# Summary of OEE Data and Downtime Events (August-September 2025)

*Reference Document for Equipment Efficiency Analysis and Downtime Investigation*

## Table of Contents



## 1. Introduction

This document provides a comprehensive summary of the Overall Equipment Effectiveness (OEE) data and associated downtime events recorded during August and September of 2025 at the NA-ID-P01 plant, focusing specifically on Line 3. The report synthesizes equipment performance metrics, downtime incidents, maintenance protocols, quality specifications, and error analysis to facilitate operational review, continuous improvement initiatives, and strategic

planning.

The target audience includes plant operations managers, maintenance engineers, quality assurance teams, and process improvement specialists responsible for optimizing production throughput and minimizing unplanned downtime across the manufacturing line.

## 2. Scope and Purpose

This report aims to provide stakeholders with detailed insights into the operational efficiency and downtime patterns of Line 3 for the specified period. It emphasizes the impact of maintenance deferments and process adjustments on throughput, documents significant downtime events such as DOW-PI-4521 and DOW-PI-4574, and reviews compliance with quality and safety standards based on raw material specifications and SKUs targeted processing parameters.

The purpose is to support data-driven decision-making, identify root causes of inefficiencies, and develop proactive strategies for equipment maintenance, quality management, and process optimization.

## 3. Plant Overview and Line 3 Context

NA-ID-P01 is a key processing facility specializing in the production of snack items and frozen foods. Line 3 operates continuous processing equipment pivotal to throughput and product quality. During August-September 2025, operational challenges arose due to scheduled and unscheduled maintenance activities, as well as process adjustments driven by quality control metrics.

Specific events, such as maintenance deferments, led to reduced throughput and increased downtime. The following sections analyze these conditions with detailed data and procedural insights.

## 4. Equipment Specifications and Parameters

### 4.1 Equipment Models and Rated Throughput

| Equipment ID | Model/Type | Rated Throughput (t/h) | Efficiency Threshold |
|---|---|---|---|

| | | | |
|---|---|---|---|
| CT-2000 | Cutting Machine | 8.5 | 85% |
| FRY-XL | Frying Line XL | 6.0 | 80% |

### 4.2 Maintenance Procedures

Maintenance steps follow standard operating procedures outlined in the equipment manuals. Typical activities include lubrication, blade replacement, sensor calibration, and safety checks. Maintenance logs from August-September 2025 indicate scheduled interventions with specific attention to critical components.

### 4.3 Error Codes and Their Significance

- **DOW-PI-4521**: Belt misalignment detected during operation, leading to potential tear if unaddressed.
- **DOW-PI-4574**: Over-temperature condition in fryer unit, triggering automatic shutdown.

Detailed troubleshooting steps for these errors are provided in Section 10.

## 5. OEE Metrics Summary

The overall equipment effectiveness (OEE) is calculated based on three core components: Availability, Performance, and Quality. The following metrics summarize the performance of Line 3 during the period:

| Metric | August 2025 | September 2025 | Average |
|---|---|---|---|
| Availability | 88.2% | 85.7% | 86.9% |
| Performance | 92.5% | 89.8% | 91.2% |
| Quality | 97.0% | 96.5% | 96.8% |

Overall Equipment Effectiveness (OEE) averaged 77.8% across both months, with notable dips during specific downtime events associated with maintenance deferments.

### 5.1 Data Collection Methods

Data was collected via real-time sensors, SCADA systems, maintenance logs, and manual audits. The integration of these sources ensures comprehensive coverage of operational and quality metrics.

## 6. Downtime Events Analysis

Downtime events are categorized by root causes, duration, and impact on throughput. Major incidents are identified in the table below, with detailed case studies provided in subsequent sections.

| Event ID | Date | Duration (hours) | Cause | Impact |
|---|---|---|---|---|
| DOW-PI-4521 | 2025-08-15 | 2.5 | Belt Misalignment | Reduced throughput by 15% |
| DOW-PI-4574 | 2025-09-10 | 3.0 | Over-temperature Shutdown | Complete line halt, throughput loss of 22% |

The cumulative impact of these events resulted in approximately 178 hours of reduced productivity across the two months, necessitating alternative operational strategies and maintenance interventions.

## 7. Specific Downtime Events: DOW-PI-4521 and DOW-PI-4574

### 7.1 DOW-PI-4521: Belt Misalignment

The DOW-PI-4521 event was detected by sensors indicating belt deviation in the main conveyor segment. Symptoms included abnormal vibration and audible noise, which prompted automated alerts.

**Root Cause Analysis:**

- Accumulated debris leading to belt drift.
- Inadequate tensioning during previous maintenance.

- Sensor calibration drift complicating early detection.

**Resolution Steps:**

1. Stop the conveyor and inspect for physical obstructions.
2. Realign and tension the belt according to calibration standards.
3. Replace worn belts if necessary.
4. Update sensor calibration and verify signal accuracy.
5. Restart equipment and monitor performance for anomalies.

**Prevention Tips:**

- Implement routine debris removal schedules.
- Schedule periodic calibration checks.
- Train operators to recognize early signs of belt issues.

### 7.2 DOW-PI-4574: Over-Temperature in Fryer

This event was triggered by the automated safety system shutting down the fryer due to exceeding temperature thresholds. Symptoms included process halts, product quality deviations, and throughput reduction.

**Root Cause Analysis:**

- Sensor malfunction causing false over-temperature readings.
- Fryer heating elements operating beyond normal parameters.
- Insufficient cooling airflow due to blocked vents.

**Resolution Steps:**

1. Isolate the fryer and inspect temperature sensors for faults.
2. Perform calibration or replace faulty sensors.
3. Check heating elements and replace if degraded.
4. Clear vents and enhance airflow management.
5. Test safety systems before restarting production.

**Prevention Tips:**

- Schedule routine sensor calibration and maintenance.
- Monitor temperature data continuously with alarms for deviations.
- Implement cooling system checks as part of preventative maintenance.

## 8. Maintenance Deferments and Throughput Reduction

Throughout August-September 2025, several maintenance activities were deferred based on operational priorities and production demands. These deferments led to temporary reductions in machine uptime and throughput capacity, especially on Line 3.

### 8.1 Examples of Deferred Maintenance

- Scheduled lubrication of conveyor belts postponed by one week.
- Sensor calibration activities delayed due to staffing constraints.
- Component replacements aligned with predictive maintenance schedules deferred to optimize throughput.

### 8.2 Impact on Throughput

| Week | Planned Capacity (t/h) | Actual Average Throughput (t/h) | Throughput Deviation (%) |
|---|---|---|---|
| Week 34 | 8.5 | 6.9 | -18.8% |
| Week 36 | 8.5 | 7.0 | -17.6% |

Operational decisions prioritized minimal downtime over scheduled maintenance, resulting in increased risk of unplanned outages and a need for rigorous post-event analysis.

## 9. SKU Downgrading Protocols and Quality Specifications

### 9.1 Quality Specification Targets

| Parameter | Target | Bandwidth / Tolerance | Relevant SKU |
|---|---|---|---|
| Dry Matter Content (%) | 21.8 | ±0.3pp | SC-9mm, SC-12mm |
| Defects Percentage (%) | <2% | - | All SKUs |

| | | | |
|---|---|---|---|
| Fry Color Range (L* | 50-65 | - | All SKUs |

### 9.2 Downgrading Procedures

Products failing to meet specific quality tolerances are subject to downgrading protocols which include:

- Sorting and removal of non-conforming units.
- Reprocessing where feasible within quality limits.
- Labeling as downgraded and adjusting SKUs accordingly.
- Updating inventory and quality logs.

### 9.3 Quality Management and Traceability

Each SKU batch is tagged with traceability data, including production date, quality parameters, and inspection results. Deviations trigger immediate corrective actions and documentation per compliance standards.

## 10. Error Codes and Troubleshooting

### 10.1 DOW-PI-4521: Belt Misalignment

Symptoms include vibration alarms and visual belt displacement. Troubleshooting involves sensor verification and physical belt inspection.

**Steps to Resolve:**

1. Stop the conveyor system safely.
2. Inspect for debris or physical damage.
3. Re-align the belt to specified tension.
4. Calibrate belt position sensors.
5. Restart and monitor for persistent errors.

### 10.2 DOW-PI-4574: Fryer Over-Temperature

Symptoms include process shutdowns and temperature alarms exceeding upper thresholds.

**Troubleshooting Steps:**

1. Disable the fryer safely.
2. Check sensor signals and calibration status.
3. Inspect heating elements for faults or damage.

4. Verify cooling airflow paths and unblock vents if necessary.
5. Recommission the unit and observe temperature stability before resuming normal operation.

## 11. Conclusions and Recommendations