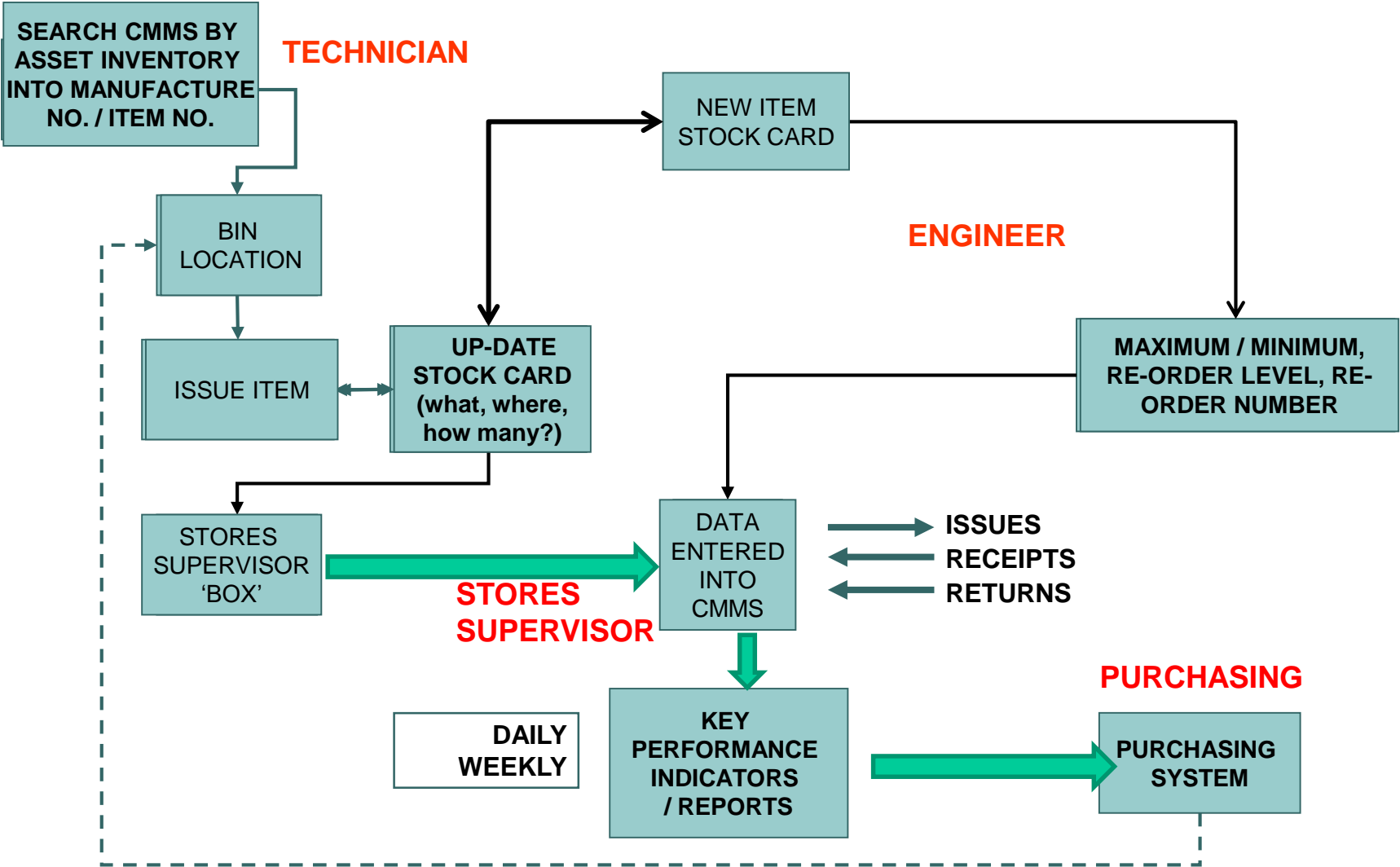




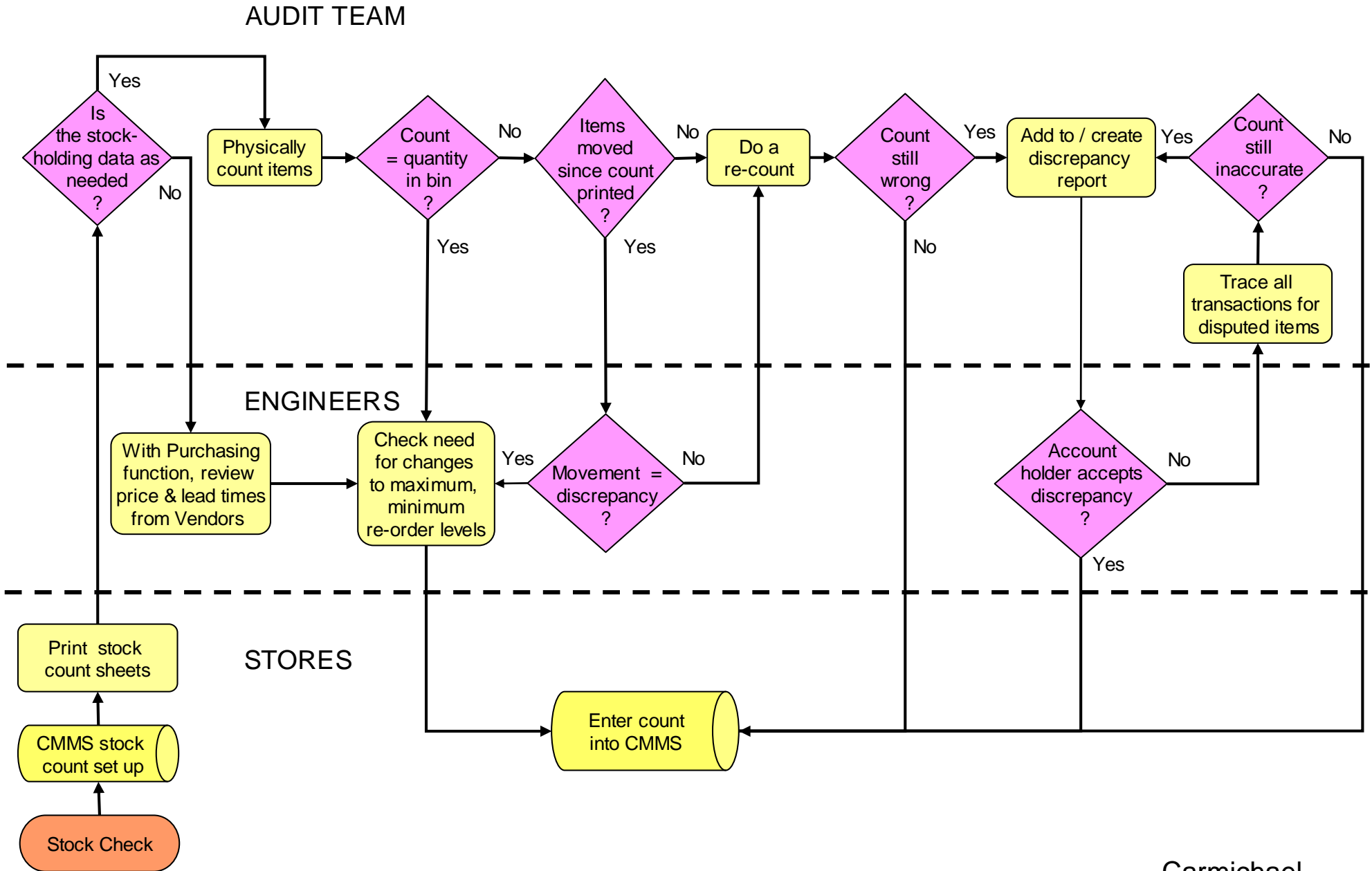
## STEP 4 – SET UP A BASIC STORES COMPUTER APPLICATION SYSTEM

- COMMENCE INITIALLY ON A DUAL MANUAL / APPLICATION SYSTEM CONTROL
- ABOUT 8 DIFFERENT TYPES OF PRODUCTION LINE TO IMPLEMENT
- FURTHER PRODUCTION LINES OF THE SAME TYPE ARE ON ORDER - LEADING TO ABOUT 10,000 ITEMS TO BE IN STOCK
- ENTER THE DATA, FOR EACH PRODUCTION LINE IN TURN
- BEGIN WITH A STOCK CHECK

# OUTLINE OF INITIAL MANUAL / STORES COMPUTER SYSTEM

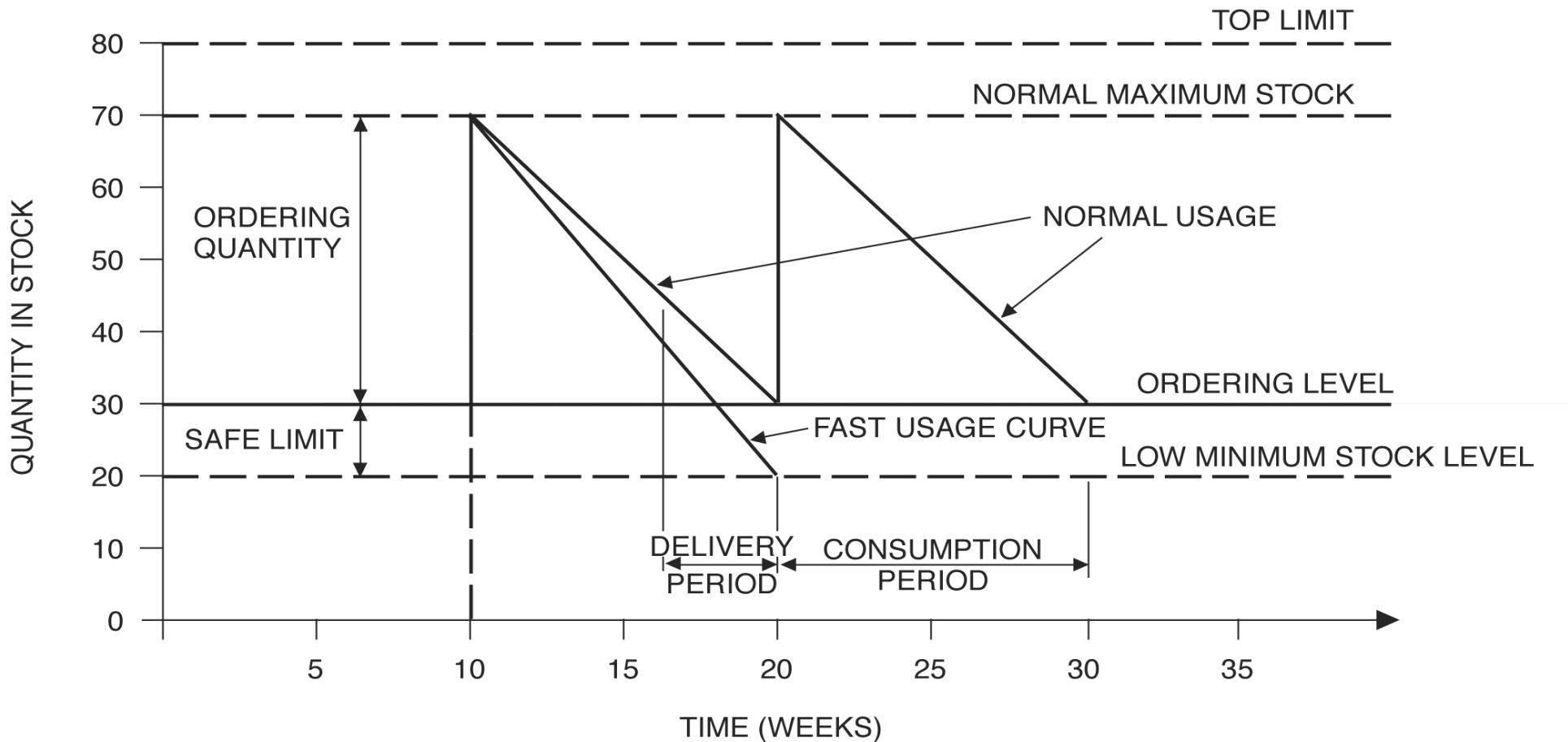


# FIRST - CARRY OUT A STOCK CHECK



# Stock Control

- maximum & minimum stock-holding levels
- ordering (purchasing) level
- ordering quantity
- delivery period



## STEP 5 - MAPPING OUT THE PROCESSES FOR:

- STOCK CHECKS
- THE ISSUE OF ITEMS
  
- REORDERING STOCK
- THE RECEIPT OF ITEMS INTO THE STORES
  
- THE ISSUE OF ITEMS FOR PREVENTIVE WORK
- ROTABLE (FOR REPAIR) ITEMS; STOCK RATIONALISATION.



- the data for each item was entered onto a 'bin' stock control card attached to each bin
- key information for item re-ordering being 'number in stock' and 'minimum stock level'.

STORES ITEM NUMBER _____							
Manufacturer's Specification _____							
SUPPLIER NAME TEL NO				Manufacturer's Number NAME TEL NO			
STOCK CHECK							
DATE	NO. IN STOCK			CHECKED BY			
ISSUES & RECEIPTS							
DATE	ISSUE		RECEIPTS		STOCK LEVEL		
MINIMUM STOCK LEVEL							
ORDERING LEVEL				ORDERING QUANTITY			
ITEM VALUE	\$	\$	\$	\$	\$	\$	\$
REORDERING							
ORDER NO	DATE	QUANTITY		BY WHOM			

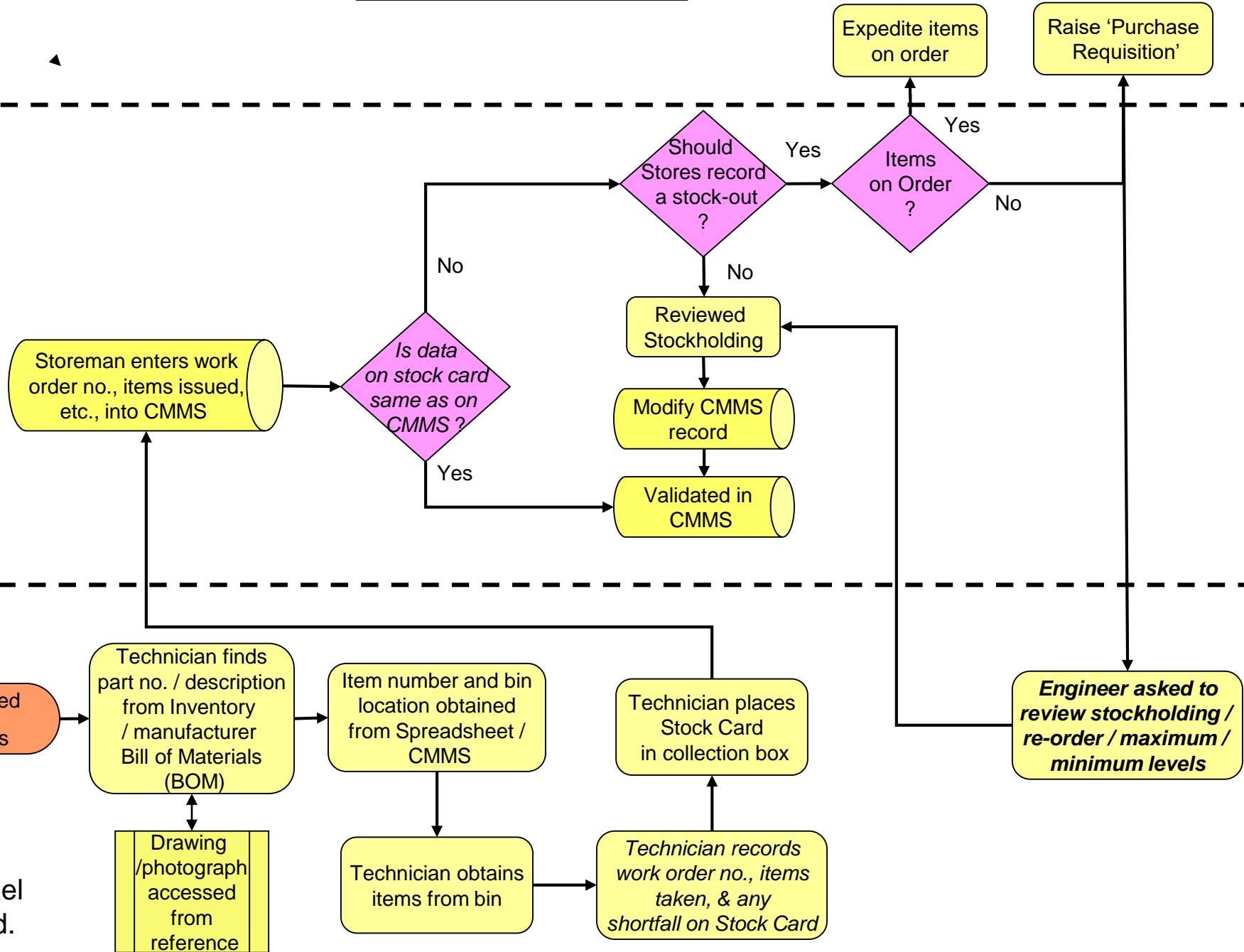
# ISSUE OF STOCK ITEMS

PURCHASING

STORES

ENGINEERS

Carmichael  
Smith Ltd.



## Stock Control data listing

Item	Item Description	Vendor Number	Manufacturer Part No	Bin Location	Current Stock	Reorder Level	Reorder Quantity	Delivery Days	Max. Stock	Unit of Measure	Unit Cost - £
3623	CABLE SUPPORT OPTIONAL	384101	027836 B	NIK40906	2.00	2.00	3.00	4.00	5.00	EA	20.28
3627	FLOATING JOINT, ALIGNMENT	384101	730	NIK40907	1.00	1.00	4.00	4.00	5.00	EA	20.27
3630	MOTOR UPGRADE, RIGHT HAND	384101	028916-01	NIK40907	0.00	2.00	6.00	7.00	8.00	EA	393.96
3657	BEARING, BALL .625 OD .250 ID	384101	24816	NIK40909	4.00	3.00	5.00	1.00	8.00	EA	15.07
3822	MINIATURE FUSES (4 A)	114272	3-431	NIK41109	12.00	6.00	24.00	1.00	30.00	EA	0.34
3841	MODULAR POTENTIOMETER	863799	6569637	BWE 05-22-13	1.00	3.00	12.00	3.00	15.00	EA	119.22
3983	AIR FILTERS, VAC	224590	92889	NIK41307	30.00	30.00	45.00	1.00	75.00	EA	12.52
4204	FUSE, 2.5A BOARD	333990	B2225HEV	BWE 05-30-02	5.00	5.00	20.00	1.00	25.00	EA	2.52
4211	NUT, LEADSCREW ELEVATOR	104794	0210-104-6345	SAT14103	2.00	1.00	3.00	7.00	4.00	EA	24.35

## THE INVOLVEMENT OF THE LINE ENGINEERS IN PREPARING THE STOCK CONTROL DATA

- MAXIMUM AND MINIMUM NUMBERS FOR BIN STOCK LEVELS WERE GIVEN BY THE LINE ENGINEERS FOR THE STOCK CONTROL METHOD.

- THE KEY COLUMNS OF RE-ORDER LEVEL AND RE-ORDER QUANTITY, AS WELL AS DELIVERY PERIOD

WERE GIVEN BY 'PURCHASING'  
AND BY THE ENGINEERS, AND RECORDED IN THE SYSTEM

STEP 6 – ORGANISATION AGREED AND THE STAFF TRAINED IN  
THE STORES PROCESSES,  
THE COMPUTER SYSTEM,  
AND THE KARDEX UNITS

STAFF:

A SUPERVISOR

A BUYER

AN ISSUER / RECEIPTOR

AN ISSUER / STOCK CATALOGUE EXPERT

+ 2 TEMPORARY ASSISTANTS TO PREPARE THE MANUAL CARDS  
AND CONTINUE TO ENTER THE DATA INTO THE SYSTEM



4. Operators and Maintenance technicians have easy access to an up-to-date parts catalogue, or computer database, showing parts and location.

TR	JS	SM	SF	SJ
75%	75%	25%	25%	25%

5. All parts requisitions, returns and purchases for maintenance jobs are tied to a job-specific work order number in the CMMS. No materials are released without work order, excluding 'free issue items.' Blanket work orders are not allowed.

TR	JS	SM	SF	SJ
25%	0%	50%	25%	25%

6. Every item on the Master Equipment List is linked to an up-to-date Bill of Materials, or parts list.

TR	JS	SM	SF	SJ
25%	25%	50%	25%	50%

7. Maintenance participates in an effective parts standardization program.

TR	JS	SM	SF	SJ
25%	100%	25%	25%	25%

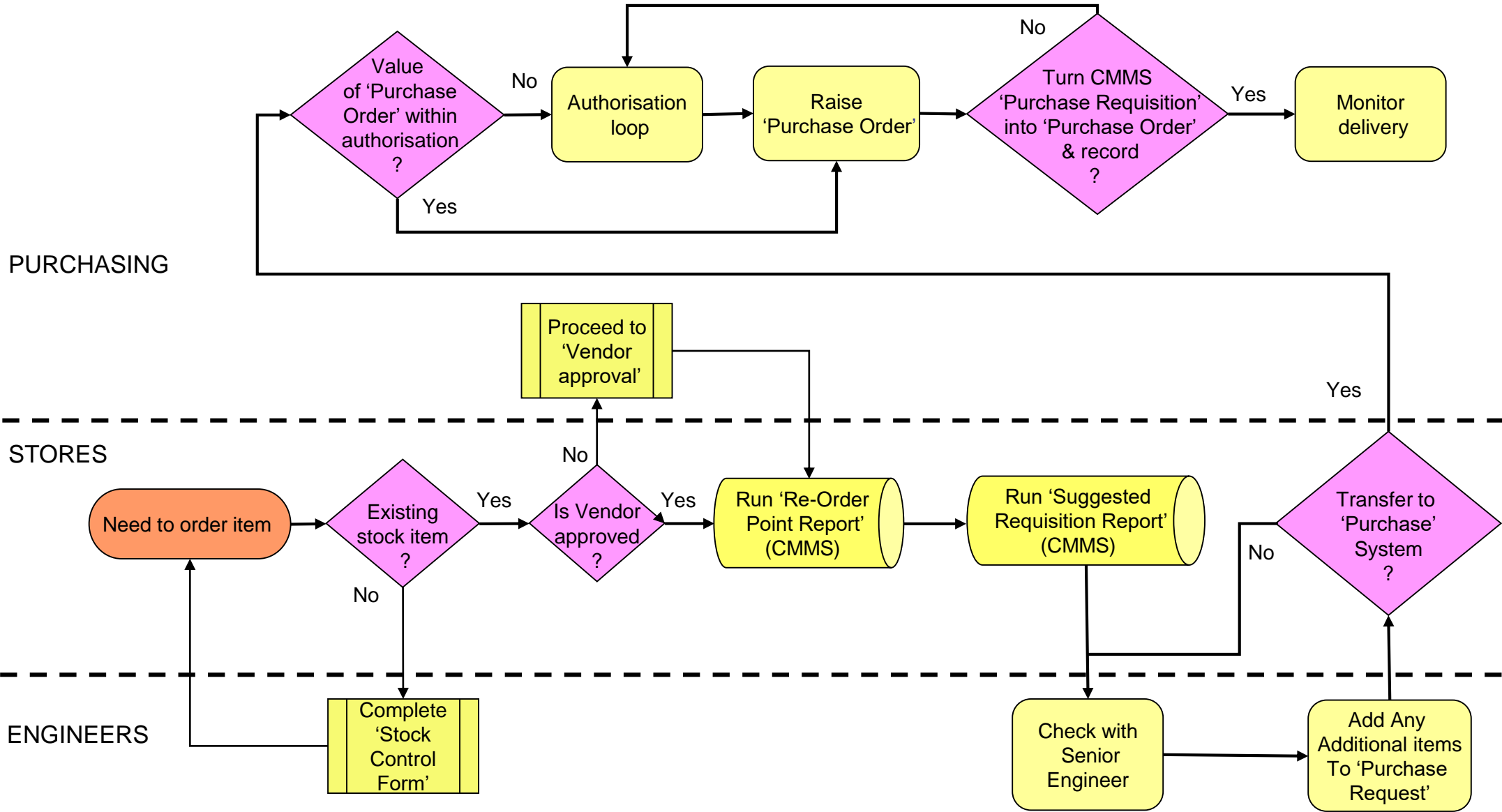
8. Maintenance provides input to determine inventory levels and participates in inventory control.

TR	JS	SM	SF	SJ
25%	100%	50%	25%	0%

9. All parts identification and descriptions are up to date and available on the parts management system.

TR	JS	SM	SF	SJ
50%	75%	50%	25%	50%

# RE-ORDER STOCK



# Purchase order status report

Order Number	Supplier	Supplier Number	Item	Item Description	Manuf. Part No	Quantity Ordered	Delivered	Delivery Date	Due Date	Status	GRN Number	Bin Location
5182	MATION INC	384101	3623	CABLE SUPPORT OPTIONAL	027836 B	3			10.01.12	Not Yet Due		NIK40906
5182	MATION INC	384101	3627	FLOATING JOINT, ALIGNMENT	730	4			10.01.12	Not Yet Due		NIK40907
5182	MATION INC	384101	3630	MOTOR UPGRADE, RIGHT	028916-01	8			10.01.12	Not Yet Due		NIK40907
5184	MJC POWER	863799	3841	MODULAR POTENTIOMETER	6569637	14			11.11.12	Overdue		BWE 05-22-13
5185	KYO IND.	224590	3983	AIR FILTERS, VAC	92889	45	20	04.12.11	22.12.11	In Stores	423A	NIK41307
5187	TRONIC LTD	333990	4204	FUSE, 2.5A BOARD	B2225HEV	20			05.01.12	Not Yet Due		BWE 05-30-02

THE KARDEX SPARES  
STORAGE UNITS WERE  
INSTALLED

- MOSTLY FOR HANDLING  
'COMMON' ITEMS





## STEP 7 – TIME FOR COMMUNICATION AND ‘GETTING PEOPLE ON BOARD’

WITH THE STORES-PEOPLE IN WEEKLY “ISSUE” MEETINGS

WITH SENIOR ENGINEERS ON THE TACTICS

WITH PURCHASING AND SUPPLIERS ON OUTSOURCING

WITH FINANCE ON FOCUSING ON COST REDUCTIONS

ON WITNESSING THE IMPROVEMENTS  
THE SENIOR ENGINEERS BECAME INCREASINGLY  
INTERESTED AND SUPPORTIVE, AND WERE LOOKING FOR:

- STORES, FOR BETTER CONTROL, TO GIVE WEEKLY REPORTS:
  - OF USAGE ON EQUIPMENT
  - STORES STOCKOUTS AND FOR WHICH EQUIPMENT
  - OF THE TIME TAKEN BETWEEN RE-ORDER REPORT & ITEMS ORDERED
  - OF ITEMS ORDERED / WERE ORDERS RECEIVED ON TIME?
- PURCHASING TO
  - SET-UP 'SUPPLIER ACCOUNTS' AND 6 MONTHS FORWARD PRICING
  - TO TAKE-OVER THE RESPONSIBILITY FOR RECEIVING QUOTATIONS
- ENGINEERS TO CHECK THE ENTRY OF NEW ITEMS INTO THE KARDEX FOR  
DETAIL OF THE RECORDS AND THE ITEM SPECIFICATION
- "TECHNICIANS TO GIVE A WORK ORDER NUMBER ON ISSUE; OR NO ISSUE"

# DOING THE CLEVER STUFF

## COST REDUCTION – HOW?

1. BY RATIONALISATION – Entering the item description / manufacturer's code number to find where the same item is stored for different equipment
2. BY PURCHASING FROM FEWER SUPPLIERS OR CONTRACTING
3. BY SETTING BETTER MAXIMUM AND MINIMUM LEVELS FOR STOCK CONTROL - PURCHASING WHEN NEEDED – E.G. FOR PMs AND FOLLOWING CONDITION MONITORING
4. BY CONCENTRATING ON HIGH COST / ACTIVE ITEMS (80/20%)
5. BY IDENTIFYING SLOW MOVING ITEMS

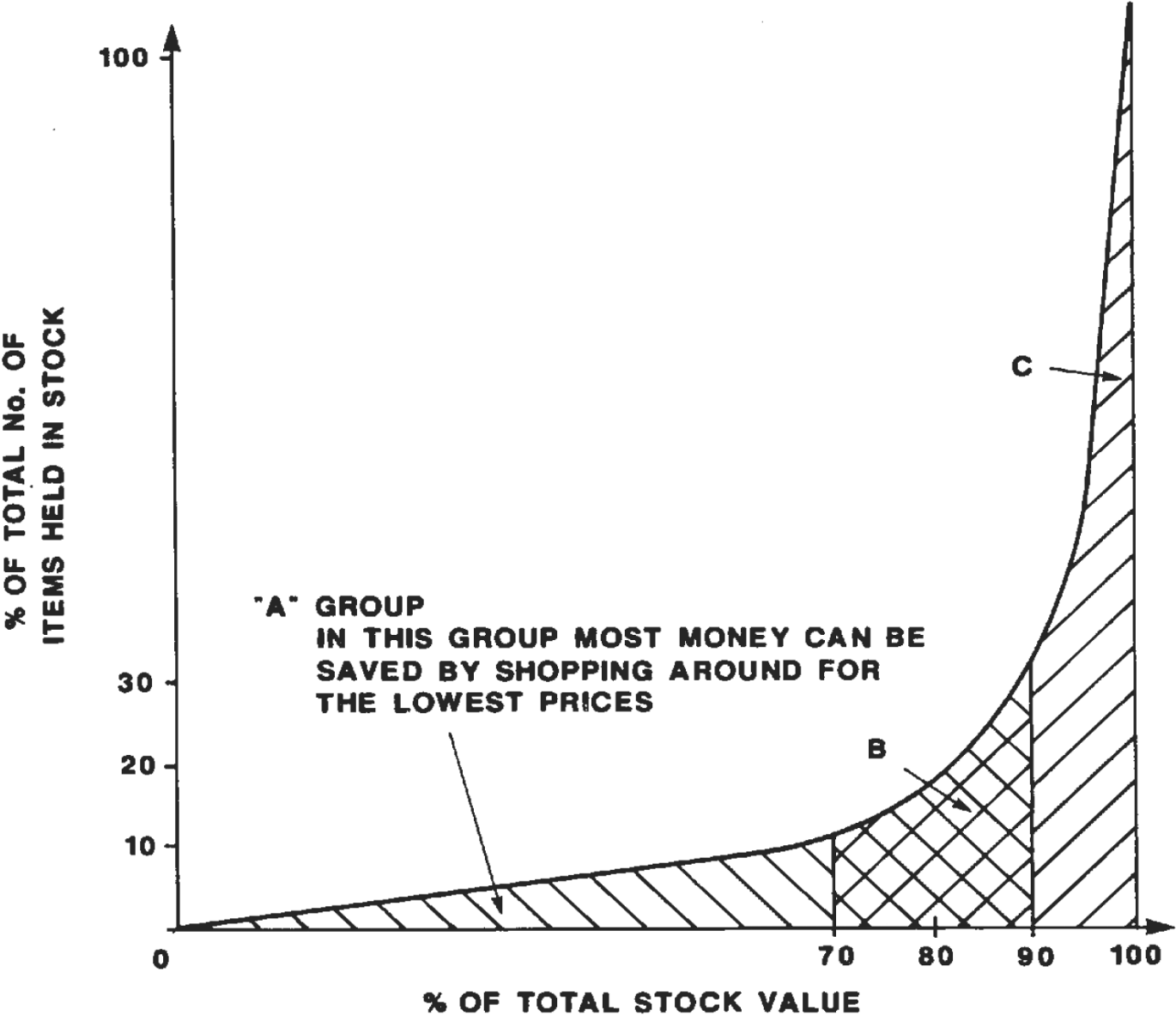
## IDENTIFYING THE SLOW MOVING ITEMS, (e.g. > 12+ MONTHS SINCE LAST ISSUED)

The Engineer may be advised that  
'unless justified within three months,  
these parts will be sold and the stores space discontinued'.

He / she may choose to:


- change the re-order level,
- change the order quantity,
- agree to order on request,
- retain the existing levels,
- scrap the items.

# Identification of cost reduction methods



**A**   
**EXPENSIVE**

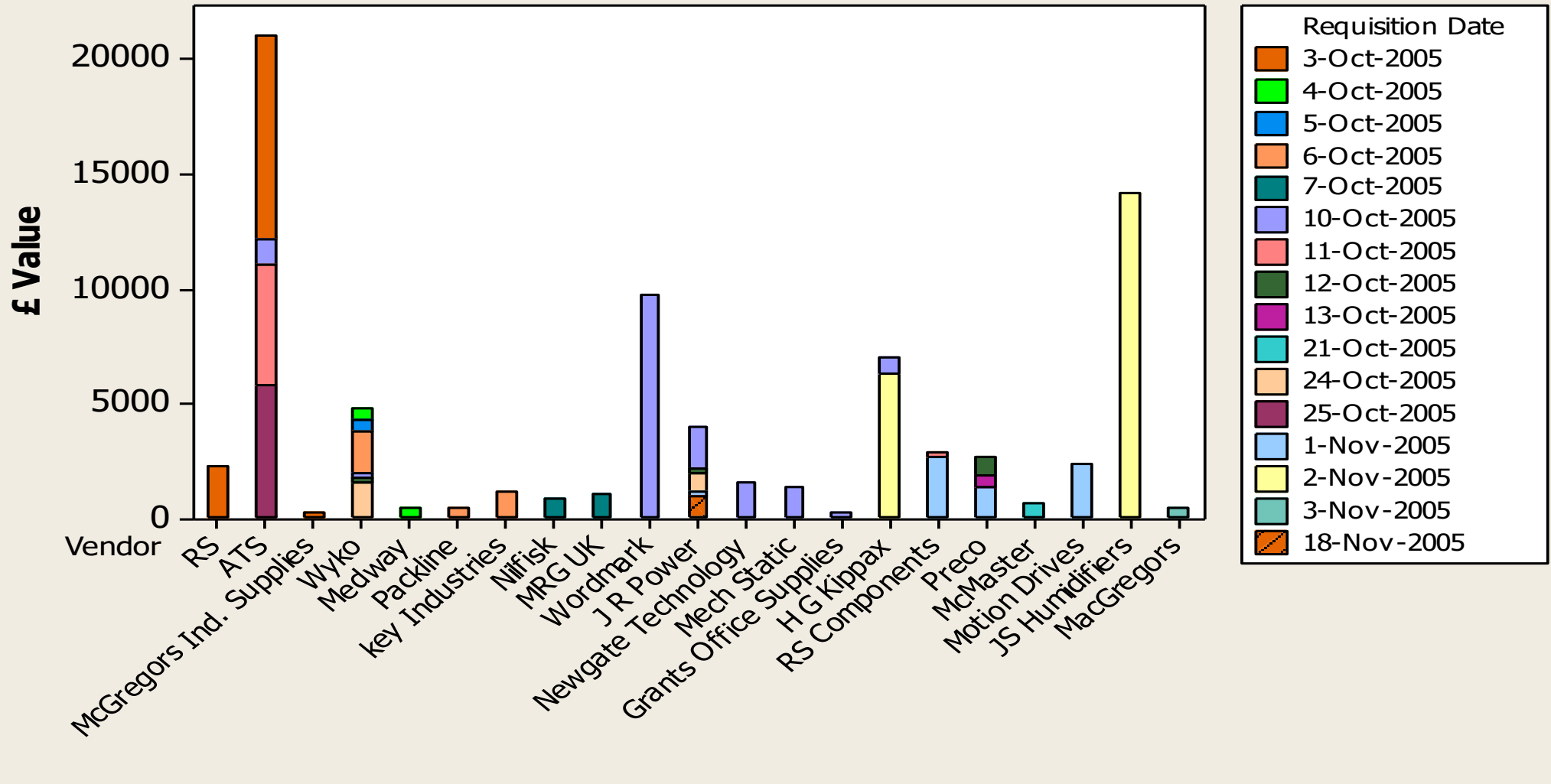
**B**   
**MEDIUM**

**C**   
**LOW COST**

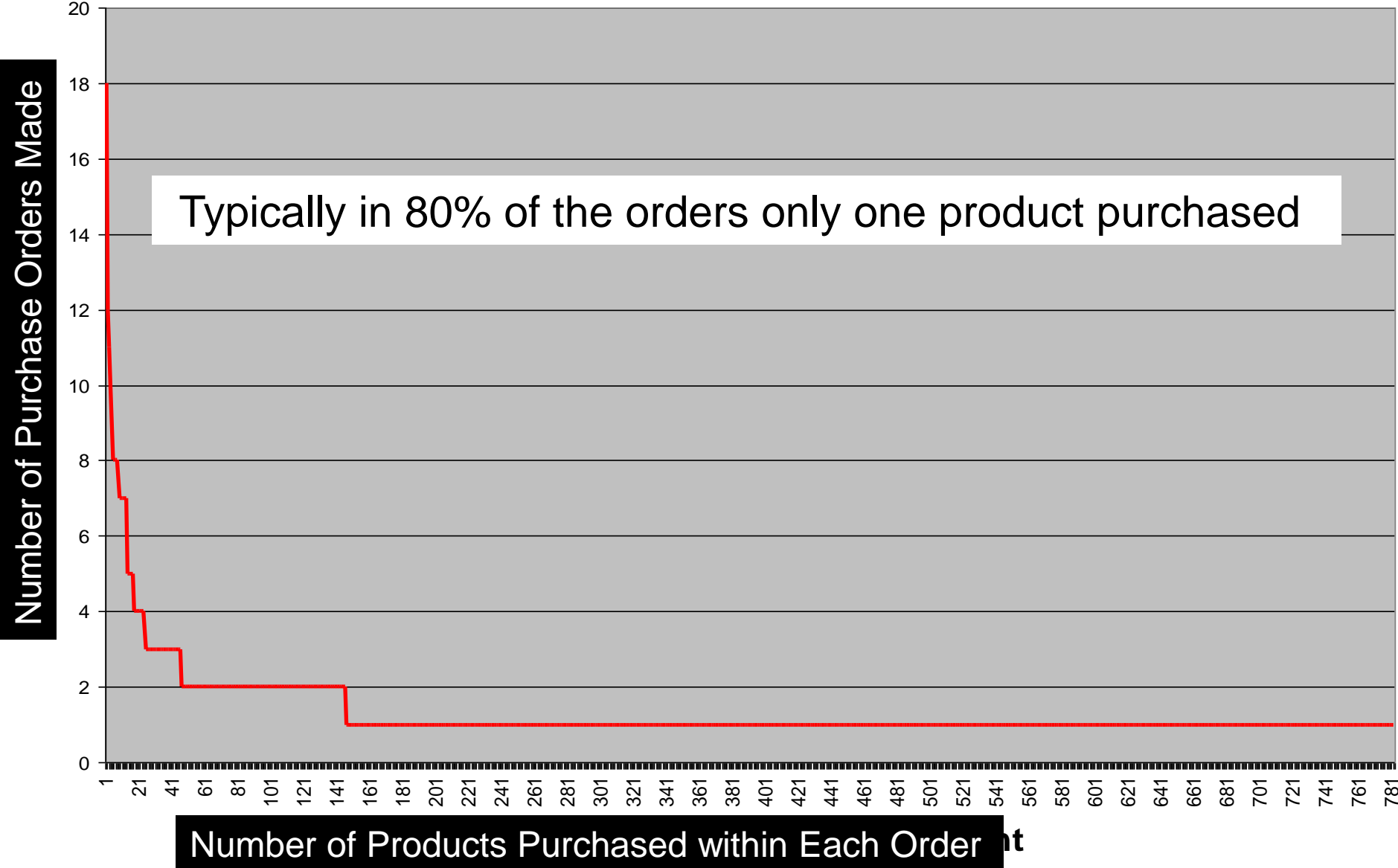


# PURCHASING WITH FEWER VENDORS therefore fewer orders

## Chart of £ Value vs Vendor, Requisition Date



# Existing Trading Relationship With One Supplier



## STEP 8 - THE FUTURE

### **Technicians:**

- Retrieve spares directly
- Print issue record from CMMS
- Assist update of spares catalogue



### **Operations / Engineers:**

- Assess benefits of asset standardisation
- Identify common items for standardisation
- Monitor MTBFs and assess whether spares may be stored with supplier
- Share asset failure / usage data for 'design-out'



### **Stores and Systems Administration:**

- Classify items by 'ABC' analysis
- Monitor and action rationalisation
- Develop a list of 'second sources'
- Review justification for holding critical / strategic spares

### **Purchasing / Finance:**

- Place orders as near to the manufacturer as possible
- Understand the manufacturing process
- Support the internet system of spares information (as by GlaxoSmithKline in Kardex system)



Carmichael Smith Ltd.

WHAT WOULD BE YOUR SET OF PERFORMANCE INDICATORS  
FOR THE STORES OPERATION ?

TOTAL STOCK VALUE – WE JUSTIFIED THE PROJECT ON INVENTORY COSTS

TOTAL NUMBER OF STOCK ITEMS

STORES INVESTMENT COSTS AS % OF ASSET REPLACEMENT COST

NUMBER OF SUPPLIERS AND PURCHASING COSTS

SLOW MOVING ITEMS

% OF STOCK ITEMS UNDER CONTROL

RATIONALISATION OF ITEMS

RESPONSE TIMES

TIME BETWEEN REQUISITION AND ORDER

LATE DELIVERIES

STOCK-OUTS

HIGHEST NUMBER OF ITEMS ISSUED BY INDIVIDUAL EQUIPMENT ITEM

HIGHEST NUMBER OF ITEMS ISSUED DUE TO FAILURES

SHARE VALUE / LEGISLATION (TAX ETC.)

TOTAL BUDGET

RETURN ON INVESTMENT / EBITDA

Business Area / Process Unit

SYSTEM LIFE COSTS / REPLACE

Asset Cost Centre

MAINTENANCE / PROJECTS / OVERHAULS

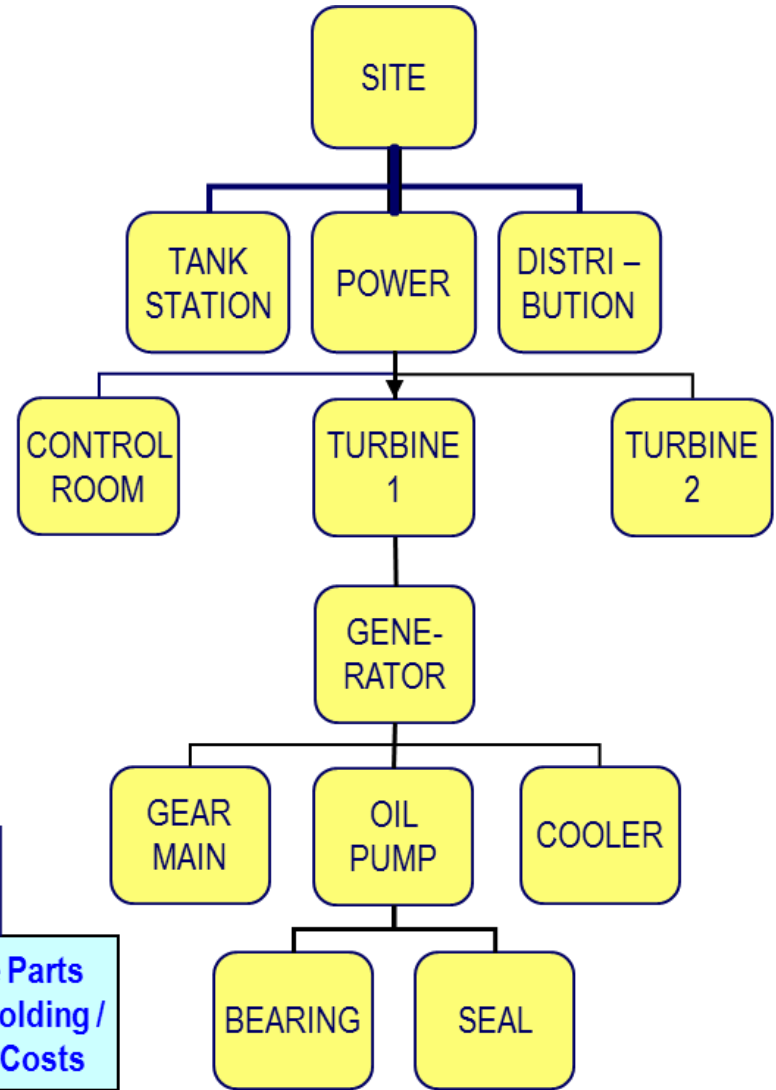
Work Packs

MAINTENANCE JOB COSTS BY ASSET / TYPE

Cost Codes / Work Orders

STORES INVENTORY / PURCHASING

Spare Parts Stockholding / Issue Costs




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# Coordination & monitoring improved – a maturity profile?

Stage 1 'A beginning'	Stage 2 'Awareness including Standards'	Stage 3 'Control'	Stage 4 'Quality'	Stage 5 'Excellence'
<p>1) A stores parts inventory is in place for Z% of equipment assets with the parts descriptions identical to those as listed in the asset manufacturer's Bills of Materials (BOM).</p> <p>2) X% of spare part types are stored in 'bins' which are organised in individual referenced locations on numbered store racks.</p> <p>3) A link is created between Y% of equipment assets on the overall site asset register to the list (inventory) of spare parts created from the BOM.</p> <p>© Alan Wilson - 'Asset Maintenance Management – Developing Strategy and Improving Performance' Industrial Press, New York, 1999.</p> 	<p>4) A strategy is in place with an implementation plan which is monitored monthly.</p> <p>5) The use of a stock issue and receipt card for A% of spare part types is practiced.</p> <p>6) B% of parts and materials are re-ordered when the stock count is seen to be at a re-order point level which is set by the appropriate Engineer.</p> <p>7) The stock card is used to record and check the balances for issues, orders to Procurement, receipts, and current stock levels, for C% of spare part types.</p> <p>8) Manual maintenance stores processes are in place for issues, receipts, and stock checks, and the stores personnel are trained to suit.</p>	<p>9) A stand-alone stores computer module is implemented to assist with the updating of the inventory, and the location and recording of issues, receipts and checks for K% of the spare parts types.</p> <p>10) The computer system identifies the speed of issue of L% of the items which assists in the decision of: - whether to remove slow moving items from the stores for ordering when needed, depending on the delivery period - whether to focus the stores control decisions on the fast moving / high cost items, thereby reducing the procurement and holding costs, etc.</p>	<p>13) A full computer maintenance management system (CMMS) is in place, which includes stores inventory control and the support of all stores processes, and identification of obsolete items.</p> <p>14) Spares for M% of planned maintenance requests are raised automatically and made ready for the craftsman as scheduled.</p> <p>15) Recording of the maintenance job work order number takes place for N% of the spare part usage; (allowing costs to be assigned to the completed job, and thereby to the equipment asset).</p>	<p>18) For G% of purchases preferred and certified suppliers have long term purchase agreements in place.</p> <p>19) Buyers are trained to purchase using the supply chain management system, and are trained in negotiations, due diligence and legal issues.</p> <p>20) H% of suppliers are web ready for easy ordering. Invoicing and payments are completed electronically.</p> <p>21) Supplier audits are performed for P% of suppliers, and quarterly review meetings are set up between the company and supplier to discuss procurement performance, costs, etc.</p>

# Considered Outsourcing

- ▶ CONSIGNMENT STOCK – Supplier stock items in client store / invoice
- ▶ MANAGED STOCK – Supplier manages a range of items
- ▶ INTEGRATED SUPPLY – Supplier manages the complete store

How would you consider the advantages and disadvantages of outsourcing to the levels below?

- ▶ OUTSOURCING THE STORES ONLY, TO WHAT LEVEL?
- ▶ OUTSOURCING THE PROCUREMENT OF SPARES
- ▶ OUTSOURCING PROCUREMENT OF ASSETS



# Integrated Supply

Integrated Supply, is where a supplier would manage the complete store.

## Advantages

- ▶ Overhead of stores personnel removed
- ▶ Cost reduction targets can be imposed
- ▶ Radical rationalisation of stores suppliers
- ▶ Potentially one invoice per month for stock items

## Drawbacks

- ▶ Supplier may have expertise within confined areas only
- ▶ Potential loss of visibility, relationship and control over suppliers
- ▶ Large reliance on one supplier which could be exploited over time
- ▶ Often no better buying power in non-core items

Managed Stock Replenishment

# Managed Stock

Managed Stock is where a supplier would manage a range of items in the store.

## Advantages

- ▶ Number of suppliers reduced
- ▶ Number of invoices reduced
- ▶ Stock-out situations reduced Max / Min levels reduced
- ▶ Reduction in working capital
  
- ▶ Products owned by customer
- ▶ Maintain relationship with suppliers

## Drawbacks

- ▶ Stock still owned by customer, representing an overhead
- ▶ Tendency for “fictitious” usage of stock from some suppliers

## Managed Stock Replenishment