Internship Report on

“HML Production Delay Analysis”

Domain: Textile Industry

Company: Versatile Enterprises Pvt Ltd

Institution: NIT Jalandhar

Intern Name: Harsh Vardhan Pareek

On-Site Intern
(26 June 2025-28 July 2025)

Submitted To: Mr. Akhil Seth
Executive Director

Acknowledgement

I would like to express my sincere gratitude to Versatile Enterprises Pvt Ltd for providing me with the opportunity to undertake my internship and gain valuable industry exposure.

I am especially thankful to Mr. Anil Kumar Verma, HR at Versatile Enterprises Pvt Ltd, for reaching out and facilitating my onboarding process. His guidance and coordination made the start of this journey seamless.

I am deeply grateful to Mr. Akhil Seth, Executive Director of the company, under whose leadership I carried out my internship project. His strategic insights, mentorship, and continuous support played a vital role in shaping my learning experience and understanding of real-world industrial operations.

I would also like to thank Mr. Pardeep Maurya, Production Incharge, to whom I had the opportunity to present my observations and suggestions based on the time study conducted during the internship. His receptiveness to my recommendations and feedback was truly motivating.

This internship has been an enriching experience, and I am thankful to all the team members at Versatile Enterprises Pvt Ltd who directly or indirectly supported and guided me during this learning journey.

Lastly, I extend my gratitude to my institute, NIT Jalandhar, for its support and encouragement throughout the process.

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Introduction

This report documents the internship experience I gained at Versatile Enterprises Pvt Ltd, where I worked as an On-site Intern during the period 26 June 2025 to 28 July 2025. The internship was a part of my academic curriculum at NIT Jalandhar, aimed at providing practical exposure to industrial environments and strengthening my understanding of real-time operations.

The primary objective of this internship was to bridge the gap between theoretical knowledge and textile industrial application. During my time at the company, I was involved in a hands-on project focused on identifying and analyzing causes of idle time in lamination operations, using tools such as Excel, SQL, and Power BI. This report outlines the tasks performed, key contributions made, challenges faced, and the overall learning outcomes of the internship.

Through this experience, I developed critical professional skills, gained insights into production processes, and learned how to convert raw data into actionable business insights that contribute to process improvement.

Internship Objectives

The objective of this internship was to gain practical exposure to industrial operations within the textile manufacturing domain, specifically focusing on production efficiency and process improvement.

My key responsibility was to conduct a comprehensive time study of the Hot Melting Machine, which plays a crucial role in lamination processes in the textile industry. I collected detailed operational data and recorded it in Excel to ensure systematic tracking of machine activity.

Using analytical tools like Excel, SQL, and Power BI, I analyzed the data to identify major causes of machine idleness, with the goal of recommending data-driven strategies to reduce downtime and enhance productivity.

Furthermore, I worked on determining the Standard Operating Time (SOT) for each task or process observed during machine idle periods. This analysis helped in setting performance benchmarks and identifying bottlenecks in the lamination workflow.

Overall, the internship allowed me to apply analytical thinking and domain understanding in a real-time textile production setting, contributing insights that support continuous improvement and operational efficiency.

“HML Production Delay And SOT Analysis”

Problem Statement

The Hot Melting Machine at Versatile Enterprises Pvt Ltd, crucial to textile lamination, was experiencing frequent idle periods, reducing overall production efficiency.

There was no structured data available to pinpoint the exact causes of downtime or to define standard operating times for sub-processes during idleness. This lack of insight hindered efforts to improve performance and optimize output.

To address this, a detailed time study and data-driven analysis were needed to:

Identify major causes of idleness,

Establish standard timings for key activities,

And suggest actionable ways to reduce downtime and boost productivity.

Tools and Terminologies used

Tools Utilized

Microsoft Excel
Used for gathering, organizing, and cleaning raw time study data collected during the observation of the Hot Melting Machine. It helped in creating a structured dataset that formed the base of all further analysis.

SQL (Structured Query Language)
Employed to perform key queries for data filtering, grouping, and summarizing. SQL helped in identifying patterns and extracting actionable insights from the structured dataset.

Power BI
Used to create visually appealing, real-time, and interactive dashboards. These dashboards played a critical role in identifying the root causes of machine idleness and presenting insights in a way that enabled data-driven decision-making.

Key Terminologies

Material is Being Ready
This includes preparatory tasks such as wrapping and batching of the remaining fabric before it's moved as output material.

M/C Settings
Refers to machine-specific setup operations like display configuration, fabric stitching, and chemical application, required before starting a new production cycle.

Roll Changeover
The process of changing fabric rolls, even if they are not completely used, typically done to meet specific fabric type requirements for the next batch.

Take-Up Shaft Changeover
Involves replacing the take-up shaft after the output material has been prepared, ensuring the shaft is ready for the next set of operations.

Methodology

Time Study Data Organization in Excel

The raw time study data collected during the observation of the Hot Melting Machine was systematically organized in Excel.
The dataset included the following columns:

Date

Machine

Start Time

End Time

Status (e.g., ONN, Idle)

Reason for idle time

Duration (calculated using Excel formulas)

Data Management in PostgreSQL

After cleaning, the dataset was imported into a PostgreSQL database. SQL was used to run multiple analytical queries such as:

- What is the total idle time for each reason?
- What is the idle time by date and day of the week?
- How much time (ONN vs Idle) is spent by each machine?
- How does idle time vary by hour of the day?
- What are the top idle reasons for each machine?
- What is the Standard Operation Time (SOT) per machine and reason (based on lowest 3 durations)?
- How to create a table of estimated SOT values?
- How does actual idle time compare with estimated SOT, and what is the efficiency percentage for each idle event?

Observations

- Frequent Idle Reasons: The most significant contributors to idle time are Roll Loading, Material Not Ready, Lunch Break, and Tea Break.
- Idle Time Trends by Day: Idle durations vary across weekdays, indicating possible staffing gaps, planning issues, or supply delays on specific days.
- Underutilized Machines: Certain machines consistently report higher idle durations than active time, highlighting potential inefficiencies in usage or scheduling.
- Break Time Impact: Idle time spikes are observed during lunch and tea breaks, suggesting that actual break durations often exceed planned time.
- Repetitive Idle Causes: The same idle reasons are frequently reported for specific machines, indicating recurring operational bottlenecks.
- Deviation from SOT: Actual idle times often exceed the estimated Standard Operation Time (SOT), pointing to gaps in execution or process control.
- Low Idle Efficiency: Many records show idle efficiency below 70–80%, signaling the need for better monitoring and adherence to operational standards.

Dashboard Visualizations and Their Interpretation

1. ***Bar Chart – Total Idle Time by Reasons***
Displays the sum of idle minutes for each reason. Helps identify top contributors to downtime like Roll loading, Lunch break, and Tea break.

2. Line Chart – Total Idle Time by Day
Shows daily idle time trends, highlighting peak idle days (e.g., Day 6) and efficient days (e.g., Day 10).

3. KPI Cards

Total Idle Time – Overall idle duration across all observations

Avg Idle Time (min) – Average duration of each idle event

Avg Idle Efficiency – Efficiency based on time spent vs. expected duration

4. Slicers (Filters)

Machine Selector (M-1, M-2) – Filters visuals by machine

Idle Reason Selector – Filters all charts based on selected reason

5. Data Table – Idle Reasons with SOT
Shows total idle duration and average Standard Operating Time (SOT) for each reason, helping compare actual vs. expected durations.

Observations

Major Idle Time Contributors:

- The highest idle times were due to roll loading, lunch breaks, tea breaks, material being ready, and open-end loading. These top 5 reasons were responsible for the majority of the total idle time, which means they should be the key focus areas for improvement.

Long and Unregulated Breaks:

- The average idle time for lunch and tea breaks was very high. This shows that breaks might not be properly timed or regulated, causing machines to remain idle for longer than necessary.

Delays in Material Availability:

- In several cases, the machine was idle because the material was not ready. This indicates a communication or coordination gap between production and material handling teams.

Daily Trend Observations:

- On some days (like Day 1 and Day 7), idle times were extremely high, while on other days (like Day 12), they dropped significantly. This shows that certain practices or operator behaviors may have helped improve efficiency on those better d

Recommendations

1. Improve Roll Loading Process

Issue: Roll loading is taking more time than expected.

Suggestions:

- Prepare rolls in advance before the shift starts.
- Assign a dedicated helper for roll loading.
- Rearrange the layout to reduce unnecessary movement.

2. Restructure Lunch and Tea Breaks

Issue: Breaks are exceeding the planned time.

Suggestions:

- Stagger break timings so machines aren't all idle at once.
- Use biometric or attendance records to track break durations.
- Raise awareness about sticking to standard break timings.

3. Ensure Material Readiness

Issue: Machines are idling while waiting for material.

Suggestions:

- Use a pre-shift checklist to ensure all materials are available.
- Improve coordination between store and production teams.
- Stage materials during off-peak hours.

4. Reduce Machine Setup Time

Issue: Operators are spending too much time on machine settings.

Suggestions:

- Provide simple, step-by-step setup instructions (SOPs).
- Keep tools and materials easily accessible.
- Train operators to reduce trial-and-error.

5. Minimize Cleaning Delays

Issue: Cleaning takes longer than the standard time.

Suggestions:

- Use efficient tools like compressed air or vacuum.
- Schedule cleaning during breaks or shift end.
- Assign a helper to assist with cleaning tasks.

6. Implement Real-Time Monitoring

Issue: Idle time is not tracked immediately, causing unnoticed delays.

Suggestions:

- Use logbooks or digital tools to record idle time.
- Set alerts when idle time exceeds expected limits (SOT).

7. Monitor Shift and Operator Performance

Issue: It's unclear which shifts or teams cause more delays.

Suggestions:

- Create performance scorecards by shift or operator.
- Recognize efficient teams and offer support where needed.
- Provide feedback and regular training.

Expected Results:

- Idle time can be reduced by 30–40%, especially in top problem areas.
- Idle efficiency can increase from ~60% to over 80%.
- Lower idle time means more production, better output, and higher efficiency.

Conclusion

The internship at Versatile Enterprises Pvt Ltd provided me with valuable hands-on experience in the textile manufacturing domain, particularly in analyzing operational efficiency on the shop floor.

By conducting a detailed time study of the Hot Melting Machine, I was able to collect and organize real-time production data, identify the root causes of machine idleness, and propose data-driven recommendations to improve productivity.

Using tools like Excel, SQL, and Power BI, I not only enhanced my technical skills but also gained practical insights into how data can be leveraged to make meaningful operational decisions.

Moreover, interacting with professionals like Mr. Akhil Seth (Executive Director), Mr. Pardeep Maurya (Production Incharge), and others enriched my understanding of industrial workflows, communication, and cross-functional collaboration.

This internship has strengthened my foundation in business analysis, process improvement, and data visualization, and will significantly contribute to my career as a future data-driven problem solver in the industry.