

Technical Data Management from the Perspective of Identification and Traceability in the Manufacturing Industry

Gourav Vivek Kulkarni

B.E. Mechanical, KLS Gogte Institute of Technology, Belagavi, Karnataka, India

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The Technical data involves information on the technical aspects related to the technical design of the product while the Non-Technical data comprises of the information on the aesthetic and commercial design of a product. Technical data is the area of interest of this paper shall be discussed in sections that follow.

A.A. Technical Data

Technical Data covers all those aspects of information which are governed by scientific laws and are well defined. There is no place for vague information in this area. Approximations do form a part of the Technical Knowledge Pool but they need to make only after rigorous experimentation and experience. This makes Technical Data be an entity of complete relevance with evidence and thus makes it necessary that the Technical data shall be meaningful, faithful and relevant. There is a discretionary requirement on the part of the person accessing the data to choose the relevant data as per personal requirements because the relevance of data is relative indeed. Technical data covers results of the analysis in the form of calculations, graphs, tables and such similar ordered arrangement of information. The challenge before the industry is that such data is generated time in and time out and the same needs to be stored and retrieved as the demand arises. This required a strong Technical Data Management tool that needs to be implemented.

A.B. Technical Data Management

Technical Data Management is simply the upkeep of technical data in a manner so as to ease the access to the same and at

ABSTRACT

In a Manufacturing Industry, be it of any scale, the entity of utmost importance is the technical data. As the quantum of the generation of such necessary data is large, it paves the way to the need of establishing a data management tool such that would aid ease of access and clarity of thought. Such a tool may be in the form of software or in the form of a set personal routine or procedure that is sincerely adhered to. Technical data literally forms the backbone of the Industry's progress. Just like the nervous system is highly dependent on the well being of the backbone, almost all the departments in an Industry are highly reliant on the Technical Data Pool available. This paper highlights the importance of Technical data management from the key perspective of identification wherein a document can be easily identified and traceability wherein the document can be quickly traced for the origin as well as the locations where it is currently used. Certain recommendations shall be appended for a reference towards improved functioning of various departments in the Manufacturing Industry. A conclusion shall thereafter be drawn highlighting the utility and importance of Technical Data Management.

KEYWORDS: Data, Management, Identification, Traceability, Industry

A. INTRODUCTION

Be it any organization, the data generated in it needs to be stored and utilized wisely to avoid confusion [1]. Basically, the data generated in an organization can be widely categorized into Technical and Non-Technical data.

the same time prevent confusion and instill a sense of confidence in the data manager. Therefore every person who handles data is now a data manager. What makes a person qualified to be a technical data manager is the ability to segregate relevant information based on its relative relevance. Some companies may look for some data management tools that cost them quite an amount and may implement technical data management successfully, but instead of the same, certain changes at a personal level can lead to effective self-management after which such commercial products can be implemented in a company and the expenditure on the same can be justified [1]. At the very basic level, Management speaks all of how best can the available resources can be utilized to the optimum and the desired output can be achieved. This itself makes a clear demarcation between 'Efficiency' and 'Performance'. While efficiency is a measure of how much of the inputs were converted to outputs, performance is a measure of how well were the inputs converted to output. Thus for improved performance, effective technical data management is the key.

A.C. Identification and Traceability

In any activity that is undertaken, if the input parameters are clearly identified, the process won't face any difficulties and the outputs would definitely be faithful. This identification involves the allocation of appropriate location and name to the data that has been clearly sorted according to relevance. There is a Japanese technique called 5S wherein the first two steps explicitly talk of identification. The first step involves 'Sorting' of data into four categories according to their need.

The second step involves 'Setting in order' those things that have been sorted. This implies that there is a place for everything and everything is in its place. Therefore if these steps are rigorously implemented, one can ensure proper upkeep of data such that there is no ambiguity with regards to the contents. Appropriate naming can work out wonders by saving valuable time which would have been spent in examining the contents of each and every file.

The second aspect which holds greater importance is that of traceability. Data may be identified excellently, but at the same time, it should be stored in such a manner that it can be traced within minutes. Effectiveness of Data traceability lies in the fact that how fast was the required data fetched from its location for further processing. When it comes to technical data, conditional relevance of data is of prime concern as there are myriad forms of information for the same aspect and the data manager needs to retrieve the correct data. Thus traceability requires a self-discipline wherein every bit of information has been stored in a place such that it can be easily retrieved by any person. This makes Identification and traceability a Process-Centric approach rather than a 'Person Centric' approach. The essence is that in the work should continue smoothly even if a particular employee is not available at the given time.

A.D. Need for Technical Data Management in a Manufacturing Industry

The term Manufacturing Industry encompasses all such units irrespective of size and scales wherein certain raw material is converted to a finished product by means of certain well-defined Engineering Processes. The processes need to be well defined in order to ensure repeatability of positive results. Although continual improvements are a part of growth, sustainability can be thought of only when the system has a strong Technical Knowledge Pool. Right from the procurement of raw material to dispatch of finish goods, every process requires a certain set of skills which may or may not be interchangeable with respect to each other. Every stage generates ample data amount of data from the workmanship and logistics point of view but it may be only a part of it which may qualify to be of relevance for future references. Such data needs to be segregated, identified as technical data and stored in a designated location for future retrievals. In a scenario wherein the suppliers are not willing to decrease the cost and customers are not willing to increase the sales value, competitiveness can be achieved only by bringing out optimization. This can be smoothened and made easy if the past technical data has been stored in the form of a strong database.

When the situation demands to fit a product in a given cost, multiple aspects of the product when studied, point out to the need for innovation. For innovation, as a general plebiscite, two things are required. Firstly an open mind which is full of positive ideas and secondly accurate knowledge of abilities of the individual and the company to achieve the desired results. However, while looking for innovation; currently available data can help build a strong basis for continual growth from time to time. The following section comprises of certain general executive recommendations towards various departments that together form a Manufacturing Industry.

B. Executive Recommendations

In this section various departments functioning in a Manufacturing Industry shall be considered and Technical data relevant to all of them shall be taken into account and

certain key recommendations shall be stated [2]. In the context of manufacturing industry, following are the key departments that can be considered in this paper; Marketing, Sales and aftermarket, Procurement, Design and Development, Production and Process Control and Quality Control.

B.A. Technical Data Management recommendations towards Marketing, Sales and After-Market

The names of departments mentioned are in serial order of execution of a project. These departments form the face of the industry as they are in direct contact with the customer. Since these departments need to play a liaison role between the Industry and the market, they themselves need to be sound with the basics of the Company's products, features and unique selling points so that effectiveness of marketing can be improved [3]. This requires the Marketing staffs to maintain ready tables and charts that indicate the technical details of the products. Similarly, the sales staff needs to maintain records of trends in the market based on customer demands and emerging trends in the market. After Sales mainly deals with the resolution of queries and complaints. In the ideal case, the progress of a company is measured by the effectiveness of output i.e. the utility of its products in the market.

Technical Data related to the products for these departments includes general assembly drawings, specifications of the bill of material used to make the product, special components or materials used and the feasibility reports. There are two methods of data management; one being order centric wherein there shall be a new folder for every order and related data has been stored in the same so as to retrieve the same in future. The second method is product-centric wherein product-specific data can be stored. Both methods need a disciplined approach because minor errors can lead to major miscommunications in the context of technical feasibility and may lead to the magnification of errors in the future. Thus it is recommended that firstly, sound knowledge and secondly a technical knowledge pool which is order centric or product centric shall be maintained.

B.B Technical Data Management recommendations towards Procurement

The Procurement department in any company mainly functions considering the QCD approach. In this 'Q' stands for Quality, 'C' stands for Cost and 'D' stands for Delivery. Delivery is a logistic aspect and requires a Non-Technical knowledge pool. Cost is a commercial aspect and it does require a technical knowledge pool with respect to the trend in the price variations with respect to the grades of raw material. This requires thorough understanding of technical knowhow of the product being procured. However the most technical aspect in the context of work related to the procurement department is that of Quality. The key challenge before the procurement department is to strike a balance between these three QCD aspects. Compromises are certain but should not affect the business. However, the right decisions can only be taken when there is complete knowledge of the past performance of suppliers and this calls for sound technical data management.

The most recommended approach in this regard is that of a Product Centric data control. Firstly there should be clarity of the bill of material that forms the individual products. Each part in the bill of materials can be placed in different categories like Raw materials, Finish products and

accessories. For each product, the list of suppliers can be maintained right against them with the procurement costs. This brings out complete traceability which enables one to refer the cost of a required part at any point of time. Performance evaluation sheets of the vendors can also be appended therewith.

B.C Technical Data Management recommendations towards Design and Development

Design and Development form the heart of the Technical Knowledge Pool of any Industry. It is necessary that the data available with Design and Development is updated and relevant. The technical data generated by Design and Development includes Drawings, Process Sheets and Development data. The Product centric approach is the most recommended one in this case. Each product can have separate folders. Further this can be divided into the types based on models or sizes or features. It is also recommended that the current data and old obsolete data are maintained and identified separately for future references. The link factor is that the bill of material referred by the Procurement Department shall be same for Design and Development including the sequence of items [4]. This brings a linking of data between the departments. Clear demarcations between valid and obsolete data help improve the faithfulness of the data referred. Transmittal or issue of documents needs to be well recorded and if this is done digitally, ease of traceability in event of changes can be improved.

B.D. Technical Data Management recommendations towards Production and Process Control

The Production and Process Control Department includes the Primary treatment shops, machine shops, assembly hubs, maintenance units, paint shops and so on where the executive actions take place and raw material is converted to a finished product. The most important form of technical data that is generated in this process is the records of the processes undertaken. These records can act as beacon lights to improve the processes in days to come in order to improve the competitiveness of the product. The key aim of any company would be to use minimum resources and convert it to finish products at the lowest possible cost.

The technical data management in this aspect can be Process Centric rather than product centric because of the repetitiveness of the processes rather than the products. For each process undertaken, the inputs, process parameters and desired outputs shall be made available from time to time. Analysis with respect to the relevance and utility of the said procedures shall be done to improve the performance. Reports that are of high importance shall be identified and placed separately as ready references. In the event of process optimizations, detailed process sheets shall be maintained to further improve similar processes. These may be a few recommendations to bring about a radical change in the upkeep of technical data in the context of Production and Process control.

B.E Technical Data Management recommendations towards Quality Control

The department of Quality Control encompasses all the processes from procurement to dispatch and thus bears a greater responsibility of maintaining technical data. The technical data in this aspect would include the inspections reports at large which may be prepared at various stages of the product development or order execution. Therefore the

most recommended approach towards Quality Control is the Product centric approach which can be further sub-divided based on the orders. In this case also the link factor is that the bill of material shall be same as that available with the Procurement and Design and Development. This brings out uniformity of knowledge, clarity of understanding and builds confidence among the data managers. The effectiveness of Technical data management lies in the fact that a desired inspection can be easily retrieved at the desired time.

C. Example of effective Technical Data Management considering a medium scale industry

Consider that a certain Project order inquiry has been received by the Marketing department. At their level, using the Technical Knowledge pool available, the decision needs to be taken whether this order may or may not be executed by the industry. If found to be feasible, the Procurement department can use their knowledge pool to filter the suppliers that could satisfy the project requirements. This can be helpful in case the project requires special materials or accessories of a specific make. The Design and Development can refer past data and generate new data in line with the new requirements. Past data in this case can be a helpful factor to prevent errors in considerations. The Production team can refer to similar processes undertaken in the past and arrange for the required tools and machinery. The Quality Control team can refer their data and consider key critical parameters while carrying inspection at various stages and point out improvements as required. Thus proper Technical Data Management can help in the execution of orders without any hitch.

Conclusion

Thus it can be concluded that on observing the necessity and importance of Technical Data Management in the manufacturing industry, it is recommended that each data manager sincerely maintains data according to relevance in order to retrieve faithful data in the future. The recommendations made are generalized in nature and can be elaborated with respect to the individual industry requirements. However, if imbibed, this virtue of Technical Data Management can help bring clarity of understanding and improve the confidence levels due to complete identification and traceability of data generated and stored.

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