

MANUFACTURING DOWNTIME

DATA ANALYSIS & INTERACTIVE POWER BI DASHBOARD

PROJECT TEAM

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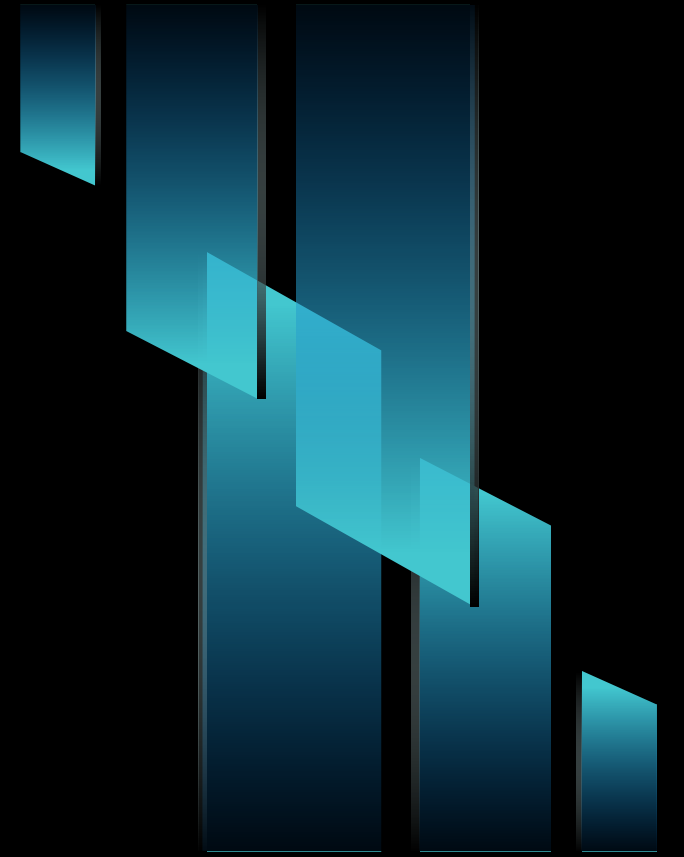
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PROJECT DESCRIPTION:

This project focuses on analyzing and forecasting downtime in a manufacturing setting to improve operational efficiency and decision-making. The objective is to transform raw downtime data into meaningful insights, identify key factors influencing production interruptions, and build predictive models to anticipate future downtime events.



DATA DESCRIPTION:

Line productivity: The core sheet it tracks production runs on each manufacturing line.

Products : A reference/crosswalk table with product details.

Downtime factors :A lookup table of reasons why a production line might stop

Line downtime :A log of actual downtime events.

Maintenance log : A log of maintenance activities on production lines.



METADATA

Column Name	Description	Data Type	Example	Notes / Cleaning Suggestions
Date	Production date	Date	1/1/2024	Ensure consistent format (YYYY-MM-DD).
Product	Product code/name	Categorical (string)	RB-600	Map to product details in Products sheet.
Batch	Batch number	Integer/String	422149	Check for duplicates.
Operator	Operator name	String	Eva	Normalize casing.
Operator Experience	Operator experience in years	Numeric (int)	4	Consider grouping (e.g., Junior/Mid/Senior).
Start Time	Shift start time	Time	6:00:00	Convert to datetime.
End Time	Shift end time	Time	7:38:10	Ensure duration is calculated properly.
Production Line	Line identifier	String	Line A	Cross-check with downtime & maintenance logs.
Line Capacity	Max capacity per line	Numeric	100	Validate against reference.
Line Age	Age of line in years	Numeric	3	Could be used in predictive analysis.
Units Produced	Units actually produced	Numeric	—	Check for negative/missing values.
Defective Units	Units marked defective	Numeric	—	Validate: must be ≤ Units Produced.
Rework Units	Units reworked	Numeric	—	Ensure logical consistency.
Total Time (mins)	Time between start & end	Numeric	—	Cross-check with Start/End Time.
Planned Downtime	Planned downtime	Numeric	—	Compare with Line downtime sheet.
Unplanned Downtime	Unplanned downtime	Numeric	—	Map with Downtime factors .

METADATA

Day of Week	Weekday name	String	Monday	Already provided.
Month	Month name	String	January	Derived column (already included).
Quarter	Fiscal quarter	String	Q1	Derived column (already included).
Is Weekend	Weekend indicator	Boolean (0/1)		0 Useful for patterns.
Line Utilization	Actual utilization ratio	Float		0.885 Should be Units Produced ÷ Line Capacity × 100.
Duration Variance	Variance from expected duration	Float		38.175 Needs definition check.
Efficiency Score	Operator/line efficiency	Float		59.89 Check formula correctness.
Theoretical Output	Expected output based on capacity	Float		88.54 Derived field.
Expected Revenue	Predicted revenue from output	Float		30.99 Cross-check with product price.
Performance Rating	Final rating score	Float		0.826 Ensure normalization (0–1 scale).

DATA CLEANING & TRANSFORMATION

RECOMMENDATIONS

MISSING/INVALID VALUES

FILL MISSING CATEGORICAL FIELDS WITH "UNKNOWN".

HANDLE OUTLIERS IN NUMERIC COLUMNS (E.G., NEGATIVE DOWNTIME).

DERIVED COLUMNS FOR INSIGHTS:

$\text{DOWNTIME \%} = (\text{UNPLANNED DOWNTIME} + \text{PLANNED DOWNTIME}) \div \text{TOTAL TIME} \times 100.$

$\text{REVENUE PER UNIT} = \text{EXPECTED REVENUE} \div \text{UNITS PRODUCED}.$

$\text{OPERATOR PRODUCTIVITY} = \text{UNITS PRODUCED} \div \text{OPERATOR EXPERIENCE (PROXY FOR EFFICIENCY TRENDS)}.$

ADD DOWNTIME REASON, DOWNTIME CLASSIFICATION COLUMNS

The background is a dark navy blue. On the left side, there are several overlapping, semi-transparent blue geometric shapes, including rectangles and parallelograms, some of which are tilted. On the right side, there is a grid of small, light blue dots that fade out towards the center.

THANK YOU