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# HML Analysis for Inventory Management-Case Study of Steel Plant 

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#### Abstract

An inventory management is most commonly used technique to manage inventory efficiently in an organization. The organization wants to control their inventory cost, so they used to different inventory techniques to control this. There are several techniques such as ABC, HML, VED and S-OS. In this study we shall focus on HML analysis. In HML analysis the items are classified into $H, M$ and L classes based on unit cost. Data collection is mainly of 1 year through the general store manager and other staff involved in inventory control operation of steel plant.


Key Words:- ABC analysis, inventory management, inventory control.

## I. INTRODUCTION

"Reference [1] shows, In any industry today inventory optimization is such a vital function. Excess and Shortage of inventory in all levels of the supply chain can affect the availability of products and/or services to consumers. Several monitoring systems and processes can be employed to check inventory imbalances to minimize the supply and demand dynamics. To simply these monitoring systems and process items/materials/products are classified into different groups".
"Reference [2] shows, Effective inventory Management has played an important role in the success of supply chain management. For organizations that maintain thousands of inventory items, it is unrealistic to provide equal consideration to each item. Managers are required to classify these items in order to appropriately control each inventory class according to its importance rating".
There are various types of inventory control analysis techniques such as ABC, HML, VED, S-OS etc. Here we shall focus on the HML analysis techniques

## II. OBJECTIVE

## A. General objective

To categories the inventory items into $\mathrm{H}, \mathrm{M} \& \mathrm{~L}$ class.

## B. Main objectives

The main objective of this analysis is to minimize the inventory cost such as labor cost, material cost etc.

## III. METHODOLOGY

There are various types of inventory control analysis techniques such as ABC, HML, VED and S-OS etc. Here we shall focus on the HML analysis techniques
A. HML analysis

The HML analysis is similar to ABC analysis the difference that instant "usage value, price" criteria is used. It is based on Pareto principle or the 80/20 rule.

In this analysis cut-off-lines are then fixed by the management of the organization to classify the inventory items. The cut-off-lines are based on unit cost such as

1) H-class item: - (10000-100000) Rs.
2) M-class item: - $(1000-10000)$ Rs.
3) L-class item: - (0-1000) Rs
4) 

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B. Percentage based classification on the $H, M$ and $L$ classes.

1) H-class item: These are the costly item and are generally $10-15 \%$ of total item.
2) $M$-class item: These items are low cost item as compared to H class items, this are generally $20-25 \%$ of total item.
3) L-class item: These items are low class item and generally $60-70 \%$ of total items.

TABLE 1
Shows particulars of HML analysis

| Particulars | H-class item | M-class item | L-class item |
| :--- | :--- | :--- | :--- |
| Control | High | Intermediate | Low |
| Requirement | Low | Intermediate | High |
| Check | Tight | Intermediate | No |
| Safety stock | High | Low | Rare |

## C. Procedure

To conduct HML analysis, following steps are necessary:

1) Prepare the list of items and calculate their unit cost, annual demand and annual usage.
2) Arrange items in the decreasing order of their unit cost.
3) Calculate percentage of unit cost, cumulative of unit cost and then categories the inventory item.
4) The cut off lines are then fixed by the organization for deciding three categories.
5) Plot the graph on the basis of cumulative of unit cost and then categories the inventory items.

## IV. CASE STUDY

Step1. Prepare the list of items and calculate their unit cost, annual demand and annual usage.
Step. 2 Arrange items in the decreasing order of their unit cost.

TABLE2
Shows name of item, unit price, annual demand and annual usage of each item.

| Item <br> no. | Item | Unit cost <br> (Rs) | Annual demand <br> (Units) | Annual usage <br> (Rs) |
| :--- | :--- | :--- | :--- | :--- |
| 1. | TNT 8mm | 31829.70 | 2.02 MT | 64296 |
| 2 | M.S. round 25mm | 31212.33 | 4.055 MT | 126566 |
| 3 | Rolled diameter 110x520 | 11162.71 | 7 No. | 78139 |
| 4 | Rolled diameter 110x320 | Coupling F-100 | 5391 | 6 No. |
| 5 | Seating wall block (PP) | 3375 | 6 No. | 32346 |
| 7 | Coupling F-80 | 3083.5 | 6 No. | 1850202 |
| 8 | Oxygen regulator | 2257 | 13542 |  |

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| 9 | Full argon gas cylinder | 1301.4 | 15 No. | 19521 |
| :--- | :--- | :--- | :--- | :--- |
| 10 | Porous plug | 900 | 15 No. | 13500 |
| 11 | A.C. sheet 3MPR | 556.5 | 90 No. | 50085 |
| 12 | Slide gate plate 25mm | 495 | 150 No. | 74250 |
| 13 | P.V.C. 5 WR (pipe 110mm) | 370 | 6 No. | 2220 |
| 14 | L.P.G. regulator | 319 | 6 No. | 1914 |
| 15 | Full nitrogen cylinder | 299.9 | 30 No. | 8997 |
| 16 | Tundish nozzle 13mm | 225 | 450 No. | 101250 |
| 17 | Tundish nozzle 1305mm | 225 | 150 No. | 101250 |
| 18 | Laddle nozzle 25mm | 225 | 33750 |  |
| 19 | Collector nozzle 25mm | 179.32 | 150 No. | 33750 |
| 20 | Female receptical with housing MK III | 118.625 | 120 No. | 1423549 |
| 21 | Full oxygen cylinder | 110.2487 | 52.5 | 615 No. |
| 22 | Dummy bar bolt | 28.125 | 60 No. | 1575 |
| 23 | Cotton tape 1" | Tundish well block | Temp tips 600mm | 100 No. |
| 24 |  | 27360 |  |  |
| 25 |  |  |  |  |

Step3. Calculate percentage of unit cost, cumulative of unit cost and then categories the inventory item.
Step 4.The cut off lines are then fixed by the organization for deciding three categories.
TABLE 3
Show name of items, unit cost, \%unit usage, Cumulative of unit \& category for each item.

| Item <br> no. | Item | Unit cost <br> (Rs) | \% Unit cost | Cumulative of <br> unit cost | Annual usage <br> (Rs.) | Category |
| :--- | :--- | :--- | :---: | :---: | :---: | :---: |
| 1. | TNT 8mm | 31829.70 | 31.45 | 31.45 | 64296 | H |
| 2 | M.S. round 25mm | 31212.33 | 30.84 | 62.30 | 126566 | H |
| 3 | Rolled diameter 110x520 | 11162.71 | 11.03 | 73.33 | 78139 | H |
| 4 | Rolled diameter 110x320 | 7229.14 | 7.14 | 80.47 | 50604 | M |

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| 5 | Coupling F-100 | 5391 | 5.33 | 85.80 | 32346 | M |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 6. | Seating wall block (PP) | 3375 | 3.34 | 89.14 | 20250 | M |
| 7 | Coupling F-80 | 3083.5 | 3.05 | 92.19 | 18501 | M |
| 8 | Oxygen regulator | 2257 | 2.23 | 94.42 | 13542 | M |
| 9 | Full argon gas cylinder | 1301.4 | 1.28 | 95.70 | 19521 | M |
| 10 | Porous plug | 900 | 0.89 | 96.59 | 13500 | L |
| 11 | A.C. sheet 3MPR | 556.5 | 0.55 | 97.14 | 50085 | L |
| 12 | Slide gate plate 25 mm | 495 | 0.49 | 97.63 | 74250 | L |
| 13 | P.V.C. 5WR (pipe 110 mm ) | 370 | 0.36 | 97.99 | 2220 | L |
| 14 | L.P.G. regulator | 319 | 0.31 | 98.30 | 1914 | L |
| 15 | Full nitrogen cylinder | 299.9 | 0.30 | 98.60 | 8997 | L |
| 16 | Tundish nozzle 13 mm | 225 | 0.22 | 98.82 | 101250 | L |
| 17 | Tundish nozzle 1305 mm | 225 | 0.22 | 99.04 | 101250 | L |
| 18 | Laddle nozzle 25 mm | 225 | 0.22 | 99.26 | 33750 | L |
| 19 | Collector nozzle 25 mm | 225 | 0.22 | 99.48 | 33750 | L |
| 20 | Female receptical with housing MK III | 179.32 | 0.18 | 99.66 | 13449 | L |
| 21 | Full oxygen cylinder | 118.625 | 0.12 | 99.78 | 14235 | L |
| 22 | Dummy bar bolt | 110.2487 | 0.11 | 99.89 | 67802.95 | L |
| 23 | Cotton tape 1" | 52.5 | 0.05 | 99.94 | 1575 | L |
| 24 | Tundish well block | 28.125 | 0.03 | 99.97 | 16875 | L |
| 25 | Temp tips 600 mm | 27.36 | 0.03 | 100 | 27360 | L |

Step5. Plot the graph on the basis of cumulative of unit cost and then categories the inventory items.
X -axis shows $=\mathrm{HML}$ classification
Y-axis
shows $=$ Cumulative percentage
HML
analysis on the basis of cumulative of unit cost is shown in fig. 1

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Fig. 1 Shows HML analysis on the basis of cumulative of unit cost

## V. RESULTS

TABLE 4
Shows the result of HML analysis

| Category | Annual demand | \% Annual demand | Annual usage (Rs) | \% Annual usage |
| :--- | :--- | :--- | :--- | :--- |
| H | 3 | 12 | 269001 | 27.28 |
| M | 7 | 28 | 168264 | 17.06 |
| L | 15 | 60 | 548763 | 55.66 |
| Total | 25 | 100 | 986028 | 100 |

ABC analysis on the basis of percent Annual demand is shows in fig.2.


Fig.2. Shows percent item usage of the inventory items.

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HML analysis on the basis of percent Annual usage is shows in fig.3.


Fig.3. Shows percent annual usage of the inventory item.

## VI. CONCLUSION

In manufacturing environment, an organization needs to maintain the balance between critical stock- outs and minimizing inventory costs material cos. From the above study we have found that this analysis help to the organization to manage the inventory item effectively not only for raw material but also for finished goods. It will help to understanding of problems occurs due to purchasing, inventory, material cost and safety stock.

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## REFERENCES

[1] Mitchell A. Millstein, Liu Yang, Haitao Li, Optimizing ABC Inventory Grouping Decisions, International Journal of Production Economics November 2013.
[2] T.V.S.R.K.Prasad, Dr. Srinivas Kolla, Multi Criteria ABC analysis using artificial - intelligence-based classification techniques - case study of a pharmaceutical company, IJIRMPS,Volume 2, Issue 3, December 2014, p 35-40.

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