Power BI Dashboard Analysis Report: Manufacturing Asset Performance

1. Executive Summary

This report provides a comprehensive analysis of the Manufacturing Asset Performance Power BI dashboard. The dashboard effectively tracks key metrics across **Downtime, Failures, Maintenance Costs, and Parts Inventory**. The data reveals significant challenges in asset reliability, with **Wear** and **Corrosion** being the primary drivers of downtime and production loss. A critical finding is the high cost of spare parts, which accounts for over 95% of the reported maintenance expenditure. Furthermore, a substantial financial discrepancy between total maintenance cost and total parts consumed cost requires immediate investigation to ensure data integrity. The overall Mean Time To Repair (MTTR) is 6.02 hours, but this figure rises significantly for Critical failures.

2. Operational Performance and Downtime Analysis

The dashboard indicates a total of **35,770 hours** of downtime and **145,270 units** of production loss across the recorded period [1]. The trend analysis shows a volatile downtime count over the years, with notable peaks in early 2023 and mid-2024, suggesting inconsistent asset reliability [1].

2.1. Root Causes of Loss

The analysis of downtime causes highlights a clear focus area for reliability improvement.

Cause	Lost Production (Tons/Units)	Downtime Hours
Wear	12.4K	3.6K
Seal Failure	11.4K	2.9K
Corrosion	11.1K	3.5K
Trip	11.3K	2.9K
Electrical Fault	10.6K	3.3K

Wear and **Corrosion** are the top two causes for both lost production and total downtime hours, indicating that a more robust **Preventive Maintenance (PM)** program, focusing on

material science, lubrication, and protective coatings, is necessary to address these systemic issues [1].

2.2. Equipment Criticality and Cost

The dashboard tracks 60 unique equipment IDs, categorized into 47 types [2]. The **Cost of Downtime per Hour** metric is a crucial tool for prioritizing maintenance efforts.

Equipment Name	Cost of Downtime per Hour	Criticality	Equipment Type
Urea Granulation Conveyor	1592	*Not Visible*	*Not Visible*
Scrubber S-101	1362	*Not Visible*	*Not Visible*
Temperature Sensor TS-101	1354	*Not Visible*	*Not Visible*

The Urea Granulation Conveyor has the highest cost of downtime, making it a prime candidate for a **Reliability-Centered Maintenance (RCM)** review [2]. The equipment list also confirms that **Critical** assets, such as the Acid Wash Tank AWT-01, are correctly identified, allowing for risk-based decision-making [2].

3. Maintenance and Failure Analysis

The total number of recorded downtime events is 6,800, with **5,031** classified as formal failures [4].

3.1. Failure Severity and Frequency

The failure data shows that while **Minor** failures are the most frequent (2.5K), the **400 Critical failures** represent the highest risk and must be the focus of immediate attention [4].

Failure Severity	Count	Percentage of Total Failures
Minor	2.5K	~50%
Major	1.3K	~26%
Critical	0.4K	~8%

3.2. Mean Time To Repair (MTTR)

The overall average MTTR is **6.02 hours** [5]. However, the time required to repair the most critical assets is significantly longer.

Failure Severity	Average MTTR (Hours)
Critical	7.97
Major	6.04
Minor	6.02

The **33% increase** in MTTR for Critical failures compared to the average suggests that repair procedures for high-risk equipment are more complex, require specialized resources, or suffer from parts availability issues [5]. Furthermore, the highest MTTR by equipment type is **Loading** (7.6 hours), which should be investigated for potential process bottlenecks [5].

4. Financial and Inventory Review

The financial metrics highlight a significant imbalance in maintenance spending.

4.1. Maintenance Cost Breakdown

The total maintenance cost is **$30.67 Million**, with a cost per hour of maintenance of **$857.28** [3].

Cost Component	Value (USD)	Percentage of Total Cost
Parts Cost	29.22M	95.2%
Labor Cost	1.07M	3.5%
Other Cost	0.37M	1.2%

The overwhelming dominance of **Parts Cost** (95.2%) is highly unusual for a typical maintenance operation and suggests that the organization is primarily replacing components rather than repairing them, or that the cost of spare parts is exceptionally high [3].

4.2. Inventory and Consumption

The inventory dashboard shows a total inventory value of **$70.65 Million** with **19K** parts in stock [6]. Only **32 parts** are currently below the reorder level, indicating generally good inventory management [6].

However, a critical data integrity issue is observed:

- **Total Maintenance Cost** (Screenshot 3): **$30.67M**
- **Total Parts Cost Consumed** (Screenshot 6): **$46.50M**

The cost of consumed parts ($46.50M) is **$15.83 Million higher** than the reported total maintenance cost ($30.67M). This discrepancy must be resolved immediately, as it severely compromises the accuracy of all financial reporting and decision-making based on these figures. The high consumption cost is driven by specific items, with **Orifice Plate** ($1.07M) and **Bearing 63...** ($1.05M) being the top two most expensive consumed parts [6].

5. Recommendations

Based on the analysis, the following actions are recommended for company discussion:

1. **Investigate Financial Discrepancy:** Immediately launch an investigation into the **$15.83M difference** between Total Maintenance Cost and Total Parts Cost Consumed to ensure accurate financial reporting.
2. **Target Reliability Improvements:** Prioritize RCM and PM programs for assets affected by **Wear** and **Corrosion**, which are the top causes of downtime and production loss.
3. **Optimize Critical Repairs:** Review the repair procedures and resource allocation for **Critical failures** to reduce the **7.97-hour MTTR**. This may involve pre-kitting parts or increasing technician specialization.
4. **Address Parts Cost:** Analyze the procurement and consumption of the most expensive parts (e.g., Orifice Plate, Bearing 63...) to identify opportunities for bulk purchasing, alternative suppliers, or engineering changes to reduce reliance on high-cost components.
5. **Close Data Gaps:** Investigate the **1,769 downtime events** not linked to a formal failure record to improve process documentation and ensure all significant events are captured for root cause analysis.