OEE Performance Thresholds and Downtime Event Classification

Table of Contents

1. Introduction

This document delineates the performance thresholds, availability, and quality standards for Overall Equipment Effectiveness (OEE) across processing lines, and provides detailed procedures for classifying and logging downtime events such as `DOW-PI-4521` and `DOW-PI-4574`. It also contextualizes typical operational metrics, emphasizing the importance of performance dips during changeovers and scheduled maintenance windows.

2. Objective and Scope

The primary objective of this procedure is to establish standardized metrics for OEE performance monitoring, define acceptable thresholds for operation, and

outline classification protocols for downtime events. This document applies to all processing lines within the manufacturing facility, integrating data from equipment manuals and PSS quality specifications over the last six months.

3. Definitions of OEE Components

OEE is a composite metric composed of three core elements:

- **Availability**: The ratio of operating time to planned production time.
- **Performance**: The ratio of actual throughput to the theoretical maximum throughput under optimal conditions.
- **Quality**: The ratio of good units produced to total units produced, considering defect rates.

Mathematically, OEE is expressed as:

```
OEE = Availability × Performance × Quality
```

Each component's threshold determines operational success and informs classification of downtime causes.

4. Performance Thresholds and Tolerance Bands

Normal Operation Metrics

During stable manufacturing conditions, typical OEE performance metrics range from 0.80 to 0.92. The acceptable performance thresholds for individual lines are delineated as follows:

Component	Threshold	Description
Availability	≥ 90%	Line operational without unplanned stoppages.
Performance	≥ 80%	Achieving at least 80% of rated throughput under normal conditions.
Quality	≥ 95%	Producing acceptable quality standards as per specifications.

Tolerance Bands for Deviations

Deviation thresholds are set to trigger alerts and classification protocols:

- **Performance dip:** Between 0.80 and 0.90 triggers caution; below 0.80 warrants immediate investigation.
- **Availability drops:** Below 90% indicates potential downtime contributing to overall OEE decline.
- **Quality deviations:** Falling below 95% may indicate process issues requiring corrective actions.

Figures and graphs (not included here) in equipment manuals illustrate these tolerance bands across different line configurations.

5. Equipment Performance Parameters

Typical Equipment Throughputs

Below are examples of rated throughput based on equipment specifications:

Equipment	Rated Throughput	Description	Threshold Efficiency
CUT-2000	8.5 t/h	Primary cutting line for raw material processing	≥ 85%
FRY-XL	6.0 t/h	Frying line for finished product	≥ 80%

Maintenance and Efficiency Monitoring

Regular maintenance steps include:

- Replacing worn blades or heating elements every scheduled maintenance interval.
- Performing calibration and sensor checks weekly to ensure accurate throughput measurements.
- Logging error codes (e.g., DOW-PI-45xx) and investigating root causes as per the troubleshooting procedures.

6. Downtime Event Classification and Logging

Downtime Event Codes

Downtime events are categorized with specific codes for tracking and analysis:

Code	Description	Typical Causes
DOW-PI-4521	Equipment Malfunction - Cutting Line	Blade jams, motor failures, sensor errors
DOW-PI-4574	Fryer Line Stop	Heating element failure, conveyor jam, sensor faults
DOW-PI-4530	Changeover Period	Product switch, cleaning, calibration

Logging procedures involve recording event start and end times, underlying cause, and corrective actions taken. This ensures accurate reporting and analysis for continuous improvement.

Event Classification Criteria

- **Unplanned Downtime:** Any stoppage due to equipment failure or process anomaly.
- **Planned Downtime:** Scheduled changeovers or maintenance activities.
- **Quality-related Downtime:** Stops caused by quality issues such as defect spikes or safety concerns.

7. Typical Performance Metrics and Scenarios

Normal Operation Scenario

Under standard conditions, the following metrics are observed:

- Availability: ≥ 92%
- Performance: ≥ 85%
- Quality: ≥ 97%

This results in overall OEE values typically between 0.80 and 0.92, aligning with industry standards for high-efficiency lines.

Changeover and Maintenance Scenario

During scheduled changeovers, the performance may dip below the established thresholds temporarily, but must be logged appropriately. Planned

downtime should be classified separately to avoid skewing OEE analysis.

Impact of Performance Dips

Performance dips during changeovers, if managed properly, do not significantly impair overall efficiency but should trigger review to optimize procedures and minimize duration.

8. Maintenance and Preventive Care

Preventive maintenance is critical to sustain optimal performance thresholds:

- Conduct routine inspections every 24 hours.
- Replace consumable parts as per manufacturer's schedule.
- Update calibration data after maintenance interventions.

Documentation of maintenance activities should include timestamps, performed tasks, and observations related to performance deviations.

9. Troubleshooting and Error Code Resolution

Common Error Codes and Remedies

Error Code	Symptoms	Root Causes	Resolution Steps	Prevention Tips
DOW-PI-4510	Unexpected shutdown, no response from sensor	Sensor failure, loose wiring	Check sensor connections, replace sensor if faulty, reset error	Inspect wiring weekly; ensure proper connector fit
DOW-PI-4521	Blade jam detected, line stops	Blade wear, debris buildup	Stop line, clear jam, inspect and replace blades as needed	Schedule blade inspections bi-weekly; clean equipment after each run

For persistent issues, escalate to maintenance team and record all actions taken for future reference.

10. Downtime Logging Protocols and Examples

Logging Procedures

When a downtime event occurs, follow these steps:

1. Identify and classify the event code based on initial assessment.
2. Record start time, equipment involved, and described cause.
3. Initiate corrective action and monitor progress.
4. Record end time once resolved and classify the event (planned/ unplanned).
5. Complete the downtime report with detailed notes and corrective actions performed.

Example Log Entry

```
Event Code: DOW-PI-4521
Start Time: 2024-04-01 08:15
End Time: 2024-04-01 08:45
Duration: 30 minutes
Cause: Blade jam due to debris accumulation
Actions: Cleared jam, replaced worn blades, recalibrated senso
Classification: Unplanned equipment failure
Remarks: Line performance restored; replaced blades during sch
```

This structured approach ensures traceability and continuous improvement in downtime management.

11. Appendices

Appendix A: Equipment Manuals References

- [Cutter Model CUT-2000](#)
- [Fryer Model FRY-XL](#)

Appendix B: Quality Specifications

Summary of key quality targets based on recent PSS documents:

Parameter	Target	Tolerance

Dry Matter Content	21.8%	± 0.3 percentage points
Defect Rate	< 2%	-
Fry Color Range	Golden hue (Color index 3.5 - 4.5)	-