Manufacturing Productivity

Analyzing factory efficiency.

Our Team

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Sara Farouk

Executive Summary

Manufacturing Downtime Analysis

Insights - Forecasting - Productivity

Introduction

Manufacturing downtime is a recurring issue that disrupts the production flow and decreases overall efficiency. When a production line stops, the factory loses time, output, and productivity. Our data includes detailed records of downtime events, production lines, and daily batches produced. Understanding these patterns is essential to identify the main causes of disruptions and improve the factory's performance.
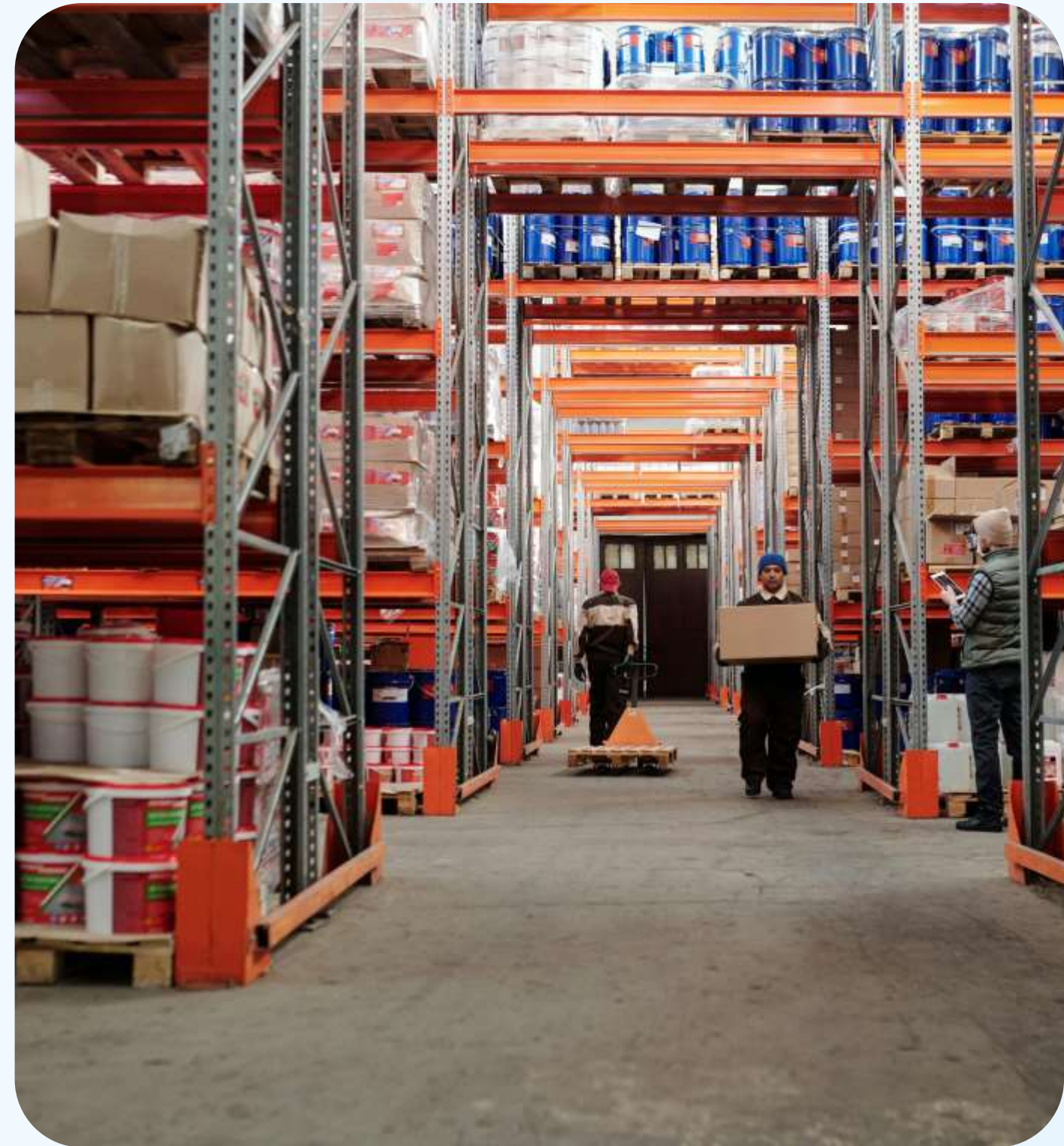
Methodology

- We performed data cleaning using Python to fix missing values, removing errors, and making sure all information was organized and ready for analysis.

- We calculated the main KPIs and performance metrics using Excel to understand production behavior and downtime impact.

- We created an interactive dashboard using Power BI to visualize downtime patterns, operator performance, and daily batch output.

- Finally, we applied predictive models to estimate next-day downtime and forecast expected production batches.

Results

Manufacturing Productivity

Operator: Charlie | Dee | Dennis | Mac

Product: All

Date: 8/29/2024 — 9/3/2024

56%	23 h 8 m	1h 52m	23 m	40 m
% Operator Error	Total Downtime	Avg Production Duration	Avg Occurrence	Avg Downtime per Batch

Downtime by Factor (mins)

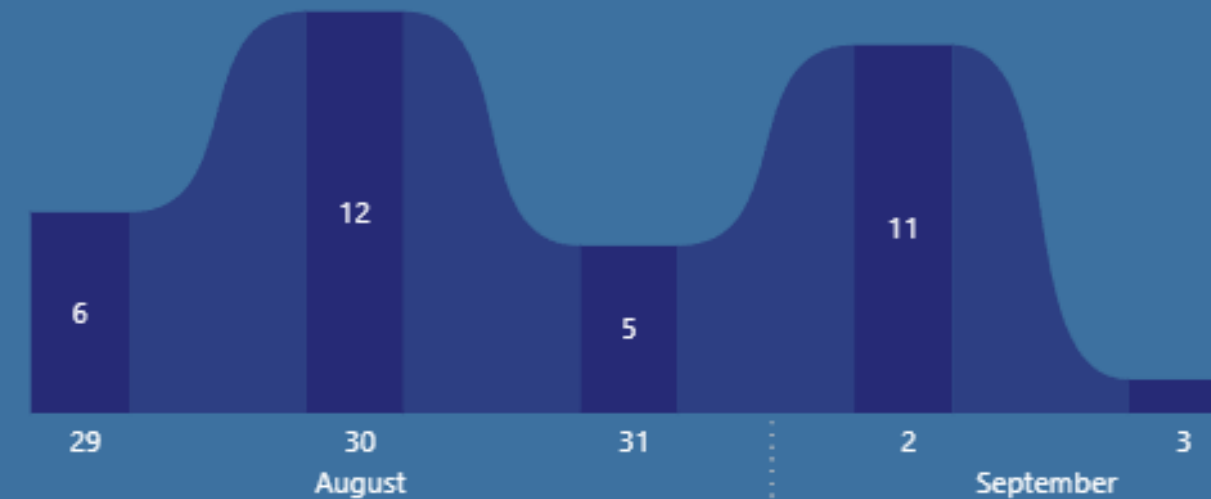| Factor	Mins
Machine adjustm...	332
Machine failure	254
Inventory shortage	225
Batch change	160
Batch coding error	145
Other	74
Product spill	57
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Label switch	33
Conveyor belt jam	17

Downtime by Product (%)

- CO-2L 19.96%
- CO-600 35.59%
- DC-600 8.29%
- LE-600 12.18%
- OR-600 5.4%
- RB-600 18.59%

Downtime by Day (mins)

Day	Mins
29 August	244
30 August	444
31 August	165
2 September	503
3 September	32

Batchs by Day

Day	Batches
29 August	6
30 August	12
31 August	5
2 September	11
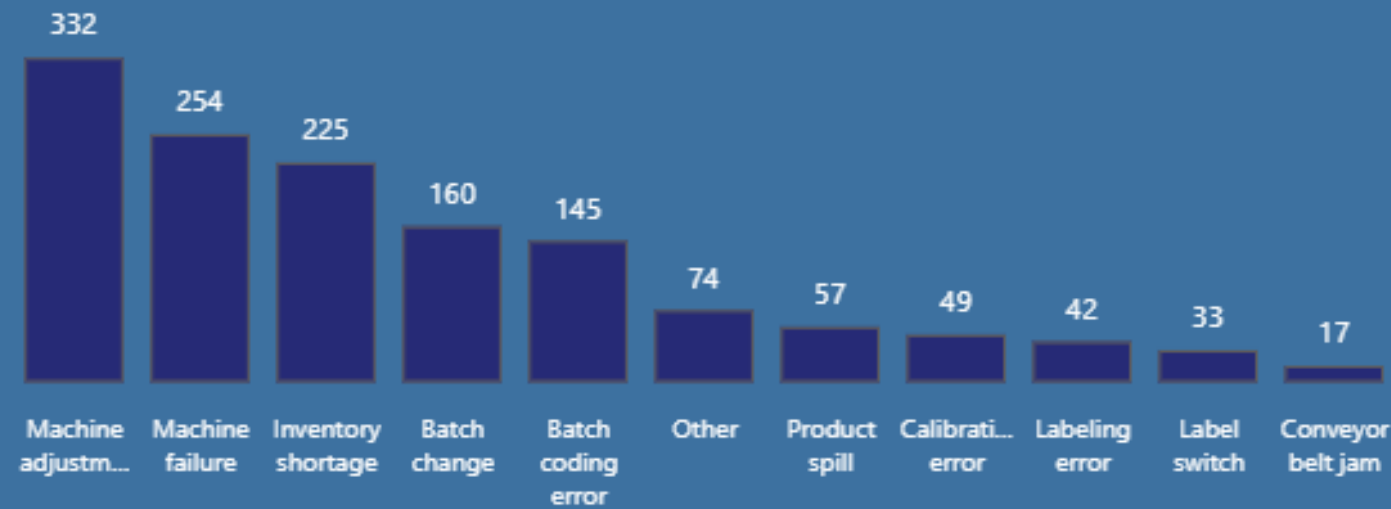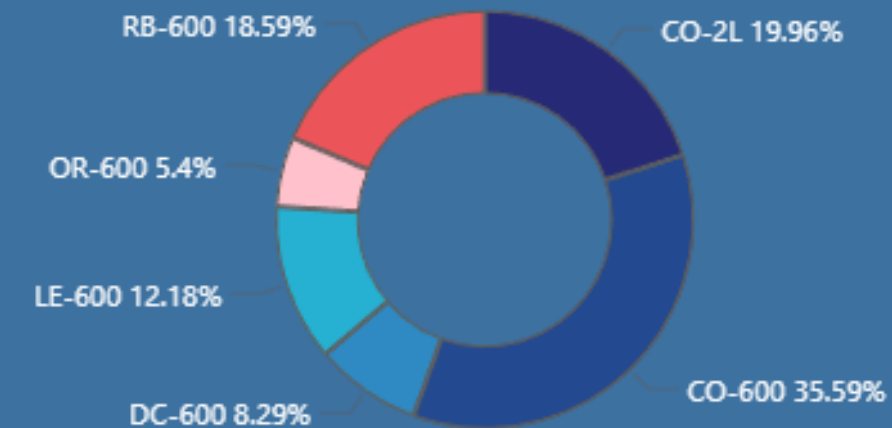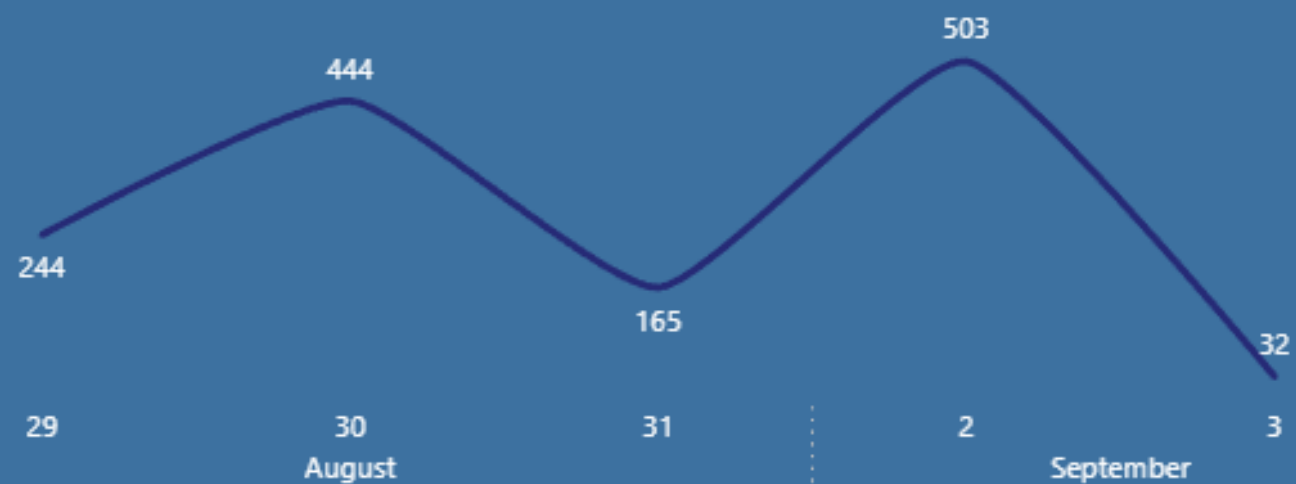
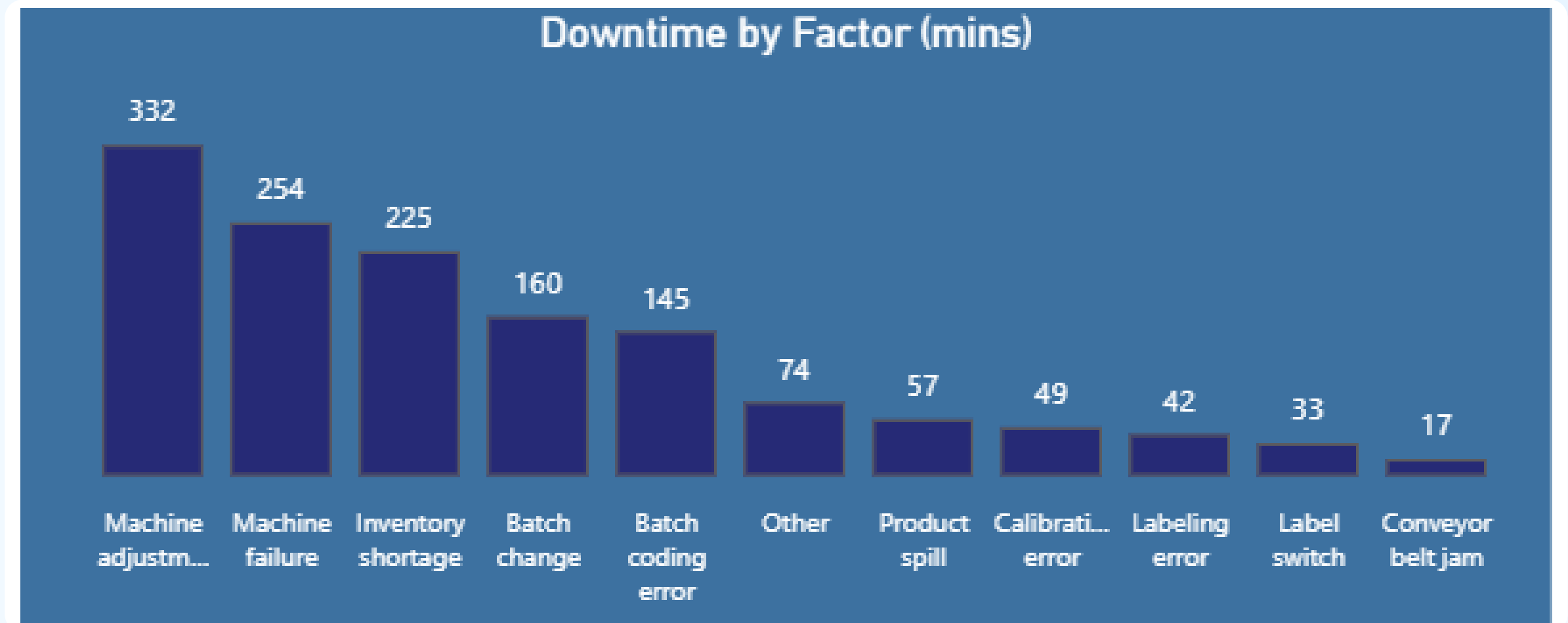## Total Downtime by Factor

This chart shows the main factors causing production downtime, with machine adjustment and machine failure being the highest contributors. Other factors like inventory shortage and batch change also add to the total downtime but their impact is less significant.

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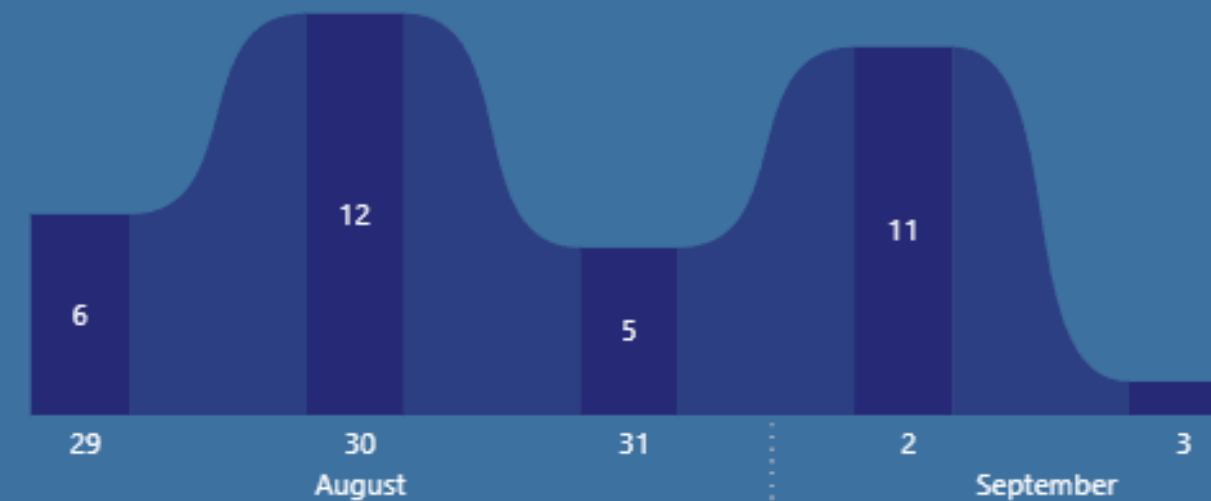- Machine adjustm... 332
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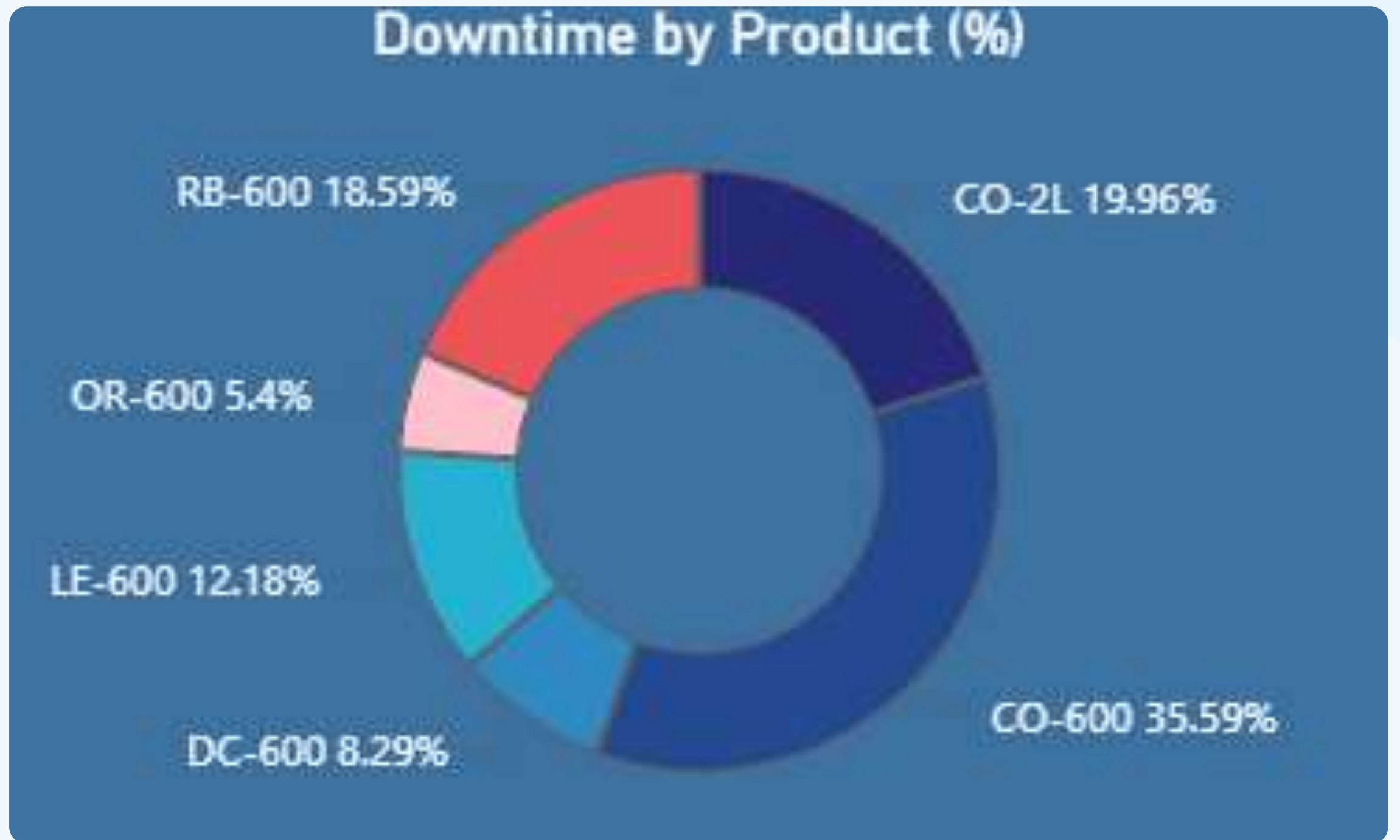- 31 August: 5
- 2 September: 11
- 3 September: (low)
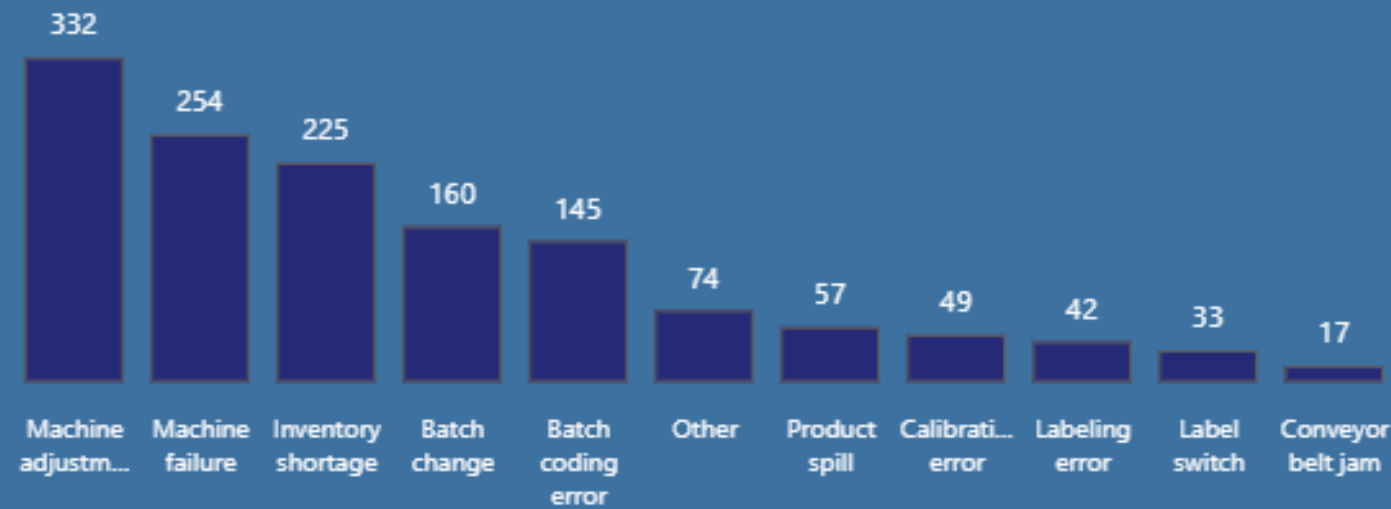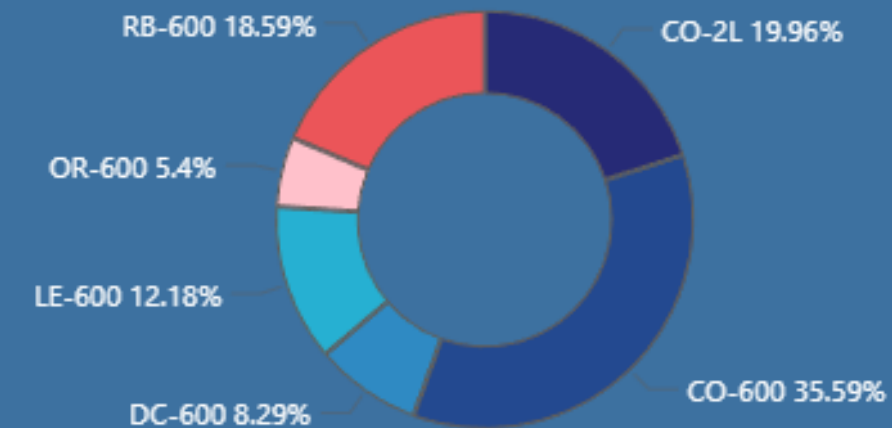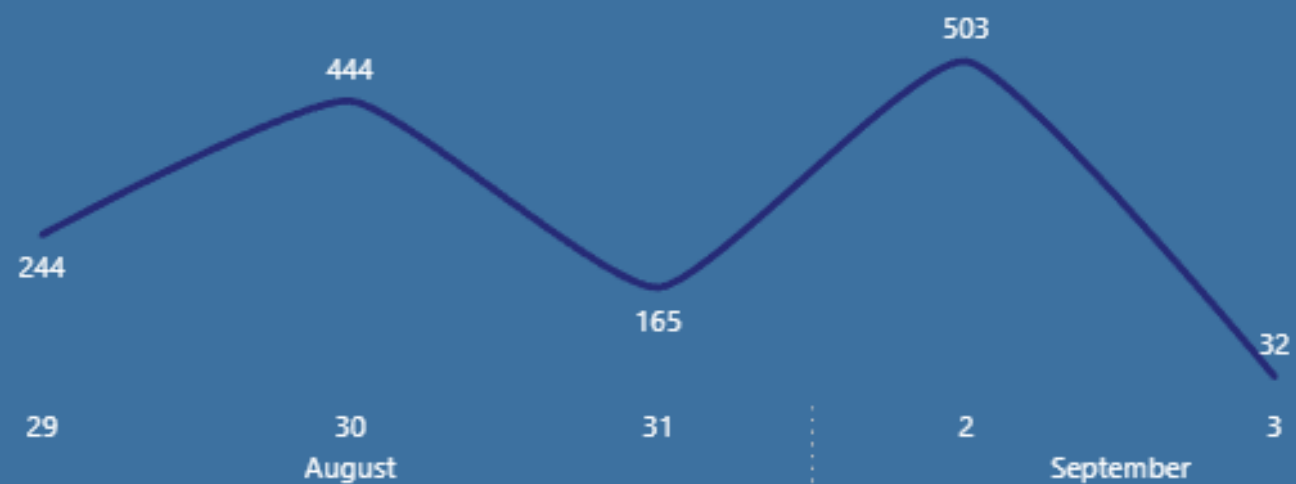
✓ Downtime by Product

This chart shows downtime distribution by product, with CO-600 accounting for the largest share followed by CO-2L and RB-600. Products like OR-600 and DC-600 contribute the least to overall downtime.

Downtime by Product (%)

RB-600 18.59%

CO-2L 19.96%

OR-600 5.4%

LE-600 12.18%

DC-600 8.29%

CO-600 35.59%

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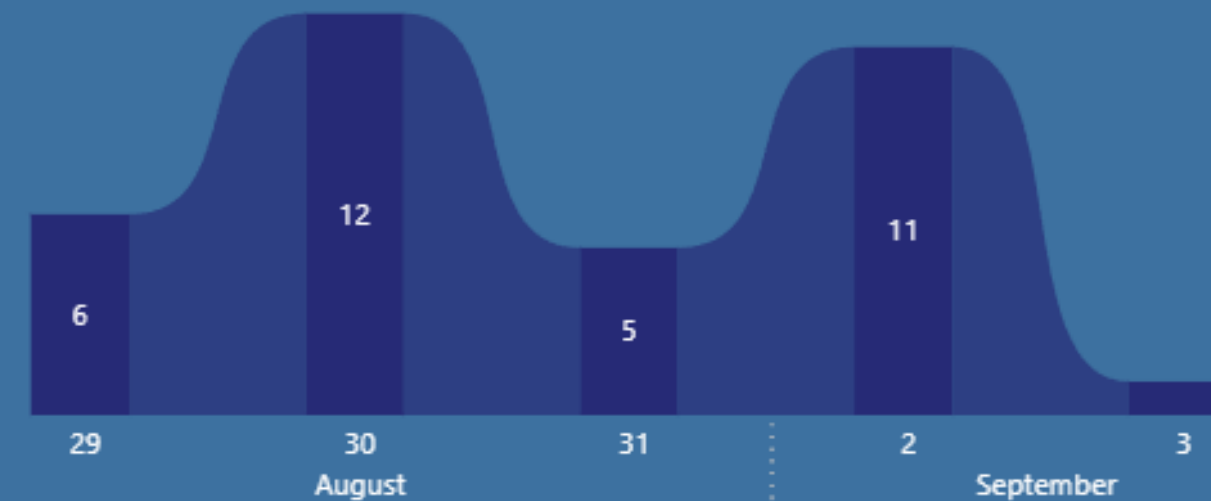- Machine adjustm...: 332
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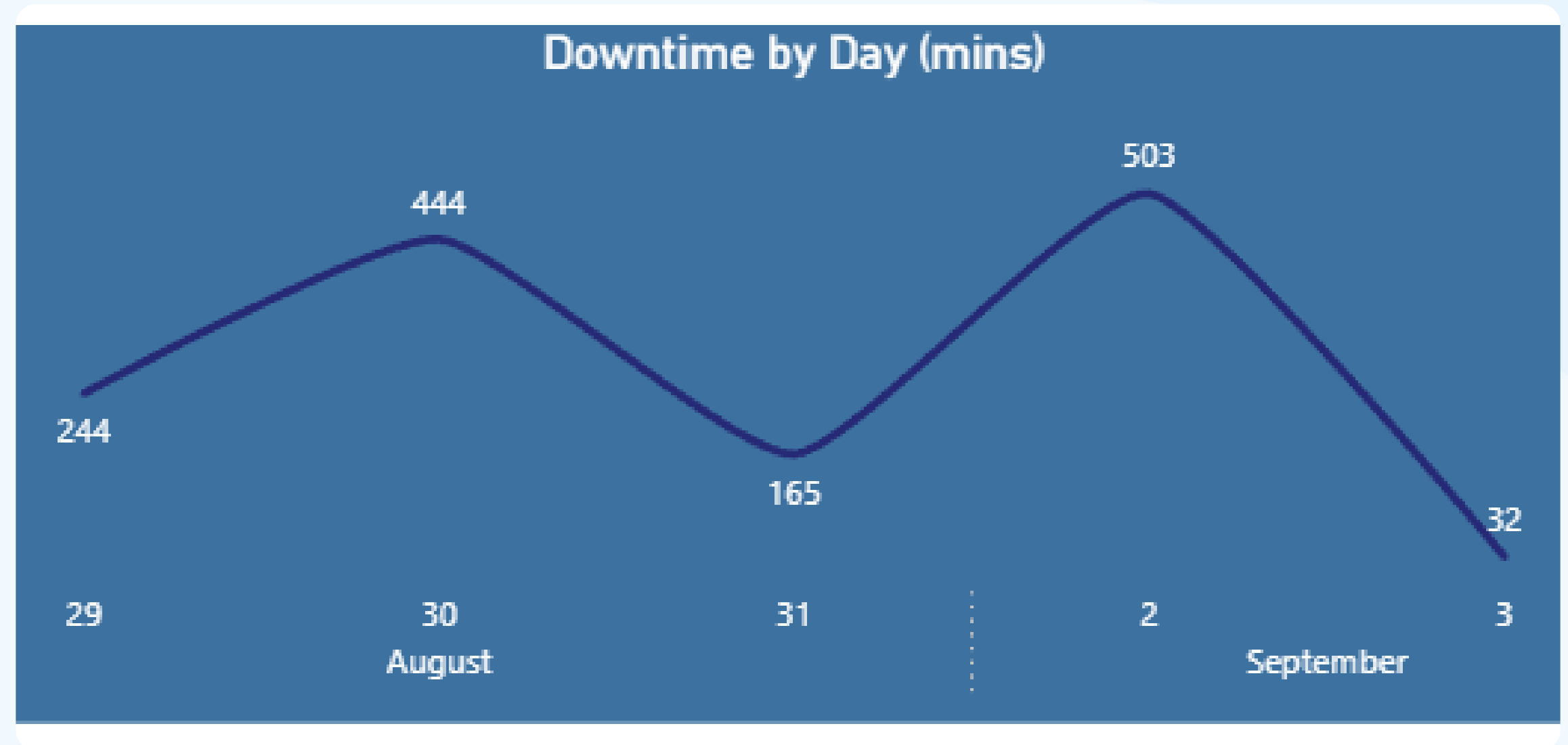- 30 August: 12
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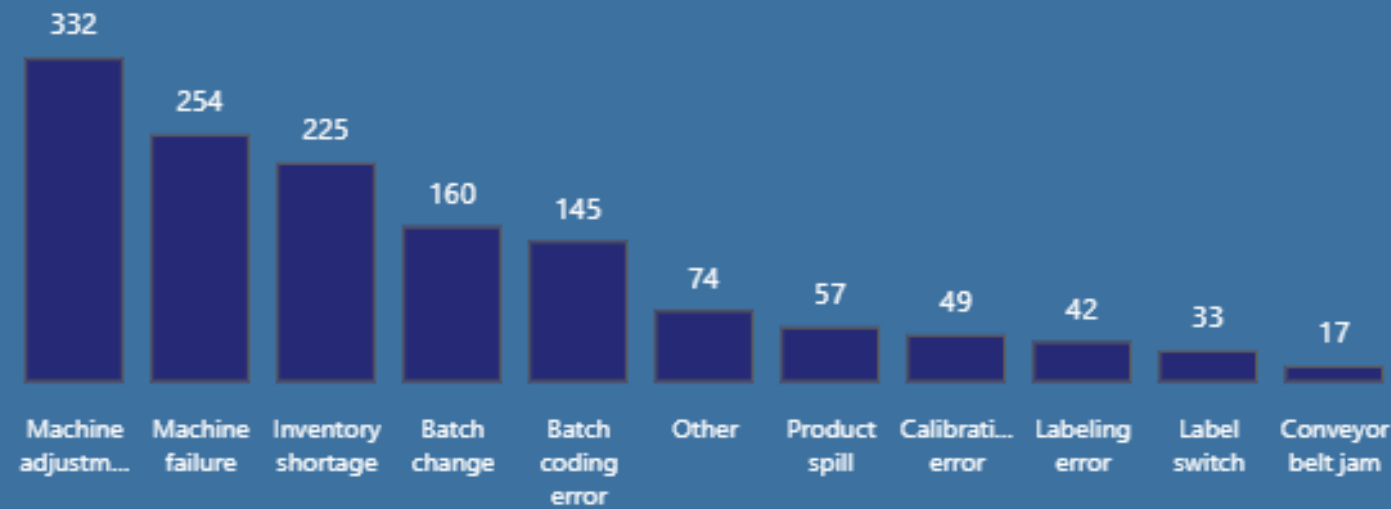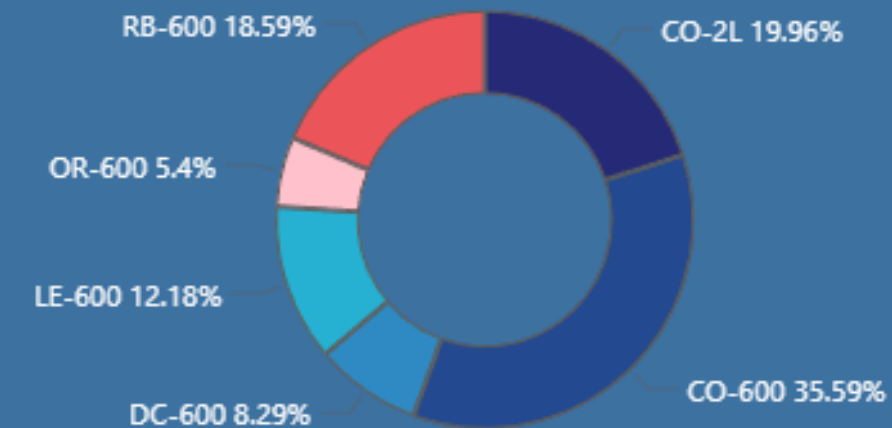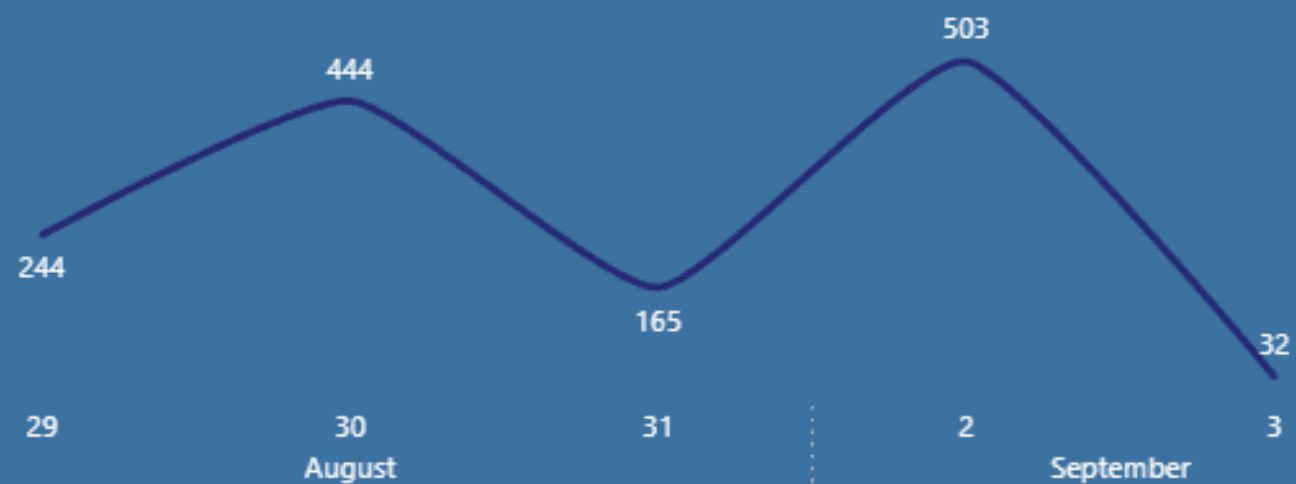
Downtime by Day

This chart shows daily downtime, starting at 244 minutes and peaking at 503 minutes before dropping sharply to 32 minutes. Overall, downtime fluctuates significantly across the displayed days.

Downtime by Day (mins)

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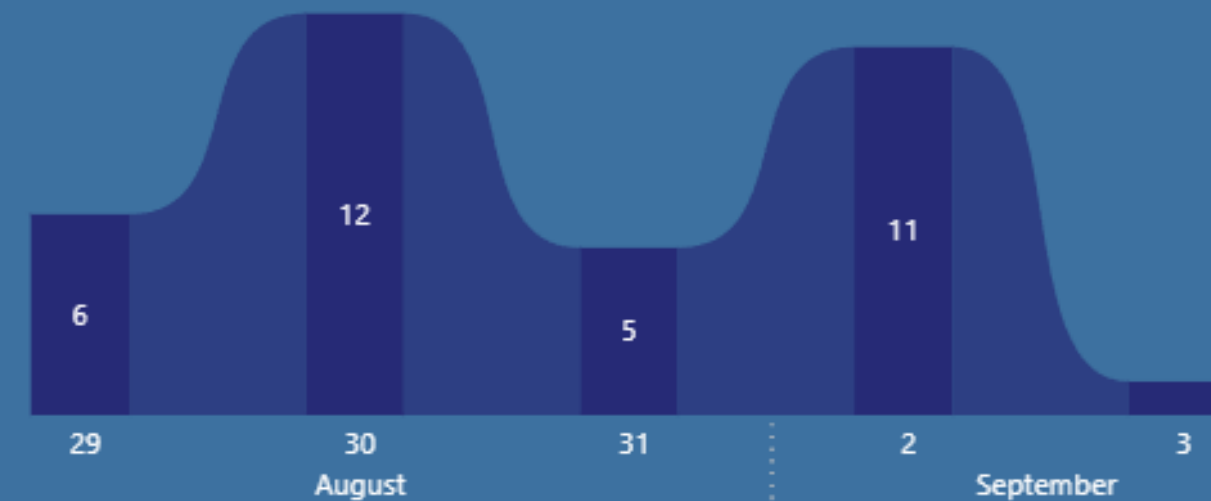| Factor	Minutes
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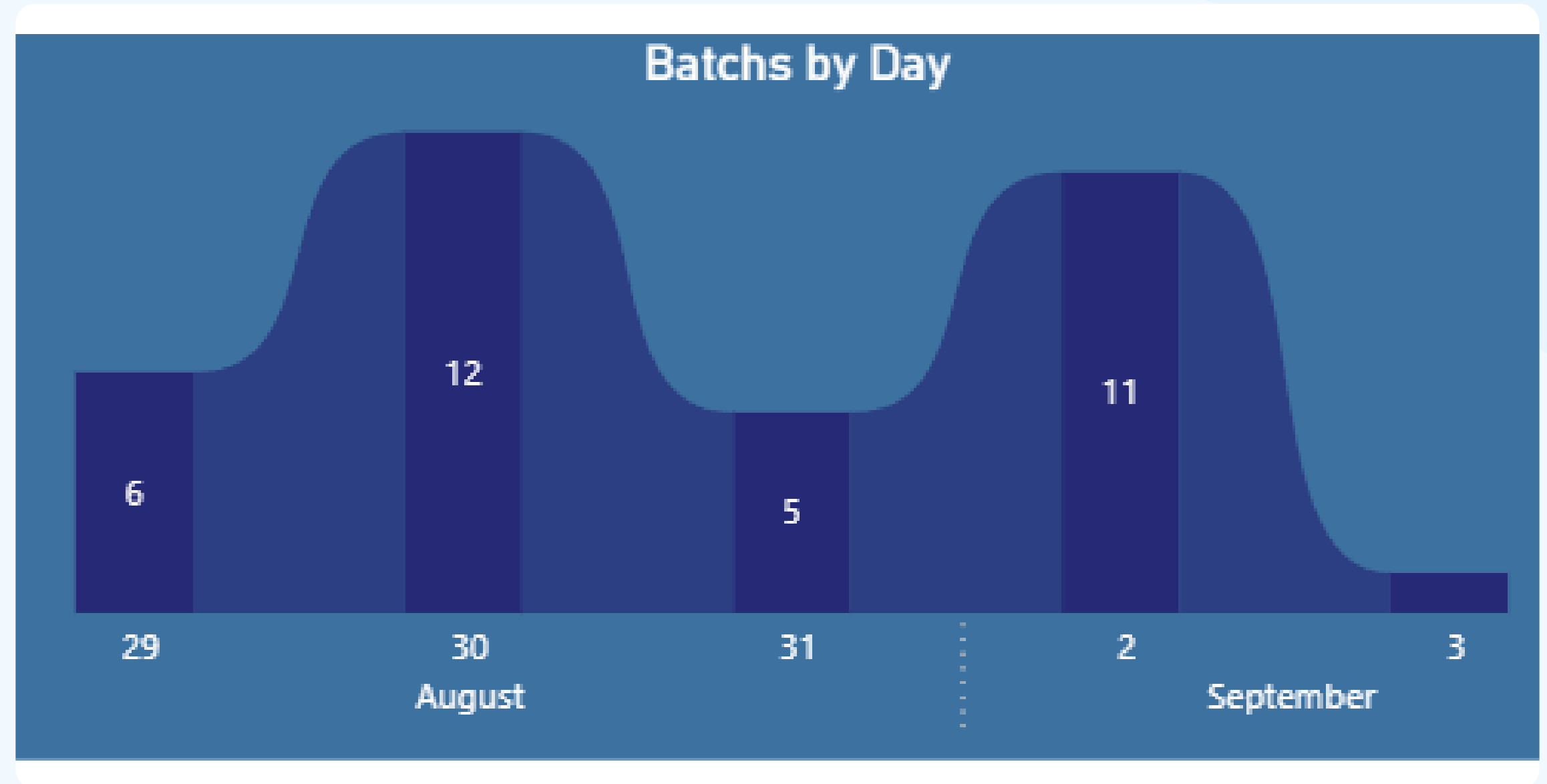| Date	Batches
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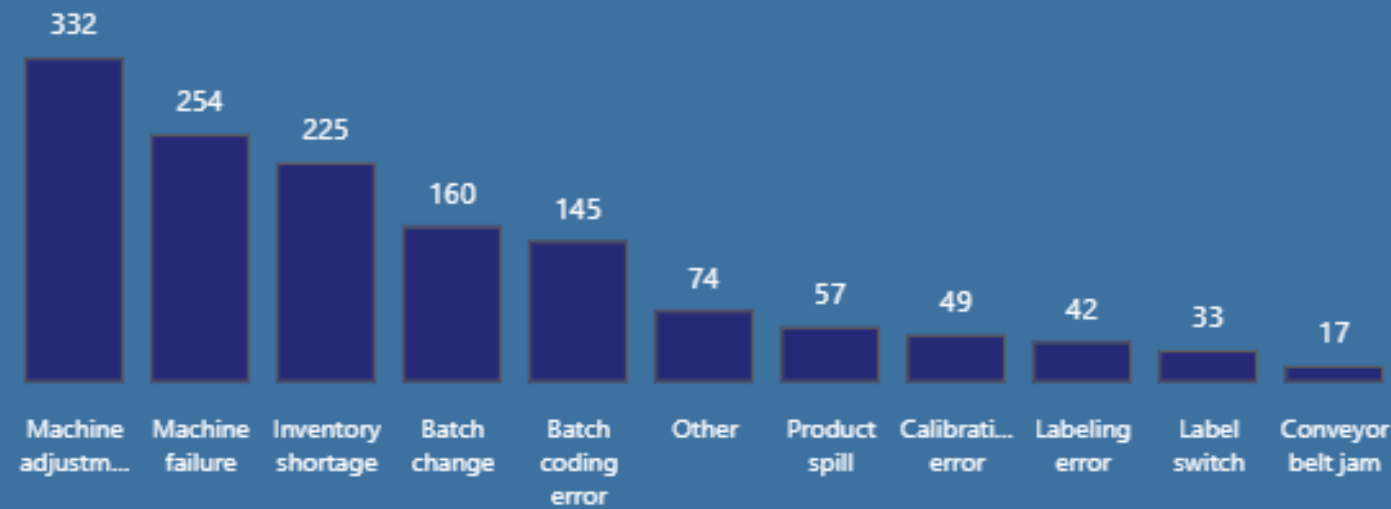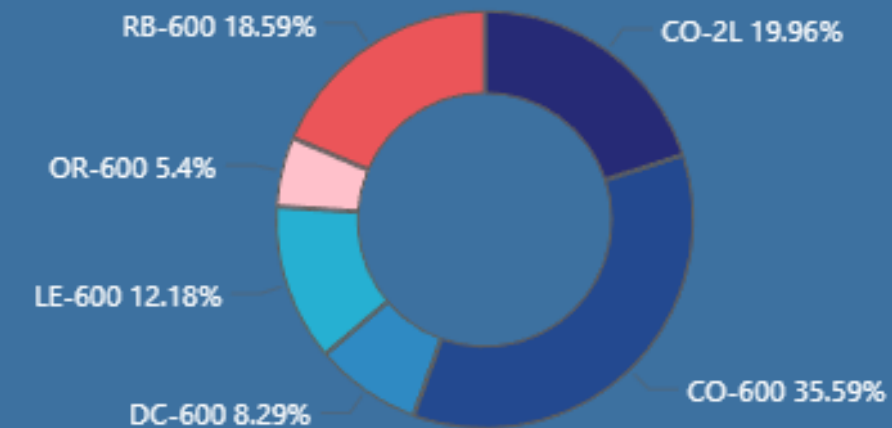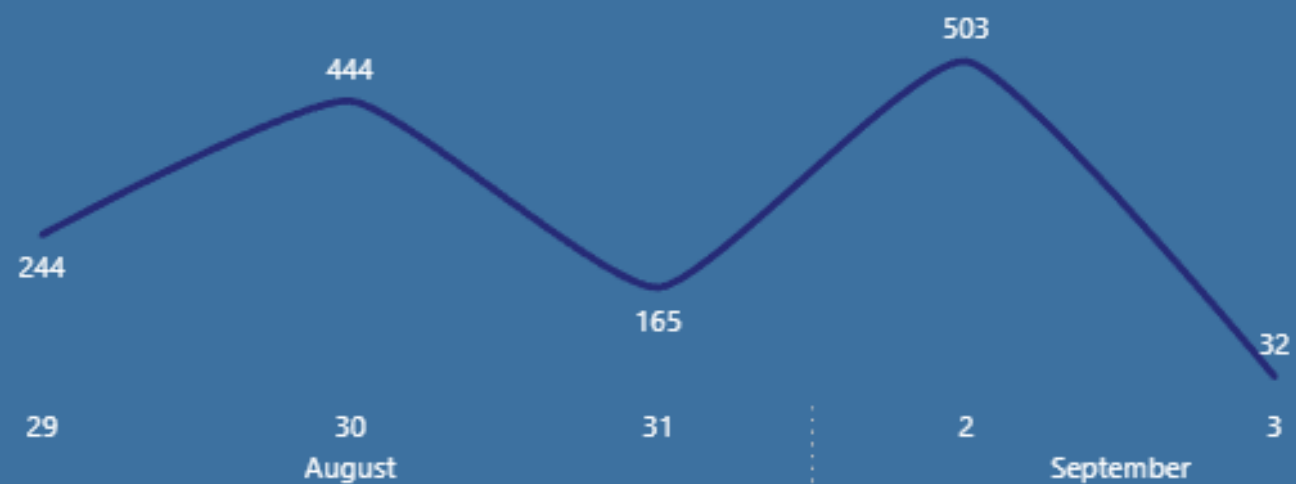
Batches by Day

This chart shows how many batches were processed each day from August 29 to September 3. Activity peaked on August 30 and September 2, while September 3 had almost no batches.

Batchs by Day

6 — 29
12 — 30
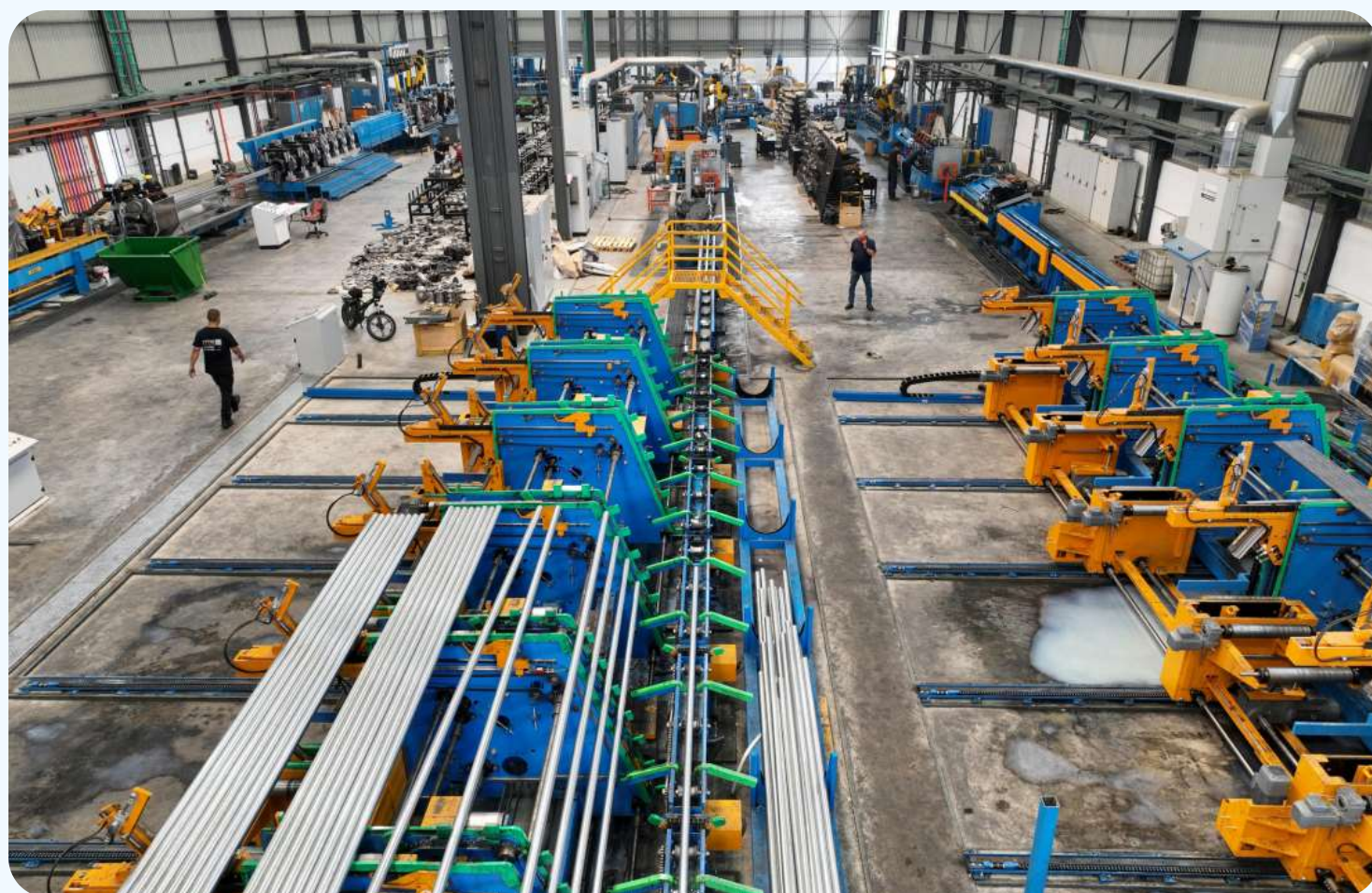5 — 31
11 — 2
3

August

September

Conclusion

- ✓ Operator errors are the main source of downtime, indicating process instability.

- ✓ Total downtime (23h) reflects significant productivity loss.

- ✓ Frequent interruptions show a system-wide performance issue.

- ✓ Machine failures remain a key technical bottleneck.

- ✓ CO-600 is the most affected product, creating concentrated inefficiency.

- ✓ Large daily fluctuations reduce consistency and predictability.
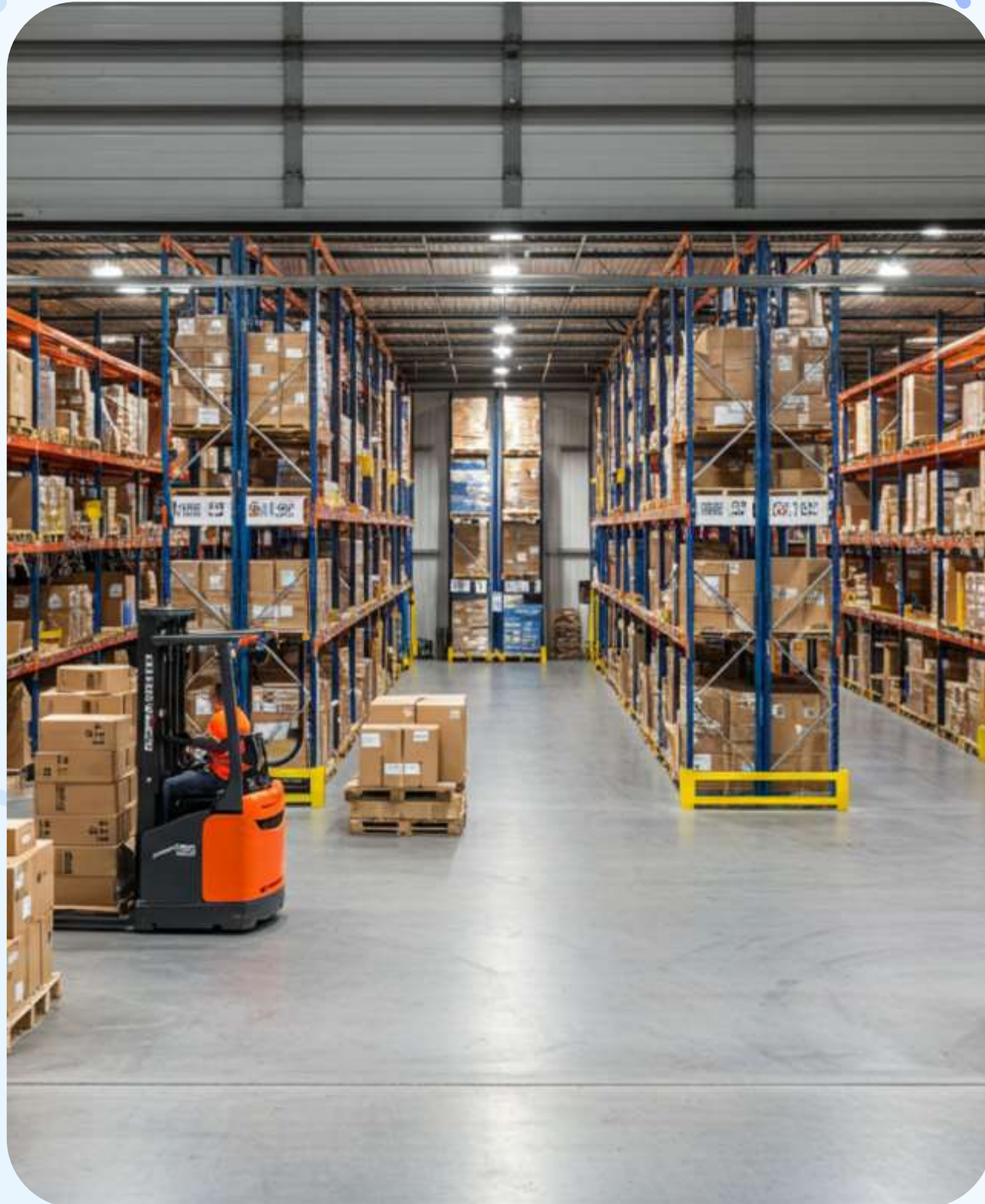
Recommendations

- Eliminate operator-related errors by enforcing strict training, clear SOPs, and continuous performance monitoring.

- Adopt a preventive maintenance strategy to reduce machine failures and ensure consistent line availability.

- Stabilize the production workflow through standardized processes, better scheduling, and tighter control over daily operations.

- Prioritize optimization of the CO-600 line, as it creates the largest productivity loss, requiring focused root-cause analysis and corrective action.

Thank You
for Listening.