Inventory Accuracy for Switchboard Manufacturing Plant using Cyclic Counting method

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Abstract- *Inventory record accuracy is most important measure of performance of warehouse. This work examines three-way approach used to achieve maximize inventory record accuracy and study various methods of cyclic counting. The past and current research into inventory record accuracy are studied and the three-step approach by Roger B. Brooks & Larry W. Wilson is applied to achieve inventory accuracy in Switchboard manufacturing company. One of the most dominant reason for stock discrepancies is error in bill of material. This research enlightens the method for bill of material correction which applied for correction of 1500 Bill of Material. The paper also shows the effect of increased inventory accuracy on warehouse parameters.*

*Keywords-*IRA, BOM, Inventory turn, Inventory value, SAP (ERP), Supply Chain Management, Cyclic Counting

1. INTRODUCTION-

What the inventory is? Inventory is a raw material, work in process (WIP) products and finished product which are measured as the share of an organization's assets that are ready for sale or will be ready for sale. [2] Inventory Record Accuracy (IRA) is a measure of how closely inventory records (SAP Record) matches with the physical inventory (On hand inventory). [3]

The units of measurement for accuracy are either

1. Cost based.
2. Count based.

These two units of measurement have different purposes and may give widely divergent results. Accountants and financial auditors favor cost-based measurements. While, Operations and material management people are strongly interested in the accuracy of individual stock keeping unit (SKU). [3]

There are two types of stock discrepancies, - Positive discrepancies and negative discrepancies. [4] Presence of the positive discrepancies can be stated when the actual physical inventory present is larger than the inventory present in ERP system (SAP), while presence of the negative discrepancy can be stated when actual physical inventory present is lower than inventory in ERP system (SAP). [4]

Inventory accuracy is a critical and highly sensitive part affecting on an organization [1]. Safety stock is generally held due to inaccurate records because procurement does not trust the inventory record accuracy. [4] AS SAP is most commonly used ERP System it has great impact on the material requirement planning element of the SAP system specially through back flush process. [3].

If the inventory records are not accurate, then organization cannot really analyze the state of its inventory. [1] And due to lack of that knowledge, their ability of planning, scheduling or delivering what the customers want is significantly affected. That deficiency results into various cost, reducing the profits and constraining the operations. [1]

There are many reasons for stock discrepancies like BOM Errors, Human Error in processing the order, Stocks mixing, Incorrect data entry by receiving section (Errors in GRN), Misplaced stocks, Stocks loss due theft., Human error during

physical inventory counting (Stock Take), Wrong material number labelled on material), Supplier fraud., Lack of Standard Packaging, Unable to distinguish between WIP and Stock Material.

1.1 Switchboard-

A switchboard forms an important link in the distribution chain of power, from its source of generation to its end user. It controls the flow and distribution of power from a central place. The simplest form of a switchboard is found in our homes - the board on a central place. [4]

The simplest form of a switchboard is found in our homes the board on the wall on which the switches for lights and fans are mounted. Its complexities span across medium and high voltage boards used in industrial set-ups for power distribution. [4]

It usually consists of a circuit breaker inside it - switchgear, which makes and breaks the circuit as and when, required. One of the major applications of a switchboard is in the distribution of electric supply in cities, industrial centers, or electricity boards like Maharashtra State Electricity Board (MSEB) etc. [4]

1.2 Motivation-

The importance of inventory accuracy is

1. To avoid to sell missing due to out -of- stock items.
2. Avoid cash wastage in overstocked inventory.
3. Improve accuracy of accounting and profit and profit reporting.
4. Keeping the system under control.
5. Minimize theft and losses
6. To improve customer service.
7. Efficient Reordering.
8. To trust information system of an organization.
9. Minimize warehouse costs.
10. Efficient stock take
11. Accurate inventory planning and to analyze inventory trends
12. Ensuring time to improve skills and talent of warehouse personnel.

2. RESEARCH GAP

Finding root causes of stock discrepancies and implantation of inventory correction process to achieve accuracy up to 95 percent along with bill of material correction while working with the guideline set by an organization.

3.　RESEARCH OBJECTIVE

The goal this research is to introduce a step by step guide for achieving and maintaining inventory record accuracy of the material in the switchboard manufacturing plant.

Particularly this paper discusses the inventorying process and three-step approach to achieve inventory accuracy. The first step of these is related with designing of inventory record system and the creation of the internal proficiencies to implement and keep it in use. The second step is the to establish initial inventory balances. The third and final step is to maintain inventory record of the system. By implementing three step method inventory accuracy up to 95 percent to be achieve.

Correcting all bill of material by implementing the process of BoM correction and achieve zero error in BoM.

4. METHODOLOGY FOR INVENTORY ACCURACY

The three-step approach by Roger B. Brooks & Larry W. Wilson is applied. [1]

1. Design and preparation Phase
2. Establishing the initial balance
3. Cyclic Counting.

Step-I is purely a planning, designing, preparation and training phase; so, it does not have direct impact on accuracy. Step-II, is an action phase in which all the records are put right. Step-III is basically maintenance phase in which accuracy achieved is maintained. [1]

These three steps must be processed in sequence that means step-I must be complete before step-II which must be completed before step-II [1].

Below table shows the materials (Classified into ABC Category). for which the method of inventory accuracy is applied.

Table 1. ABC Material classification

Inventory Class	Materials % of total inventory	Cost Ratio	Number of Parts
A	20	80	900
B	30	15	1350
C	50	5	2250
Total	100		4500

5. BILL OF MATERIAL CORRECTION

Error in the bill of material is one of the most dominant reason for stock discrepancies

Simply stating, Bill of Materials (BoM) is the list of material(components) required to build a product.

As the company is Make to order, the material as per customer requirement must appears in bill of material.

Bill of Material mostly falls in three categories

1. Completeness
2. Correctness
3. Consistency

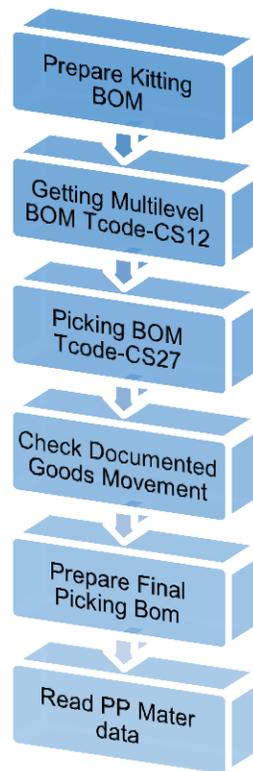Below chart shows the BOM correction process applied.

Chart 1-BOM Correction Process

5.1 Prepare Kitting BOM - Actual Material Required.

The order picking is one major operation of warehouse. It consists of kitting material in a specified quantity before commissioning to production line. This is basic warehouse operation and has major impacts on entire supply chain and productivity of the firm, hence it is most controlled operation of the warehouse.

Preparing the kitting BOM is most important and tedious work in the BOM Correction Process. It requires complete knowledge of assembly of product, need to check drawings of components, need to check purchasing info record of materials etc. Kitting BOM Shows Actual components required to assemble the final product with their quantities.

5.2 Get Multilevel BOM from SAP

A multi-level BOM, is a bill of materials that lists all the components, assemblies, and parts required to make a product. The multilevel BOM extracted from SAP using CS12 Transaction.

5.3 Get SAP BOM- Picking BOM

Co27 is Tcode, used to pick material against production order with movement type -261. This Tcode shows material required for production order excluding bulk material and phantom assemblies which is actually physically picked (Kitted) and issued to assembly line in kitting trollies.

5.4 Check Documented Goods Movement.

Documented goods movement of the latest order is check to ensure that there is no material posted or received against production order. as once material posted or received against production order, the corrected BOM is cannot be apply to that production order. i.e. "Read PP Master data" this function cannot be use.

5.5 Final Picking BOM

After getting data as mention in step 1, 2 and 3 is received; next step is comparison of that data (i.e. comparing actual requirement with SAP picking BOM) which is mostly Microsoft Excel based work. Once the error in BOM are identified, BOM are corrected concerning with Research and Development team (R&D).

5.6 Read PP Master Data

This is actual implementation phase of the corrected BOM. Read master can be done only when the production is in created and released status. There is no automatic way to do the read master data function in production order.

After reading PP Master data, whatever changes done while BOM correction are get reflected while picking the order

6.　WAREHOUSE ENHANCEMENT

6.1 Inventory Accuracy

Inventory accuracy is measure of accurately physical inventory matches with system (SAP) inventory. [3]

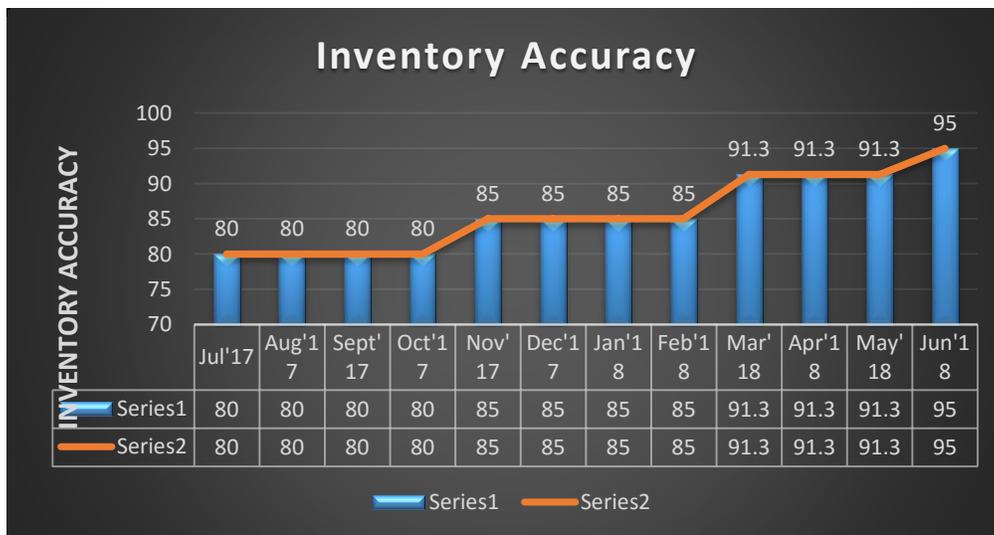The below chart shows the inventory accuracy for the period of one year (July'17-Jun'18).

Figure 1- Result-Increase in Inventory Accuracy

During this research inventory accuracy is increased by 15 per Approx. by bill of material correction and stock correction using concept of cyclic counting.

6.2 Idle Time

Idle time is unproductive time of the worker. Below graph shows the idle time (Data taken from Nx-Tool Software). reduced during the last one year due to inventory accuracy and BOM Correction
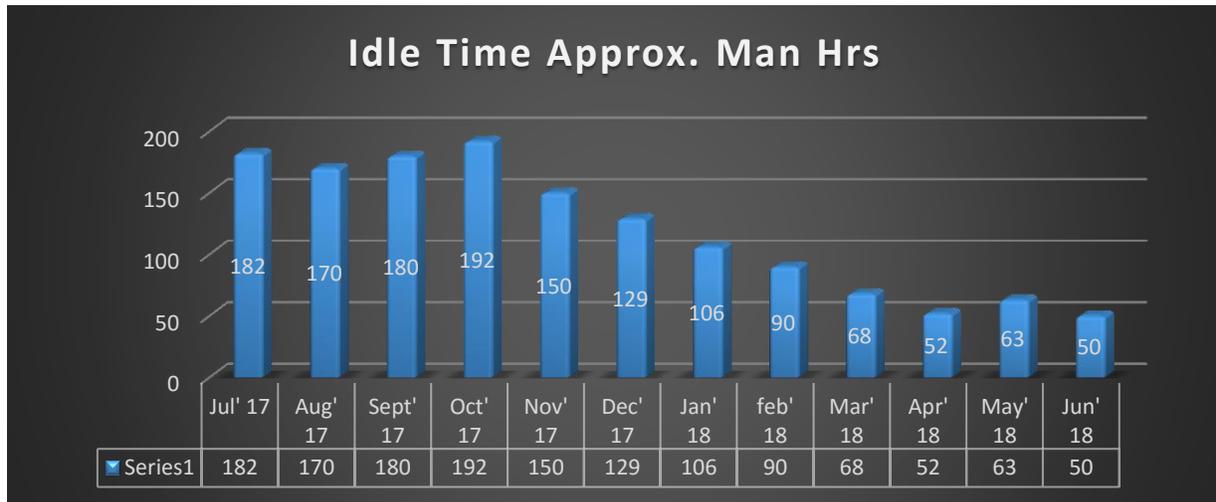

Figure 2- Result-Reduced idle time.

6.3 Inventory Value

Inventory value is the cost of the inventory value that is unsold (The inventory in the warehouse). Inventory is valued at the market price of the inventory, means the purchase value of the inventory.
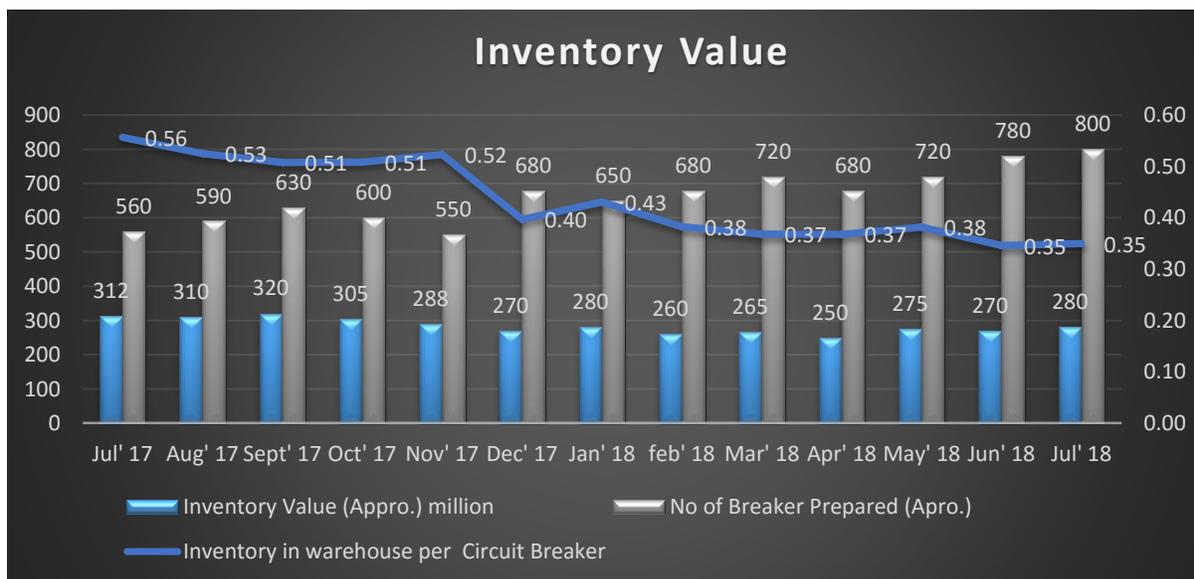

Figure 3- Result-Inventory Value

Advantages of holding the minimum inventory.

1. Reduced inventory holding cost.
2. Easy to manage inventory.
3. Organization get more usable cost.
4. More space Availability.

Due to increased inventory accuracy, there is no need to keep an extra inventory, that's why the inventory value decreases.

6.4 Inventory Turn

Inventory turnover is ratio which calculate how frequently an organization sells and replaces inventories. [5] It is the ratio of total finished goods sold by an organization in particular time span to the average inventory of the organization in that period. [5]

$$Inventory\ turnover\ ratio = \frac{Fnished\ Goods\ sold\ for\ time\ period}{Average\ inventory\ for\ same\ time\ period}$$

Advantages of having higher turnover ratio:

1. High inventory turnover typically shows that organization sells many goods during the period. So, the Income to the company increases.
2. Highest Inventory turnover give to an organization, power of negotiation with raw material suppliers.
3. High inventory turnover results into low inventory holding cost.

	Jul' 17	Aug' 17	Sept' 17	Oct' 17	Nov' 17	Dec' 17	Jan' 18	feb' 18	Mar' 18	Apr' 18	May' 18	Jun' 18
Inventory turn	4.4	4.3	4.3	4.6	5.1	7.4	6.4	7.2	7.9	7.6	7.2	7.8

Figure 4 Result-Inventory Turnover

7. CONCLUSION

The inventory record accuracy is most dominating parameter of warehouse performance, so inventory must be as accurate as possible to run an organization successfully. Errors in Bill of material is prime source of stock discrepancies; hence bill of material must be corrected before implementing any inventory correction process. The real secrete about inventory accuracy is that it is continuous improvement process. By improving inventory accuracy, the warehouse parameter like inventory turnover, inventory days, inventory value, idle time of workers etc. can be improve.

The three-step approach used in this research is one of the best practice, using which inventory accuracy up to 95% can be achieved

8. REFERENCES

[1]. Roger B. Brooks and Larry W. Wilson, (1993), "Inventory record accuracy-Unleashing the power of cyclic counting."

[2]. Deepesh Singh, Ajay Verma, (2017), "Inventory Management in Supply Chain"

[3]. Quarterman Lee, (2006) "Strategies Guide to Cycle Counting & Inventory Accuracy"

[4]. Johannes B. Rwazo. and Rene van der Linden, (25 may 2009), "Causes of stock discrepancy and impact on delivery time to customer", Page no 8-11.

[5]. Weygandt, J. J., Kieso, D. E., & Kell, W. G. (1996). Accounting Principles (4th ed.). New York, Chichester, Brisbane, Toronto, Singapore: John Wiley & Sons, Inc. p. 802.

[6]. Edward H. Frazelle, (2001), "World-Class Warehousing and Material Handling"

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