

Getting Started

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Licensing

Contact sales for respective modules/platform

Getting Set up for MES

There are a few items you will need to run the example project from this document:

- Windows or Linux environment (Server or Laptop for testing)
- Inductive Automation [Ignition Gateway software](#)
- SQL Database (MySQL, MSSQL, PostgreSQL, Oracle)
- Sepasoft MES [modules](#)
- Project Resource Export .zip to import to Ignition

This document steps through how to set up Ignition for MES.

<https://docs.sepasoft.com/articles/mes-module-tutorials/setting-up>

Connect Database

1. General Settings:

<https://docs.inductiveautomation.com/display/DOC81/Database+Connections>

2. MES Settings:

<https://docs.sepasoft.com/articles/user-manual/mes-module-settings-in-gateway>

- **Be sure to configure the User Source Profile. The Demo project depends on this setting:**

https://docs.sepasoft.com/articles/#/user-manual/mes-module-settings-in-gateway/a/h2__55841322

Import Project to Ignition

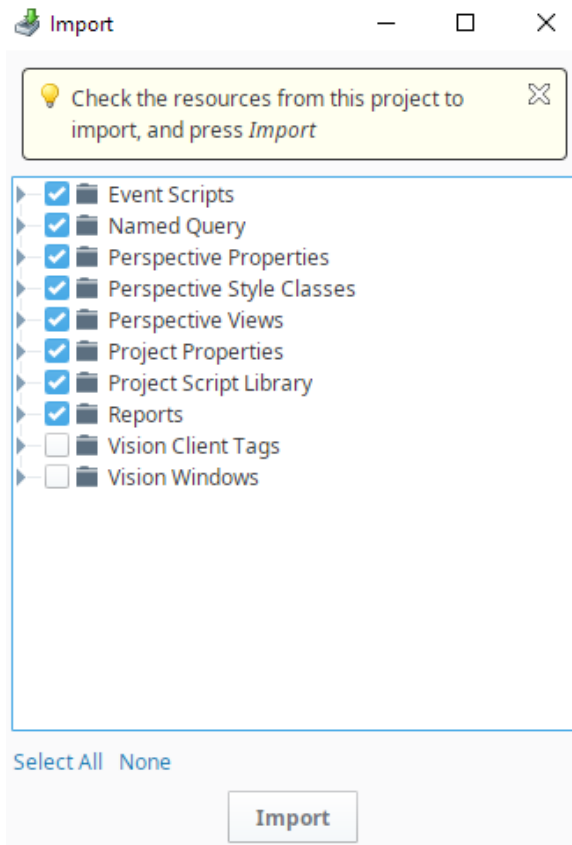
We recommend you use the MESGateway project if this is a fresh install.

Open an Ignition designer:

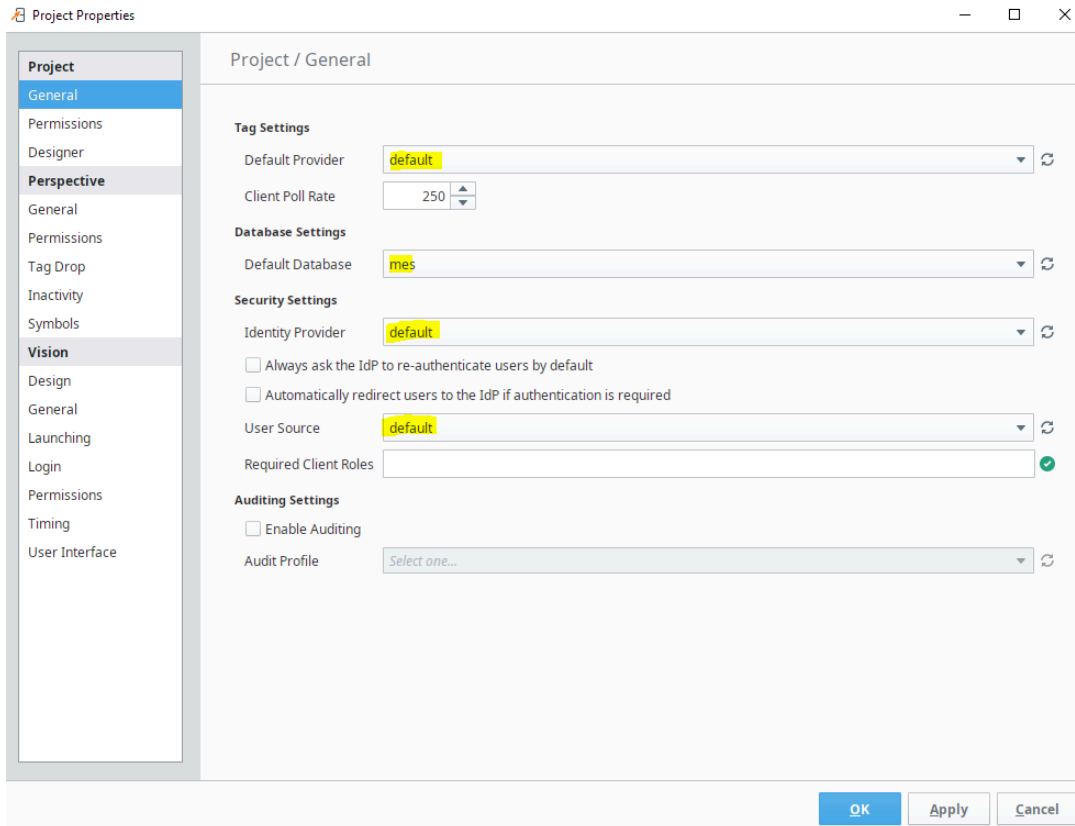
<https://docs.inductiveautomation.com/display/DOC81/Designer+Launcher>

File → Import (select .zip file).

There will be a preview of what will be imported.



Set your Project properties from the toolbar → Project → Project Properties




Save your project

Launch Project

1. Launch a perspective client to the MESGateway project.
 - [IgnitionBaseURL]/data/perspective/client/MESGateway/



2. Expand the  menu, navigate to **Settings** → **Onboarding**
 - *If there is a note about creating custom tables, click the create button.*



- *This will redirect you to the Getting Started page when complete.*
- *Note - after any lines exist, the Getting Started menu will move as a submenu under **Settings***
- **If you do not see a submenu and there is an overlay fault, you may need to run this gateway startup script:**

```
shared.onboarding.init.startup_script()
```

3. Create Example Simulation Line:

- The Example Simulation line can help serve as an example for configuration and best practices.
- If Desired, create Simulation Line by clicking:

Create Simulation Line

- **If the simulation line is created, you may need to restart the production module after line creation to sync live analysis.**

Connecting Via MQTT

Sending MQTT

- If using Cirrus Link modules at local system, you may use the Transmitter module.
- <https://docs.chariot.io/display/CLD80/MQTT+Transmission+Transmitters+and+Tag+Trees>

Receiving MQTT

- MQTT Engine
 - <https://docs.chariot.io/display/CLD80/MQTT+Engine>
- MQTT Transmission
 - <https://docs.chariot.io/display/CLD80/MQTT+Transmission>
- Configuration for MES:
 - [MQTT Store and Forward](#)

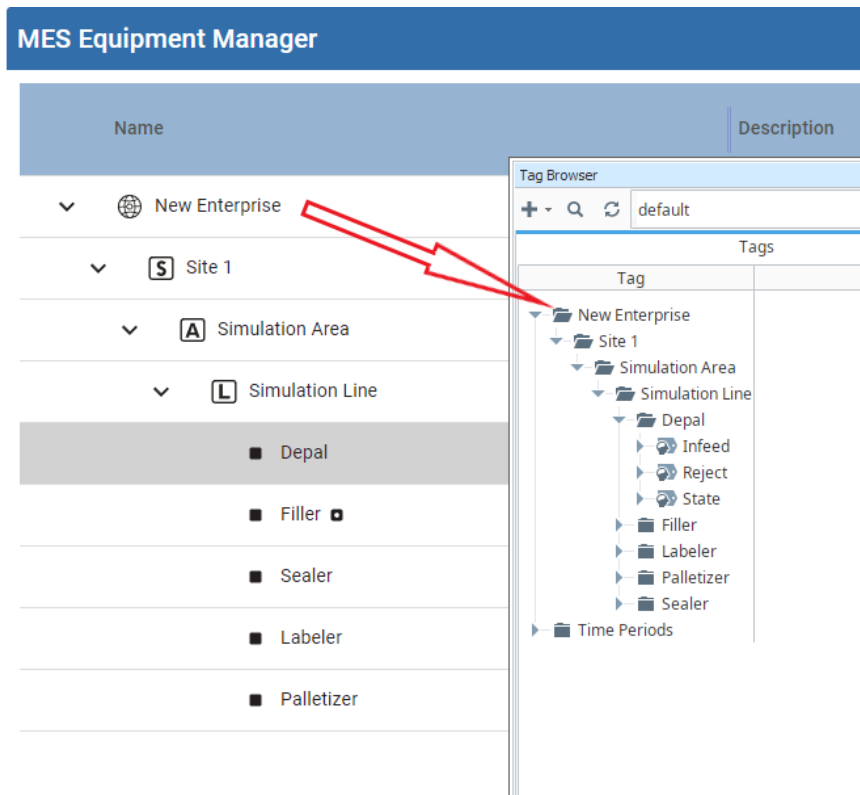
Modeling your Equipment

- *The Equipment Manager allows you to define your manufacturing process in a tree view form and provides an organized way to configure, control, and analyze your manufacturing activities. It provides the foundation on which the MES modules are built.*
<https://docs.sepasoft.com/articles/user-manual/production-equipment-model>

Equipment Manager

- Navigate to Settings → Equipment
- The Equipment Manager allows you to connect your tags to MES, including counters and equipment status, called Equipment State. If possible, it is best

practice to mirror your tag folder structure to match your Equipment Hierarchy:



- This allows for better organization and the ability to take advantage of Parameterized tag pathing:
<https://docs.sepasoft.com/articles/user-manual/parameterized-tag-paths>
- If using MQTT, you may be using the Cirrus Link Engine and Transmission modules in Ignition. Mapping should be directly to the MQTT tag provider as this module can handle disconnect, reconnect, and replay to ensure MES is synchronized when the gateway reconnects. Reference tags or memory tags should not be used in this case.
 - The raw tag path may look like: ***[MQTT Engine]Edge Nodes/New Enterprise/Site 1/Simulation Area/Simulation Line/Depal/Infeed***
 - a. This can be mapped directly in the Equipment manager. Optionally, if a consistent tag structure is used, you are able to use parameterized tag pathing to replace the above with: ***[MQTT Engine]Edge Nodes/{Equipment Path}/Infeed***
- Equipment Status is set up in the tag collector named Equipment State. This should be mapped to an integer tag.

MES Equipment Manager

Search ...

Name

- New Enterprise
- Site 1
- Simulation Area
- Simulation Line
 - Depal
 - Filler
 - Sealer
 - Labeler
 - Palletizer

General

Additional Factors [0 defined]
 Counters [2 defined]
Tag Collectors
 Shift [DayShift]
 Live Analysis [1 defined]

OEE

Mode Class [Default]
 State Class [Simulation]

* Tag Collectors

Tag Name	Tag Path
Equipment State	[MQTT Engine]Edge Nodes/{Equipment Path}/State
Equipment Mode	Tag Path
Equipment Note	Tag Path
Equipment Shift	Tag Path
Equipment Product Code	Tag Path
Equipment Work Order	Tag Path

- The module will lookup the assigned state class to find the state code to interpret machine status.
 - States are grouped under State Classes and have several properties to assist definition:
 - <https://docs.sepasoft.com/articles/user-manual/equipment-modes-and-states>
 - <https://docs.sepasoft.com/articles/user-manual/configuring-equipment-states>

MES Equipment Manager



Name	Description
▼ New Enterprise	
▼ Site 1	
▼ Simulation Area	
▼ Simulation Line	
■ Depal	
■ Filler	
■ Sealer	
■ Labeler	
■ Palletizer	

General	
Additional Factors	[0 defined]
Counters	[2 defined]
Tag Collectors	
Shift	[DayShift]
Live Analysis	[1 defined]

OEE	
Mode Class	[Default]
State Class	[Simulation]

State List

Name	Description
▼ Equipment States	
> Default	
▼ Simulation	
⊗ Blocked	
⬇ Broken Arm	
⬇ E-Stop	
⬇ Generic Stop	
⬇ PCB Fault	
⬇ Planned Maintenance	
▶ Running	
⬇ Slipped Gear	
⊗ Starved	

- The MES software ships with a default set of states for example. If the Simulation line was created, more examples under the Simulation state class are created.
- To Create a new State Class, select the root “Equipment States” and click  and add a new State Class.
 - a. Select newly created State class and click  to create a new State.
 - b. Generally, states are a lookup table for the integer code which would be read in to the state tag.

Edit Equipment State

Name*
Broken Arm

Type
Unplanned Downtime

Code* 14 Short Stop Threshold (seconds)* 0

Override Optional Scope Detected Equipment State

Override Current Line Downtime? Enable Meantime Metrics

Assigned Codes

1
4
5
6
10
11
12
13
14

- c. Name - Any String name (useful in Analysis/reports)
- d. Type - Category for the event
- e. Code - Integer expected from tag
- f. For further explanation, see state documentation: <https://docs.sepasoft.com/articles/user-manual/configuring-equipment-states>

Create Counters

- Counters are created in the Equipment Manager. Counters can be created on Lines, Cells, and Cell Groups. Not all machines may have counters. The MES software does not require this. Create counters and map to your tags. If using MQTT, use the same method from configuring the Equipment State tag.
 - <https://docs.sepasoft.com/articles/user-manual/mes-counters>

Create a shift schedule and apply it to the equipment.

- There are two methods to do this.
 - From the Gateway configuration under Alarming → Schedules
 - <https://docs.inductiveautomation.com/display/DOC81/Alarming+Schedules#AlarmingSchedules-DefineaNewSchedule>
 - In the project, A custom schedule interface has been created. Navigate to **Settings** → **Shifts**
 - Click + on right panel

Configure your shift.

The screenshot shows the 'Schedule Manager' interface. It has a blue header with the title 'Schedule Manager'. Below the header, there are two main sections: 'Schedules' and 'Holidays'. The 'Schedules' section contains a table with columns 'Name' and 'Description'. The rows are: 'Always' (Built-in schedule that is always available: 24x7x365), 'Example' (An example of a M-F 8am-5pm schedule with a lunch break), 'Simulation Day Shift' (Example Shift for Simulation Line), 'Simulation Mid Shift' (Example Shift for Simulation Line), and 'Simulation Swing Shift' (Example Shift for Simulation Line). The 'Holidays' section contains a table with columns 'Name' and 'Description', with one row: 'No Holidays Exist'. On the right side of each section, there are icons for adding (+), editing (pencil), deleting (trash), and closing (X).

- After creating the shift, you will need to navigate back to the Equipment Manager and add the shift to all relevant equipment:
 - a. Select Equipment, Select Shift, Check desired shifts and save:

The screenshot shows the 'MES Equipment Manager' interface. It has a blue header with the title 'MES Equipment Manager' and a search bar. Below the header, there is a tree view on the left showing the hierarchy: 'New Enterprise' > 'Site 1' > 'Simulation Area' > 'Simulation Line'. Under 'Simulation Line', there are several equipment items: 'Depal', 'Filler', 'Sealer', 'Labeler', and 'Palletizer'. On the right side, there are two panels: 'General' and 'OEE'. The 'General' panel shows settings for 'Additional Factors' (0 defined), 'Counters' (2 defined), 'Tag Collectors', 'Shift' (Simulation Swing Shift...), and 'Live Analysis' (0 defined). The 'OEE' panel shows settings for 'Mode Class' (Default) and 'State Class' (Simulation).

After creating Equipment

- Navigate to Settings → Onboarding
- Click the “Refresh Analysis for all Equipment” button to create analysis needed to drive dashboards and screens.

Refresh Analysis for all Equipment

- For the Map screen to function, add in the Lat/Long coordinates for your site and click **Save**.

- Optionally, if your Line is fully manual with no device to connect to pull states or counts, select line, set isManual checkbox to True and click



- Configure UDT (Tag Driven Approach)
 - This is an optional (recommended) approach to OEE data injection. This will create a UDT structure in your tag folders using the equipment hierarchy. More information is available here: <https://docs.sepasoft.com/articles/#!knowledge-base/driving-oee-with-tags>
 - Infeed and Outfeed Equipment is where the module should look for infeed and outfeed counters. More information about production counters is available here: <https://docs.sepasoft.com/articles/#!user-manual/production-counter-assignments>

Create UDT For Line

Select Line	New Enterprise\Site 1\Simulation Area\Simulation Line
Select Infeed Equipment	
Select Outfeed Equipment	Depal
Select Outfeed Equipment	
Select Infeed Equipment	Palletizer

Create UDT

This is based on the equipment configured in the equipment manager

MES Equipment Manager



Name

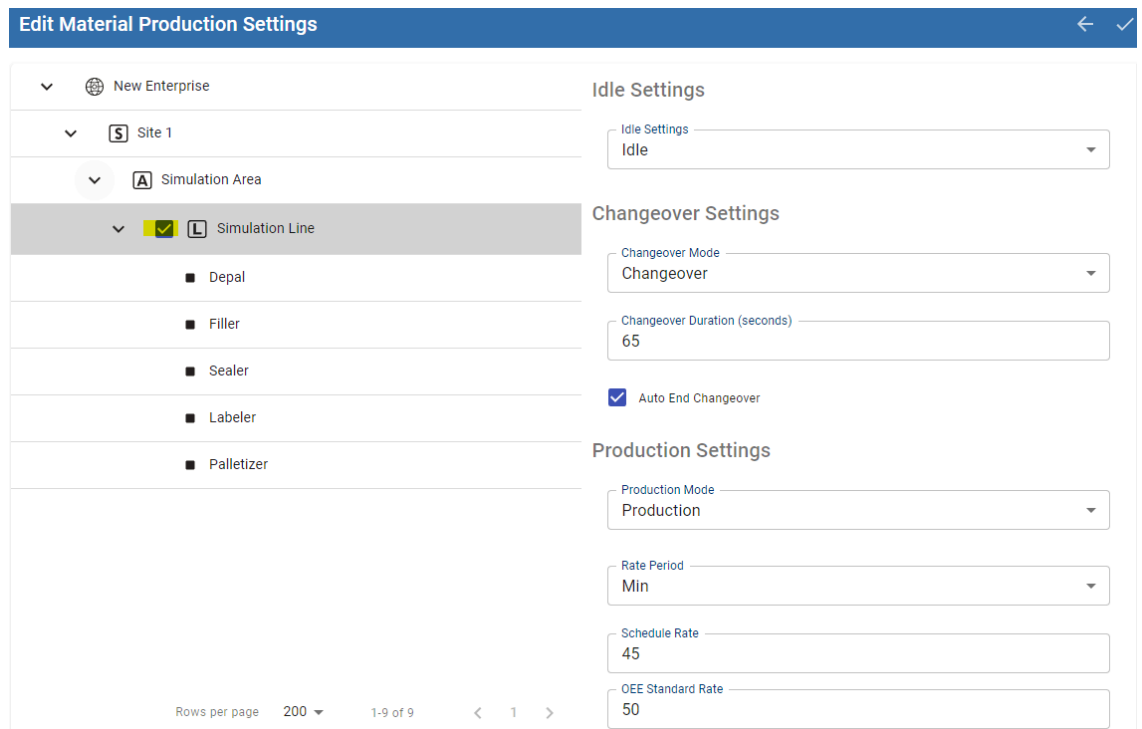
- ▼ New Enterprise
- ▼ Site 1
- ▼ Simulation Area
- ▼ Simulation Line
 - Depal
 - Filler
 - Sealer
 - Labeler
 - Palletizer

Modeling Materials (Not required if using [Tag-driven approach](#))

- *The Sepasoft Modules use the concept of Material Classes and Material Definitions to manage materials. Material Classes provide a method for grouping similar materials together into a category. Material Definitions are necessary for OEE Downtime production run definition. The MES Material Manager is primarily used to create material definitions and classes for OEE, Track and Trace, and Batch Procedure.*
- *To start a production run, Materials and Production Settings should be defined. This can be accomplished in the Material Manager Component. Material Production settings are for a combination of a Material and Equipment. You may have the same material with different settings for a different Line, for example.*

Material Manager

- Navigate to **Settings** → **Materials**
- Select “Material Root” and click the  to add a Material Class.
- After creating the Material Class, select the Class created and Click the  again to create a Material Definition.
- With the Material Definition selected, select “Production” on the right side panel.
- Selecting a Line creates production settings for the Material and Line combination:



Edit Material Production Settings

New Enterprise

Site 1

Simulation Area

Simulation Line

- Depal
- Filler
- Sealer
- Labeler
- Palletizer

Idle Settings

Idle Settings
Idle

Changeover Settings

Changeover Mode
Changeover

Changeover Duration (seconds)
65

Auto End Changeover

Production Settings

Production Mode
Production

Rate Period
Min

Schedule Rate
45

OEE Standard Rate
50

Rows per page: 200 | 1-9 of 9 | < 1 >

- Note: there are some settings scoped for Line level equipment only and will not be available at the Cell level.

Infeed and Outfeed Count Equipment for the Line should point to where you first Infeed the Line and where you last Outfeed off of the line. There should be counter definitions set up as Infeed and Outfeed counter kinds, respectively. It is valid to have counters only at the Line if the production settings point to the Line. See <https://docs.sepasoft.com/articles/user-manual/mes-counters>

Starting a Production Run

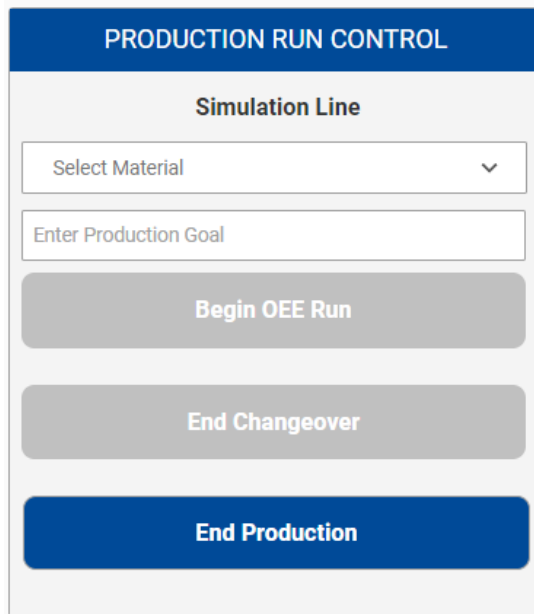
- There are multiple ways to start a production run in the Sepasoft modules. Here we will cover two common methods in this project.

Operator Adhoc material start.

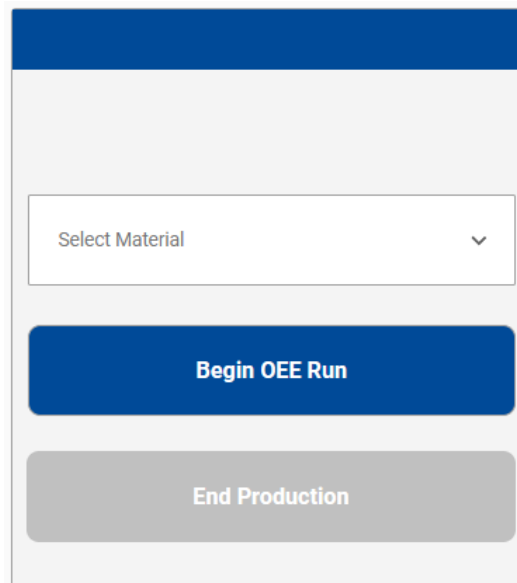
- The Navigation in this project is based on the Equipment Hierarchy set up while configuring Equipment. To start production on a given line, navigate to the line desired in the menu.
- There are multiple methods to starting a run ad hoc:
 1. Built-in OEE Run Director Component (simplest): <https://docs.sepasoft.com/articles/#!user-manual/oe-run-director-perspective>



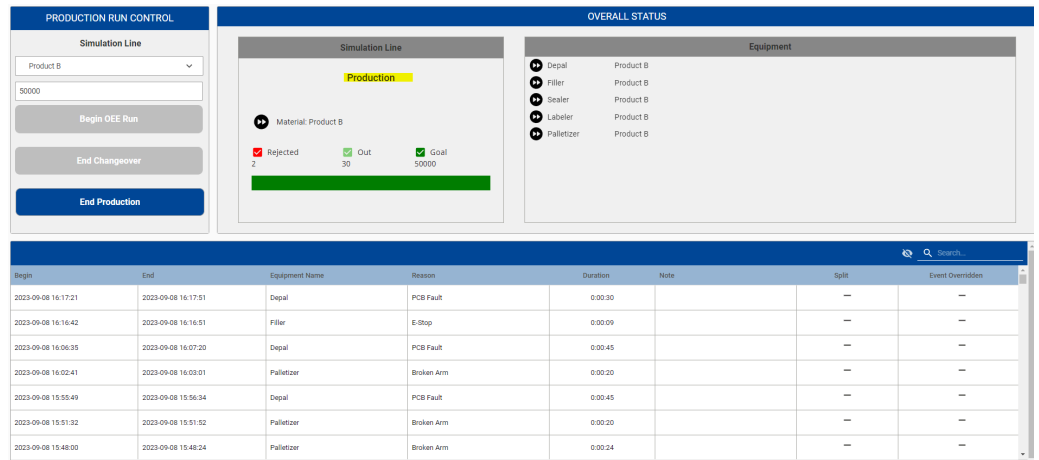
2. Custom Run Control Buttons calling system.mes.ooo script functions:
<https://docs.sepasoft.com/articles/#!/user-manual/system-mes-ooo>



3. Tag Based OEE using a UDT:
<https://docs.sepasoft.com/articles/#!/knowledge-base/driving-ooo-with-tags>



- Once production is started, you should see the screen update to inform you production is in progress.



Operator Schedule start

- Scheduling in MES can be accomplished in the tool (UI or script) or pulled down from ERP via the Web Services module <https://www.sepasoft.com/products/web-services/>. This example covers using only the UI to create and execute schedules.
- Navigate through the menu equipment hierarchy to the Site level and select **Scheduling**.
- This screen contains multiple components used to create and execute schedules:
 - <https://docs.sepasoft.com/articles/user-manual/mes-work-order-table-perspective>
 - <https://docs.sepasoft.com/articles/user-manual/mes-schedule-view-perspective>
 - <https://docs.sepasoft.com/articles/user-manual/mes-schedule-selector-perspective>

Designing your own dashboard

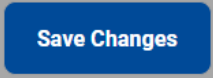
This application allows you to create, delete, and modify dashboards and screens within the browser.

Creating a new run screen

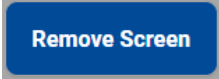
- Navigate to the **Settings** → **Screen Designer** page
- On the right navigation pane
 - Select (New Screen)
 - Give the Screen a unique name

- Select from an existing Menu Path or Type in a new menu path using the ` ` key to create submenu items.
- Select Roles allows to use this screen. Any user with the roles selected may view the screen.
- Save Changes
- At this point, a blank screen is created at the menu location selected. You can start adding widgets to the screen.

Editing an existing screen

- Navigate to the **Settings** → **Screen Designer** page
- On the right navigation pane
 - Select the screen to edit
 - All settings on the right panel can be edited for the selected screen.
- Widgets can be added, removed, moved, or changed (See Widget section of documentation).
- Ensure to Save Changes  after making desired changes to your screen.

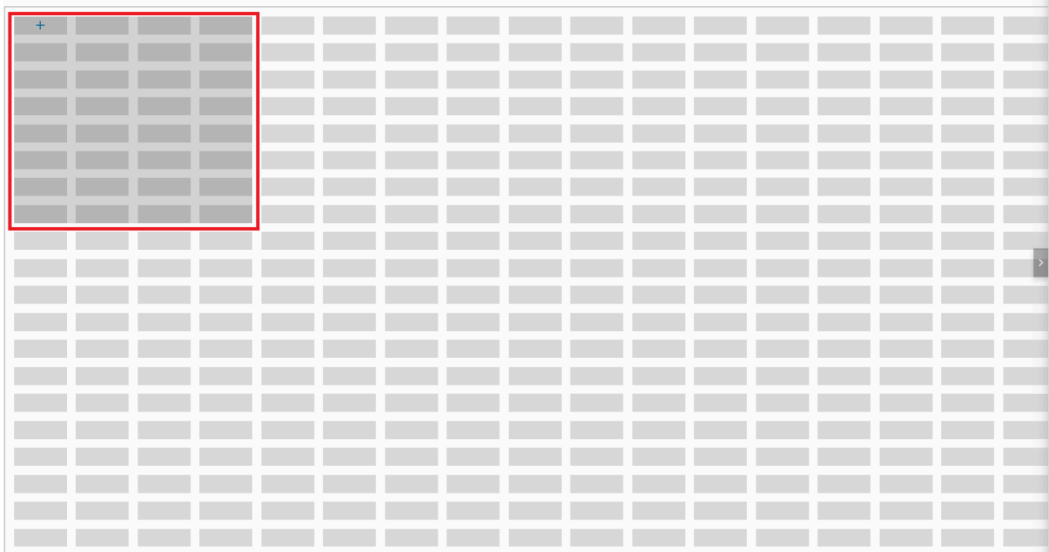
Removing a new screen

- Navigate to the **Settings** → **Screen Designer** page
- On the right navigation pane
 - Select the screen you want to delete
 - Click Remove Screen  and confirm.

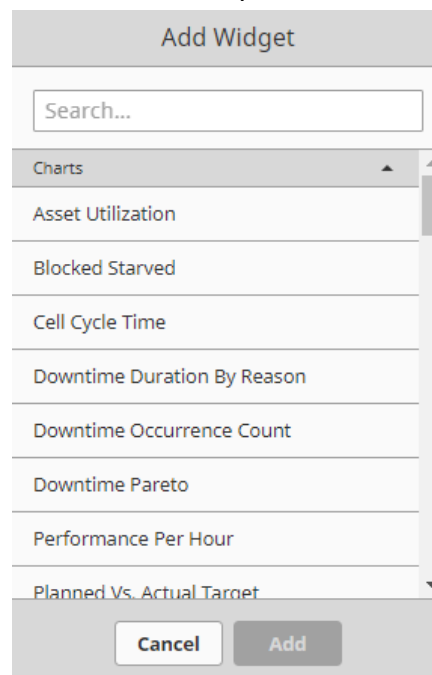
Widgets

Creating Widgets

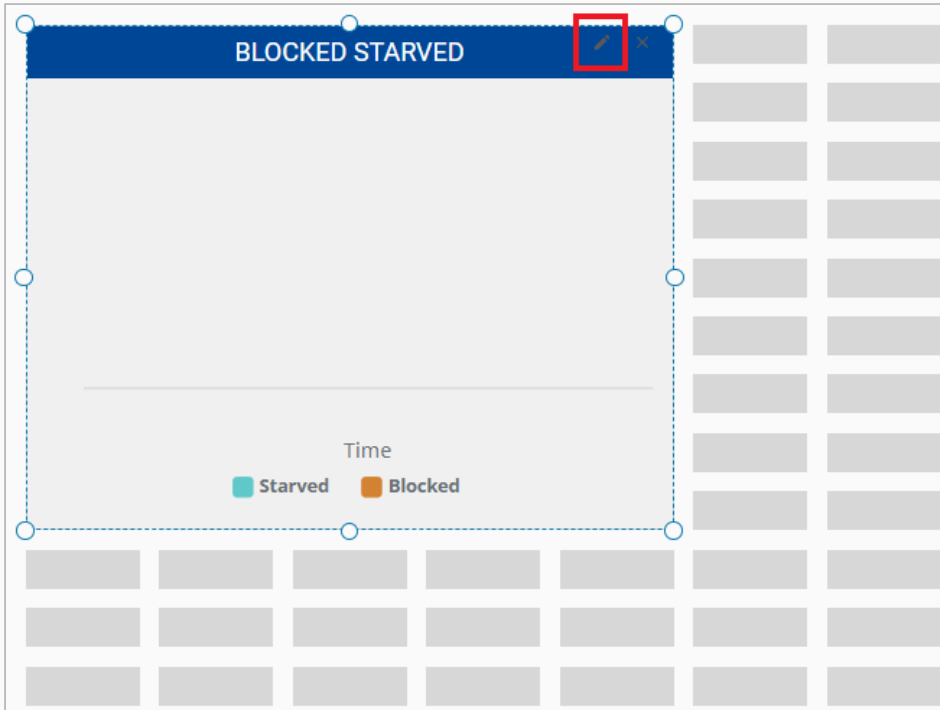
- On the grid, click on the location you desire your widget and drag your mouse to the desired size of the widget.



- On release a menu will appear. This is the list of available widgets in the application. Some widgets contain charts for visualization, others simple labels for information.

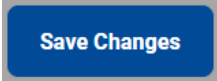


- All widgets have configuration menus of various complexity. Select the Pencil icon to access the menu.

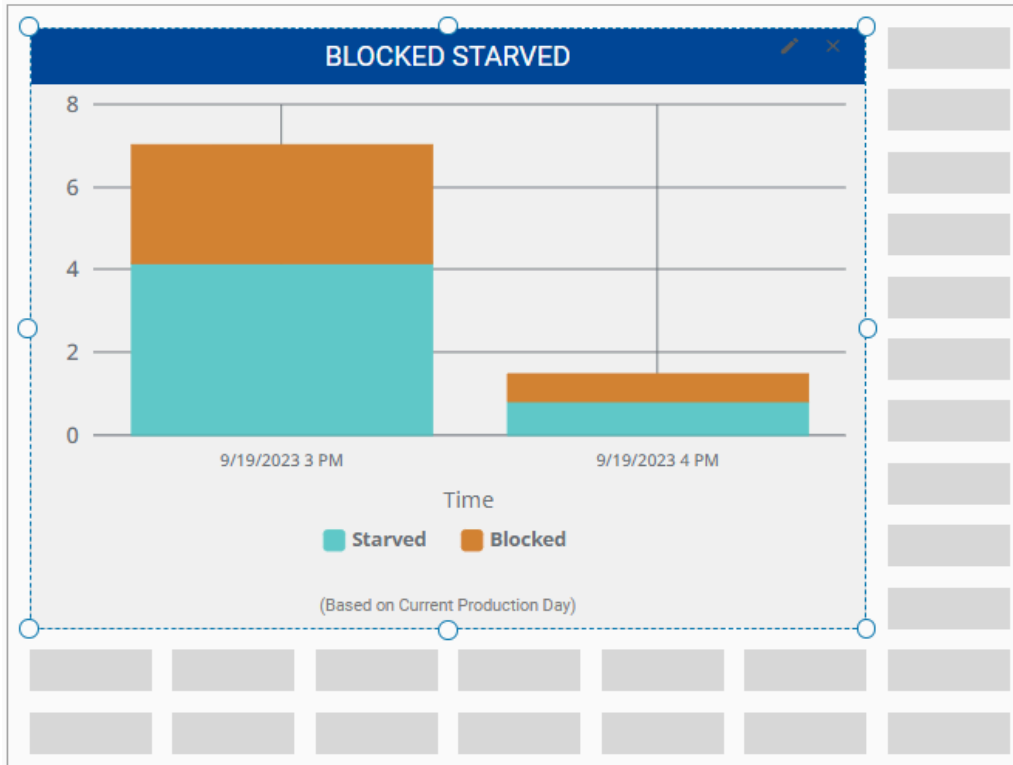


- This chart contains three properties:
 - Equipment to return data
 - Time period to view data
 - Any title name desired

- Select the Pencil icon again to return to data mode. Depending on your production data, you may have data in the widget at this point. If data is not returned, return to previous steps to ensure setup is correct.
- After any change to your screen, make sure to Save Changes in the right

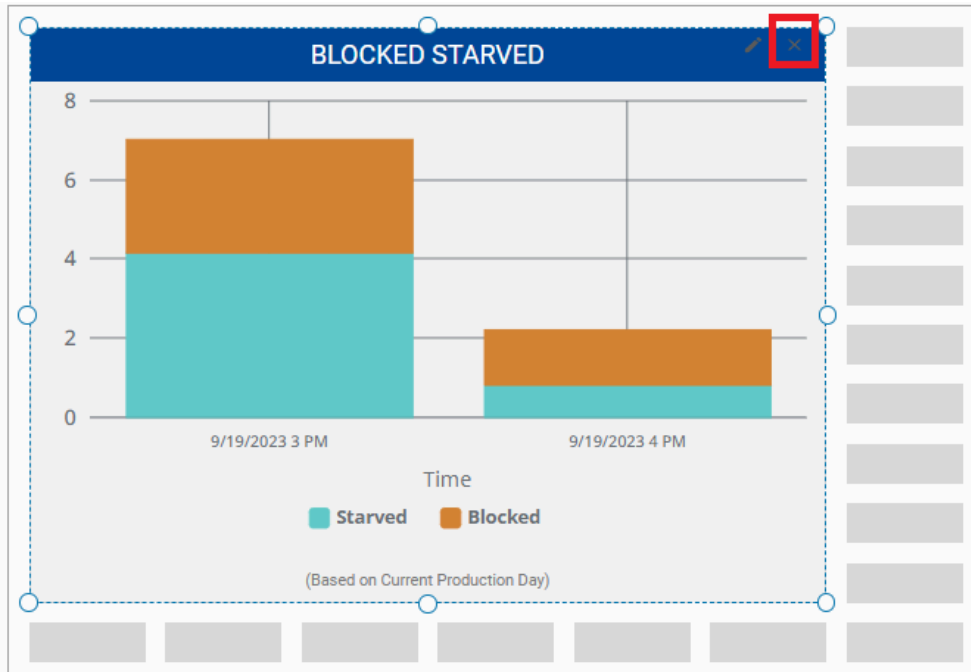


- Your should see changes in the screen by navigating to your menu item.

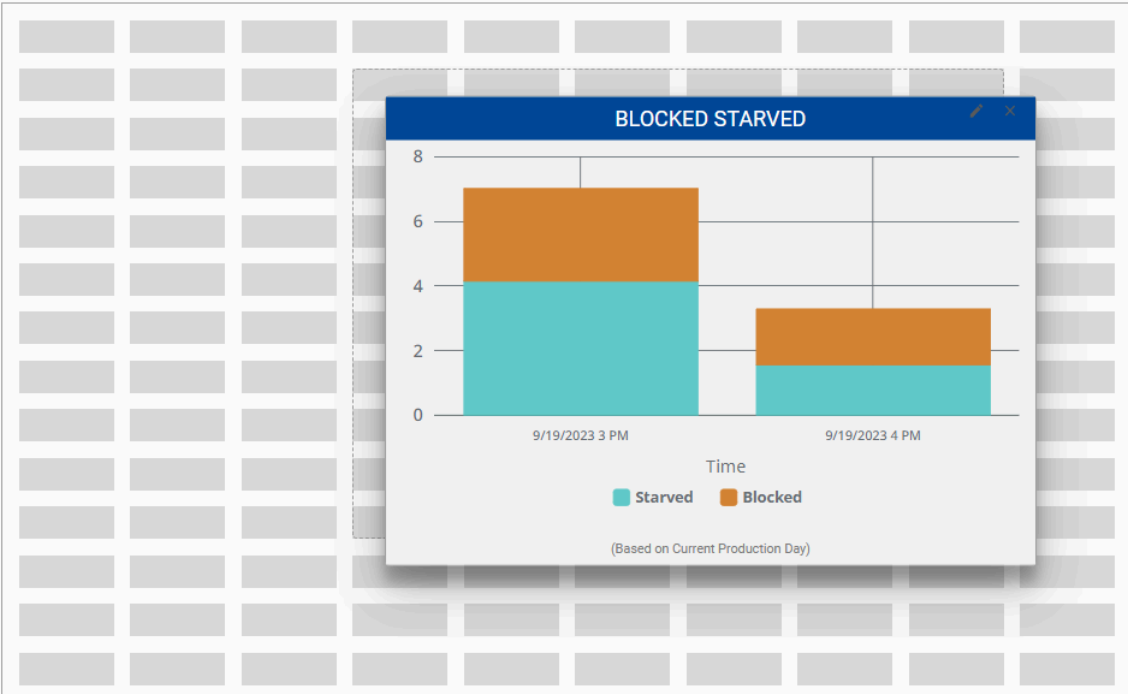


Editing Widgets

- Widgets can removed, moved, or properties edited.
- Deleting a widget can be done via the 'x' at the top right and confirming the popup.



- Moving a Widget is accomplished by click and drag the desired widget to the new location and release.

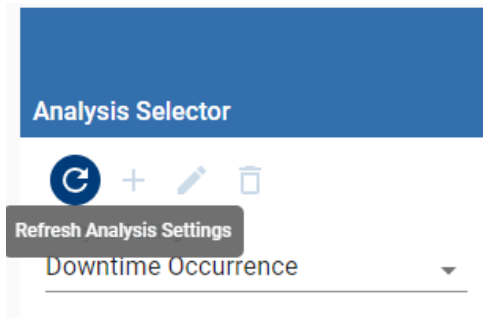


Ad Hoc Reporting

The analysis engine in the MES modules allows you to select data graphically, including filtering, grouping, and ordering results.

Executing Analysis

- Navigate to the **Impromptu Analysis** page
- Select one of the pre-made analysis settings.
- Select equipment from the upper dropdown menu.
- Select dates to execute analysis From and To.
- Click the Refresh Analysis Settings button to execute your analysis



Visualizing Analysis

- The analysis selector returns a dataset of calculated data based on your settings. There are several icons at the top of the Analysis

page.



Analysis Table

- with Drilldown capability.

<https://docs.sepasoft.com/articles/user-manual/mes-analysis-table-perspective>

- Execute analysis and ensure the table icon is selected.
- Data can be exported to CSV via the Export button on the

Analysis Table:



- Select a row in the Analysis Results.
- A submenu will popup to drill down into a selected category.

Downtime Occurrence		
Line Downtime Reason	Line State Duration	Line Downtime Occurrence Count
PCB Fault	227.03333333333333	357
Broken Arm	179.06666666666666	363
E-Stop	8.283333333333333	66

- This will execute analysis grouping on the selected item.
- Breadcrumbs at bottom of the page shows context of your analysis result.

Downtime Occurrence			
Analysis Selector	Shift	Line State Duration	Line Downtime Occurrence Count
Simulation Swing Shift	82.75		129
Simulation Mid Shift	77.1		123
Simulation Day Shift	67.18333333333334		105

Downtime Occurrence > Shift

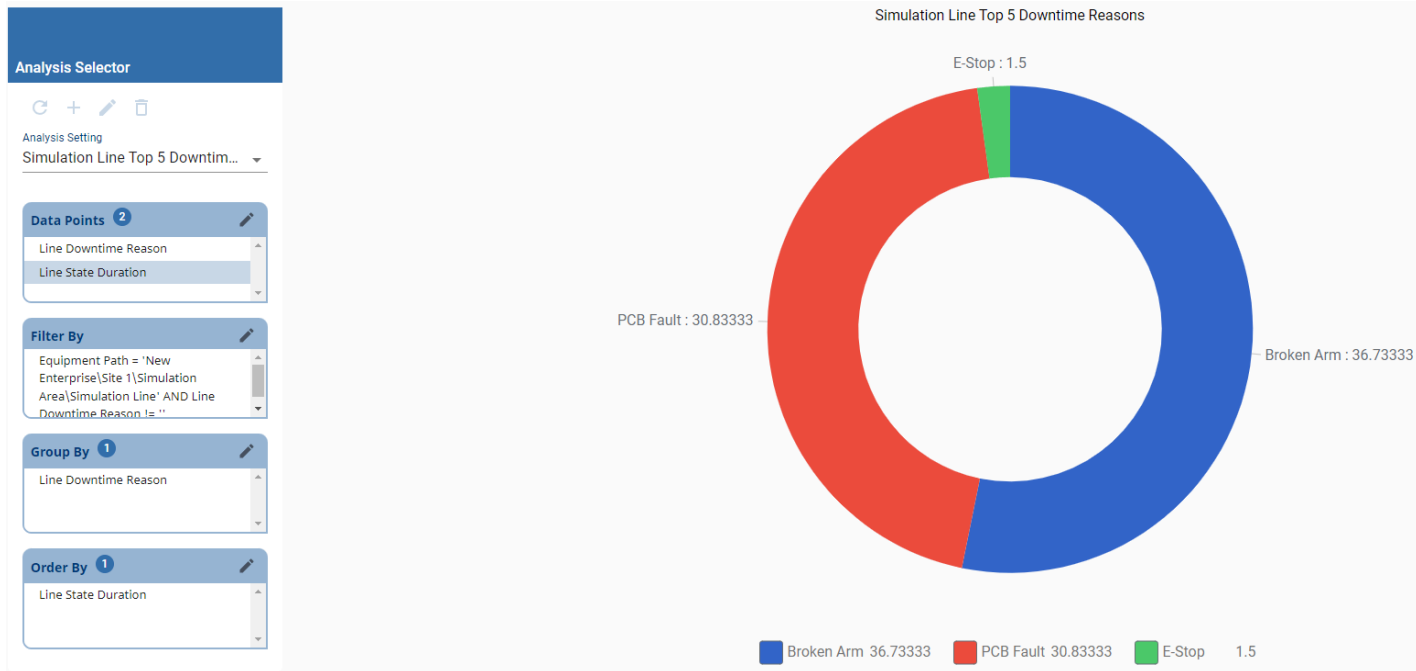
- Select the row again to go back.

Downtime Occurrence			
Shift	Line State Duration		Line Downtime Occurrence Count
Simulation Swing Shift	82.75		129
Simulation Mid Shift	77.1		123
Simulation Day Shift	67.18333333333334		105



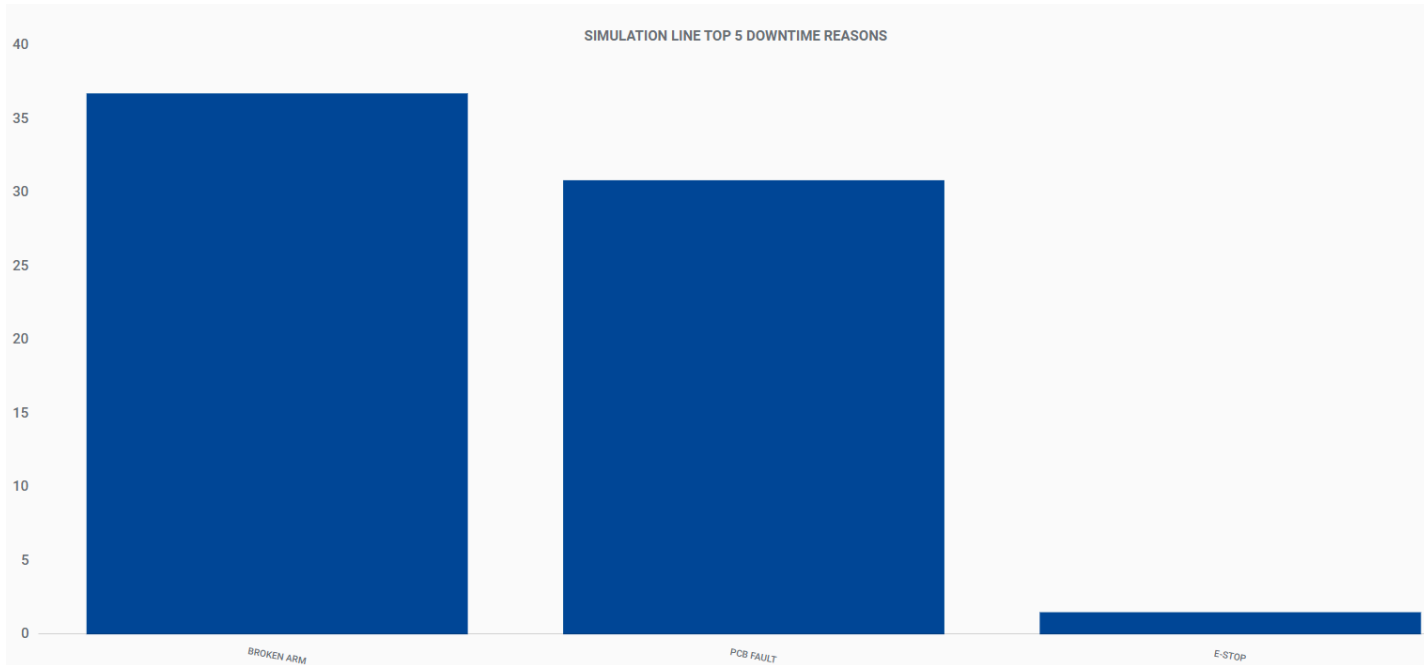
Pie Chart

- This chart takes a category and value pair and plots to an Ignition pie chart.
<https://docs.inductiveautomation.com/display/DOC81/Perspective+-+Pie+Chart>
- For example: Top 5 downtime includes two data points:
 - Line Downtime Reason (category)
 - Line State Duration (value)



Bar Chart

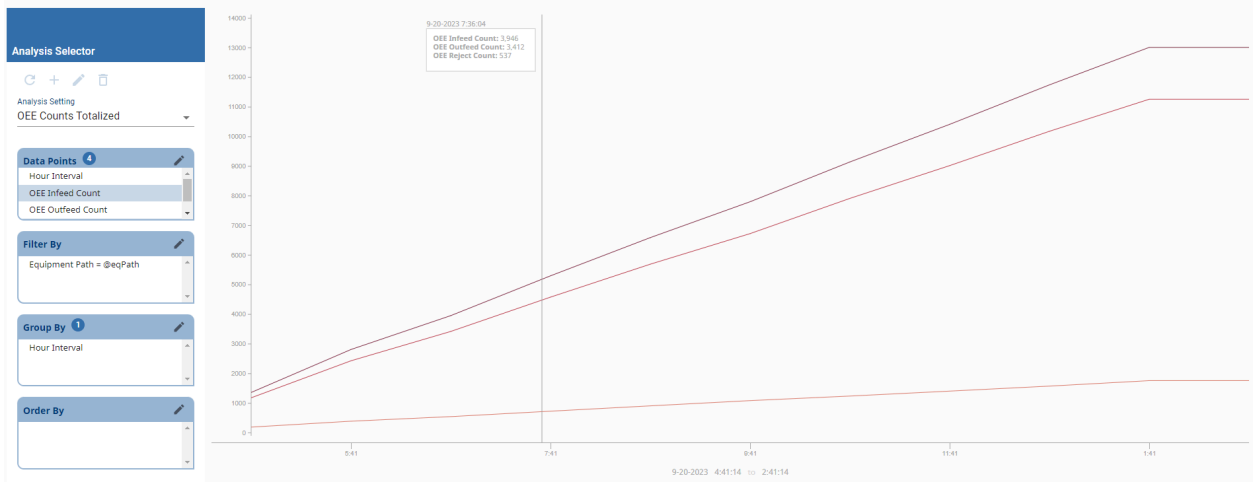
- This chart takes in a category and value pair and plots to an Ignition bar chart.
- <https://docs.inductiveautomation.com/display/DOC81/Perspective+-+XY+Chart>



 Time Series Chart

- This chart will plot time series data on an Ignition Time Series Chart.
- <https://docs.inductiveautomation.com/display/DOC81/Perspective+-+Time+Series+Chart>
- The first column must be time data.
- Subsequent items must be numbers.
- Chart labels will use the Column names in the dataset.
- Example:

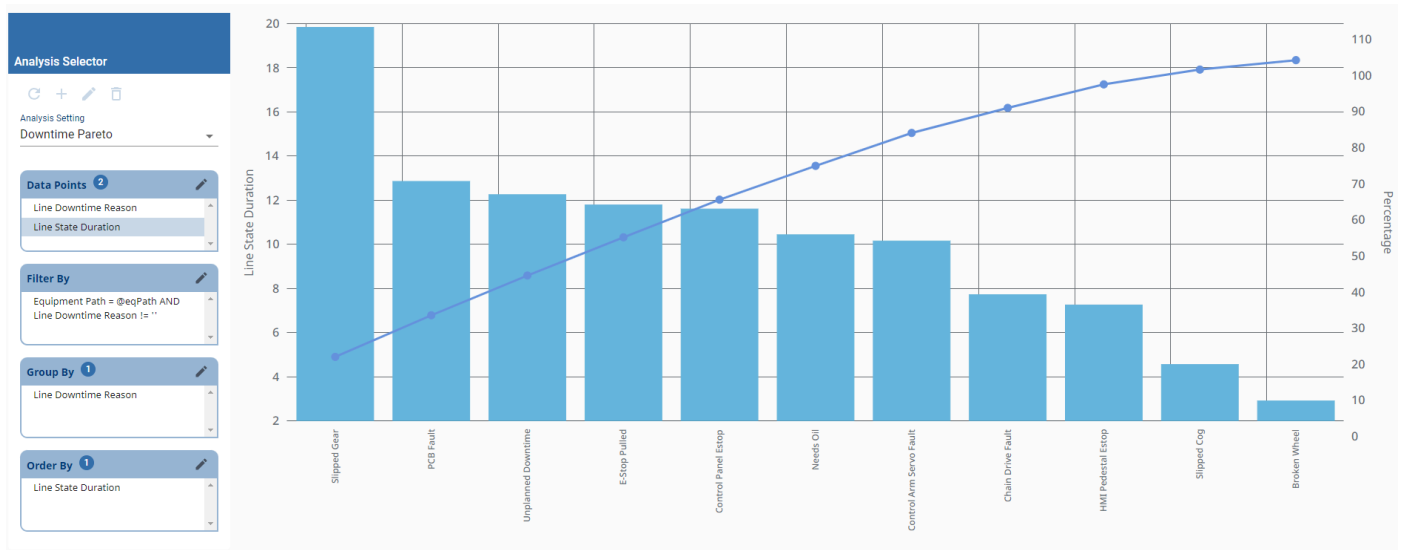
OEE Counts Totalized				
Hour Interval	OEE Infeed Count	OEE Outfeed Count	OEE Reject Count	
2023-09-20 04:41:14	1352	1172	183	
2023-09-20 05:41:14	2802	2421	382	
2023-09-20 06:41:14	3946	3412	537	
2023-09-20 07:41:14	5290	4571	720	
2023-09-20 08:41:14	6580	5683	900	
2023-09-20 09:41:14	7791	6715	1077	
2023-09-20 10:41:14	9134	7904	1231	
2023-09-20 11:41:14	10404	9011	1398	
2023-09-20 12:41:14	11737	10170	1567	
2023-09-20 13:41:14	13003	11252	1751	
2023-09-20 14:41:14	13003	11252	1751	



Pareto Chart

- This chart takes in a category and value pair and plots to Ignition XY Chart.

<https://docs.inductiveautomation.com/display/DOC81/Perspective+-+XY+Chart>



Print a chart

- Any chart can be printed using the print icon. This will print the entire View for context.

<https://docs.inductiveautomation.com/display/DOC81/Component+Events+and+Actions#ComponentEventsandActions-RequestPrintAction>

Additional Settings

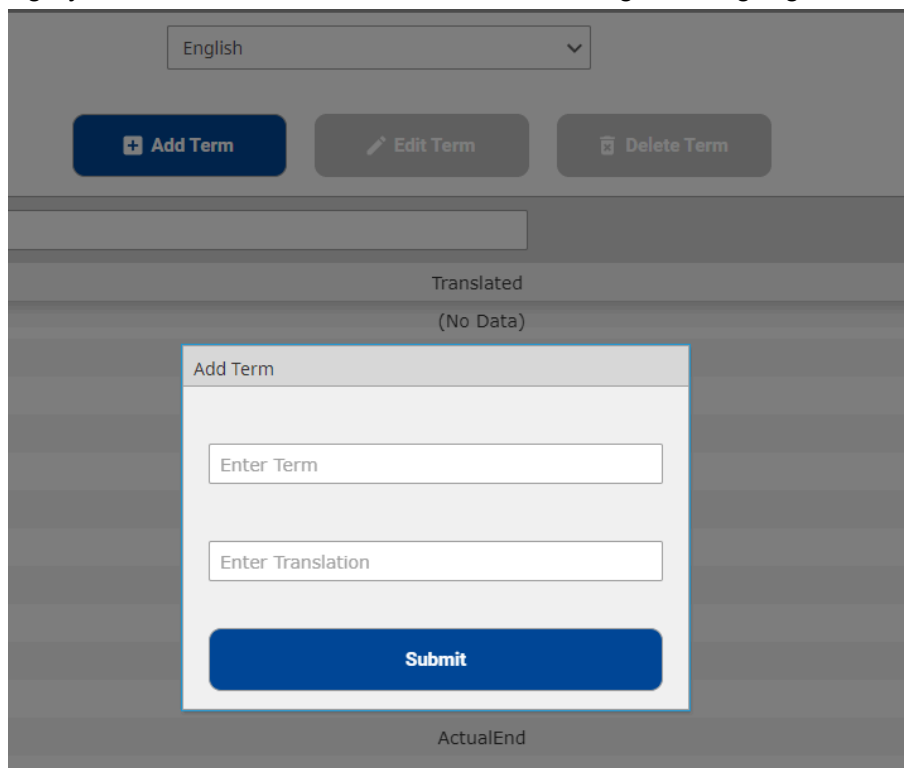
Translations

The Translation Manager in Ignition can translate terms given a language selected.

Translations can be set up in the designer following this documentation: <https://docs.inductiveautomation.com/display/DOC81/Localization+and+Languages#LocalizationandLanguages-TranslationManager>

In the example project, there is a screen which calls functions in the translation manager to create and set translation.

- Navigate to the **Settings** → **Language** page.
- In this page you can Add, Edit, and Delete Terms for a given language:



- Changing the language sets the language for the session.
- New Translations can be added simply using the UI.
- If there is a desire to edit in mass, you can export the terms to CSV, make changes, and import back.



-
- The import will apply changes to the currently selected language.