
AVEVAWORLD

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APRIL 9, 2025

# AVEVA Hybrid MES with CONNECT Data and Visualization Services

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AVEVA

AVEVA WORLD 2025

# Agenda

Moscone West Center
San Francisco

Overview of CONNECT

AVEVA Hybrid MES in CONNECT

Visualization of MES Event Data

AVEVA MES Data Publishing

# Overview of CONNECT

# CONNECT

## Industrial intelligence platform

**A unified experience to manage cloud and on-premises applications**

**Aggregate, contextualize, and share real-time industrial data**

**Visualize industrial data using self-service and pre-defined dashboards**

**Combine existing data with AI for faster and smarter decisions**

**Expand your ecosystem with solutions that bring added value**

# Community Data Sharing

**Securely share operations data in a bidirectional way across tenants with your trusted business partners**


## Features

- Bidirectional and secure data sharing across tenants
- Granular control over your data and what data each partner sees

## Benefits

- Shared data can be:
  - Trended in CONNECT data services
  - Shaped and leveraged in data views and REST APIs to drive machine learning and AI projects
  - Visualized in Power BI using our Power BI connector
  - Shared across custom applications, AI/ML platforms, or third-party analytics tools, like Grafana, via REST APIs
  - Queried for changes with our new data change broker

# AVEVA Advanced Analytics

## Combine existing data with AI for faster and smarter decisions


### Features

- Automate investigations and understanding of performance drivers with ML
- Consolidate learnings and apply solutions that mitigate problems and improve performance
- Leverage CONNECT data services and digital twins to create analytical models
- Apply algorithms & logic to continuously assess performance
- Give early warnings of performance issues with improvement suggestions

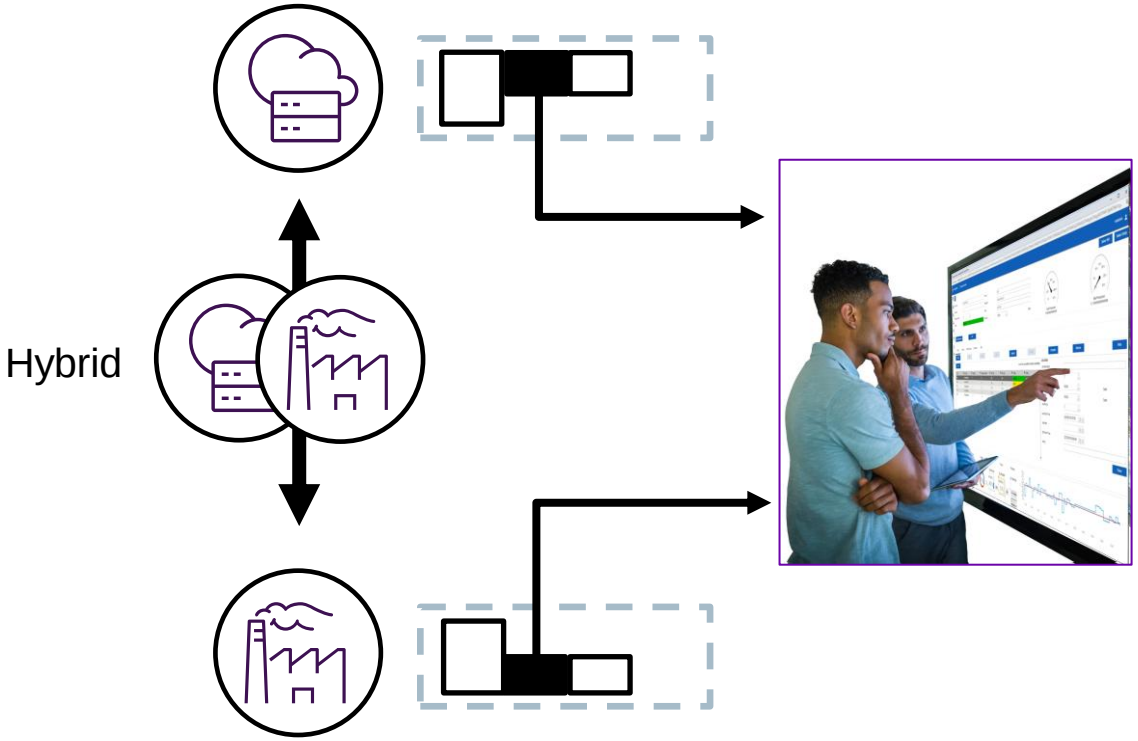
### Benefits

- Improve process efficiency
- Understand production outcomes and get recommended corrective actions
- Additional Session: “AVEVA Smart MES - Advanced Insights and Guidance, Optimized with AI” (Lightning session in Spotlight Theater at 2:15)

# AVEVA Hybrid MES in CONNECT

# AVEVA MES - Hybrid

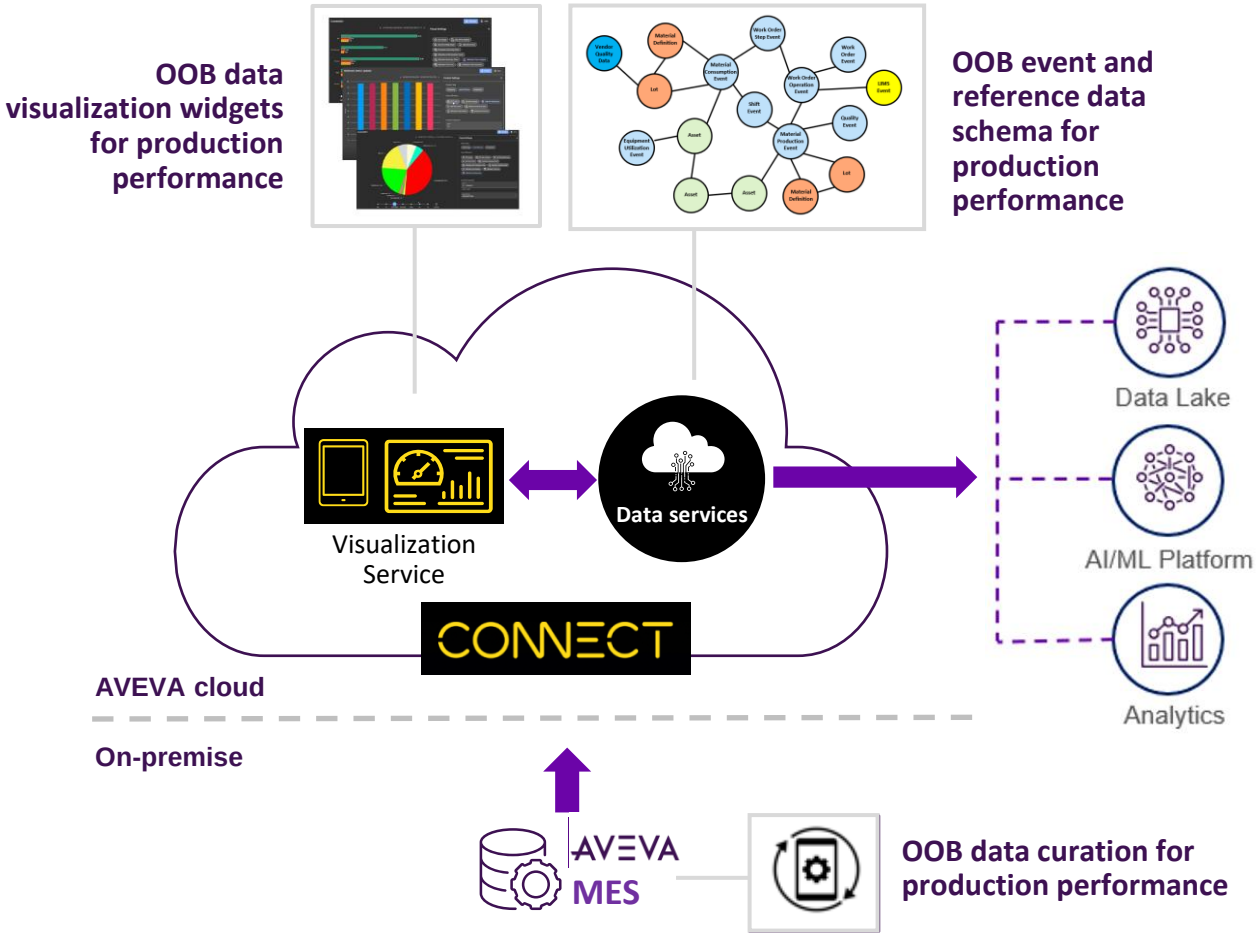

## What is a Hybrid MES Application?




- **“Hybrid MES”** refers to a **new deployment option** we are providing with our commercial **MES offerings**.
- This new capability will allow us to **host/run some capabilities of our MES solution** (e.g., core execution functions, etc.) **at the edge/on-premises** and other capabilities (e.g., data management, analytics, optimization, etc.) **in CONNECT**.

# AVEVA MES - Hybrid


## Integration with CONNECT




### Adopts CONNECT as an enterprise data management service

- Store **event data** (production, utilization, etc.) and **reference data** (related contextual info) for enhanced production performance analysis
- **Out-of-the-box event and reference data schema** that can be employed for AVEVA MES and 3rd party MES data

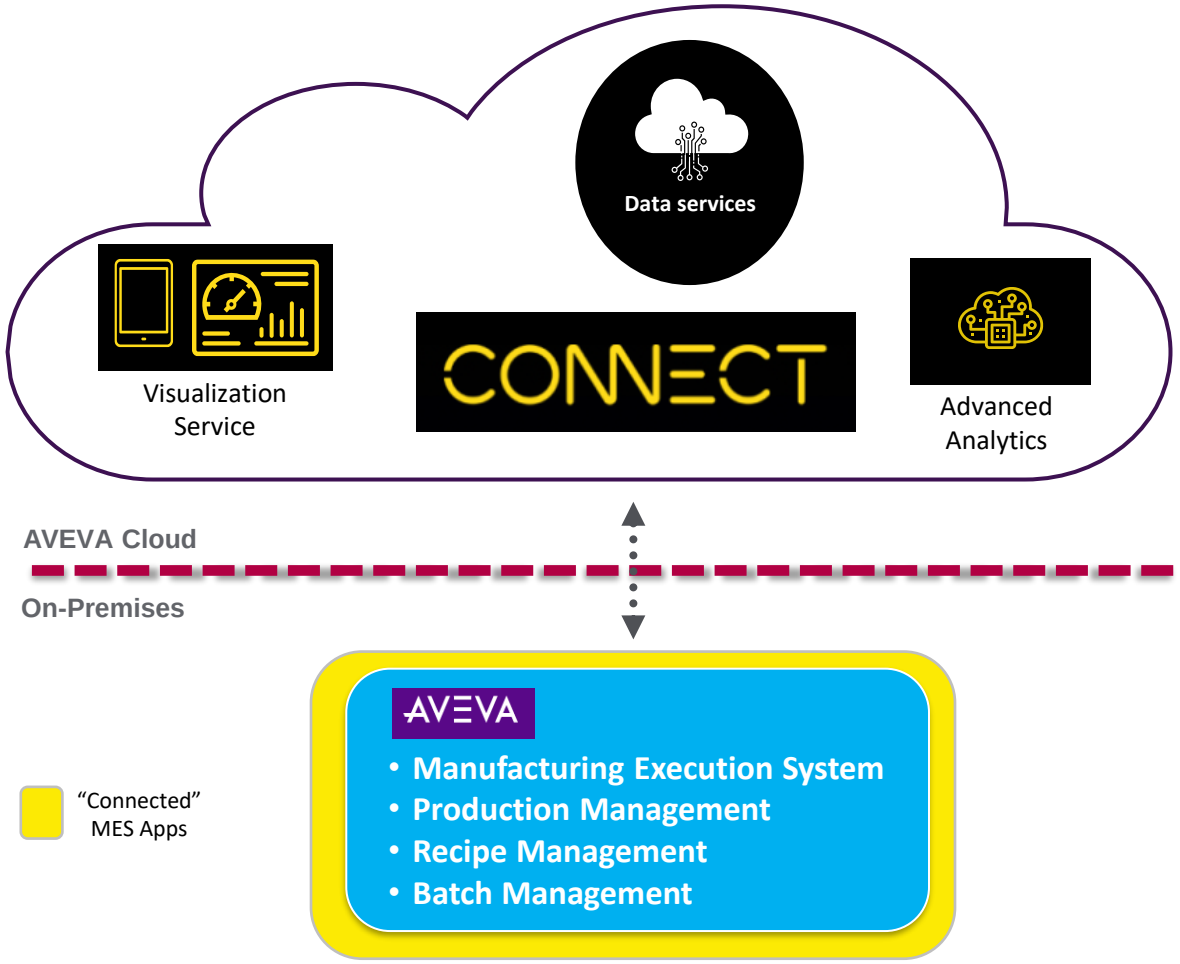
### Adopts CONNECT as an enterprise visualization service

- Visualize **event data** (production, utilization, etc.) and other **operational data** (e.g. HMI displays, time series data, etc.) in a single pane of glass
- **Out-of-the-box AVEVA MES data visualization widgets** that enable end users to rapidly assemble production performance dashboards
- Access to Advanced Analytics

### On-premises AVEVA MES provides:

- **Out-of-the-box cloud integration capabilities** to manage the persistence of event and reference data in CONNECT data services in a **safe, secure and robust manner**

# MES Portfolio Evolving to a Hybrid Cloud Architecture




## Commercial MES Offerings…

Transition our MES products to cloud "Connected" MES apps

**AVEVA MES is the initial offering:**

AVEVA Manufacturing Execution System 7.0.1 – hybrid
Supports MES 2020 and 2023 (April / October 2024)
AVEVA Manufacturing Execution System 2023 R2 (Q3 2025)

**Production Management followed:**

Production Management 2024 9.1 – hybrid (Sept 2024)
Production Management 2023 9.0 – standalone publisher (Feb 2025)

**Recipe Management and Batch Management (future)**

# MES Portfolio Evolving to a Hybrid Cloud Architecture

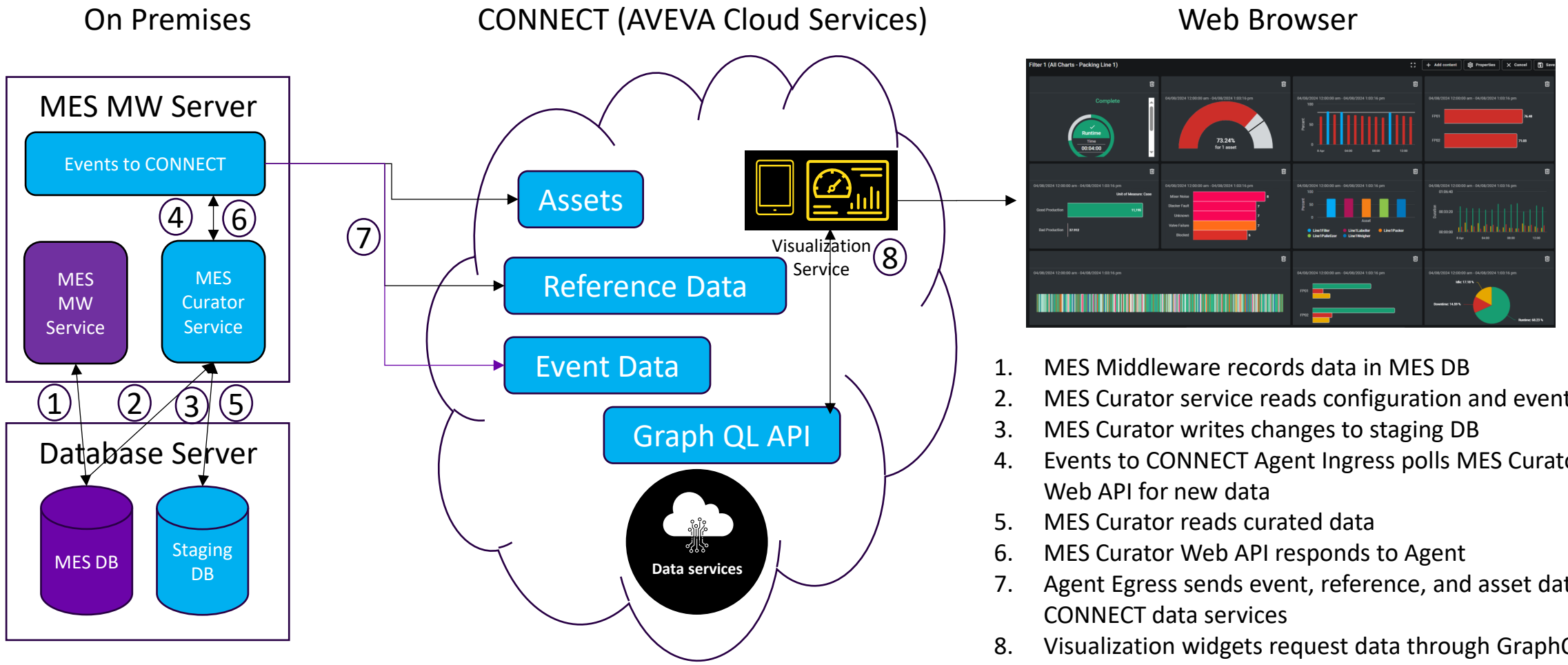
## CONNECT Data Services Event Data Store

- Assets
  - Hierarchical Equipment Model
  - Trait Definitions
- Examples
  - Site
  - Area
  - Equipment
  - Track Jobs
  - Track OEE

- Event Data
  - Point in time transactional event
  - Span of time events
- Examples
  - Material production event
  - Material consumption event
  - Production Job state change
  - Equipment downtime event
  - Shift history

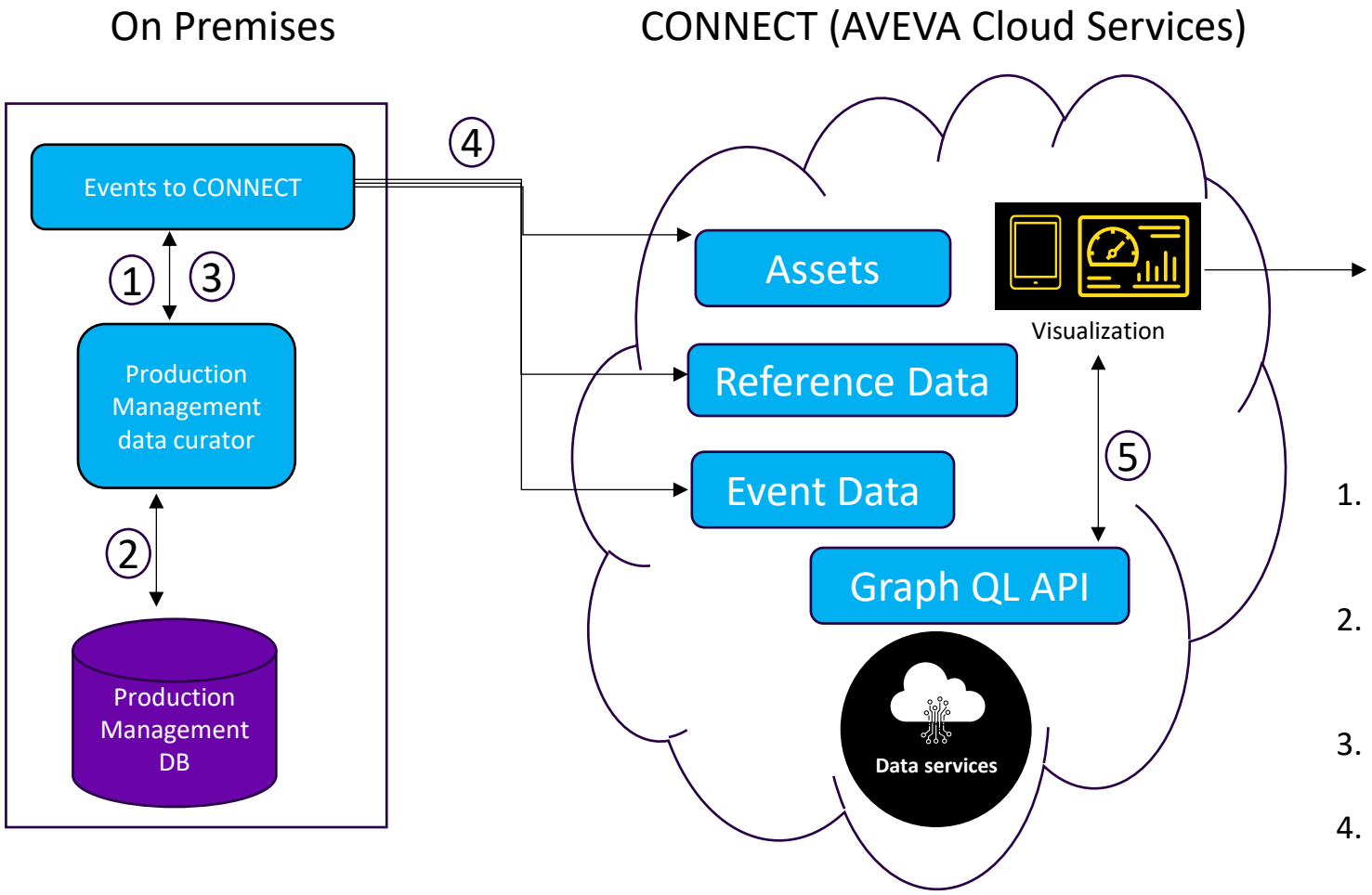
- Reference Data
  - Contextual Data related to Asset or Event
  - Includes Enumerations for set of values
- Examples
  - Materials
  - Disposition Codes / Reason Codes
  - Equipment State Type
  - Units of Measure
  - Users

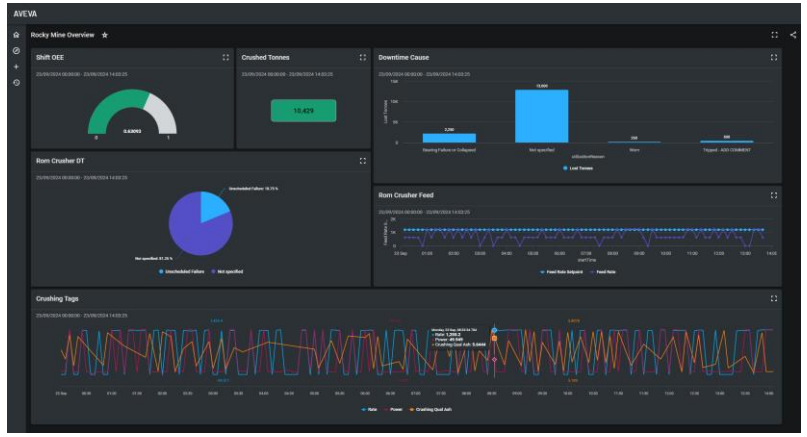
# AVEVA MES-hybrid - Enterprise-wide Data Management




1. MES Middleware records data in MES DB
2. MES Curator service reads configuration and event data
3. MES Curator writes changes to staging DB
4. Events to CONNECT Agent Ingress polls MES Curator Web API for new data
5. MES Curator reads curated data
6. MES Curator Web API responds to Agent
7. Agent Egress sends event, reference, and asset data to CONNECT data services
8. Visualization widgets request data through GraphQL API to show in Dashboards

# Production Management -hybrid - Enterprise-wide Data Management

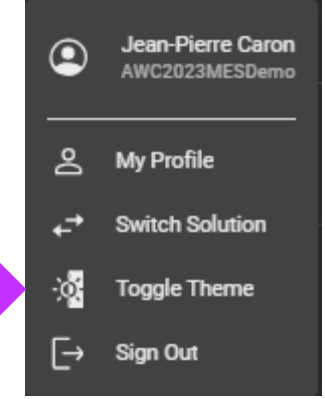


1. Events to CONNECT Agent Ingress polls Production Management data curator for new/modified events or configuration
2. Production Management data curator queries Production Management DB for new /modified events or configuration
3. Production Management data curator returns the events/ config to the Events to CONNECT Agent
4. Events to CONNECT Agent Egress sends event, reference, and asset data to CONNECT data services
5. Visualization widgets request data through GraphQL API to show in Dashboards

# Visualization of MES Event Data

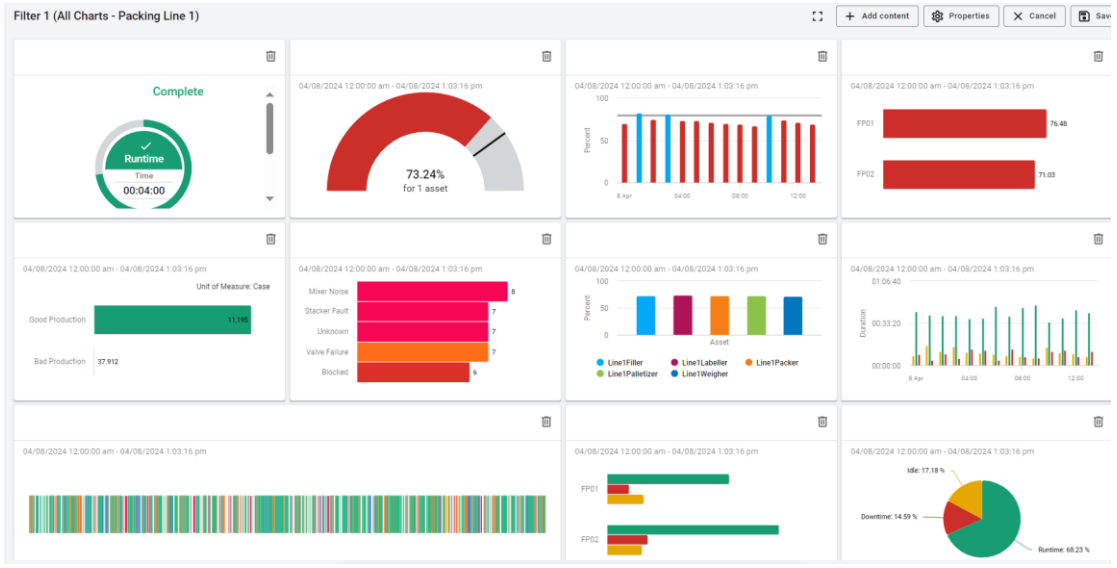
# CONNECT Visualization Widgets for Asset Efficiency




## Support for Two Different Themes

- Dark Theme (Default)

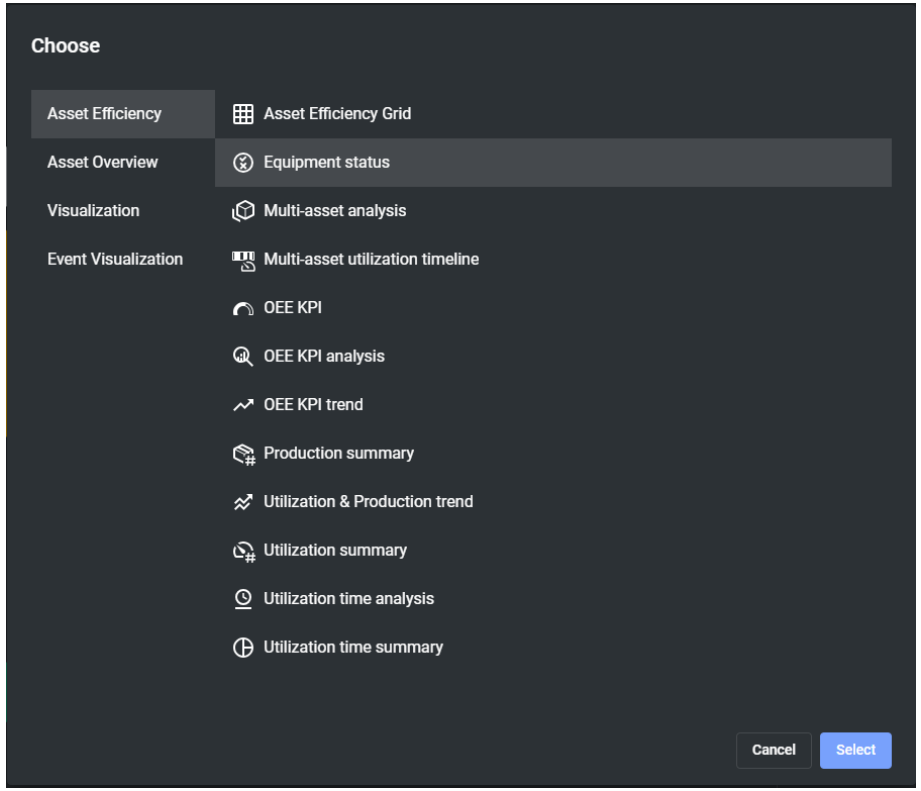

- Light Theme



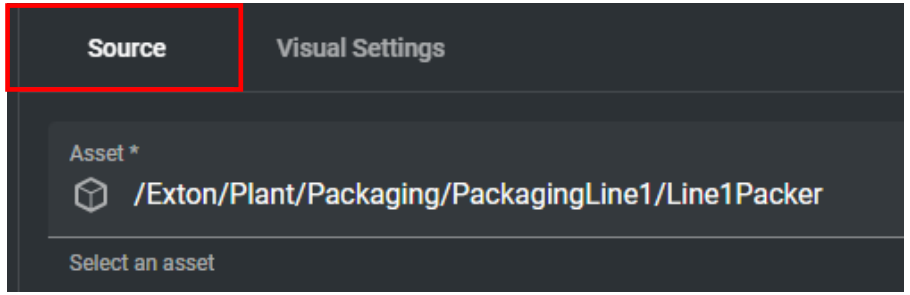
# CONNECT Visualization Widgets for Asset Efficiency

## Common Approach to Widget Configuration

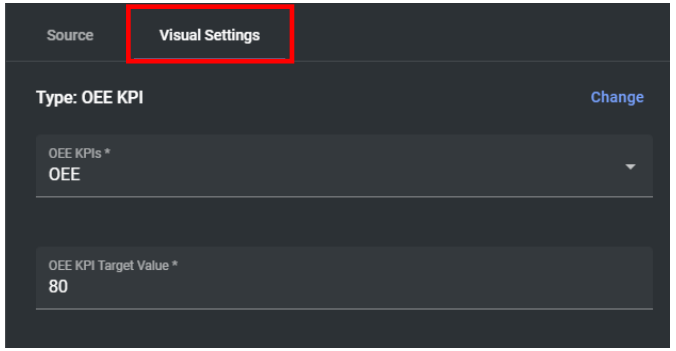
- Widget selection browser




- Widget asset selection



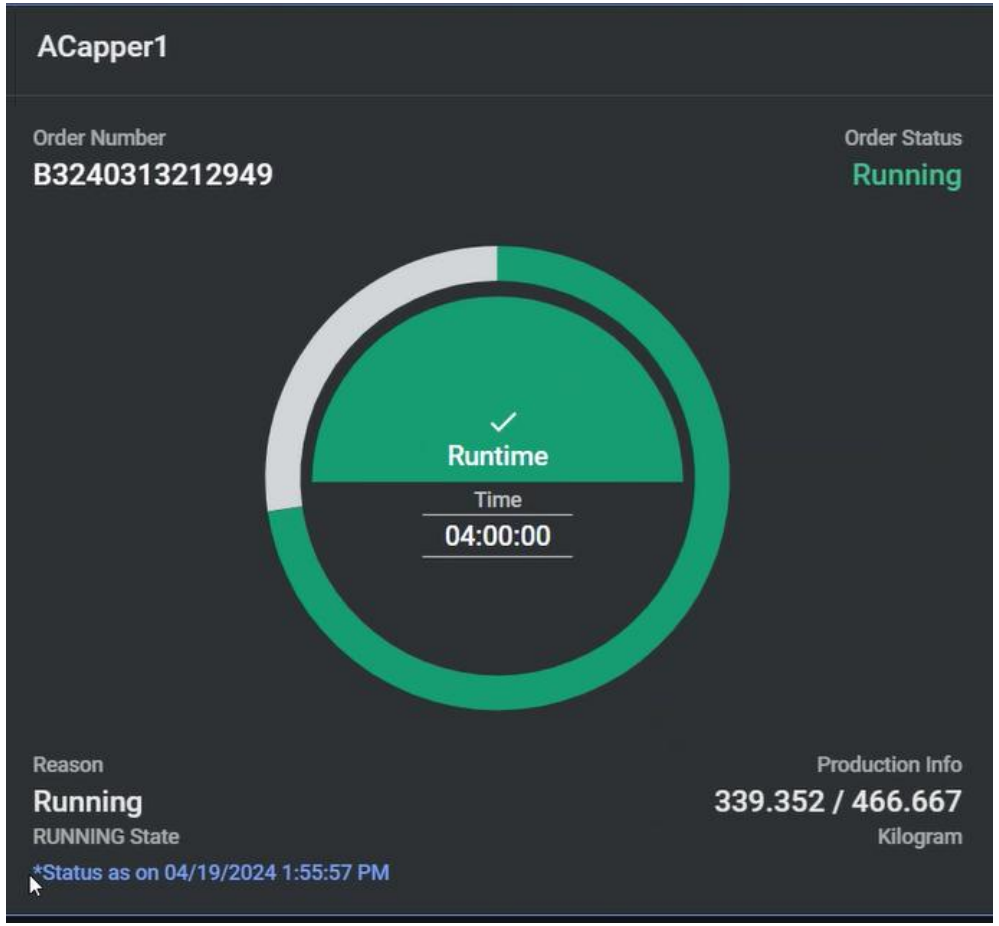

- Widget visualization Settings



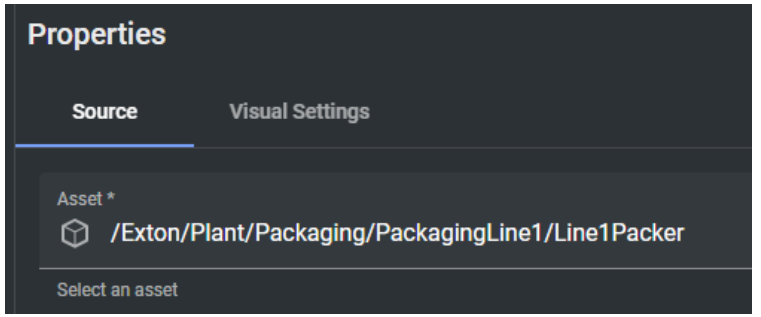
# CONNECT Visualization Services – MES Event Visualization

## Equipment Status (Utilization History for current event, Job History for production)

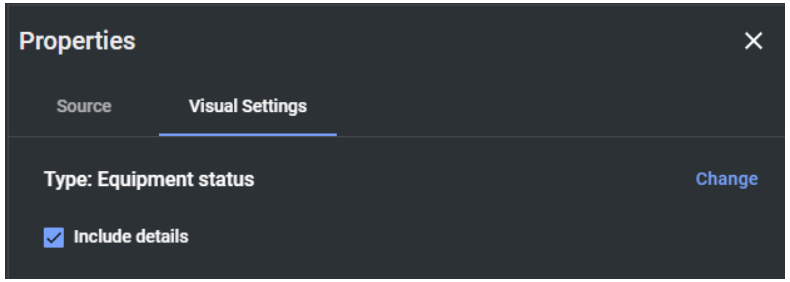
- Widget Look




- Asset selection




- Properties visual settings to enable or not details

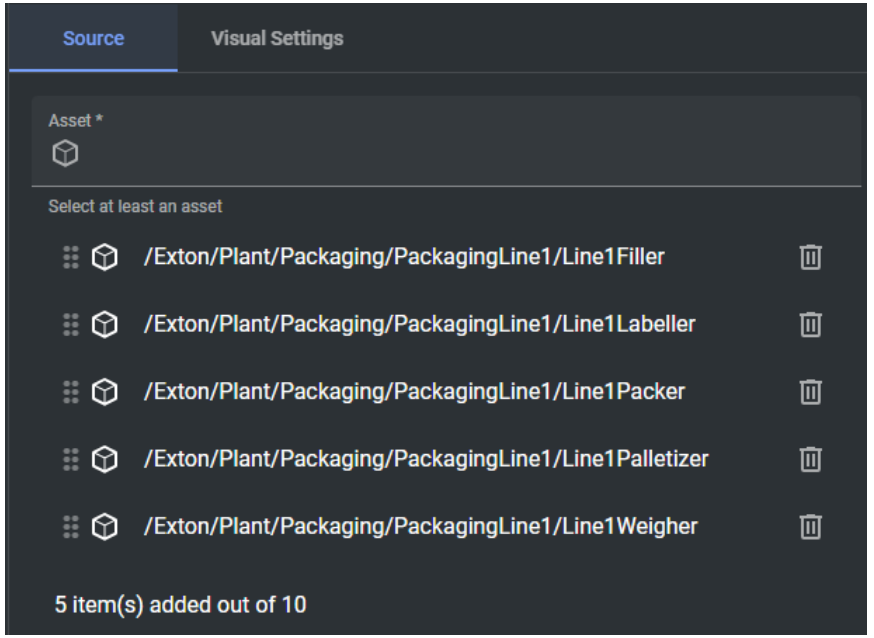


# CONNECT Visualization Services – MES Event Visualization

## Multi-Asset Utilization Timeline (Utilization History events)

- Widget Look

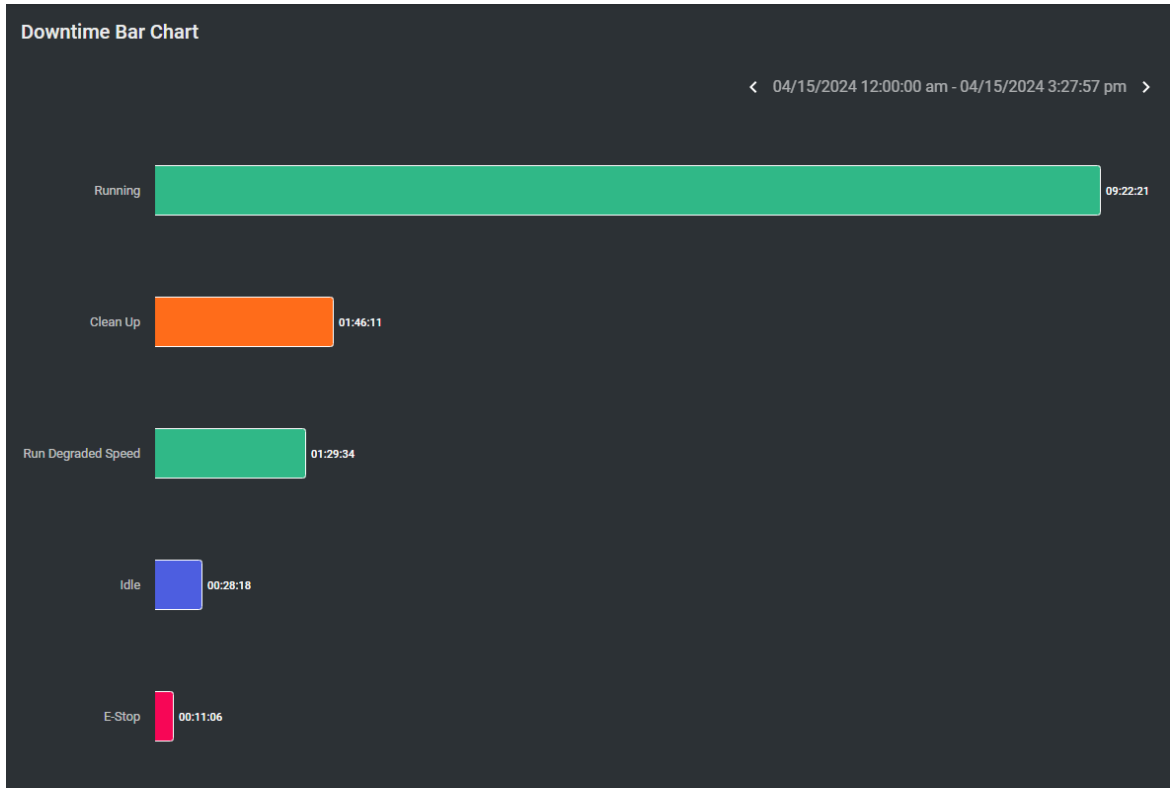

- Up to 10 asset selection with re-ordering



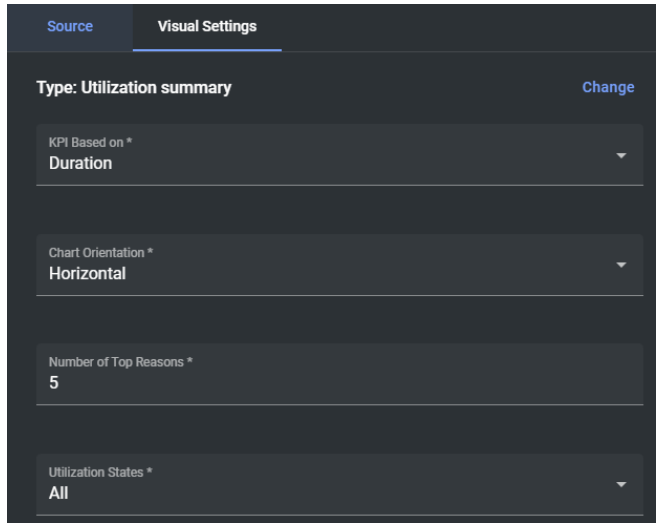
# CONNECT Visualization Services – MES Event Visualization

## Utilization Summary Chart (Utilization History events)

- Widget Look



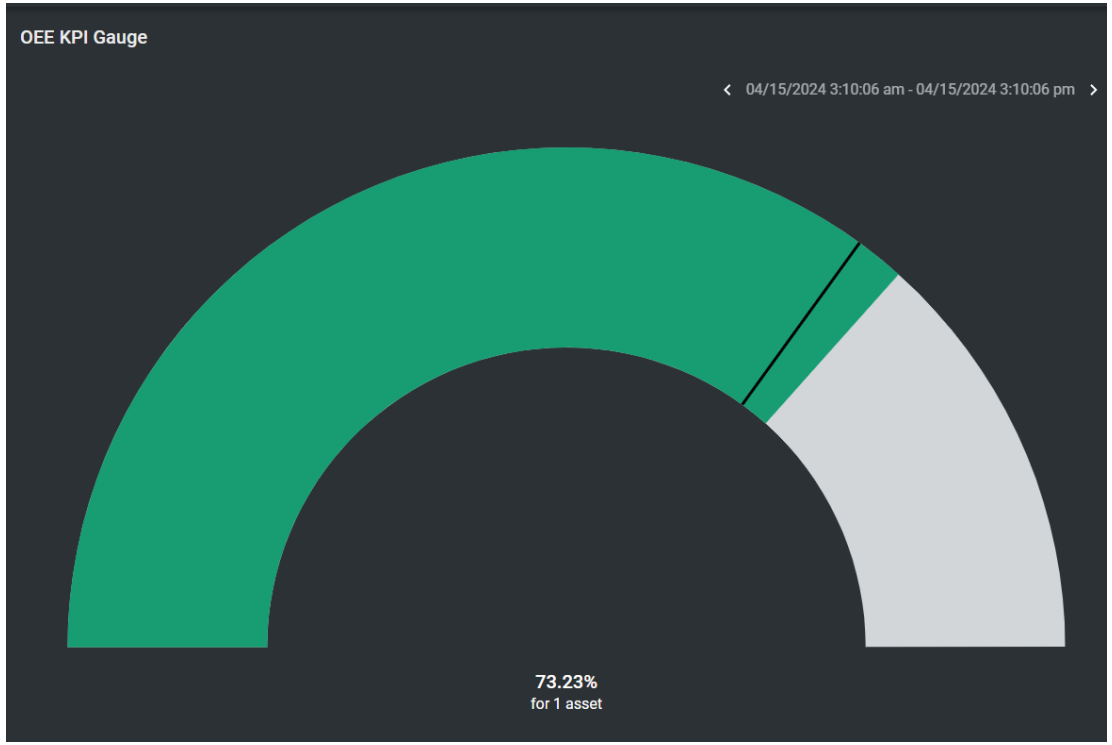

- Single Asset
- Visualization Settings
  - Select Count or Duration
  - Set Orientation
  - Set Number of bars
  - Select which state types
    - Downtime
    - Idle
    - Runtime
    - Downtime and Idle
    - All



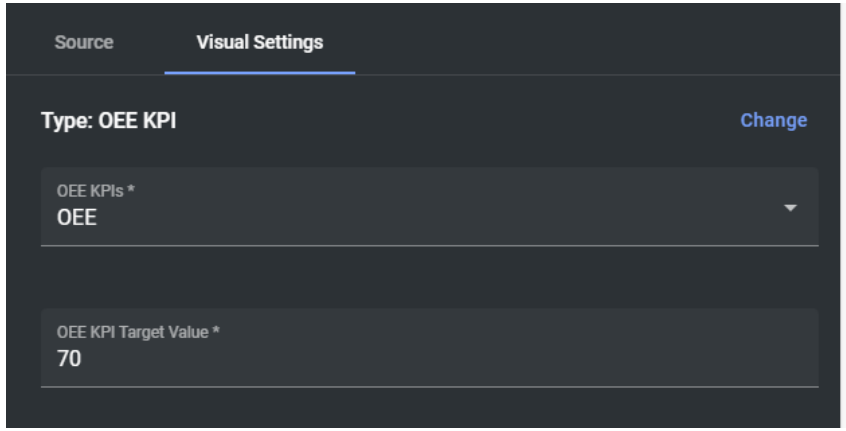
# CONNECT Visualization Services – MES Event Visualization

## OEE Gauge (Job Hour History events)

- Widget Look



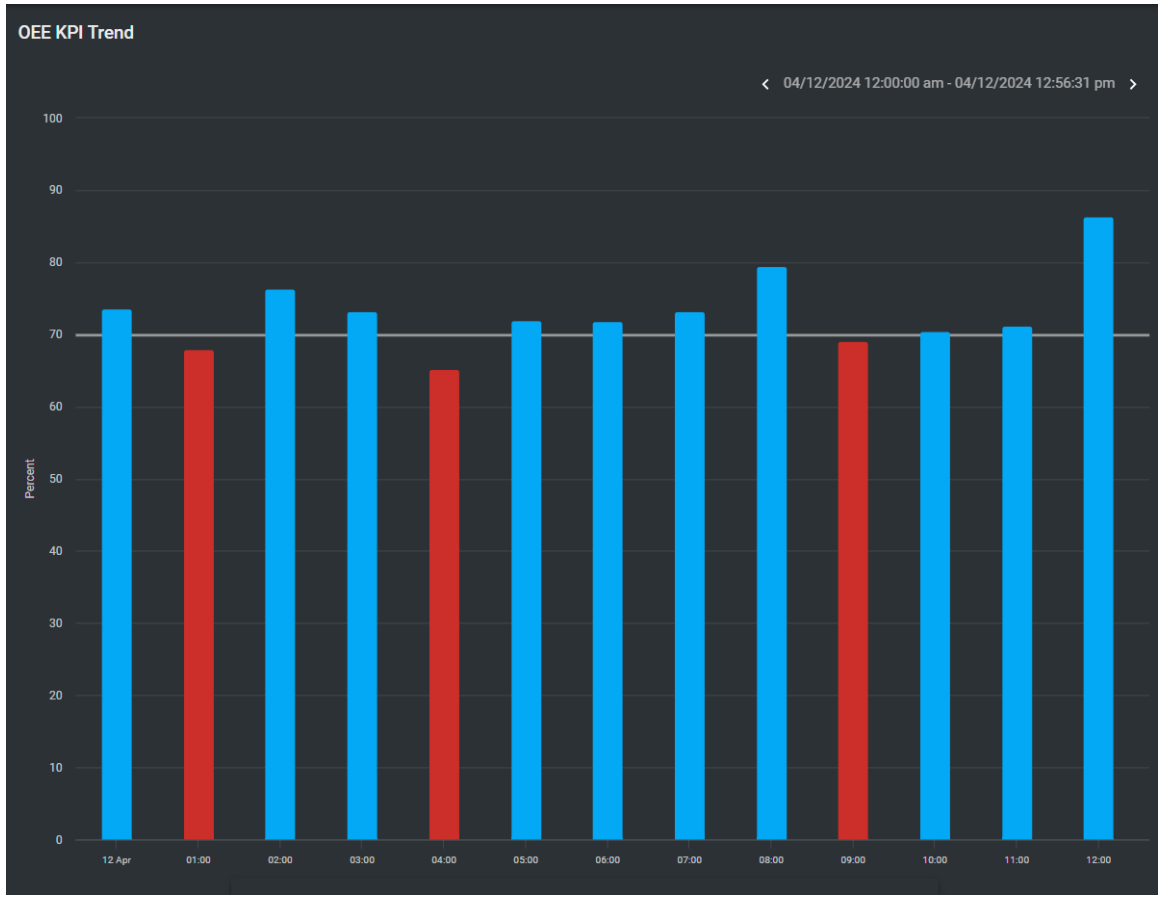

- Single Asset
- Visualization settings
  - KPI selection: OEE, Performance, Availability or Quality
  - Manual setting of Target (default is MES target)



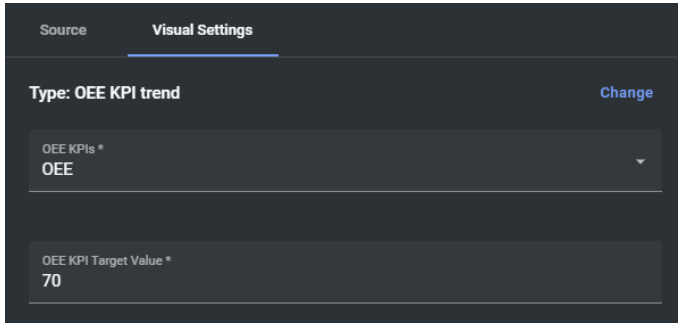
# CONNECT Visualization Services – MES Event Visualization

## OEE KPIs Trend (Job Hour History events)

- Widget Look



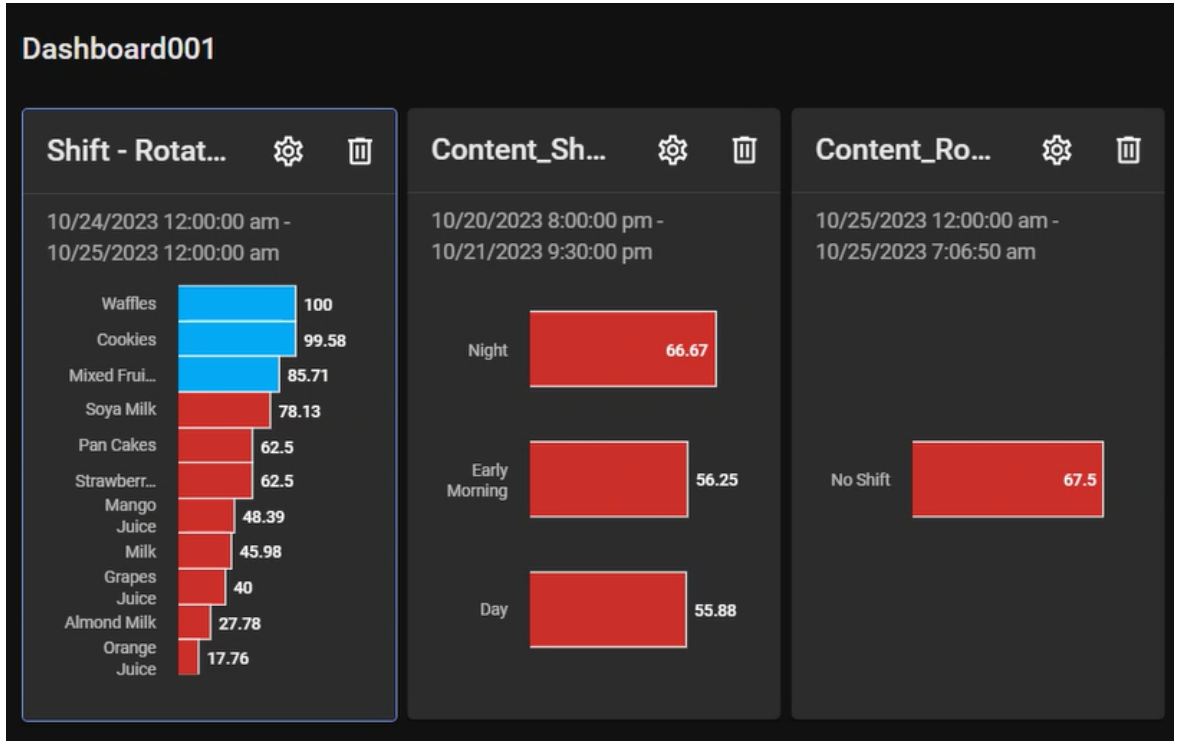

- Single Asset
- Select KPI to show (OEE, Availability, Performance, or Quality)
- Orientation
- Buckets adjust based on time range
  - Day = hourly buckets
  - X Day = X hours in a bucket
  - 8 - 31 Days = daily buckets
  - >31 Days = weekly buckets



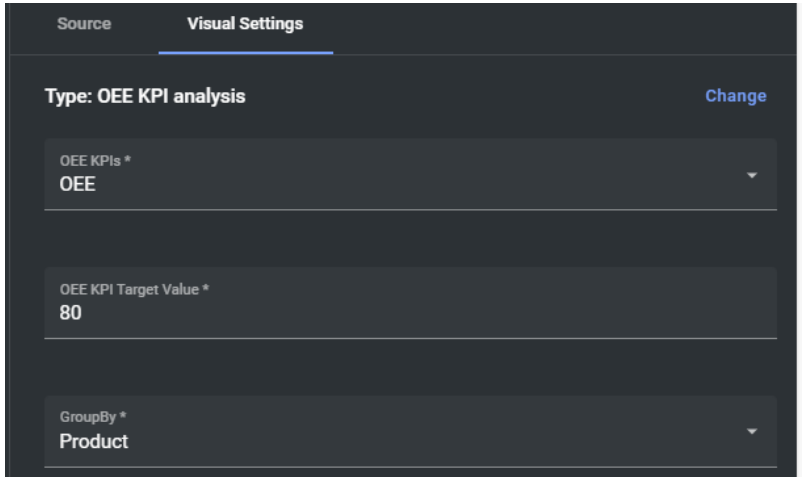
# CONNECT Visualization Services – MES Event Visualization

## OEE KPIs Analysis (Job Hour History and Shift History events)

- Widget Look



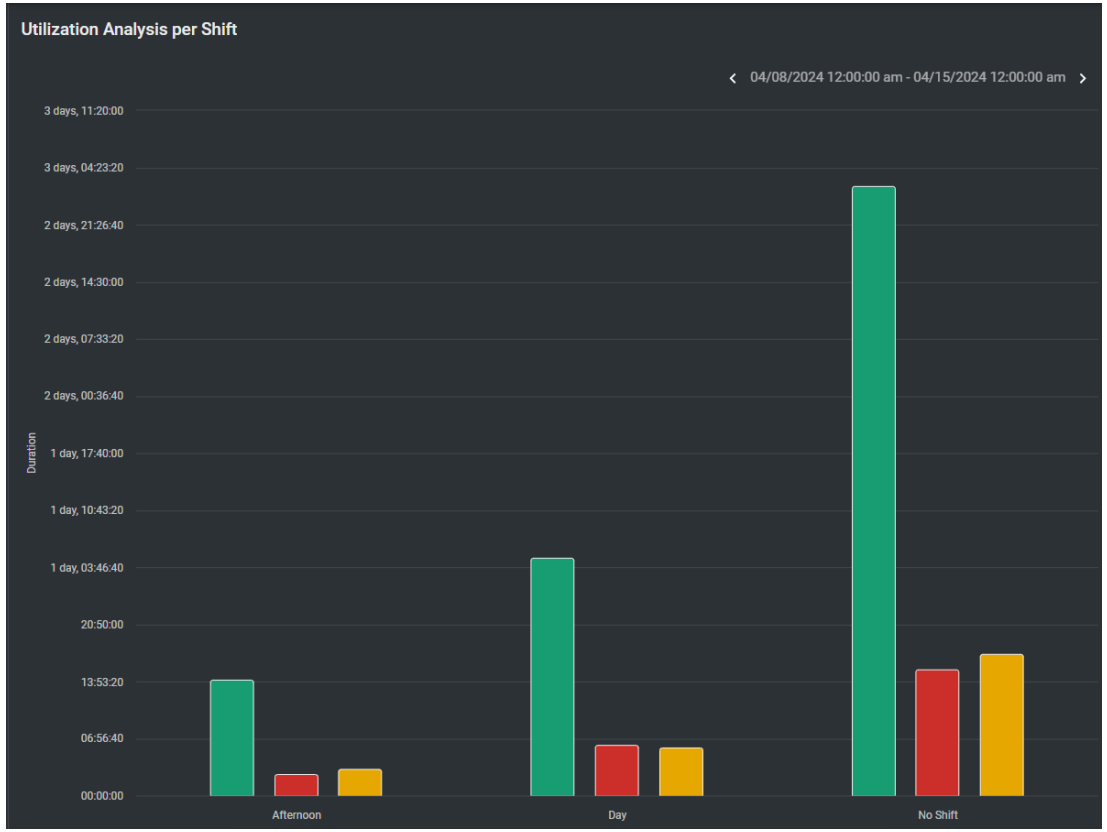

- Single Asset
- KPI selection : OEE, Availability, Performance, Quality
- Manually set target
- GroupBy Product or shift



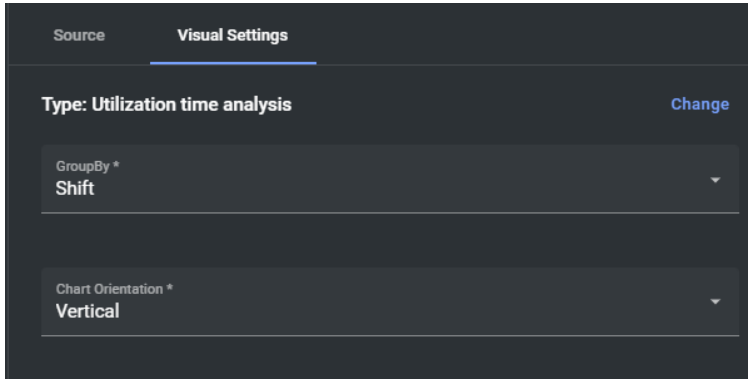
# CONNECT Visualization Services – MES Event Visualization

## Utilization Time Analysis (Job Hour History and Shift History events)

- Widget Look



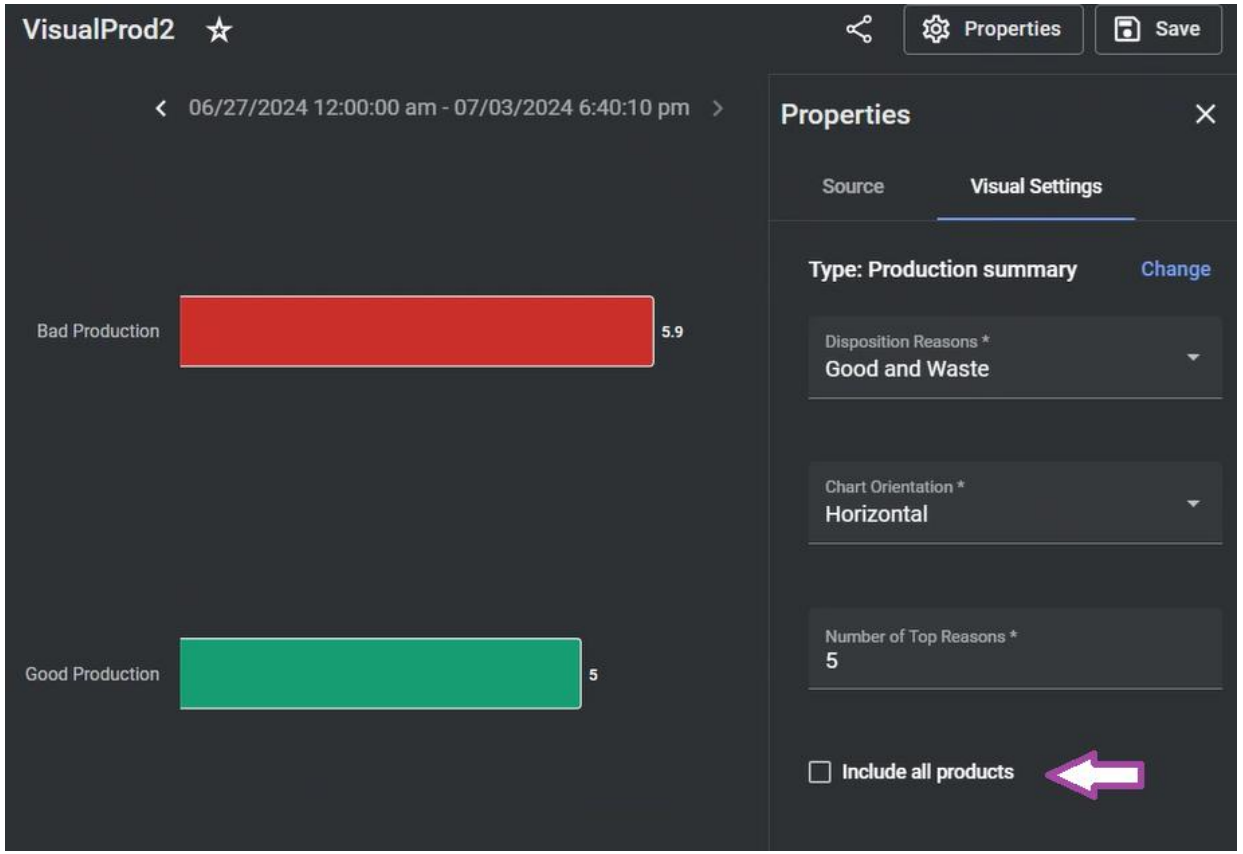

- Single Asset
- Hours of Runtime, Downtime, and Idle time within time range
- Option to group by product or shift
- Orientation : Vertical or Horizontal



# CONNECT Visualization Services – MES Event Visualization

## Production Summary – (Material Produced Events)

- Widget Look

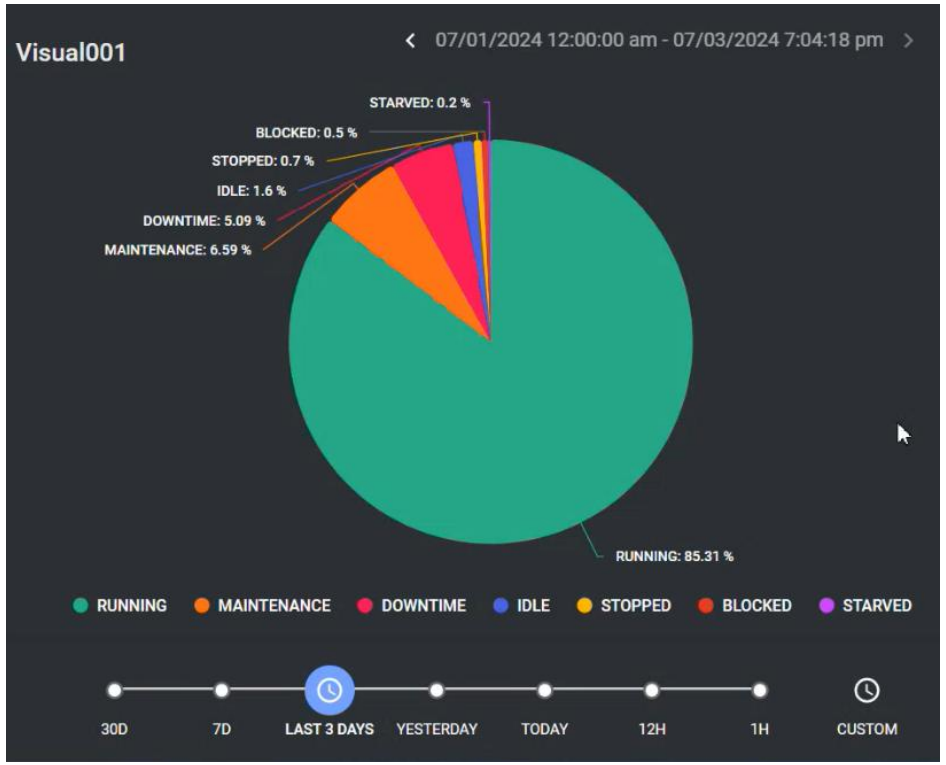


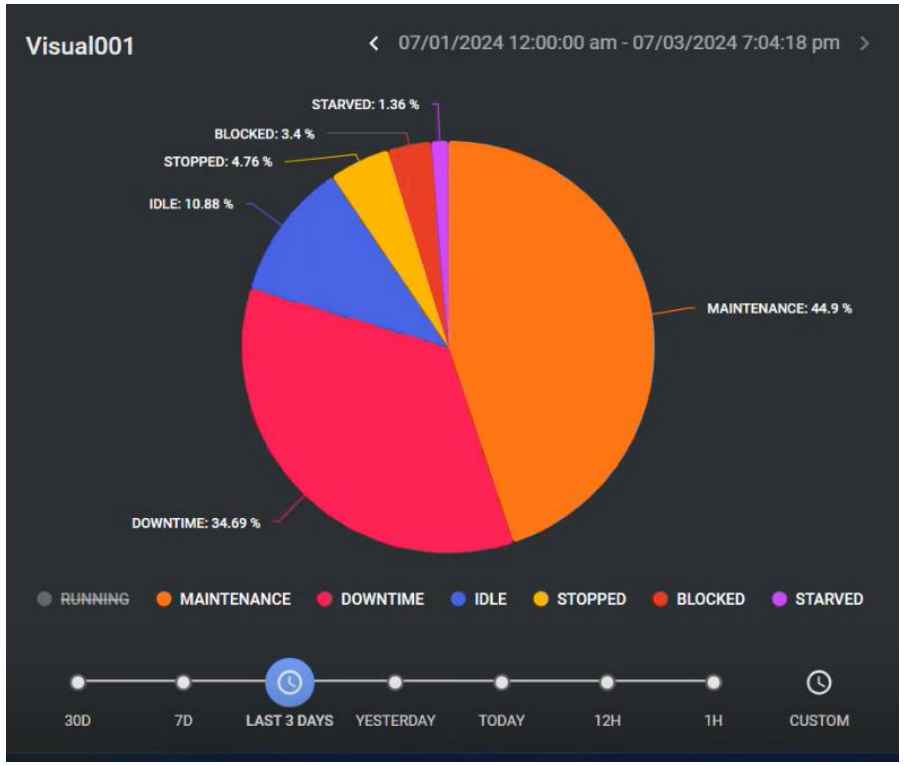

- Single Asset
- Visualization settings
  - Select Good, Waste or Both
  - Orientation
  - Set number of disposition codes
  - Option to include co-products / by-products

# CONNECT Visualization Services – MES Event Visualization

## Utilization Time Summary – Pie chart of time in state (Utilization History Events)

- Widget Look
  - Example of Using Legend to Toggle Off RUNNING state
- Single Asset
- Visualization settings
  - Summary by Equipment State or State Type
  - Option to Show Legend

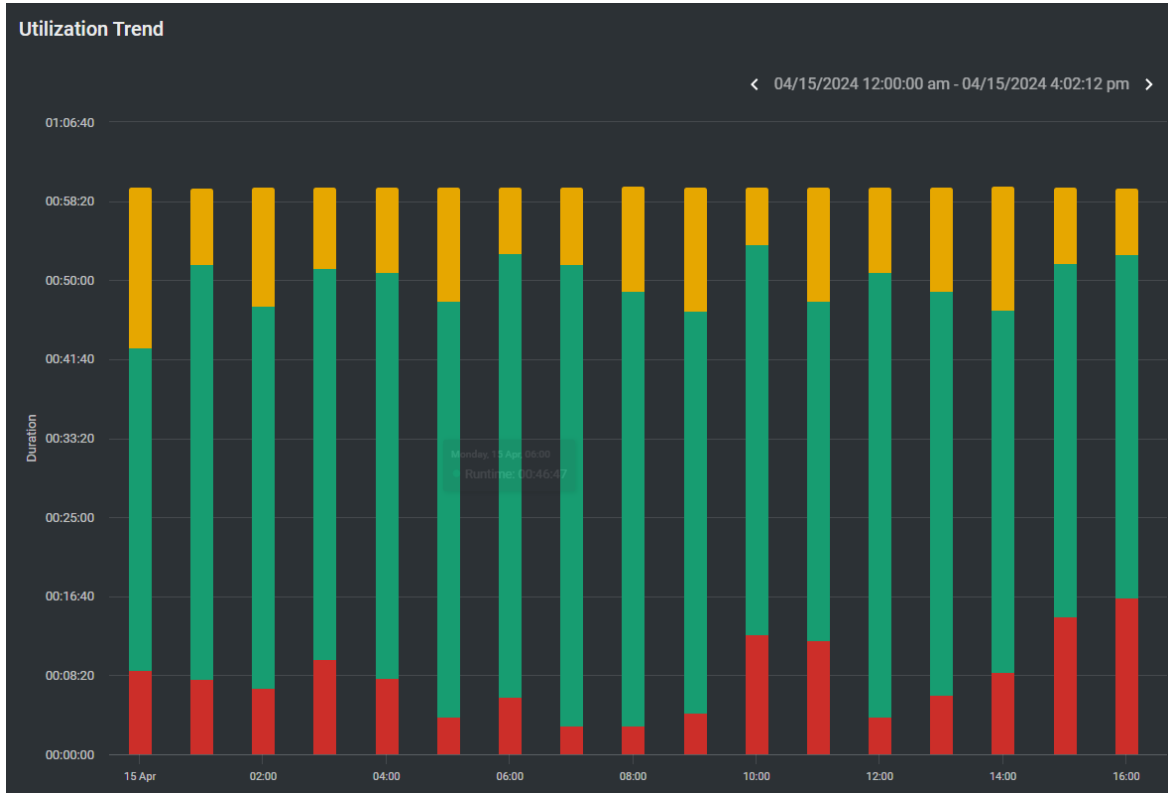


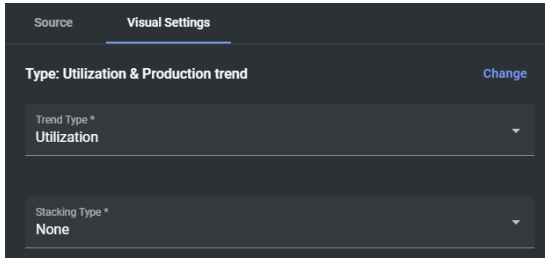
# CONNECT Visualization Services – MES Event Visualization

## Utilization and Production Trend (Job Hour History events)

- Widget Look

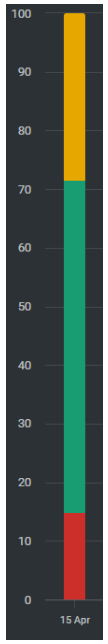



- Single Asset
- Visualization Settings
  - Show Legend
  - Utilization or production
  - Stack type

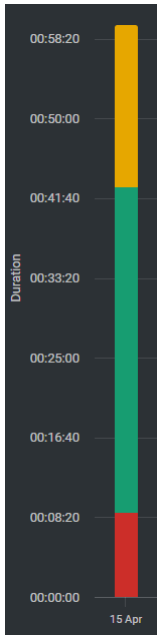



None


Percent



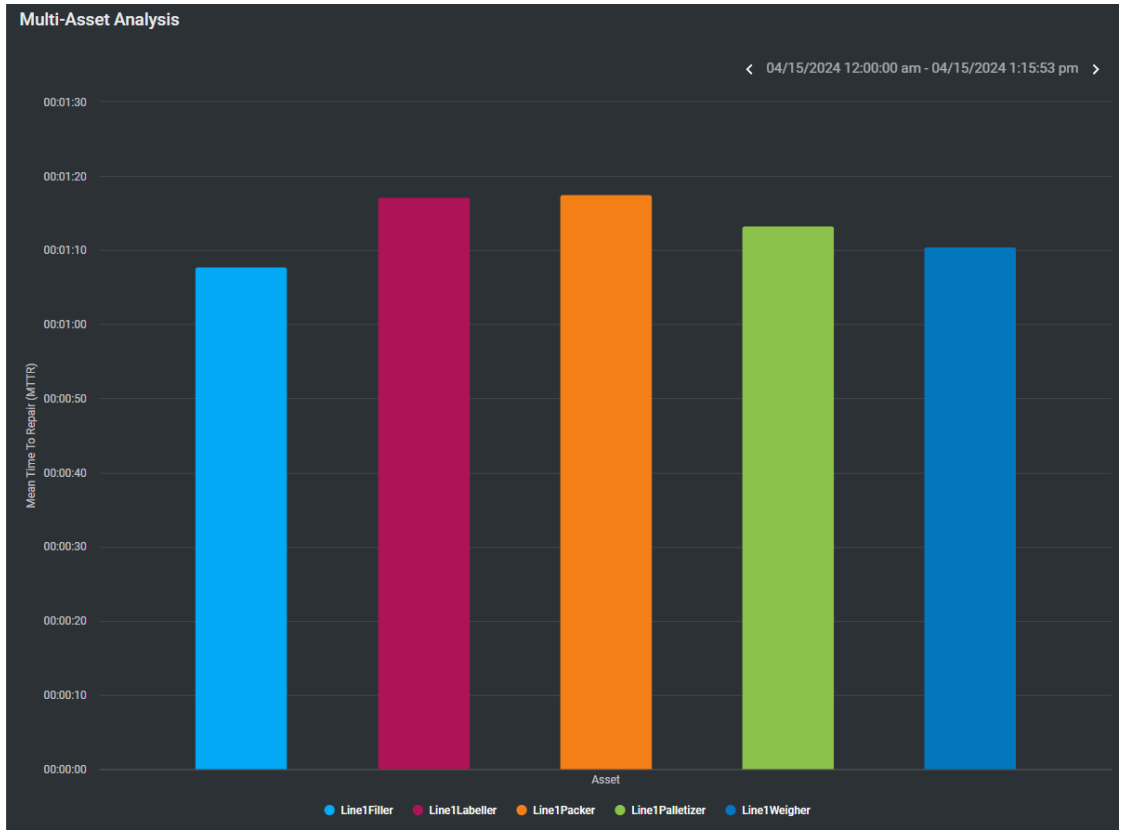

Raw values



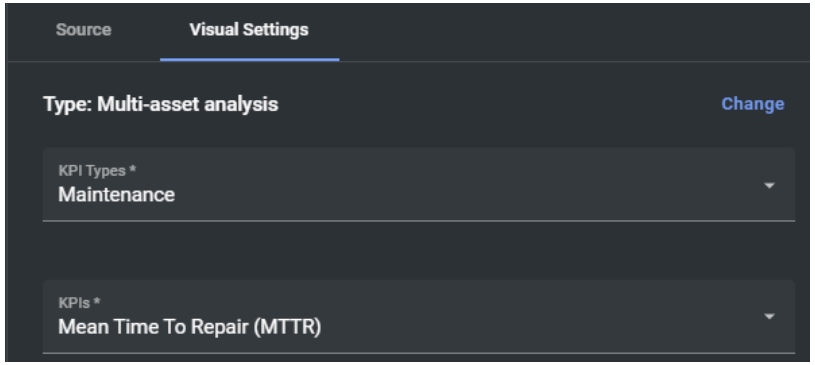
# CONNECT Visualization Services – MES Event Visualization

## Multi Asset Analysis (Job Hour History and Utilization History events based on KPI)

- Widget Look (MTTR example)



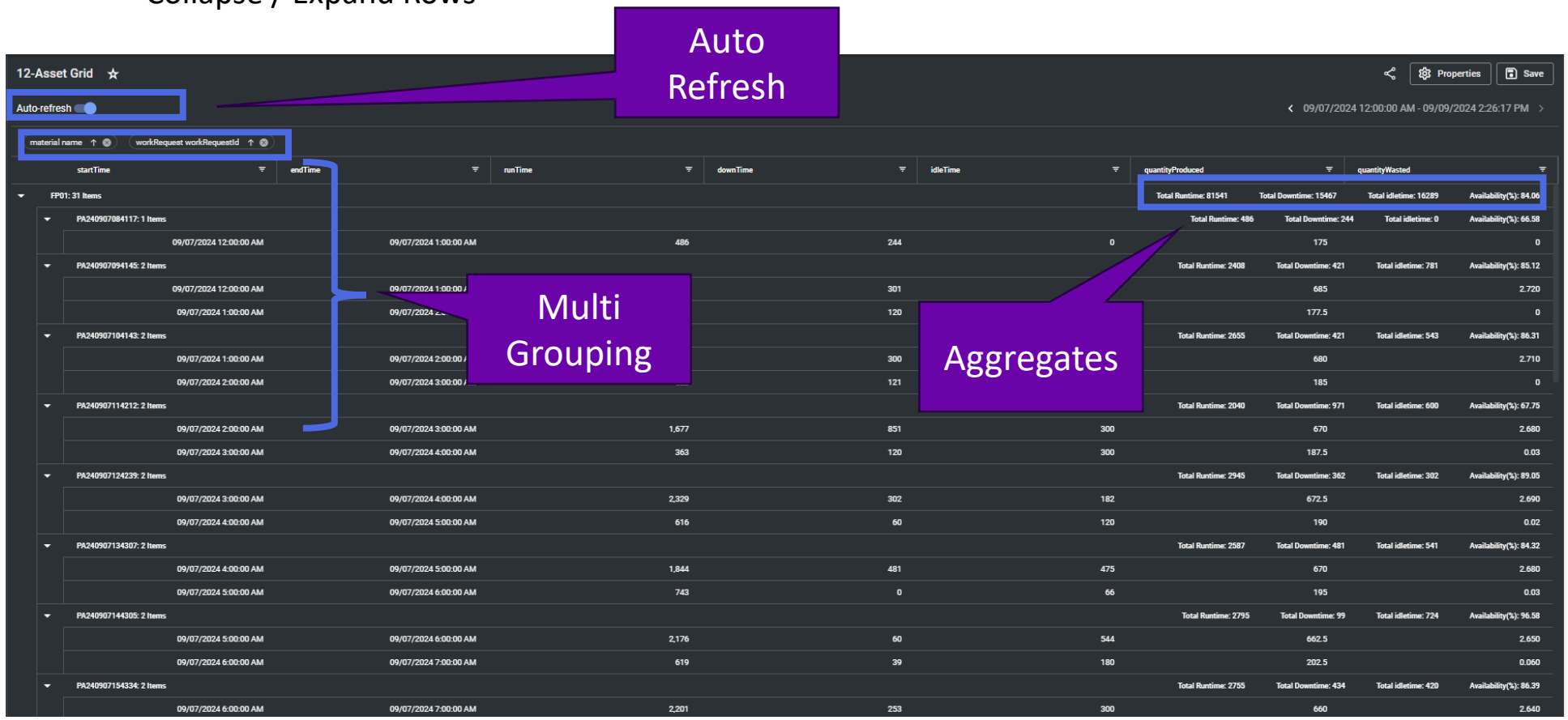

- Multi Asset – up to 10
- Select KPI Type (OEE, Downtime, Maintenance)
  - OEE: OEE, Performance, Availability, Quality
  - Downtime: Count or duration
  - Maintenance: MTTR, MTBF
- Optional Target (applies to all)
- Enable / Disable asset by clicking its label



# CONNECT Visualization Services – MES Event Visualization

## Asset Efficiency Grid

- Widget Look
  - Column Filtering and Group By
  - Collapse / Expand Rows

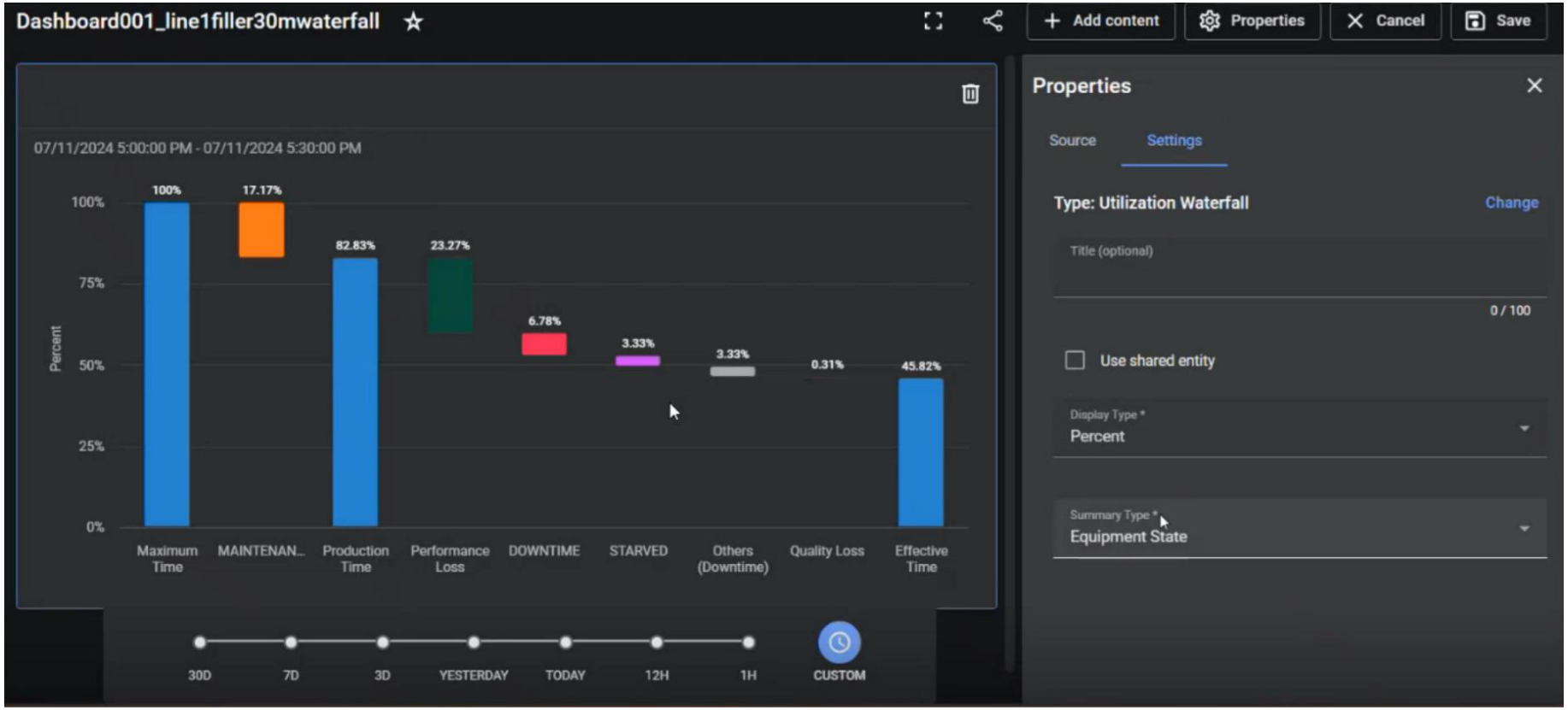



- Single Asset
- Select Event Type
  - Utilization Events
  - Job Hourly History
  - Material Produced Events
- Predefined, but Selectable Columns
- Data Export
- Drill Through from Other Widgets

# CONNECT Visualization Services – MES Event Visualization

## Utilization Waterfall

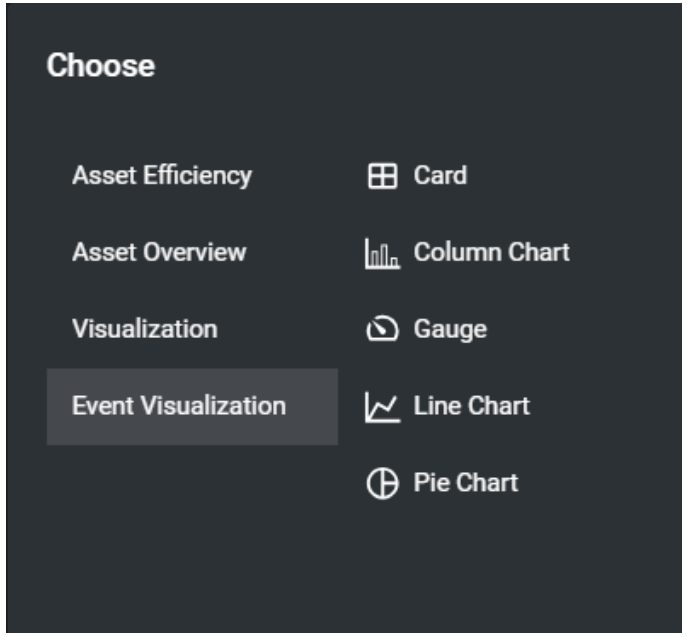
- Single Asset
- Set Time Period
- Display Idle Time Loss
- Performance Loss
- Downtime Loss
  - By Equipment State
  - Or Equipment Reason
- Quality Loss
- Option to show in time or Percent



# CONNECT Visualization Widgets for Event Visualization

## Generic widgets for visualizing any event – Designed for Production Management

- Widget selection browser

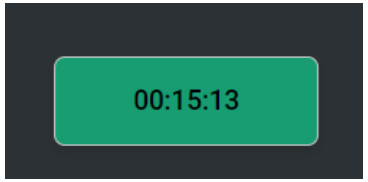


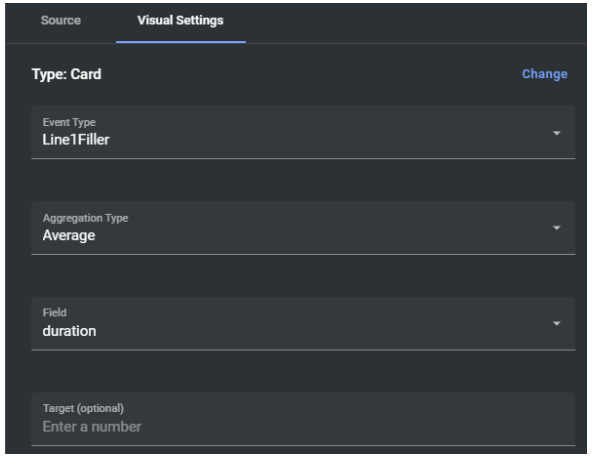

- Highly flexible/configurable widgets for visualizing events from any source system
- Widget source selection common properties
  - Asset selection
  - Event type selection
  - Aggregation type selection: Min, max, avg, count, sum
- Widget Visual Settings common properties
  - Title
  - Use shared entity

# CONNECT Visualization Services – Event visualization

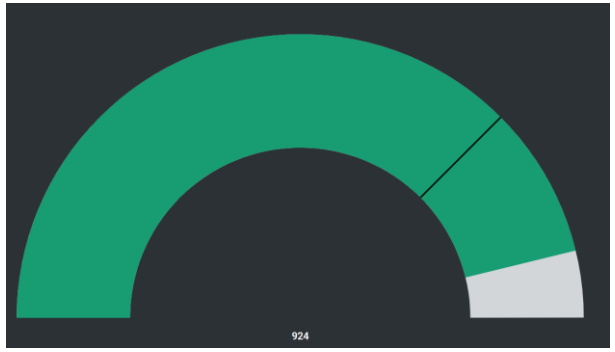
## Card and Gauge

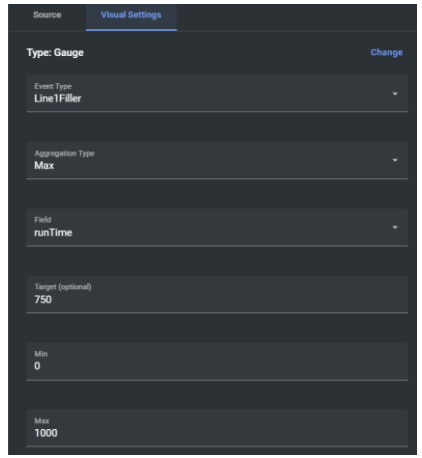
- Card
  - Single Asset
  - Field : Any numeric or timespan field in event type
  - Target: If a target is specified, widget is green to indicate above target or red if below target.



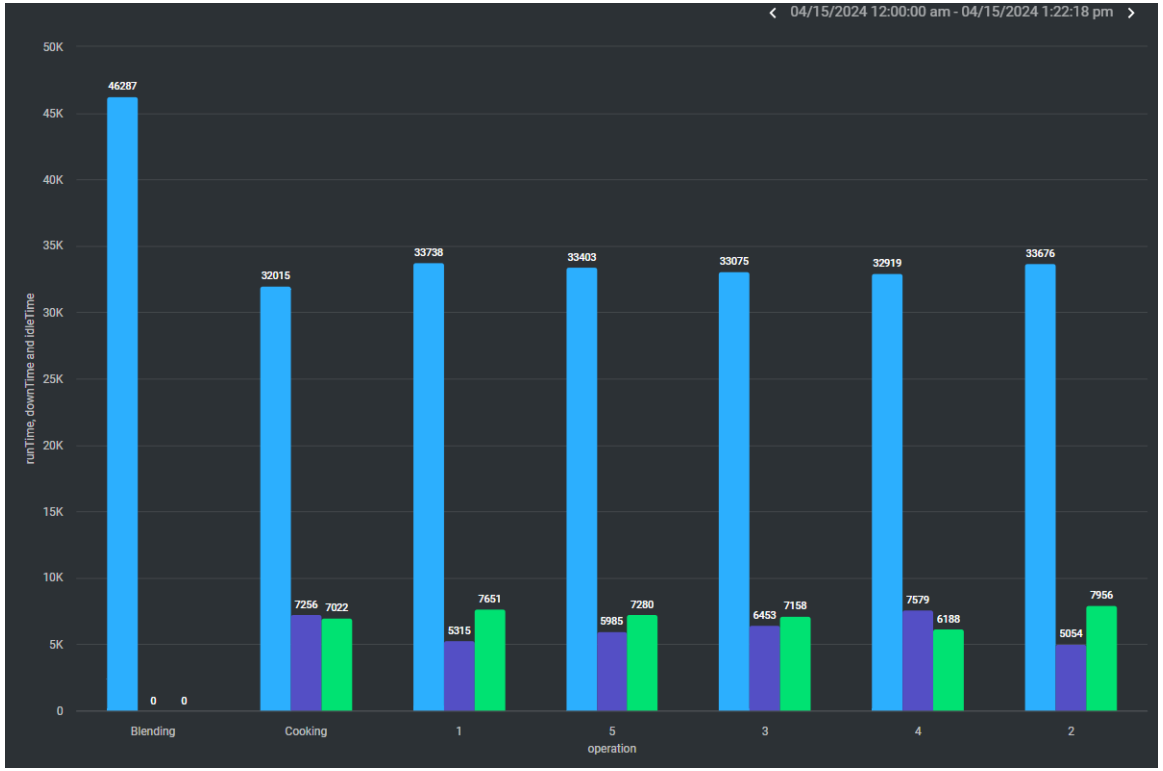

- Gauge
  - Single Asset
  - Field : any numeric  or timespan  field in event type
  - Min/Max: Define the min and max range for the gauge
  - Target: If a target is specified, widget is green to indicate above target or red if below target.



# CONNECT Visualization Services – Event Visualization

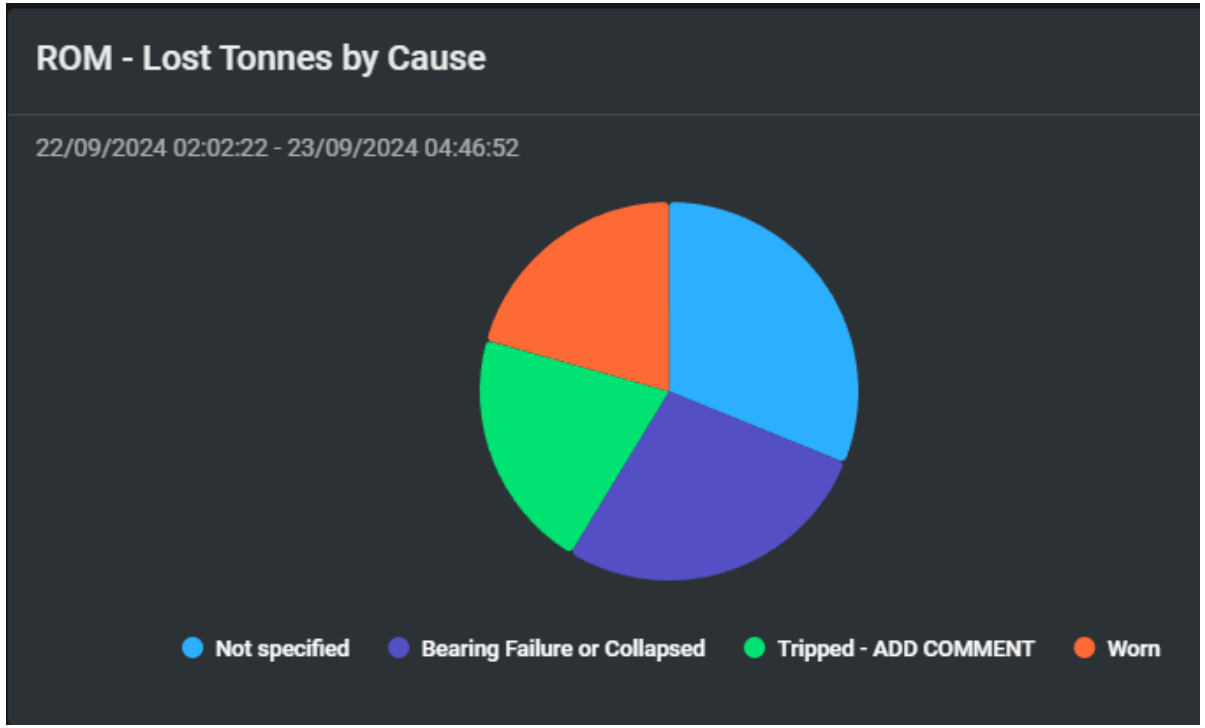
## Column Chart




- Single Asset
- Field(s): Numeric or timespan field(s) in the selected Event type
- Grouping option: String fields in the event type
- Stacking and orientation option
- Toggle label & legend options

# CONNECT Visualization Services – Event Visualization

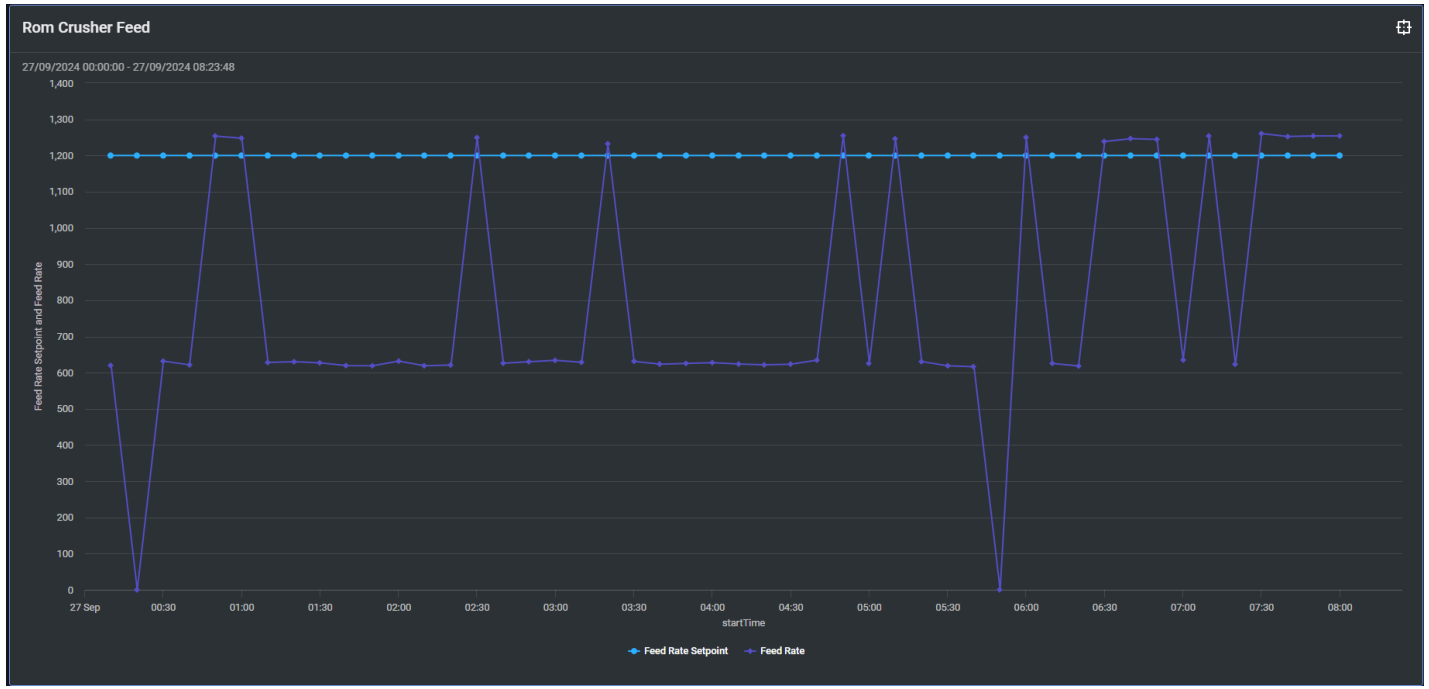
## Pie Chart




- Single Asset
- Field: Numeric or time span field on the selected Event type
- Grouping Option: String field on the selected Event type
- Display Format: Percentage or value

# CONNECT Visualization Services – Event Visualization

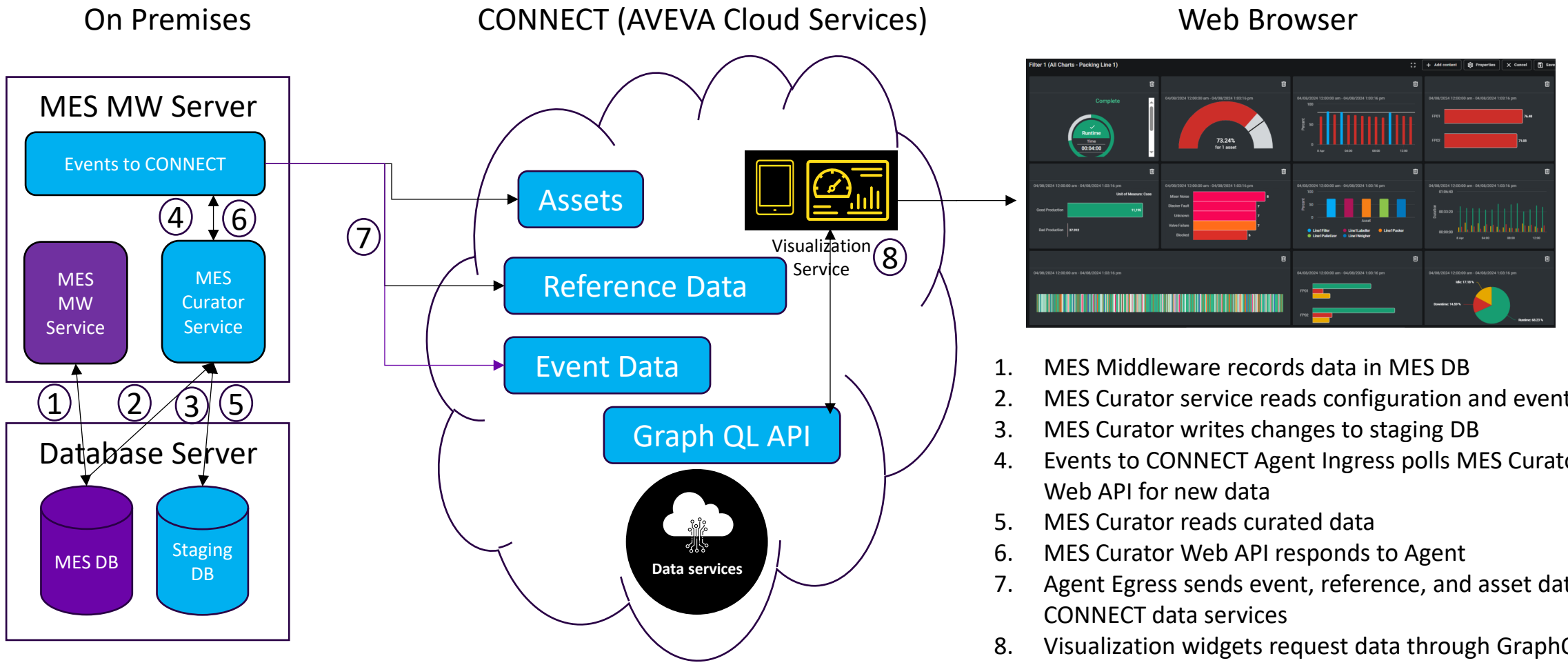
## Line Chart




- Single Asset
- Field: Any numeric field on the event type
- Grouping: Any Date Time field on the selected event type
- Single, multi or stacked Y axis options
- Ability to zoom on chart area

# AVEVA MES Data Publishing

# MES-hybrid - Enterprise-wide Data Management

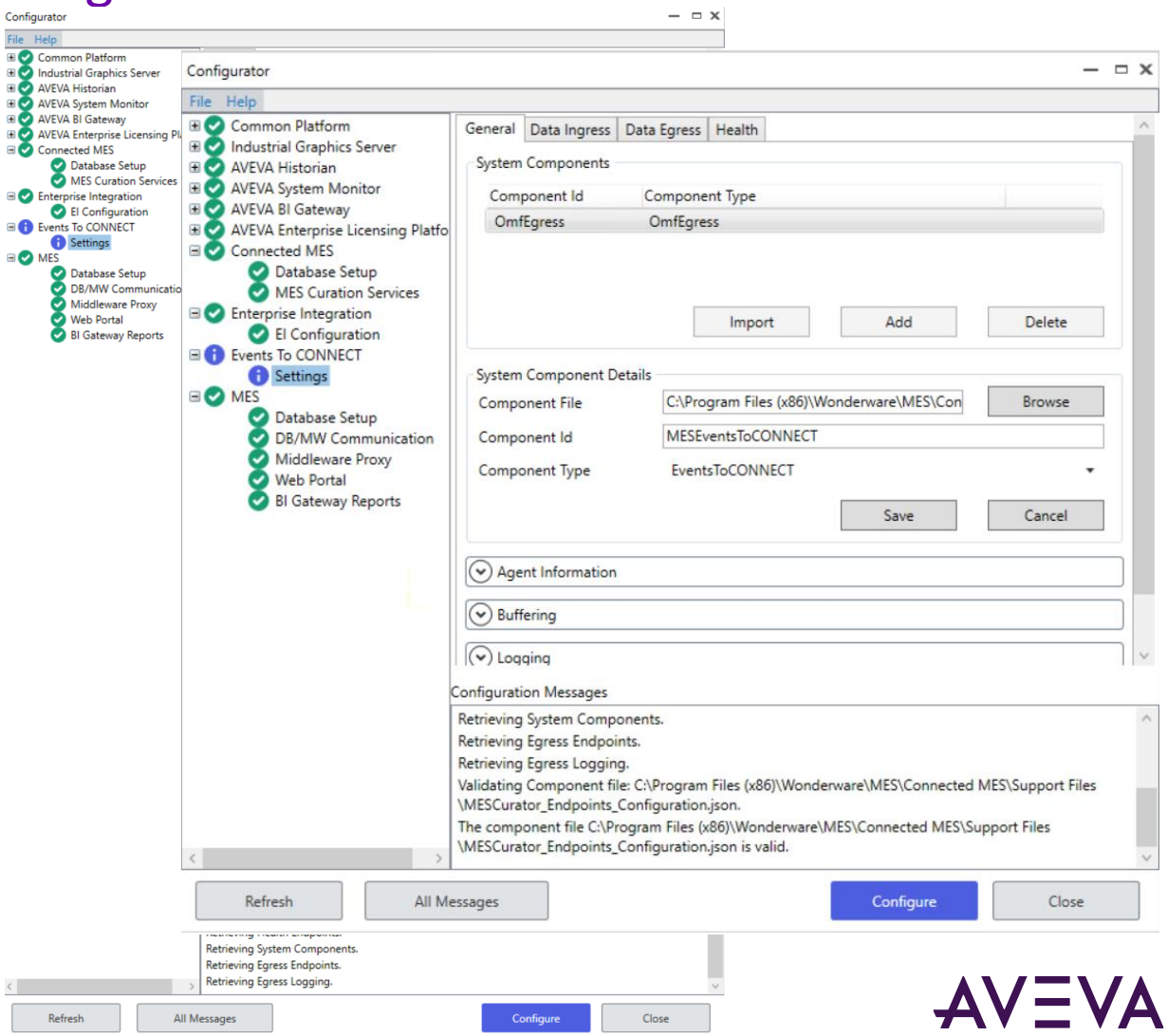



1. MES Middleware records data in MES DB
2. MES Curator service reads configuration and event data
3. MES Curator writes changes to staging DB
4. Events to CONNECT Agent Ingress polls MES Curator Web API for new data
5. MES Curator reads curated data
6. MES Curator Web API responds to Agent
7. Agent Egress sends event, reference, and asset data to CONNECT data services
8. Visualization widgets request data through GraphQL API to show in Dashboards

# AVEVA Events to CONNECT Agent (Publisher)

## Generic Agent for MES and Production Management

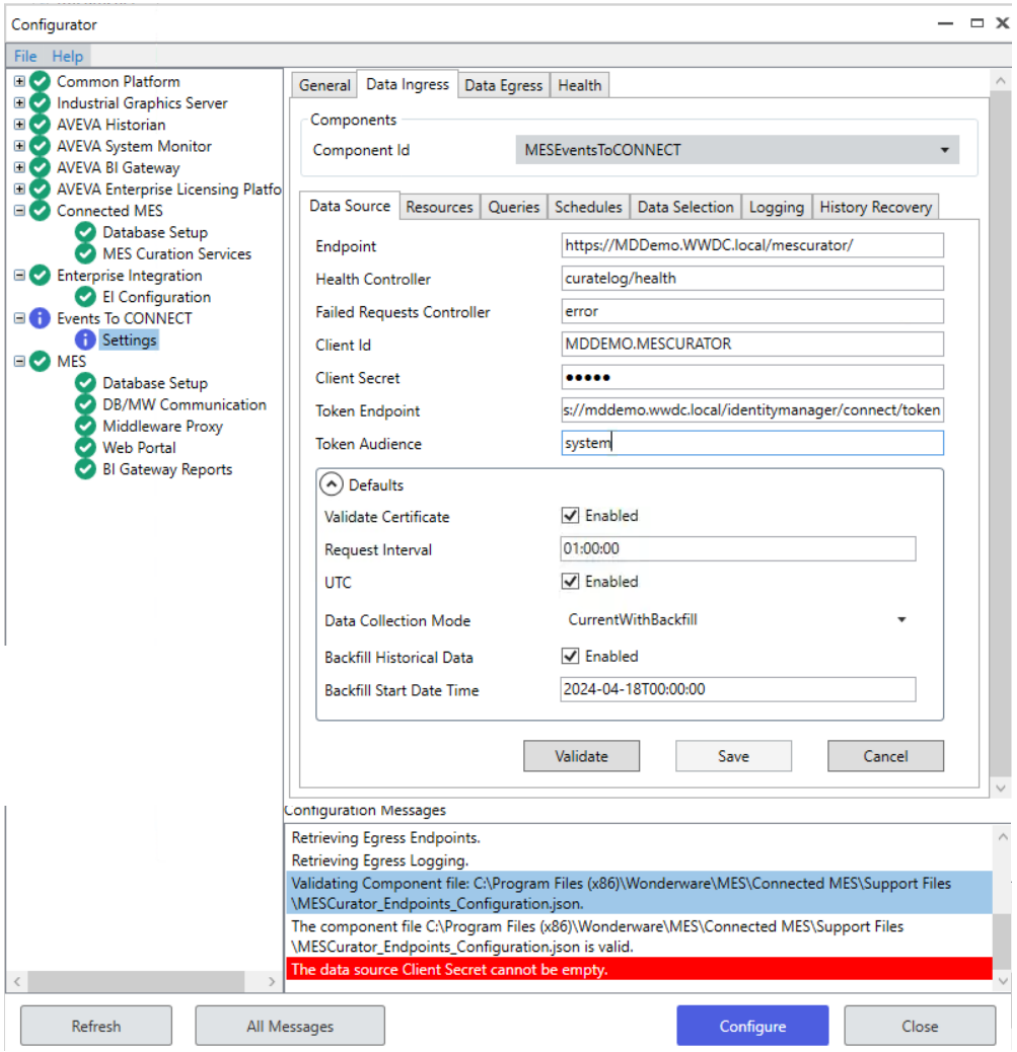
- Separate msi Install but included with download
- Uses Configurator or API Calls
- MES includes import file for Data Ingress configuration
- Production Management data curator configuration tool populates General and Data Ingress configuration automatically
- One Publisher can manage multiple sources



# AVEVA Events to CONNECT Agent

## Data Ingress Definition

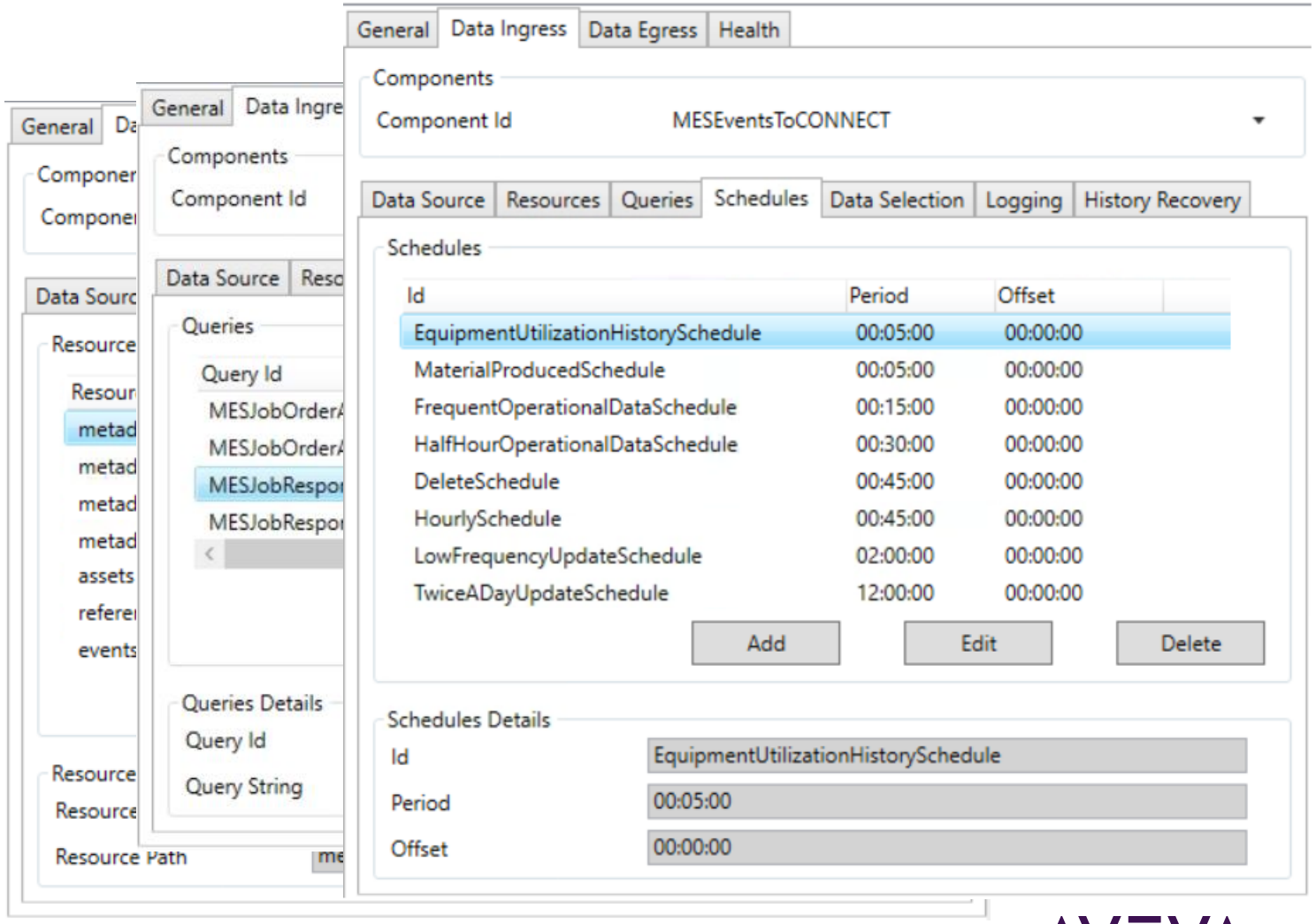
- Data Source – defines the base Web API endpoint for the configured component ID
- Requires security information to communicate with the component
  - For MES, these are the settings configured for the MES Curator Service
- Sets the request interval and the data collection mode for the component
  - Current with Backfill (Default)
  - Current only
  - History only



# AVEVA Events to CONNECT Agent

## Data Ingress Definition

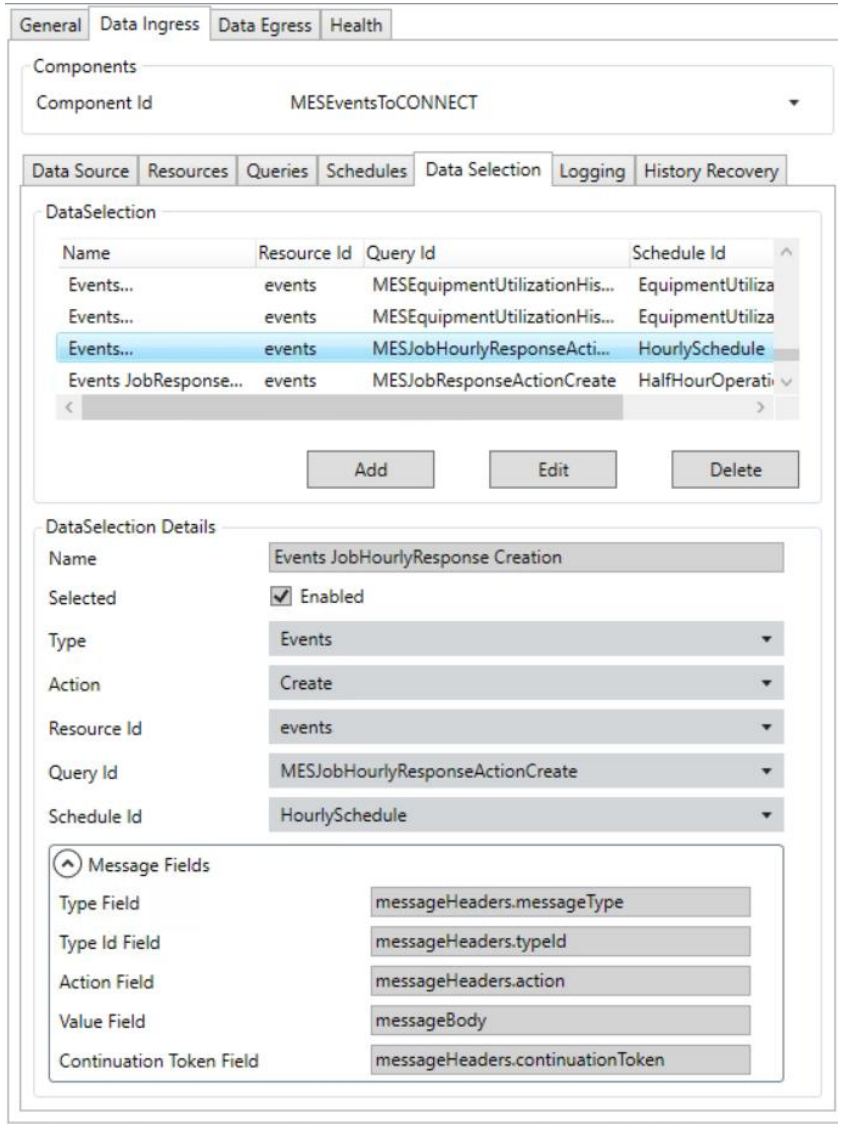
- Resources – Specific endpoints in the Web API for event and reference data
- Queries – Additional API routing to add to resources
- Schedules – Time periods to request data



# AVEVA Events to CONNECT Agent (Publisher)

## Data Ingress Definition

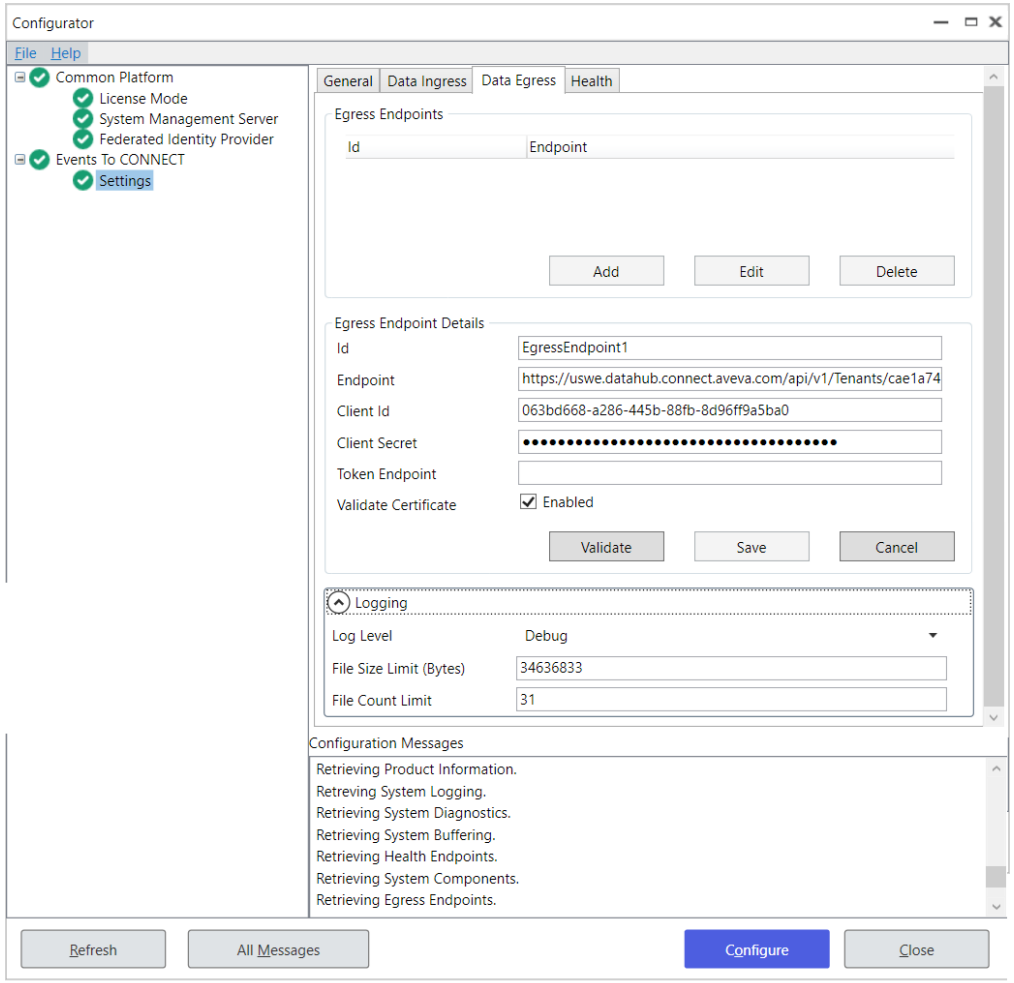
- Once resources, queries, and schedules are defined; these are used to define data selection
- Data Selection – Links resource to query and schedule with additional settings for event type, action, etc.



# AVEVA Events to CONNECT Agent (Publisher)

## Data Egress Definition

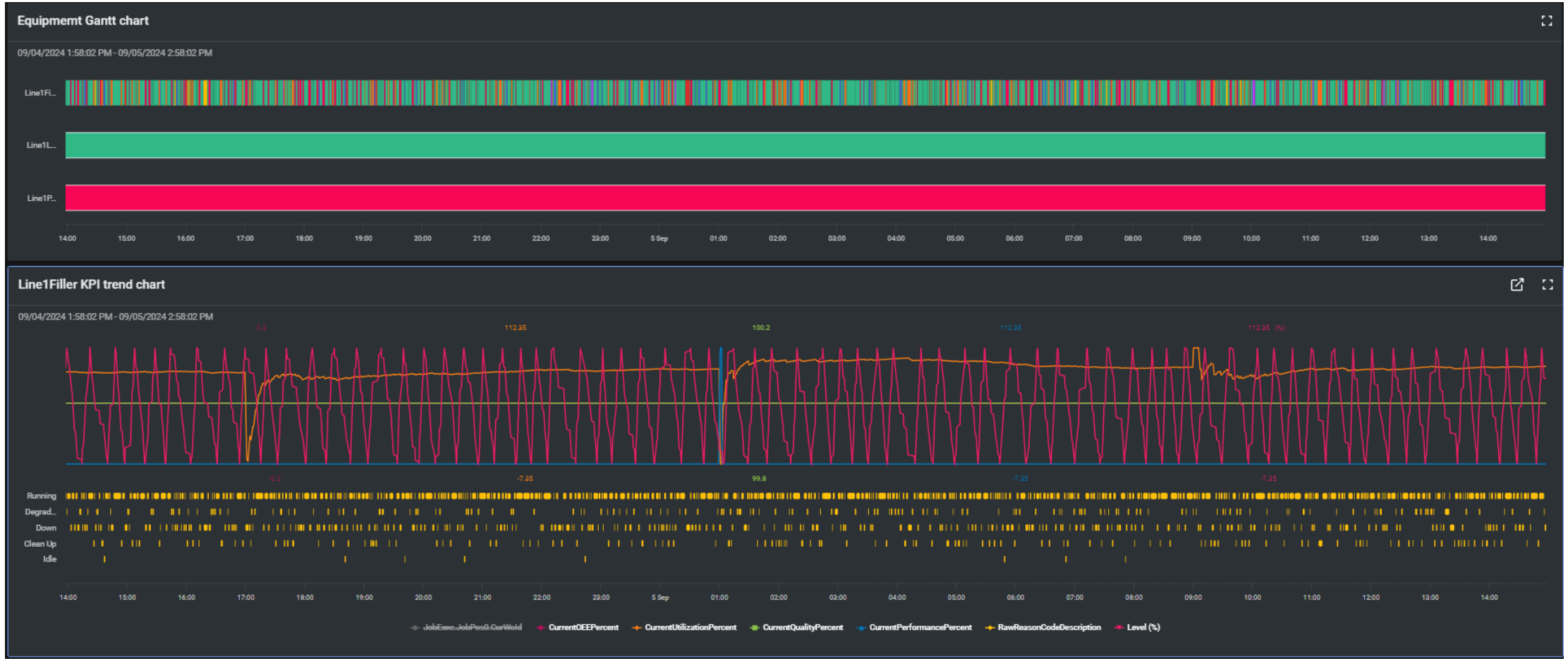
- Data Egress – Connection settings for AVEVA CONNECT data services
- Endpoint is customer's tenant and namespace information
- Client ID and secret is created in CONNECT administration



# Closing Comments

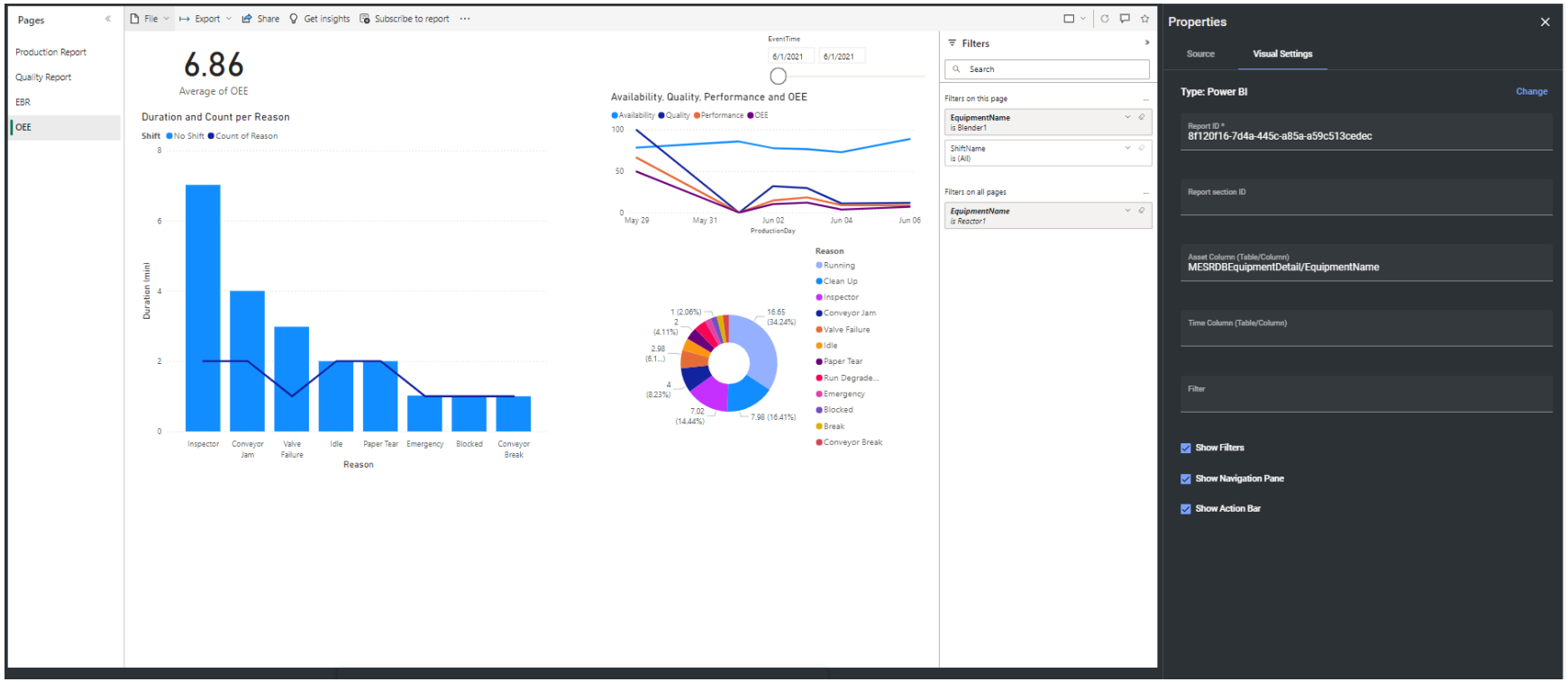
# Combining Various CONNECT Data Sources

## MES Event Data with Streaming Data



# Leverage Your Data with Power BI Widget

## Using Embed Mode/URL Filtering




You Specify

- Report ID
- Report Section ID
- Link to Connect Asset
- Link to Connect Time range
- Some additional settings and filtering

AVEVA

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