

TIME STUDY ANALYSIS ON THE PACKING PROCESS IN INDO SHELL CAST

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ABSTRACT

Time Study Analysis on the Packing Process in Indo Shell Cast, investigates how the efficiency of industrial operations largely depends on how effectively time is utilized in various processes. This study, titled “Time Study Analysis on the Packing Process in Indo Shell Cast,” aims to evaluate and improve the productivity of the packing section within the company. The research focuses on identifying the standard time required for completing packing operations and determining factors that influence time variations. Using the principles of scientific management, direct observations were conducted to record multiple cycle times of different operators. Statistical tools such as mean, variance, and frequency distribution were applied to analyze the data and assess the consistency of the process.

Keywords: Time study, Packing process, Indo Shell Cast, Productivity improvement, Standard time, Cycle time, Scientific management, Industrial efficiency, Work measurement, Process analysis, Variance, Mean, Frequency distribution, Operator performance, Time utilization.

INTRODUCTION

In today’s highly competitive industrial environment, organizations are under continuous pressure to enhance productivity, reduce costs, and ensure timely delivery without compromising on quality. Achieving these goals requires a systematic understanding and optimization of processes involved in packing department. Among the various industrial engineering tools available for process improvement, time study plays a vital role in identifying inefficiencies and setting performance standards for labor and machinery. It provides a scientific basis for measuring the time taken to complete specific tasks and helps in determining the most efficient methods to perform them.

The packing process plays an essential role in ensuring that finished goods are safely and efficiently prepared for shipment. It not only protects the products from damage during transportation but also reflects the company’s standards of quality and reliability. Delays or inefficiencies in this process can result in production bottlenecks, increased lead time, and customer dissatisfaction. Therefore, conducting a time study analysis on the packing process helps identify unnecessary delays, redundant movements, and areas where productivity can be improved.

OBJECTIVES OF THE STUDY

1. To identify and analyze the time taken for the packing process for every single worker in the Department.
2. To find a benchmark for the packing process through observing the performance of the workers.
3. To find the workers who lack performance and consume more time during the packing process.

REVIEW OF LITERATURE

• **Dinesh Kumar, V., & Suresh, G. (2024)** carried out an insightful study titled “Time Study on Packaging Operation in Automotive Supply Chain,” which focused on enhancing operational performance and delivery reliability through systematic time analysis. The researchers examined various stages of the packaging process within the automotive supply chain, where delays and uneven workload distribution were causing inefficiencies and missed delivery targets. By applying detailed time study methods, they measured the duration of each task, identified process bottlenecks, and analyzed work distribution among operators. Their findings revealed significant variations in task timings due to the absence of standardized procedures and unbalanced work assignments.

- **Bhattacharya, A., & Rani, S. (2024)** conducted a detailed research study titled “A Study on Optimization of Packing Processes through Time Study and Ergonomic Assessment,” which focused on improving efficiency and worker health in packaging operations. The authors employed a combination of Rapid Entire Body Assessment (REBA) and Value Stream Mapping (VSM) tools to analyze worker postures, identify ergonomic risks, and detect sources of waste in the workflow. By observing and recording various stages of the packing process, they pinpointed repetitive and awkward motions that contributed to fatigue, slow task performance, and inefficiencies in material flow.
- **Patil, A., & Joshi, R. (2023)** conducted an advanced study in the packing section of a heavy engineering plant, utilizing both digital stopwatch techniques and video-based time study methods to enhance measurement precision and workplace safety. Their research aimed to modernize traditional time study practices by integrating digital tools and ergonomic assessment. Through high-resolution video recordings, they were able to capture detailed movements of operators, analyze postures, and identify inefficient or unsafe body mechanics that could lead to fatigue or injury. The digital stopwatch provided accurate time readings for each element of the packing process, while the video analysis allowed for a frame-by-frame review to validate data consistency and minimize observer bias.
- **Arun, K., & Meenakshi, P. (2023)** carried out a comprehensive study titled “Productivity Improvement through Time Study in Metal Component Industry,” which aimed to enhance operational efficiency by identifying and eliminating non-value-adding activities. The research focused particularly on the packing section, where frequent delays and unnecessary movements were affecting overall productivity. Using systematic time study techniques, the authors observed each step of the packing process to record cycle times, analyze motion patterns, and detect inefficiencies. Their detailed analysis revealed that several activities, such as excessive material handling, redundant checks, and improper sequencing of tasks, contributed little to the final product value but consumed significant time.
- **Sahu, P., & Behera, S. (2022)** conducted a research study titled “Application of Work Measurement in Foundry Operations,” published in the International Journal of Mechanical Engineering. Their study focused on the application of work measurement techniques to enhance efficiency and scheduling accuracy in foundry operations. The researchers emphasized that downstream processes such as inspection, finishing, and packing often experience variability in task durations due to the absence of standardized time data. Through systematic time study and data collection, they analyzed these processes to determine realistic standard times for each activity.

RESEARCH DESIGN

Research design serves as a framework for systematically gathering, measuring, and analysing data. For this study, a descriptive research design has been utilized. The primary aim of descriptive research is to provide an accurate representation of the current situation. It focuses on identifying and describing the characteristics of the variables under investigation. The sample size chosen for the research is 26 samples.

STATISTICAL TOOLS

1. **Descriptive Analysis:** Used to summarize time data, identify average time for the process, and find process delays.
2. **Basic Statistical Tools:** Mean, variance, and percentage analysis were used to interpret time study results.

DATA ANALYSIS AND INTERPRATATION

TIME STUDY ANALYSIS

CONSOLIDATED PACKING TIME PERFORMANCE

Individual	Age	Experience (Years)	Mean Cycle Time (min)	Variance (min ²)	Interpretation Summary
Kanmani	28	4	18.8	1.36	Low mean, moderate consistency
Samjith	20	1	22.4	3.04	High mean, Lowest consistency (Highest Variance)
Dineshraj	24	3	19.2	1.08	Low mean, Highest Consistency
Mithun Kumar	23	1	21.6	2.64	Moderate mean, lower consistency
Nitish	18	1	23.2	1.76	High mean, moderate consistency
Kundan	21	1	24.4	1.04	Highest mean, very high consistency
Saitha	26	4	19.6	1.04	Low mean, very high consistency
Reena Davi	21	1	22.2	1.36	Moderate mean, moderate consistency
Senthil Kumar	26	3	19.6	1.04	Low mean, very high consistency
Gopal	32	6	19.6	2.68	Low mean, lower consistency (wide range 17-21)
Govinda Raj	31	7	19.6	2.68	Low mean, lower consistency (wide range 17-21)
Kumaran	24	2	23.8	1.76	High mean, moderate consistency
Selva Kumar	19	1	23.8	1.36	High mean, moderate consistency
Vikram	26	2	23.8	1.36	High mean, moderate consistency
Puja	21	2	23.8	1.36	High mean, moderate consistency
Mohammed Nami	30	6	20.0	1.40	Moderate mean, moderate consistency
Raman	31	6	19.4	1.72	Low mean, moderate consistency (low 17 min entry)
Abinesh	20	1	22.8	2.16	Moderate mean, lower consistency
Ramya	28	2	22.8	2.16	Moderate mean, lower consistency
Adithya	33	8	18.4	1.04	Lowest mean, very high consistency
Kumar	30	5	19.6	1.04	Low mean, very high consistency
Karuppan	31	5	19.6	1.04	Low mean, very high consistency
Neha	27	5	21.2	2.16	Moderate mean, lower consistency
Kumutha	26	5	21.8	2.16	Moderate mean, lower consistency

INTERPRETATION

Adithya (33 yrs, 8 yrs Exp) achieved the fastest average time with the lowest mean cycle time of 18.4 minutes, while Kundan (21 yrs, 1 yr Exp) recorded the slowest average time with the highest mean of 24.4 minutes. In terms of consistency, Kundan, Saitha, Senthil Kumar, Adithya, Kumar, and Karuppan demonstrated the best performance with the lowest variance of 1.04 min², followed closely by Dineshraj with 1.08 min². Conversely, Samjith (20 yrs, 1 yr Exp) showed the least consistency with the highest variance of 3.04 min², indicating a wider fluctuation in his performance. The fastest and most consistent group, defined by a mean of ≤ 19.6 minutes and variance ≤ 1.08 min², primarily consisted of experienced individuals (3–8 years), including Adithya, Kanmani, Dineshraj, Saitha, Senthil Kumar, Kumar, and Karuppan. Meanwhile, the slower group with greater variability (mean ≥ 21.2 minutes) was mostly composed of less experienced workers (1–2 years) such as Samjith, Mithun Kumar, Nitish, and Kundan, whose higher mean times reflected their lower familiarity with the process. Overall, this analysis suggests that higher experience generally contributes to faster and more consistent performance, although some less experienced workers like Kundan demonstrate strong consistency despite longer average times.

FINDING THE BENCHMARK THROUGH OBSERVING THE PERFORMANCE OF THE WORKERS.

TABLE SHOWING ADITHYA’S PACKING TIME (BEST PERFORMER)

AGE: 33

EXPERIENCE: 8 YEARS

Cycle Time (min)	Frequency	Percentage
19	1	20%
18	2	40%
20	1	20%
17	1	20%

Total Observations (N): 5

Variance (Measure of Spread)

Cycle Time	Frequency	Deviation from Mean	Squared Deviation	Contribution
19	1	0.6	0.36	0.36
18	2	-0.4	0.16	0.32
20	1	1.6	2.56	2.56
17	1	-1.4	1.96	1.96

INTERPRETATION

The mean of 18.4 minutes stands as the lowest among all your datasets, indicating a clear shift toward shorter and more efficient cycle durations. The variance of 1.04 minutes² reflects tight clustering, suggesting that the process remains highly consistent despite the reduced average time. The cycle time of 18 minutes, occurring most frequently at 40%, serves as the anchoring point of the dataset, pulling the overall mean downward and highlighting a strong tendency toward improved speed and stability in performance. This person’s performance can be taken as the bench mark for the packing performance.

FINDING THE WORKERS WHO LACK PERFORMANCE AND CONSUME MORE TIME DURING THE PACKING PROCESS

Individual	Age	Experience (Years)	Mean Cycle Time (min)	Variance (min ²)	Interpretation Summary
Kundan	21	1	24.4	1.04	Highest mean, very high consistency
Kumaran	24	2	23.8	1.76	High mean, moderate consistency
Selva Kumar	19	1	23.8	1.36	High mean, moderate consistency
Vikram	26	2	23.8	1.36	High mean, moderate consistency
Puja	21	2	23.8	1.36	High mean, moderate consistency
Nitish	18	1	23.2	1.76	High mean, moderate consistency
Abinesh	20	1	22.8	2.16	Moderate mean, lower consistency
Ramya	28	2	22.8	2.16	Moderate mean, lower consistency

INTERPRETATION

This dataset indicates poor overall performance, with mean cycle times (22.8–24.4 min) well above the standard 19.6 minutes, showing low productivity. While Kundan (1 yr exp) is the most consistent (variance 1.04 min²), his time of 24.4 minutes reflects consistent inefficiency. Others like Kumaran, Selva Kumar, Vikram, Puja, and Nitish also show high mean times and moderate consistency, suggesting lack of skill and process control. Abinesh and Ramya, though slightly faster, have the highest variance (2.16 min²), indicating irregular performance. Overall, this group represents the lowest-performing workers, requiring training, supervision, and process standardization to improve efficiency and consistency.

FINDINGS

- Fastest Average Time (Lowest Mean): Adithya (33 yrs, 8 yrs Exp) achieved the lowest mean cycle time at 18.4 min.
- Slowest Average Time (Highest Mean): Kundan (21 yrs, 1 yr Exp) had the highest mean cycle time at 24.4 min.
- Most Consistent (Lowest Variance): Kundan, Saitha, Senthil Kumar, Adithya, Kumar, and Karuppan all showed the best consistency with the lowest variance of 1.04 min² (or 1.08 min² for Dineshra).
- Least Consistent (Highest Variance): Samjith (20 yrs, 1 yr Exp) showed the largest spread in performance with the highest variance of 3.04 min².
- Fastest and Consistent Group (Mean \leq 19.6, Variance \leq 1.08): Individuals with higher experience (3-8 years) like Adithya, Kanmani, Dineshra, Saitha, Senthil Kumar, Kumar, and Karuppan dominate this group.
- Slower Group with More Variability (Mean \geq 21.2): This group is generally composed of individuals with low experience (1-2 years), such as Samjith, Mithun Kumar, Nitish, and Kundan, whose mean times are significantly higher.
- This suggests that while high experience tends to lead to faster and more consistent work, some lower-experience workers like Kundan can achieve high consistency despite having a longer average time.

SUGGESTIONS

To improve packing efficiency, the process should be standardized using the recurring mean cycle time of 19.6 minutes as a benchmark. Establishing clear SOPs and visual work instructions will ensure uniformity and consistency. Regular training and cross-training can reduce skill gaps and improve overall performance. Workstation layout optimization and material flow improvements will minimize unnecessary movement and handling time. Implementing lean techniques (5S, Kaizen) and maintaining equipment regularly will reduce waste and downtime. Introducing digital time tracking, performance monitoring, and incentive systems can motivate operators and sustain productivity. Providing ergonomic tools, ensuring comfortable environmental conditions, and incorporating work rotation with rest breaks will help prevent fatigue. Finally, encouraging

operator feedback, conducting periodic time studies, and holding weekly review meetings will promote continuous improvement and team involvement in achieving operational excellence.

CONCLUSION

The packing time study shows a strong link between experience and performance, with experienced operators achieving faster and more consistent results. Adithya (8 years' experience) sets the benchmark with the lowest mean cycle time of 18.4 minutes, while the experienced group (≥ 3 years) maintains a stable average of 19.6 minutes and minimal variance (1.04 min^2). In contrast, less experienced operators (≤ 2 years) display higher mean times (≥ 22.4 minutes) and greater variability, as seen with Samjith's variance of 3.04 min^2 , indicating inconsistent methods. Overall, the process is efficient when handled by experienced workers but lacks standardization for new recruits. To improve productivity, Indo Shell Cast should document best practices into SOPs and implement a mentoring system to transfer skills, reduce variance, and ensure consistent performance across all operators.

REFERENCES

1. Rizwan, M., & Mehta, J. (2025) – “Smart Stopwatch-Based Time Study for Packaging Efficiency Improvement.” Journal: International Journal of Smart Manufacturing Systems, 12(1), 45–57.
2. Harish, K., & Venkatesh, P. (2025) – “Time Study Application for Lean Optimization in Casting and Packing Units.” Journal: Journal of Manufacturing Excellence, 10(2), 110–123.
3. Bhattacharya, A., & Rani, S. (2024). “Optimization of Packing Processes through Time Study and Ergonomic Assessment.” International Journal of Industrial and Systems Engineering, 15(2), 77–85.
4. Dinesh Kumar, V., & Suresh, G. (2024). “Time Study on Packaging Operation in Automotive Supply Chain.” Journal of Productivity and Performance Engineering, 8(3), 99–107.
5. Karthik, P., & Ramesh, K. (2024) – “Ergonomic Work Study and Time Analysis in Automotive Component Packaging.” Journal: Journal of Industrial Engineering and Operations Management, 18(2), 212–225.



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