

Analysis and Development of Effective Tool Inventory Management

Prashant M. Sagare¹, Adarsh Dilip Desai², Bhushan A. Dongare³

¹. Assistant Professor, Department of Mechanical Engineering, Sanjay Ghodawat University, Kolhapur, India.

². Research Scholar, Department of Mechanical Engineering, Sanjay Ghodawat University, Kolhapur, India.

³. Co-founder, Zeel Code Labs, Belgaum, India

Abstract

The goal of this project was to create an automated system for the integrated management of tools within a business. Automated tool management ensures optimal tool use on selected machines by combining planning, inspection, and tool-room activities.

The first stage of the project entailed defining and developing a Tool Management System with a unified Data Base for all tools that is part of the company's Technological Files (files on machines, materials, equipment, methods, and so on) and interfaceable with all company departments that require tool information. In the system, code numbers are assigned to individual tool components, which are then categorized by morphological and functional attributes.

Keywords: Tool management, Tool master, Vendor, and Worker master.

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I. INTRODUCTION

Tool management is crucial in industrial settings, but it's also becoming more vital in machine shops that produce small batches. For effective production planning and control, real-time knowledge of the state of the production system is essential, which tools play a key part in.

The mechanical industries, as well as IT organizations, are facing a lot of problems not only in storing data but also in keeping it intact, as the amount of storage grows every day. Typically, an inventory system includes modules for many stakeholders such as Department, Warehouse, Raw Materials, Suppliers, and Employees, making it difficult for the administrator to keep track of all of this information and the relationships between them. This system makes it easy to store, delete, search, and update information from various modules. It will also keep track of information such as who touched an item in storage, from which department the individual came, who gave the item to whom, and from which Warehouse the item was recovered.

In Fig. 1, there are various modules such as Department, Supplier, Dealer, Employee, and Warehouse that make up an inventory, e.g., the Department module contains Department Name; the Supplier module contains Supplier Name, Item issued, Item delivered; and the Dealer module contains Dealer Name, ID, and item amount. With the Supplier and Dealer modules, we can determine the person's Department, i.e., which Department the supplier or dealer belongs to. Employee ID, Name, Issuing and Receiving Dates are all part of the Employee module. The purpose of the Warehouse division is to keep track of which items should be issued and which should be received for later use.

The following are some of the goals that can be achieved by implementing an integrated Tool management system:

1. Improvements in the Production System's Performance.
2. Machine utilization at a high level.
3. Decrease in downtime.
4. Best tool selection.
5. The number and diversity of tools utilized are reduced.
6. Industrial purchasing optimization.
7. Supplying tools to machines at the appropriate time, and involving the engineering department in the Shop problem.

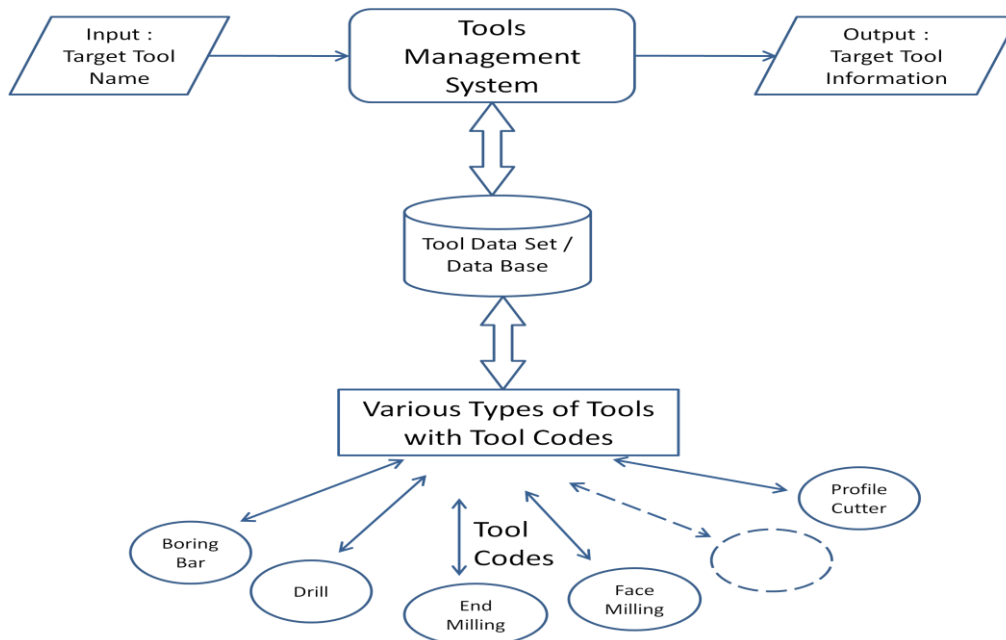


Figure1: Tool management system.

II. LITERATURE

In 2008 Indian Farmers Fertilizer Cooperative Limited (IFFCO) and National Fertilizer Limited (NFL) handled inventories and working capital (NFL). He came to the conclusion that IFFCO and NFL's total working capital condition is good. However, in the instance of IFFCO, inventory needs to be improved. IFFCO's inventory, on the other hand, was not used or kept correctly over the research period. NFL management must make every effort to appropriately utilize inventory and keep inventory in accordance with rules. As a result, liquidity will not be disrupted [1]. Over a 26-year period, a statistical analysis of the relationship between inventory performance and financial performance of manufacturing companies was conducted, from 1980 to 2005, utilizing financial data from a large sample of US-based manufacturing enterprises. They deduced that inventory performance, as well as the performance of its components, had a major impact on profitability. The performance of raw material inventories was substantially associated with gross profit and operating profit. The performance of work-in-progress inventory was highly connected with gross profit measurements, but the performance of finished goods inventory was more correlated with operational profit indicators [2]. They investigated the link between inventory management techniques and small-scale enterprise (SSE) performance in Kisii Municipality, Kisii County, Kenya. In a cross-sectional survey, they used a small sample size of 79 SSEs. The analysis concluded that inventory made up the majority of working capital, and that poor working capital management was one of the leading causes of SSE failures. The empirical findings revealed a considerable positive association between business performance and inventory management strategies, with inventory budgeting having the greatest impact on business performance, followed by shelf-space management. According to the survey, businesses may improve their performance by using good inventory management strategies [3].

The link between inventory management and firm success, as well as capital intensity, has been studied empirically. They used a sample of 82 Malaysian construction enterprises from 2006 to 2010 for this study. They discovered that inventory management is favorably connected with company performance using regression and correlation analysis approaches. Furthermore, inventory management and capital intensity have a positive association, according to the data [4]. Inventory management that is well-designed and implemented has been found to improve the profitability of small and medium-sized businesses (SMEs). They investigated the relationship between inventory conversion time and profitability, as well as the impact of inventory management on the profits of small businesses. They collected data from financial statements from 2006 to 2011 to study a group of 26 Tanzanian SMEs. Regression analysis was utilized to look at the impact of the inventory conversion period on gross operating profit. There was a substantial negative linear relationship between inventory conversion time and profit, according to the data [5]. An analytical study was conducted on inventory management in the Indian commercial vehicle industry. A sample of five businesses was chosen for this investigation. According to the findings, there is a considerable association between inventory and sales in all commercial vehicle units. Inventory management is essential for maintaining and improving an organization's health. Effective inventory management will boost the company's profitability [6]. A study on the impact of

inventory management on the profitability of cement manufacturing enterprises was conducted in Kenya. According to the findings, the gross profit margin is negatively connected with inventory conversion duration, and an increase in sales, which indicates firm growth, enriches the company's inventory levels, pushing profits upwards due to appropriate inventory levels. Firm inventory systems must also maintain optimum inventory levels to improve profitability and reduce inventory expenses associated with retaining surplus stock in warehouses, according to the report [7].

III. TOOL MANAGEMENT SYSTEM

Tool management is an area where downtime can be reduced, part quality can be improved, inventory can be managed, and overall productivity can be increased. Tool and die equipment and activities, which are directly involved in the production, are normally covered by tool and die management. It is distinct from storeroom management, which encompasses many aspects. Tool management is a set of practices that ensures that tools and dies are easy to find within the facility, that they are ready to use when needed, and that they are kept in good operating order (or replaced as needed). A tool and die management system ensures that these requirements are met, allowing the facility to keep running smoothly. We'll go over the tool and die management in more detail later on this page, including techniques and benefits.

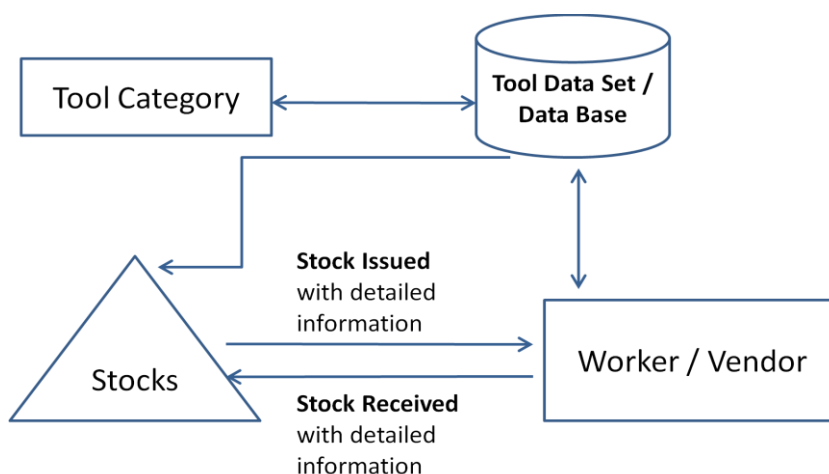


Figure1: Tool management system.

III.1. Master module

The master module has facilities for controlling the module status of all modules in the installation with a single interface command. "Master modules" are used to define the configuration. "Master modules" are bespoke modules or features that give dependencies to all of the site's other modules. That technique, in combination with Features and possibly some custom code and scripts, can control the entire site setting.

III.1.1 Category master:

It breaks down the tools into subcategories. Hand tools include physical instruments like hammers, as well as equipment for more abstract tasks like wrenches, pliers, cutters, files, striking tools, struck or hammered tools, screwdrivers, vises, clamps, snips, saws, drills, and knives. Hand tools that can be used outside include garden forks, pruning shears, and rakes. Hand tools are not portable power tools. The majority of the articles will be divided into subcategories for the many types of tools.

Table 1: Category master

Category Code	Category Name
0001	Drills

III.1.2 Tool master:

The term "tool master" refers to the tool's relationship to the category master. In the mechanical area, many tools are employed on a big scale, and this tool master is used to store these tools in specific software. By mentioning the tool code, category code, and tool description, this master is linked to the category master. Drilling instruments, for example, include hand drills, conventional electric drills, hammer drills, tabletop drill presses, twist bits drills, masonry bits drills, dowel bits drills, and so on. Roughing end mills, slab mills, end mill cutters, hollow mills, ball mill cutters, involute gear mill cutters, face mill cutters, and woodruff cutters are only a few of the milling equipment available.

Table 2: Tool master

Tool Code	Category Code	Tool Name	Tool Description
10	0001	Drill 10 mm	Drilling O/P

III.1.3 Worker and Vendor master:

It is a master where all information about workers and vendors is kept. The details of vendors and workers in a company can be managed more easily and quickly with the help of this master. It contains the names of workers and vendors, as well as specific codes, contacts, and departments.

Table 3: Worker and Vendor master

Worker/Vendor Code	Name	Contact Number
W1	XYZ	1234567890

Table 3

IV. TOOL MANAGEMENT TRANSITION

IV.1 Stock Information:

It is designed to add the different tools in the warehouse. This module is used to add the different tools to stock with its category and tool description and the same will be issued to the worker and vendors.

Table 4: Stock information

Tool Code	Category	Tool Name	Tool Description	Quantity
10	Drill	Drill 10 mm	Drilling O/P	100

IV.2 Tool Issued:

When a worker or a vendor asks for a tool, it's called a tool request. After entering the tool code, the availability of that tool in stock is displayed. The tool will be supplied based on availability. It also includes the issue date and time.

Table 5: Tool issued

Tool Code	Quantity Issued	Date	Time
10	1	11/12/2021	10.00 am

IV.3 Tool Received:

Similarly, to the higher case, the worker or vendor requests that the tool be returned; tool receiving verification is generated when you enter the receiving page and simply code for received order; The gadget is recollected based on its current state. It also includes the date and time when the tools were delivered by a specific vendor or worker.

Table 6: Tool received

Tool Code	Quantity Received	Date	Time
10	1	12/12/2021	4.12 PM

V. TOOL MANAGEMENT TRANSITION REPORTS

It displays tool information in the form of stock reports, issue reports, received reports, and employee vice tool reports.

V.1 Stock Report:

A stock report is a category-based information-based document issued by a variety of tools. The majority of stock reports concentrate on a broad area of stock availability.

V.2 Issue Report:

It's a report that shows how many tools were delivered to the vendor or worker. The day, time, and date the tool was issued are all included in this data. It may also include information about the workers and vendors to whom the tools are being distributed.

V.3 Received Report:

The contents of a tool's delivery to a warehouse are documented in a receiving report. This is completed by receiving tools from workers or vendors who accept the tools that have been received. It also contains

information on the date and time the tools were given. Name of the employee or vendor that brought the tools, as well as the names of each tool received.

V.4 Worker/Vendor vice tool report:

The history of the worker or vendor to whom the tool was delivered is indicated by this. It is possible to track down a specific vendor or worker using the worker/vendor code. It also shows how many items the individual is carrying. Once the vendor's and worker's codes are entered, it displays their whole history.

V.5 Tool Report:

This report, like the worker and vendor reports, displays the history of a certain tool and to which worker or vendor it was issued. Tool code can be used to track down a certain tool. It also shows how many items the individual is holding.

VI. CONCLUSION

From the analysis done in the past, it is clear that there is a high accumulation of tools in the company. The company has purchased all the types of tools required to carry the production as well as maintenance, but the only thing the company needs is to maintain a sound tool inventory management process and use of appropriate techniques to make sure greater ease in the transits. There should be a periodic review by the management for material planning and control department must check the level of inventories are depending upon circumstances and avoid unnecessary building up of stocks which result in locking up of funds. The conclusion one should draw effective tool management can make a significant contribution to company's objective to improve inventory system, the company should be open to:

- Regularly monitor the inventory.
- Reduce lead time of issuing & receiving.
- Localization.
- Better planning of Tool ordering

REFERENCES

- [1]. Pradeep Singh(2008),” Inventory and Working Capital Management- An Empirical Analysis”, The ICFAI Journal of Accounting and Research, Vol.VII, NO.2, pp.53-73.
- [2]. Capkun, Vedran, Hameri, Ari-Pekka& Weiss, Lawrence A. (2009). On the relationship between inventory and financial performance in manufacturing. International Journal of Operations & Production Management, vol.29, iss.8, pp.789–806.
- [3]. Nyabwanga, Robert Nyamao&Ojera, Patrick. (2012). Inventory management practices and business performance for small scale enterprises in Kenya. KCA Journal of Business Management, vol.4,iss.1, pp.11–28.
- [4]. Sahari, Salawati, Tinggi, Michael & Kadri, Norlina. (2012). Inventory management in Malaysian construction firms: Impact on performance. SIU Journal of Management, vol.2,iss.1, pp.59–72.
- [5]. Madishetti, Srinivas &Kibona, Deogratias. (2013). Impact of inventory management on the profitability of SMEs in Tanzania. International Journal of Research in Commerce & Management, vol.4,iss.2, pp.1–6.
- [6]. Srinivasa Rao Kasisomayajula (2014) “An Analytical Study on Inventory Management in Commercial Vehicle Industry in India”, International Journal of Engineering Research, Vol.3, Iss.6, pp.378-383.
- [7]. VipleshShardeo, Edwin Sitienei and Florence Memba (2015), “Impact of Inventory Management on the Financial Performance of the firm” IOSR Journal of Business and Management (IOSRJBM). Vol. 17, Iss. 4, pp. 01-12.
- [8]. LeCun, Y., Bengio, Y. and Hinton, G. "Deep learning." nature 521, no.7553 (2015): 436.
- [9]. Huang, G.B., Zhu, Q. and Siew, C.K. "Extreme learning machine: theoryand applications." Neurocomputing 70, no. 1-3 (2006):489-501.
- [10]. Tang, J., Deng, C. and Huang,G.B. "Extreme learning machine for multilayer perceptron." IEEE transactions on neural networks and learning systems 27, no. 4 (2016): 809-821.