Improving Production and Quality Control in Injection Moulding through Operational Optimization

A Mid Term Submission Report for the BDM Capstone Project

Submitted by

Name: Ritesh Sharma

Roll number: 24f1001677

Email: 24f1001677@ds.study.iitm.ac.in

IITM Online BS Degree Program

Indian Institute of Technology, Madras, Chennai

Tamil Nadu, India, 600036

Contents

1. Executive Summary:

The firm on which this project is focused, Ganes Metplast Pvt. Ltd. is a privately held manufacturing company established in 2011 in Chennai – 600123. It specializes in high-precision plastic components using advanced injection moulding technology. Primarily serving the automotive and electrical sectors, despite its reputation for quality, the firm faces challenges such as high rejection rates due to moulding defects, production shortfalls, and inventory inefficiencies.

The dataset from Ganes Metplast Pvt. Ltd. covers 4 months (January to April 2025) of detailed production, quality, and inventory records in Excel format. Each month includes part lists, stock details, raw material and regrind data, OEE summaries, downtime reports, and daily shift-wise production logs. April's data was also reviewed as a sample to show meta data. Descriptive statistics analyze rejection rates, PPM, inventory levels, and machine-wise performance for a comprehensive operational overview.

To address the firm's key operational problems, the primary data was cleaned, structured, and key outcome variables were selected based on their relevance to issues. A structured, data-driven approach was followed using tools such as Microsoft Excel, Python, and Power BI to perform statistical analysis and generate insightful visualizations. Techniques including bar charts, control charts, line charts etc. were applied to assess rejection trends, actual vs. target outputs, inventory flows and so on.

By correlating performance gaps with material delays, analysis of downtime and OEE report these insights will support targeted interventions to reduce rework and defects, improve product quality, optimize inventory to prevent shortages and overstocking, and enhance production targets through better downtime and workload management.

2. Proof of originality of the Data:

"To validate the authenticity and reliability of the data collected from Ganes Metplast Pvt. Ltd. for this project, supporting evidence has been provided as follows:"

i). Photograph of the official business card.

(a)

ii). Photograph of the firm's main entrance gate.

(b)

iii). Photograph of the manufacturing facility/area, good and rejected product and interaction.

(a) 200T-350T Machines

b). Discusion Panel

c). Me while watching the rejctions.

a). Cavity defect

b). Alignment defect

c). Hole defect

d). Short fill defect

e). Line Mark

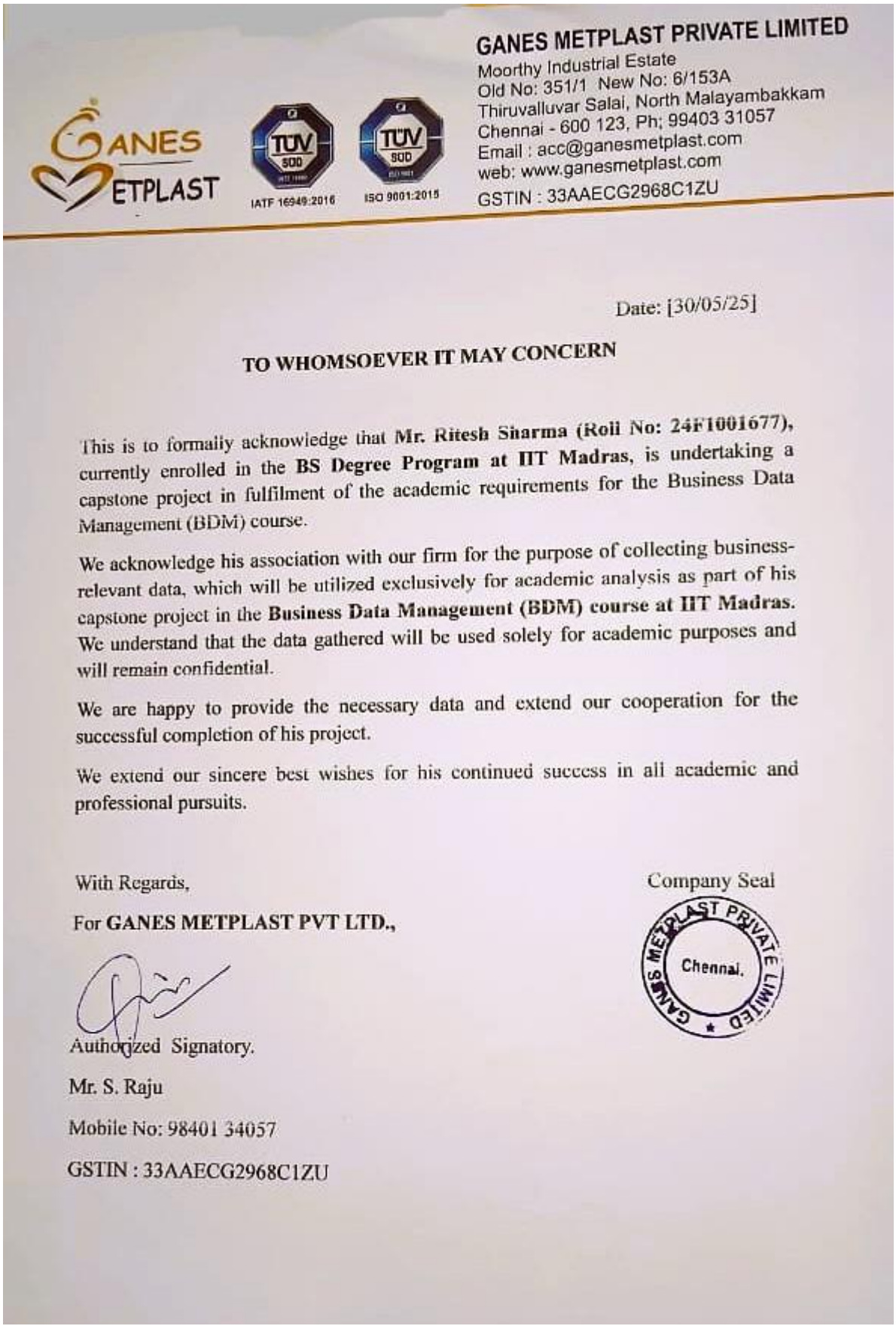
iv) Video Interaction with Managing Director and Data Provided.

A. Video Interaction with Mr. Sadagopan Raju, Managing Director.
Video Interaction link: Click_Here

B. Primary Data of 4 Months (JAN-APR 2025).
Primary Data Link: Click_Here

C. Data for the Part of my Analysis:
Data for Analysis: Click_Here

v). Authorization letter from *Ganes Metplast Pvt. Ltd*. provided on official letterhead a formal proof of data source.



GANES METPLAST PRIVATE LIMITED
Moorthy Industrial Estate
Old No: 351/1 New No: 6/153A
Thiruvalluvar Salai, North Malayambakkam
Chennai - 600 123, Ph; 99403 31057
Email : acc@ganesmetplast.com
web: www.ganesmetplast.com
GSTIN : 33AAECG2968C1ZU

IATF 16949:2016 ISO 9001:2015

Date: [30/05/25]

TO WHOMSOEVER IT MAY CONCERN

This is to formally acknowledge that **Mr. Ritesh Sharma (Roll No: 24F1001677),** currently enrolled in the **BS Degree Program at IIT Madras,** is undertaking a capstone project in fulfilment of the academic requirements for the Business Data Management (BDM) course.

We acknowledge his association with our firm for the purpose of collecting business-relevant data, which will be utilized exclusively for academic analysis as part of his capstone project in the **Business Data Management (BDM) course at IIT Madras.** We understand that the data gathered will be used solely for academic purposes and will remain confidential.

We are happy to provide the necessary data and extend our cooperation for the successful completion of his project.

We extend our sincere best wishes for his continued success in all academic and professional pursuits.

With Regards,

For **GANES METPLAST PVT LTD.,**

Company Seal

GANES METPLAST PRIVATE LIMITED Chennai.

Authorized Signatory.

Mr. S. Raju

Mobile No: 98401 34057

GSTIN : 33AAECG2968C1ZU

3. Metadata:

1. **Dataset Name:** Monthly Production, Quality & Inventory Logs (Jan–Apr 2025)
2. **Description:** This dataset contains detailed manufacturing records from *Ganes Metplast Pvt. Ltd.* for the period of 4 Months (**January to April 2025).** Each month's Excel file includes five structured summary sheets, followed by the daily production reports for every date of the month based on their number of days.
3. **Creator:** Ganesh Metplast Pvt. Ltd.
4. **Collected by:** Ritesh Sharma (Roll: 24f1001677) handed on their industry visit.
5. **Data Format:** Microsoft Excel (.xlsx)
6. **Sheets per Month:**
    i) Part list
    ii) Overall Stock Parts
    iii) Material Stock Details
    iv) OEE Summary
    v) Downtime Summary
    vi) Daily Reports: Sheets named by date (e.g. '01.03.2025','02.03.2025'……'30/31.03.2025'), capturing details and also daily shift wise logs.
7. **Data for Analysis:**

    Out of the four months of collected datasets, I have **selected the April month data** to present and illustrate the metadata structure and analysis. The datasets for the other months—January, February, and March—follow the **same format and structure** as April. This representative selection helps in demonstrating the overall data consistency and processing approach.

❖ Machine wise OEE Summary Metadata.

Below I have attached a snapshot of April month machine wise OEE report for the Sample of meta data.

OEE SUMMARY

Machine wise OEE Report in %	MACHINE	1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr	7-Apr	8-Apr	9-Apr	10-Apr	11-Apr	12-Apr	13-Apr	14-Apr	15-Apr	16-Apr	17-Apr	18-Apr	19-Apr	20-Apr	21-Apr	22-Apr	23-Apr	24-Apr	25-Apr	26-Apr	27-Apr	28-Apr	29-Apr	30-Apr
	80T	63%	122%	117%	123%	56%	-	109%	120%	76%	27%	57%	47%	-	-	82%	109%	115%	131%	93%	-	93%	92%	99%	105%	130%	126%	-	71%	45%	101%
	150T	-	18%	33%	31%	79%	-	101%	56%	46%	27%	83%	87%	-	-	33%	34%	43%	64%	103%	-	110%	86%	107%	105%	65%	44%	-	56%	108%	112%
	125T	43%	98%	53%	105%	73%	-	73%	91%	81%	102%	81%	65%	-	-	58%	37%	20%	37%	54%	-	55%	75%	76%	18%	16%	58%	-	49%	32%	63%
	180T	16%	90%	71%	112%	20%	-	101%	54%	103%	84%	103%	108%	-	-	99%	72%	81%	92%	49%	-	97%	82%	69%	79%	67%	82%	-	92%	95%	43%
	200T	26%	91%	70%	51%	73%	-	72%	81%	80%	81%	70%	75%	-	-	92%	74%	54%	74%	68%	-	88%	107%	66%	111%	118%	51%	-	68%	68%	96%
	250T	103%	58%	38%	70%	61%	-	54%	73%	100%	117%	63%	42%	-	-	94%	77%	75%	99%	115%	-	90%	74%	54%	68%	107%	100%	-	80%	52%	52%
	300T	18%	19%	69%	96%	48%	-	68%	91%	78%	61%	80%	60%	-	-	47%	44%	59%	86%	56%	-	52%	51%	87%	80%	84%	57%	-	73%	90%	95%
	350T-1	23%	30%	50%	83%	50%	-	56%	33%	38%	49%	79%	86%	-	-	83%	69%	83%	82%	91%	-	88%	88%	89%	76%	77%	115%	-	95%	70%	38%
	350T-2	100%	104%	58%	73%	24%	-	29%	92%	30%	82%	19%	59%	-	-	84%	75%	83%	99%	86%	-	53%	70%	102%	89%	79%	91%	-	92%	91%	87%

Fig 3.1. Machine wise OEE Summary of April Month 2025

i) **Sheet Name:** OEE Summary Report – April 2025

ii) **Description:** Daily machine-wise Overall Equipment Effectiveness percentage.

iii) **Records:** 30 days x Machine Entries (125T, 150T, 200T, 250T etc.) # T stands for tonnage (capacity of particular machine).

iv) **Fields:** Machine Name, Daily OEE% (1st to 30 April)

v) **Purpose:** Machine wise Performance analysis of daily basis.

vi) **Use Case:** Identifying underperforming machines, production trends and maintenance planning.

❖ Overall OEE Summary for actual vs plan, rejections, material Lumps Metadata.

Below I have attached a Snapshot of the Overall OEE summary from the same "OEE Summary" sheet.

		1-Apr	2-Apr	3-Apr	4-Apr	5-Apr	6-Apr	7-Apr	8-Apr	9-Apr	10-Apr	11-Apr	12-Apr	13-Apr	14-Apr	15-Apr	16-Apr	17-Apr	18-Apr	19-Apr	20-Apr	21-Apr	22-Apr	23-Apr	24-Apr	25-Apr	26-Apr	27-Apr	28-Apr	29-Apr	30-Apr
OVER ALL OEE in %	TARGET	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%
	ACTUAL	49.17%	70.04%	62.11%	82.49%	53.85%	-	73.54%	76.86%	70.27%	70.01%	70.60%	69.74%	-	-	74.61%	65.69%	68.27%	84.91%	79.57%	-	80.49%	80.44%	83.02%	81.15%	82.59%	80.45%	-	75.34%	72.26%	76.31%
	PLAN / ACTUAL	63.51%	76.93%	80.21%	91.80%	71.88%	-	84.87%	85.58%	82.70%	77.50%	84.09%	84.53%	-	-	84.32%	80.43%	83.18%	94.05%	88.21%	-	93.85%	89.99%	93.01%	88.73%	89.85%	89.23%	-	88.27%	91.54%	90.39%
REJ %		1.74%	1.07%	1.64%	1.11%	1.80%	-	1.13%	2.29%	1.24%	1.26%	1.69%	1.73%	-	-	1.21%	1.93%	1.94%	1.38%	1.95%	-	1.74%	2.16%	2.31%	1.24%	1.27%	0.87%	-	1.58%	1.72%	1.04%
REJECTION PPM		17433	10704	16358	11145	17996	-	11307	22909	12436	12598	16879	17307	-	-	12062	19328	19354	13781	19501	-	17440	21609	23057	12359	12710	8665	-	15778	17217	10372
LUMPS IN KG'S		17.200	10.300	15.750	17.700	20.100	0.000	20.500	14.300	13.700	6.500	5.800	14.800	0.000	0.000	12.850	20.800	22.400	14.150	23.850	0.000	14.820	11.950	17.300	13.850	14.850	11.500	0.000	13.300	13.500	10.500

Fig 3.2. Machine wise OEE Summary of April Month 2025

i) **Sheet Name:** OEE Summary Report – April 2025

ii) **Description:** This part of analysis data contains Percentage wise report Rejection, Actual Production, Lumps in kg's.

iii) **Records:** Individual data entries for each time periods for example actual production in term of OEE% on 2nd April is 70.04% and on holidays there is (-) dashed entries.

iv) **Fields:**

- Target OEE (%) -- Benchmark target for Overall Equipment Efficiency (same every day – 85%)
- Actual OEE (%) -- Achieved machine efficiency on each date
- Plan vs Actual (% -- Ratio of planned vs actual production output
- Rejection (%) -- Percentage of products rejected (quality defect rate)
- Rejection PPM -- Defective parts per million produced (more granular than %)
- Lumps in Kg -- Quantity of rejected material (scrap) in kilograms

v) **Use Case:** OEE optimization, quality control, process waste reduction, etc.

vi) **Purpose:** Analysis of Quality Trends, Rejection, Scrap generation, and target achievability.

❖ Downtime Summary Metadata

Below I have attached a Snapshot of the Downtime Summary of April month as a sample to show the meta data because other datasets follow same format.

	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
1	DOWN TIME SUMMARY														
2															
3	DOWN TIME		TRIAL	MOULD CHANGE	TOOL DOWN	M/C DOWN	RM & POLY COVER SHORTAGE	NEW MAN POWER LOW EFFICIENCY	STARTUP	POWER CUT	NO MANPOWER	FOOD CHANGE OVER	MATERIAL PRE-HEATING	PROCESS	TOTAL
4		01-Apr	0	190	0	1028	0	188	238	0	3129	0	168	44	4985
5		02-Apr	0	240	0	0	0	60	0	0	1756	0	0	170	2226

Fig 3.3. Downtime Summary

i) **Sheet Name:** Machine Downtime Summary
ii) **Description:** Categorized downtime reasons and durations for each machine Over April as a demo
iii) **Records:** Each row correspond to a particular date's downtime breakdown.
iv) **Fields:** Each Column is a Downtime Summary e.g. (Downtime due to Powercut)
v) **Purpose:** Root cause analysis of Productivity losses and corrective action planning to achieve the target.

❖ Individual Daily Production Sheet (e.g. 30.04.2025) meta data

Below I have attached an Individual Daily production sheet of April month.

TRIAL	MOULD CHANGE	COLOUR CHANGE	TOOL DOWN	M/C DOWN	RM & POLY COVER SHORTAGE	NEW MAN POWER LOW EFFICIENCY	STARTUP / MACHINE CLEANING	POWER CUT	NO MANPOWER	FOOD CHANGE OVER	MATERIAL PRE-HEATING	PROCESS	TOTAL DOWN TIME	TOTAL PROD	RG GENERATE
			205										205	2984	8.957

M/C	CUSTOMER	MODEL	MOULD NAME	UPH	NO OF CAVITY	PLAN QTY	PRODUCTION RUNNER WEIGHT	RM CONS IN (KG)	PLAN TIME (MINUTES)	PLAN EFF 85%	ACT HOUR	SHIFT A	SHIFT B	SHIFT C	REJ	REJ WEIGHT	ACTUAL QTY	LUMPS	PLAN VS ACTUAL in %	OK QTY	QUALITY %	AVAILABILITY %	OEE %
350T-1	TOPRUN	SU2I FL	LEVER-RR BACK LATCH - YGN	90	2	3597	6.565	134.872	1199	0.85	994	1547	1385		52	2.392	2984	1	83%	2932	98%	83%	68%

Fig 3.4. Individual Daily Production sheet

i) **Dataset Name**: Monthly Production, Quality & Inventory Logs (Jan–Apr 2025)
ii) **Description:** Complete daily performance, downtime, shiftwise production etc.
iii) **Records**: Each row represent a production unit (machine + part + shift)
iv) **Fields:** Machine Mould, Customer, Cycle time, Downtime reasons, Shift wise output, Corrective actions and so on.
v) **Purpose:** Daily tracking for OEE inputs, shift Managements, Root cause analysis, downtime analysis, and detailed reason for the problems.

❖ Reconciliation for Inventory for 4 Months meta data

RECONCILIATION FOR INVENTORY

MONTH	JANUARY		FEBRUARY		MARCH		APRIL	
DESCRIPTION	Purchased & Opening RM JAN	Despatch/. Closing	Purchased & Opening RM FEB	Despatch/. Closing	Purchased & Opening RM MAR	Despatch/. Closing MAR	Purchased & Opening RM APR	Despatch/. Closing APR
PURCHASED RM/DISPATCHED	17450	16413	25068	25775	23548	22999	18610	18903
OPENING STOCK RM	2775	4172	4172	1575	1575	3298	3298	3696
OPENING STOCK RG	1251		0	384	384	1632	1632	923
RUNNER	250	1300	1300	1966	1966	426	426	864
OPENING STOCK PART	4377	3967	3967	4243	4242	2749	2749	2292
REGRIND (FG AREA)	470	430	430	430	430	430	430	430
LUMPS		1200		675		700		400
REJECTION	350	350	350	350	350	260	260	260
SHORTAGE	1184		275		164		165	
TOTAL RM+RG	28107	27832	35562	35398	32659	32494	27570	27768
BALANCE(EXCESS/SHORTAGE)	-275		-164		-165		198	

Fig 3.5. Inventory data for Jan-April 2025

i) **Dataset Name:** Inventory
ii) **Description:** Monthly inventory data showing raw material availability, usage.
iii) **Records and Fields:** Records indicate the type of stock tracked (e.g., raw or regrind),while fields represent monthly values for material availability,stock & usage.
iv) **Purpose:** Help in tracking Inventory flow and material usage monthly wise.

4. Descriptive Statistics:

Machine wise descriptive statistics.

Machine	Jan-25 (%)	Feb-25 (%)	Mar-25 (%)	Apr-25 (%)	Mean (%)	Median (%)	Std Dev (%)	Min (%)	Max (%)
80T	91	69	75	92.3	81.83	83.5	11.01	69	92.3

Fig 4.1. Sample statistics of monthly machine wise utilization

1. **Mean (Average Utilization)**
   - 80T has the highest average (81.83%): Most heavily used, key machine.
   - 180T and 300T have lowest averages (~67%): Underutilized or inconsistently used.
   - Overall average is 70.6%, used as a benchmark.
2. **Median (Typical Utilization)**
   - 80T again leads (83.5%): Consistently high usage.
   - 250T and 350T-2 show median > mean, indicating some low outlier months.
   - 125T and 200T have mean ~ median: Balanced performance.
3. **Standard Deviation (Variability)**
   - 180T (11.06%) and 80T (11.01%): Highly variable usage, unstable patterns.
   - 300T (3.74%) and 150T (3.78%): Very stable, consistent usage.
   - Above 4.16% Std Dev means more volatility than average.
4. **Minimum (Lowest Monthly Utilization)**
   - 180T hit 55%: Worst drop, possible breakdown or downtime.
   - 80T's minimum is 69%, showing high baseline reliability.
5. **Maximum (Peak Monthly Utilization)**
   - 80T peaked at 92.3%, the highest among all machines.
   - 350T-1 had a strong peak (86%), but inconsistent overall.
   - 300T and 125T had low peaks (~72–75%), suggesting limited max capacity or deployment.

OEE Performance:

OEE Metric	Jan-25	Feb-25	Mar-25	Apr-25	Average	Min	Max	Range
Target (%)	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	85.00%	0.00%
Actual (%)	73.50%	68.47%	68.89%	73.35%	**71.55%**	68.47% (Feb)	73.50% (Jan)	5.03%
Plan/Actual (%)	83.14%	78.41%	78.62%	85.15%	**81.33%**	78.41% (Feb)	85.15% (Apr)	6.74%

Fig 4.2. Monthly wise OEE report of actual vs target performance.

1. **Stable Target:** Target OEE was consistently set at 85% across all months.
2. **Underperformance:** Actual OEE averaged 71.55%, staying below target throughout.
3. **February Dip:** February had the lowest Actual OEE (68.47%) and Plan/Actual (78.41%).
4. **Fluctuations Observed:** Actual OEE varied by 5.03%, and Plan/Actual by 6.74%.
5. **Execution Gap:** Plan/Actual was closer to the target, but Actual OEE lagged behind.

Monthly wise rejection % and rejection ppm of the Product Statistics.

Description	Jan-25	Feb-25	Mar-25	Apr-25	Mean	Median	Min	Max	Std Dev	Variance
REJ %	1.59%	1.66%	1.57%	1.56%	1.60%	1.59%	1.56%	1.66%	0.04%	1.4E-06
REJECTION PPM	15939	16643	15190	15612	15846	15775.5	15190	16643	604.54	365467

Fig 4.3 Monthly wise rejection and ppm report.

1. Rejection %

- **Highest Rejection %** was in **Feb (1.66%)**, indicating possible quality issues during that month.
- **Lowest Rejection %** was in **Apr (1.56%)**, showing improvement.
- The **variation is low** (range: 0.10%, std dev ~0.038%), meaning the process is relatively stable month-to-month.

2. Rejection PPM

- **Feb-25** again recorded the **worst PPM (16,643)**.
- **Mar-25** had the **lowest PPM (15,190)**, showing better control.
- PPM has a **moderate fluctuation** (std dev ~605), indicating some inconsistency in quality or production volume.

Inventory Report for total RM (Raw material)+RG (Regrind) and Net Inventory Flow

RECONCILIATION FOR INVENTORY								
MONTH	JANUARY		FEBRUARY		MARCH		APRIL	
DESCRIPTION	Purchased & Opening RM JAN	Despatch/. Closing	Purchased & Opening RM FEB	Despatch/. Closing	Purchased & Opening RM MAR	Despatch/. Closing MAR	Purchased & Opening RM APR	Despatch/. Closing APR
SHORTAGE	1184		275		164		165	
TOTAL RM+RG	28107	27832	35562	35398	32659	32494	27570	27768

Fig 4.4. Snapshot of arranged Inventory total (Raw material + Regrinds) over 4 months (Jan-April)

Month	Purchased RM + Opening Stock RM	Despatch/Closing Stock	Net Inventory Flow (Balance)
January	20225	16413	3812
February	29240	25775	3465
March	25123	22999	2124
April	21908	18903	3005

Fig 4.5. Snapshot of arranged data for the Net Inventory Flow (Balance)

- February had the highest inventory at 35,562 units, suggesting a stock buildup or increased procurement.
- April recorded the lowest inventory with 27,570 units, indicating consumption or drawdown of stock.
- The range of inventory levels across months is 7,992 units, showing noticeable fluctuations possibly due to production or supply variations.
- **Lowest Inventory Surplus in March**: March records the lowest net inventory flow at 2124 units, implying closer alignment between procurement and usage.
- **Highest Inventory Flow in January and February**: The months of January (3812 units) and February (3465 units) show the highest net inventory flow, indicating excess procurement

5. Detailed Explanation of Analysis Process / Method:

The analysis began with the **collection of four months of primary data** (January to April 2025) from *Ganes Metplast Pvt. Ltd.,* focusing on key operational areas—**production**, **quality**, and **inventory**. This included data such as shift-wise production logs, machine-wise utilization reports, actual vs target OEE%, rejection percentages, PPM, and inventory levels of raw material and regrind. Following collection, the **data preparation** process involved cleaning and organizing the raw data into structured Excel sheets. Essential information was extracted into separate sheets, including the OEE summary, machine-wise utilization, actual vs target OEE%, rejection data, and inventory flow.

Descriptive Statistical Analysis

Once the data was organized, key statistical measures were calculated to extract meaningful insights. The **standard deviation of machine utilization** was used to assess variability in performance across different machines. To evaluate efficiency, the **average Actual OEE%** was computed for each month and compared against the target values. Additionally, **rejection percentages and PPM (parts per million)** were averaged across the four-month period to evaluate quality trends. For inventory, the **net flow of total stock (Raw Material + Regrind)** was calculated month-wise to understand material movement and potential inefficiencies. These descriptive statistics were crucial in identifying areas with high variability, consistent underperformance, and potential quality control issues.

Visualization Techniques

To communicate the insights effectively, various visualization techniques were used. **Column Stacked Vertical Charts** were utilized to highlight the month-wise comparison of **Actual vs Target OEE%**, clearly depicting deviations from performance expectations. **Bar Charts** illustrated the **inventory flow** across the four-month period, making it easier to observe stock build-ups or drawdowns. To represent the quality trends, **Line Charts** were created to track both **rejection percentage** and **rejection PPM** over time. These visual tools provided a clear, comparative view of operational performance, allowing for easy identification of patterns, anomalies, and areas needing attention.

6. Results and Findings:

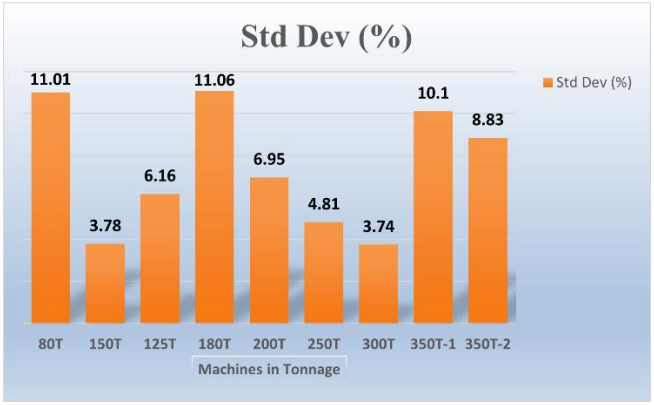


Fig 6.1. Bar chart showing the Standard deviation of various machines

Summary:

- **Problem:** Machine utilization variability causes issues. High variability raises defects, rework, and rejection. Low variability with low use shows poor inventory planning and idle time.
- **Data Justification:** High standard deviations in 180T, 80T, and 350T show unstable performance. Lower variability but low utilization in 150T and 300T suggests inefficiencies in inventory and material planning causing idle times.
- **Inference:** The chart highlights production gaps from untracked downtime, shift imbalances, and poor material flow. Addressing these issues is key to improving quality, cutting costs, and meeting targets.

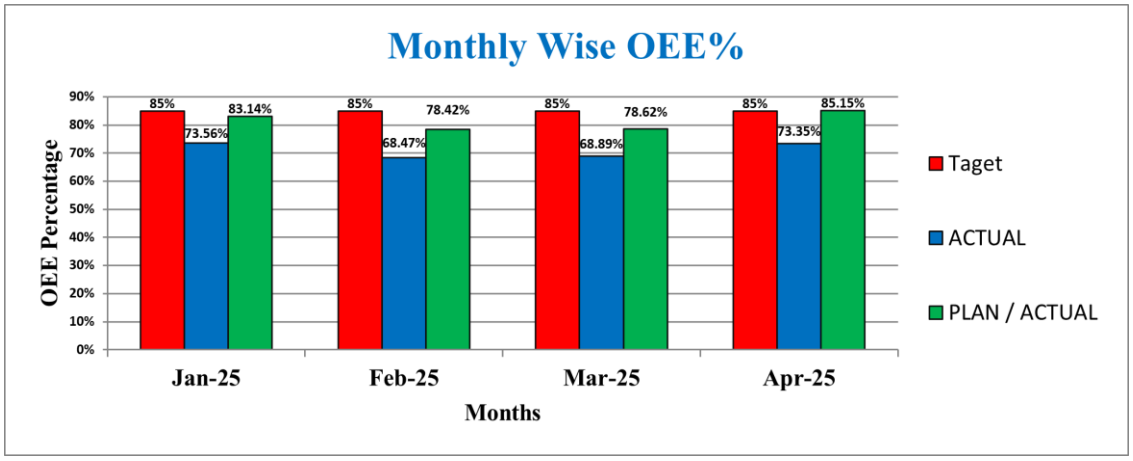


Fig 6.2. Stacked column chart compares the monthly target OEE against actual OEE and the plan-to-actual ratio

Summary:

- **Problem Identified**: Production target gaps in all four months productions.
- **Data Justification from Column Chart:** The actual OEE remains below the 85% target from January to March, with the lowest in February (68.47%) and March (68.89%), indicating peak inefficiencies.
- **Inference:** The OEE gap indicates ongoing inefficiencies from underutilization, untracked downtimes, and shift imbalances, and many more can be expected.

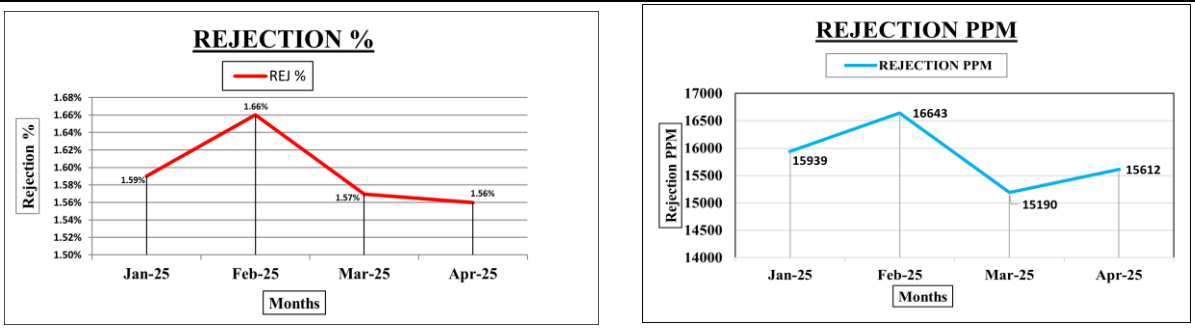


Fig 6.3. Line chart showing the fluctuation of Rejection% and Rejection ppm over Jan-April

Summary:

- **Problem Identified:** High rework and rejection rates due to frequent moulding defects
- **Data Justification:**
  a. The rejection percentage remains consistently high, ranging from 1.56% (Apr) to 1.66% (Feb).
  b. The rejection PPM is also elevated, fluctuating between 15,190 (Mar) and 16,643 (Feb).
  c. February shows the highest rejection in both % and PPM, directing peak quality issues during that period.
- **Inference:** The persistently high rejection rates confirm ongoing quality control issues and directly contribute to increased rework, material wastage and so on.

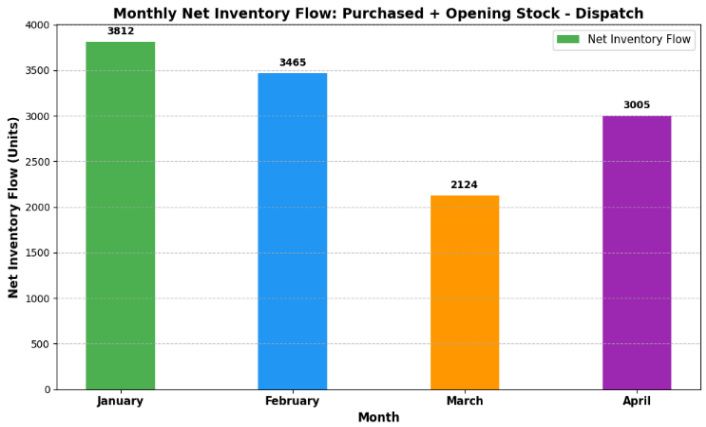


Fig 6.4. Bar chart of Inventory Fluctuation and Material Utilization Efficiency Over Four Months

Summary:

- **Problem Identified:** Inefficient inventory and material planning cause overstocking, shortages and production delays, disrupting workflow and contributing to high rework & rejection rates.
- **Finding from Data:** Net inventory flow fluctuates significantly from 3812 in January to2124 in March, then rises again to 3005 in April, showing inconsistent inventory management.
- **Inference:** These fluctuations confirm poor material planning, leading to disruptions in production, increased quality issues, and widened gaps between actual and target output.