5th of April 2025

Manufacturing Line Downtime Report

Data Overview

Line Productivity, Products, Downtime Factors, and line Downtime that cover production from August 29 to September 3, 2024, across 5 Flavors and 4 operators.

Methodology

- Handled Missing Values.
- Standardized Data Format using SQL.
- Identified key downtime causes impacting productivity.

Limitation and Challenges

- Small Data Range.
- Missing Quantity Produced to measure full productivity.
- Missing Shift Schedules from Start, End Perspective and Rotation or Flexibility, noting that there are some Gaps among Batches Starting Time for Each Day, 30th of Aug started at 4:05 the Delay causes are not mentioned, however the first batch on 31st of Aug started at 7:45.
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Key Performance Indicators (KPIs)

Production Efficiency KPIs:

- Total Production Time
- Average Cycle Time
- Production throughput (batches per Day)
- Operator Efficiency Percentage

Downtime KPIs:

- Total Downtime
- Downtime as Percentage of Production time
- Top Downtime Causes

Data Analysis and Findings

Top Downtime Drivers:

Factor 6 (Machine Adjustment): 12 Instances totaling 332 Minutes of Downtime.

Factor 7 (Machine Failure): 11 instances totaling 254 Minutes of Downtime.

Operator-Specific Issues:

Charlie: Highest operator-error downtime: 9 Instances totaling 228 Minutes of Downtime which includes 4 instances of Machine Adjustments.

Product Impact:

CO-600: Longest Downtime totaling 494 Downtime minutes as 35.59% of total Downtime.

CO-2L: High Variability in Production Time (Batch 422147 took 3 Hours and 25 Minutes Above Average which is 2 Hours and 33 Minutes and Minimum batch time is 98 minutes.

Recommendation and Action Items

Operator Training:

Focus on Charlie, Dennis and Dee for repetitive Machine Adjustment Errors.

Focus on Mac for Batch Codding and Batch Change Errors.

Inventory Management:

Address Shortage with real time Tracking with Alert Setting to Avoid Reaching minimum Stock.

Machine Adjustment:

Set priority for machine adjustments and schedule maintenance activities outside production hours to minimize downtime and avoid productivity loss.

Batch Change:

Review Batch Change process to enhance it to avoid the Downtime caused by this factor.

Clear KPIs:

Set Clear key performance indicators for the operators during their working hours, this will lead to transparency, and accountability, this will be used against future Date to review the efficiency gains.

Notes: Focus on the top 2 Factors will save 42% of Downtime.

Charlie Performance should by Supervised by shift leader to determine if batch delay is due to frequent late shifts, or due to lake of supervision.

Forecasting

Model	RMSE (Error)	Interpretation	Best For
SARIMA	**1185 min** (~19.75 hrs)	Poor fit (needs more data)	Long-term trends (months/years)
Prophet	**253.28 min** (~4.22 hrs)	Better, but still high	Short-term (days/weeks)