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Review Papers on Production of Densoshaft-FZM00211

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Abstract - This thesis explores the application of time and motion study techniques to a specific industrial process with the goal of reducing process time while maintaining efficiency and productivity. The study focuses on a detailed examination and analysis of each component i.e. Denso Shaft-FZMOO211of the process to identify inefficiencies and areas for improvement. By utilizing both direct observation and quantitative data collection, the research identifies bottlenecks and unnecessary movements that contribute to prolonged process times. The study employs various methodologies, including process mapping, work sampling, and time measurement, to gather comprehensive data.

Key Words: denso shaft, study, productivity, time, measurements

1.INTRODUCTION

Time and Motion Study is a structured approach utilized for examining and enhancing work procedures by deconstructing them into distinct elements like tasks and movements, followed by assessing the time needed for each element. This method is frequently employed in industrial engineering and management to boost efficiency, productivity, and quality.

The main objectives of Time and Motion Study include:

- Enhancing Efficiency: Through the analysis of work processes, identification of unnecessary movements, and optimization of tasks, the study aims to enhance overall efficiency.
- Standardization: By establishing standard procedures and best practices based on the most efficient methods identified through the study, consistent quality and output can be ensured.
- Workplace Design: Insights obtained from time and motion studies can guide the design of workspaces, equipment, and tools to improve workflow and minimize fatigue or strain on workers.
- Cost Reduction: By eliminating unnecessary movements and reducing idle time, organizations can lower production costs and boost profitability.

The process of conducting a time and motion study typically involves several key steps. First, observers closely monitor workers as they perform their tasks, carefully recording each step and the time taken for each action. This observation phase allows for a thorough understanding of the current workflow.

2. Literature Review

The construction industry faces constant challenges in maintaining productivity and efficiency. Factors affecting the efficiency of both labor and machinery can lead to decreased productivity. This study aims to emphasize the advantages of implementing time and motion studies in the construction sector. By utilizing time and motion studies and work sampling, the productivity of various construction activities can be measured. The research paper explores the application of these methods in different phases of erecting a steel structure, such as installing purlins, primary beams, and secondary beams on an airport's arrival slab. Parameters like efficiency, productivity, tool time, support time, and idle times are carefully analyzed. The results show great promise, indicating that construction industry management should consider incorporating time and motion studies not only to improve efficiency and resource utilization but also to address employee psychology aspects. [1]

The current research utilizes deep learning techniques to identify repetitive assembly tasks and predict their durations. The goal is to supervise workers' assembly processes and prevent quality issues stemming from missing crucial steps and inconsistent worker performance. Given the repetitive nature and tool reliance of assembly tasks, the study treats assembly task recognition as tool object detection. Additionally, the YOLOv3 algorithm is employed to detect and assess

assembly tools and recognize workers' assembly tasks. The research demonstrates a 92.8% accuracy in task recognition. Subsequently, the CPM pose estimation algorithm, based on deep learning, is utilized to recognize human joint positions. Ultimately, joint coordinates are extracted to determine the durations of repetitive assembly tasks. The accuracy rate for predicting task durations in repetitive assembly actions stands at 82.1%. [2]

Due to the labor-intensive nature of construction tasks and the high costs associated with labor operations, accurately estimating construction labor productivity is essential. However, the dynamic and varied nature of construction activities makes obtaining precise productivity data challenging. Therefore, a motion data-based modeling approach is suggested for estimating labor productivity. This method involves estimating the standard motion time of tasks, measuring the unit workload of an operation cycle using 3D models, and quantifying production rates based on cycle times and unit workloads. Motion-data analysis is also incorporated into simulation modeling to consider the impact of jobsite conditions. A case study on estimating the production rate of concrete placement operations validates the effectiveness of this approach, showing that it can reliably estimate operational productivity. [3]

The study conducted at the Motor Vehicle Periodic Inspection (MVPI) station focused on enhancing the efficiency of the bottleneck inspection point through the implementation of various applications to reduce inspection time. The primary issue identified was inspection point No. 1, which was found to be consuming more time compared to other inspection points, leading to increased flow time in the inspection lanes. The research explored potential solutions and alternatives utilizing tools from motion and time study, as well as ARENA software for simulation and prediction of changes in the inspection lanes. As a result, the proposed alternatives were projected to improve production capacity by 174.8%. [4]

Economic competitiveness has evolved globally over time, prompting many countries to engage in the global market competition to enhance productivity and profitability. Various factors impact manufacturing organization productivity, with a key focus on enhancing efficiency. Motion and time study technique is commonly utilized in manufacturing companies to improve productivity by scientifically analyzing repetitive tasks and measuring the time taken by workers to complete them. Implementing motion and time study poses challenges that require the involvement of skilled engineers, business administrators, industrial relations personnel, trained supervisors, and psychologists. This paper aims to explore the implementation of motion and time study and its impact on productivity enhancement. [5]

Productivity plays a crucial role in enhancing the quality of a product. Improving productivity is essential for survival and achieving significant progress in the machining industry. Various areas such as the production department, assembly line, machining shop, material handling, and quality department may have inefficient processes that consume more time, effort, and resources, leading to increased expenses and worker fatigue. This ultimately results in reduced industry productivity and longer production cycle times. Implementing tools and techniques such as quality control, quality assurance, statistical quality control, and total quality management are key factors not only in enhancing product quality but also in improving overall productivity and efficiency. In this study, we have introduced quality checking techniques including the use of Spirit level, Autocollimator, and digital measuring instruments like Vernier, micrometer, and gear tooth Vernier. [6]

In the era of industry 4.0, Smart Factories are increasingly in need of reliable, fast, and automated tools for production analysis and improvement. Manufacturing companies heavily reliant on human labor require instruments capable of effectively managing complex production systems, including resource utilization, product mix, component allocation, and material handling optimization.
To address these needs, this study introduces an innovative hardware/software architecture called the Motion Analysis System (MAS). MAS aims to digitize and analyze the human body's movements during manufacturing and assembly tasks performed at a typical industrial workstation. The system combines Motion Capture (MOCAP) technology with custom software designed for productive and ergonomic analysis of operators during their work.
MAS hardware incorporates a network of depth cameras originally developed for gaming (Microsoft Kinect v2™), which have now found application in industrial analysis. The accompanying software infrastructure is programmed to automatically and quantitatively provide valuable information about productivity (such as time execution and space utilization within the workplace, hand movements, and operator's visited locations) as well as ergonomic insights (including full body analysis based on internationally recognized indexes like OWAS, REBA, NIOSH, and EAWS).
This dual perspective makes MAS an exceptional and indispensable tool for industrial managers focused on workplace analysis and design, with a specific emphasis on productivity while also considering the operator's

health. To demonstrate the system's capabilities, a real industrial application involving the analysis of a water pump assembly station is presented. The setup of the system is discussed, and the key results [7]

Within the realm of industrial engineering, the predetermined time systems (PTS) are crucial in identifying inefficiencies in manual assembly processes. This research introduces a method to examine time and motions in manual processes by utilizing a capture motion system integrated into a virtual environment. The capture motion system tracks IR passive markers on the hands to record their positions. A virtual representation of a real workplace is created using basic geometries. The motion data captured is then combined with the virtual workplace to simulate operations, followed by a time and motion analysis conducted through an algorithm. This approach allows for the classification of quantifiable aspects that are not easily identified in traditional time and motion analyses. The automated analysis is considered the primary contribution of this study, offering significant potential in monitoring workplace activities, analyzing repeatability, PTS, workplace layout, and labor distribution.
The construction industry is currently facing challenges related to productivity, particularly in terms of labor performance. The performance of labor is influenced by various factors and is closely tied to time, cost, and quality. Although efforts have been made in the past decade to identify and evaluate the factors affecting construction labor productivity, there is still a need for a deeper understanding in order to enhance productivity. The findings from these efforts will provide valuable information for determining the necessary steps to improve project completion time and will also serve as a foundation for further research on modeling the interaction between key factors that impact productivity in the Indonesian construction industry. [8]

The aim of this research is to conduct a time and motion study along with work sampling on workers in order to evaluate the productivity of different tasks at DCM cotton mill. By analyzing parameters such as time and motion, the study aims to distinguish between value-added and non-value-added activities to enhance productivity and reduce costs. Implementing improved working methods can lead to increased efficiency and reduced fatigue among workers involved in cotton yarn manufacturing. The research focused on two machines, namely finisher D/F and slub attachment, within the cotton mill. Various activities performed on these machines were categorized into operations, inspections, delays, storage, transportation, etc. An analysis of all activities, along with the creation of flow process charts, was conducted to measure the total distance covered during one hour of activity. [9]

An effort has been made to enhance the efficiency of the forging process for crane hooks in an industry situated in the northern region of India. This research paper focuses on the utilization of time and motion study in the manufacturing of crane hooks within the forging industry. By increasing productivity, the company can offer competitive wages to its employees, deliver satisfactory dividends to shareholders, and sell products and services at affordable prices. Many industries calculate their labor productivity index on an annual basis and maintain a continuous record, enabling them to compare their performance with other companies in the same industry as well as the national index. It has been discovered that the implementation of motion and time study can potentially lead to a remarkable 107% improvement in the productivity of crane hooks. [10]

The post-World War II rationalization process in France witnessed a remarkable phenomenon: the division of large firms into distinct "functions" such as the Production Department, Engineering Department, and Personnel Department. This paper focuses on a specific aspect of this process, namely the establishment of the Engineering Department and its fundamental management tool, operation time. Operation time refers to the duration required to complete a specific production task. Our account explores the significant milestones in the development of operation time during the 1950s. Subsequently, it delves into an analysis of the impact of implementing this tool on the operations and trajectory of major French firms from 1945 to 1975. [11]

This research paper introduces a study that focuses on the implementation of time and motion study techniques in a manufacturing industry's production line for tractor loader backhoes. The primary aim of conducting the time study is to identify activities that do not add value and determine the necessary manpower. On the other hand, motion study techniques are employed to identify challenges related to posture and alleviate worker fatigue. By conducting both time and motion studies, the organization can develop more efficient work methods and establish standard motion and time allocations. This, in turn, enables the organization to minimize waste and enhance productivity. [12]

3. CONCLUSIONS

Enhancing the efficiency of the Scrap Removal process involves repairing the conveyer belt used for scrap removal.

It is essential for operators to wear safety glasses and gloves while operating machinery to prevent accidents.

Operators should possess the necessary skills and experience required for their assigned tasks.

To prevent monotony, if an operator works on the same machine for 10 consecutive hours, we can split the workload between two workers for 5 hours each by rotating their work stations.

Implementing a structured time schedule for workers can lead to increased productivity.

In order to avoid disruptions in production, if a worker is absent from their assigned machine for the day, another worker can be stationed to handle both machines simultaneously.

Allocating a dedicated workstation for cleaning tasks can help save time and prevent delays in the job completion process.

Thorough inspection of the job is crucial to prevent component rejection and material wastage.

To enhance productivity, consider adding specific machines that require more time for operation based on the company's earnings.

Regular maintenance of operational machines on a weekly basis is essential for improved productivity.

Implementing standardized procedures based on efficient methods identified through research ensures consistent performance and high-quality output.

Organizing health care camps for workers every 2-3 months is essential for their well-being.

Providing reasonable wages to workers and periodic raises every 6-9 months can boost productivity and maintain motivation.

Optimizing workflows can help organizations achieve higher productivity levels without the need for additional resources.

Identifying and eliminating wasteful activities in processes can result in significant cost savings, reduced labor costs, and minimized material waste. Streamlining operations can lead to lower overhead expenses.

Insights obtained from time and motion studies have the potential to shape the layout of workspaces, the selection of equipment, and the development of tools in order to enhance workflow efficiency and reduce ergonomic hazards.

Through consistent evaluation and improvement of procedures using feedback and performance metrics, businesses can effectively adjust to evolving market dynamics, technological progress, and customer demands.

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