Tulip OEE Application

Training Manual

Moto IE Engineering Team

May 5, 2025

Contents

Chapter 1

Introduction to the Tulip OEE Application

1.1 Purpose and Benefits

The Tulip OEE (Overall Equipment Effectiveness) Application is a powerful tool designed to help Moto IE engineers monitor, analyze, and improve manufacturing efficiency. This application streamlines data collection, visualization, and reporting processes to provide real-time insights into production performance.

1.1.1 Key Benefits

- **Real-time Monitoring**: Track production metrics in real-time to identify issues as they occur
- **Data-Driven Decision Making**: Base operational decisions on accurate, up-to-date information
- **Customizable Reports**: Generate tailored reports to address specific monitoring needs
- **Performance Visibility**: Access clear visualizations of performance trends across time periods
- **Efficiency Optimization**: Identify bottlenecks and opportunities for improvement

1.2 OEE Overview

Overall Equipment Effectiveness (OEE) is a standard measure of manufacturing productivity that combines three essential factors:

$$\text{OEE} = \text{Availability} \times \text{Performance} \times \text{Quality} \tag{1.1}$$

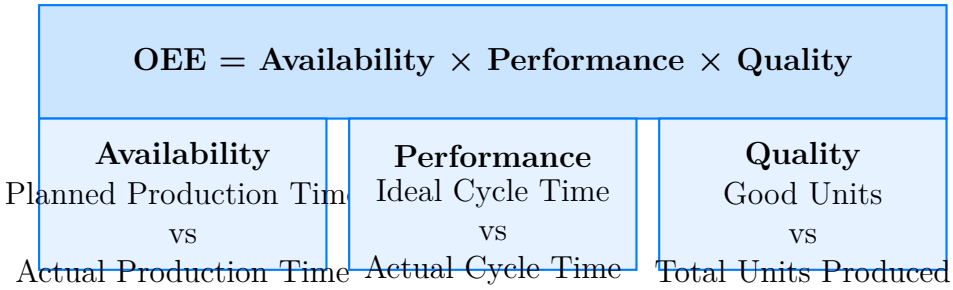

Figure 1.1: OEE Components and Calculation

1.2.1 Understanding OEE Components

- **Availability** (A): Measures the percentage of scheduled time that the operation is available to operate

$$\text{Availability} = \frac{\text{Actual Production Time}}{\text{Planned Production Time}} \times 100\% \tag{1.2}$$

- **Performance** (P): Measures the speed at which the work center runs as a percentage of its designed speed

$$\text{Performance} = \frac{\text{Ideal Cycle Time} \times \text{Total Count}}{\text{Operating Time}} \times 100\% \tag{1.3}$$

- **Quality** (Q): Measures the good units produced as a percentage of the total units started

$$\text{Quality} = \frac{\text{Good Count}}{\text{Total Count}} \times 100\% \tag{1.4}$$

Tip

World-class OEE is generally considered to be 85% or higher. However, the average manufacturing OEE is typically around 60%.

Chapter 2

Getting Started with the Tulip OEE Application

2.1 System Requirements

Before using the Tulip OEE Application, ensure your system meets the following requirements:

- **Operating System**: Windows 10/11 or macOS 11+
- **Browser**: Google Chrome (latest version), Mozilla Firefox (latest version), or Microsoft Edge (latest version)
- **Internet Connection**: Stable broadband connection (minimum 5 Mbps)
- **Display Resolution**: Minimum 1366 × 768 (recommended: 1920 × 1080)
- **User Permissions**: Access credentials for the Tulip platform

2.2 Accessing the Application

To access the Tulip OEE Application:

1. Open your web browser
2. Navigate to `https://company-instance.tulip.co/`
3. Enter your username and password
4. From the dashboard, select "Applications" from the main menu
5. Click on "OEE Application" from the list of available applications

> **Note**
>
> If you don't have login credentials, please contact your system administrator to request access.

2.3 User Interface Overview

The Tulip OEE Application features an intuitive user interface designed for easy navigation and efficient data analysis.

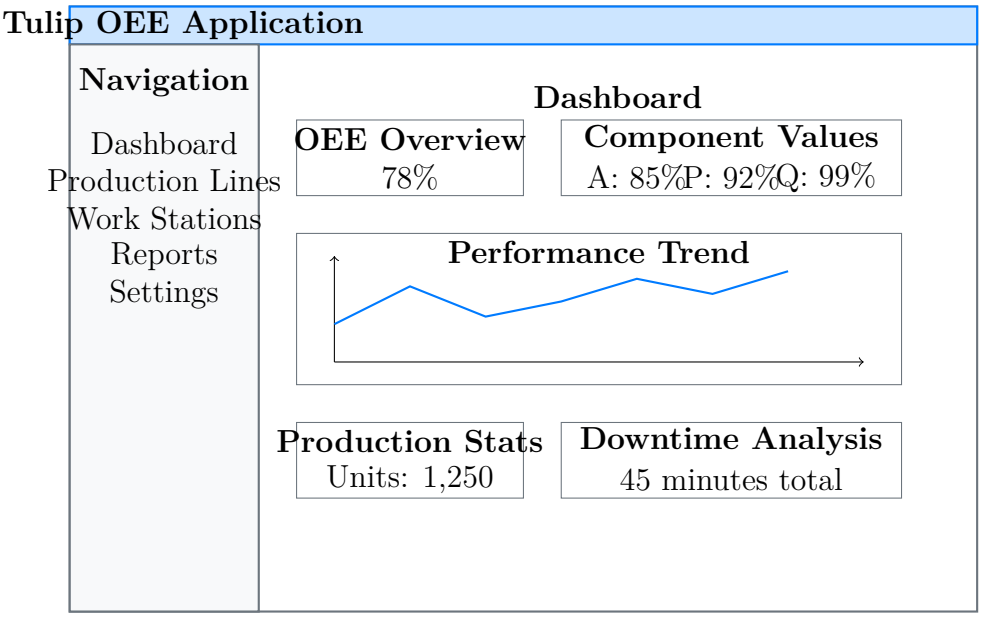

Figure 2.1: Tulip OEE Application User Interface

2.3.1 Main Interface Components

- **Navigation Sidebar**: Access different sections of the application
- **Dashboard**: Overview of key performance metrics
- **Toolbar**: Contains action buttons and filters
- **Data Visualization Area**: Displays charts, graphs, and tables
- **Settings Panel**: Configure application preferences and parameters

Chapter 3

Dashboard and Navigation

3.1 Dashboard Overview

The dashboard is your central hub for monitoring OEE performance at a glance. It displays key metrics, performance trends, and alerts in a visually intuitive format.

3.1.1 Key Dashboard Elements

- **OEE Summary Cards**: Display current OEE percentage and component values
- **Performance Timeline**: Shows OEE trends over selected time periods
- **Production Statistics**: Provides counts of units produced, rejected, and planned
- **Alerts Panel**: Highlights issues requiring attention
- **Equipment Status**: Visual indicators of machine states

3.2 Navigating the Application

3.2.1 Using the Navigation Sidebar

The navigation sidebar provides quick access to different sections of the application:

- **Dashboard**: Return to the main overview screen
- **Production Lines**: View and manage different production lines
- **Work Stations**: Access individual work station data
- **Reports**: Generate and view OEE reports
- **Settings**: Configure application parameters
- **Help**: Access support resources and documentation

3.2.2 Using Filters and Date Ranges

The Tulip OEE Application allows you to filter data based on various parameters:

1. Click the "Filter" button in the toolbar
2. Select desired filtering criteria:
    - Date range (Today, Yesterday, This Week, Last Week, Custom)
    - Production line
    - Work station
    - Product type
    - Shift
3. Click "Apply" to update the displayed data

Tip

Save frequently used filter combinations by clicking "Save as Preset" in the filter panel. You can quickly apply these presets later.

Chapter 4

Customizing OEE Reports

4.1 Creating Custom Reports

The Tulip OEE Application allows you to create customized reports tailored to your specific requirements.

4.1.1 Accessing the Report Builder

To access the Report Builder:

1. Navigate to the "Reports" section using the sidebar
2. Click on "Create New Report" button
3. Select "Custom OEE Report" from the template options

4.1.2 Defining Report Parameters

1. **General Settings**:
    - Report Name: Enter a descriptive title
    - Description: Add optional context about the report's purpose
    - Time Period: Select the date range for analysis
    - Refresh Rate: Set how often the report updates (if real-time)
2. **Data Selection**:
    - Select Production Lines: Choose specific or all production lines
    - Select Work Stations: Choose specific or all work stations
    - Select Products: Filter by product types if needed
    - Select Shifts: Include specific shifts in analysis
3. **Metric Selection**:
    - OEE Components: Select any combination of Availability, Performance, and Quality
    - Production Metrics: Units produced, reject rates, downtime, etc.
    - Custom Calculations: Create custom KPIs based on available data points

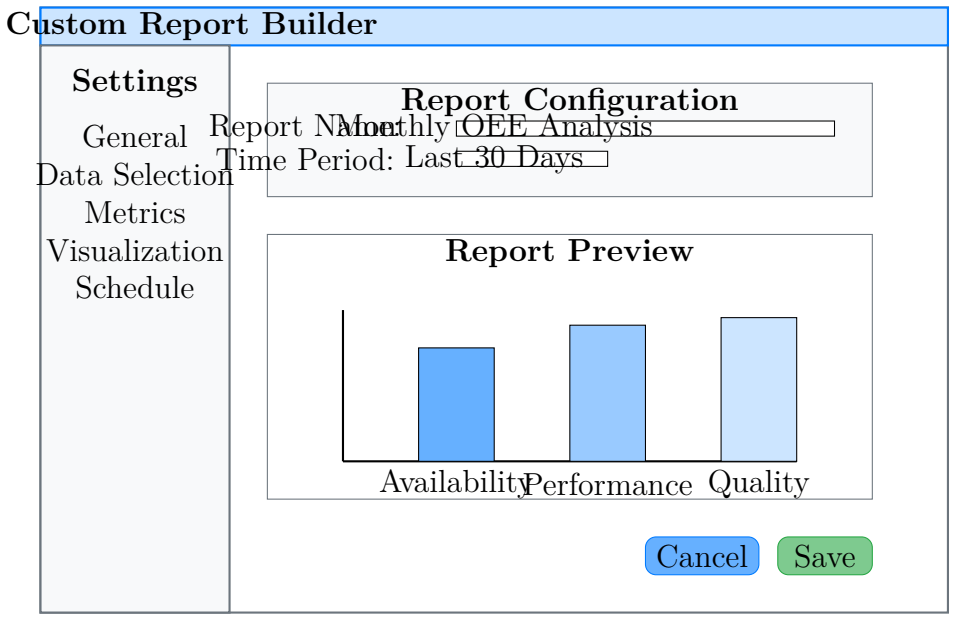

Figure 4.1: Custom Report Builder Interface

4.2 Visualization Options

The Tulip OEE Application offers multiple visualization options to present your data effectively.

4.2.1 Chart Types

- **Line Charts**: Ideal for showing trends over time
- **Bar Charts**: Compare values across categories
- **Pie/Donut Charts**: Show proportional distribution
- **Gauge Charts**: Display KPIs against targets
- **Tables**: Present detailed numerical data
- **Heat Maps**: Visualize data intensity across multiple dimensions

4.2.2 Customizing Visualizations

1. Select the desired chart type from the visualization panel
2. Configure chart properties:
    - Title and description
    - Axis labels and units
    - Data series colors
    - Legends and tooltips
    - Thresholds and reference lines

3. Preview the chart in the visualization area
4. Adjust the size and position of the chart on the report canvas

Tip

For complex reports, consider using multiple visualization types to present different aspects of your data. For example, use line charts for trends and pie charts for composition analysis.

4.3 Scheduling and Sharing Reports

4.3.1 Setting Up Automated Reports

To schedule automated report generation and distribution:

1. Open the saved report you want to schedule
2. Click on "Schedule" in the report options menu
3. Configure the schedule settings:
   - Frequency: Daily, Weekly, Monthly, or Custom
   - Time: When the report should be generated
   - Start/End dates: Optional duration for the schedule
4. Set up distribution options:
   - Email recipients
   - File format (PDF, Excel, CSV)
   - Include message/notes
5. Click "Save Schedule" to activate

4.3.2 Exporting and Sharing Reports

To manually export and share a report:

1. Open the report you want to export
2. Click on "Export" in the report toolbar
3. Select the desired export format:
   - PDF: Best for presentation and printing
   - Excel: For further data analysis
   - CSV: For raw data processing
   - Image (PNG/JPG): For quick sharing
4. Choose export options:

- Include raw data: Attach data tables
- Page size and orientation
- Include filters and parameters

5. Click "Export" to generate the file
6. Save locally or share directly via email

Warning

Be mindful of data sensitivity when sharing reports. Ensure recipients have appropriate authorization to view the information contained in your reports.

Chapter 5

Data Analysis and Interpretation

5.1 Understanding OEE Metrics

Properly interpreting OEE metrics is essential for making data-driven decisions to improve manufacturing efficiency.

5.1.1 Interpreting Availability

Availability measures the percentage of scheduled time that the operation is running. Low availability indicates significant downtime.

Common causes of availability losses:

- Equipment failures
- Setup and adjustment time
- Material shortages
- Operator unavailability
- Planned maintenance

Example Analysis

If your availability is 85%, it means your operation is running 85% of the planned production time. For an 8-hour shift, you're losing approximately 1.2 hours to downtime.

Action: Analyze the "Downtime Reasons" report to identify the most frequent or longest causes of downtime. Focus improvement efforts on addressing these specific issues.

5.1.2 Interpreting Performance

Performance measures how close your actual production rate is to the ideal (theoretical maximum) rate.

Common causes of performance losses:

- Machine wear and reduced speed

- Operator inefficiency
- Material flow issues
- Minor stops and idling
- Suboptimal process settings

Example Analysis

If your performance is 92%, your production is running at 92% of its ideal speed. If your theoretical maximum is 100 units per hour, you're actually producing about 92 units per hour.
Action: Check for machine speed settings, investigate minor stops that may not trigger downtime events, and analyze operator work patterns to identify improvement opportunities.

5.1.3 Interpreting Quality

Quality measures the percentage of good units out of total units produced.

Common causes of quality losses:

- Process defects
- Machine calibration issues
- Material defects
- Operator errors
- Start-up rejects

Example Analysis

If your quality rate is 99%, 1% of your production is defective. For every 1,000 units, you're producing 10 defective units.
Action: Use the "Quality Defects Pareto" report to identify the most common defect types and their causes, then implement targeted quality improvement initiatives.

5.2 Using Advanced Analytics

5.2.1 Trend Analysis

The Tulip OEE Application provides tools for analyzing trends over time:

1. Navigate to the "Analytics" section
2. Select "Trend Analysis" from the options
3. Choose metrics to analyze (OEE, components, production rate, etc.)

4. Select time period and grouping (hourly, daily, weekly, monthly)
5. Apply filters if needed (production lines, products, shifts)
6. Analyze the resulting trend charts to identify patterns

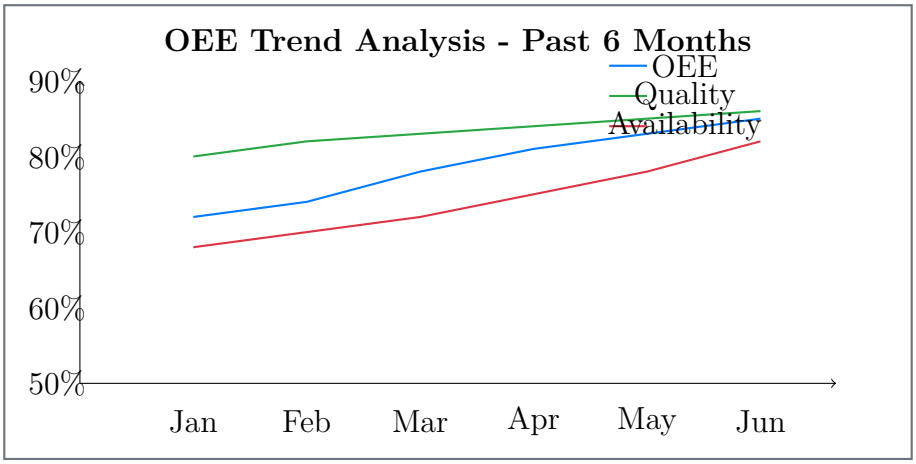

Figure 5.1: OEE Trend Analysis Chart

5.2.2 Comparative Analysis

Compare performance across different dimensions:

1. Navigate to the "Analytics" section
2. Select "Comparative Analysis"
3. Define comparison parameters:
   - Metrics to compare
   - Primary grouping (e.g., Production Lines)
   - Secondary grouping (e.g., Product Types)
   - Time period
4. Analyze results to identify performance variations

5.2.3 Root Cause Analysis

When investigating performance issues:

1. Identify the problem area (low OEE, high downtime, quality issues)
2. Use the "Drill Down" feature to explore detailed data
3. Apply the "5 Whys" approach using available data
4. Examine correlation between different factors

5. Create a Pareto chart of issues to focus on the vital few

Tip

The "Event Timeline" view can help identify sequences of events that lead to problems, showing how one issue may cascade into others.

Chapter 6

Troubleshooting

6.1 Common Issues and Solutions

This section covers common issues you might encounter when using the Tulip OEE Application and provides solutions.

6.1.1 Data Display Issues

- **Issue**: Charts or metrics not displaying
  - **Solution**: Check your filter settings. Overly restrictive filters may result in no data being available for display.
  - **Solution**: Verify the time period selection. Ensure the selected period contains production data.
- **Issue**: Unexpected or inaccurate OEE values
  - **Solution**: Check input data quality. Verify that availability, performance, and quality data are being correctly captured.
  - **Solution**: Review calculation settings. Ensure the correct ideal cycle times and planned production times are configured.
- **Issue**: Slow loading times
  - **Solution**: Reduce the date range or amount of data being processed.
  - **Solution**: Check your internet connection speed and stability.
  - **Solution**: Close unused browser tabs to free up system resources.

6.1.2 Access and Login Issues

- **Issue**: Unable to log in
  - **Solution**: Verify your username and password.
  - **Solution**: Check if Caps Lock is enabled.
  - **Solution**: Clear browser cache and cookies, then try again.
  - **Solution**: Contact your system administrator to verify your account status.

- **Issue**: Missing features or limited access
  - **Solution**: Confirm your user role and permissions with your administrator.
  - **Solution**: Request additional access rights if needed for your role.

6.2 Error Messages and Meanings

Error Message	Error Code	Meaning and Solution
No data available	ERR-101	No data exists for the selected filters. Try broadening your search criteria or checking data inputs.
Connection error	ERR-201	Unable to connect to the Tulip server. Check your internet connection and try again.
Authentication failed	ERR-301	Your login credentials could not be verified. Verify your username and password or contact support.
Calculation error	ERR-401	Problem calculating metrics. Check for missing input data or configuration issues.
Report generation failed	ERR-501	Unable to generate the requested report. Check report parameters and try again.
Data sync error	ERR-601	Problem synchronizing data with production systems. Contact your administrator.

Table 6.1: Common Error Messages and Their Solutions

6.3 Getting Help

If you encounter issues not covered in this section:

1. Check the in-app help by clicking the "Help" icon in the navigation bar
2. Access the knowledge base at `https://support.tulip.co/knowledge`
3. Contact your internal Tulip administrator

4. Submit a support ticket through the "Support" menu in the application
5. For urgent issues, contact the support hotline at (555) 123-4567

Note

When contacting support, include details such as error messages, steps to reproduce the issue, and screenshots if possible. This helps resolve your issue more quickly.