

## **CHAPTER - THREE**

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### CHAPTER - 3 Inventory Management Practices at GPI

As explained earlier, GPI's product - line consists of 7 products produced each by its casting unit and the foundry unit. Sales, during the three years upto 31st March, 1994, and the position of inventories as on these dates, is shown in the following Table.

Table 3.1 : Sales & Inventory for three years (figures in Rs. lakh).

	Year ending	Sales				Inventories
		Raw Materials	Stores & Spares	Finished Products	Work in Progress	Total Inventories
31/3/92	3102	139 (4.48)	79 (2.54)	83 (2.68)	335 (10.80)	636 (20.50)
31/3/93	3610	124 (3.43)	62 (1.72)	69 (1.91)	319 (8.84)	574 (15.90)
31/3/94	4388	119 (2.74)	60 (1.38)	132 (3.04)	266 (6.11)	577 (13.27)
31/3/95	5612	127 (2.25)	60 (1.07)	172 (3.06)	308 (5.50)	667 (11.89)

(Note : Figures in brackets are percentages)

Source : Compiled from office Records of GPI

Followings things may be observed from the above Table :

- 1) Sales of GPI show an increasing trend throughout the four years i.e. years ending 31st March 1992 through 31st March, 1995.
- 2) Except in case of finished goods inventory all other items (i.e. Raw Materials, Stores & Spare Parts & Work - in - Progress) show, in percentage terms, a declining trend over the four year peri-

od. Finished goods inventory, as a percentage of sales, shows a mixed trend.

- 3) Total inventories, as a percentage of sales, by 31st March 1992, 93, 94 and 95, was 20.50%, 15.90%, 13.27% and 11.89% respectively. Thus there is a downward trend seen in this behalf.

All these observations give an impression of overall good management having control over sales and also the inventory items.

#### **Raw Material consumption**

Raw Materials consumed during the three years ending 31st March, 1994, 1993 and 1992 is shown in the following Table

**Table 3.2 Raw Materials Consumed**

Sr. Raw Material	Unit	31-3-94		31-3-93		31-3-92	
		Quantity	Rs.	Quantity	Rs.	Quantity	Rs.
1) Pig Iron	M.T.	4090	26935422	4070	25448109	6131	36225026
2) C.I. Scrap & Boring	- " -	33	138611	108	477304	459	2420377
3) Home C.I Boring /RR/ Rejection	- " -	1764	----	1149	----	1172	----
4) S.G.I Scrap & Boring	- " -	----	----	52	262887	107	444808
5) M.S. Scrap	- " -	4649	31149997	3786	25714336	5422	38486145
6) Silicon Scrap	- " -	867	5358052	680	4790090	625	5719865
7) Graphise Powder	- " -	101	1740016	89	1143408	262	2512763
8) Ferro Silicon	- " -	228	6430745	166	4583734	239	5007903
9) Petroleum Coke	- " -	227	1694164	83	1122073	---	----
10) Other foundry Raw Material	- " -	----	2912272	----	4207882	----	5177979
11) Forgings and Castings	Nos	91114	15853603	81190	14644572	91027	13678137
12) Steel Bars	Kg	192791	3709570	155619	3336252	204484	4509242
13) Other	--	----	23875804	----	14845690	----	18907871
			-----		-----		-----
			119798336		100554347		133590116
			-----		-----		-----

Source : Compiled from the Records of GPI. Imported & indigenous raw material consumed during these three years is given in Table 3.3.

**Table 3.3 : Imported & Indigenous Raw Material Consumed**

	Year ending		Year ending		Year ending	
	31-3-94		31-3-93		31-3-92	
	Rs.	%	Rs.	%	Rs.	%
a) Imported Raw Material	3294637	2.75	1668990	1.66	24119888	18.6
b) Indigeneour Raw Material	116503699	97.25	98885357	98.74	109470228	81.94
	-----		-----		-----	
	119798336		100554347		133590116	
	-----		-----		-----	

Source : Records at GPI.

#### BILL OF MATERIAL

A Speciman of a Bill of Material in GPI is given bellow. When an organisation receiver a work order or a Production Programme of the concern is finalised, a list of all the materials required for execution of the order or manufacturing of the product is prepared by the concerned foreman. The list of materials so prepared is known as a Bill of Materials (BOM) which includes all the details as regards to quality, quantity, code number, drawing number and other necessary specifications. Thus, Bill of Material is nothing but a document which shourt for given component the list of materials required, unit consumption and location code.

BOM is the simplest technique of materials planning. BOM with required lead time and necessary contingency provisions is drawn for each product or order which eventually turns into indents for procurement. It also acts as a guide to delivery and inventory requirement. A BOM, Therefore, helps in keeping watch over the delivery of matching equipment. Spareparts, components, and also over materials directly going into Production. It enables the evaluation of the progress of the project undertaken and ensures the flow of required materials. A BOM is also helpful in avoiding the locking funds unnecessarily by proper scheduling the order, delivery and arrival of materials. Such as avoidance of capital blockade saves and diverts the working capital and reduces the inventory carrying cost to a large extent. The BOM technique of materials planning is ideally suited for engineering industries.



## PURCHASE PROCEDURE

Materials constitute one of the important factors of production in a business. The term 'Materials' refers to the commodities supplied to an undertaking for the purpose of consumption in the process a manufacture of rendering service of for transformation into product is follow by following purchase procedure by the GPI.

### 1) PURCHASE ORDER :

Soon after the quotations are finalised and supplier from whom materials are to be purchased is decided upon a purchase order is placed on the firm asking them to deliver supplier. Tender is simply an offer but the purchase order forms a contractual agreement with the suppliers. Before sending out the order it should be ensured that suitable funds have been provided in the purchase budget. The contents of the purchase order should be complete and definite and it should include full details so as to leave no room for ambiguity or misunderstanding. If the Purchase order is not properly laid out it may result not only in subseaut disputes and bad business relationship, but may also upset production schedules due to non delivery or delayed devilyery of materials.



Each purchase order is serially numbered and contains the date of its issue. This is necessary in order to facilitate cross linking so that supplier when received may be correctly identified and payment to the suppliers may be made promptly. The supplier quotes this number and date on the invoice and in all his correspondence. The quantity on order is stated in the purchase order in both figures and words. Difficulty arises where a material is measured in more than one physical unit. For example, the same material may be supplied some time by volume and some time by weight. In such case, the factors for conversion from one unit to another should be specified in the purchase order.

**2) Receipt of Material :**

Materials when received from the supplier are under the temporary custody of the receiving department. The material are usually accompanied with one or both of the following documents.

- 1) Advice of despatch, which is sent by the supplier intimating despatch of materials from his premises.
- 2) Delivery note or packing note : which is received from the carriers who transports and delivers the material.

### 3) **Inspection :**

On receipt, the materials are checked with reference to the copy of the purchase order in possession of the receiving department. The quantity received is varified with the quantity an order, an the quality specified on the purchase order it checked by the inspection department. In small firms, these may not be a separase inspection department but inspector may be attached to the receiving department or the store.

### 4) **Store**

The practice in most concerns, both small and big, is to have a central store. That is responsible for the handling and upkeeping of all types of store, separte stores to cater to the needs of each production department are uncommon because of the heavy expenditure involved.

To obviate the above dificulties, the ideal solution is to have a central store and in addition, sub-stores or departmental stores in each main production department under the overall control of the central store. For the sub stores, imprest system may be used

under which replenishment of each item in stores is made at the end of the period so as to bring its stock to pre-determined level.

### **Vendor Quality Analysis**

In GPI Vendor Quality Analysis is generally adopted for fabrication of "ROCKET HARDWARES" at VSSC. The fabrication of Rocket components and subassemblies cover a wide range of manufacturing process, requiring high processing control. It calls for a special type of attention to control the quality. This requires for quantifying the data of quality to evaluate various vendors involved. The philosophy and objective behind under quality analysis are :

- to select suitable vendor
- to monitor the vendor quality

Hence any system followed tries to judge a vendor in terms of price/quality & capability to deliver the goods in required time frame.

### **VENDOR SELECTION**

The basic approach followed for vendor selection is as follows.

A team of experts for different discipline visit various industries to study.

- Manufacturing facility and the process capabilities.
- The quality control and inspection support to production.
- Quality control manual and procedure for handling quality problems.
- State of quality consciousness.

A part from these the expert team has to study the following :

- Has vendor any previous experience in the manufacturing of similar components.
- Is the vendor familiar with Rocut System / sub system fabrication, specifications and application ?
- What inspection and quality control techniques does the vendor has ?

Generally followed method is to send a details questionaire to ellicitf information for the vendor. If required the expert team could ask some samples to be prepared for evaluation.

Alternately at the initations of a big project a symposium is generally organised with participation of different vendors to get a view in to utilizing them.

## TOTAL QUALITY RATING

Total quality rating is most practical measure. Vendor performans : It helps the customer to select suitable vendor. The rating system is only comparative method useful to evaluate various vendors offering similar componants. The buyers has to fix the rating valuer to decide selection or eliminating a vendor for rating the vendor in terms of quality, price and promph-ess in delivery a weightage of 50%, 30% & 20% respecti-vally are assumed an example of typical total quantity rating analysis is illustrated below.

Ex. An example of typical total quality rating analy-sis is illustrated.

	Vendor A	Vendor B	Vendor C
1) Lots inspected	60	65	20
2) Lots accepted	54	60	16
3) Percent accepted (ii/i x 100)	90	92.3	80
4) Quantity Rating (iii x 0.50)	45	46.15	40
5) Neb. Price Quoted (Each component)	9.3	11.2	12.3
6) Lowest price x 100 ----- Net price	100	83	76
7) Price Rating (vi x 0.30)	30	24.9	22.8
8) Delivery Promise kept	80%	70%	95%
9) Delivery Rating (viii x 0.20)	16.0	14.0	19.0
10) Total Rating (iv + vii + ix)	91	85.05	81.8

## **VENDOR QUALITY EVALUATION DURING FABRICATION PHASE :**

A further evaluation of vendor performans during fabrication will be made by collecting and analysing. Inspection data with referance to the design and specifications. The defiations of these defeate / deviations are classified as follows.

- Minor
- Major
- Critical

### **Minor Deviations**

Minor deviations are those which do not have any relevance to the product performans, process and quality. Eg. :- The dimensional variation and componont level which are possiable to rework or suited during assembly without affecting the quality of the assembly.

### **Major Deviations**

Major deviations are those which are related to the end product quality & performans. Eg. Deviation - such as dimeusion of final product which may affect the product further interface with integrated product and may need a change during intergration.

## CRITICAL

## Deviations

Critical deviations are those deviations which will directly reflect on the product performance in conjunction with other integral system.

Eg. Deviations which have bearing on flight performance required special attention in further processing.

A typical example of such classification of an assembly is shown in the table.

The various defects classification are assigned numerical desired value an example.

CRITICAL - 5 Points

MAJOR - 2 ---"

MINOR - 1 ---"

Table No. 3.4 Name of the Assembly.

Sr. No.	D.R.G.No.	Part / Subassembly	Drawing / Specification Dimension	Classification of Deviation			Remark	
				Minor	Major	Critical		
1.	6007:1850 10	Cylinder	1) length	-	646 ±0.20	-	-	
			2) 646 ±0.20	-	-	-	-	
			3) Thickness 1.5 ± 0.10	±0.20	-	-	-	
			4) Bend 1.00	1.5 -0.10	-	-	-	
			5) Hardness 28 to 39 R.C	-	1000	-	-	
							28 to 36	-
2.	6007-1853:12	Dome	1) 97 ±0.30	-	-	97 ±0.5	-	
			2) Hardness 28 to 32	-	28 to 36	-	-	
			3) Etc.	-	-	-	-	
3.	6007:1853:15	Boss	1) 12 ±0.20	12 ±0.50	-	-	-	
			2) 3 ±0.18	-	3 ±0.20	-	-	
			3) Etc.	-	-	-	-	
4.	1750:1853:20	Fasteness	1) 90 ±2.0 0.0	-	-	-	-	
			2) 10 mm	10 mm	-	-	-	
			3) Credia	-	-	-	-	

Source : Records of GPI

### VENDOR QUALITY ANALYSIS RECORD

The vendor quality evaluation is a export for the Management / Purchase depti, which summeriers vendors performans, along period indication, these are referred when ever new order is to be placed.



Periodically inspections reports are stored out giving vendor no. part order no. and date of visiting a vendor quality analysis as shown in the Table No. 3.

With the help of above data report is prepared containing all post fabricated, inspected, accepted, and rejected. This provides a mean for rapaia evaluation. If possible vendor will institute a corrective action on the recommendation of contractor analysis. In the event that the vendor tailer to do so a new source of supply for componants may be done.

#### **Evaluation of Vendor Quality Analysis**

This briefly gives the various methods of seketing and evaluating a vendor at GPI. The methods illustrated help the castomer to the Vendor Quality trends and form the basis of meaning ful vendor, castomer relationship by judicious use of the these methods unsuitable vendors are eliminated and suitable vendors developed and encouraged to meet the quality goals of the customers..lm

Table 3.5 : VENDOR QUALITY ANALYSIS RECORD

Sr. No.	Vendor Name	Part No.	Order No.	No. of component				No. of Assembler			Period	Remark
				Inspectio	Accepted	Demerits	Rejected	Received	Accepted	Rejected		
1.	MIS X	AY 10001 to 10120	3758 / 3 1279	100	90	128	5	50	68	4	6	-
2.	MIS XY	B 22002 to 22080	48981 / 4	80	59	130	10	40	31	22	4	-
3.	MIS AB	CD 16001 to 16060	1518 / 5	51	51	200	10	10	9	10	2	-
4.	MIS CD	EF 15001 to 15100	3100 / 6 1681	100	80	100	20	40	35	12.5	3	-

Source : Records of GPI

Inventory Valuation Methods of GPS are given below.

Inventory item	Valuation method
1) Raw Material Inventory	at cost
2) Stores & spars	at cost or marker value which ever is lower
3) Finished Goods	---- " ----
4) Work - in - progress	at cost

A,B,C LALVE ANALYSIS

A)	500	70%
B)	5000	20%
C)	24500	10%
	-----	
	30,000	
	-----	

*What does it suggest?*

### Selective credit control at GPI

GPI follows ABC Analysis of selective inventory control. ABC Analysis, done

**Table 3.6 : ABC Classification Foundry Items**

List of 'A' class Items (31/3/95)

Sr. No.	Material Code	Material Description	Yearly value Rs. Lakh	Cumulative value Rs. Lakh	%
1.	40040017	Scrap ms HP Bundles	314.657	314.657	28.91
2.	40040025	Pig iron low phosphorous std.	212.402	527.059	45.08
3.	40040018	Scrap silicon Bundles	91.649	618.708	52.93
4.	40700196	Noboke part A (Fowet 11.225 D)	63.831	682.589	58.39
5.	40040022	Boring C.I. (Home)	57.38	739.919	63.29
6.	40700045	Hard Coke	55.761	795.68	68.08
7.	40700037	Ferrosilicon lumps	40.32	836.00	71.51
8.	40040021	RIR & Rejection GI (Home) unutilised material	41.146	877.146	75.03
9.	40700109	Petroleum Coke Calcined / (Carbonizer)	27.335	904.481	77.37
10.	40700068	Sand Silicon unwashed 60-65	22.755	927.236	79.32
11.	40700109	Petroleum Coke calcined	17.745	944.981	80.84
12.	30580006	Bentonite Powder	17.54	962.821	82.34
13.	40700197	Nobake Part B	16.996	979.517	83.79
14.	30580005	Bentckal cole 77 / Iva-coal	13.79	993.307	84.97
15.	4070014	Steel Shots	12.893	1005.95	86.052
16.	40700111	Ferro Manganese lumps	12.092	1018.042	87.08
17.	40700244	Innoculine - 16	8.98	1027.022	87.85
18.	30530001	Primer-red oxide Addition	8.70	1035.722	88.59
19.	40700249	Sand phonda washed 48-52		1043.188	89.24

Source Record of GPI :

List of B class items (31/3/95) Table No. 3.7

20.	20950040	Grianding wheel	7.34	1050.500	89.86
21.	40700064	Pure magnesium lumps 95.8%	7.119	1057.627	90.47
22.	40040007	Pig iron (kalinga)	5.938	1063.565	90.98
23.	40040030	RIR & Raj SGI (Home) Unutilised Material	5.51	1069.075	91.45
24.	40700156	Innoculine	4.47	1073.545	91.83
25.	40700023	Cole dust Powder	4.667	1078.212	92.23
26.	20950023	Grianding Wheel 300 x 40 x 127	4.08	1082.292	92.88
27.	40700212	Rheotec 161	3.516	1085.808	92.88
28.	30520019	Furnale oil	3.82	1089.628	93.21
29.	30530030	Paint Stell Gery Synthesis (Enames)	3.25	1092.978	93.50
30.	40030185	Bar round 6 lack ms 10 mm dia	2.84	1095.818	93.74
31.	30510080	Sodium Silicon	2.737	1098.558	93.97
32.	30520121	Core oil (s)	2.382	1100.937	94.17
33.	30520008	Diesel (Hian Speed Heavy)	2.224	1103.161	94.37
34.	40700034	Ferro Chromium/evacrolad	2.22	1105.381	94.55
35.	02300001	Metacap CE	2.402	1107.783	94.76
36.	40700110	Copper scrap	2.073	1109.856	94.94
37.	30510025	Bar cerium misch metal	1.944	1111.80	95.10
38.	30530035	Thinner HC	2.63	1114.43	95.33

Source Record of GPI :

List of C class items (31/3/95) Table No. 3.8

39.	30580009	Cloth Asbestos k.152 3.2 mm	1.786	1116.216	95.48
40.	30530024	Paint Primer red oxide	1.68	1117.896	95.63
41.	30580013	Fire bricks 10 x 9 x 4 in	1.668	1119.564	95.77
42.	30530059	Pincote G/W/Graphicont	1.368	1120.932	95.89
43.	30580028	Ranning Mass	1.246	1122.178	95.99

44. 40700004	Nails Antiscabring 1 inch.	1.30	1123.478	96.105
45. 20950019	Grinding wheel 200 x 25 x 15.88	1.18	1124.858	96.20
46. 30510035	Carbondioxide Co <sub>2</sub> (Gas Co <sub>2</sub> )	1.067	1125.725	96.30
47. 20950004	Grinding wheel (D. centre)	1.052	1126.777	96.388

Sorce Record of GPI

12808<sup>41</sup>

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