Project Proposal: Manufacturing Downtime

1. Project Description

This project aims to analyze and forecast machine downtime in a manufacturing plant to help reduce production losses and improve operational efficiency. The project focuses on cleaning, analyzing, predicting, and visualizing downtime data to support data-driven decisions for process improvement.

2. Group Members & Roles

- Rana Essam Eldean Taha Abdelaal– Data Modeling & Structure Analyst
- Malak Mohamed Sayed Amin – Data Visualization & Reporting Analyst
- Eyad Mohanad Mohamed Bakry – Exploratory Data Analyst (EDA Specialist)
- Anas Sayed Ali Ali – Predictive Analyst (Forecasting Specialist)
- Youmna Emad Soliman Abdeljwad– Data Acquisition & Preparation Analyst

3. Team Leader

- Rana Essam Eldean Taha Abdelaal

4. Objectives

- Identify the main causes and patterns of machine downtime using data analysis.
- Build predictive models to forecast future downtime events and production impacts.
- Develop a Power BI dashboard to visualize downtime trends and performance KPIs.
- Optimize maintenance schedules based on data-driven insights to reduce future downtime.

5. Tools & Technologies

- Programming & Analysis: Python (pandas, matplotlib, seaborn), SQL
- Data Preparation & Reporting: Excel
- Visualization: Power BI

6. Milestones & Deadlines

Week	Phase	Tasks	Deliverables
Week 1	Build Data Model, Data Cleaning & Preprocessing	Data preprocessing, data model creation	Cleaned dataset & preprocessing notebook
Week 2	Analysis Questions Phase	Identify key analysis questions	Documented set of analysis questions
Week 3	Forecasting Questions Phase	Develop forecasting model & visualize predictions	Visualization plots & forecasting results
Week 4	Visualization Dashboard & Final Presentation	Build Power BI dashboard & final report	Dashboard, final report & presentation

7. Key Performance Indicators (KPIs)

- Data Cleaning & Processing: 100% of missing/duplicate data handled.
- Analysis & Insights: ≥ 90% of business questions answered.
- Visualization & Reporting: Dashboard load time < 3s; usability ≥ 80%.
- Final Documentation & Presentation: 100% report completeness; ≥ 3 actionable recommendations.
- Model Accuracy: Forecasting model accuracy ≥ 85%.