

PREDICTIVE MAINTENANCE

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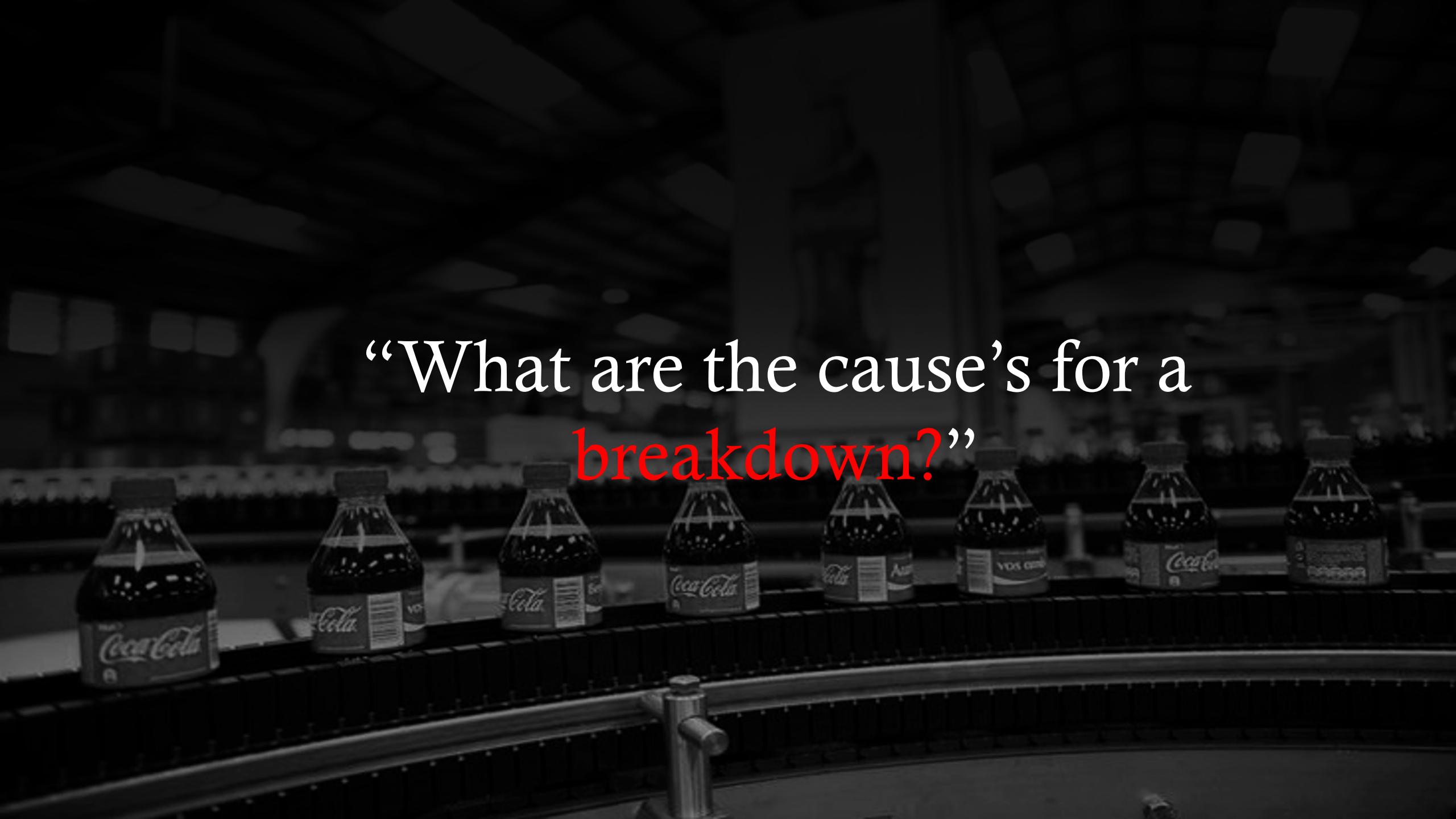
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BUSINESS PROBLEM

Accurately predict machine breakdowns across all production plants to streamline maintenance processes, reduce unplanned downtime, and ensure operational efficiency while meeting 100% of production demand.

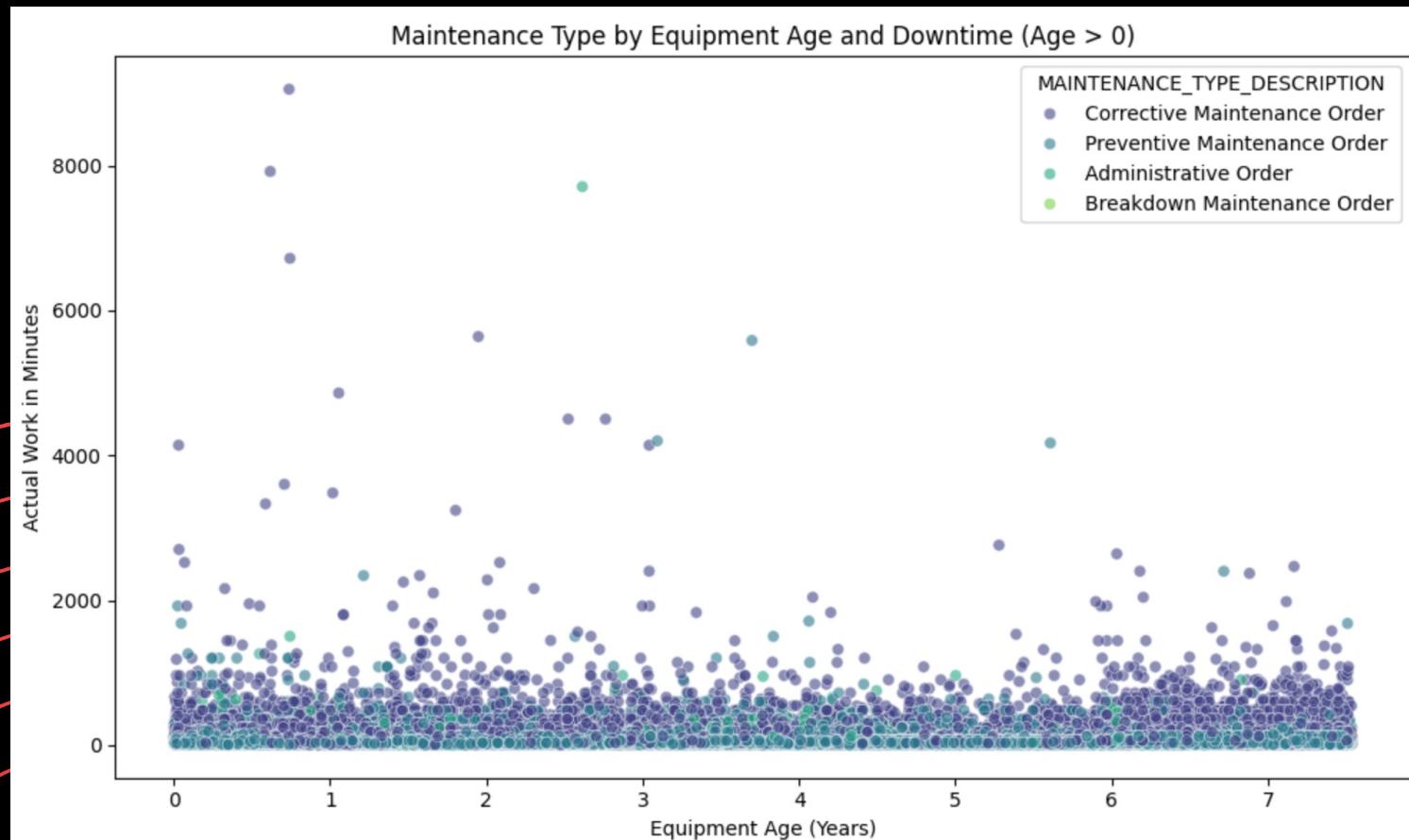
IMPACT

By leveraging predictive maintenance, the company can boost revenue, extend machine life, reduce maintenance costs, optimize spare part inventory, and enhance production capacity.



“What are the cause’s for a
breakdown?”

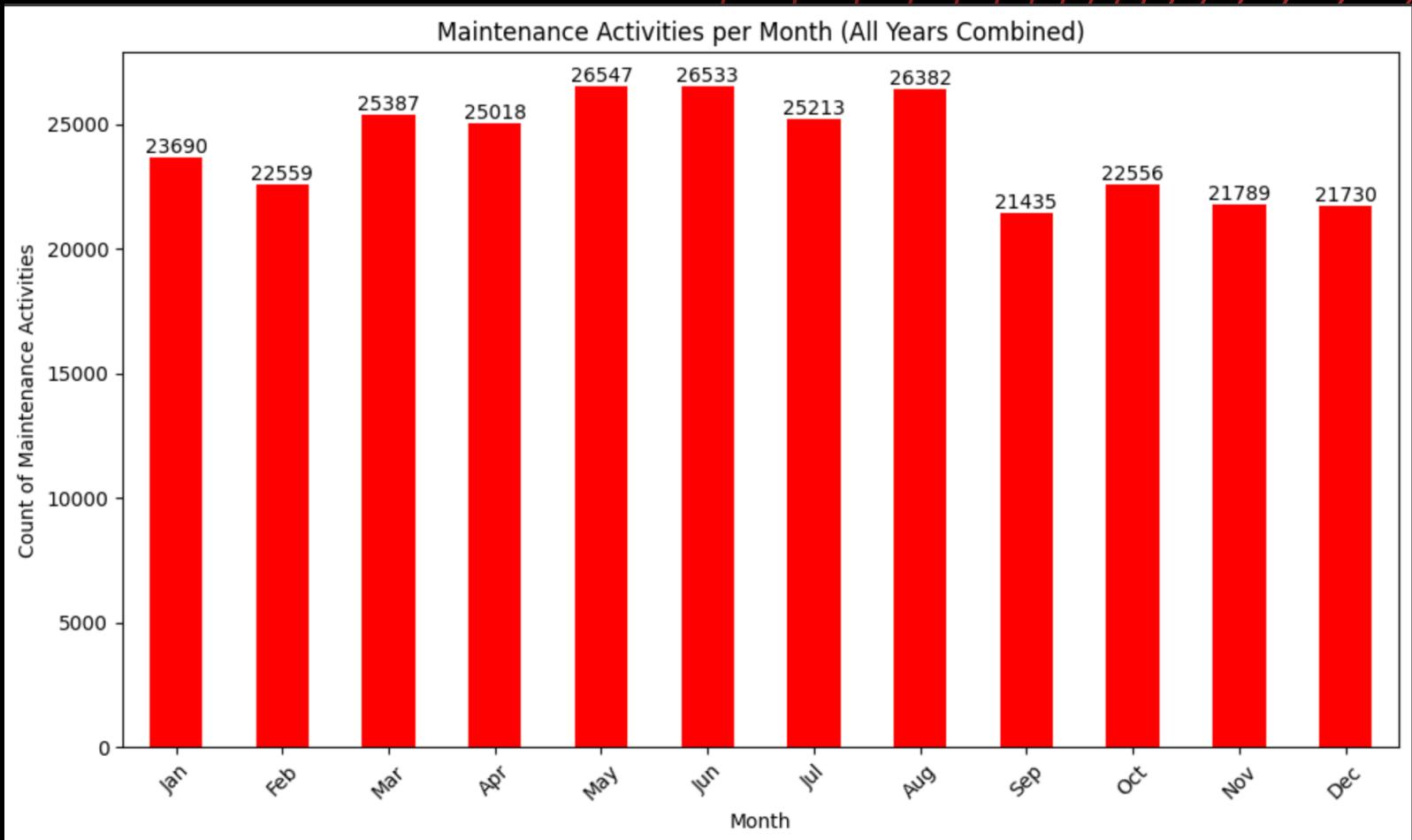
IMPACT OF AGE AND WEAR ON MACHINE PERFORMANCE

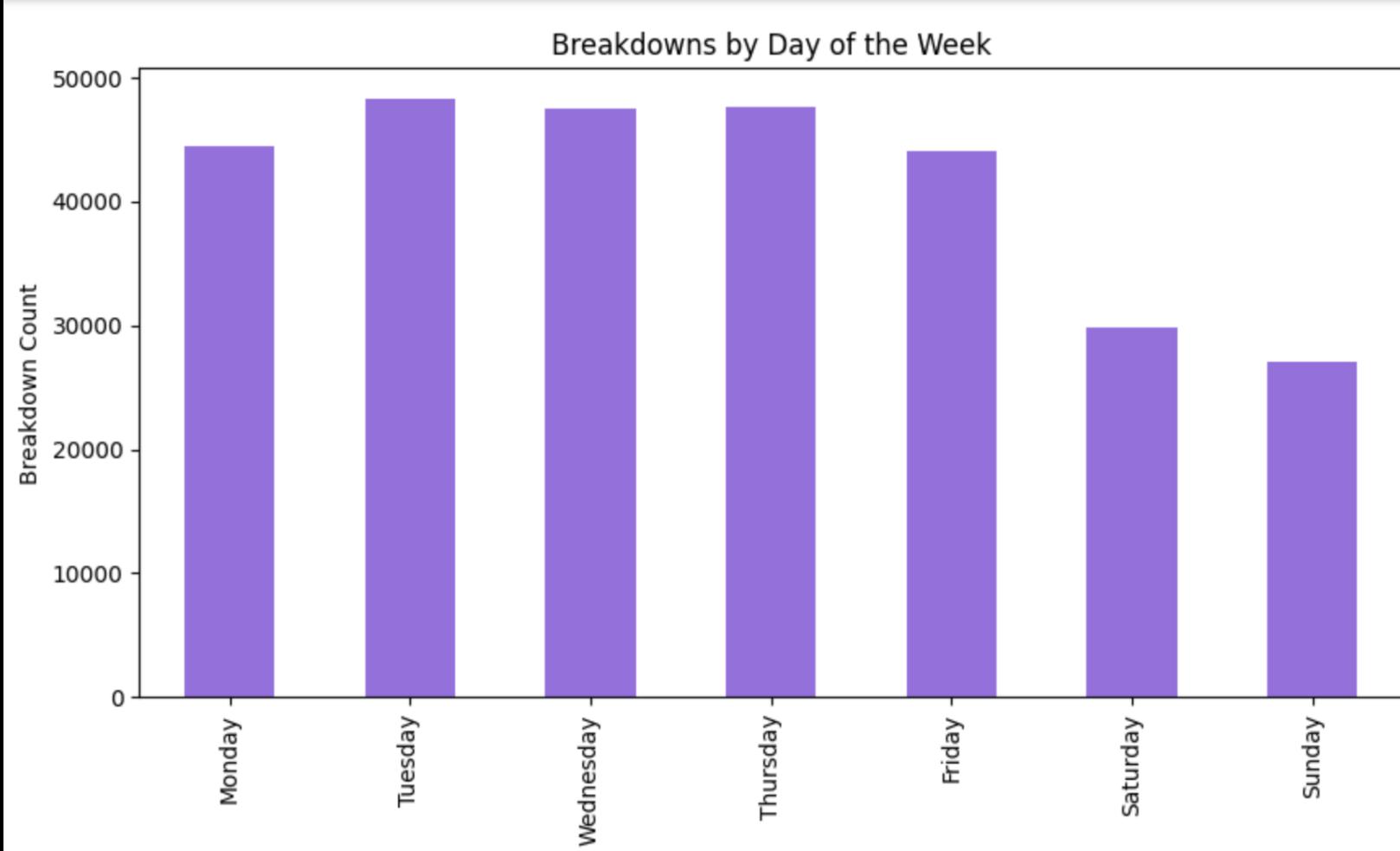


- Downtime not limited to older equipment; significant in newer machines too.
- Majority breakdown 0-3 years.
- Corrective dominates; Preventive reduces downtime.

UNCOVERING **SEASONAL** PATTERNS

- Maintenance activities peak during late spring and summer
- May (26,547), June (26,533), August (26,382)
- May has the highest maintenance activities, prioritize preventive strategies before this peak.





Breakdown counts are higher during weekdays, likely due to higher machine utilization during production schedules.

Equipment by Plant and Production Location

Suzuka (Plant ID: G221)

- L04 KRONES PALLETIZER
- L04 PACKR_CASE_KHS_TSP A-M

Silverstone (Plant ID: G261)

- L2 LINE 2 FILLER
- L2 PALLETIZER_T-TEK_TS-0075

Monza (Plant ID: G291)

- L1 FILLER_ROTARY_BTL_60_VALVE
- L4 FILLER_ROTARY_CAN_100_VALVE

Monaco (Plant ID: G811)

- ILBM COOLING TOWER
- ROGERS AIR COMPRESSOR

Roma (Plant ID: G812)

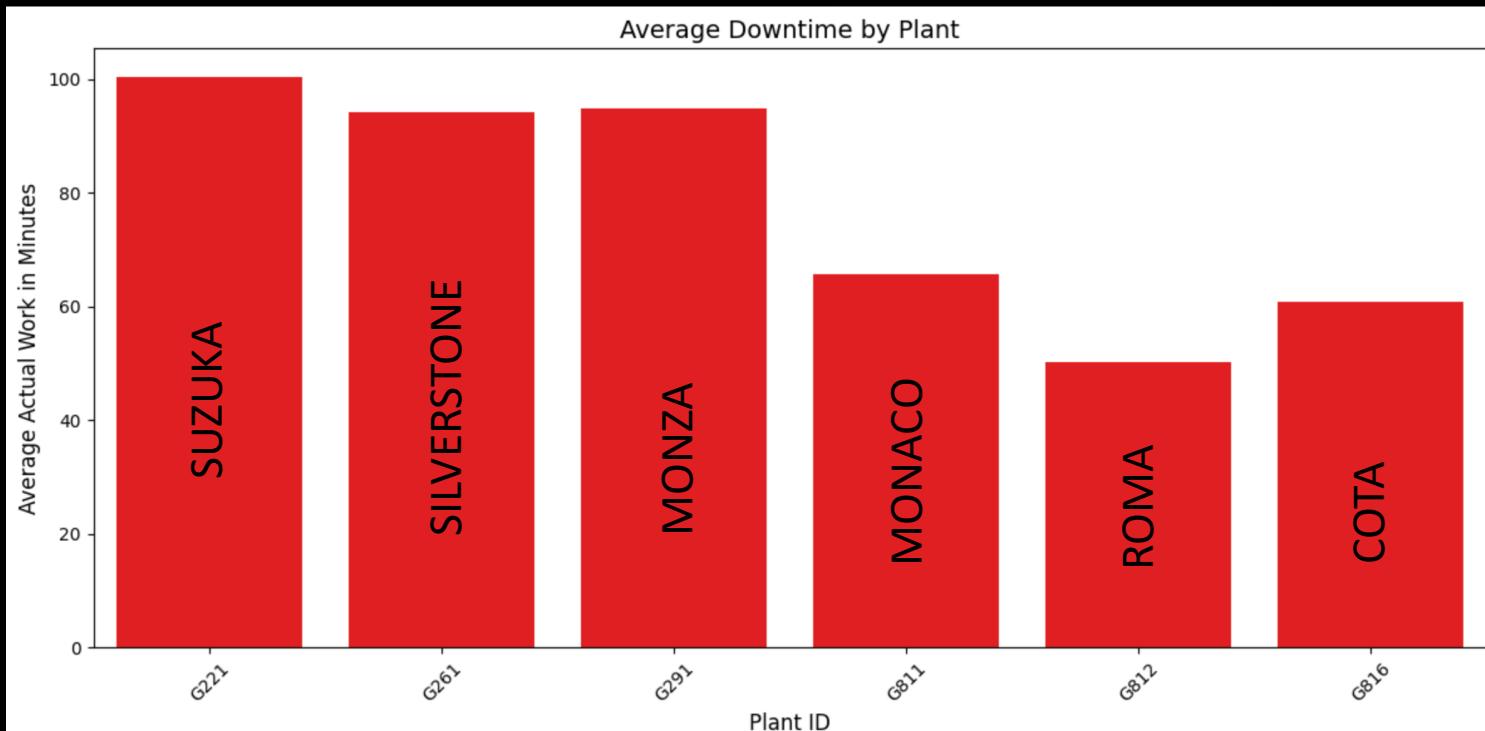
- L3 FILLER_ROTARY_CAN_124_VALVE
- CAN LINE 3 SEAMER

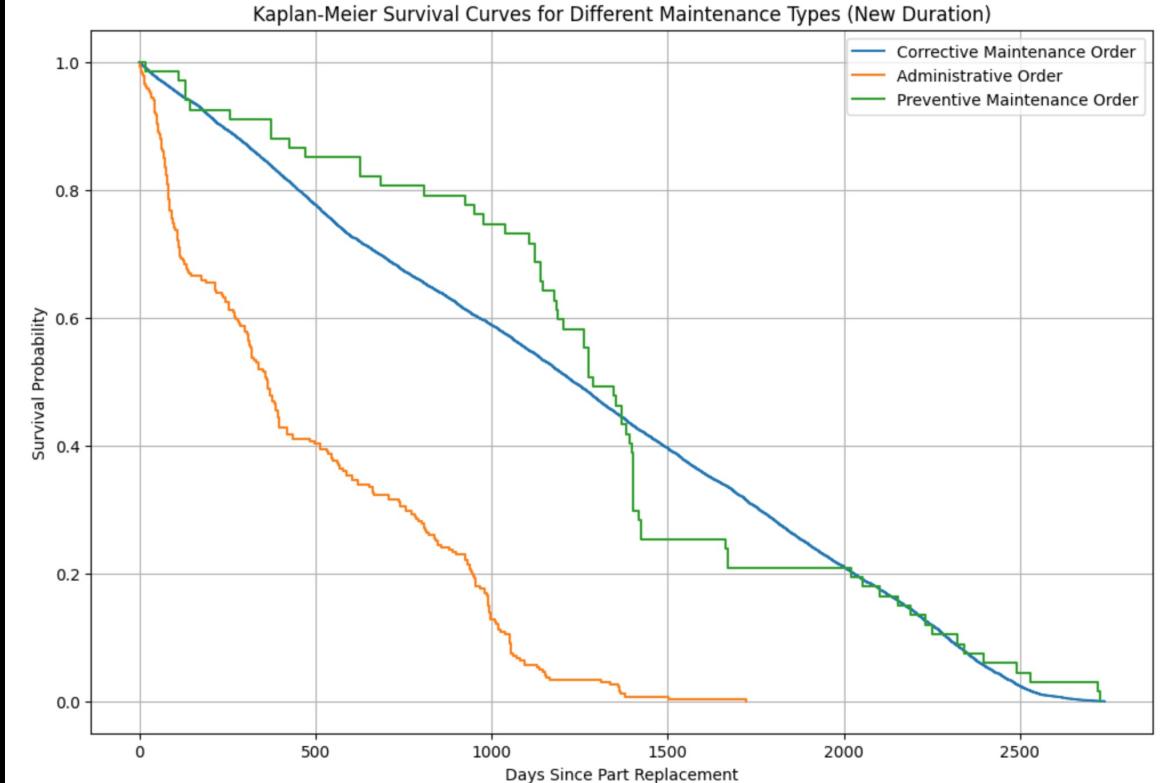
Cota (Plant ID: G816)

- L1 FILLER_ROTARY_CAN_72_VALVE
- L3PACKR_CASE_WESTROCK_DD1250M



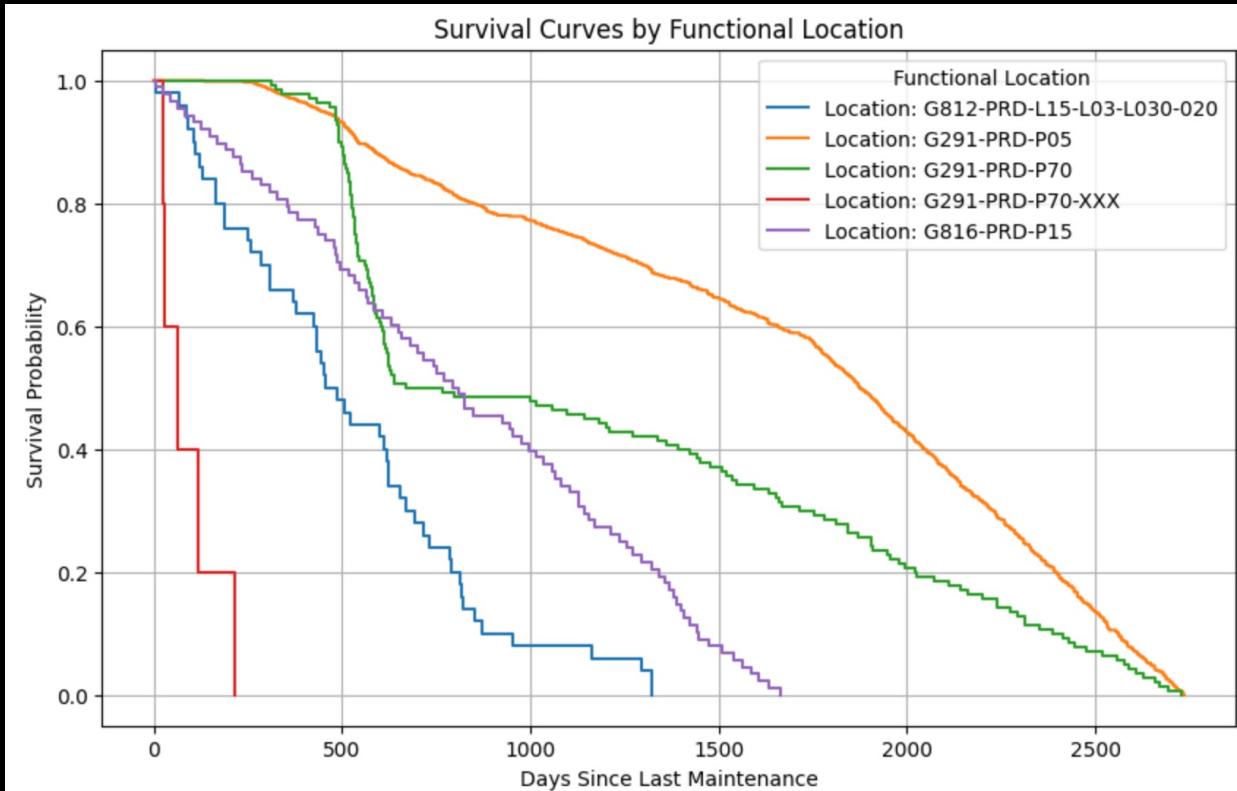
Average Downtime by Plant





- **Corrective Maintenance Order:** 1,231 days
- **Administrative Order:** 364 days
- **Preventive Maintenance Order:** 1,288 days

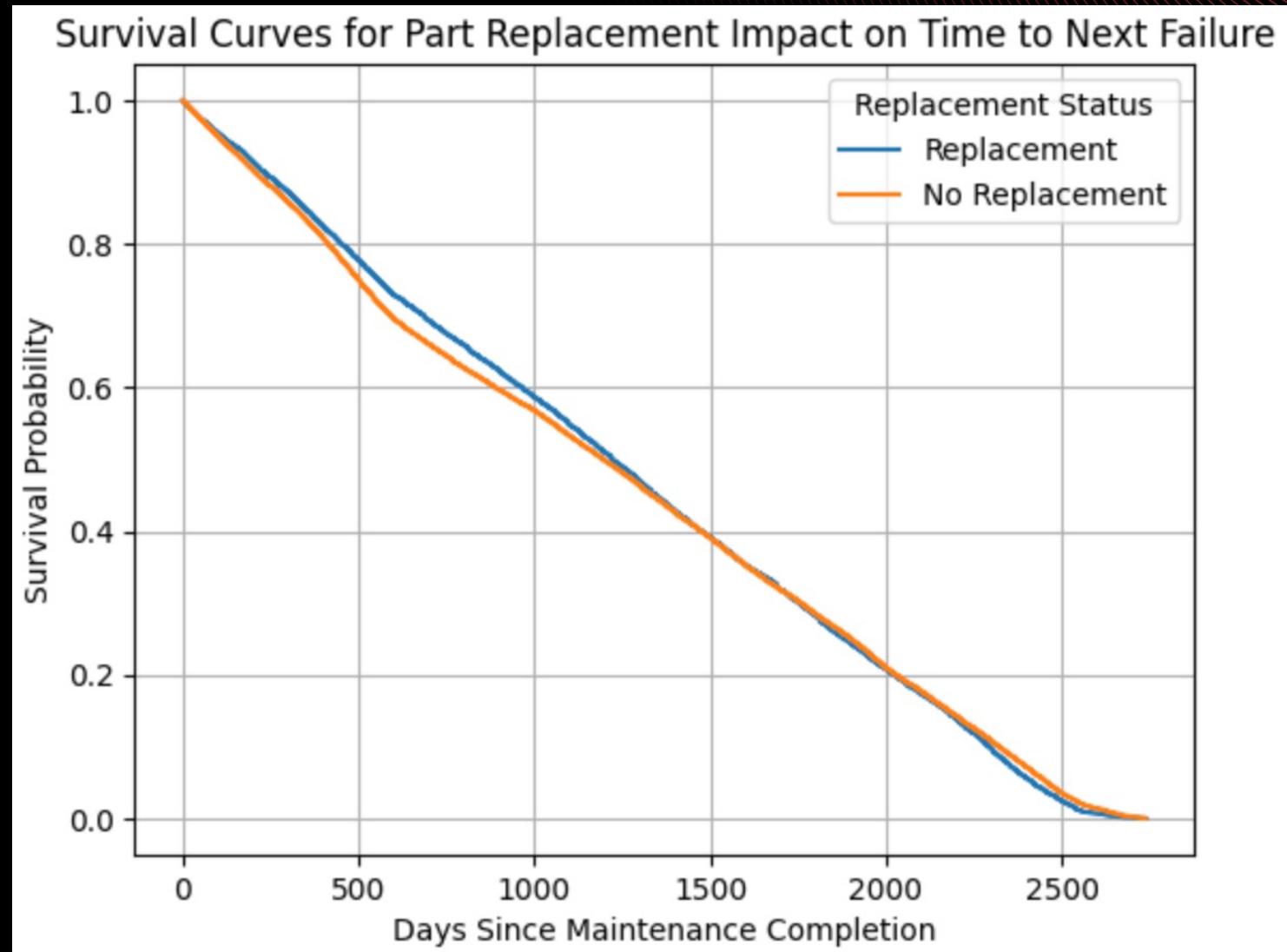
These figures highlight the comparative longevity of equipment under different maintenance strategies, emphasizing the effectiveness of **preventive maintenance** in extending operational life.



- The survival probabilities differ significantly across the functional locations.
- **Location G291-PRD-P05 (orange)** demonstrates the highest survival probability, maintaining operational stability over 2,500 days since the last maintenance.
- This suggests efficient maintenance practices or lower operational stress in this location.

REPLACEMENT IMPACT ON TIME TO NEXT FAILURE

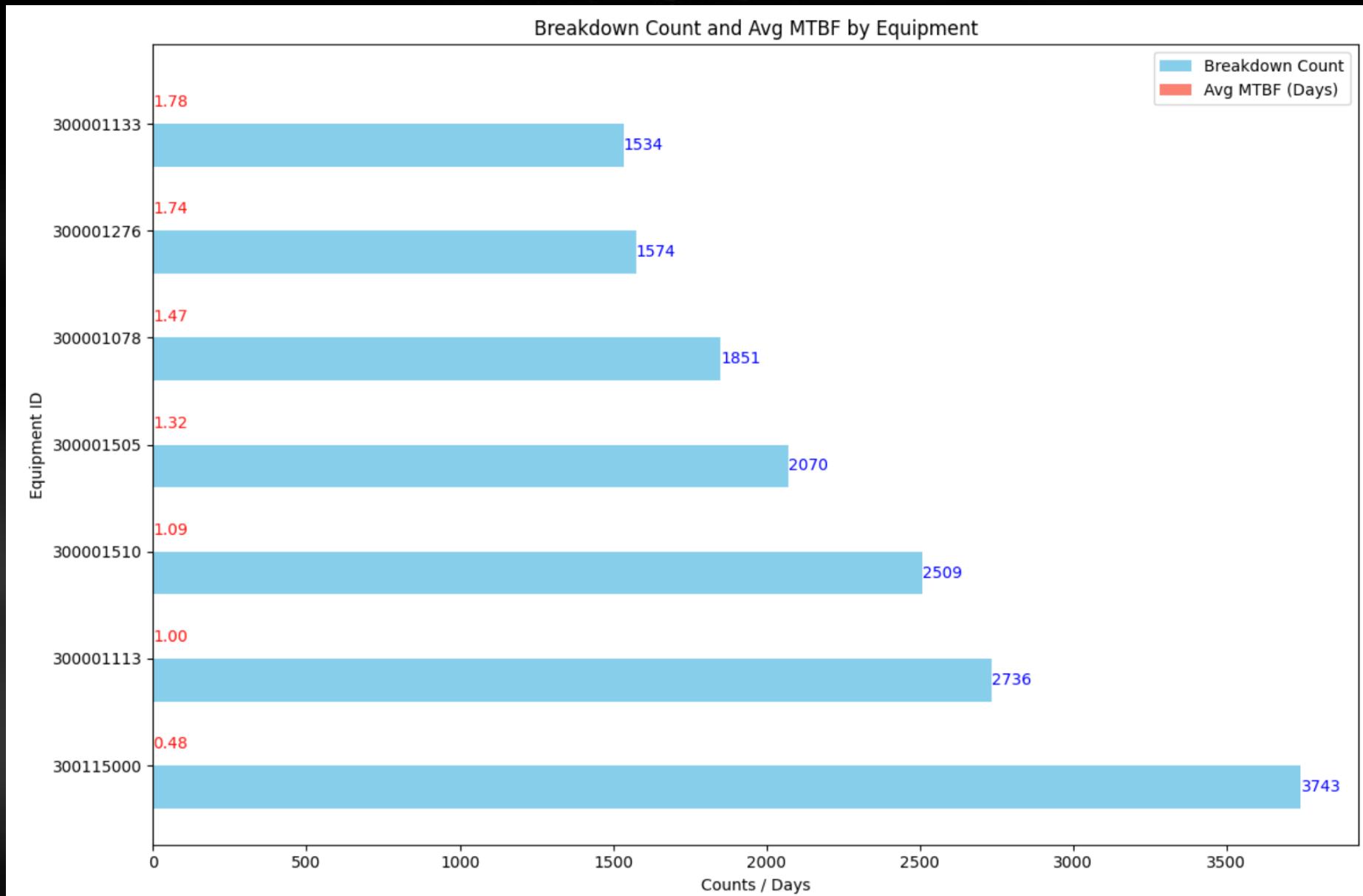
- The survival curves compare the time to next failure for equipment with and without part replacements.
- Replacement (Blue Line):** Shows slightly higher survival probability, indicating that part replacement generally extends the time to the next failure.
- No Replacement (Orange Line):** Demonstrates lower survival probabilities, suggesting a higher likelihood of failures occurring sooner without part replacements.



TOP EQUIPMENT PERFORMANCE AND BREAKDOWN INSIGHTS

EQUIPMENT_ID	BREAKDOWN_COUNT	AVERAGE_MTBF(DAYS)	EQUIP_CAT_DESC	EQUIPMENT_DESC	EQUIPMENT_CATEGORY
300115000	3743	0.476760	MACHINES	L1_FILLER_ROTARY_CAN_72_VALVE	FILLER
300001113	2736	0.998537	MACHINES	L1_FILLER_ROTARY_BTL_60_VALVE	FILLER
300001510	2509	1.088118	MACHINES	L4_FILLER_ROTARY_CAN_100_VALVE	FILLER
300001505	2070	1.320445	MACHINES	L2_FILLER_ROTARY_BTL_45_VALVE	FILLER
300001078	1851	1.473514	MACHINES	L4_SEAMER_ROTARY	SEAMER
300001276	1574	1.736173	MACHINES	L4_PACKER_CASE	PACKER
300001133	1534	1.778213	MACHINES	L3_PACKER_KHS_TSP80V	PACKER

BREAKDOWN COUNT BY EQUIPMENT



EQUIPMENT AT RISK

EQUIPMENT ID	EQUIP_AGE (DAYS)	PLANT ID	PRODUCTION LOCATION	RISK STATUS
300115000	1789.0	G816	COTA	AT RISK
300001113	2752.0	G291	MONZA	AT RISK
300001510	2750.0	G291	MONZA	AT RISK
300001505	2751.0	G291	MONZA	AT RISK
300001078	2739.0	G291	MONZA	AT RISK
300001276	329.0	G291	MONZA	AT RISK
300001133	2742.0	G291	MONZA	AT RISK

MACHINE LONGEVITY WITH MEDIAN SURVIVAL DAYS

EQUIPMENT CATEGORY	FAILURE FREQUENCY	MEDIAN SURVIVAL DAYS
FILLER	46,322	1,177
PACKER	35,320	1,193
CONVEYER	34,765	1,139
LABELER	18,945	1,524

- Calculated from Functional Area Node 4.
- High occurrences in Filler and Packer.
- Labeler has higher survival despite lower failure frequency





“HOW WE COULD REDUCE
DOWNTIME”

IMPACT OF PROACTIVE MAINTENANCE



- **HIGH-RISK EQUIPMENT :** Fillers, packers, labelers with low MTBF and high downtime.
- **MEDIAN SURVIVAL DAYS :** What if we implement proactive interventions before median survival days.
- **PROACTIVE INTERVENTIONS:** Identifies and resolves potential equipment failures before they occur.
- **PREVENTIVE MEASURES :** Potential to reduce unplanned breakdowns by 70 % and reduced costs.
- **BUSINESS IMPACT:** Improved efficiency, reduced downtime, and significant cost savings.

SIGNIFICANTLY REDUCING DOWNTIME HOURS

EQUIPMENT	CURRENT DOWNTIME (HOURS)	OPTIMIZED DOWNTIME (HOURS)
L1 FILLER_ROTARY_CAN_72_VALVE	5531.29	618.41
L3 FILLER_ROTARY_BTL_100_VALVE	3661.61	789.19
L1 FILLER_ROTARY_BTL_60_VALVE	2948.87	820.98
L4 FILLER_ROTARY_CAN_100_VALVE	3310.47	782.22
MICROBLEND MICRO2 BLENDER (LINE 1)	43.58	29.03
MICROBLEND MICRO2 BLENDER (LINE 3)	32.13	20.13
L2 LINE 2 FILLER	810.9	0
CAN LINE 3 GPI PACKER	898.80	98.83

STRATEGIC IMPACT: REDUCING DOWNTIME THROUGH INVENTORY

EQUIPMENT	FAILURES (COUNT)	DOWNTIME WITHOUT INVENTORY (HOURS)	DOWNTIME WITH INVENTORY (HOURS)
L1 FILLER_ROTARY_CAN_72_VALVE	3745	7490	1872.5
L1 FILLER_ROTARY_BTL_60_VALVE	2738	5476	1369
L4 FILLER_ROTARY_CAN_100_VALVE	2511	5022	1255.5
L2 FILLER_ROTARY_BTL_45_VALVE	2072	4144	1036
L3 FILLER_ROTARY_BTL_100_VALVE	1474	2948	737

BUSINESS RECOMMENDATIONS

- IMPLEMENT PROACTIVE MAINTENANCE STRATEGIES
- INVENTORY MANAGEMENT
- PRIORITIZE HIGH-RISK EQUIPMENT AND PLANT'S
- SEASONAL MAINTENANCE



Thank You

