



OEE Downtime and Scheduling Module

# User Manual



# Table of Contents

<b>Part I Introduction</b>	<b>8</b>
1 Production Model.....	8
2 OEE .....	9
3 TEEP.....	10
4 Production Count Tracking.....	11
5 Down Time Tracking.....	11
6 Production Scheduling.....	12
7 Getting Help.....	12
8 Licensing and Activation.....	13
<b>Part II Getting Started</b>	<b>16</b>
1 Installation.....	16
Installing Modules .....	16
Configure Database .....	17
MES Module Settings .....	18
Demo Installation .....	19
2 User Interface.....	19
Work Orders .....	20
Product Codes .....	22
Production Schedule .....	23
Operator Screen .....	25
Line Charts .....	27
Analysis Screen .....	28
Report Screen .....	33
3 Dashboard.....	34
Line Charts .....	34
4 Production Model.....	34
Production Item Settings .....	34
Adding Production Items .....	39
5 Configuration.....	40
Components .....	40
Creating a Screen .....	41
<b>Part III Configuration</b>	<b>48</b>
1 MES Module Configuration.....	48
Datasource Settings .....	48
2 Production Model Configuration.....	49
Production Module .....	49
Enterprise Configuration.....	50
Site Configuration.....	51
Area Configuration.....	53

Line Configuration.....	55
Cell Configuration.....	64
<b>3 Workday Routines.....</b>	<b>69</b>
<b>4 Downtime Reasons.....</b>	<b>70</b>
Adding a Downtime Reasons .....	73
Editing a Downtime Reasons .....	74
Deleting a Downtime Reasons .....	74
Import / Export .....	74
<b>5 Product Infeed.....</b>	<b>75</b>
Adding a Product Infeed .....	75
Editing a Product Infeed .....	76
Deleting a Product Infeed .....	77
Import / Export .....	77
<b>6 Product Outfeed.....</b>	<b>77</b>
Adding a Product Outfeed .....	77
Editing a Product Outfeed .....	79
Deleting a Product Outfeed .....	79
Import / Export .....	79
<b>7 Product Waste.....</b>	<b>80</b>
Adding a Product Waste Counter .....	80
Editing a Product Waste Counter .....	81
Deleting a Product Waste Counter .....	81
Import / Export .....	81
<b>8 Scripting.....</b>	<b>82</b>

## **Part IV Component Reference 86**

<b>1 Production Components.....</b>	<b>86</b>
Production Line Selector .....	86
Production Cell Selector .....	87
Product Code Selector .....	88
Product Code Table .....	89
Product Code Line Table .....	90
Product Code Properties Table .....	92
Production Comments Panel .....	93
Product Code Controller .....	94
Analysis Controller .....	95
Production Analysis Selector .....	100
Production Stored Analysis Selector .....	105
Production Bar Chart .....	106
Production Pie Chart .....	109
Analysis Table .....	112
<b>2 Down Time Components.....</b>	<b>115</b>
Down Time Table .....	115
Performance Indicator .....	117
Line Run Selector .....	119
<b>3 Schedule Components.....</b>	<b>120</b>
Work Order Selector .....	120
Work Order Table .....	121
Work Order Controller .....	122
Line Schedule Selector .....	124

Schedule Day View .....	125
Schedule Week View .....	127
Schedule Month View .....	129
Schedule Date Selector .....	130
Schedule Entry Controller .....	132
Schedule Controller .....	137
Time Selector .....	140

## **Part V Production OPC Values 144**

1 Using OPC Values.....	144
2 OPC Value Reference .....	145
Project .....	145
Enterprise .....	146
Site .....	147
Area .....	148
Line .....	149
Cell .....	157
Additional Factors .....	160
Workday Routine .....	160
Downtime Reasons .....	161

## **Part VI Binding Function Reference 164**

1 Analysis.....	165
Analysis Filter .....	165
2 History.....	166
Downtime History .....	166
Production History .....	167

## **Part VII Analysis Providers 172**

1 Comment.....	172
2 Downtime.....	175
3 OEE.....	178
4 Schedule.....	182
5 TEEP.....	184

## **Part VIII Miscellaneous 190**

1 Additional Factors.....	190
2 Auto Waste Calculation.....	190
3 Production Rate Calculation.....	191

## **Index 193**



# Introduction

## Part I

# 1 Introduction

Improving production efficiency is the key to improving profit and reducing capital expenditures. It can make the difference competitively; however, it can also be very challenging because it requires more than just installing software. Improving efficiency requires commitment from management, maintenance, production and IT departments, as well as integration, training, actions to reduce downtime and new operational procedures. The OEE Downtime and Scheduling Module helps you to diagnose the inefficiencies within your production, allowing you to make improvements on the line and between employees.

The first step in improving efficiency is knowing where you are starting from. Think of it like improving the gas mileage of your car. You must start by determining your current gas mileage before you can begin making changes to improve your mileage. Once you know your existing OEE and have tracked the causes of downtime, then you can finish the process and start fixing the sources of your production inefficiencies.

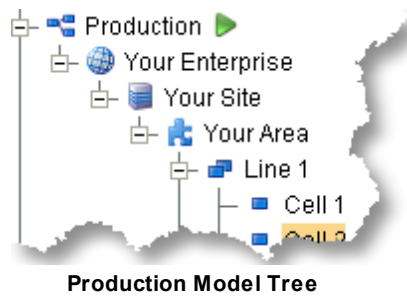
But why combine OEE, downtime and scheduling into one module? The OEE Downtime and Scheduling Module does not require the use of all three functions, but we packaged them together because the combination provides the best tools for the improvement of production efficiency. If only downtime was tracked, then you would not see the full picture. Downtime only informs you as to whether or not a machine is running, not if the machine is actually producing a quality product. Or if only OEE was tracked, you would know that efficiency is lower than normal, but not why or what actions to take to improve it. Low efficiencies also result from ineffective procedures or a lack of communications between departments. This is where the scheduling helps by providing current schedule information to all associated departments, improving communication and reducing unnecessary delays. The OEE Downtime and Scheduling Module allows you to see the whole picture, resulting in the improvement of your production in every aspect.

## 1.1 Production Model

To start out, it is important to define what the production model is, which is heavily referred to when dealing with OEE and downtime.

A production model defines your manufacturing or process in tree view form. It provides an organized way to easily configure, control and analyze your facility.





## Enterprise

The *enterprise* is the highest level of the production model and typically represents a manufacturing company. A company may have one or more production facilities.

## Site

A *site* is a geographical production location and is part of an *enterprise*. Separating your *enterprise* into multiple production sites allows for comparing OEE, downtime and production information between them.

## Area

An *area* is a physical or logical grouping of production *lines*.

## Line

A *line* is a collection of one or more cells that run a single product at any given time. Typically, the product flows from one cell to the next in sequence until the product, or sub assembly, being produced is complete.

## Cell

The *cell* is a single machine, sub process or step required in the manufacture a product. The product may be a hard product such as used in packaging, adding liquid or powder, etc. Packaging machines are a common example, but a cell applies to processes also.

## 1.2 OEE

OEE stands for Overall Equipment Effectiveness and is used to monitor manufacturing effectiveness. The resulting OEE number, represented as a percentage, is generic and allows comparisons across differing industries.

Efficiency is not simply the ratio of machine run time to scheduled time. Look at the situation of your manufacturing *line* or process running at half speed with 0 downtime. This is truly only 50% efficient. Or what if 10% of the product being produced does not meet your minimum quality and must be reworked. This equates to 90% efficient, which does not take into account the effort to rework or the losses of raw material.

There are three factors, all represented as a percentage, taken into consideration for the final OEE result:

### OEE Availability

OEE Availability is the ratio between the actual run time and the scheduled run time. The

scheduled run time does not include breaks, lunches and other pre-arranged time a production *line* or process may be down.

*Example:*

*If a line is scheduled for one 8 hour shift with two 15 minute breaks and one 30 minute lunch, then the scheduled time is 7 hours (determined from 8 hours - 15 minute break - 15 minute break - 30 minute lunch). If during the production run, there are 25 downtime events totaling to 45 minutes of downtime, then the run time is 6 hours and 15 minutes (derived from 7 hours of scheduled time - 45 minutes). The OEE Availability of 89% is calculated by actual run time divided by scheduled run time, or 6 hours 15 minutes divided by 7 hours.*

### **OEE Performance**

OEE Performance is the ratio between the actual number of units produced and the number of units that theoretically can be produced based on the standard rate. The standard rate is the rate the equipment is designed for.

*Example:*

*If a work cell is designed to produce 10 units per minute we can calculate the theoretical amount of units it can produce in a given amount of time. Using the 6 hours and 15 minutes of actual run time from the above example, a total of 3750 units would be produced. Calculated by taking 6 hours and 15 minutes (375 minutes times) 10 units per minute. If the actual number of units produced is 3000, then the OEE Performance is 80% (calculated by 3000 / 3750).*

### **OEE Quality**

OEE Quality is the ratio between good units produced and the total units that were started.

*Example:*

*Taking the number of units produced from above of 3000, if 200 units were rejected at the quality inspection station, then 2800 good units are produced. The OEE Quality is 93% calculated from 2800 divided by 3000.*

The final calculation is  $OEE = Availability \times Performance \times Quality$ .

*Example:*

*Using all the numbers from above,  $89\% \times 80\% \times 93\% = 66\%$ .*

This may seem like a low number but it is important to keep in mind that the OEE is not to be compared to 100%. The OEE result from this production run is compared to other production runs; however, using Inductive Automation's OEE Downtime and Scheduling module allows much more than just comparing OEE results between production runs. It allows you to compare OEE results between operators, viscosity, mechanics, products, raw material vendors and any user defined factor you can think of.

## **1.3 TEEP**

Where OEE represents the equipment efficiency during a production run, Total Effective Equipment Performance (TEEP) represents the equipment utilization against a calendar period. For example, 365 days a year, 24 hours a day. It can also be thought of as asset utilization and will help in the decision making process of purchasing new equipment.

There are two factors used to calculate TEEP:

### Loading

Loading is the ratio between the scheduled time for the production *line* (or process) and the calendar time.

*Example:*

*If a production line is scheduled for 5 days, 24 hours each day, over a 7 day period, then the loading is 71% calculated by  $(5 \times 24) / (7 \times 24)$ .*

### OEE

OEE = Availability x Performance x Quality as described in the previous section.

The calculation is  $TEEP = \text{Loading} * \text{OEE}$

*Example:*

*To simplify this example we will use made up OEE result of 82%. The actual OEE value used must be the OEE result for all production runs of the same calendar time period that were used to calculate the Loading value.*

*$TEEP = 71\% * 82\%$*

*The TEEP result is 58% .*

## 1.4 Production Count Tracking

For OEE calculations to be performed, production count information is required. At a minimum, the outfeed production count for a production *line* is needed. Additional production count information can be configured, leading to more OEE calculations.

For example, if the infeed production count is configured for a production, then product accumulation and waste can be calculated.

## 1.5 Down Time Tracking

OEE provides a method to monitor the efficiency of your production facility and tracking downtime provides information of where to focus efforts to improve efficiency. Think of it this way, if your production *line* typically runs at 69% OEE, what actions do you take to increase it? OEE alone doesn't tell you what factors are preventing your efficiency from being higher than 69%.

In the simplest form, downtime tracking will identify the production cell (machine or process) that is preventing you production *line* from producing product. This can be done manually, but history has shown that manually collected downtime information is not accurate. In addition, if it is manually collected on paper log sheets, then someone has to further enter the details into a program or spreadsheet to be able to organize it into actionable information used to focus your efforts to make improvements. Putting recording inaccuracies, extra labor and typos aside, by the time the information is available, it is old.

Tracking downtime automatically or semi-automatically solves the issues associated with manual tracking. In a perfect world, monitoring all downtime reasons automatically is the ideal solution. But in the real world, this can be difficult, pricey, or just not practical. For this reason, it is important for downtime tracking software to support an automatic reason detection with a manual override. For example: if an operator presses the stop button because they see a bottle laying on its side feeding into a filler, then the only automatic reason that can be detected is "operator pressed stop button". Now the operator should be able to override this reason with more specific information.

Once the period of time that production cells were not producing product and the associated reasons are recorded, analyzing the summary of the reasons will identify where effort should be focused to improve efficiency.

## 1.6 Production Scheduling

A lot of coordination must be used when scheduling production. If one item is not in unison with the rest, then production *line* efficiencies will drop. If raw material is not at the *line* when the *line* is ready to start production, then *line* production is waiting. Even if this is just 10 minutes, it negatively reduces the production *line* efficiency.

In some operations, production schedules change, sometimes at the last minute, making it difficult and forcing employees to rely on a verbal updates involving multiple people. It becomes an issue of how much effort is being consumed to do so and how many times are there hiccups.

By instantaneously propagating schedule changes to all departments, combined with tools to track required, scheduled, produced and remaining production information, can help make an operation run smoother.

## 1.7 Getting Help

There are multiple methods of getting help with both Ignition and the MES modules:

### Online Forum

From [www.inductiveautomation.com](http://www.inductiveautomation.com) website, the online support forum can be accessed to search for solutions and post questions. It is actively patrolled by Inductive Automation staff and many knowledgeable users.

### Email Support

E-mail support is available at [support@inductiveautomation.com](mailto:support@inductiveautomation.com)

### Phone Support

You can reach us during business hours 8am-5pm Pacific time at 1-800-266-7798.

Support charges may apply. 24-hour support is also available for an addition fee.

### Design Services

Inductive Automation has design support staff skilled in working with IT, maintenance, production departments and integrating the OEE Downtime and Scheduling module to the plant floor and ERP systems. For more information, contact sales.

## 1.8 Licensing and Activation

### Trial Mode

The OEE Downtime and Scheduling module follows the same trial operation as Ignition. The OEE Downtime and Scheduling module can be used for 2-hours at a time, with no other restrictions. At the end of the trial period, the system will stop logging data to the database, display expired trial overlays on live values and clients will see a demo screen. By logging into the gateway, you may re-start the demo period, and enable another 2 hours of execution. The demo period may be restarted any number of times.

You may install a unlicensed OEE Downtime and Scheduling module into a licensed Ignition server. The Ignition server licensing will not be affected and the OEE Downtime and Scheduling module will operate in Demo mode.

### Licensing

The OEE Downtime and Scheduling license can be purchased along with, or separately from, the Ignition license. Despite the modular licensing, each Ignition server only has a single CD-Key and license file. That is, there is a single license file that dictates which modules are current activated.

When module(s) are purchased, you will receive a CD-Key - a six digit code that identifies your purchase. You then use this CD-Key to activate the software through the Ignition Gateway. Activation is a process by which the CD-Key and its associated parameters get locked to the machine that you are activating. If you adding an additional module, your account will be updated, and you can re-use your existing CD-Key to activate the new features. For this reason, if you purchased the OEE Downtime and Scheduling module separately from the Ignition server, the OEE Downtime and Scheduling license will have to be added to your existing CD-Key.

It is possible to inactivate your CD-Key, freeing it for activation on a different machine.

Not all production facilities have the large number of *lines* and *cells* while others do. For this reason there are two basic editions to choose from to meet your situation:

#### Standard License

The Standard edition provides OEE, downtime and scheduling functionality for unlimited production *areas*, *lines* and *cells*. Includes the OEE, downtime and schedule engine; configuration software; user interface screens; enhanced analysis tools; and reports. There are no restrictions on the number of tags, logged data items, screens or clients (users).

#### Line License

The Standard edition provides OEE, downtime and scheduling functionality for a single production *lines*. Multiple Line Licenses can be installed on a single server. There is no limit on the number of cells that a *line* can be configured for. Includes the OEE, downtime and schedule engine; configuration software; user interface screens; enhanced analysis tools; and reports. There are no restrictions on the number of tags, logged data items, screens or clients (users).

### Enterprise Extension

In addition to the above editions, the Enterprise Extension allows analysis and reporting across multiple physical production *sites* from anywhere on your network. Compare efficiency and downtime by production *line*, operator, user defined values and more. Requirements: Standard or Line License for the OEE Downtime Module, and the Reporting module.

### Activation

Activation, as mentioned above, is the method by which a cd-key is locked down to the install machine, and the modules are notified of their license state. It is a two step process that can be performed automatically over the internet, or manually through email or the Inductive Automation website.

#### Step 1 - Enter CD-Key

When the software is purchased, you are provided with a *six digit CD-key*. After logging into the gateway configuration, go to Licensing > Purchase or Activate, and select "Activate". Enter your CD-key.

#### Step 2a - Activate over Internet

If your computer has internet access, activating over the internet is the easiest option. A secure file will be created with your cd-key, and sent to our servers. The response file will then be downloaded and installed, completing the entire process in seconds.

**OR**

#### Step 2b - Activate Manually

If you do not have internet access on the installation machine, you must activate manually. In this process, an activation request file is generated (activation\_request.txt). You must then take this file to a machine with internet access, and email it to support@inductiveautomation.com, or visit our website to activate there. Either way will result in a license file (license.ipl) being generated, which you then must take back to the Gateway machine and enter into the License and Activation page.

# Getting Started

## Part II

## 2 Getting Started

This getting started guide will step you through OEE Downtime and Scheduling module installation, demo installation, a tour of the demo user interface and a tour of configuration features.


### 2.1 Installation

Follow the next four sections to install the complete OEE Downtime and Scheduling. If you just want to install the core modules and skip the demo, follow the next three sections.

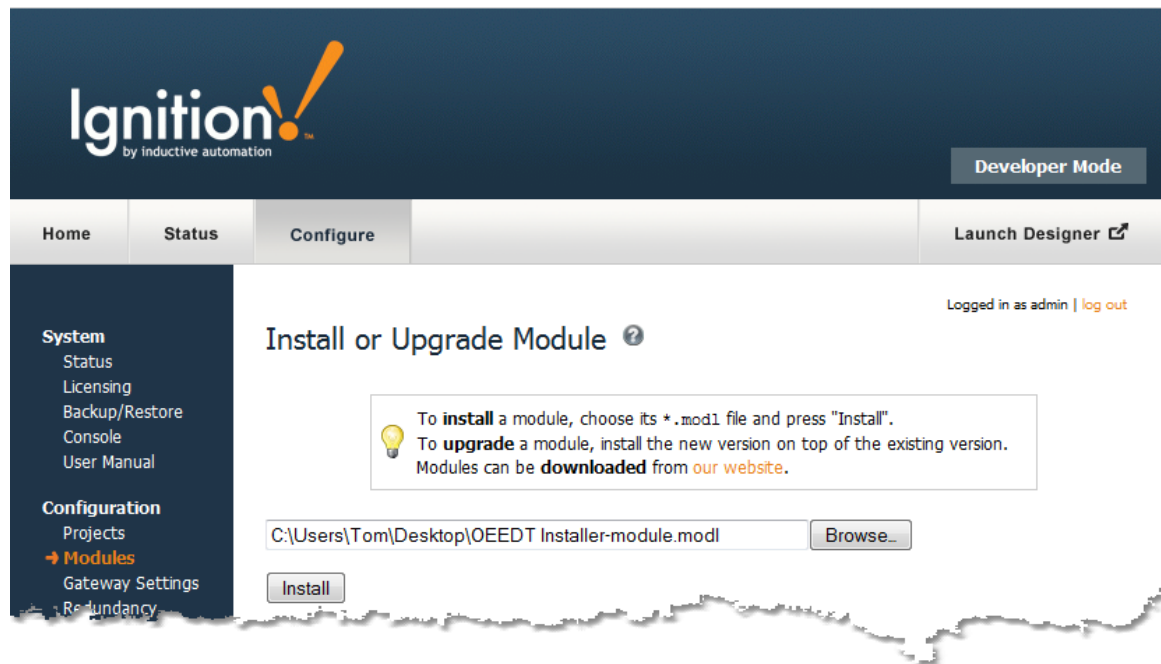
#### 2.1.1 Installing Modules

To install the OEE Downtime and Scheduling module on to an existing Ignition server, follow the steps below:

Before installing the OEE Downtime and Scheduling module, it is recommended to first setup the database connection that will be used to store OEE, downtime and scheduling data.

1. **Download the OEEDT Installer.modl module**  
from the Inductive Automation download website. It will be under the MES modules heading.
2. **Install the OEEDT Installer.modl module**  
Navigate to the Modules page of the Ignition gateway. At the bottom of the list of already installed modules, click the  [Install or Upgrade a Module...](#) link. Next, browse to the OEEDT Installer.modl file and click the install button as shown below.





#### Install Ignition Module

The OEEDT Installer module will install all required modules. These are the Production, OEE Downtime and Scheduling modules. It is important to keep in mind not to install or update these module individually. Instead, it should be done by updating the OEEDT Installer module.

## 2.1.2 Configure Database

OEE, downtime and schedule data is stored in databases external to Ignition. These database(s) are setup in the gateway configuration section by selecting the **Databases>Connections** section from the left-hand configuration menu. See the Ignition documentation for more information on setting up a database connection.

Below shows a typical database connection that is required for the OEE, Downtime and Scheduling module.

### Database Connections

Name	Description	JDBC Driver	Translator	Status	
ProductionDB		Microsoft SQLServer JDBC Driver	MSSQL	VALID	edit delete

→ Create new Database Connection...

**Note:** For details about a connection's status, see the [Database Connection Status](#) page.

## Sample Database Connection

### 2.1.3 MES Module Settings

The OEE Downtime and Scheduling module stores data in a SQL database. Because Ignition can be configured to multiple databases, the MES Module Settings configuration page is used to select which databases to store OEE, downtime and scheduling data. If only one database has been configured in Ignition, then it will be selected by default.

To change the MES module settings, go to the configuration section in the gateway and select the **MES Modules> Settings** section from the left-hand side configuration menu.

Once a database connection is created, and if only one database connection exists, then it will be automatically selected to be used by the MES modules.

If more than one database connection exists, then the desired database connection can be selected to be used by the MES modules as shown below.

The screenshot displays the Ignition MES Module Settings page. The top navigation bar includes 'Home', 'Status', 'Configure', and 'Launch Designer'. The left sidebar lists various system and configuration options. The main content area is titled 'MES Module Settings' and contains two sections: 'Runtime Datasource' and 'Analysis Datasource'. Both sections have a dropdown menu set to 'ProductionDB' and a text description. A 'Save Changes' button is located at the bottom of the configuration area.

Runtime Datasource	
Runtime Database	ProductionDB The database connection to store runtime production data.
Data Retention Duration	30 Number of days to retain runtime production data.

Analysis Datasource	
Analysis Database	ProductionDB The database connection to store historical analysis production data to. Multiple sites can be set to the same analysis database to allow enterprise reporting.

Save Changes

MES Module Settings Page

For more information on the MES Module Settings, see MES Module Configuration.

### 2.1.4 Demo Installation

The OEE Demo project can be used to quickly start using and evaluate the features of the OEE Downtime and Scheduling module.

By installing the OEE Demo, SQLTags will be imported, the Production Simulator will be installed, the demo Ignition project will be installed and sample database data will be added. To remove the demo, each of these components will have to be manually removed.

To install the OEE Demo project, go to the configuration section in the gateway and select the **MES Modules> Demo** section from the left-hand side configuration menu. Next, click on the [→ Install OEE Downtime and Scheduling demo](#) link. This will take a few seconds as it is installing and making all of the configuration changes to run the OEE Demo.



Demo Installation Page

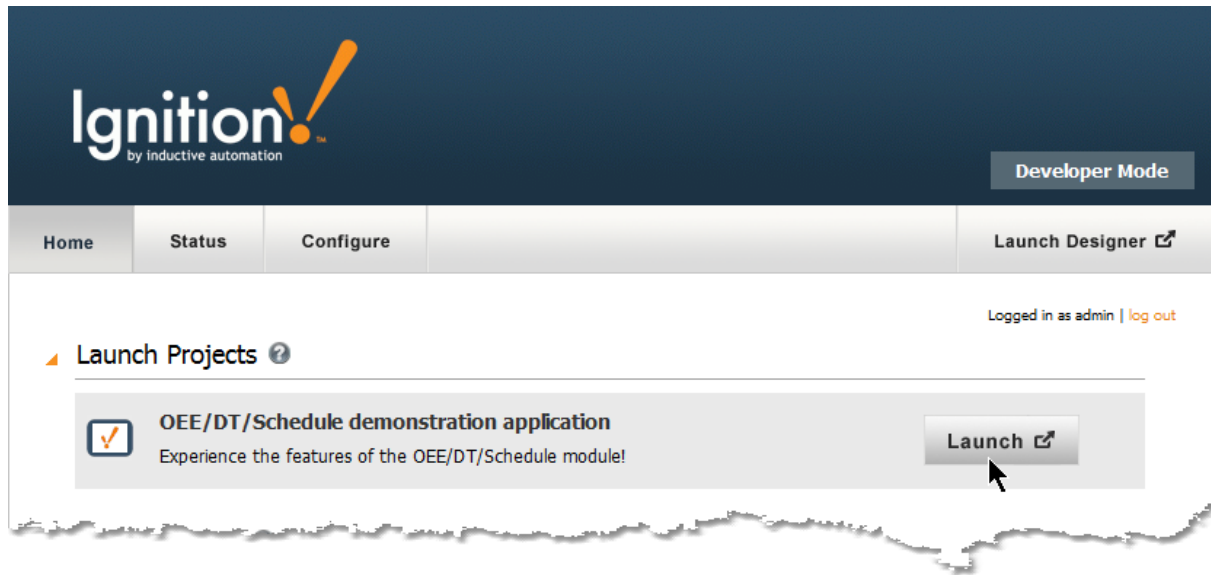
If the OEE Demo has already been installed, then there will be a note stating so. If a database connection has not been installed, a note will appear stating a database connection is needed before installing the demo.

## 2.2 User Interface

This section will walk through the user screens of the OEE Demo. As you are going through this section, it is important that you keep in mind that these screens are just provided for demo, training and to reduce the time required to get up and running. They

can be modified, deleted or add new screens using the Ignition designer. But we will save that for the next section.

To start the OEE Demo, go to the home section in the gateway and click on the launch button as shown below.



Launch OEE Demo Client

### 2.2.1 Work Orders

Work orders track the progress of production of a given product. They can span across multiple production runs of a given product. As shown below, the total number of products in the first work order is 10,000. We can also see that no cases have been scheduled, no cases have been produced so far, so all the cases are remaining. As production runs are scheduled and product is manufactured against a work order, these values will update.

**Work Order**

Work Orders  ☐ Show Closed Work Orders ☐ Show Hidden Work Orders

Closed	Hide	Work Order	Product Code	Description	Quantity	Produced	Scheduled	Remaining
<input type="checkbox"/>	<input type="checkbox"/>	WO_PC1A	PC_001	Product Code 1	10,000	0	0	10,000
<input type="checkbox"/>	<input type="checkbox"/>	WO_PC1B	PC_001	Product Code 1	42,000	0	0	42,000
<input type="checkbox"/>	<input type="checkbox"/>	WO_PC2	PC_002	Product Code 2	67,000	0	0	67,000
<input type="checkbox"/>	<input type="checkbox"/>	WO_PC3	PC_003	Product Code 3	623,852	0	0	623,852

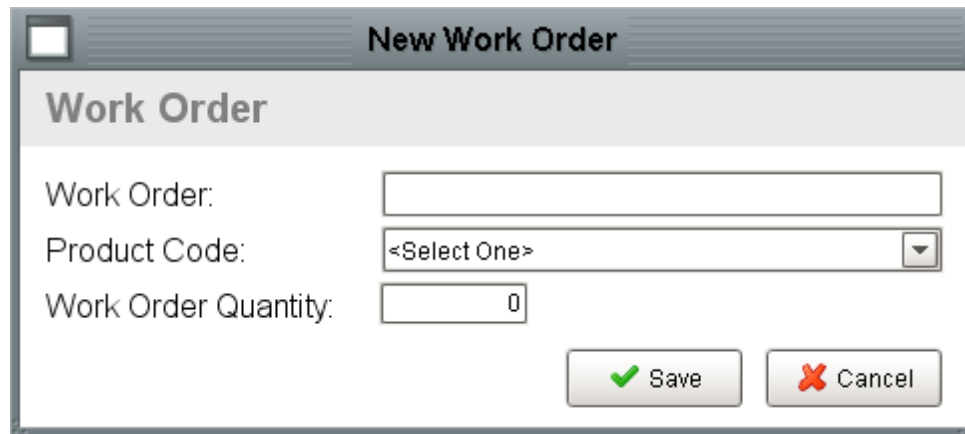
2/16/11 - 2/18/11

Jan 19 Jan 24 Jan 29 Feb 3 Feb 8 Feb 13 Feb 18

Work Order Screen

It is possible to remove work orders that are closed or hide an open work order by selecting one of the two check boxes to the left of the work order. It is also possible to show these work orders again by selecting "Show Closed Work Orders" or "Show Hidden Work Orders" in the top, right-hand corner of the screen. In order to show work orders in a specific date or the time range, there is a slide bar at the bottom of the screen which can be dragged to the correct date. The magnifying glasses allow a more specific time or a broader range of dates to be viewed.

The system supports adding work orders, as well as editing and removing work orders. For companies that have ERP (Enterprise Resource Planning) or other systems containing work order information, work orders can be added or updated automatically. To add a work order, simply click "Add" and fill in the necessary information. A product code must be entered before a work order can be added.



**New Work Order**

**Work Order**

Work Order:

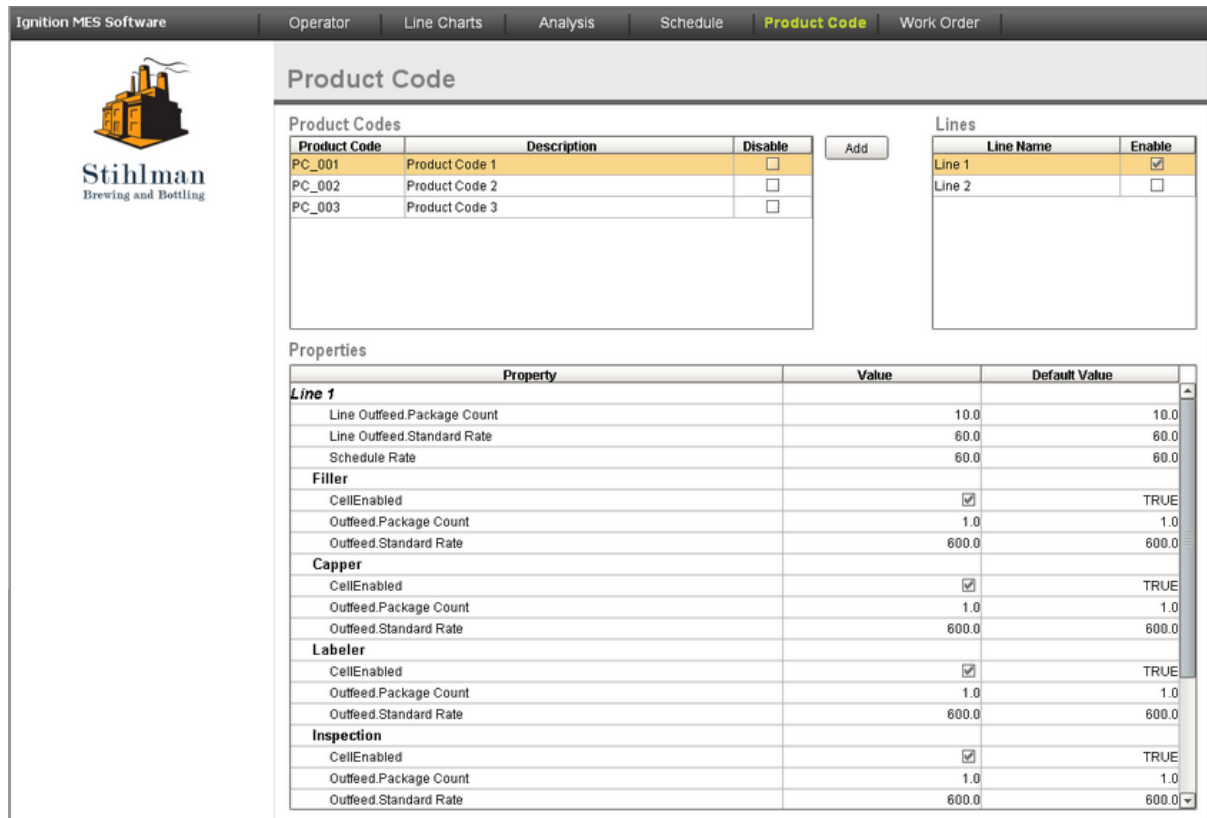
Product Code:

Work Order Quantity:

New Work Order Window

## 2.2.2 Product Codes

Product codes or pack codes represent the products that are manufactured within your facility. If you have multiple production *lines*, this screen is where product codes are assigned to individual production *lines*. In addition, the settings for a product code may vary depending on the *line* it is being produced on. Those settings are also set on this screen in the Properties section.



Ignition MES Software | Operator | Line Charts | Analysis | Schedule | **Product Code** | Work Order

**Product Code**

**Product Codes**

Product Code	Description	Disable
PC_001	Product Code 1	<input type="checkbox"/>
PC_002	Product Code 2	<input type="checkbox"/>
PC_003	Product Code 3	<input type="checkbox"/>

**Lines**

Line Name	Enable
Line 1	<input checked="" type="checkbox"/>
Line 2	<input type="checkbox"/>

**Properties**

Property	Value	Default Value
<b>Line 1</b>		
Line Outfeed.Package Count	10.0	10.0
Line Outfeed.Standard Rate	60.0	60.0
Schedule Rate	60.0	60.0
<b>Filler</b>		
CellEnabled	<input checked="" type="checkbox"/>	TRUE
Outfeed.Package Count	1.0	1.0
Outfeed.Standard Rate	600.0	600.0
<b>Capper</b>		
CellEnabled	<input checked="" type="checkbox"/>	TRUE
Outfeed.Package Count	1.0	1.0
Outfeed.Standard Rate	600.0	600.0
<b>Labeler</b>		
CellEnabled	<input checked="" type="checkbox"/>	TRUE
Outfeed.Package Count	1.0	1.0
Outfeed.Standard Rate	600.0	600.0
<b>Inspection</b>		
CellEnabled	<input checked="" type="checkbox"/>	TRUE
Outfeed.Package Count	1.0	1.0
Outfeed.Standard Rate	600.0	600.0

Product Code Screen

To assign a product code to one or more production *lines*, select the product code, then

select the "Enable" box next to the appropriate *line*. It is also possible to disable a product code altogether by selecting the box to the right of the product code. To edit the properties, select the product code and the *line* you wish to edit, then double click the value to be changed. Pressing Enter or clicking off of the value will save the change. Product code descriptions can also be edited by double clicking.

The demo demonstrates adding product codes, but the system also supports editing and removing product codes. For companies that have ERP (Enterprise Resource Planning) or other systems containing product code information, product codes can be added or updated automatically from them.

### 2.2.3 Production Schedule

The scheduling screen is similar to Outlook calendar and is easy for new users to learn how to use. It has month, week and day views that are selected by clicking on the

Day **Week** Month buttons. Select the production *line* to view and edit the schedule by using the drop-down list as shown below.



Line Selection on Calendar

Production runs can be scheduled for part of a shift, across multiple shifts, days and even months.

To see how editing production run entries works, select the week view. Next, using the mouse, right-click on a day and time to start the production run and click **New Entry**. Here, you can also choose to edit or delete an existing scheduled production run. The New Schedule Entry popup window allows for scheduling production runs, maintenance and other entries. By selecting the Work Order Run schedule type, work order options appear. Continue by selecting a work order (these must be created before adding a new schedule entry). Notice, the total work order units to be produced, units produced, units scheduled and units remaining information is shown for the selected work order. The quantity entry is automatically set to the remaining units for the work order. A C/O duration may also be added to account for the change over duration before the production *line* begins.

**New Schedule Entry**

**Schedule Entry**

Schedule Type: Work Order Run

Start: 02/18/2011 5:00 AM

Finish: 02/18/2011 6:05 AM ☐ Override Automatic Finish

Note:

**Work Order**

Work Order: WO\_PC1A

Product Code: PC\_001  
Product Code 1

C / O Duration: 00:30

Quantity: 1,200

Work Order Units: 10000

Units Produced: 0

Units Scheduled: 0

Units Remaining: 10000

Save Cancel

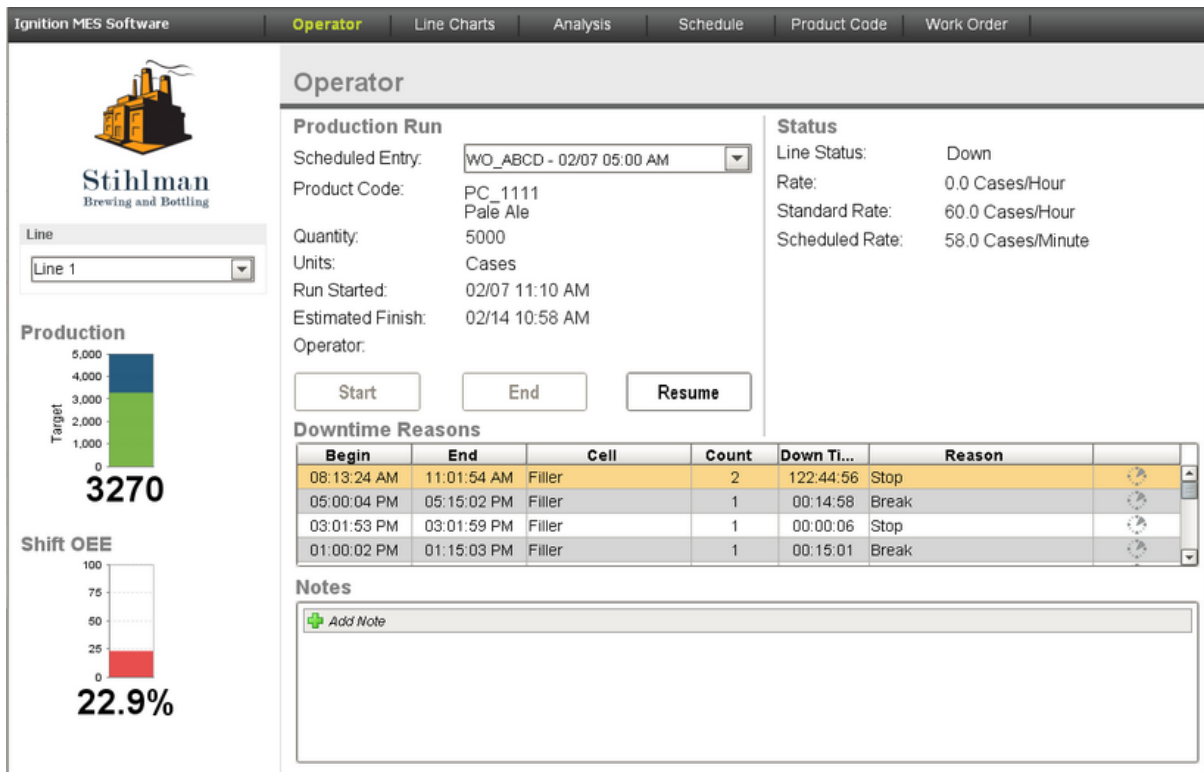
Schedule New Production Run

After entering the desired quantity, the finish time for the work order will automatically update to show the predicted production end time and date. The system forecasts the finish time based on the schedule rate for the product code associated with the work order and all breaks or meals that are configured. You can override the finish time by selecting the Override Automatic Finish option and manually selecting a date and time.



## 2.2.4 Operator Screen

The operator screen provides an interface to allow the operator to control the current production run, select downtime reasons and monitor the current production run. This screen is used as a demo, but can reduce the amount of time needed to implement an OEE, downtime and scheduling system. It can be modified using the Ignition designer to accommodate your requirements.



Operator Screen

The portion of the operator screen shown below, allows the operator to start, end and resume production runs. By clicking on the down arrow of the scheduled entry drop-down box, a list of scheduled production runs that have not been started will be shown for the operator to select from. Before a different production run can be selected, the current production run must be ended.

**Production Run**

Scheduled Entry: WWO\_ABCD - 02/07 05:00 AM

Product Code: WWO\_127982 - 12/30 01:00 AM  
 WWO\_127980 - 01/13 10:00 AM  
 WWO\_127980 - 01/13 07:00 PM  
 WWO\_127980 - 12/08 09:30 AM  
 WWO\_ABCD - 02/01 02:00 AM

Quantity: WWO\_WXYZ - 02/03 04:00 AM

Units: WWO\_ABCD - 02/07 05:00 AM  
 WWO\_ABCD - 02/07 08:00 AM


Run Started:

Estimated Finish:



Operator:

Start End Resume

Scheduled Run Selection

Once the run has started, the downtime events for the selected *line* will show in the downtime reason table. Sometimes downtime events occurred for more than one reason. When this happens, downtime events can be split by clicking on the split icon as shown below. Comments can also be added by clicking  to the right of the split icon.

**Downtime Reasons**

Begin	End	Cell	Count	Down Ti...	Reason	
11:00:04 AM	11:30:03 AM	Filler	1	00:29:59	Meal	
10:51:03 AM	10:53:05 AM	Palletizer	1	00:02:02	Wrapper feed empty	
10:48:03 AM	10:50:03 AM	Case Packer	1	00:02:00	Case	
10:45:03 AM	10:47:03 AM	Inspection	1	00:02:00	Setup	
10:42:03 AM	10:44:03 AM	Labeler	1	00:02:00	Label	
10:39:03 AM	10:41:03 AM	Capper	1	00:02:00	Cap f	
10:36:03 AM	10:38:02 AM	Filler	1	00:01:59	Mach	
10:33:02 AM	10:35:03 AM	Filler	1	00:02:01	Scale	
10:30:01 AM	10:32:01 AM	Filler	1	00:02:00	Waiti	

10:51:03 AM 10:53:05 AM

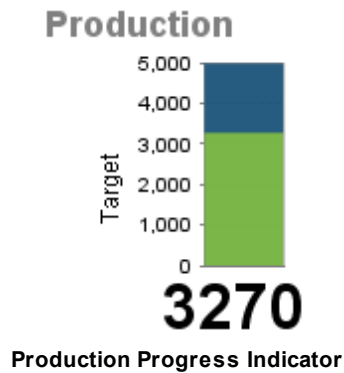
0 60 120

10:51:03 AM

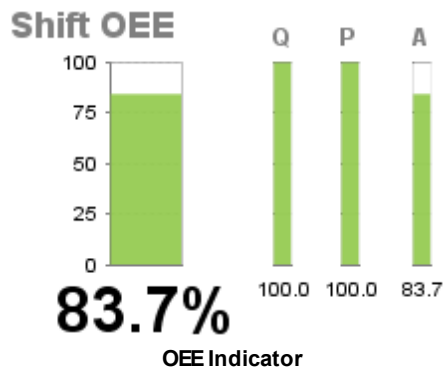
Cancel Split

Downtime Reason Table

You will notice other information of the screen that give the operator realtime indication of how the production run is progressing. The indicator shown below displays the target and actual production for the current shift. At the start of every shift change, new targets are calculated for the new shift. This always provides the operator relevant production information on their shift to keep the entire production run on track.



Below this, the OEE information is displayed for the shift. Here, the total OEE for the shift is displayed, as well as the Quality, Performance, and Availability individually.



## 2.2.5 Line Charts

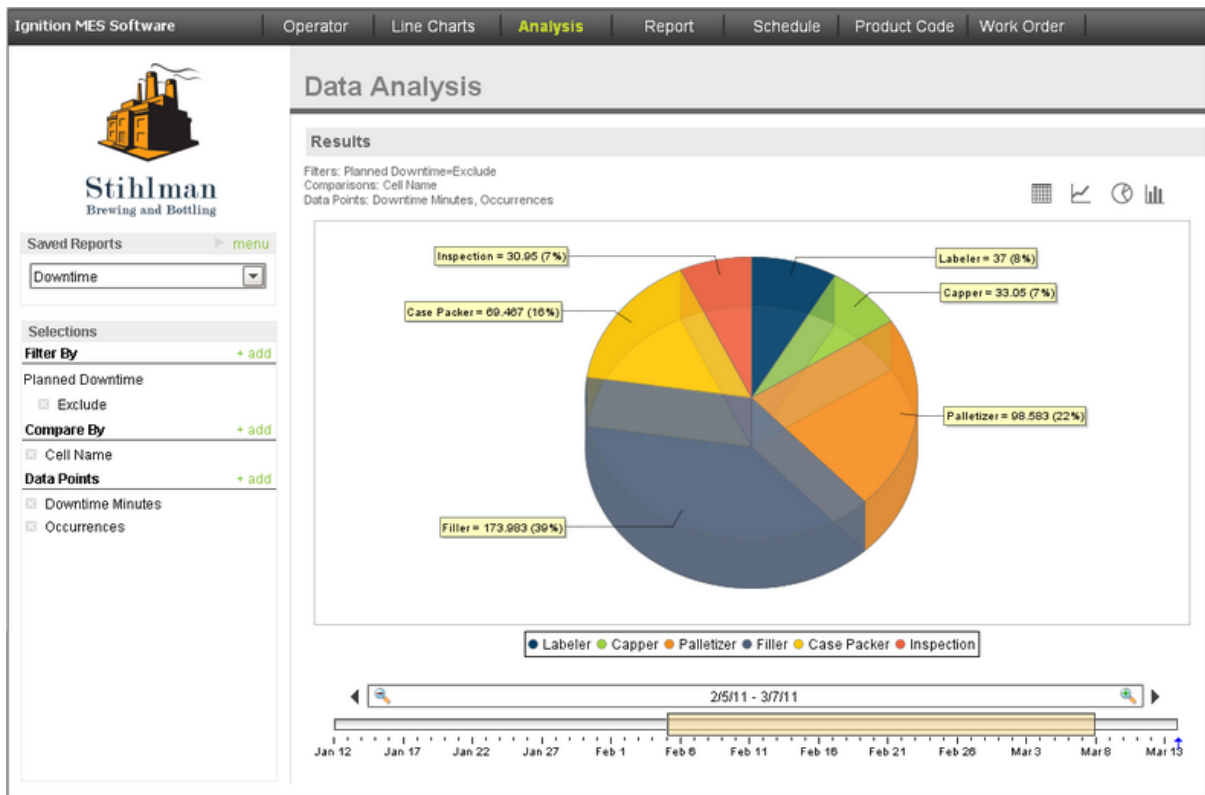
The line charts screen provides realtime information as the production runs progresses. Completed production runs can be selected using the production run drop-down list. At the bottom of the screen, a graph showing the top reasons for down time is displayed and the number of minutes of down time caused by each of the given reasons. It is possible to zoom in on any of the graphs by clicking and dragging over the desired area, or by right-clicking and selecting **Zoom In**. To restore the previous view, you can right-click and select **Zoom Out** or **Reset Axes**. **Auto Range** can also be used to see more of the graph.



Sample Line Charts Screen

## 2.2.6 Analysis Screen

The analysis screen allows for ad-hoc analysis of production data. OEE, TEEP, downtime, production and even user defined data can be viewed across a date range. This data can also be filtered to only include specific criteria. Additionally, comparisons can be made between different factors. For example, downtime by operator can be analyzed or even downtime by operator by shift.

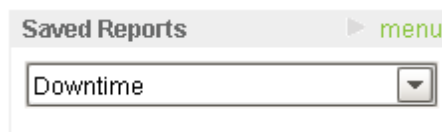


Ad-hoc Analysis Screen

The date range selector at the bottom is used to define the data range to include in the analysis. As you change the start or end dates, only the production runs that are within that range will be included in the analysis.

### Stored Analysis

In the demo project, there are pre-configured analyses that can be selected in the store reports section. As different stored analyses are selected, the values in the Selections section will change. The demo project, has a Downtime by Line stored analysis. Selecting it will make the selection to view downtime occurrences and downtime minutes values by individual *lines*.



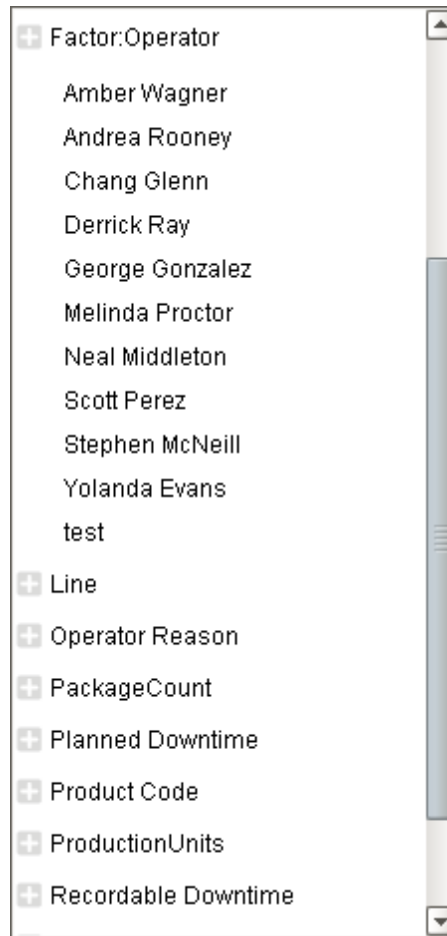
Saved Reports

If the pie chart is selected, only the downtime occurrences will be represented graphically. However, if the bar chart is selected, then both the downtime occurrences and the downtime length in minutes will be shown graphically in separate bars.

### Filter By

Once an stored analysis has been selected, you can change the selections to zero in on the data that you desire. The filter section allows you to limit the data that is included in the

analysis. Filters can be added by clicking on the **+ add** icon on the right side of the *Filter By* section. Within the popup filter selection window, scroll down to the **Factor:Operator** option and click the **+** icon. Notice the names of operator that can be selected. Clicking on George Gonzalez will add the Factor:Operator = George Gonzalez causing the analysis results to included downtime data while George Gonzalez was the operator.



Filter By Options

The list of available filters change based on the date range. For example, if George Gonzalez was on vacation for the desired date range, then his name will not show as an available options.

The filter selection shown below includes data for only Line 1 when George Gonzalez was the operator and excluding all planned downtime.



Filter By Selections

Filter By items can be removed by clicking on the ☒ located to the left of the name.

### Compare By

Breaking up information into groups is more meaningful than just seeing a total for a given date range. For example, knowing the total downtime for Line 1 for a given data range really does not provide actionable information that can be used to improve efficiencies. Now, by comparing the total downtime for each machine on Line 1, it is possible to identify the machine(s) causing the most downtime. Focusing efforts on these machines and solving sources of downtime will result in better efficiencies.

Additional Compare By items can be added by clicking on the **+ add** icon on the right side of the *Compare By* section. Within the popup Compare By selection window, click on the desired item that you want to compare analysis results between.



Compare By Selections

Compare By items can be removed by clicking on the ☒ located to the left of the name.

### Data Points

Data points are the individual pieces of information that will be present in the analysis. For example, downtime minutes or downtime occurrences are just two of the many available data points. To add a data point, click on the **+ add** icon on the right side of the *Data Points* section. Within the popup Data Point selection window, click on the data point item to include in the analysis.

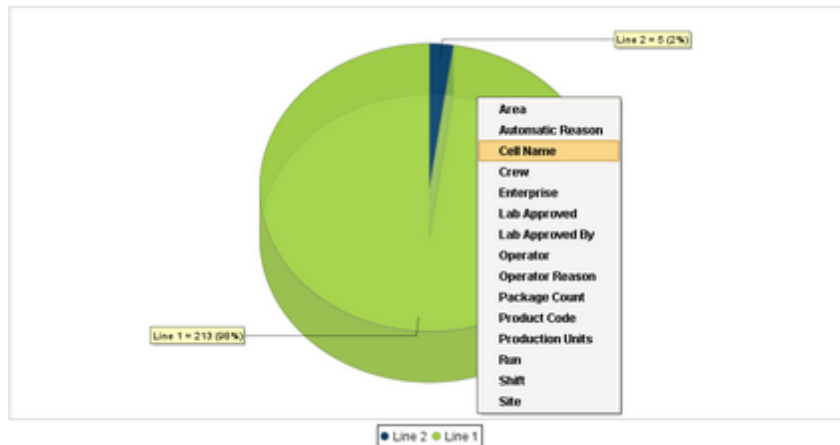


Data Point Selections

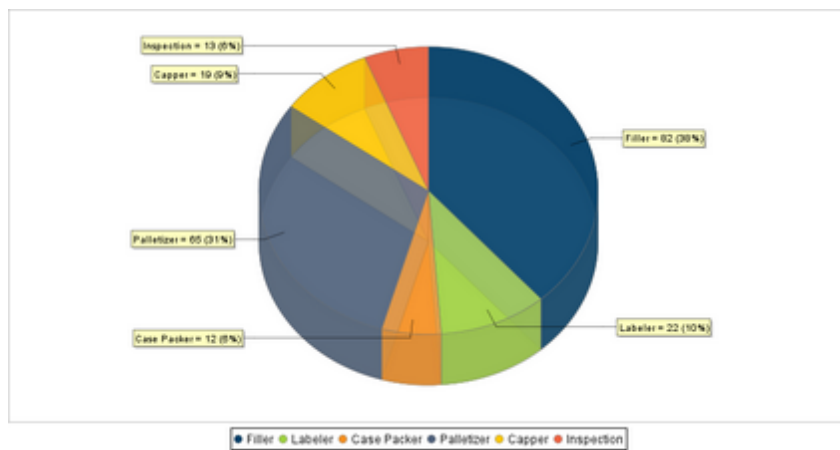
Data Points can be removed by clicking on the ☒ located to the left of the name.

## Drill Down

The drill down feature simplifies the compare by and filter selections. Click on a chart series to display the available drill down options. As shown in **Drill Down Example 1** below, clicking on the Line 1 pie segment will show a popup menu of drill down options. If the **Cell Name** option is selected, then the analysis filters to show the information by Cell Name. The Filter By and the Compare By sections add *Cell Name*. The result is shown in **Drill Down Example 2**. Again, by clicking on the "Filler" pie segment and selecting **Operator Reason**, the Filter By and Compare By selections will change to show information for only Line 1 Filler and Compare By Operator Reason as shown in **Drill Down Example 3**.

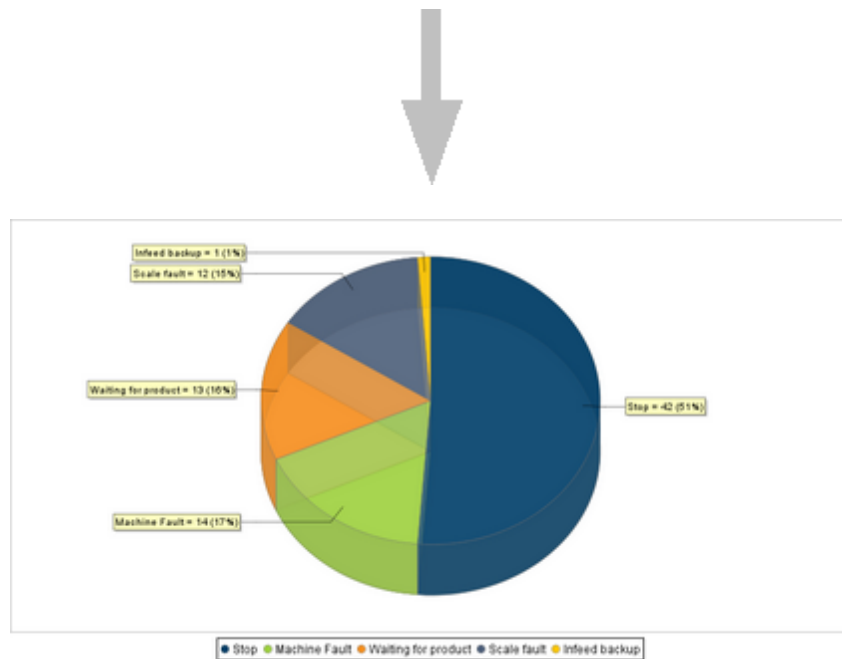


Drill Down Example 1



Drill Down Example 2



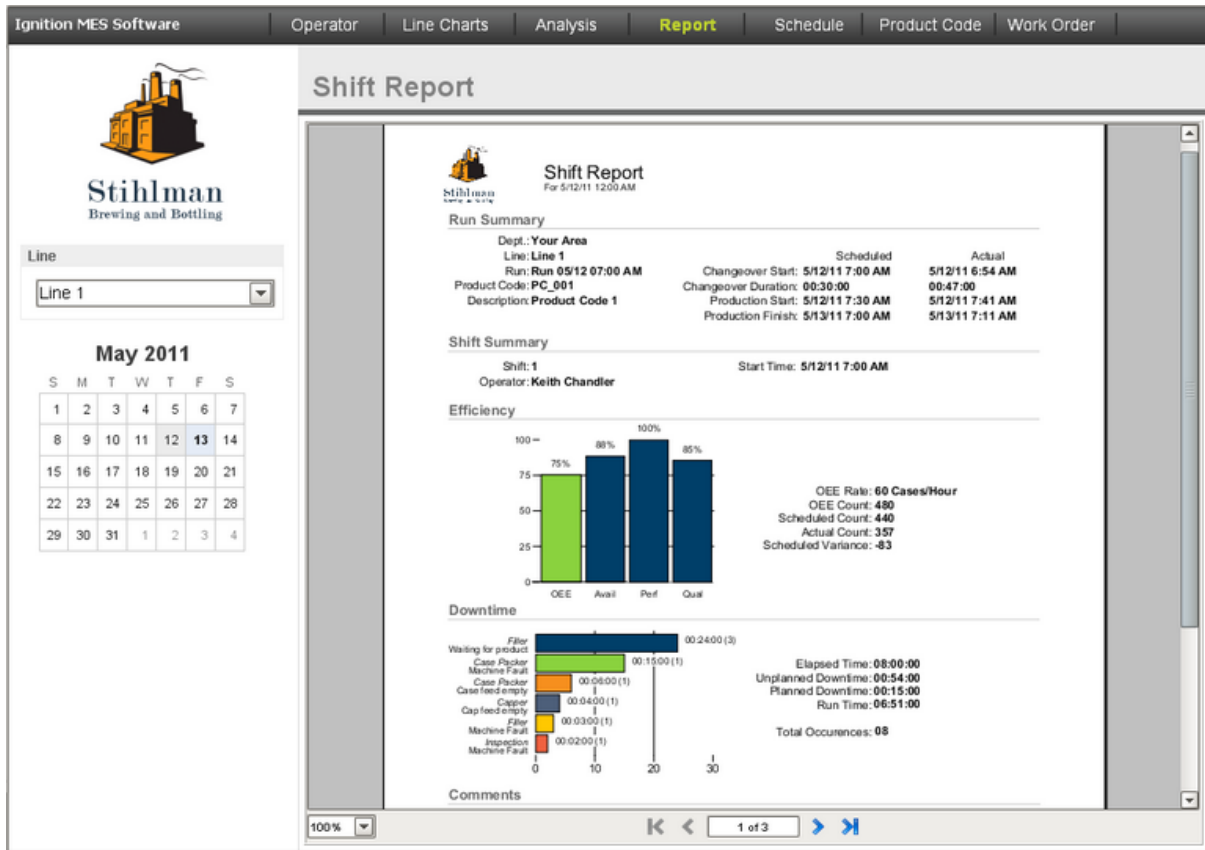


Drill Down Example 3

## 2.2.7 Report Screen

This is a very basic sample report that shows downtime information for a *line* during a given date range. It can be expanded to include much more information. It is built using the Ignition Reporting Module and presents data provided by the OEE Downtime and Scheduling module. All the flexibility of how data is presented in the analysis screen is also available in reports and multiple analysis results can be included in reports.

In addition to viewing reports in a screen, they can be printed, saved to PDF, HTML or image.



Sample Report

## 2.3 Dashboard

Enter topic text here.

### 2.3.1 Line Charts

Enter topic text here.

## 2.4 Production Model

A production model defines your manufacturing or process in tree view form. It enables an organized manor to easily configure, control and analysis your facility. See Production Model for more detailed information.

### 2.4.1 Production Item Settings

#### General Settings

When you click on the "Your Site" production item in the production model, there are settings that are accessible in the open workspace. By clicking the the **General** tab, the

current general settings are visible and can be changed. As shown below the *Default Shift Start Time* settings are visible and can be changed.

**Your Site**  
Site Production Item

General OEE Downtime **Schedule** Advanced

Enabled: ☒

Description:

Shift 1: Default Enabled ☒ Default Start Time 7:00 AM

Shift 2: Default Enabled ☒ Default Start Time 3:00 PM

Shift 3: Default Enabled ☒ Default Start Time 11:00 PM

**Default Shift Start Time Settings**

When configuring a production *Area* the Shift Start Times can be inherited from the production *Site* or overridden. The same is true for production *Lines*.

### Workday Routine Settings

From the **Schedule** tab, daily activities that are considered *scheduled downtime* can be entered. This includes activities such as breaks, meals, safety meetings, etc. When production runs are scheduled they are scheduled around these activities.

**Your Site**  
Site Production Item **Save project to make production changes active.**

General OEE Down Time **Schedule** Advanced

Workday Routine:

Name	Start Time	End Time
Graveyard shift break 1	1:00 AM	1:15 AM
Graveyard shift meal	3:00 AM	3:30 AM
Graveyard shift break 2	5:00 AM	5:15 AM
Day shift break 1	9:00 AM	9:15 AM
Day shift meal	11:00 AM	11:30 AM
Day shift break 2	1:00 PM	1:15 PM
Swing shift break 1	5:00 PM	5:15 PM
Swing shift meal	7:00 PM	7:30 PM
Swing shift break 2	9:00 PM	9:15 PM

**Workday Routine List**

These settings can be inherited or overridden by a production *Area*. A production *Line* can in turn inherit or override the entries from the production *Area*.

## OEE Settings

For OEE values to be calculated, production data is needed. This is configured by clicking on the **OEE** tab and configuring the system to collect production counts. True OEE calculations use product infeed counts to determine OEE Performance. The production outfeed is used to determine waste which affects OEE Quality. At a minimum, a product outfeed for the production *line* must be configured, but for more accurate results, a product infeed should be configured as well.

**Line 1**  
Line Production Item

General OEE Downtime Schedule Advanced

Auto Calc Waste: ☐

Primary Infeed: Line Infeed

Product Infeed:

Name	Count SQLTag	Max Raw Count	Productions Units
Line Infeed	Line 1/PLC/Filler/Infeed	32768	Bottles

Primary Outfeed: Line Outfeed

Product Outfeed:

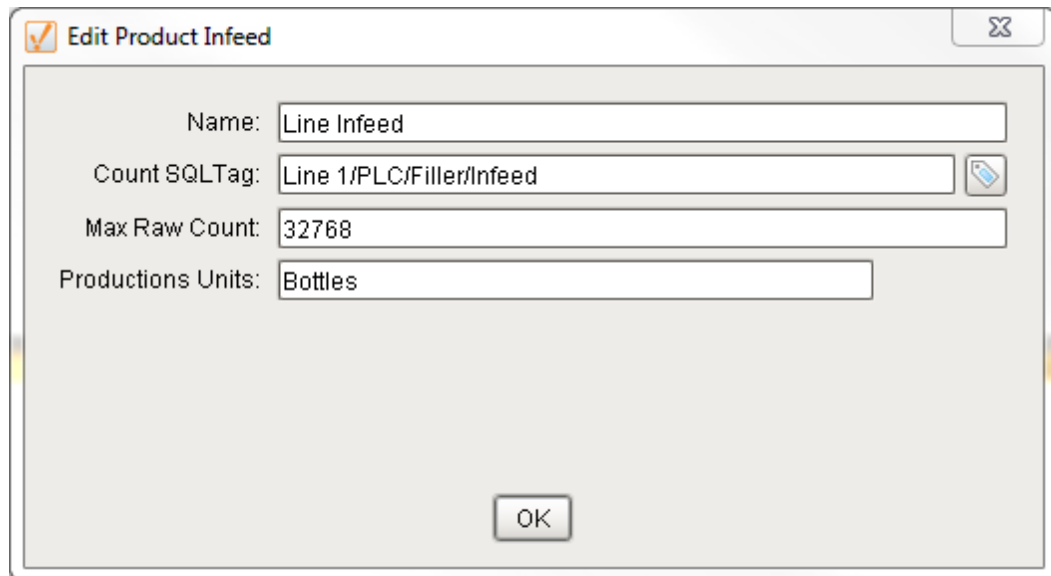
Name	Count SQLT...	Max Raw Co...	Default Stan...	Default Pack...	Standard Ra...	Production ...	Waste Tran...
Line Outfeed	Line 1/PLC/...	32768	60.0	10.0	Hour	Cases	120

Product Waste:

Name	Count SQLTag	Max Raw Count
Rejector	Line 1/PLC/RejectorCount	32768

**Line OEE Settings**

Optionally, each cell can be configured with product outfeed and infeeds. This will enable OEE data to be calculated for each cell as well as the production *line*.



**Product Infeed Settings**

The Count SQL Tag property is set to the Ignition SQLTag that will provide infeed production counts. This is typically from a PLC, but can be from a barcode scanner, database or other source. The programming required in the PLC is simplified greatly because no handshaking or start of resets are required. In the PLC, the counter can simply rollover from the maximum value of a counter back to 0 and continue counting. The OEE module tracks the production count at the start of the run and all rollovers. This tracking is even maintained during power outages.

### Downtime Settings


The OEE Downtime and Scheduling module uses a single numeric value, typically read from a PLC, to determine the current state. This applies to both a production *line* or production cells of a *line*. If the state value is 0, it is considered that the *line* or cell is idle and if it is 1, it is considered the *line* or cell is running. State values 2 on up (typically to 32767), are user defined and can be automatically detected or can be tied to an operator selectable downtime reason.

Below is a list containing sample downtime reasons. Notice the **Record Downtime**, **Planned Downtime** and **Operator Selectable** columns. If the **Record Downtime** option is true, then downtime events with this reason will be treated as unplanned downtime. This allows for downtime reasons such as *outfeed backup* to not be counted as unplanned downtime. If the **Planned Downtime** option is true, then downtime events with this reason will be treated as planned downtime.

**Filler**  
Cell Production Item

General OEE Downtime Schedule Advanced

Log Downtime Details: ☐

State SQLTag:  

Downtime Reasons:

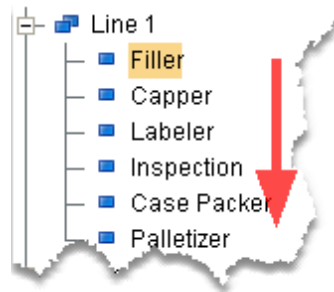
Reason Name	Reason Code	Record Downtime	Planned Downtime	Operator Selectable
Break	101	false	true	true
Clear out product ja...	22	true	false	true
Machine Fault	3	true	false	false
Meal	100	false	true	true
Outfeed Backup	4	false	false	false
Planned Shutdown	99	false	true	true
Scale fault	8	true	false	false
Scales maintenance	20	true	false	true
Stop	0	true	false	false
Waiting for product	6	true	false	false

Cell Downtime List

Downtime tracking can be done three different methods. The first two methods focus on the primary reason the production *line* is not producing product. The third method tracks all downtime for production cell regardless of whether it caused production loss for the *line*.

In cases where there is a single PLC controlling the production *line*, downtime events can be read from a single numeric value representing the *line* state. The State SQLTag and downtime reasons are configured in the production *line*.

It is common that each cell of a production *line* has its own PLC. To set up communication between the PLC and a master PLC, and to add the logic to determine the cause of why production *line* is not producing product is a complex process; however, the OEE Downtime module eliminates this complexity with a feature called **Use Key Reason Detection**. When this option is selected on the **Downtime** tab for a *line*, the module will determine the primary cause as to why the *line* is not producing product. This method uses the flow of the *line* to determine the cause for the *line* not being able to product product. It also assumes there is a primary cell that, if down, will cause the *line* to stop producing product. If the first cell is down for a reason that is not configured as *Record Downtime*, the next cell will be checked. If it is down for a reason that is configured as *Record Downtime*, then it will be assigned as *line* downtime cell and reason. When the second cell that caused the *line* downtime restarts but the first cell has not started yet because its discharge is still backed up, then the original cell and reason will still be the cause until the first cell restarts.




Flow of Key Reason Detection

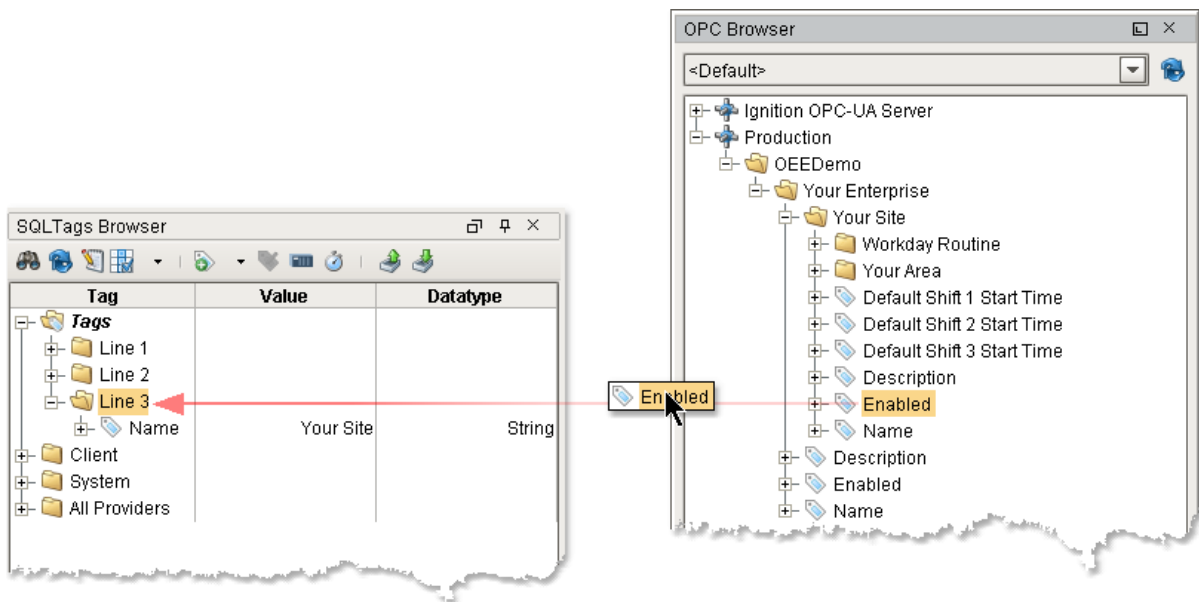
## 2.4.2 Adding Production Items

New production model items can be added by right clicking on the parent item. A popup menu with the available options will appear. For example, right clicking on the "Your Area" production item, then clicking on the **New Production Item > New Production Line** menu item will add a new *line* below "Your Area."



Adding A New Production Line

After production items are added, their OEE downtime and scheduling configuration settings and runtime values are available for use in Ignition windows, transaction groups, scripting, etc. Before values from the Production OPC Server can be used, they must be added to the Ignition SQLTags. This is done in the designer by selecting the SQLTags Browser and clicking on the  icon. This will cause the OPC Browser to appear. Next, drill down in the **Production** node within the OPC Browser. Drag any of the Production OPC Values over to the SQLTags Browser as depicted below.



Add Production OPC Server Values to SQLTags

## 2.5 Configuration

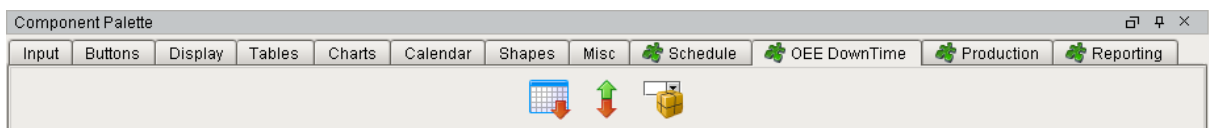
Because the OEE Downtime and Scheduling Module is built on the Ignition platform, configuration is done using the Ignition Designer.

### 2.5.1 Components

In addition to the components that come with Ignition, the OEE Downtime and Scheduling Module provides additional components that make implementing an OEE, downtime and scheduling system easier. These components greatly reduce, or in some cases eliminate, the need for custom SQL statements and scripting.

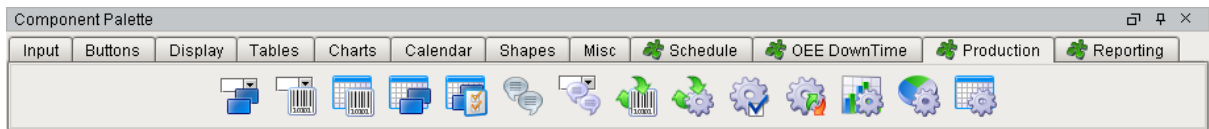


Schedule Components




OEE and Downtime Components





Production Components

For example the Production Line Selector component , allows users to select a production *line*. When a new production *line* is added to the system, it will automatically appear in the list as shown below. No SQL statements, script or configuration is needed.

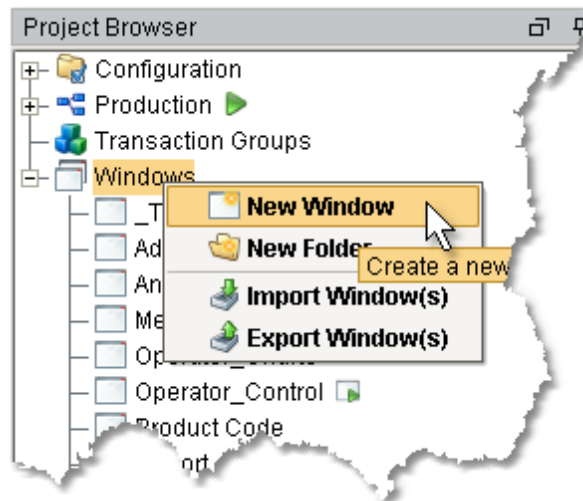


Production Line Selector Component

If the functionality of the components that come with OEE Downtime and Scheduling Module does not meet the project requirements, you can still use custom SQL statements, customer script and the standard Ignition components.

## 2.5.2 Creating a Screen

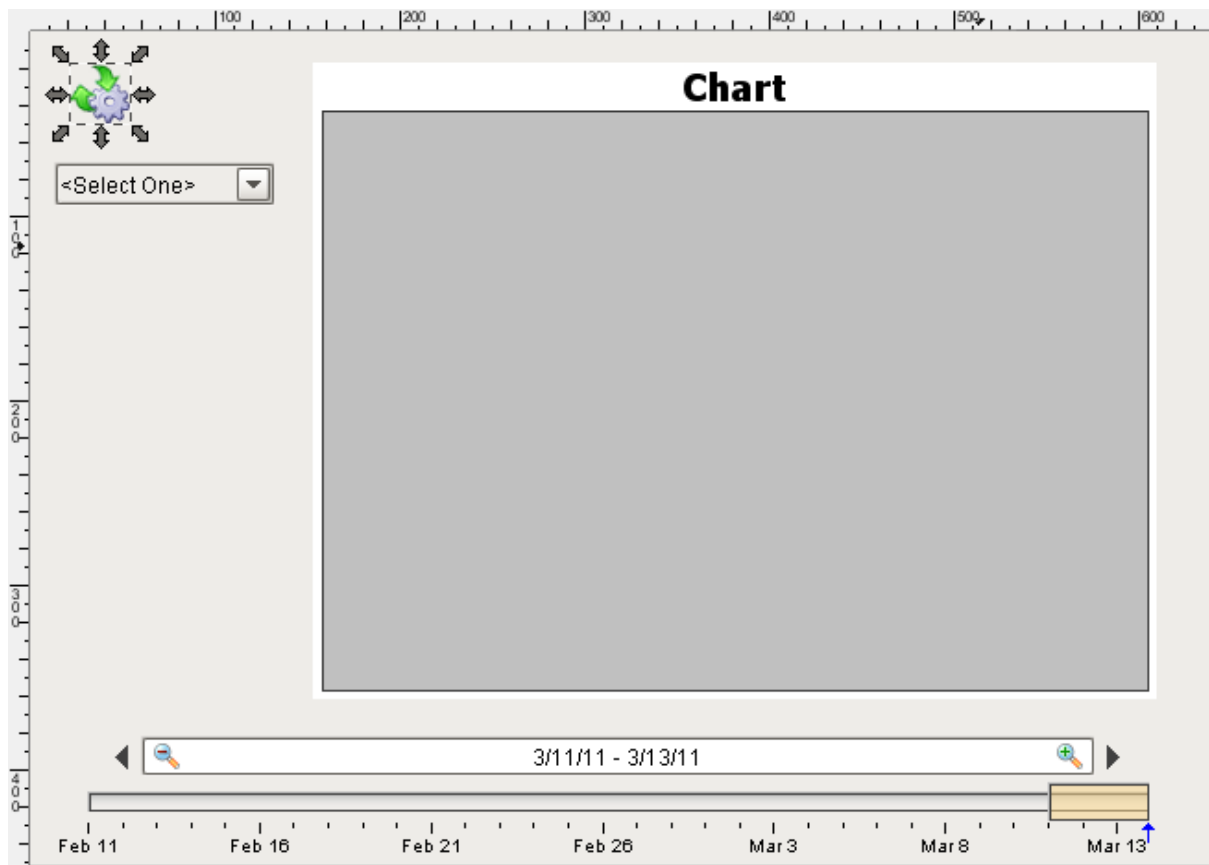
To add a new window in Ignition, right-click on the **Windows** node in the Project Browser and select the New Window menu item.



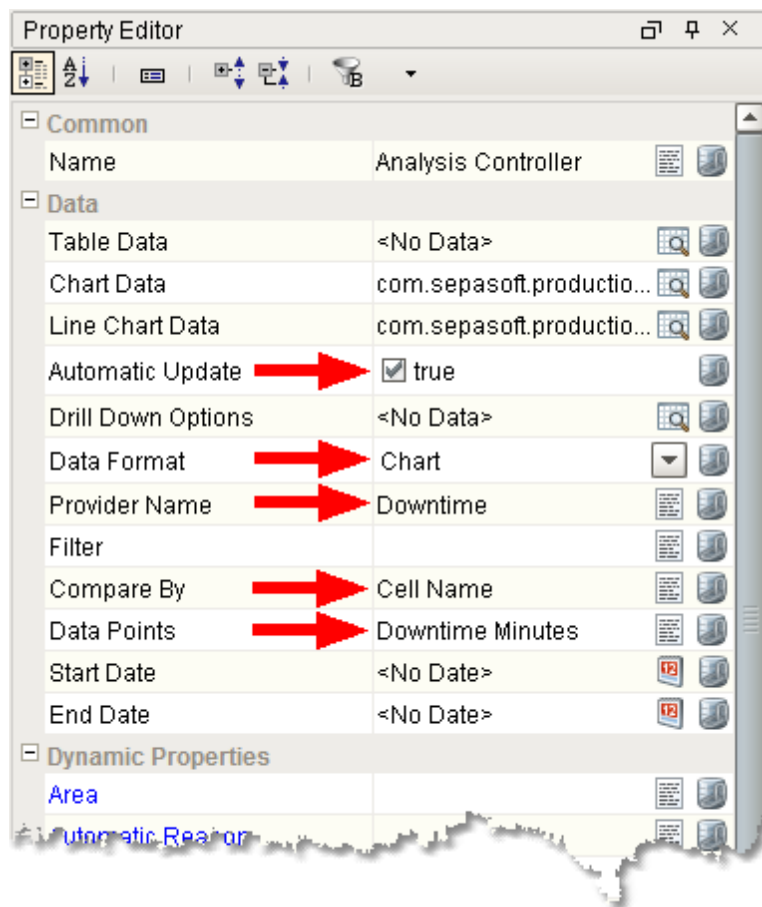
Adding a New Window

A new blank window will appear. Here is an example of a window you can create in Ignition.

First, drag a Analysis Controller, Production Line Selector, Production Bar Chart and Date Range components onto the new window as shown below.




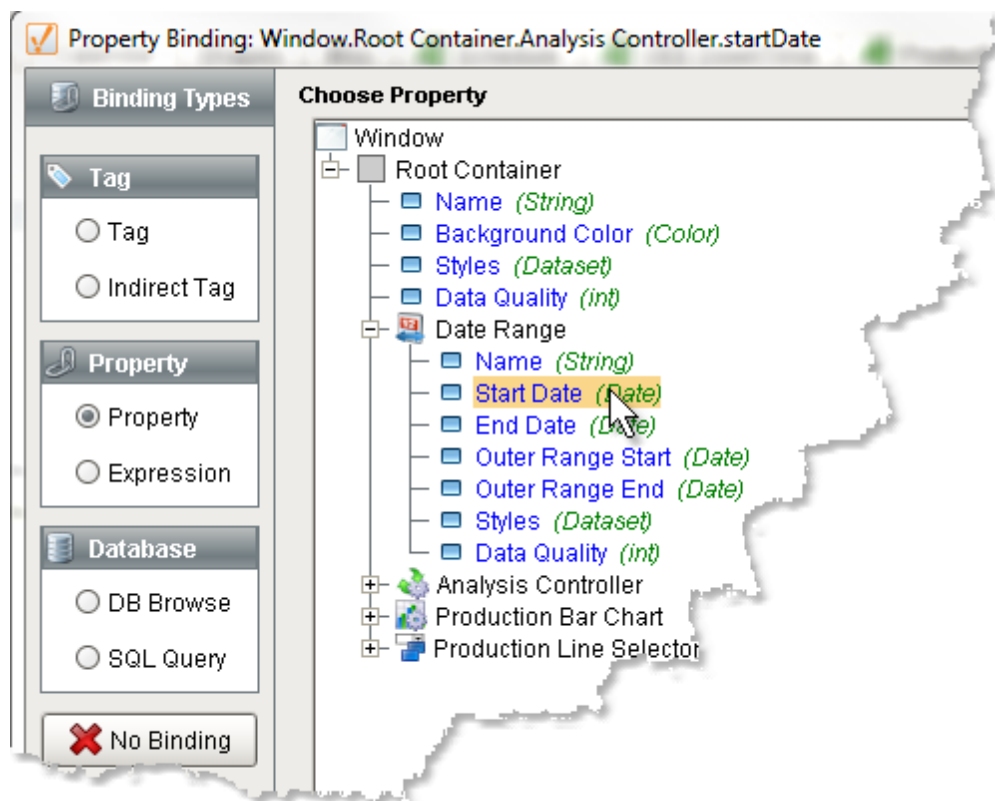
With the Analysis Controller selected, enter in the properties as shown below.



Property Editor


Now we will bind the date properties of the Analysis Controller component to the Date Range date properties. This will allow the user to select the date range that will affect the analysis results.

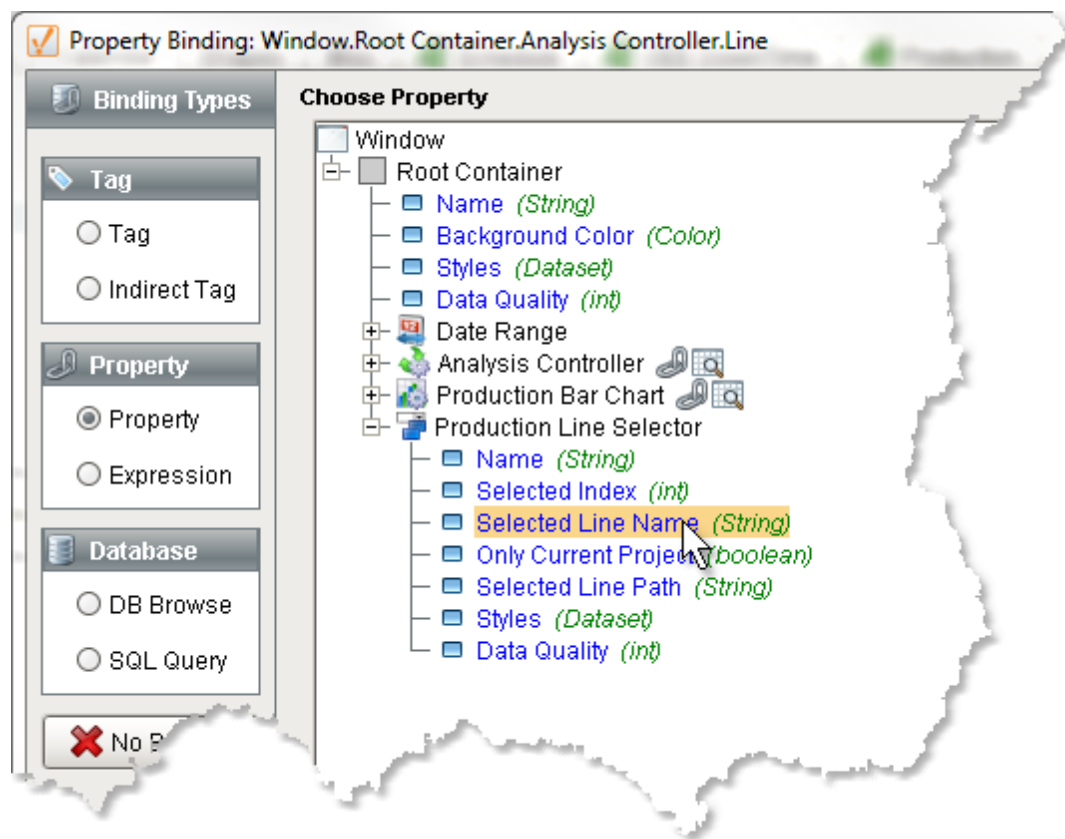
Do so by clicking the  for the Start Date property, select **Property** binding type, navigate to the Date Range component and select Start Date property as shown below. Then click on the **OK** button.




Property Selector

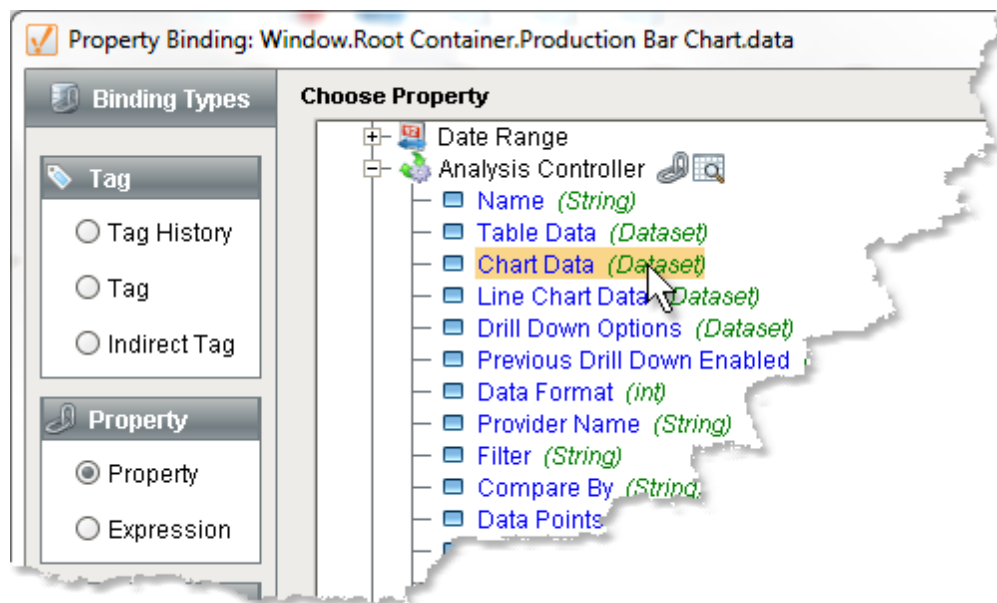
Do the same for the End Date property, but select the End Date property of the Date Range component.

To allow the users to filter the analysis results by production *line*, we need to bind the Analysis Controller Line filter property to the Production Line Selector component. Click on the  for the Line property, select **Property** binding type, navigate to the Production Line Controller component and select Selected Line Name property as shown below. Click the **OK** button.




Property Selector

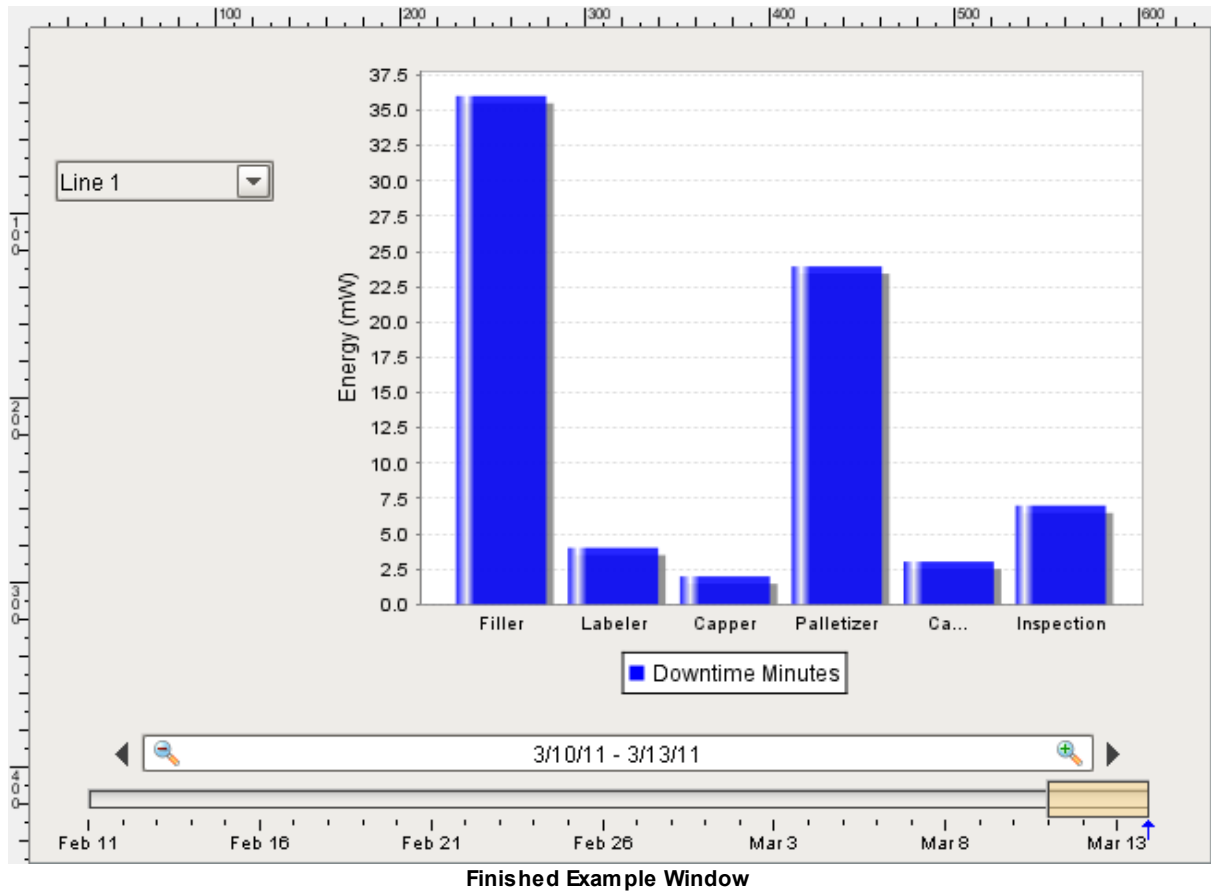
Now, click the Production Bar Chart on the new window. Next click the  for the Data property, select **Property** binding type, navigate to the Analysis Controller component and select the Chart Data property as shown below. Click the **OK** button.



Property Selector

To test, click on the preview button . This will allow use to use the screen as a user.

Select "Line 1" in the Production Line Selector component and you should see result as shown below.



Go ahead and play with the selected *line* and date range.

# Configuration

## Part III

## 3 Configuration

There are two areas to configure the OEE, Downtime and Scheduling module. The first area is in the Ignition Gateway and affects all MES Modules.

The second is in the Ignition Designer and is used to configure production models, user screens and the like. These settings are saved in an Ignition project and can be backed up and restored using the built-in project backup and restore features of Ignition.

### 3.1 MES Module Configuration

The OEE, Downtime and Scheduling is just one of the MES (Manufacturing Execution System) modules that has settings which can be set.

#### 3.1.1 Datasource Settings

OEE, downtime and schedule data is stored in databases external to Ignition. These database(s) are setup in the gateway configuration section by selecting the **Databases>Connections** section from the left-hand configuration menu in Ignition. See the Ignition documentation for more information on setting up a database connection.

Below shows a typical database connection that is required for the OEE, Downtime and Scheduling module.

#### Database Connections

Name	Description	JDBC Driver	Translator	Status	
ProductionDB		Microsoft SQLServer JDBC Driver	MSSQL	VALID	edit delete

→ [Create new Database Connection...](#)

**Note:** For details about a connection's status, see the [Database Connection Status](#) page.

#### Sample Database Connection

To change the MES module settings, go to the configuration section in the gateway and select the **MES Modules>Settings** section from the left-hand side configuration menu.

Once a database connection is created, and if only one database connection exists, then it will be automatically selected to be used by the MES modules.

If more than one database connection exists, then the desired database connection can be selected to be used by the MES modules as shown below.



## MES Module Settings

Runtime Datasource	
Runtime Database	<div>ProductionDB ▾</div> <p>The database connection to store runtime production data.</p>
Data Retention Duration	<div>30</div> <p>Number of days to retain runtime production data.</p>

Analysis Datasource	
Analysis Database	<div>ProductionDB ▾</div> <p>The database connection to store historical analysis production data to. Multiple sites can be set to the same analysis database to allow enterprise reporting.</p>

Save Changes

MES Module Settings Page

### Runtime Database

The runtime database is where production and downtime data is stored during a production run. During a production run data is logged every minute or partial minute if a downtime event occurs, so a larger amount of data is stored in the runtime database.

### Data Retention Duration

This setting specifies the number of days to retain the data in the runtime database after a production run has completed. The default setting is 30 days. This allows for viewing current and past production run information, down to the minute, for the past 30 days.

### Analysis Database

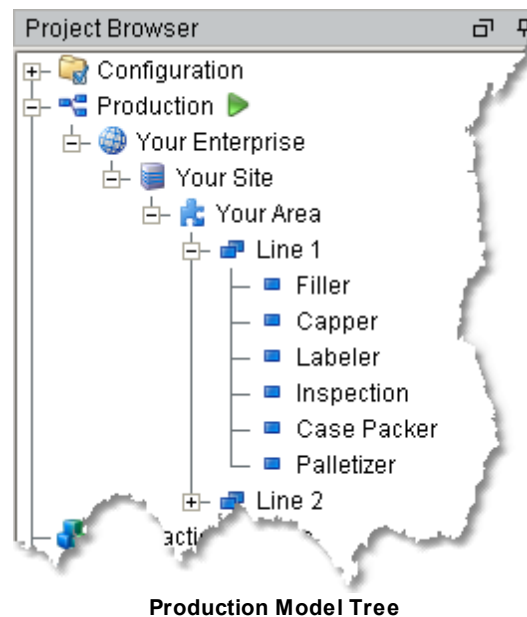
The analysis database is where summarized production and downtime data is saved. For single production *site* installations, this can be set to the same database as the runtime database. For multi-production *site* installations, all *sites* must set the analysis database to the same database to allow for *enterprise* analysis and reporting.

## 3.2 Production Model Configuration

A production model defines your manufacturing or process in tree view form. It provides an organized way to easily configure, control and analyze your facility. It starts with your *enterprise*, which represents your company, and continues down to the *site* (physical location), *area*, *line* and *cells*.

### 3.2.1 Production Module

The production model is configured within the Ignition designer and is accessed by selecting the "Production" folder in the project browser. From here your *enterprise*, *site*, *area(s)*, *line(s)* and *cell(s)* can be added, renamed and deleted.



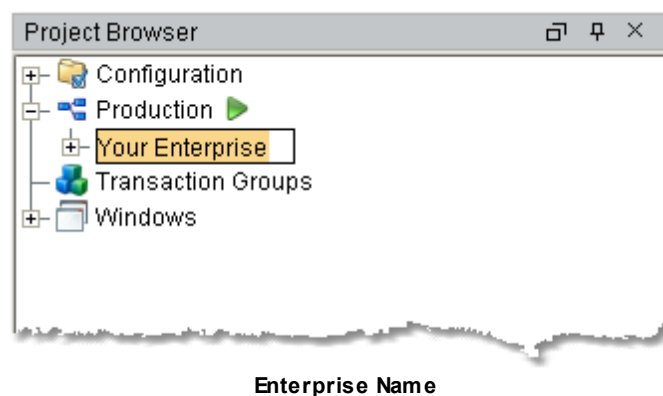
### 3.2.1.1 Enterprise Configuration

#### Adding an Enterprise

To add your *enterprise*, right-click on the "Production" folder in the project browser and select the **New Production Item > New Production Enterprise** menu item. An *enterprise* named "New Enterprise" will be added to the "Production" folder.

#### Renaming an Enterprise

To rename it to the name of your *enterprise*, right-click on it and select **Rename**, then enter the new name.



#### Deleting an Enterprise

To remove an existing *enterprise*, right-click on the *enterprise* item and select the **Delete** menu item. A window will appear confirming that you permanently want to delete the production *enterprise*. Please note that the *site*, *area(s)*, *line(s)* and *cell(s)* underneath the *enterprise* will also be permanently removed.

## General Enterprise Settings

For the *enterprise*, there are only general settings. These settings are accessed by selecting the *enterprise* item contained in the "**Production**" folder in the project browser and then selecting the "General" tab as shown below.



Enterprise General Settings

**Enabled** By default, added *enterprises* are enabled. It can be disabled by unchecking the Enabled setting and saving the project. This will stop the OEE, downtime and scheduling module from executing the *enterprise*, the *site* and all *area(s)*, *line(s)* and *cell(s)* that are underneath it.

**Description** This is an optional description and is just for your reference.

### 3.2.1.2 Site Configuration

#### Adding a Site

To add your *site*, right-click on your *enterprise* folder in the project browser and select the **New Production Item > New Production Site** menu item. A *site* named "New Site" will be added to the *enterprise* folder.

#### Renaming a Site

To rename it to the name representing the *site*'s physical location, right-click on it and select **Rename**, then enter the new name.

#### Deleting a Site

To remove an existing *site*, right-click on the *site* item and select the **Delete** menu item. A window will appear confirming that you permanently want to delete the production *site*. Please note that the *area(s)*, *line(s)* and *cell(s)* underneath the *site* will also be

permanently removed.



New Site

## General Site Settings

These settings are accessed by selecting the *site* item contained in the *enterprise* folder in the project browser, and then selecting the "General" tab.

**Enabled** By default, added *sites* are enabled. It can be disabled by un-checking the Enabled setting and saving the project. This will stop the OEE, downtime and scheduling module from executing the *site* and all *area(s)*, *line(s)* and *cell(s)* that are underneath it.

**Description** This is an optional description and is just for your reference.

### Shift 1:

**Default Enabled** If checked, shift 1 will be included during scheduling. If not checked, shift 1 will be scheduled around.

**Default Start Time** The time of day that first shift starts. The first shift ends at the start of second shift.

### Shift 2:

**Default Enabled** If checked, shift 2 will be included during scheduling. If not checked, shift 2 will be scheduled around.

**Default Start Time** The time of day that second shift starts. The second shift ends at the start of third shift.

### Shift 3:

**Default Enabled** If checked, shift 3 will be included during scheduling. If not checked, shift 3 will be scheduled around.

**Default Start Time** The time of day that third shift starts. The third shift ends at the start of first shift.

*Note: The shift enabled and shift start times are the default for your production site and can be overridden by the production area and/or production line.*

## Schedule Settings

These settings are accessed by selecting the *site* item contained in the *enterprise* folder in the project browser and then selecting the "Schedule" tab as shown below. See Workday Routines for more information.

**Your Site**

Site Production Item **Save project to make production changes active.**

General OEE Down Time **Schedule** Advanced

Workday Routine:

Name	Start Time	End Time
Grave Shift Night Break	1:00 AM	1:15 AM
Day Shift Meal Break	12:00 PM	12:30 PM
Swing Shift Morning Break	6:00 AM	6:15 AM
Swing Shift Meal Break	8:00 PM	8:30 PM
Day Shift Morning Break	9:00 AM	9:15 AM
Grave Shift Meal Break	3:00 AM	3:30 AM
Swing Shift Evening Break	5:00 PM	5:15 PM
Day Shift Afternoon Break	2:00 PM	2:15 PM
Swing Shift Night Break	10:00 PM	10:15 PM

Site Workday Routing List

**Workday Routine Entry**

See the Workday Routines section for more information.

*Note: The workday routine entries are the default for your production site and can be overridden by the production area and/or production line.*

**3.2.1.3 Area Configuration****Adding an Area**

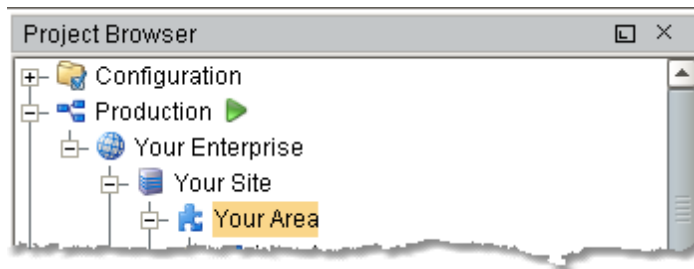
To add a production *area*, right-click on your *site* folder in the project browser and select the **New Production Item > New Production Area** menu item. An *area* named "New Area" will be added to the *site* folder. Multiple production *areas* can be added to your production *site*. Each *area* can represent a physical or logical production *area* within your production *site*. Some examples of production *areas* are: packaging, cracking, filtration, fabrication, etc.

**Renaming an Area**

To rename it to the name representing the production *area*, right-click on it and select **Rename**, then enter the new name.

**Deleting an Area**

To remove an existing production *area*, right-click on the *area* item and select the **Delete** menu item. A window will appear confirming that you permanently want to delete the production *area*. Please note that the *line(s)* and *cell(s)* underneath the *area* will also be permanently removed.



New Area

### Area General Settings

These settings are accessed by selecting the desired *area* item contained in the *site* folder in the project browser and then selecting the "General" tab.

**Enabled** By default, added *areas* are enabled. It can be disabled by un-checking the Enabled setting and saving the project. This will stop the OEE, downtime and scheduling module from executing the *area* and all *line(s)* and *cell(s)* that are underneath it.

**Description** This is an optional description and is just for your reference.

#### Shift 1

**Default Enabled** If checked, shift 1 will be included during scheduling. If not checked, shift 1 will be scheduled around. To inherit the shift enabled from the from the *site*, select the "Inherit From Parent" option.

**Default Start Time** The time of day that first shift starts. The first shift ends at the start of second shift. To inherit the time of day that first shift starts setting from the *site*, select the "Inherit From Parent" option.

#### Shift 2

**Default Enabled** If checked, shift 2 will be included during scheduling. If not checked, shift 2 will be scheduled around. To inherit the shift enabled from the from the *site*, select the "Inherit From Parent" option.

**Default Start Time** The time of day that second shift starts. The second shift ends at the start of third shift. To inherit the time of day that second shift starts setting from the *site*, select the "Inherit From Parent" option.

#### Shift 3

**Default Enabled** If checked, shift 3 will be included during scheduling. If not checked, shift 3 will be scheduled around. To inherit the shift enabled from the from the *site*, select the "Inherit From Parent" option.

**Default Start Time** The time of day that third shift starts. The third shift ends at the start of first shift. To inherit the time of day that third shift starts setting from the *site*, select the "Inherit From Parent" option.

*Note: The shift start times are the default for your production site and can be overridden by the production area and/or production line.*

### Area Schedule Settings

These settings are accessed by selecting the *area* item contained in the *site* folder in the

project browser and then selecting the "Schedule" tab as shown below. See the Site Schedule Settings section for more information on workday routines.

If no *area* workday routine entries are entered, then they will be inherited from the production *site* as shown below.

**Your Area**  
Area Production Item **Save project to make production changes active.**

General OEE Down Time **Schedule** Advanced

Workday Routine:

Name	Start Time	End Time
The workday routine will be inherited from the parent item.		

**Area Workday Routine List**

### Workday Routine Entry

See the Workday Routines section for more information.

*Note: The workday routine entries are the default for your production area and can be overridden by the production line.*

#### 3.2.1.4 Line Configuration

##### Adding a Line

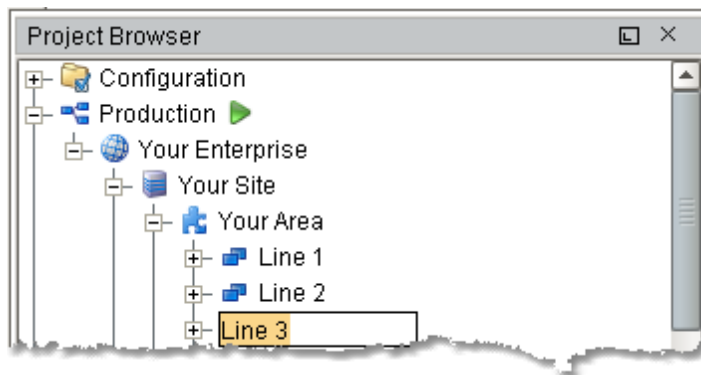
To add a production *line*, right-click on an *area* folder in the project browser and select the **New Production Item > New Production Line** menu item. A *line* named "New Line" will be added to the *area* folder. Multiple production *lines* can be added to a production *area*.

##### Renaming a Line

To rename it to the name representing the production *line*, right-click on it and select **Rename**, then enter the new name.

##### Deleting a Line

To remove an existing production *line*, right-click on the *line* item and select the **Delete** menu item. A window will appear confirming that you permanently want to delete the production *line*. Please note that the cell(s) underneath the *line* will also be permanently removed.



New Line

### Line General Settings

These settings are accessed by selecting the desired *line* item contained in the *area* folder in the project browser and then selecting the "General" tab.

<b>Enabled</b>	By default, added <i>lines</i> are enabled. It can be disabled by un-checking the Enabled setting and saving the project. This will stop the OEE, downtime and scheduling module from executing the <i>line</i> and <i>cell(s)</i> that are underneath it.
<b>Description</b>	This is an optional description and is just for your reference.
<b>Shift 1</b>	
<b>Default Enabled</b>	If checked, shift 1 will be included during scheduling. If not checked, shift 1 will be scheduled around. To inherit the shift enabled from the from the <i>area</i> , select the "Inherit From Parent" option.
<b>Default Start Time</b>	The time of day that first shift starts. The first shift ends at the start of second shift. To inherit the time of day that first shift starts setting from the <i>area</i> , select the "Inherit From Parent" option.
<b>Shift 2</b>	
<b>Default Enabled</b>	If checked, shift 2 will be included during scheduling. If not checked, shift 2 will be scheduled around. To inherit the shift enabled from the from the <i>area</i> , select the "Inherit From Parent" option.
<b>Default Start Time</b>	The time of day that second shift starts. The second shift ends at the start of third shift. To inherit the time of day that second shift starts setting from the <i>area</i> , select the "Inherit From Parent" option.
<b>Shift 3</b>	
<b>Default Enabled</b>	If checked, shift 3 will be included during scheduling. If not checked, shift 3 will be scheduled around. To inherit the shift enabled from the from the <i>area</i> , select the "Inherit From Parent" option.
<b>Default Start Time</b>	The time of day that third shift starts. The third shift ends at the start of first shift. To inherit the time of day that third shift starts setting from the <i>area</i> , select the "Inherit From Parent" option.
<b>Additional Factors</b>	Additional Factors are user defined data points that are logged along with the production and downtime information. Once they are logged, they can be shown in charts, tables and reports. Additionally, other analysis



can be done by filtering and/or setting up comparisons by their values.

Any value that can be read from an Ignition SQLTag can be added as a additional factor. This includes, values from barcode readers, databases, calculations, PLCs, or values derived from scripts, etc.

Example: An additional factor named cardboard manufacturer can be added. The operator can select the manufacturer that provided the cardboard or it can be obtained from some other source. Now, OEE and downtime results can be shown for each cardboard manufacturer. This can identify quality problems with raw material that directly affect efficiencies.

Below is an example of an operator additional factor. The operators name will be logged along with the production and downtime data. By doing so, OEE and downtime information can be filtered and grouped by the operator name.

**Line 1**  
Line Production Item

General | OEE | Down Time | Schedule | Advanced

Enabled: ☒

Description: Line 1 Description

Shift 1 Start Time: Inherit From Parent

Shift 2 Start Time: Inherit From Parent

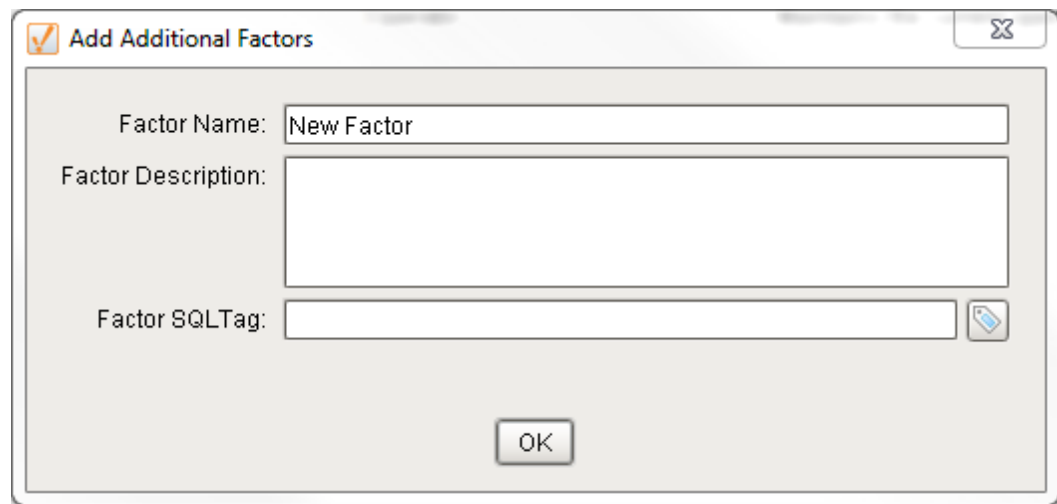
Shift 3 Start Time: Inherit From Parent

Additional Factors:	Factor Name	Factor Description	Factor SQLTag
	Operator	Maintains the current operator for the run. Other use...	Line 1/Run/Operator

Additional Factor List

### Adding an Additional Factor

To add an additional factor, right-click anywhere on the additional factor table and select the **New** menu item. A dialog box will appear to allow entry of a new additional factor as shown below.



Additional Factor Settings

### Factor Name

The required name of the additional factor is used to reference one additional factor from another. You can have any number of additional factors, but user usability will be hindered if too many are added. This is because the additional factors are added to user menus and if too many are added, the menus can become too long and confuse the end user.

The name given to an additional factor should be meaningful to the end user. Again, this is because additional factors appear in menus allowing the end user to filter and group analysis and report data by them.

### Factor Description


The optional description is just for reference or to keep internal notes about the additional factor.

### Factor SQLTag

The required SQLTag is the source of the data value that will be logged. It is an Ignition SQLTag and the values can come from a PLC, a database query, other device in the field such as a barcode reader, expression, user input, or script. This opens the door to mesh any type of outside data into the MES module analysis and reporting.

Any type (format) of data that can be stored in an SQLTag can be logged. If SQLTag value is a string, then the end user can filter and group by the additional factor. If the SQLTag is a number, the option to filter and group by the additional factor will not be shown to the end user.

The SQLTag can be manually typed or pasted into the Factor SQLTag edit box.

Optionally, clicking on the  icon will display a browser where a SQLTag can be selected.

### Editing an Additional Factor

To edit an existing additional factor, right-click on the desired entry in the additional factor table and select the **Edit** menu item. A dialog box similar to the add dialog box will appear, allowing editing of the additional factor.

### Deleting an Additional Factor

To remove an existing additional factor entry, right-click on the desired entry in the additional factor table and select the **Delete** menu item. A window will appear confirming that you want to remove the additional factor. The additional factor will no longer be logged. However, any production runs that occurred before the additional factor was deleted, will still show in the analysis and reporting.

### Line Schedule Settings

These settings are accessed by selecting the *line* item contained in the *area* folder in the project browser and then selecting the "Schedule" tab as shown below. See the Site Schedule Settings section for more information on workday routines.

If no *area* workday routine entries are entered, then they will be inherited from the production *area* as shown below.

The screenshot shows a software window titled "Line 1" with the subtitle "Line Production Item". It has five tabs: "General", "OEE", "Down Time", "Schedule" (which is selected and highlighted with a yellow border), and "Advanced". Below the tabs, there is a section labeled "Workday Routine:" followed by a table with three columns: "Name", "Start Time", and "End Time". The table is currently empty and contains a large, light gray text overlay that reads: "The workday routine will be inherited from the parent item."

Line Workday Routine List

### Workday Routine Entry

See the Workday Routines section for more information.

### Other Line Schedule Settings

<b>Default Schedule Rate</b>	This default production rate used for scheduling purposes. Because the standard production rate is typically not achieved, a scheduling rate is used when determining the work order finish time during scheduling. The actual scheduling rate used is determined from the product code and <i>line</i> that is being scheduled.
<b>Schedule Rate Period</b>	The period of time used for the scheduling rate. The options are Hour and Minute.
<b>Auto Start Schedule Entries</b>	If true, the scheduled entries on the calendar will automatically start at the scheduled time. If false, scheduled entries can be chosen out of order and started manually, typically by the operator clicking the <b>Start</b> button.

- Auto Start** Determines the behaviour when the change over time has expired. If **Production After Changeover** is true, the production run will automatically start. If the *line* is not running, then downtime will start being accumulated. If false, the production run must be started by some other means. Typically, this is done by the operator clicking the **Start** button but it can be accomplished by programmatically setting the *Enable Run* property for the *line*.
- Auto Schedule** If true, production runs will automatically be scheduled in the calendar. This does not include maintenance or other items that may be scheduled manually. If false, production runs will need to be scheduled manually as well.

### Line OEE Settings

The Line OEE settings are accessed by selecting the *line* item contained in the *area* folder in the project browser, and then selecting the "OEE" tab as shown below.

Before OEE calculations can be performed, production count information is required. At a minimum, the outfeed production count for a production *line* is needed. Additional production count information can be configured, which will result in more OEE calculations. For example, if the infeed production count is configured for a production, then product accumulation and waste can also be calculated. Also, OEE Performance uses items started vs. standard rate so that it is isolated from quality factors. When the infeed production count is not used and quality is being used, then quality will not be isolated from performance.

If a production *line* is configured for more than one infeed or outfeed, then accumulation and waste calculations will be performed for each combination. For example, a production *line* can be configured to track container, caps and product as infeeds, and a single outfeed of full containers. The independent waste calculations for containers, caps and production will be performed. See Production Count Tracking section for more information.

Below is an example showing a single infeed and outfeed configure for a production *line*.

**Line 1**  
Line Production Item

General OEE Downtime Schedule Advanced

Auto Calc Waste: ☐

Primary Infeed: Line Infeed

Product Infeed:

Name	Count SQLTag	Max Raw Count	Productions Units
Line Infeed	Line 1/PLC/Filler/Infeed	32768	Bottles

Primary Outfeed: Line Outfeed

Product Outfeed:

Name	Count SQLT...	Max Raw Co...	Default Stan...	Default Pack...	Standard Ra...	Production ...	Waste Tran...
Line Outfeed	Line 1/PLC/...	32768	60.0	10.0	Hour	Cases	120

Product Waste:

Name	Count SQLTag	Max Raw Count
Rejector	Line 1/PLC/RejectorCount	32768

Line OEE Settings

### Auto Calc Waste

Set the Auto Calc Waste setting based on the waste tracking method being used:

1. Check Auto Calc Waste when using the built-in algorithm based on the infeed count, outfeed count and transit time defined in the Product Outfeed.
2. Uncheck Auto Calc Waste when using the Run Waste Count OPC value for the *line*.
3. Uncheck Auto Calc Waste when using Product Waste counters.

See the section on Product Waste for more information on each method.

### Primary Infeed

The production *line* OEE waste is derived from the primary infeed. If a production *line* has been configured for multiple infeeds, select the infeed that is to be used for the waste calculation.

### Product Infeeds

For each infeed, the OEE module will start calculating production rate per minute or production rate per hour values. These values can be accessed through the Production OPC Server. See the section on Production OPC Values, and the section on Product Infeed for more information.

#### Adding a Product Infeed

See the section on Adding a Product Infeed for details on adding product infeed entries.

#### Editing a Product Infeed

See the section on Editing a Product Infeed for details on editing product infeed entries.

#### Deleting a Product Infeed

See the section on Deleting a Product Infeed for details on deleting product infeed

entries.

### Primary Outfeed

The production *line* OEE waste is derived from the primary outfeed. If a production *line* has been configured for multiple outfeeds, select the outfeed that is to be used for the waste calculation.

### Product Outfeeds

For each outfeed, the OEE module will start calculating production rate per minute, or production rate per hour values. These values can be accessed through the Production OPC Server. See the section on Production OPC Values for more information. See the section on Product Outfeed for more information.

#### Adding a Product Outfeed

See the section on Adding a Product Outfeed for details on adding product outfeed entries.

#### Editing a Product Outfeed

See the section on Editing a Product Outfeed for details on editing product outfeed entries.

#### Deleting a Product Outfeed

See the section on Deleting a Product Outfeed for details on deleting product outfeed entries.

### Product Waste

For each waste entry, the OEE module will start tracking true waste count values. These values can be accessed through the Production OPC Server. See the section on Production OPC Values for more information. See the section on Product Waste for more information.

#### Adding a Product Waste Entry

See the section on Adding a Product Waste Counter for details on adding product waste entries.

#### Editing a Product Outfeed

See the section on Editing a Product Waste Counter for details on editing product waste entries.

#### Deleting a Product Outfeed

See the section on Deleting a Product Waste Counter for details on deleting product waste entries.

### Line Downtime Settings

These settings are accessed by selecting the *line* item contained in the *site* folder in the project browser and then selecting the "Downtime" tab as shown below. Once downtime reasons have been added, the OEE, Downtime and Scheduling module will either check the list if the *line* stops running or allow the operator to select reason. See the section on Downtime Reasons for more information.

**Line 1**  
Line Production Item

General OEE Downtime Schedule Advanced

Downtime Detection Method: Initial Reason

State SQLTag:

Downtime Reasons:

Reason Name	Reason Code	Record Downtime	Planned Downtime	Operator Selectable
Disabled Shift	1010	false	true	true

Run Disabled Reason Code: 1010

Line Downtime Settings

### Downtime Detection Method

To determine the reason a production *line* or process is down, set the Downtime Detection Method setting:


1. Select **Initial Reason** to select the initial cell that is down as the reason the *line* is down.
2. Select **Key Reason** to select the first cell as they appear in order in the designer that is down as the reason the *line* is down.
3. Select **Line State** to ignore the cells and use the value of the State SQLTag that is configured for the *line*.

See the section on Downtime Reasons for more information on each method.

### State SQLTag

When the line state method of downtime detection is used, this means the SQLTag is to read the current state of the *line* or process. It is an Ignition SQLTag and the values can come from a PLC, a database query, other device in the field such as a barcode reader, an expression, user input, or script.

The data type (format) of the SQLTag containing the state must be a number. The SQLTag can be manually typed or pasted in to the Factor SQLTag edit box.

Optionally, clicking on the  icon will display a browser where a SQLTag can be selected.

### Downtime Reasons

#### Adding a Downtime Reason

See the section on Adding a Downtime Reason for details on adding downtime

reason entries.

#### **Editing a Downtime Reason**

See the section on Editing a Downtime Reason for details on editing downtime reason entries.

#### **Deleting a Downtime Reason**

See the section on Deleting a Downtime Reason for details on deleting downtime reason entries.

#### **Run Disabled Reason Code**

Anytime a production run is ended and then later resumed, this reason code will be used as a downtime reason. A downtime reason with the same reason code must exist in the downtime reason table. The reason can be set to planned or unplanned downtime to produce the desired results during analysis and reporting.

#### **Changeover Time Reason Code**

When changeover time is scheduled for a production run, but production does not begin when the changeover ends, this reason code will be used as a downtime reason. A downtime reason with the same reason code must exist in the downtime reason table. The reason can be set to planned or unplanned downtime to produce the desired results during analysis and reporting.

See the section on Downtime Reasons for more information.

### **3.2.1.5 Cell Configuration**

#### **Adding a Cell**

To add a production cell, right-click on a *line* folder in the project browser and select the **New Production Item > New Production Cell** menu item. A cell named "New Cell" will be added to the *line* folder. Multiple production cells can be added to a production *line*.

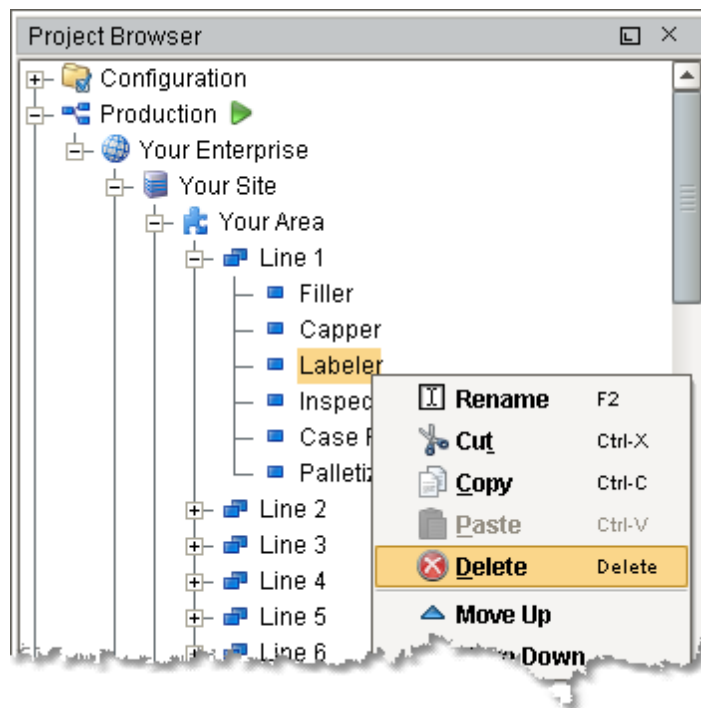
#### **Renaming a Cell**

To rename it to the name representing the production cell, right-click on it and select **Rename**, then enter the new name.

#### **Deleting a Cell**

To remove an existing production cell, right-click on the cell item and select the **Delete** menu item. A window will appear confirming that you permanently want to delete the production cell.





Deleting a Cell

### Cell General Settings

These settings are accessed by selecting the desired cell item contained in the *line* folder in the project browser and then selecting the "General" tab.

**Enabled** By default, added cells are enabled. It can be disabled by un-checking the Enabled setting and saving the project. This will stop the OEE, downtime and scheduling module from executing the cell.

**Description** This is an optional description and is just for your reference.

### Cell OEE Settings

The Cell OEE settings are accessed by selecting the cell item contained in the *line* folder in the project browser and then selecting the "OEE" tab as shown below.

For production cells, the OEE settings are optional and are only needed if you want to track efficiencies, waste or monitor production rate by individual production cells. It is also important to note that the OEE information is not required to track downtime for the cell.

Before OEE calculations can be performed, production count information is required. At a minimum, the outfeed production count for a production cell is needed if tracking OEE for it is desired. Additional production count information can be configured, which will result in more OEE calculations. For example, if the infeed production count is configured for a production, then product accumulation and waste is calculated.

If a production cell is configured for more than one infeed or outfeed, then accumulation and waste calculations will be performed for each combination. For example, a

production cell can be configured to track containers and caps as infeeds and a single outfeed of full containers. The independent waste calculations for containers and caps will be performed. See Production Count Tracking section for more information.

Below is an example showing a single infeed and outfeed configure for a production cell.

**Filler**  
Cell Production Item

General OEE Downtime Schedule Advanced

Auto Calc Waste: ☐

Primary Infeed:

Product Infeed:

Name	Count SQLTag	Max Raw Count	Productions Units

Primary Outfeed:

Product Outfeed:

Name	Count SQLT...	Max Raw Co...	Default Stan...	Default Pack...	Standard Ra...	Production ...	Waste Tran...

Product Waste:

Name	Count SQLTag	Max Raw Count

**Cell OEE Settings**

### Auto Calc Waste

Set the Auto Calc Waste setting based on the waste tracking method being used:

1. Check Auto Calc Waste when using the built-in algorithm based on the infeed count, outfeed count and transit time defined in the Product Outfeed.
2. Uncheck Auto Calc Waste when using the Run Waste Count OPC value for the *line*.
3. Uncheck Auto Calc Waste when using Product Waste counters.

See the section on Product Waste for more information on each method.

### Primary Infeed

The production cell OEE waste is derived from the primary infeed. If a production cell has been configured for multiple infeeds, select the infeed that is to be used for the waste calculation.

### Product Infeeds

For each infeed, the OEE module will start calculating production rate per minute, production rate per hour values. These values can be accessed through the Production OPC Server. See the section on Production OPC Values for more information. For the section on Product Infeed for more information.

### Adding a Product Infeed

See the section on Adding a Product Infeed for details on adding product infeed entries.

**Editing a Product Infeed**

See the section on Editing a Product Infeed for details on editing product infeed entries.

**Deleting a Product Infeed**

See the section on Deleting a Product Infeed for details on deleting product infeed entries.

**Primary Outfeed**

The production *line* OEE waste is derived from the primary outfeed. If a production cell has been configured for multiple outfeeds, select the outfeed that is to be used for the waste calculation.

**Product Outfeeds**

For each outfeed, the OEE module will start calculating production rate per minute, or production rate per hour values. These values can be accessed through the Production OPC Server. See the section on Production OPC Values, and the section on Product Outfeed for more information.

**Adding a Product Outfeed**

See the section on Adding a Product Outfeed for details on adding product outfeed entries.

**Editing a Product Outfeed**

See the section on Editing a Product Outfeed for details on editing product outfeed entries.

**Deleting a Product Outfeed**

See the section on Deleting a Product Outfeed for details on deleting product outfeed entries.

**Product Waste**

For each waste entry, the OEE module will start tracking true waste count values. These values can be accessed through the Production OPC Server. See the section on Production OPC Values, and the section on Product Waste for more information.

**Adding a Product Waste Entry**

See the section on Adding a Product Waste Counter for details on adding product waste entries.

**Editing a Product Outfeed**

See the section on Editing a Product Waste Counter for details on editing product waste entries.

**Deleting a Product Outfeed**

See the section on Deleting a Product Waste Counter for details on deleting product waste entries.


## Cell Downtime Settings

These settings are accessed by selecting the *line* item contained in the *site* folder in the project browser and then selecting the "Downtime" tab as shown below. Once downtime reasons have been added, the OEE, Downtime and Scheduling module will either check the list if the *line* stops running or allow the operator to select the reason. See the section on Downtime Reasons for more information.

**Filler**  
Cell Production Item

General OEE **Downtime** Schedule Advanced

Log Downtime Details: ☐

State SQLTag:  

Downtime Reasons:

Reason Name	Reason Code	Record Downtime	Planned Downtime	Operator Selecta...
Bottle Jam	10	true	false	true
Jam	2	true	false	false
Infeed backup	3	true	false	false

Cell Downtime Settings

## Log Downtime Details


Cell downtime logging is independent from *line* downtime. To log all of the downtime details for a cell, check the Log Downtime Details setting. This will cause all downtime events for the cell to be logged to the database. If this amount of detail is not used, it is recommended to uncheck this setting as it saves space in the database.

See Downtime Reasons for more information.

## State SQLTag

This is the SQLTag used to read the current state of the cell. It is an Ignition SQLTag and the values can come from a PLC, a database query, other device in the field such as a barcode reader, an expression, user input, or script.

The data type (format) of the SQLTag containing the state must be a number. The SQLTag can be manually typed or pasted in to the Factor SQLTag edit box.

Optionally, clicking on the  icon will display a browser where a SQLTag can be selected.

## Downtime Reasons

### Adding a Downtime Reason

See the section on Adding a Downtime Reason for details on adding downtime reason entries.

### Editing a Downtime Reason

See the section on Editing a Downtime Reason for details on editing downtime reason entries.

### Deleting a Downtime Reason

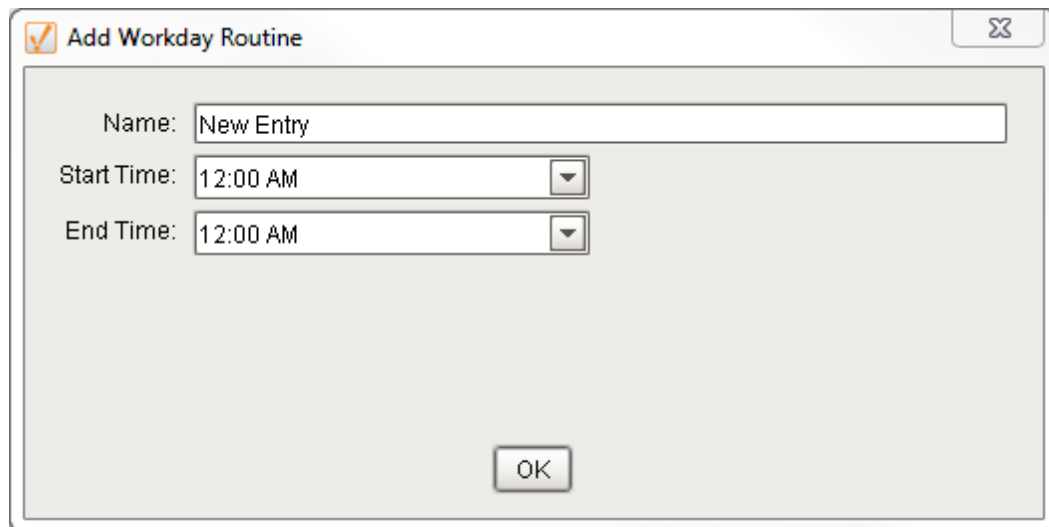
See the section on Deleting a Downtime Reason for details on deleting downtime reason entries.

## 3.3 Workday Routines

Workday routine activities can be breaks, lunches, safety meetings or anything that is scheduled, non-production times that occur every day. When production runs are scheduled by the production planner, these workday routine items are scheduled around and do not count against the OEE of the production run.

### Adding a Workday Routine

To add a workday routine entry, right-click anywhere on the table containing workday routines and select the **New** menu item. A dialog box will appear to allow entry of a name, start time and end time for the workday routine entry as shown below.



Workday Routine Entry Settings

### Editing a Workday Routine

To edit an existing workday routine entry, right-click on the desired entry in the workday routine table and select the **Edit** menu item. A dialog box similar to the add dialog box will appear allowing editing of the entry.

### Deleting a Workday Routine

To remove an existing workday routine entry, right-click on the desired entry in the workday routine table and select the **Delete** menu item. A window will appear confirming that you want to remove the workday routine entry.

### Import/ Export

To import workday routine entries, right-click anywhere on the workday routine table and select the **Import** menu item. A dialog box will appear to allow selection of a comma separated values (csv) formatted file.

The first *line* of the file must at least contain the property names separated by commas. If additional names exist, they will be ignored. The property names can be in any order. Below is a sample csv file showing multiple workday routine entries.

```
Name, Start Time, End Time
Graveyard shift break 1, Fri Jan 14 01:00:00 PST 2011, Fri Jan 14 01:15:00 PST 2011
Graveyard shift meal, Fri Dec 03 03:00:00 PST 2010, Fri Dec 03 03:30:00 PST 2010
Graveyard shift break 2, Fri Jan 14 05:00:00 PST 2011, Fri Jan 14 05:15:00 PST 2011
Day shift break 1, Fri Jan 14 09:00:00 PST 2011, Fri Jan 14 09:15:00 PST 2011
Day shift meal, Fri Dec 03 11:00:00 PST 2010, Fri Dec 03 11:30:00 PST 2010
Day shift break 2, Fri Jan 14 13:00:00 PST 2011, Fri Jan 14 13:15:00 PST 2011
Swing shift break 1, Fri Jan 14 17:00:00 PST 2011, Fri Jan 14 17:15:00 PST 2011
Swing shift meal, Fri Dec 03 19:00:00 PST 2010, Fri Dec 03 19:30:00 PST 2010
Swing shift break 2, Fri Jan 14 21:00:00 PST 2011, Fri Jan 14 21:15:00 PST 2011
```

To export workday routine entries, right-click anywhere on the table containing workday routines and select the **Export** menu item. A dialog box will appear to allow selection of an existing file or the typing in of a name of the new file to save the workday routine entries to. If a file extension is not entered, then the default .csv will be used.

### 3.4 Downtime Reasons

Downtime reasons allow the tracking of specific causes preventing a *line* or cell from running. Some reasons are considered causes of downtime where others are not. For example, if the production cell outfeed is backed up and there is no room to discharge product to, then it must shutdown. In this example, it is simply normal operation for the cell and it is not causing the production *line* from producing product. A cell further down the *line* is the cell preventing the production *line* from producing product.

Other downtime reasons may be planned. Any time that the production *line* is scheduled around, such as breaks, lunches, safety meeting, disable shifts, etc., is planned and will not count against the production *line* OEE Availability.

The OEE Downtime and Scheduling module has been designed to accommodate a variety of methods to determine reasons that a production *line* is down. This was done because monitoring all downtime reasons automatically is the ideal solution. But in the real world, this be difficult, costly, or just not practical to detect downtime reasons automatically. For this reason it is important for downtime tracking software to support both automatic reason detection and a manual override. For example: if an operator presses the stop button because they see a bottle laying on its side feeding into a filler, then the only automatic reason that can be detected is "operator pressed stop button". Now, the operator should be able to override the reason with more specific information.

In applications where the production cell is not automated and work is performed completely by manual labor, all downtime information can be entered manually from a predetermined list.

## Downtime Reason Detection

For this reason, the OEE Downtime and Scheduling module determines the downtime reason from a single numeric value. Single numeric values are stable and can only represent one state. Of course one could use Expressions or script in Ignition to evaluate multiple values from the PLC and calculate a single numeric value representing the downtime reason, but this degrades the reliability of determining downtime reasons. Another benefit is that it is typically faster and reduces network traffic to read one value as opposed to multiple scattered values from a PLC.

The reason code with the numeric value of 0 is reserved for idle and 1 is reserved to mean running. All other reason codes are available for downtime reasons and is only limited by the maximum numeric value your PLC can handle. When the OEE Downtime and Scheduling module detects a production *line* or cell state that changed from a value of 1 (running), it will lookup the downtime reason from the state value. If communication to the PLC fails, in the case when a electrical disconnect is shut off, the production *line* or cell state is replaced with 0. If this happens during a production run, it will count as downtime.

### Important:

Some systems may accommodate boolean logic to determine the downtime cause. However, consider the various values from a PLC that are going to be used to determine the downtime reason. These scattered values may come in from the PLC at different times and if the boolean logic resided in the OEE Downtime and Scheduling module, then it may be determining the reason on partially current values. Oops, now we have the incorrect reason and when all of the current values do arrive, what do we do? Do we change the original reason, add a new downtime entry, or maybe put a delay in to allow for all of the current values to arrive? None of these options are good solutions.

## Automatic Detection

When the value of the State SQLTag changes to a value that is other than the numeric value of one, the system will look for a matching reason code in the entries in downtime reasons table. If it is not found it will replace then reason code with zero (0).

## Manual Override

After an automatic reason has been triggered, the operator can override it with a more specific reason. Both are logged and can be viewed in analysis and reporting. For details about how to disable manual override see the *Editable* property in the Down Time Table section

## Manual Only

For production *lines* that do not support automatic downtime detection, a completely manual implementation can be setup. This is done by providing a *line* drop-down list, or other component, on the operator screen that the user can use to select the the current *line* state.

## Line Downtime Versus Cell Downtime

It is important to understand the difference between *line* downtime and cell downtime. *Line* downtime, which is only the downtime reasons that are preventing the production *line* from producing product, is typically used to zero in and improve OEE. The cell downtime is used to look at trends and detect maintenance issues before they cause *line* downtime. Consider a production *line* that has 25 cells. If 5 of the cells are down all at the same time for unrelated reasons and only one of them is preventing product from being produced on the *line*, then there will be a lot of noise (extra irrelevant data) to weed through. Also, if a faster downstream cell stops, restarts and catches up, it may never affect the production of the *line* as a whole. The OEE Downtime Module provides the best of both worlds and tracks both *line* downtime and cell downtime.

For settings controlling cell downtime, see Cell Configuration under the Cell Downtime Settings section.

### Detecting Line Downtime

In the OEE Downtime Module, there are multiple options for detecting *line* downtime reasons. The options have been added to accommodate the wide variety of manufacturing processes. Below is a description of each method along with the situations where it can be used.

As you read through the methods described below, think of the effort required to manually implement them, whether done in the PLC or in Ignition.

#### Initial Reason

The concept of this method is the first cell that went down for an unplanned reason is the cause for the *line* not being able to produce product.

When a cell first goes down, the date and time is recorded. If multiple cell are down, they will each have their own date and time that it went down. The data and time for each down cell is looked at to determine the initial cell that went down and will be assigned as the cell causing the *line* downtime along with its reason. If the initial cell restarts, then the other down cells are looked the next cell in chronological order that went down. If there are two or more cells that went down at the same time, then it will use the order that they appear in the designer.

If there are no cells down for an unplanned reason, then the *line* will return to running state.

This method should be used if all cells interact with one another. If any cell is down, then all other cells have to stop. A continuous liquid mixing process where at each cell, new ingredients are added or mixing or some other action is being performed fits into this category. If one cell stops, then all other upstream cells have to stop because there is no where to put the liquid and all downstream cells have to stop because there is not liquid to process. In this case the first cell that stopped is the cause for all other cells to stop.

#### Key Reason

This method uses the flow of the *line* to determine the cause for the *line* not being able to product product. It also assumes there is a primary cell that, if down, will cause the *line* to stop producing product.



This method also uses the order of the cells as they are configured in the designer. If the first cell is down for a reason that is not configured as *Record Downtime*, the next cell will be checked. If it is down for a reason that is configured as *Record Downtime*, then it will be assigned as *line* downtime cell and reason. When the second cell that caused the *line* downtime restarts but the first cell has not started yet because its discharge is still backed up, then the original cell and reason will still be the cause until the first cell restarts.

The concept behind this is that a faster downstream cell can go down, restart and catch up without ever causing loss of production on the *line*.

This method should be used for packaging *lines*. If the first cell on the *line* keeps accepting raw material, then the *line* will be producing product. However, in some situations, it could be the slowest machine because it cannot catch up for lost production.

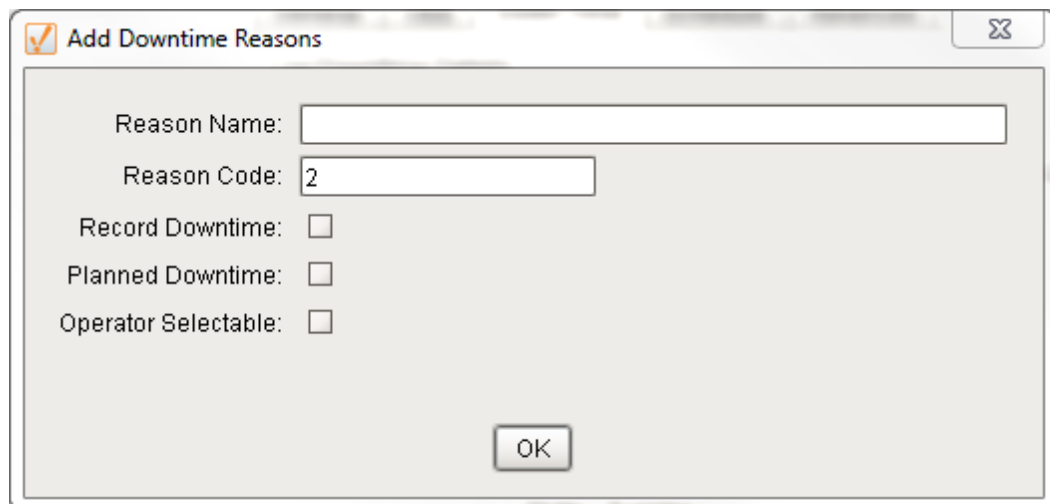
### Line State

This method is used when the other methods are not appropriate. This method allows implementing custom methods of *line* downtime detection. When using this method, all downtime reasons must be entered into the *line* downtime reason table and not the cell downtime reasons table. This method will only read the *line* downtime reason from the State SQLTag configured for the *line* to determine the *line* downtime reason.

When using this method, detailed cell downtime tracking can still be used but it is isolated from the *line* downtime reasons.

## 3.4.1 Adding a Downtime Reasons

To add a Downtime Reason, right-click anywhere in the Downtime Reasons table, and select "New" from the menu. The following window will appear:



☒ Add Downtime Reasons

Reason Name:

Reason Code:

Record Downtime: ☐

Planned Downtime: ☐

Operator Selectable: ☐

OK

### Adding a Downtime Reason

#### Reason Name

The required reason name is used to reference one reason from another and must be unique within the production *line* or cell. The reason name should be meaningful to the end user. This is because the end user can filter and group analysis and report by the reason name.

#### Reason Code

The reason code is a required unique number to the cell that identifies the downtime reason. PLCs and other equipment are more apt to handling numbers versus strings, therefore a reason code is used for reference within the program.

The reason code 0 is reserved for idle.

The reason code 1 is reserved for running.

#### Record Downtime

If the **Record Downtime** option is true, then downtime events with this reason will be treated as unplanned downtime. This allows for downtime reasons such as *outfeed backup* to not be counted as unplanned downtime.

#### Planned Downtime

This option will make the reason Planned Downtime, meaning it is scheduled and will not be used in computing the OEE.

#### Operator Selectable

This option allows the operator to manually select the reason, for example, from a drop-down list, as the reason for downtime.

### 3.4.2 Editing a Downtime Reasons

To edit a Downtime Reason, select the existing Downtime Reason you wish to edit, then right-click and select "Edit" from the menu. The same window used to add downtime reasons will appear, allowing the information to be edited.

### 3.4.3 Deleting a Downtime Reasons

To delete a Downtime Reason, select the existing Downtime Reason you wish to remove, then right-click and select "Delete" from the menu. A window will appear confirming that you permanently want to delete the downtime reason.

### 3.4.4 Import / Export

To import downtime entries, right-click anywhere on the downtime table and select the **Import** menu item. A dialog box will appear to allow selection of a comma separated values (csv) formatted file.

The first line of the file must at least contain the property names separated by commas. If additional names exist, they will be ignored. The property names can be in any order.

Below is a sample csv file showing multiple downtime entries.

```
Reason Name, Reason Code, Record Downtime, Planned Downtime, Operator Selectable
Break, 101, false, true, true
Clear out product jam, 22, true, false, true
Machine Fault, 3, true, false, false
Meal, 100, false, true, true
Outfeed Backup, 4, false, false, false
Planned Shutdown, 99, false, true, true
Scale fault, 8, true, false, false
Scales maintenance, 20, true, false, true
Stop, 0, true, false, false
Waiting for product, 6, true, false, false
```

To export downtime entries, right-click anywhere on the table containing downtime entries and select the **Export** menu item. A dialog box will appear to allow selection of an existing file or the typing in of a name of the new file to save the downtime entries to. If a file extension is not entered, then the default .csv will be used.

## 3.5 Product Infeed

Product infeeds are used only to calculate waste or if infeed rate information is desired. This applies to both production *lines* and production cells. If a production *line* or cell is configured for more than one infeed or outfeed, then accumulation and waste calculations will be performed for each combination. For example, a production *line* can be configured to track containers, caps and product as infeeds and a single outfeed of full containers. The independent waste calculations for containers, caps and production will be performed. See Production Count Tracking section for more information.

For each infeed, the OEE module will start calculating production rate per minute, or production rate per hour values. These values can be accessed through the Production OPC Server. See the section on Production OPC Values for more information.

### 3.5.1 Adding a Product Infeed

To add a product infeed entry, right-click anywhere on the product infeed table of a production *line* or cell and select the **New** menu item. A dialog box will appear to allow entry of a name, count sql tag, maximum raw count and production units as shown below.

Product Infeed Settings

**Name**

The required infeed name is used to reference one infeed from another and must be unique.

**Count SQLTag**

The required SQLTag is the source of the raw production counts. This typically comes from a PLC, but can come from other sources such as barcode readers, database queries or derived by another means. The data type (format) of the SQLTag containing the raw production count must be a number.

**Max Raw Count**

This is the maximum raw count value before it is reset to zero. See note below.

**Production Units**

This can be anything you want that represents the units. Examples are: gallons, cases, bottles, pounds, liters, etc.

*Note: The term raw count is used because it is a relative production count. It just starts at zero and counts up to a rollover value, typically 32767, where it becomes zero again. The OEE Downtime and Scheduling module calculates the actual production count from raw count. This eliminates having to reset the value in the PLC, or other device, at the beginning of a production run. As a result, the programming that is required in the PLC, or other device is simplified. It also eliminates problems typically associated with reset handshaking and production runs that exceed the limits of PLC counters. For an OEE tracking system to be accurate, it must withstand communication errors power outages, etc. By using raw counts that rollover and let the OEE Downtime and Scheduling module handle the actual production count, the system is robust. Besides, that is just less PLC programming that has to be done and tested.*

**3.5.2 Editing a Product Infeed**

To edit an existing product infeed entry, right-click on the desired entry in the product infeed table of a product *line* or cell and select the **Edit** menu item. A dialog box similar to

the add dialog box will appear, allowing editing of the entry.

### 3.5.3 Deleting a Product Infeed

To remove an existing product infeed entry, right-click on the desired entry in the product infeed table of a production *line* or cell and select the **Delete** menu item. A window will appear confirming that you want to remove the product infeed entry.

### 3.5.4 Import / Export

To import product infeed entries, right-click anywhere on the product infeed table and select the **Import** menu item. A dialog box will appear to allow selection of a comma separated values (csv) formatted file.

The first line of the file must at least contain the property names separated by commas. If additional names exist, they will be ignored. The property names can be in any order. Below is a sample csv file showing a single product infeed entry.

```
Name, Count SQLTag, Max Raw Count, Productions Units
Line Infeed, Line 1/PLC/Filler/Infeed, 32768, Bottles
```

To export product infeed entries, right-click anywhere on the table containing product infeeds and select the **Export** menu item. A dialog box will appear to allow selection of an existing file or the typing in of a name of the new file to save the product infeed entries to. If a file extension is not entered, then the default .csv will be used.

## 3.6 Product Outfeed

Before OEE calculations can be performed, production count information is required. At a minimum, the outfeed production count for a production *line* is needed. Additional production count information can be configured that will result in more OEE calculations. For example, if the infeed production count is configured for a production, then product accumulation and waste is calculated. See Production Count Tracking section for more information.

For each outfeed, the OEE module will start calculating production rates, OEE, etc. values. These values can be accessed through the Production OPC Server. See the section on Production OPC Values for more information.

### 3.6.1 Adding a Product Outfeed

For each outfeed, the OEE module will start calculating the production rate per minute, or production rate per hour values. These values can be accessed through the Production OPC Server. See the section on Production OPC Values for more information. To add a product outfeed entry, right-click anywhere on the product outfeed table of a production *line* or cell and select the **New** menu item. A dialog box will appear to allow entry of the new information, as shown below.

**Add Product Outfeed**

Name:

Count SQLTag:

Max Raw Count:

Default Standard Rate:

Default Package Count:

Standard Rate Period:

Production Units:

Waste Transit Time (Seconds):

Product Outfeed Settings

**Name**

The required outfeed name is used to reference one outfeed from another and must be unique.

**Count SQLTag**

The required SQLTag is the source of the raw production counts. This typically comes from a PLC, but can come from other sources such as barcode readers, database queries or derived by another means. The data type (format) of the SQLTag containing the raw production count must be a number.

**Max Raw Count**

This is the maximum raw count value before it is reset to zero. See note below.

**Default Standard Rate**

The OEE calculation requires the designed rate that the production *line* can produce. Typically, machines and processes only run at these rates theoretically. This setting is the default value for the standard rate but can be overridden by product and *line* in the user screens.

**Default Package Count**

This is the default number of infeed units which end up in a outfeed unit. If package count does apply, then enter 1.0. For example, there may be 10 bottle (infeed) in a case (outfeed) or 10 gallons (infeed) in a bucket (outfeed).

When calculating waste and production count information, the package size is very important. It can change based on the product being run and the default value, and can be

overridden by the product in the user screens.

### Standard Rate Period

This is the time period to use for the default standard rate. If the default standard rate is in units per hour, select **Hour** otherwise select **Minute**.

### Production Units

This can be anything you want that represents the units. Examples are: gallons, cases, bottles, pounds, liters, etc.

### Waste Transit Time (Seconds)

The waste transit time specifies the amount of time it takes for one unit to travel from the infeed to the outfeed if the production *line* is running at standard rate. It is used to calculate the waste count.

*Note: The term raw count is used because it is a relative production count. It just starts at zero and counts up to a rollover value, typically 32767, where it become zero again. The OEE Downtime and Scheduling module calculates the actual production count from raw count. This eliminates having to reset the value in the PLC, or other device, at the beginning of a production run. As a result, the programming that is required in the PLC, or other device is simplified. It also eliminates problems typically associated with reset handshaking and production runs that exceed the limits of PLC counters. For an OEE tracking system to be accurate, it must withstand communication errors power outages, etc. By using raw counts that rollover and let the OEE Downtime and Scheduling module handle the actual production count, the system is robust. Besides, that is just less PLC programming that has to be done and tested.*

## 3.6.2 Editing a Product Outfeed

To edit an existing product outfeed entry, right-click on the desired entry in the product outfeed table of a product *line* or cell and select the **Edit** menu item. A dialog box similar to the add dialog box will appear allowing editing of the entry.

## 3.6.3 Deleting a Product Outfeed

To remove an existing product outfeed entry, right-click on the desired entry in the product outfeed table of a production *line* or cell and select the **Delete** menu item. A window will appear confirming that you want to remove the product outfeed entry.

## 3.6.4 Import / Export

To import product outfeed entries, right-click anywhere on the product outfeed table and select the **Import** menu item. A dialog box will appear to allow selection of a comma separated values (csv) formatted file.

The first line of the file must at least contain the property names separated by commas. If additional names exist, they will be ignored. The property names can be in any order. Below is a sample csv file showing a single product infeed entry.

Name, Count SQLTag, Max Raw Count, Default Standard Rate, Default Package Count, Standard Rate Period, Production Units, Waste Transit Time (Seconds)  
Line Outfeed, Line 1/PLC/Palletizer/Outfeed, 32768, 60.0, 10.0, Hour, Cases, 120

To export product outfeed entries, right-click anywhere on the table containing product outfeeds and select the **Export** menu item. A dialog box will appear to allow selection of an existing file or the typing in of a name of the new file to save the product outfeed entries to. If a file extension is not entered, then the default .csv will be used.

## 3.7 Product Waste

Before OEE Quality calculations can be performed, waste count information is required. Because of the varied approaches of determining waste on a production *line* or process, the OEE Downtime Module allows different methods of collecting waste information.

1. Use the Run Waste Count OPC value for the *line*. With this method, the OEE Downtime Module will simply use the current value of the Run Waste Count OPC value when calculating the OEE Quality values. This provides for custom waste tracking or calculations if the methods built in to the OEE Downtime Module don't fit your requirements. If OEE Quality is not being used, then this method should be used and setting the Run Waste Count OPC value to zero.
2. Automatically calculate the waste count using the built-in algorithm based on the infeed count, outfeed count and transit time defined in the Product Outfeed. This method is an approximation and is less accurate especially in cases when product accumulation sections are used on the *line*.
3. Use configured Product Waste counters. This OEE Downtime Module will track waste count using the same method used for infeed and outfeed counts. The waste counts will be totalized and used in the OEE Quality calculations.

### 3.7.1 Adding a Product Waste Counter

To add a product waste entry, right-click anywhere on the product waste table of a production *line* or cell and select the **New** menu item. A dialog box will appear to allow entry of a name, count SQLTag and maximum as shown below.

Product Waste Settings



**Name**

The required product waste name is used to reference one waste entry from another and must be unique.

**Count SQLTag**

The required SQLTag is the source of the raw waste counts. This typically comes from a PLC, but can come from other sources such as barcode readers, database queries or derived by another means. The data type (format) of the SQLTag containing the raw waste count must be a number.

**Max Raw Count**

This is the maximum raw count value before it is reset to zero. See note below.

*Note: The term raw count is used because it is a relative waste count. It just starts at zero and counts up to a rollover value, typically 32767, where it become zero again. The OEE Downtime and Scheduling module calculates the actual waste count from raw count. This eliminates having to reset the value in the PLC, or other device, at the beginning of a production run. As a result, the programming that is required in the PLC, or other device is simplified. It also eliminates problems typically associated with reset handshaking and production runs that exceed the limits of PLC counters. For an OEE tracking system to be accurate, it must withstand communication errors power outages, etc. By using raw counts that rollover and let the OEE Downtime and Scheduling module handle the actual waste count, the system is robust. Besides, that is just less PLC programming that has to be done and tested.*

**3.7.2 Editing a Product Waste Counter**

To edit an existing product waste entry, right-click on the desired entry in the product waste table of a product *line* or cell and select the **Edit** menu item. A dialog box similar to the add dialog box will appear allowing editing of the entry.

**3.7.3 Deleting a Product Waste Counter**

To remove an existing product waste entry, right-click on the desired entry in the product waste table of a production *line* or cell and select the **Delete** menu item. A window will appear confirming that you want to remove the product waste entry.

**3.7.4 Import / Export**


To import product waste entries, right-click anywhere on the product waste table and select the **Import** menu item. A dialog box will appear to allow selection of a comma separated values (csv) formatted file.

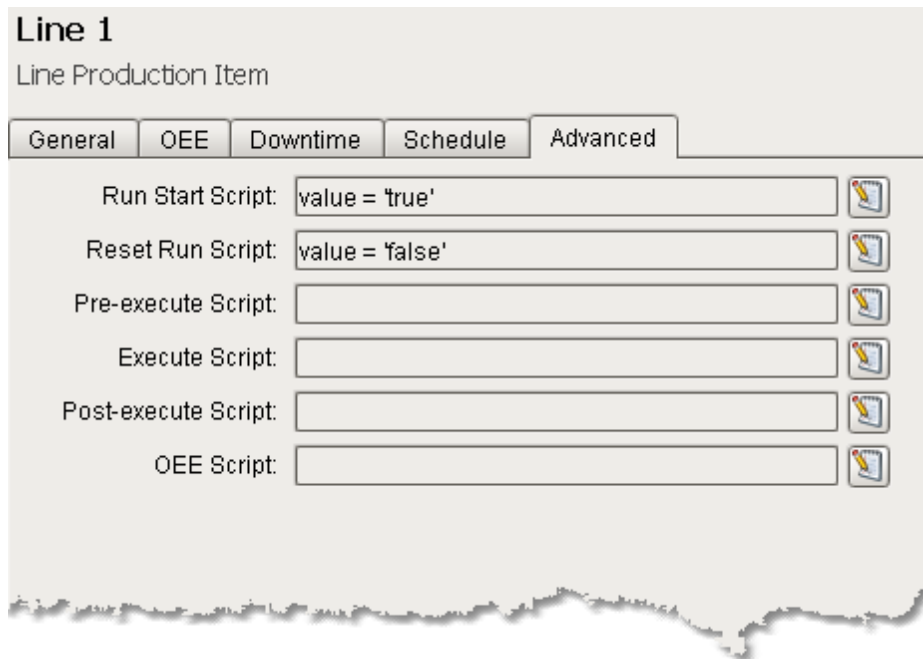
The first *line* of the file must at least contain the property names separated by commas. If additional names exist, they will be ignored. The property names can be in any order. Below is a sample csv file showing a single product waste entry.

```
Name, Count SQLTag, Max Raw Count
Rejector, Line 1/PLC/RejectorCount, 32768
```

To export product waste entries, right-click anywhere on the table containing product waste entries and select the **Export** menu item. A dialog box will appear to allow selection of an existing file or the typing in of a name of the new file to save the product waste entries to. If a file extension is not entered, then the default .csv will be used.


### 3.8 Scripting


Due to modules included in the OEE Downtime and Scheduling Module, the need for scripting is virtually nonexistent. However, if the user would like to expand on the existing scripting, or make adjustments to better fit his or her needs, this can still be done within Ignition. Scripting is also used with *Lines* and *Cells* under the **Advanced** tab. In order to edit the script under this tab, simply click the  button and enter the desired script, then click **OK** to save.





**Line 1**  
Line Production Item


General OEE Downtime Schedule **Advanced**


Run Start Script: value = 'true' 

Reset Run Script: value = 'false' 

Pre-execute Script: 

Execute Script: 

Post-execute Script: 

OEE Script: 

a Line

Advanced Tab for

Example:

This script is used under Run Start Script and will cause the *line* to run when the operator clicks *Start*.

```
value = 'true'
system tag.writeToTag(' [ Default ] Line 1/ PLC/ Run' , value)
```

Additional scripting help and examples can be found in the Ignition Manual.



# Component Reference

Part IV

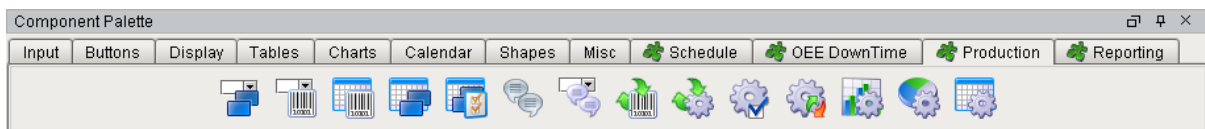
## 4 Component Reference

This section will describe the components that are available with the OEE Downtime and Scheduling module.

Please note that only the properties, methods and events that are specific to the OEE Downtime and scheduling module components are described here. For description and usage of other properties see the Ignition reference manual.

### 4.1 Production Components

When the Production Module, which is part of the OEE Downtime and Scheduling Module, is opened, a new component tab will appear. On it are a number of components that provide functionality specific to the production model, product codes, analysis, etc.



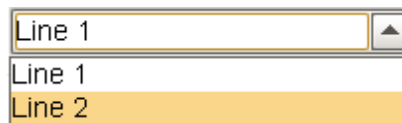
Production Components

#### 4.1.1 Production Line Selector



##### Description

A component that provides users to select a production *line* from a drop-down list. Production *lines* are defined in the production model within the designer.



Line Drop-Down List

##### Properties

This component has standard Ignition properties with the addition of the following properties:

**Selected Line Path** The currently selected *line* path. This is the full path name of the *line* starting with the project name.

For example: "OEE Demo\Your Enterprise\Your Site\Your Area\Line 1"

Scripting name	selectedLinePath
Data Type	String

**Selected Line Name** The currently selected *line* name. This is just the *line* name excluding the rest of the *line* path.

For example: "Line 1"

Scripting name	selectedLineName
Data Type	String

**Events**

This component has standard Ignition events.

**Methods**

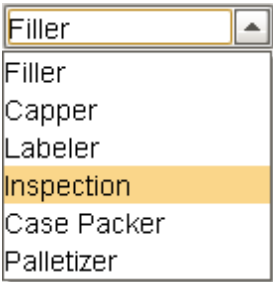
(none)

4.1.2 Production Cell Selector



**Description**

A component that provides users to select a production cell from a drop-down list. Production cells are defined in the production model within the designer.



Cell Drop-Down List

**Properties**

This component has standard Ignition properties with the addition of the following properties:

**Line Path** The *line* path of the production *line* that this component is associated with. This is the full path name of the *line* starting with the project name. Only the cells for this *line* path will be shown in this component.

For example: "OEE Demo\Your Enterprise\Your Site\Your Area\Line 1"

Scripting name      linePath  
Data Type            String

**Selected Cell Path** The currently selected cell path. This is the full path name of the cell starting with the project name.

For example: "OEE Demo\Your Enterprise\Your Site\Your Area\Line 1\Filler"

Scripting name      selectedCellPath  
Data Type            String

**Selected Cell** The currently selected cell name. This is just the cell name excluding the rest of the cell path.

**N**  
**a**  
**m**  
**e** For example: "Filler"

Scripting name      selectedCellName  
Data Type            String

## Events

This component has standard Ignition events.

## Methods

(none)

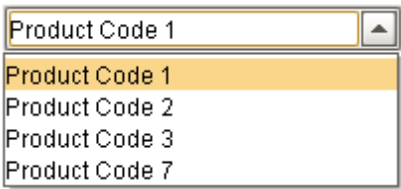
### 4.1.3 Product Code Selector



## Description

A component that provides users to select a product code from a drop-down list of available product code for a production *line*. Product code information is stored in the "ProductCode", "ProductCodeLine", "ProductCodeLineProperty" database tables. The Product Code Table, Product Code Line Table and Product Code Properties Table are typically used to manage the information in these database tables eliminating the need for SQL statements and scripts to do so.





Product Code Drop-Down List

**Properties**

This component has standard Ignition properties with the addition of the following properties:

<b>Line Path</b>	The <i>line</i> path of the production <i>line</i> that this component is associated with. This is the full path name of the <i>line</i> starting with the project name.
	For example: "OEE Demo\Your Enterprise\Your Site\Your Area\Line 1"
Scripting name	linePath
Data Type	String

<b>Selected Product Code</b>	The currently selected product code ID.
------------------------------	---

Scripting name	selectedStringValue
Data Type	String

**Events**

This component has standard Ignition events.

**Methods**

(none)

**4.1.4 Product Code Table**



**Description**

A component that displays all the available product codes in a table and allows the product code to be disabled. All product codes are automatically displayed from the "ProductCode" database table without the need for custom SQL statements or script.

Product Code	Description	Disable
Product Code 1		<input type="checkbox"/>
Product Code 2		<input type="checkbox"/>
Product Code 3		<input checked="" type="checkbox"/>
Product Code 7		<input type="checkbox"/>

Product Code Table

When a product code is disabled then it cannot be selected during work order creation or product code selection.

This component usually works in conjunction with the Product Code Line Table and Product Code Properties Table components. Refer to the OEE Demo project for a complete example.

### Properties

This component has standard Ignition properties with the addition of the following properties:

**Selected Product Code** The currently selected product code from the table.

Co  
de

Scripting name      selectedProductCode  
Data Type            String

**Selected Product Code ID** The currently selected product code ID. This is the ID for the "ProductCode" database table.

Co  
de  
ID

Scripting name      selectedProductCodeID  
Data Type            String

### Events

This component has standard Ignition events.

### Methods

(none)

## 4.1.5 Product Code Line Table



### Description

This component displays all the available *lines* and allows the linked product code to be enabled to be run on production *lines*. All product code lines are automatically displayed

from the "ProductCodeLine" database table without the need for custom SQL statements or script.

Line Name	Enable
Line 1	<input checked="" type="checkbox"/>
Line 2	<input type="checkbox"/>

Product Code Line Table

When a *line* is enabled for a product code, it will show up in the list of available products when scheduling, etc. for that *line*.

This component usually works in conjunction with the Product Code Table and Product Code Properties Table components. Refer to the OEE Demo project for a complete example.

Properties

This component has standard Ignition properties with the addition of the following properties:

**Product Code ID** The currently selected product code ID. This is the ID for the "ProductCode" database table.

Scripting name productCodeID  
Data Type String

**Selected** Value of the currently selected product code internal ID. This is the ID for the "ProductCodeLine" database table.

ProductCodeLine ID

Scripting name selectedProductCodeLineID  
Data Type String

**Selected Line Name** Value of the currently selected *line* name.

Scripting name selectedLineName  
Data Type String

Events

This component has standard Ignition events.

## Methods

(none)

### 4.1.6 Product Code Properties Table



#### Description

This component displays, and allows editing of, property values for specific product code and production *line* combination. This is where standard rates and scheduling rates are defined by product code and production *line*.

The properties that appear depend on the production model configuration done in the designer. There will be properties for the production *line* at the top followed by properties for each production cell.

Property	Value	Default Value
<b>Line 1</b>		
Line Outfeed.Package Count	1.0	1.0
Line Outfeed.Standard Rate	3500	3600.0
Schedule Rate	3400	3600.0
<b>Filler</b>		
CellEnabled	<input checked="" type="checkbox"/>	TRUE
Outfeed.Package Count	1.0	1.0
Outfeed.Standard Rate	3600.0	3600.0
<b>Canper</b>		

Product Code Properties Table

The Value column will indicate the property setting value and allow editing the of value for the specified *line*. The default value is for reference and is not editable. The values are saved in the "ProductCodeLineProperty" database table.

This component usually works in conjunction with the Product Code Table and Product Code Line Table components. Refer to the OEEDemo project for a complete example.

#### Properties

This component has standard Ignition properties with the addition of the following properties:

Product Code Line ID	The product <i>line</i> ID. This is the ID for the "ProductCodeLine" database table.	
Scripting name	productCodeLineID	
Data Type	String	

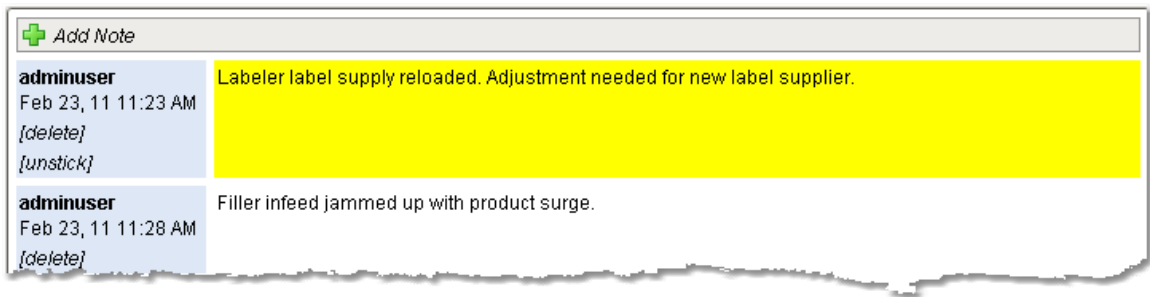
**Events**  
This component has standard Ignition events.

**Methods**  
  
(none)

4.1.7 Production Comments Panel



**Description**  
A component that allows comments/notes to be entered for the current production run. This component is similar to the Ignition Comments Panel component, but eliminates the need for SQL statements or scripting. It ties comments to the production run that the production *line* is currently running.



Production Comments Panel

To add a comment select the "+ Add Note" link. A new window panel will appear and allow you to enter text.

If you select "Sticky?" that will force the note(s) to appear at the top of the list. The color of the background of a sticky note can be controlled with the "Sticky Note Color" property.

After a sticky note is entered, it can be "un-stuck" by selecting the "[unstick]".

If note deletion is allowed, the link "[delete]" can be selected to delete the note.

**Properties**  
This component has standard Ignition properties with the addition of the following properties:

**Line Path** The *line* path of the production *line* that this component is associated with. This is the full path name of the *line* starting with the project name.

For example: "OEE Demo\Your Enterprise\Your Site\Your Area\Line 1"

Scripting name      linePath  
Data Type            String

**Run Reference ID** The run ID of the production run to display comments for. If its value is set to -1, then comments for the current production run will be displayed.

Note: Setting of this property is only required when viewing comments for past production runs.

Scripting name      refID  
Data Type            int

**Delete Mode** Determines how deleting of comments will be handled.

Scripting name      deleteMode  
Data Type            int  
Values                No Deletes  
                          Owner Deletes  
                          Any Deletes

## Events

This component has standard Ignition events.

## Methods

(none)

### 4.1.8 Product Code Controller



## Description

An invisible component that provides adding product codes. The term *invisible component* means that the control appears during design time, but is not visible during runtime. Product codes are stored in the "ProductCode" database table and this control handles all SQL statements, duplicate checking, etc.

Alternatively, product codes can added directly into the "ProductCode" database table

directly, bypassing the OEE Downtime and Scheduling Module. This method supports integration to ERP or other software systems.

Properties

This component has standard Ignition properties.

Events

This component has standard Ignition events.

Methods

**addProductCode (productCode, description)**

Add new production code and description to database.  
paramet

	productCode	The product code to add to the database
		Data Type String
	description	A descriptive label for the product code
		Data Type String
returns	message	contains a description of any error encountered, usually if the product code already exists. Otherwise it will be empty
		Data Type String

Example Code

The following script can be entered in a button's actionPerformed event. It will add the product code and description to the database. The return message will indicate if there are any issues adding the product code, such as if the product code already exists.

```
message = event.source.parent.getComponent('Product Code Controller').addProductCode  
if message == '':  
    system.nav.closeParentWindow(event)  
else  
    system.gui.errorBox(message)
```

4.1.9 Analysis Controller



Description

An invisible component that makes analysis data available for reports and other components. The term *invisible component* means that the control appears during design time, but is not visible during runtime.

In cases where the Production Analysis Selector offers too many options to the use, this component can be used. It has all of the same functionality as the Production Analysis Selector but without the user interface. This means property bindings or script must be used to make the filter, compare by and data point selections. It also is used for providing data to canned reports and optionally allowing the user to make limited filter options.

## Properties

This component has standard Ignition properties with the addition of the following properties:

**Automatic Update** When true, when any property that changes the results will change, the results will automatically be updated.

Scripting name	automaticUpdate
Data Type	Boolean

**Table Data** This property holds data in a format that is optimized for binding to a table component.

Scripting name	tableData
Data Type	Dataset

**Data Format** This property specifies the type of data to return from the server.

Options:

Table - Only data optimized for tables will be included in the results.

Chart - Only data optimized for charts will be included in the results.

Both - Table and chart data will be included in the results.

Scripting name	dataFormat
Data Type	AnalysisDataFormat
values	Table Chart Both

**Chart Data** This property holds data in a format that is optimized for binding to pie and bar chart component such as the Production Bar Chart and Production Pie Chart.

Scripting name	chartData
Data Type	Dataset



<b>Line Chart Data</b>	This property holds data in a format that is optimized for binding to a <i>line</i> chart component.
Scripting name	lineChartData
Data Type	Dataset
<b>Drill Down Options</b>	This property holds the drill down options appropriate for the current filter and compare by settings.
Scripting name	drillDownOptions
Data Type	Dataset
<b>Previous Drill Down Enabled</b>	This property indicates if there are entries in the drill down cache maintained by this component.
Scripting name	previousDrillDownEnabled
Data Type	Boolean
<b>Provider Name</b>	This property holds the current provider of analysis data. See Analysis Providers for available options.
Scripting name	providerName
Data Type	String
<b>Filter</b>	This property holds the current filter item selections to filter the analysis results by. If more than one item exists, they are separated by commas. See Analysis Providers for available filters for each provider type.
Scripting name	filter
Data Type	String
<b>Compare By</b>	This property holds the current compare by item selections to group the analysis results by. If more than one item exists, they are separated by commas. See Analysis Providers for available compare by values for each provider type.
Scripting name	compareBy
Data Type	String
<b>Data Points</b>	This property holds the currently selected data points to include in the results. If more than one item exists, they are separated by commas. See Analysis Providers for available data points for each provider type.
Scripting name	dataPoints
Data Type	String
<b>Start Date</b>	This property is the starting date for retrieving analysis data and determining available filter and compare by options.
Scripting name	startDate
Data Type	Date

**End Date** This property is the ending date for retrieving analysis data and determining available filter and compare by options.

Scripting name	endDate
Data Type	Date

**Dynamic Properties** Depending on the setting of the **Provider Name** property, the dynamic properties will change. A dynamic property to be created for each filter category that can be bound to by other components. These dynamic properties can also be set through script. See Analysis Providers for available filters for each provider type.

For example

If the **Provider Name** property is set to "Downtime", then **Shift** will be created for one of the dynamic properties. The **Shift** dynamic property can be bound to a Dropdown List Component populated with 1, 2 and 3. Changing the selection of the drop-down list will change the analysis results to be filtered by the select shift.

## Events

This component has standard Ignition events.

## Methods

**drillDown(drillDownName, item)**

Sets all the analysis selections to new state dictated by the drill down definition.  
**paramet**

drillDownName	A drill down definition name. This is typically supplied by the down event of one of the display components
---------------	---

Data Type	String
-----------	--------

item	A drill down category. This is typically supplied by the down event of one of the display components
------	--

Data Type	Object
-----------	--------

**returns**  
nothing

**prevDrillDown()**

Sets all the analysis selections to the previous state before the last drill down.  
**paramet**

returns (none)  
nothing

**update ()**

Causes the results to be updated.  
parameter

returns (none)  
nothing

**addDatasetColumn ()**

This method is used for reporting. Because the Ignition Report module does not support master slave table relationships, this method is used to add new columns containing a Dataset with child rows. For each row in the analysis controller results, a child Dataset will be created and placed into the new column named specified by the columnName parameter. The rows in the child Dataset are determined from the Dataset specified in the dataset parameter and match the column value specified by the keyColumns parameter.

parameter

dataset	Dataset containing child rows.
	Data Type Dataset
columnName	Name of column to add that will contain the child datas
	Data Type String
keyColumns	Name of columns to break the child row up by. Multiple can be specified by separating then with a comma.
	Data Type String
returns	nothing

**Example Code**

This script would be entered into the "drillDown" event of a Production Bar Chart.

```
event.source.parent.getComponent('Production Analysis Selector').drillDown(event.g
```

This script would be entered into the "back" event of a Production Bar Chart.

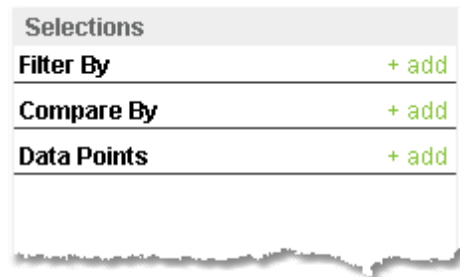
```
event.source.parent.getComponent('Production Analysis Selector').prevDrillDown()
```

#### 4.1.10 Production Analysis Selector



##### Description

A component that allows ad hoc selection of analysis data. As the user makes selections, this component will query the server for results. These results can be accessed through the Table Data, Chart Data and Line Chart Data properties to populate tables and charts.



Production Analysis Selector

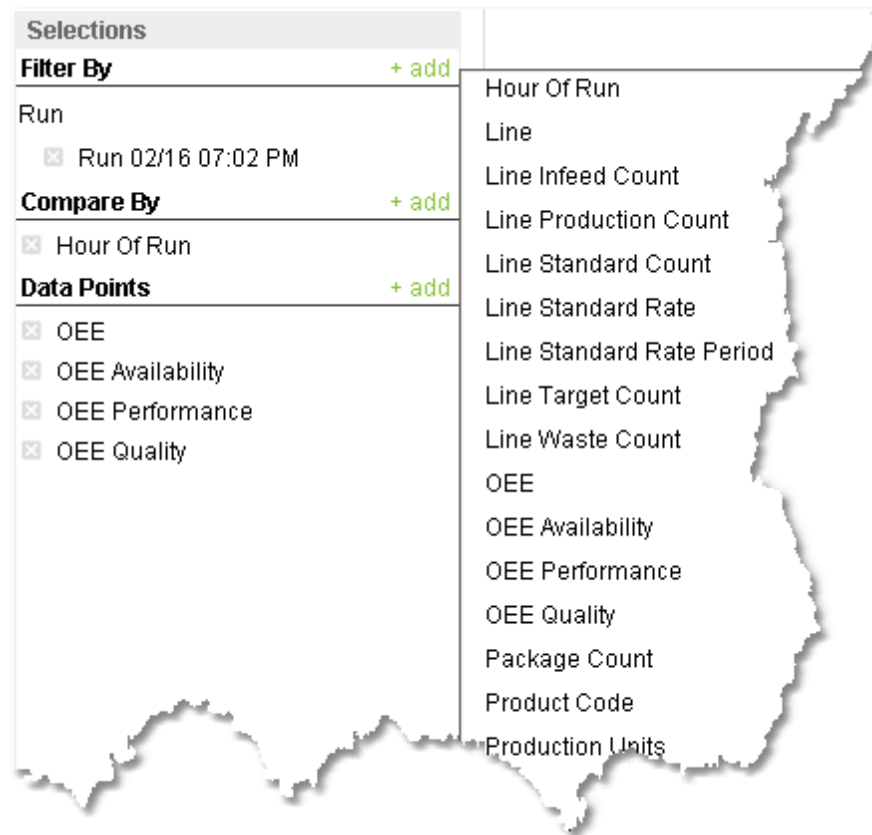
A filter can be added by selecting the **+ add** link to the right of **Filter By**. A window panel will open and filter categories will be displayed. Click the **+** link by the filter category and specific filter items will be displayed. When selected they will be added to the filters as shown below. To minimize the number of filter options, only the options for the selected date range defined by the Start Date and End Date properties will be shown.

The screenshot displays a software interface titled "Filter By List". It features a left-hand panel with three main sections: "Filter By", "Compare By", and "Data Points". Each section has a "+ add" link. The "Filter By" section is currently expanded, showing a list of items. The first item is "Run", which is selected with a checkbox. Below it, a specific run is listed: "Run 02/16 07:02 PM". The right-hand panel shows a list of available items for selection, each preceded by a plus icon in a square. These items are: Factor:Operator, Hour Of Run, Line, PackageCount, Product Code, ProductionUnits, Run, Run 02/16 07:02 PM, Run 02/19 05:21 PM, Run 02/19 09:24 AM, Shift, and Site.

Selections	
<b>Filter By</b> <span>+ add</span>	
Run	<input checked="" type="checkbox"/> Factor:Operator
<input checked="" type="checkbox"/> Run 02/16 07:02 PM	<input type="checkbox"/> Hour Of Run
<b>Compare By</b> <span>+ add</span>	<input type="checkbox"/> Line
<b>Data Points</b> <span>+ add</span>	<input type="checkbox"/> PackageCount
	<input type="checkbox"/> Product Code
	<input type="checkbox"/> ProductionUnits
	<input type="checkbox"/> Run
	<input type="checkbox"/> Run 02/16 07:02 PM
	<input type="checkbox"/> Run 02/19 05:21 PM
	<input type="checkbox"/> Run 02/19 09:24 AM
	<input type="checkbox"/> Shift
	<input type="checkbox"/> Site

Filter By List

Compare By and Data Points work similarly to Filter By except there are no categories for these selections, just items.



Compare By and Data Points List

Selections can be removed by selecting the ☒ link to the left of the selection.

## Properties

This component has standard Ignition properties with the addition of the following properties:

**Table Data** This property holds data in a format that is optimized for binding to a table component.

Scripting name	tableData
Data Type	Dataset

**Chart Data** This property holds data in a format that is optimized for binding to pie and bar chart components such as the Production Bar Chart and Production Pie Chart.

Scripting name	chartData
Data Type	Dataset

**Line Chart Data** This property holds data in a format that is optimized for binding to a *line* chart component.

Scripting name	lineChartData
Data Type	Dataset

<b>Drill Down Options</b>	This property holds the drill down options appropriate for the current filter and compare by settings.
	Scripting name      drillDownOptions
	Data Type      Dataset
<b>Previous Drill Down Enabled</b>	This property indicates if there are entries in the drill down cache maintained by this component.
	Scripting name      previousDrillDownEnabled
	Data Type      Boolean
<b>Provider</b>	This property holds the current provider of analysis data. See Analysis Providers for available options.
	Scripting name      provider
	Data Type      String
<b>Start Date</b>	This property is the starting date for retrieving analysis data and determining available filter and compare by options.
	Scripting name      startDate
	Data Type      Date
<b>End Date</b>	This property is the ending date for retrieving analysis data and determining available filter and compare by options.
	Scripting name      endDate
	Data Type      Date
<b>Filter Selection Summary</b>	This property holds the current filter item selections to filter the analysis results by. If more than one item exists, they are separated by commas.
	Scripting name      filterSummary
	Data Type      String
<b>Comparisons Summary</b>	This property holds the current compare by item selections to group the analysis results by. If more than one item exists, they are separated by commas.
	Scripting name      comparisonsSummary
	Data Type      String

**Data Points** This property holds the currently selected data points to include in the results. If more than one item exists, they are separated by commas.

Scripting name	dataPointsSummary
Data Type	String

**Data Format** This property specifies the type of data to return from the server.

Options:

- Table - Only data optimized for tables will be included in the results.
- Chart - Only data optimized for charts will be included in the results.
- Both - Table and chart data will be included in the results.

Scripting name	dataFormat
Data Type	AnalysisDataFormat
values	Table Chart Both

**Events**  
This component has standard Ignition events.

**Methods**

`drillDown(drillDownName, item)`

Sets all the analysis selections to new state dictated by the drill down definition.

**parameters**

drillDownName	A drill down definition name. This is typically supplied by the drill down event of one of the display components
	Data Type String
item	A drill down category. This is typically supplied by the drill down event of one of the display components
	Data Type Object
returns	nothing



```
prevDrillDown()
    paramet

    (none)
returns
    nothing
```

### Example Code

This script would be entered into the "drillDown" event of a Production Bar Chart.

```
event.source.parent.getComponent('Production Analysis Selector').drillDown(event.g
```

This script would be entered into the "back" event of a Production Bar Chart.

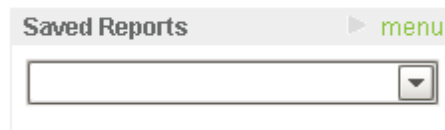
```
event.source.parent.getComponent('Production Analysis Selector').prevDrillDown()
```

## 4.1.11 Production Stored Analysis Selector




### Description

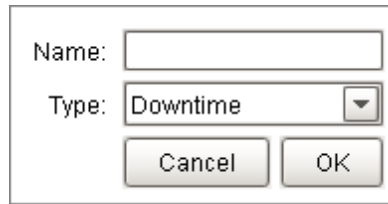
A component that allows creating, recalling and saving analysis data selections in the Production Analysis Selector. This component will automatically use the available Production Analysis Selector in the container.



Stored Analysis Selector

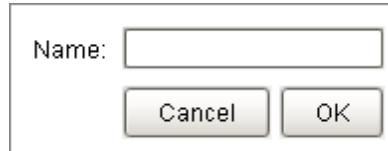
By clicking on the  link, a menu with the option to create new, save, delete and rename analysis will popup.

To add a new stored analysis, click on **New** menu item, enter a name, select a type and click **OK**. This will create an empty analysis. Now the user can make filter, compare by and data point selections that will be saved and can easily be selected at a later time.


 A dialog box titled "New Stored Analysis". It contains a "Name:" label followed by a text input field. Below it is a "Type:" label followed by a dropdown menu currently showing "Downtime". At the bottom are two buttons: "Cancel" and "OK".

New Stored Analysis

To rename a new stored analysis, click on **Rename** menu item, enter a new name and click **OK**.


 A dialog box titled "Rename Stored Analysis". It contains a "Name:" label followed by a text input field. At the bottom are two buttons: "Cancel" and "OK".

Rename Stored Analysis

To delete a stored analysis, click on **Delete** menu item, and select **Yes** to the confirmation message.

If changes to an analysis setting have been made and the user selects a different stored analysis, they will be prompted to save the changes. Alternatively, the changes can be saved by clicking on the **Save** menu item.

## Properties

This component has standard Ignition properties.

## Events

This component has standard Ignition events.


## Methods

(none)

### 4.1.12 Production Bar Chart



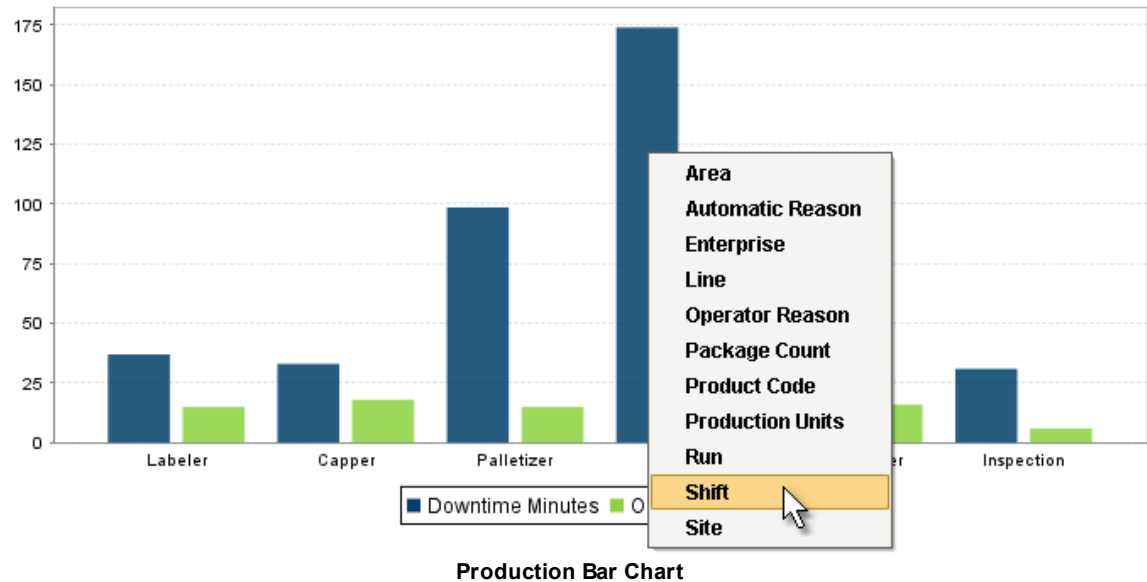
## Description

A component that displays a pie chart with drill down capabilities. This extends from the Bar Chart Component  that comes with Ignition.

When the user clicks on a bar of the bar chart, the drill down menu will appear. When an item in the drill down menu is clicked on, the drillDown event is fired. Script in the

drillDown event is responsible for updating the Data property to change the results shown in the bar chart.

The drill down menu information is set through the Drill Down Options property. The Drill Down Options can be populated from the Analysis Controller, Analysis Selector, SQL Query, scripting or it can be manually defined in the designer.



## Properties

### Data

This component has the same properties as the Ignition Bar Chart Component with the addition of the following properties:

**Drill Down Options** This is a Dataset that must have at least one column. The first column must be a data type of string. The values in the first column will be shown in the drill down options menu. Typically, this property binds to the drill down options property in a Production Analysis Selector component.

Scripting name      drillDownOptions

Data Type            Dataset

**Previous Drill Down Enabled** This controls the visibility of the "Back" drill down menu option. If it is set to true, "Back" will appear at the top of the drill down options.

Scripting name      previousDrillDownEnabled

Data Type            Boolean

## Events

This component has the same events as the Ignition Pie Chart Component with the addition of the following events:

**drillDown****Event**

Is fired when drill down menu item is selected. Excludes the "Back" menu item.

event.

Returns the text of selected drill down option menu item.  
Data Type [String](#)

event.

Returns the bar chart category that was clicked on to display the drill down menu. This is typically the first column of the Data property dataset.  
Data Type [Object](#)

**back**

## Event

(none)

## Methods

(none)

### 4.1.13 Production Pie Chart



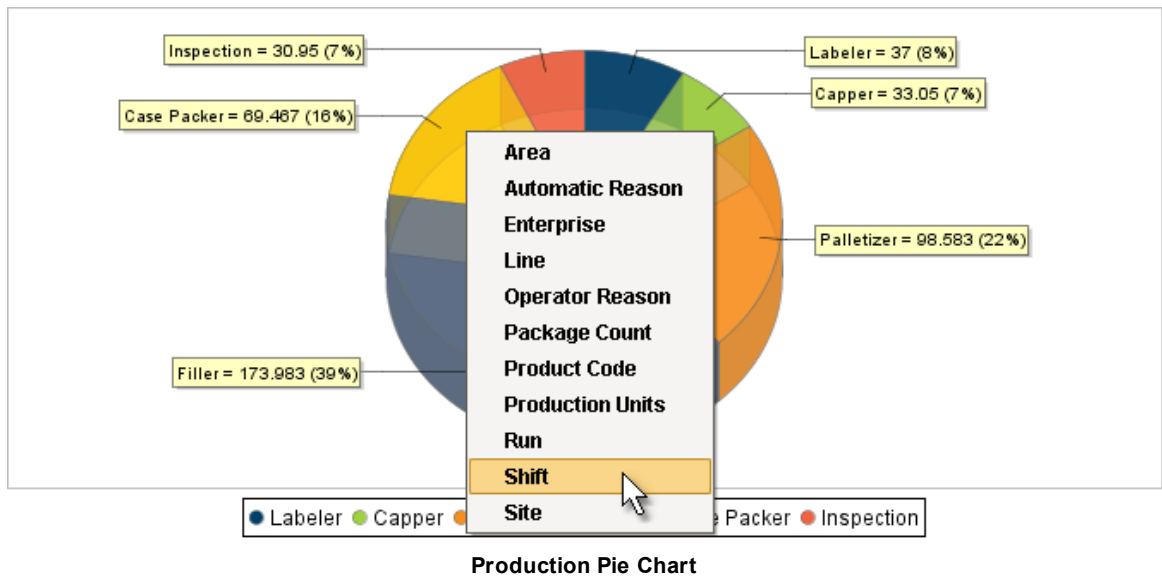
#### Description

A component that displays a pie chart with drill down capabilities. This extends from the

Pie Chart Component  that comes with Ignition.

When the user clicks on a segment of the pie chart, the drill down menu will appear. When an item in the drill down menu is clicked on, the drillDown event is fired. Script in the drillDown event is responsible for updating the Data property to change the results shown in the pie chart.

The drill down menu information is set through the Drill Down Options property. The Drill Down Options can be populated from the Analysis Controller, Analysis Selector, SQL Query, scripting, or it can be manually defined in the designer.



## Properties

### Data

This component has the same properties as the Ignition Pie Chart Component with the addition of the following properties:

**Drill Down Options** This is a Dataset that must have at least one column. The first column must be a data type of string. The values in the first column will be shown in the drill down options menu. Typically, this property binds to the drill down options property in a Production Analysis Selector component.

Scripting name      drillDownOptions  
Data Type            Dataset

**Previous Drill Down** This controls the visibility of the "Back" drill down menu option. If it is set to true, "Back" will appear at the top of the drill down options.

Scripting name      previousDrillDownEnabled  
Data Type            Boolean

## Events

This component has the same events as the Ignition Pie Chart Component with the addition of the following events:

**drillDown** Is fired when drill down menu item is selected. Excludes the "Back" menu item.

### Event

event. Returns the text of selected drill down option menu item.  
Data Type [String](#)

event. Returns the pie chart category that was clicked on to display the drill down menu. This is typically the first column of the Data property dataset.  
Data Type [Object](#)

**back**  
Event

(none)


Methods

(none)

4.1.14 Analysis Table



Description

A component that displays tabular data with drill down capabilities. This extends from the Table Component  that comes with Ignition.

When the user clicks on a row in the table, the drill down menu will appear. When an item in the drill down menu is clicked on, the drillDown event is fired. Script in the drillDown event is responsible for updating the Data property to change the results shown in the table.

The drill down menu information is set through the Drill Down Options property. The Drill Down Options can be populated from the Analysis Controller, Analysis Selector, SQL Query, scripting, or it can be manually defined in the designer.

Cell Name	Downtime Minutes	Occurrences
Labeler	44.97	18
Capper	35.03	20
Palletizer		20
Filler		44
Case Packer		21
Inspection		6

Area

Automatic Reason

Enterprise

Line

Operator Reason

Package Count

Product Code

Production Units

Run

Shift

Site



Analysis Table

Properties

Data

This component has the same properties as the Ignition Table Component with the addition of the following properties:

**Allow Export** This controls the visibility of the "Export" menu option. If it is set to true, "Export" will appear at the top of the drill down options allowing the user to export the data appearing the the table.

Scripting name allowExport  
Data Type Boolean

**Drill Down Options** This is a Dataset that must have at least one column. The first column must be a data type of string. The values in the first column will be shown in the drill down options menu. Typically, this property binds to the drill down options property in a Production Analysis Selector component.

Scripting name drillDownOptions  
Data Type Dataset

**Previous Drill Down** This controls the visibility of the "Back" drill down menu option. If it is set to true, "Back" will appear at the top of the drill down options.

Scripting name previousDrillDownEnabled  
Data Type Boolean

Events

This control has the same events as the Ignition Table Component with the addition of the following events:

**drillDown** Is fired when drill down menu item is selected. Excludes the "Back" menu item.

Event

event. Returns the text of selected drill down option menu item.  
Data Type String

event. Returns the value of first column for the selected row.  
Data Type [Object](#)

**back**  
Event

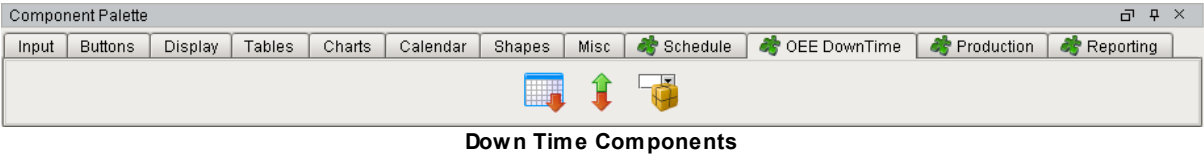
(none)

## Methods

(none)

4.2 Down Time Components

When the OEE Downtime Module, which is part of the OEE Downtime and Scheduling Module, is opened, a new component tab will appear. On it are components that provide functionality specific to the downtime and efficiency.



4.2.1 Down Time Table




Description

A component that displays automatic downtime events for an active production run and allows the operator to select more specific downtime reasons for the event. It also allows the operator to split downtime events. This accommodates downtime events that have multiple reasons. For example, if a production *line* goes down because of a mechanical failure and when maintenance finishes the repair, it is time for break. The operator can split the downtime event into two events. One for mechanical failure and the other for break.


Downtime Reasons

Begin	End	Cell	Count	Down Ti...	Reason	
11:00:04 AM	11:30:03 AM	Filler	1	00:29:59	Meal	
10:51:03 AM	10:53:05 AM	Palletizer	1	00:02:02	Wrapper feed empty	
10:48:03 AM	10:50:03 AM	Case Packer	1	00:02:00	Case	
10:45:03 AM	10:47:03 AM	Inspection	1	00:02:00	Setup	
10:42:03 AM	10:44:03 AM	Labeler	1	00:02:00	Label	
10:39:03 AM	10:41:03 AM	Capper	1	00:02:00	Cap f	
10:36:03 AM	10:38:02 AM	Filler	1	00:01:59	Mach	
10:33:02 AM	10:35:03 AM	Filler	1	00:02:01	Scale	
10:30:01 AM	10:32:01 AM	Filler	1	00:02:00	Scale	


Splitting Down Time Reason

When the user clicks on the  icon in the right-hand column, the downtime event split panel appears. The user can drag the time selector to the desired number of hours, minutes and seconds to split the event at. After the user clicks the **Split** button, two entries in the Down Time Table will appear with the exact same downtime reasons. The user can now select different downtime reasons for each entry.


When multiple downtime events occur for the same automatically detected downtime

reason, they will be combined into a single entry. The **Count** column will indicate the number of events and the **Downtime** column will reflect the total downtime of the combined events. The **Begin** column will be the start of first occurrence and the **End** column will be the end of the last occurrence. The user can click on the  icon to separate the combined downtime events. This allows selecting different downtime reasons for each of the downtime events.

#### Downtime Reasons

Begin	End	Cell	Count	Down Ti...	Reason	
03:34:18 PM	03:34:25 PM	Filler	1	00:00:07	Waiting for product	
03:33:55 PM	03:34:13 PM	Filler	2	00:00:11	Downtime Note: Called maintenance <div> <input type="text"/> </div>	<div> <input type="button" value="Cancel"/> <input type="button" value="OK"/> </div>
03:33:42 PM	03:33:48 PM	Filler	1	00:00:06		
03:33:27 PM	03:33:36 PM	Filler	1	00:00:09		
03:26:02 PM	03:32:04 PM	Filler	1	00:06:02		
03:24:18 PM	03:24:25 PM	Filler	1	00:00:07		
03:17:03 PM	03:19:03 PM	Case Packer	1	00:02:00		
03:08:02 PM	03:09:02 PM	Capper	1	00:01:00		

#### Commenting on Down Time Reason

When the user clicks on the  icon in the right-hand column, the downtime note panel appears. The user can enter a note that will be associated with the downtime reason entry.

### Properties

This component has standard Ignition events with the addition of the following properties:

**Line Path** The *line* path of the production *line* that this component is associated with. This is the full path name of the *line* starting with the project name.

For example: "OEEDemo\Your Enterprise\Your Site\Your Area\Line 1"

Scripting name      linePath  
Data Type            String

**Editable** This controls if users can change reason codes and split downtime events.

Scripting name      editable  
Data Type            Boolean

**Enable Notes** If true users can enter notes for each downtime entry in the table.

Scripting name      enableNotes  
Data Type            Boolean

### Events

This component has standard Ignition events

Methods

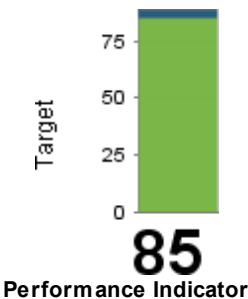
(none)

4.2.2 Performance Indicator



Description

A component that displays an indication of actual versus target values. It provides a visual indication to users that is easy to comprehend with a quick glance. These values can be unit count, OEE or any values residing in SQLTags.



This is similar to a bar chart except that it only has 2 series or bars. Also, the values reside in SQLTags instead of having to setup values in an Ignition Dataset.

Properties

This component has the same properties as the Ignition Bar Chart Component with the addition of the following properties:

**Actual Value**      The value that is represented by the actual indication bar.

Scripting name      actualValue  
Data Type            Double

**Actual Label**      The text displayed to describe the actual value.

Scripting name      actualLabel  
Data Type            String

**Actual Series Color**The color to use for the actual indication bar.

Scripting name      actualSeriesColor  
Data Type            Color

**Chart Type**            The type of chart to show.

Scripting name      chartType  
Data Type            CategoryItemRenderer

Options:              3D Bars  
                         3D Stacked Bars  
                         Area  
                         Bars  
                         Layered  
                         Stacked Bars  
                         Indicator

**Target Value**            The value represented by the target indication bar.

Scripting name      targetValue  
Data Type            Double

**Target Label**            The text displayed to describe the target value.

Scripting name      targetLabel  
Data Type            String

**Target Series Color**The color to use for the target indication bar.

Scripting name      targetSeriesColor  
Data Type            Color

**Editable**                This controls if users can change reason codes and split  
                             downtime events.

Scripting name      editable  
Data Type            Boolean

**Events**  
This component has standard Ignition events

**Methods**

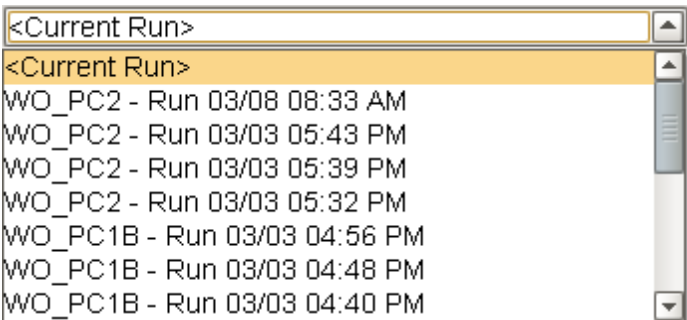
(none)

4.2.3 Line Run Selector



Description

A component that provides users to select a production run from a drop-down list of available runs on a production *line*. The user can also select the current run by selecting <Current Run>.



Line Run Selector

Properties

This component has standard Ignition properties with the addition of the following properties:

**Line Path**                      The *line* path of the production *line* that this component is associated with. This is the full path name of the *line* starting with the project name.

For example: "OEEDemo\Your Enterprise\Your Site\Your Area\Line 1"

Scripting name	linePath
Data Type	String

**Run ID**                              The currently selected production run ID. This is the ID for the "Run" database table.

Scripting name	runID
Data Type	Integer

Events

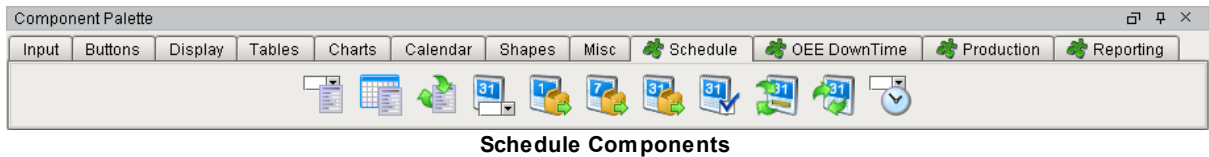
This component has standard Ignition events.

Methods

(none)

## 4.3 Schedule Components

When the Schedule Module, which is part of the OEE Downtime and Scheduling Module, a new component tab will appear. On it are components that provide functionality specific to the work orders, product codes and scheduling.

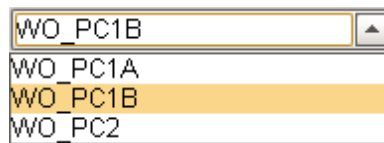


### 4.3.1 Work Order Selector



#### Description

A component that provides users to select a work order from a drop-down list of available work orders for a production *line*. The available options include only work orders for product codes that are enabled to run on the specified production *line*. All work orders are automatically displayed from the "WorkOrder" database table without the need for custom SQL statements or script.



**Work Order Selector**

#### Properties

This component has standard Ignition properties with the addition of the following properties:

##### Line Path

The *line* path of the production *line* that this component is associated with. This is the full path name of the *line* starting with the project name.

For example: "OEE Demo\Your Enterprise\Your Site\Your Area\Line 1"

Scripting name      `linePath`

Data Type          `String`



**Selected Work Order ID** The currently selected work order ID. This is the ID for the "WorkOrder" database table.

Scripting name      selectedWorkOrderID  
Data Type            Integer

### Events

This component has standard Ignition events.

### Methods

(none)

## 4.3.2 Work Order Table



### Description

A component that displays all the available work orders in a table and calculates the units produced, scheduled and remaining for each work order. All work orders are automatically displayed from the "WorkOrder" database table within the date range of **From Date** and **To Date** properties without the need for custom SQL statements or script.

Closed	Hide	Work Order	Product Code	Description	Quantity	Produced	Scheduled	Remaining
<input type="checkbox"/>	<input type="checkbox"/>	WO_PC1B	PC_001	Product Code 1	42,000	43,889	480	-2,369
<input type="checkbox"/>	<input type="checkbox"/>	WO_PC2	PC_002	Product Code 2	67,000	30,747	1,540	34,713
<input type="checkbox"/>	<input type="checkbox"/>	WO_PC3	PC_003	Product Code 3	623,852	0	0	623,852
<input type="checkbox"/>	<input type="checkbox"/>	WO_PC1A	PC_001	Product Code 1	10,000	32,488	0	-22,488

**Work Order Table**

The users can click on a checkbox in the **Closed** column to close out a work order. After it is closed out, it will no longer show in the Work Order Table component and it will not be available in any other work order selector components. This feature is provided because some production runs may finish before the target number of units are produced due to lack of raw materials, change in production priorities, etc.

The user can also click on a checkbox in the **Hide** column to hide the work order from being shown in the Work Order Component. Implementations that integrate with other software systems, such as an ERP system, may show work orders that are not relevant to this system. By hiding them, this list can be kept clean of unrelated work orders.

## Properties

This component has standard Ignition properties with the addition of the following properties:

<b>To Date</b>	This property is the starting date of when work orders were created.
Scripting name	startDate
Data Type	Date
<b>From Date</b>	This property is the ending date of when work orders were created.
Scripting name	endDate
Data Type	Date
<b>Show Closed</b>	If set to true, will show the closed work orders.
Scripting name	showClosed
Data Type	Boolean
<b>Show Hidden</b>	If set to true, will show the hidden work orders.
Scripting name	showHidden
Data Type	Boolean

## Events

This component has standard Ignition events.

## Methods

(none)

### 4.3.3 Work Order Controller



## Description

An invisible component that provides adding, editing and deleting work orders. The term *invisible component* means that the control appears during design time, but is not visible during runtime. Work orders are stored in the "WorkOrder" database table and this control handles all SQL statements, duplicate checking, etc.

Alternatively, work orders can added directly into the "WorkOrder" database table directly, bypassing the OEE Downtime and Scheduling Module. This method supports integration to ERP or other software systems.

## Properties

This component has standard Ignition properties.

Events

This component has standard Ignition events.

Methods

```
addWorkOrderEntry(workOrder, productCode, quantity)
```

Add new work order.  
paramet

workOrder	The work order number to add to the database Data TypeString
productCode	The product code to produce for work order being adde Data TypeString
quantity	The quantity of units to produce for work order being ac Data TypeInteger
returns	
message	contains a description of any error encountered, otherw empty Data TypeString

```
editWorkOrderEntry(workOrder, productCode, quantity, workOrderID)
```

Edit an existing work order.  
paramet

workOrder	The work order number to add to the database Data TypeString
productCode	The product code to produce for work order being adde Data TypeString
quantity	The quantity of units to produce for work order being ac Data TypeInteger
workOrderID	The ID of the work order to modify. This is the ID for the database table. Data TypeInteger
returns	
message	contains a description of any error encountered, otherw

empty  
Data Type String

`deleteWorkOrderEntry (workOrderID)`

Delete an existing work order.  
paramet

workOrderID      The ID of the work order to modify. This is the ID for the database table.  
Data Type Integer

returns  
message      contains a description of any error encountered, otherwise empty  
Data Type String

Example Code

The following script can be entered in a button's actionPerformed event. It will add the work order to the database. The return message will indicate if there are any issues adding the product code, such as if the work order already exists.

```
esp = event.source.parent # shorthand
workOrder = esp.getComponent('WorkOrderField').text
prodCode = esp.getComponent('ProductCodeDropdown').selectedStringValue
quantity = esp.getComponent('QuantityField').intValue

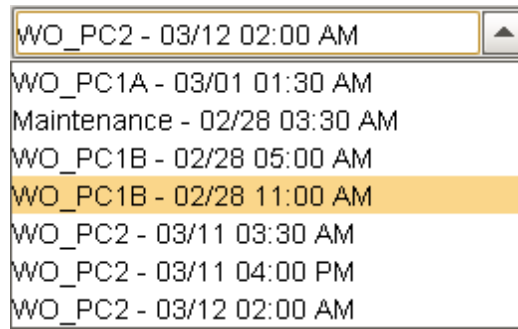
ctrl = esp.getComponent('Work Order Controller')
result = ctrl.addWorkOrderEntry(workOrder, prodCode, quantity)
if len(result) == 0:
    system.nav.closeParentWindow(event)
```

4.3.4 Line Schedule Selector



Description

A component that provides users to select a scheduled entry from a drop-down list of available schedule entries for a production *line*. The available options include only schedule entries that were scheduled for the production *line* and have not already been selected. All schedule entries are automatically displayed from the "Schedule" database table without the need for custom SQL statements or script.



Line Schedule Selector

## Properties

This component has standard Ignition properties with the addition of the following properties:

### Line Path

The *line* path of the production *line* that this component is associated with. This is the full path name of the *line* starting with the project name.

For example: "OEE Demo\Your Enterprise\Your Site\Your Area\Line 1"

Scripting name	linePath
Data Type	String

### Schedule ID

The currently selected ID of the schedule entry. This is the ID for the "Schedule" database table.

Scripting name	scheduleID
Data Type	Integer

## Events

This component has standard Ignition events.

## Methods

(none)

### 4.3.5 Schedule Day View

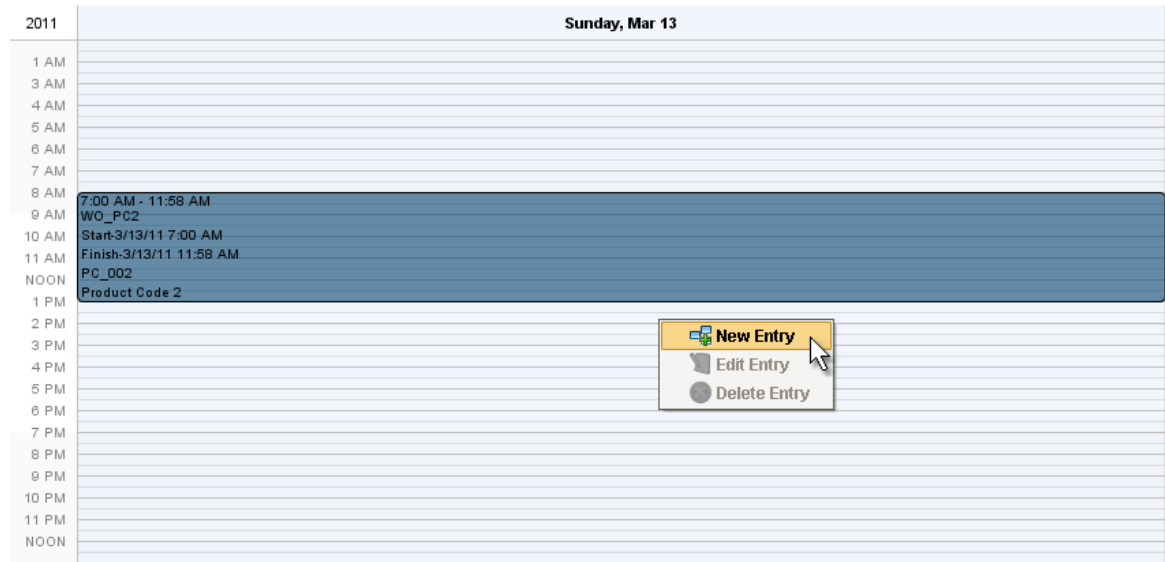


## Description

A component that displays scheduled entries for a selected day. This extends from the Day View Component that comes with Ignition to support adding, editing and deleting

schedule entries. All schedule entries are automatically displayed from the "Schedule" and other database tables without the need for custom SQL statements or script.

When the user right clicks on a time, a popup menu will appear with options to add, edit or delete a schedule entry.



Schedule Day View

## Properties

### Data

This component has the same properties as the Ignition Day View Component with the addition of the following properties:

**Line Path** The *line* path of the production *line* that this component is associated with. This is the full path name of the *line* starting with the project name.

For example: "OEE Demo\Your Enterprise\Your Site\Your Area\Line 1"

Scripting name `linePath`

Data Type `String`

**Current Date** The date to show schedule entries for.

Scripting name `currentDate`

Data Type `Date`

### Events

This control has the same events as the Ignition Table Component with the addition of the following events:

<b>newEvent</b>	Is fired when the <b>New Entry</b> menu item is selected.
<b>editEvent</b>	Is fired when the <b>Edit Entry</b> menu item is selected.
<b>deleteEvent</b>	Is fired when the <b>Delete Entry</b> menu item is selected.

## Methods

(none)

## Example Code

The following script can be entered into the newEvent event of this component. It collects the selected time when the right-click occurred and opens a new window with the collected values as parameters.

```
param1 = event.source.parent.getComponent('Production Line Selector').selectedLine
param2 = event.source.parent.getComponent('Schedule Day View').hoveredTimeLatched
system.nav.openWindow('ScheduleNew', {'LinePath' : param1, 'CurrentDate' : param2})
system.nav.centerWindow('ScheduleNew')
```

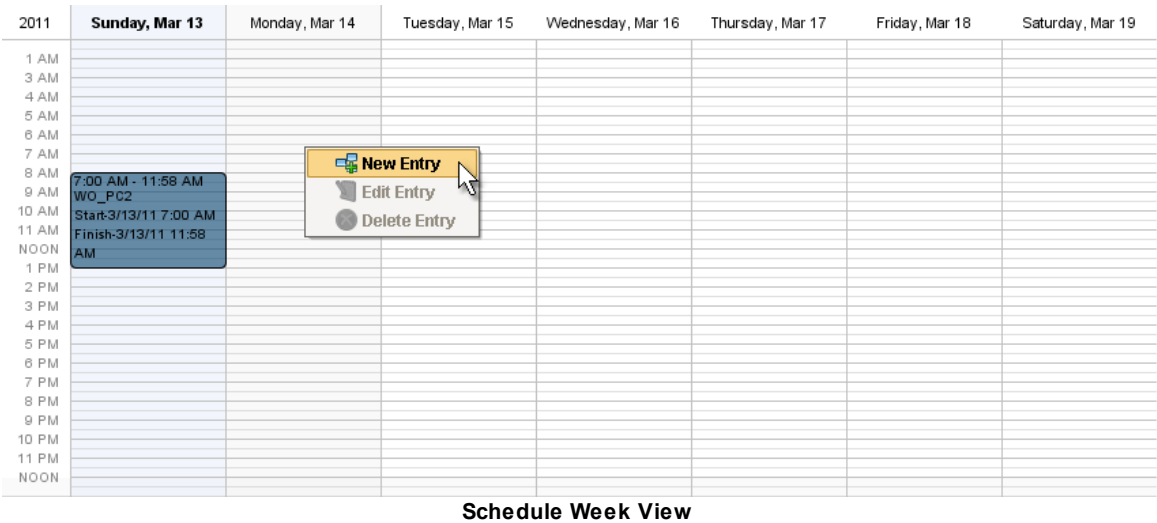
### 4.3.6 Schedule Week View



## Description

A component that displays scheduled entries for a selected week. This extends from the Week View Component that comes with Ignition to support adding, editing and deleting schedule entries. All schedule entries are automatically displayed from the "Schedule" and other database tables without the need for custom SQL statements or script.

When the user right clicks on a time, a popup menu will appear with options to add, edit or delete a schedule entry.



Properties

Data

This component has the same properties as the Ignition Week Component with the addition of the following properties:

**Line Path**                      The *line* path of the production *line* that this component is associated with. This is the full path name of the *line* starting with the project name.

For example: "OEEDEmo\Your Enterprise\Your Site\Your Area\Line 1"

Scripting name                      linePath  
Data Type                              String

**Current Date**                      The date to show schedule entries for. The date can be any day from Sunday to Saturday.

Scripting name                      currentDate  
Data Type                              Date

Events

This control has the same events as the Ignition Table Component with the addition of the following events:

**newEvent**                      Is fired when the **New Entry** menu item is selected.

**editEvent**                      Is fired when the **Edit Entry** menu item is selected.

**deleteEvent**                      Is fired when the **Delete Entry** menu item is selected.

Methods



(none)

Example Code

The following script can be entered into the newEvent event of this component. It collects the selected time when the right-click occurred and opens a new window with the collected values as parameters.

```
param1 = event.source.parent.getComponent('Production Line Selector').selectedLine
param2 = event.source.parent.getComponent('Schedule Week View').hoveredTimeLatched
system.nav.openWindow('ScheduleNew', {'LinePath' : param1, 'CurrentDate' : param2})
system.nav.centerWindow('ScheduleNew')
```

4.3.7 Schedule Month View



Description

A component that displays scheduled entries for a selected month. This extends from the Month View Component that comes with Ignition to support adding, editing and deleting schedule entries. All schedule entries are automatically displayed from the "Schedule" and other database tables without the need for custom SQL statements or script.

When the user right clicks on a time, a popup menu will appear with options to add, edit or delete a schedule entry.

March 2011						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	28	1 ●WO_PC1A Start-3/1/..	2 ●WO_PC1B Start-3/2/..	3 ●WO_PC1B Start-3/3/..	4 ●WO_PC1B Start-3/4/..	5 ●WO_PC1B Start-3/5/..
6	7 ●WO_PC1B Start-3/7/..	8 ●WO_PC1B Start-3/7/.. ●WO_PC1B Start-3/8/..	9 ●WO_PC.. ●WO_PC.. ●WO_PC2 Start-3/10/1 ●WO_PC2 Start-3/10/1 ●WO_PC.. ●WO_PC2 Start-3/10/1	10 ●WO_PC2 Start-3/10/1 ●WO_PC2 Start-3/10/1 ●WO_PC2 Start-3/10/1	11 ●WO_PC.. ●WO_PC.. ●WO_PC2 Start-3/12/1	12
13 ●WO_PC2 Start-3/13/..	14	15	<div>New Entry Edit Entry Delete Entry</div>	17	18	19
20	21	22		24	25	26
27	28	29	30	31	1	2

Schedule Month View

Properties

Data

This component has the same properties as the Ignition Month View Component with the addition of the following properties:

**Line Path** The *line* path of the production *line* that this component is associated with. This is the full path name of the *line* starting with the project name.

For example: "OEE Demo\Your Enterprise\Your Site\Your Area\Line 1"

Scripting name	linePath
Data Type	String

**Current Date** The date to show schedule entries for. The date can be any day within the month.

Scripting name	currentDate
Data Type	Date

## Events

This control has the same events as the Ignition Table Component with the addition of the following events:

<b>newEvent</b>	Is fired when the <b>New Entry</b> menu item is selected.
<b>editEvent</b>	Is fired when the <b>Edit Entry</b> menu item is selected.
<b>deleteEvent</b>	Is fired when the <b>Delete Entry</b> menu item is selected.

## Methods

(none)

## Example Code

The following script can be entered into the newEvent event of this component. It collects the selected time when the right-click occurred and opens a new window with the collected values as parameters.

```
param1 = event.source.parent.getComponent('Production Line Selector').selectedLine
param2 = event.source.parent.getComponent('Schedule Week View').hoveredTimeLatched
system.nav.openWindow('ScheduleNew', {'LinePath' : param1, 'CurrentDate' : param2})
system.nav.centerWindow('ScheduleNew')
```

### 4.3.8 Schedule Date Selector



## Description

A component that provides an easy method for users to select a day. It synchronizes the Schedule Day View, Schedule Week View and Schedule Month View components to all be selected to the same date.

**March 2011**

S	M	T	W	T	F	S
27	28	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2

**Schedule Date Selector**

## Properties

This component has the same properties as the Ignition Month View Component with the addition of the following properties:

**Current Date**      The currently selected date.

Scripting name      currentDate  
Data Type            Date

**Selected Day**      The currently selected date.

Scripting name      currentDate  
Data Type            Strin

**Add Day**      Used to adjust the currently selected day by a specified number of days forward or backwards. If the specified number of days is positive, then the current date will be adjust forward by the number of days specified. If the specified number of days is negative, then the current date will be adjust back by the number of days specified.

Scripting name      addDay  
Data Type            Integer

**Add Month**      Used to adjust the currently selected day by a specified number of months forward or backwards. If the specified number of months is positive, then the current date will be adjust forward by the number of months specified. If the specified number of months is negative, then the current date will be adjust back by the number of months specified.

Scripting name      addMonth  
Data Type            Integer

<b>Add Year</b>	Used to adjust the currently selected day by a specified number of years forward or backwards. If the specified number of years is positive, then the current date will be adjust forward by the number of years specified. If the specified number of years is negative, then the current date will be adjust back by the number of years specified.
Scripting name	addYear
Data Type	Integer

### Events

This component has standard Ignition events.

### Methods

(none)

### Example Code

The following script can be entered into a button's actionPerformed to change the Schedule Date Selector's Current Date back 1 day.

```
event.source.parent.getComponent('Schedule Date Selector').addDay = -1
```

## 4.3.9 Schedule Entry Controller



### Description

An invisible component that provides adding, editing and deleting schedule entries. The term *invisible component* means that the control appears during design time, but is not visible during runtime. Scheduled entries are stored in the "Schedule" database table and this control handles all SQL statements, duplicate checking, etc.

This component has built-in functionality to calculate finish date and time of work order type schedule entries based on the start date and time, product code, change over time, quantity and configured workday routine breaks.

Alternatively, schedule entries can added directly into the "Schedule" database table directly, bypassing the OEE Downtime and Scheduling Module. This method supports integration to ERP or other software systems.

The properties are provided so that after the **Schedule ID** property is set, selection components can be bound to them to display their current values. The methods are provided to perform adding, editing and deleting of schedule entries.

### Properties

This component has standard Ignition properties with the addition of the following properties:

<b>Schedule ID</b>	<p>The currently selected ID of the schedule entry being edited. This is the ID for the "Schedule" database table.</p> <p>Scripting name      scheduleID Data Type            Integer</p>
<b>Line Path</b>	<p>The <i>line</i> path of the production <i>line</i> that this component is associated with. This is the full path name of the <i>line</i> starting with the project name.</p> <p>For example: "OEE Demo\Your Enterprise\Your Site\Your Area\Line 1"</p> <p>Scripting name      linePath Data Type            String</p>
<b>Work Order ID</b>	<p>The current ID of the work order being scheduled. This is the ID for the "WorkOrder" database table.</p> <p>Scripting name      workOrderID Data Type            Integer</p>
<b>Work Order</b>	<p>The work order number being scheduled.</p> <p>Scripting name      workOrder Data Type            String</p>
<b>Product Code</b>	<p>The product code number associated with the work order being scheduled.</p> <p>Scripting name      productCode Data Type            String</p>
<b>Product Code Description</b>	<p>The product code description associated with the work order being scheduled.</p> <p>Scripting name      productCodeDescription Data Type            String</p>
<b>Schedule Type</b>	<p>The type of schedule entry.</p> <p>Scripting name      scheduleType Data Type            Integer</p> <p>Options:</p> <p>0 = Work Order Run 1 = Maintenance 2 = Other</p>

**Start Date Time** The start date and time of the schedule entry.

Scripting name      startDateTime  
Data Type            Date

**Run Start Date Time** The run start date and time of the schedule entry. The **Run Start Date Time** is the **Start Date Time** adjusted by the **Change Over Duration**. This is the date and time after change over is complete and the actual production begins.

Scripting name      runStartDateTime  
Data Type            Date

**Change Over Duration** The duration in minutes allowed for changeover.

Scripting name      changeOverDuration  
Data Type            Integer

**Finish Date Time** The finish date and time for the schedule entry.

Scripting name      finishDateTime  
Data Type            Date

**Override the Finish Date Time** If true, a manual finish date and time will be used instead of the automatic calculation to forecast the finish time.

Scripting name      finishDateTimeOverriden  
Data Type            Boolean

**Quantity** The quantity of units to produce for this schedule entry.

Scripting name      quantity  
Data Type            Integer

**Note** An optional note to associate with the schedule entry.

Scripting name      note  
Data Type            String

## Events

This component has standard Ignition events.

## Methods

```
addScheduleEntry(linePath, workOrderID, scheduleType, start,
coDuration, finish, quantity, userName, note)
```

Add a new schedule entry.  
**param**

linePath	<p>The line path of the production <i>line</i> that this component is associated with. This is the full path name of the <i>line</i> starting with the project name.</p> <p>For example: "OEE Demo\Your Enterprise\Your Site\Your Area\Line 1"</p> <p>Data Type <span>String</span></p>
workOrderID	<p>The ID of the work order to modify. This is the ID for the "WorkOrder" database table.</p> <p>Data Type <span>Integer</span></p>
scheduleType	<p>The type of schedule entry.</p> <p>Data Type <span>Integer</span></p> <p>Options:</p> <ul style="list-style-type: none"> <li>0 = Work Order Run</li> <li>1 = Maintenance</li> <li>2 = Other</li> </ul>
start	<p>The starting date and time of the schedule entry.</p> <p>Data Type <span>Date</span></p>
coDuration	<p>The duration of the changeover in minutes.</p> <p>Data Type <span>Integer</span></p>
finish	<p>The ending date and time of the scheduled entry.</p> <p>Data Type <span>Date</span></p>
quantity	<p>The quantity of units to produce for this schedule entry.</p> <p>Data Type <span>Integer</span></p>
userName	<p>The name of the user who is adding this scheduled entry.</p> <p>Data Type <span>String</span></p>
note	<p>An optional note to be tied to this scheduled entry.</p> <p>Data Type <span>String</span></p>

**returns**

message	<p>Contains a description of any error encountered, otherwise empty.</p> <p>Data Type <span>String</span></p>
---------	---

```
editScheduleEntry(linePath, workOrderID, scheduleType, start,
```

coDuration, finish, quantity, userName, note, scheduleID)

Edit an existing schedule entry.

**param**

linePath	<p>The line path of the production <i>line</i> that this component is associated with. This is the full path name of the <i>line</i> starting with the project name.</p> <p>For example: "OEEDEmo\Your Enterprise\Your Site\Your Area\Line 1"</p> <p>Data Type <span>String</span></p>
workOrderID	<p>The ID of the work order to modify. This is the ID for the "WorkOrder" database table.</p> <p>Data Type <span>Integer</span></p>
scheduleType	<p>The type of schedule entry.</p> <p>Data Type <span>Integer</span></p> <p>Options:</p> <ul style="list-style-type: none"> <li>0 = Work Order Run</li> <li>1 = Maintenance</li> <li>2 = Other</li> </ul>
start	<p>The starting date and time of the schedule entry.</p> <p>Data Type <span>Date</span></p>
coDuration	<p>The duration of the changeover in minutes.</p> <p>Data Type <span>Integer</span></p>
finish	<p>The ending date and time of the scheduled entry.</p> <p>Data Type <span>Date</span></p>
quantity	<p>The quantity of units to produce for this schedule entry.</p> <p>Data Type <span>Integer</span></p>
userName	<p>The name of the user who is adding this scheduled entry.</p> <p>Data Type <span>String</span></p>
note	<p>An optional note to be tied to this scheduled entry.</p> <p>Data Type <span>String</span></p>
scheduleID	<p>The ID of the schedule entry to modify. This is the ID for the "Schedule" database table.</p> <p>Data Type <span>Integer</span></p>

**returns**

message      Contains a description of any error encountered, otherwise empty.



empty  
Data Type String

`deleteScheduleEntry (workOrderID)`

Delete an existing schedule entry.  
paramet

scheduleID The ID of the schedule entry to modify. This is the ID fo  
"Schedule" database table.  
Data Type Integer

returns  
message Contains a description of any error encountered, other  
empty  
Data Type String

Example Code

The following script can be entered in a button's actionPerformed event. It will add the schedule entry to the database. The return message will indicate if the there are any issues adding the schedule entry. See the OEE Demo project's ScheduleNew window for a full implementation example.

```
esp = event.source.parent
# gather parameters required to add a schedule entry
linePath = esp.LinePath
workOrderID = esp.getComponent('WorkOrderContainer').getComponent('Work Order Sele
scheduleType = esp.getComponent('ScheduleType').selectedValue
startDate = esp.getComponent('StartDateTime').selectedDateTime
coDuration = esp.getComponent('WorkOrderContainer').getComponent('CODuration').sele
finishDate = esp.getComponent('FinishDateTime').selectedDateTime
quantity = esp.getComponent('WorkOrderContainer').getComponent('Quantity').intValu
userName = esp.getComponent('HiddenContainer').getComponent('UserName').text
note = esp.getComponent('note').text
# call the add schedule entry method of the schedule entry controller
result = esp.getComponent('Schedule Entry Controller').addScheduleEntry(linePath, v
# handle result
if (result == ''):
    esp.getComponent('WorkOrderContainer').getComponent('Work Order Selector').select
    system.nav.closeParentWindow(event)
```

4.3.10 Schedule Controller



Description

An invisible component that provides selection of scheduled entries for a specified production *line*. It also provides start, end and resume control of production runs. The term *invisible component* means that the control appears during design time, but is not visible during runtime. Scheduled entries are stored in the "Schedule" database table and this control handles all SQL statements, duplicate checking, etc.

This component has built-in functionality to calculate finish date and time of work order type of schedule entries based on the start date and time, product code, change over time, quantity and configured workday routine breaks.

Alternatively, schedule entries can added directly into the "Schedule" database table directly, bypassing the OEE Downtime and Scheduling Module. This method supports integration to ERP or other software systems.

The properties are provided so that after the **Schedule ID** property is set, selection components can be bound to them to display their current values. The methods are provided to perform adding, editing and deleting of schedule entries.

## Properties

This component has standard Ignition properties with the addition of the following properties:

**Line Path** The *line* path of the production *line* that this component is associated with. This is the full path name of the *line* starting with the project name.

For example: "OEE Demo\Your Enterprise\Your Site\Your Area\Line 1"

Scripting name      `linePath`  
Data Type            `String`

**Running** The current running read only state of the production *line*. The production *line* is considered running if a production run is started and the *line* state is running.

Scripting name      `running`  
Data Type            `Boolean`

**Production Enabled** The current production enabled read only state of the production run. This will be true after the changeover time has expired or the operator initiated the production run start depending on the setting of the Auto Start property that configured in the designer.

Scripting name      `productionEnabled`  
Data Type            `Boolean`

**Can Start** This will be true if a production run can start. It is typically used to control the enable state of a "Start" button on the operator screen.

Scripting name      `canStart`  
Data Type            `Boolean`

<b>Started</b>	This will be true if the production run is started.
	Scripting name      started Data Type            Boolean
<b>Can End</b>	This will be true if a production run can be ended. It is typically used to control the enable state of a "End" button on the operator screen.
	Scripting name      canEnd Data Type            Boolean
<b>Can Resume</b>	This will be true if a production run has been ended and a new schedule entry has not been selected. It is typically used to control the enable state of a "Resume" button on the operator screen.
	Scripting name      canResume Data Type            Boolean
<b>Can Change</b>	This will be true if the current schedule entry can be changed. It is typically used to control the enable state of a Line Schedule Selector component.
	Scripting name      canChangeSchedule Data Type            Boolean
<b>Is Work Order</b>	This will be true if the currently selected schedule entry is a work order type.
	Scripting name      isWorkOrder Data Type            Boolean
<b>Inhibit Start</b>	Can be set to true to prevent a production run from being started.
	Scripting name      inhibitStart Data Type            Boolean
<b>Start</b>	Set to true to start the production run for the current Schedule ID.
	Scripting name      start Data Type            Boolean
<b>End</b>	Set to true to stop the current production run.
	Scripting name      end Data Type            Boolean

**Resume** Set to true to resume the current production run.

Scripting name	resume
Data Type	Boolean

## Events

This component has standard Ignition events.

## Methods

(none)

## Example Code

The following script can be entered in a button's actionPerformed event. It will end the current production run. See the OEE Demo project's Operator\_Control window for a full implementation example.

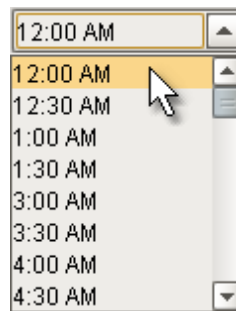
```
value = 1
event.source.parent.getComponent('Schedule Controller').end = value
```

### 4.3.11 Time Selector



## Description

A component that provides users the option to select a time from a drop-down list. The interval of time between each option is defined by the **Time Interval** property.



Time Selector

## Properties

This component has standard Ignition properties with the addition of the following properties:

**Time Interval**                      The time interval between each option in the drop-down list.

Scripting name	linePath
Data Type	String
Options:	
	Hour
	30 minutes
	15 minutes
	10 minutes
	1 minute

**Selected Date Time**                      The currently selected date and time.

Scripting name	selectedDateTime
Data Type	Date

**Date Part**                                      The currently selected date.

Scripting name	datePart
Data Type	Date

**Selected Time**                                      The currently selected time.

Scripting name	selectedTime
Data Type	String

**Events**  
This component has standard Ignition events.

**Methods**

(none)



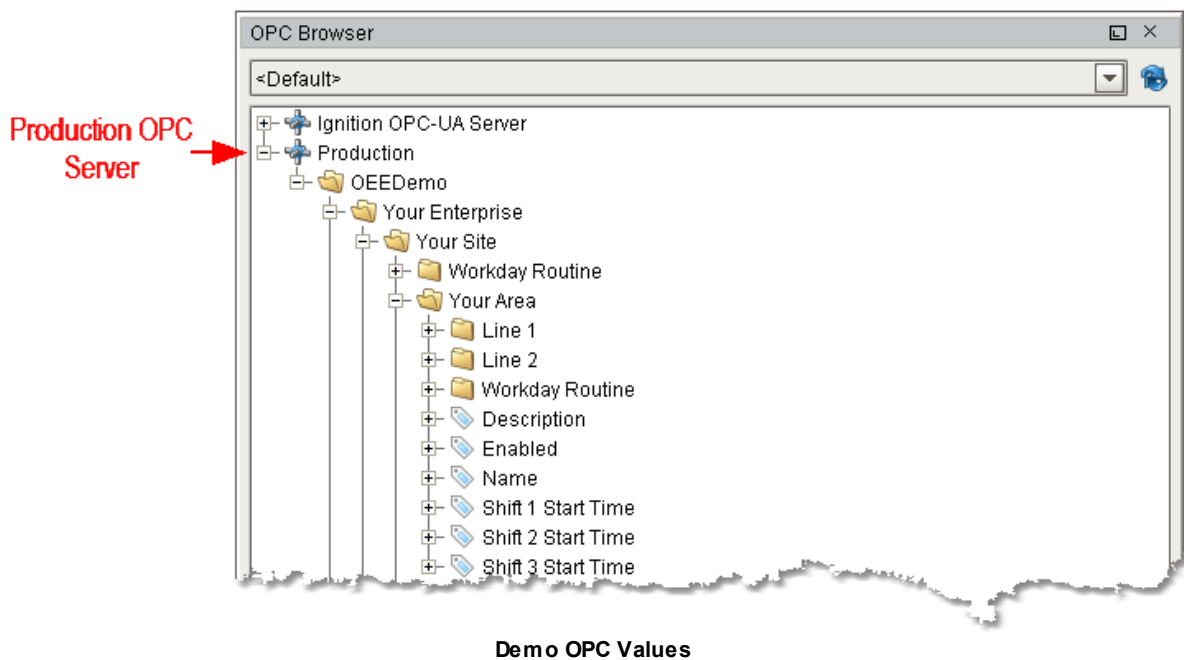
# Production OPC Values

Part V


## 5 Production OPC Values

The production model is defined in the Ignition designer and contains your production areas, lines and cells. A runtime access into configuration and current state of the production model is available through the Production OPC Server. It is added automatically when the OEE Downtime and Schedule Module is installed. When the production items are added, removed or modified, the changes will be reflected in the Production OPC Server when the project is saved in the designer.

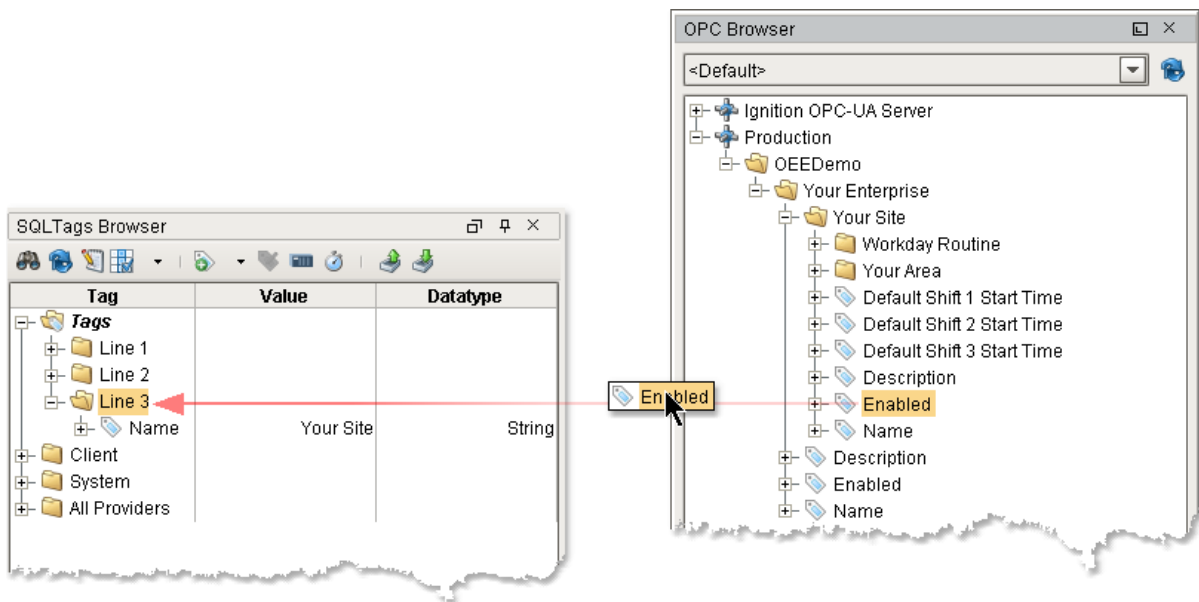
Below is a part of the values available to read, and in some cases write to, for the demo project.



### 5.1 Using OPC Values

The OEE downtime and scheduling configuration settings and runtime values are available for use in Ignition windows, transaction groups, scripting, etc. Before values from the Production OPC Server can be used, they must be added to the Ignition SQLTags. This is done in the designer by selecting the SQLTags Browser and clicking on the  icon. This will cause the OPC Browser to appear. Next, drill down in the **Production** node within the OPC Browser. Drag the desired Production OPC Values over to the SQLTags Browser as depicted below.





Add Production OPC Server Values to SQLTags

**Important:**

When writing to OPC values that are related to production model settings, the new value is not retained upon restarting. This is because production model settings are saved in the Ignition project and is only saved when done so in the designer.

## 5.2 OPC Value Reference

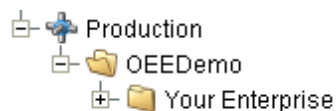
This reference details the OPC values and child folders for node types that appear when browsing the Production OPC Server. For each property, the Ignition data type is listed and if it is read only. The Ignition data types correspond to the data types that are available for SQLTags.

Within this reference, the "Read Only" means that the OPC value cannot be written to through the OPC Production Server. It can only be set in the designer or it is a calculated value. Trying to write to a read only property will result in an error message being shown.

### 5.2.1 Project

#### Description

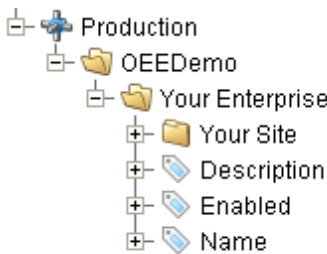
Each project within Ignition has its own production model. The first node(s) under the main **Production** node represent the Ignition project(s). Their names are the same as the project name. The image below represents the OEE Demo project.



Project	
Child Folders	
Enterprise	One folder will exist for each <i>Enterprise</i> that has been configured in the Ignition Designer. The folder can be opened to view all values within the <i>enterprise</i> .

5.2.2 Enterprise

**Description**  
The *enterprise* folder contains some properties associated with the *enterprise* and a folder for each production *Site* within it. The name is the same as the *enterprise* name that is configured in the designer. The image below represents the "Your Enterprise" of the OEEDemo project.

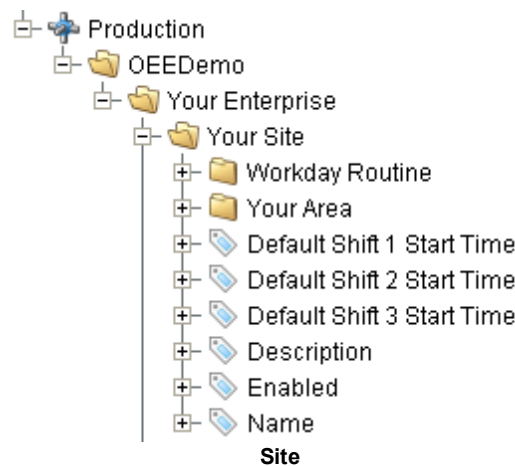


Enterprise	
Child Folders	
Site	One folder will exist for each <i>Site</i> that has been configured in the Ignition Designer. The folder can be opened to view all values within the <i>site</i> .
Properties	
Description	Optionally, this property can be set to a description for the <i>enterprise</i> . It is not used by the OEE Downtime and Scheduling Module other than for reference. String
Enabled	This reflects the <i>enterprise</i> Enabled property in the Designer. If the <i>enterprise</i> Enabled is set to true, then the OEE Downtime and Scheduling module will perform calculations for the <i>enterprise</i> and all <i>sites</i> , <i>areas</i> , <i>lines</i> and <i>cells</i> within it. If this property is set to false, then none of the <i>sites</i> , <i>areas</i> , <i>lines</i> or <i>cells</i> will have calculations performed. Boolean
Name	This reflects the name of the <i>enterprise</i> that is set in the designer. String Read Only

5.2.3 Site

Description

The *site* folder contains some properties associated with the production *site* and a folder for each production *area* within it. The name is the same as the *site* name that is configured in the designer. The image below represents the "Your Site" of the OEE Demo project.



Child Folders

- |                        |   |
|------------------------|---|
| <b>Workday Routine</b> | Contains all of the workday routine entries that are active for the production <i>site</i> .  |
| <b>Area</b>            | One folder will exist for each area that has been configured in the Ignition Designer. The folder can be opened to view all values within the <i>area</i> . |

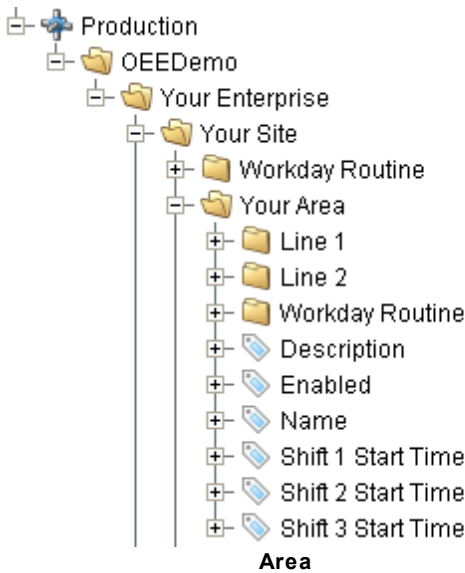
Properties

Description	Optionally, this property can be set to a description for the <i>site</i> . It is not used by the OEE Downtime and Scheduling Module other than for reference.	String
Enabled	This reflects the <i>site</i> Enabled property in the Designer. If the <i>site</i> Enabled is set to true, then the OEE Downtime and Scheduling module will perform calculations for the <i>site</i> and all <i>areas</i> , <i>lines</i> and <i>cells</i> within it. If this property is set to false, then none of the <i>areas</i> , <i>lines</i> or <i>cells</i> will have calculations performed.	Boolean
Name	This reflects the name of the <i>site</i> that is set in the designer.	String Read Only
Default Shift 1 Start Time	This reflects the <i>site</i> Default Shift 1 Start Time property in the Designer. See Site Configuration for more details.	DateTime Read Only
Default Shift 2 Start Time	This reflects the <i>site</i> Default Shift 2 Start Time property in the Designer. See Site Configuration for more details.	DateTime Read Only
Default Shift 3 Start Time	This reflects the <i>site</i> Default Shift 3 Start Time property in the Designer. See Site Configuration for more details.	DateTime Read Only

5.2.4 Area

Description

The *area* folder contains some properties associated with the production *area* and a folder for each production *line* within it. The name is the same as the *area* name that is configured in the designer. The image below represents the "Your Area" of the OEE Demo project.



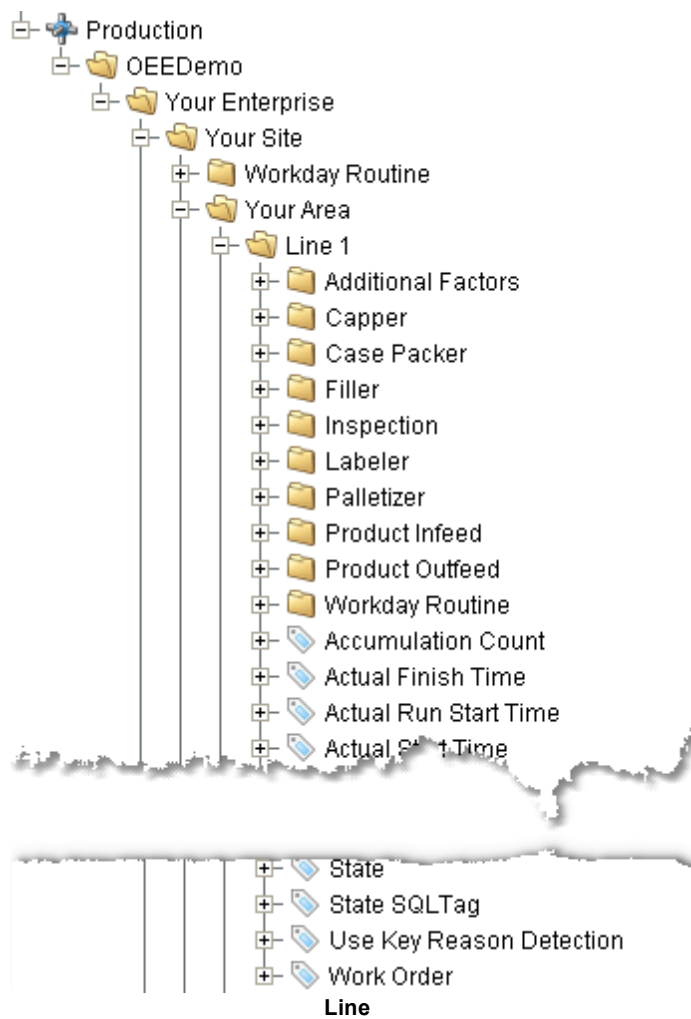
Child Folders

<b>Workday Routine</b>	Contains all of the workday routine entries that are active for the production <i>area</i> .	
<b>Line</b>	One folder will exist for each <i>Line</i> that has been configured in the Ignition Designer. The folder can be opened to view all values within the <i>line</i> .	
<b>Properties</b>		
<b>Description</b>	Optionally, this property can be set to a description for the <i>area</i> . It is not used by the OEE Downtime and Scheduling Module other than for reference.	String
<b>Enabled</b>	This reflects the <i>site</i> Enabled property in the Designer. If the <i>area</i> Enabled is set to true, then the OEE Downtime and Scheduling module will perform calculations for the <i>area</i> and all <i>lines</i> and cell within it. If this property is set to false, then none of the <i>lines</i> or cells will have calculations performed.	Boolean
<b>Name</b>	This reflects the name of the <i>area</i> that is set in the designer.	String Read Only
<b>Shift 1 Start Time</b>	The current Shift 1 Start Time time for the production <i>area</i> . If the associated Shift 1 Start Time property for the <i>area</i> in the designer is set to <i>Inherit From Parent</i> , this will be the time defined for the parent production <i>site</i> . See Area Configuration for more details.	DateTime Read Only
<b>Shift 2 Start Time</b>	The current Shift 2 Start Time time for the production <i>area</i> . If the associated Shift 2 Start Time property for the <i>area</i> in the designer is set to <i>Inherit From Parent</i> , this will be the time defined for the parent production <i>site</i> . See Area Configuration for more details.	DateTime Read Only
<b>Shift 3 Start Time</b>	The current Shift 3 Start Time time for the production <i>area</i> . If the associated Shift 3 Start Time property for the <i>area</i> in the designer is set to <i>Inherit From Parent</i> , this will be the time defined for the parent production <i>site</i> . See Area Configuration for more details.	DateTime Read Only

### 5.2.5 Line

#### Description

The *line* folder contains some properties associated with the production *line* and a folder for each production cell within it. The name is the same as the *line* name that is configured in the designer. The image below represents the "Line 1" of the OEE Demo project.



Child Folders

- Additional Factors** Contains all of the additional factor entries that have been configured for the production *line*. See Additional Factors for more details.
- Downtime Reasons** Contains all of the downtime reasons entries that have been configured for the production *line*. See Downtime Reasons for more details.
- Workday Routine** Contains all of the workday routine entries that are active for the production *line*. See Workday Routine for more details.
- Cell** One folder will exist for each **Cell** that has been configured in the Ignition Designer. The folder can be opened to view all values within the cell.

Properties

Accumulation	$Accumulation\ Count = Infeed\ Count - Run\ Count$	Int4
	This represents the amount of product accumulated on the production <i>line</i> and is adjusted for package count. It will be the same units as the infeed.	Read Only

<b>Actual Finish Time</b>	The date and time that <i>Enable Run</i> property was set to false. This typically happens when the operator clicks the <b>End</b> button.	DateTime Read Only
<b>Actual Run Start Time</b>	The date and time that <i>Enable Run</i> property was set to true. This typically happens when the operator clicks the <b>Start</b> button or a production run auto start occurred (See Line Configuration Schedule Settings for more details).	DateTime Read Only
<b>Actual Start Time</b>	The date and time that new product was selected to run on the <i>line</i> . Typically, this happens when the operator selects a new production run.	DateTime Read Only
<b>Auto Calc Waste</b>	When true, the Run Waste Count and Shift Waste Count values will be automatically calculated using the built-in waste calculation. If false, the Run Waste Count values can be set programmatically. See Auto Waste Calculation for more details.	Boolean Read Only
<b>Calculate Count</b>	This value will increment every time OEE, downtime and scheduling values are calculated for the project production model.	Int4 Read Only
<b>Can Resume Run</b>	If true, all conditions are good to resume a production run.	Boolean Read Only
<b>Can Start Run</b>	If true, all conditions are good to start a production run.	Boolean Read Only
<b>Description</b>	Optionally, this property can be set to a description for the <i>line</i> . It is not used by the OEE Downtime and Scheduling Module other than for reference.	String
<b>Downtime Detection Method</b>	This reflects the current value of the "Downtime Detection Method" setting in the designer.	String Read Only
<b>Enable Run</b>	Setting <i>Enable Run</i> to true will enable the production run for the <i>line</i> . Setting it to false will end the production run. Typically, this is controlled by the functionality of the operator screen, but it can also be handled programmatically.	Boolean
<b>Enabled</b>	This reflects the <i>line</i> Enabled property in the Designer. If the <i>line</i> Enabled is set to true, then the OEE Downtime and Scheduling module will perform calculations for the all cells within it. If this property is set to false, then none of the cells will have calculations performed.	Boolean

<b>Infeed Count</b>	The true unit count at the primary product infeed for the production run. The true unit count reflects the start of production run count and raw count rollovers.	Int4 Read Only
<b>Name</b>	This reflects the name of the <i>line</i> that is set in the designer.	String Read Only
<b>OEE</b>	The current OEE value for the current shift. See OEE for more details.	Float8 Read Only
<b>OEE Availability</b>	The current OEE Availability value for the current shift. See OEE for more details.	Float8 Read Only
<b>OEE Performance</b>	The current OEE Performance value for the current shift. See OEE for more details.	Float8 Read Only
<b>OEE Quality</b>	The current OEE Quality value for the current shift. See OEE for more details.	Float8 Read Only
<b>Prerun Remaining Time</b>	This is the amount of change over time, in minutes, remaining before the scheduled run start time .	String Read Only
<b>Prerun Remaining Time (Seconds)</b>	This is the amount of change over time, in seconds, remaining before the scheduled run start time .	Int4 Read Only
<b>Product Code</b>	The current product code being run on the <i>line</i> . Typically, this is controlled by the functionality of the operator screen, but it can also be handled programmatically. It should only be changed when <i>Enable Run</i> is false.	String
<b>Product Code Description</b>	The description for the current <i>Product Code</i> .	String Read Only
<b>Production Package Count</b>	The current package count of the primary outfeed.	Int4 Read Only
<b>Production Rate (Hourly)</b>	The current hourly production rate of the primary product outfeed. See Production Rate Calculation for more details.	Float8 Read Only
<b>Production Rate (Minute)</b>	The current production rate per minute of the primary product outfeed. See Production Rate Calculation for more details.	Float8 Read Only



e)

<b>Production Units</b>	The units of the production rate. This reflects the units defined in the primary product outfeed. See Product Outfeed for more details.	String Read Only
<b>Run Disabled Reason Code</b>	This reflects the value of the "Run Disabled Reason Code" setting in the designer.	Int4 Read Only
<b>Run Down Time (Minutes)</b>	The total amount of unplanned downtime, in minutes, for the current production run.	Float8 Read Only
<b>Run Elapsed Time (Minutes)</b>	The total minutes that have elapsed from the start of the production run.	Float8 Read Only
<b>Run ID</b>	This is the unique identification number that was generated by the database when a row is inserted into the Run table. It can be used to associate external data to a production run.	Int4 Read Only
<b>Run Ideal Standard Count</b>	The ideal production count, to the minute, for the current production run based on the standard rate. This is based on the time the <i>line</i> is scheduled to run.	Int4 Read Only
<b>Run Planned Downtime (Minutes)</b>	The total amount of planned downtime, in minutes, for the current production run.	Float8 Read Only
<b>Run Production Count</b>	The total production count that has been produced for the current production run. It is in the primary product outfeed units.	Int4 Read Only
<b>Run Standard Count</b>	The ideal production count, to the minute, for the current production run based on the standard rate. This is based on the time the <i>line</i> has been running, not counting any downtime.	Int4 Read Only
<b>Run Standard Variance</b>	The variance between the <i>Run Standard Count</i> and the <i>Run Production Count</i> .	Int4 Read Only
<b>Run Start Date Time</b>	This will equal the time that the production run started or the beginning of the current shift, whichever occurred last.	DateTime Read Only

<b>Run Started</b>	The value will be true if a production run has started. Even if the production run has been ended but a new production run has not been selected, this value will be true.	<b>Boolean</b> Read Only
<b>Run Target Count</b>	The ideal production count, to the minute, for the current production run based on the scheduling rate.	<b>Int4</b> Read Only
<b>Run Target Variance</b>	The variance between the <i>Run Target Count</i> and the <i>Run Production Count</i> .	<b>Int4</b> Read Only
<b>Run Time (Minutes)</b>	The total minutes that the production <i>line</i> has run for the current production run. This value excludes planned and unplanned downtime.	<b>Float8</b> Read Only
<b>Run Waste Count</b>	If the <i>Auto Calc Waste</i> property is true, this values will be the result of the built-in waste calculation. If the <i>Auto Calc Waste</i> property is false, this value can be set programmatically. See Auto Waste Calculation for more details.	<b>Int4</b>
<b>Running</b>	This value will be true if a production run is started and production <i>line</i> is running.	<b>Boolean</b> Read Only
<b>Schedule Rate</b>	The current schedule rate based on the selected product code and <i>line</i> .	<b>Float8</b> Read Only
<b>Schedule Rate Period</b>	The period of time used for the scheduling rate. The options are Hour and Minute.	<b>String</b> Read Only
<b>Scheduled Finish Time</b>	The production run finish date and time as it appears on the schedule.	<b>DateTime</b> Read Only
<b>Scheduled Quantity</b>	The total quantity to produce as it appears on the schedule.	<b>Int4</b> Read Only
<b>Scheduled Run Start Time</b>	The start date and time of the production run as it appears on the schedule.	<b>DateTime</b> Read Only
<b>Scheduled Start Time</b>	The start date and time of the change over as it appears on the schedule.	<b>DateTime</b> Read Only
<b>Sequence No</b>	A number that is 0 at the beginning of a production run and increments at the beginning of every shift.	<b>Int4</b> Read Only

<b>Shift</b>	The current shift based on the shift start times configured for the production <i>line</i> .	Int4 Read Only
<b>Shift 1 Enabled</b>	The current Shift 1 enabled state for the production <i>line</i> . It reflects the Shift 1 Enabled property for the <i>line</i> in the designer. The initial value of this property is determined by the Shift 1 Initial Enabled State property for the production <i>line</i> in the designer. See Line Configuration for more details. It can be changed from the initial value.	Boolean
<b>Shift 1 Start Time</b>	The current Shift 1 Start Time time for the production <i>line</i> . If the associated Shift 1 Start Time property for the <i>line</i> in the designer is set to <i>Inherit From Parent</i> , this be be the time defined for the parent production <i>area</i> . See Line Configuration for more details.	DateTime Read Only
<b>Shift 2 Enabled</b>	The current Shift 2 enabled state for the production <i>line</i> . It reflects the Shift 2 Enabled property for the <i>line</i> in the designer. The initial value of this property is determined by the Shift 2 Initial Enabled State property for the production <i>line</i> in the designer. See Line Configuration for more details. It can be changed from the initial value.	Boolean
<b>Shift 2 Start Time</b>	The current Shift 2 Start Time time for the production <i>line</i> . If the associated Shift 2 Start Time property for the <i>line</i> in the designer is set to <i>Inherit From Parent</i> , this be be the time defined for the parent production <i>area</i> . See Line Configuration for more details.	DateTime Read Only
<b>Shift 3 Enabled</b>	The current Shift 3 enabled state for the production <i>line</i> . It reflects the Shift 3 Enabled property for the <i>line</i> in the designer. The initial value of this property is determined by the Shift 3 Initial Enabled State property for the production <i>line</i> in the designer. See Line Configuration for more details. It can be changed from the initial value.	Boolean
<b>Shift 3 Start Time</b>	The current Shift 3 Start Time time for the production <i>line</i> . If the associated Shift 3 Start Time property for the <i>line</i> in the designer is set to <i>Inherit From Parent</i> , this be be the time defined for the parent production <i>area</i> . See Line Configuration for more details.	DateTime Read Only
<b>Shift Down Time (Minutes)</b>	The total minutes of unplanned downtime for the current shift.	Float8 Read Only
<b>Shift Elapsed Time (Minutes)</b>	The total minutes that have elapsed from the start of the shift.	Float8 Read Only

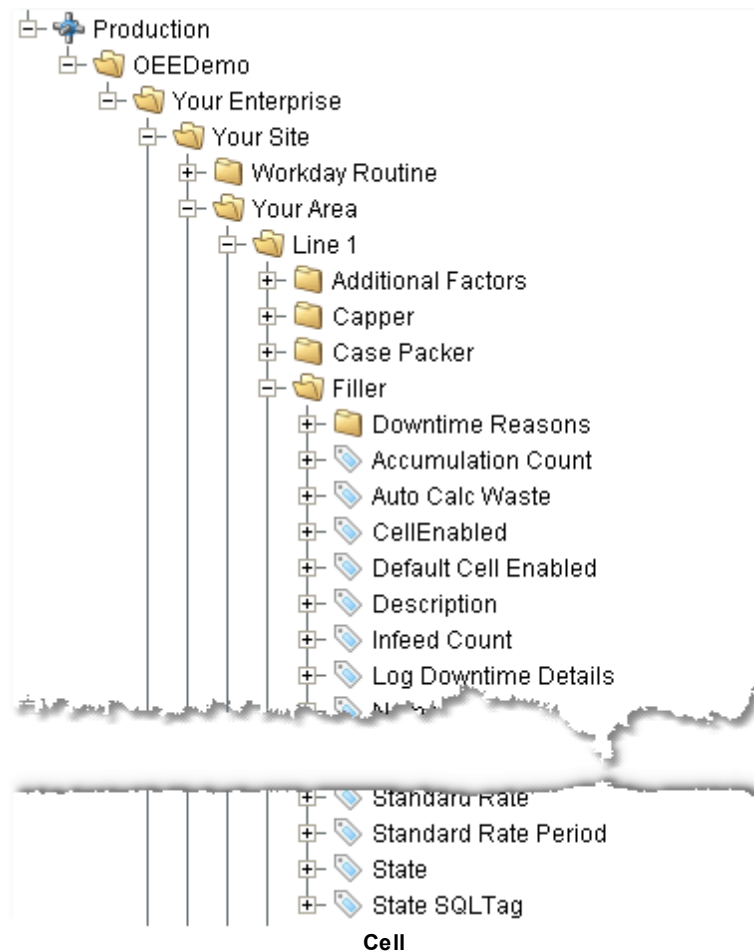
<b>Shift Infeed Count</b>	The true unit count at the primary product infeed for the current shift. The true unit count reflects the start of shift count and raw count rollovers.	<a href="#">Int4</a> Read Only
<b>Shift Production Count</b>	The total production count that has been produced for the current shift. It is in the primary product outfeed units.	<a href="#">Int4</a> Read Only
<b>Shift Run Time (Minutes)</b>	The total minutes that the production <i>line</i> has run for the current shift. This value excludes planned and unplanned downtime.	<a href="#">Float8</a> Read Only
<b>Shift Scheduled Count</b>	The total number of units that should be produced for the current shift. If a production run extends over multiple shifts, this value is calculated for the current shift. This value is adjusted for previous shift true production whether it did not achieve or exceeded its target.	<a href="#">Int4</a> Read Only
<b>Shift Scheduled Finish Time</b>	This value will equal whichever is less of the forecasted production run completion time and the end of the current shift.	<a href="#">DateTime</a> Read Only
<b>Shift Standard Count</b>	The ideal production count, to the minute, for the current shift based on the standard rate.	<a href="#">Int4</a> Read Only
<b>Shift Standard Variance</b>	The variance between the <i>Shift Standard Count</i> and the <i>Shift Production Count</i> .	<a href="#">Int4</a> Read Only
<b>Shift Target Count</b>	The ideal production count, to the minute, for the current shift based on the scheduling rate.	<a href="#">Int4</a> Read Only
<b>Shift Target Variance</b>	The variance between the <i>Shift Target Count</i> and the <i>Shift Production Count</i> .	<a href="#">Int4</a> Read Only
<b>Shift Waste Count</b>	The amount that the <i>Run Waste Count</i> increased for the current shift.	<a href="#">Int4</a> Read Only
<b>Standard Rate</b>	The current standard rate based on the selected product code and <i>line</i> .	<a href="#">Float8</a> Read Only
<b>Standard Rate Period</b>	The period of time used for the standard rate. The options are Hour and Minute.	<a href="#">String</a> Read Only
<b>State</b>	The current state for the production <i>line</i> . The value of 0 is reserved for idle or <i>line</i> powered off and 1 is reserved for running. All other values are defined in the downtime reasons for the production <i>line</i> . See Line Configuration for more details.	<a href="#">Int4</a>

<b>State SQLTag</b>	This reflects the State SQLTag setting that the production <i>line</i> is configured for in the designer. It is the name of the SQLTag to read the current production <i>line</i> state from.	String Read Only
<b>Work Order</b>	The current work order number for the current production run.	String Read Only

## 5.2.6 Cell

### Description

The cell folder contains some properties associated with the production cell. The name is the same as the cell name that is configured in the designer. The image below represents the **Filler** of the OEEDemo project.



### Child Folders

**Downtime Reasons** Contains all of the downtime reasons entries that have been configured for the production cell. See Downtime Reasons for more details.

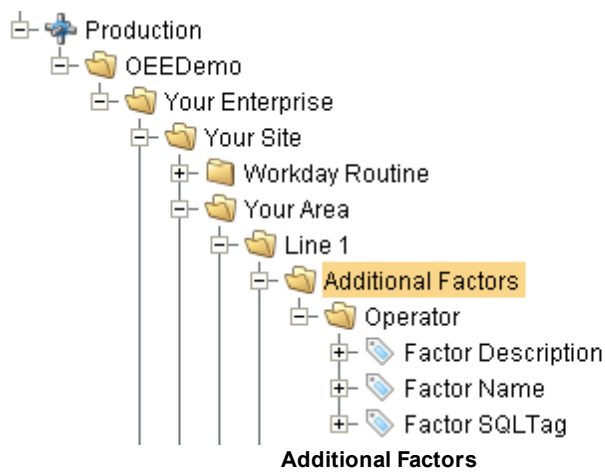
Properties

<b>Accumulation Count</b>	$Accumulation\ Count = Infeed\ Count - Run\ Production\ Count$ . This represents the amount of product accumulated on the production <i>line</i> and is adjusted for package count. It will be the same units as the infeed.	Int4 Read Only
<b>Auto Calc Waste</b>	When true the Run Waste Count and Shift Waste Count values will automatically calculated using the built-in waste calculation. If false, the Run Waste Count values can be set programmatically. See Auto Waste Calculation for more details.	Boolean Read Only
<b>Cell Enabled</b>	If Cell Enabled is set to true, then the OEE Downtime and Scheduling module will perform calculations for the cell. This value is determined by the product code and production <i>line</i> . It can also be programmatically changed.	Boolean
<b>Default Cell Enabled</b>	This reflects the <i>site</i> Default Cell Enabled property in the Designer.	Boolean Read Only
<b>Description</b>	Optionally, this property can be set to a description for the cell. It is not used by the OEE Downtime and Scheduling Module other than for reference.	String
<b>Infeed Count</b>	The true unit count at the primary product infeed for the production run. The true unit count reflects the start of production run count and raw count rollovers.	Int4 Read Only
<b>Name</b>	This reflects the name of the cell that is set in the designer.	String Read Only
<b>OEE</b>	The current OEE value for the current shift. See OEE for more details.	Float8 Read Only
<b>OEE Availability</b>	The current OEE Availability value for the current shift. See OEE for more details.	Float8 Read Only
<b>OEE Performance</b>	The current OEE Performance value for the current shift. See OEE for more details.	Float8 Read Only
<b>OEE Quality</b>	The current OEE Quality value for the current shift. See OEE for more details.	Float8 Read Only
<b>Production Package Count</b>	The current package count of the primary outfeed.	Int4 Read Only
<b>Production Rate (Hourly)</b>	The current hourly production rate of the primary product outfeed. See Production Rate Calculation for more details.	Float8 Read Only
<b>Production Rate (Minute)</b>	The current production rate per minute of the primary product outfeed. See Production Rate Calculation for more details.	Float8 Read Only
<b>Production Units</b>	The units of the production rate. This reflects the	String

5.2.7 Additional Factors

Description

The additional factors folder contains a folder for each additional factor within it. The name of each folder is the same as the additional factor name that is configured in the designer. The image below represents the "Line 1" additional factors of the OEE Demo project. In the OEE Demo there is one additional factor to track the operator during a production run. See Line Configuration and Additional Factors for more details.



Properties

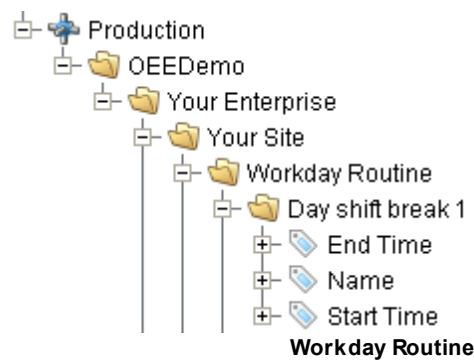
Factor Description	Optionally, this property can be set to a description for the additional factor. It is not used by the OEE Downtime and Scheduling Module other than for reference.	String
Factor Name	This reflects the name of the additional factor that is configured in the designer.	String Read Only
Factor SQLTag	This reflects the Factor SQLTag setting that the additional factor is configured for in the designer. It is the name of the SQLTag to read the factor value from.	String Read Only

5.2.8 Workday Routine

Description

The workday routine folder contains a folder for each workday routine entry within it. The name of each folder is the same as the workday routine entry name that is configured in the designer. The image below represents the *Site* workday routine entries of the OEE Demo project. See Workday Routines for more details.

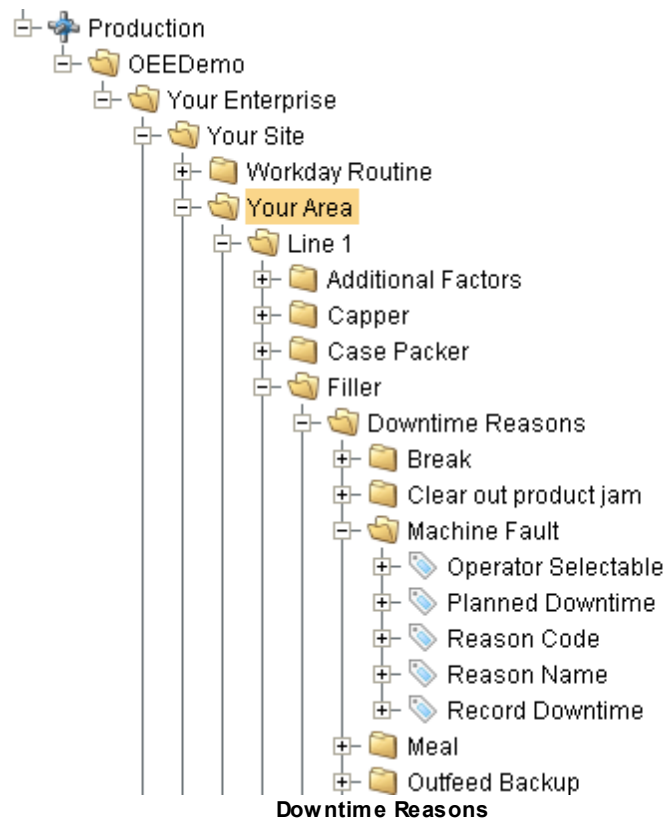




Properties		
Name	This reflects the name of the workday routine entry that is configured in the designer.	String Read Only
Start Time	This reflects the <i>Start Time</i> setting that the workday routine entry is configured for in the designer. It is the time that the workday routine starts.	DateTime Read Only
End Time	This reflects the <i>End Time</i> setting that the workday routine entry is configured for in the designer. It is the time that the workday routine ends.	DateTime Read Only

5.2.9 Downtime Reasons

**Description**  
The downtime reason folder contains a folder for each downtime reason entry within it. The name of each folder is the same as the downtime reason entry name that is configured in the designer. The image below represents the **Filler** cell downtime reason entries of the OEE Demo project. See Downtime Reasons for more details.



## Properties


<b>Reason Name</b>	This reflects the <i>Reason Name</i> property of the downtime reason entry that is configured in the designer.	String Read Only
<b>Reason Code</b>	This reflects the <i>Reason Code</i> property of the downtime reason entry that is configured in the designer.	Int4 Read Only
<b>Record Downtime</b>	This reflects the <i>Record Downtime</i> property of the downtime reason entry that is configured in the designer. If true, downtime events with this reason code will count as unplanned downtime during the OEE calculation.	Boolean Read Only
<b>Planned Downtime</b>	This reflects the <i>Planned Downtime</i> property of the downtime reason entry that is configured in the designer. If true, downtime events with this reason code will count as planned downtime during the OEE calculation.	Boolean Read Only
<b>Operator</b>	This reflects the <i>Operator Selectable</i> property of the downtime reason entry that is configured in the designer. If true, the downtime reason will be shown in the Down Time Table. See Down Time Table for more details.	Boolean Read Only

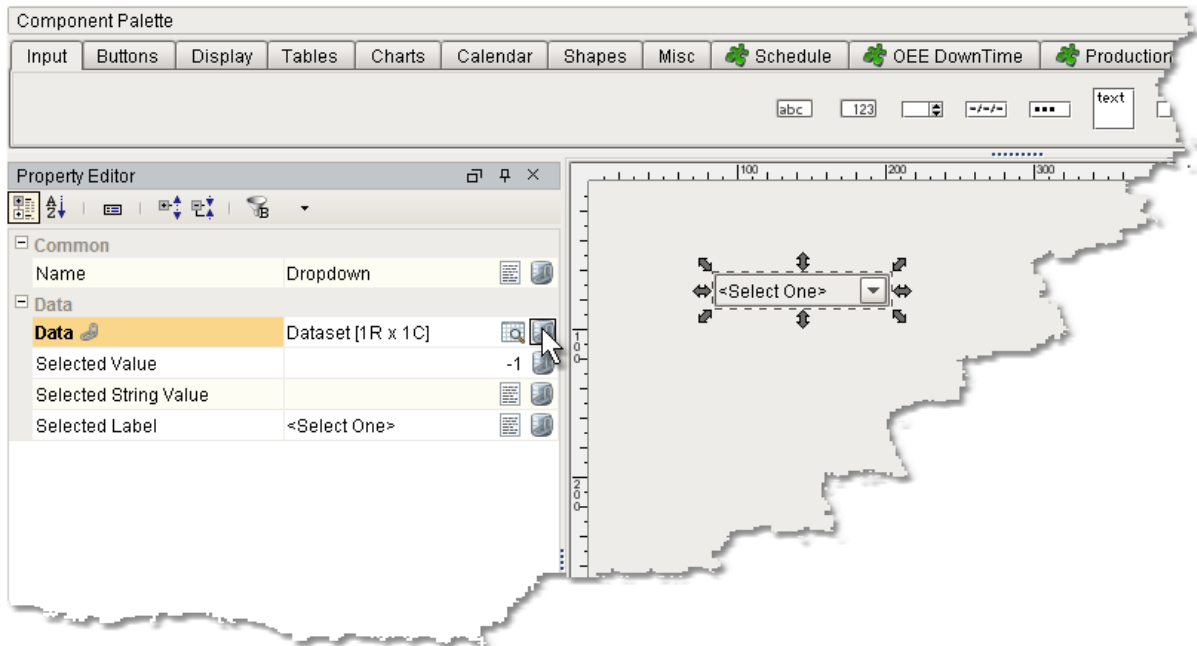
# Binding Function Reference

Part VI

## 6 Binding Function Reference

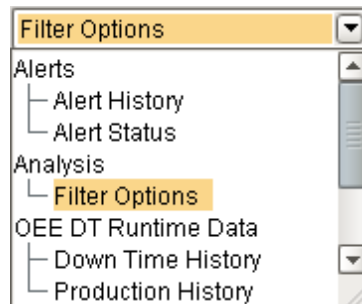
The OEE Downtime and Scheduling Module takes advantage of Ignition's built-in binding functions in order to provide data to the standard components within Ignition.

To access the binding functions, click on the  icon of a component property as shown below.



**Drop-Down List Component**

The binding options window will appear. Next click on the **Functions** option and select one of the binding functions from the drop-down list.



**Binding Options List**

The parameters that are associated with the selected binding function will appear. Each of these parameters can accept a constant value, bound to a property of another

component, or bound to a SQLTag.

Property Binding Window



Once the parameters have been set and the polling mode selected, the server will return the results based on the provided parameter values.

## 6.1 Analysis

The following binding functions are provided by the Production Module, which comes with the OEE Downtime and Scheduling Module.

### 6.1.1 Analysis Filter

#### Description

The Analysis Filter binding function is used to return available filter values for the Analysis Controller Component . Normally this is automatically handled by the Analysis Selector Component , but for the Analysis Controller, these filter values are not known. This

binding function can provide filter option data to a drop-down list or other types of components.

### Function Name

Filter Options

### Parameters

<b>Analysis Type</b>	This parameter is the provider name that will be used. See Analysis Providers for available options.	String
<b>Filter Name</b>	This parameter is the name of the filter for which available options will be returned. See Analysis Providers for available options.	String
<b>Start Date</b>	The starting date range. To reduce the number of options, only the options for the selected date range will be returned.	Date
<b>End Date</b>	The ending date range. To reduce the number of options, only the options for the selected date range will be returned.	Date

### Return

<b>Filter Options</b>	This binding function returns a Dataset with one string column with the available filter options.	Dataset
-----------------------	---	---------

## 6.2 History

The following binding functions are provided by the OEE Downtime Module, which comes with the OEE Downtime and Scheduling Module.

### 6.2.1 Downtime History

#### Description

The Down Time History binding function is used to return historical downtime data for a production run. This data is gathered from the runtime database tables. This binding function can provide downtime data to tables, charts or other types of components.

If the current run is selected, downtime data from the current production run will be returned.

### Function Name

Down Time History

### Parameters

<b>Production Line or Cell Path</b>	The line or cell path of the production item that this component is associated with. This is the full path name of the <i>line</i> or cell starting with the project name. If the path ends with a <i>line</i> , the the <i>line</i> downtime will be returned. If the path includes a cell, then downtime for the specified cell will be returned.	String
<b>Include Total Downtime</b>	For example: "OEE Demo\Your Enterprise\Your Site\Your Area\Line 1". If this parameter value is true, then total downtime for the production <i>line</i> will be included in the results	Boolean
<b>Run ID</b>	The production run ID for which data will be returned. This is the ID for the "Run" database table. If this parameter is set to -1 or left blank, data for the current production run for the specified production <i>line</i> will be returned.	Integer
<b>Run Sequence No</b>	The sequence number starts at 0 when a production run starts. It is incremented by one at the start of a new shift. This provides a method to limit results for a single shift or production runs that span over multiple days.	Integer
<b>Include Entire Run</b>	If this parameter value is true, all shifts for the production run are returned, If it is false, then only the shift specified by the value in <b>Run Sequence No</b> parameter will be returned.	Boolean
<b>Top Reasons to Show</b>	The number of top downtime reasons to return is determined by the value of this parameter.	Integer
<b>Return Downtime History</b>	This binding function returns a Dataset with a variable number of columns based in the parameter settings.	Dataset

## 6.2.2 Production History

### Description

The Production History binding function is used to return historical runtime data for a production run. The data for this binding function is gathered from the runtime database tables. The Production History binding function can provide production run data to tables, charts or other types of components.

If the current run is selected, production data from the current production run will be returned.

### Function Name

Production History

**Parameters**



<b>Production Line Path</b>	The <i>line</i> path of the production <i>line</i> that this component is associated with. This is the full path name of the <i>line</i> starting with the project name.  For example: "OEE Demo\Your Enterprise\Your Site\Your Area\Line 1".	String
<b>Run ID</b>	The production run ID for which data will be returned. This is the ID for the "Run" database table. If this parameter is left blank or set to -1, data for the current production run for the specified production <i>line</i> will be returned.	Integer
<b>Run Sequence No</b>	The sequence number starts at 0 when a production run starts. It is incremented by one at the start of a new shift. This provides a method to limit results for a single shift or production runs that span over multiple days.	Integer
<b>Include Entire Run</b>	If this parameter value is true, all shifts for the production run are returned. If it is false, then only the shift specified by the value in <b>Run Sequence No</b> parameter will be returned.	Boolean
<b>Interval</b>	This parameter specifies the time interval that the results are to be organized by.	Hour, Minute
<b>Number Minute to Show</b>	This parameter specifies the minimum number of minutes in which the results should be returned. This keeps chart appearance from shifting on each update.	Integer
<b>Include Actual Production Counts</b>	If this parameter value is true, actual production counts will be included in the results.	Boolean
<b>Include Standard Production Counts</b>	If this parameter value is true, standard production counts will be included in the results. Standard production counts are based on the standard rate.	Boolean
<b>Include Target Production Counts</b>	If this parameter value is true, target production counts will be included in the results. Target production counts are based on the scheduling rate.	Boolean
<b>Include Line Accumulation Counts</b>	If this parameter value is true, <i>line</i> accumulation counts will be included in the results. Accumulation counts reflect the difference of the infeed and outfeed counts. In other terms, the amount of product that has accumulated on the production <i>line</i> .	Boolean
<b>Include Efficiency Values</b>	If this parameter value is true, the percentage of efficiency will be included in the results.	Boolean

**Return****Production History**

This binding function returns a Dataset with a variable number of columns based in the parameter settings.

[Dataset](#)

# Analysis Providers

Part VII

## 7 Analysis Providers

Analysis providers determine which information will be viewed on a graph or pie chart. Based on which Analysis Provider is selected, some filter, compare by, and data point options may or may not be visible. For example, the filter **Recordable Downtime** can be selected if the analysis provider is Downtime, but not if the analysis provider is Comment.



Analysis Providers

### 7.1 Comment

#### Description

The Comment Analysis Provider is used to query production run comments entered by users.

#### Provider Name

Comment

#### Filters

These are the filters that are available in the OEE Downtime and Scheduling Module. However, in addition to these filters, additional factors may be available if they are string data type. All additional factors start with "Factor:". For example, "Factor:Operator". A filter will allow the user to see all of the data points in the analysis provider as it pertains to a specific *area*, shift, etc. For more information on filters, see the Filter By paragraph in the Analysis Screen section.

**Area**

**Enterprise**

**Line**

**Package Count**

**Product Code**

**Production Units**

**Run**

**Shift**

**Site**

### **Compare By**

These are the comparisons that are available in the OEE Downtime and Scheduling Module. However, in addition to these comparisons, additional factors may be available if they are string data type. All additional factors start with "Factor:". For example, "Factor: Operator". A comparison allows one data point to be compared between all *areas*, days, etc. For more information on comparisons, see the Compare By paragraph in the Analysis Screen section.

**Area**

**Day**

**Enterprise**

**Line**

**Month**

**Package Count**

**Product Code**

**Production Units**

**Run**

**Shift**

**Site**

**Week**

### **Data Points**

These are the data points that are available in the OEE Downtime and Scheduling Module. However, in addition to these comparisons, additional factors may be available if they are string data type. All additional factors start with "Factor:". For example, "Factor: Operator". Data points are the different values that will be presented or compared on a graph or chart. For more information on data points, see the Data Point paragraph in the Analysis Screen section.

**Area**

**Comment**

**Date**

**Entered By**

**Enterprise**

**Line**

**Package Count**

**Product Code**

**Product Code Description**

**Production Units**

**Run**

**Shift**

**Site**

## 7.2 Downtime

### Description

The Downtime Analysis Provider is used to analyze downtime data.

### Provider Name

Downtime

### Filters

These are the filters that are available in the OEE Downtime and Scheduling Module. However, in addition to these filters, additional factors may be available if they are string data type. All additional factors start with "Factor:". For example, "Factor:Operator". A filter will allow the user to see all of the data points in the analysis provider as it pertains to a specific *area*, shift, etc. For more information on filters, see the Filter By paragraph in the Analysis Screen section.

**Area**

**Automatic Reason**

**Cell Name**

**Enterprise**

**Line**

**Operator Reason**

**Package Count**

**Planned Downtime**

**Product Code**

**Production Units**

**Recordable Downtime**

**Run**

**Shift**

**Site**

### **Compare By**

These are the comparisons that are available in the OEE Downtime and Scheduling Module. However, in addition to these comparisons, additional factors may be available if they are string data type. All additional factors start with "Factor:". For example, "Factor: Operator". A comparison allows one data point to be compared between all *areas*, days, etc. For more information on comparisons, see the Compare By paragraph in the Analysis Screen section.



**Area**

**Automatic Reason**

**Cell Name**

**Enterprise**

**Line**

**Operator Reason**

**Package Count**

**Product Code**

**Production Units**

**Run**

**Shift**

**Site**

### **Data Points**

These are the data points that are available in the OEE Downtime and Scheduling Module. However, in addition to these comparisons, additional factors may be available if they are string data type. All additional factors start with "Factor:". For example, "Factor: Operator". Data points are the different values that will be presented or compared on a graph or chart. For more information on data points, see the Data Point paragraph in the Analysis Screen section.

Area

Automatic Reason

Cell Name

Enterprise

Line

Occurrences

Operator Reason

Package Count

Product Code

Production Units

Run

Shift

Site

## 7.3 OEE

### Description

The Run Analysis Provider is used to analyze OEE and production data.

### Provider Name

Run

### Filters

These are the filters that are available in the OEE Downtime and Scheduling Module. However, in addition to these filters, additional factors may be available if they are string data type. All additional factors start with "Factor:". For example, "Factor:Operator". A filter will allow the user to see all of the data points in the analysis provider as it pertains to a specific *area*, shift, etc. For more information on filters, see the Filter By paragraph in the Analysis Screen section.

**Area**

**Cell Name**

**Enterprise**

**Hour Of Run**

**Line**

**Package Count**

**Product Code**

**Production Units**

**Run**

**Shift**

**Site**

### **Compare By**

These are the comparisons that are available in the OEE Downtime and Scheduling Module. However, in addition to these comparisons, additional factors may be available if they are string data type. All additional factors start with "Factor:". For example, "Factor: Operator". A comparison allows one data point to be compared between all *areas*, days, etc. For more information on comparisons, see the Compare By paragraph in the Analysis Screen section.

**Area**

**Cell Name**

**Day**

**Enterprise**

**Hour Of Run**

**Line**

**Month**

**Package Count**

**Product Code**

**Production Units**

**Run**

**Shift**

**Site**

**Week**

### **Data Points**

These are the data points that are available in the OEE Downtime and Scheduling Module. However, in addition to these comparisons, additional factors may be available if they are string data type. All additional factors start with "Factor:". For example, "Factor: Operator". Data points are the different values that will be presented or compared on a graph or chart. For more information on data points, see the Data Point paragraph in the Analysis Screen section.

**Area**

**Cell Down Time**

**Cell Infeed Count**

**Cell Name**

**Cell Package Count**

**Cell Production Count**

**Cell Production Units**

**Cell Run Time**

**Cell Standard Count**

**Cell Target Count**

**Cell Waste Count**

**Date**

**Enterprise**

**Hour Of Run**

**Line**

**Line Infeed Count**

**Line Production Count**

**Line Standard Count**

**Line Standard Rate**

**Line Standard Rate Period**

**Line Target Count**

**Line Waste Count**

**OEE**

**OEE Availability**

**OEE Performance**

## 7.4 Schedule

### Description

The Schedule Analysis Provider is used to analyze scheduled versus actual production run times.

### Provider Name

Schedule

### Filters

These are the filters that are available in the OEE Downtime and Scheduling Module. However, in addition to these filters, additional factors may be available if they are string data type. All additional factors start with "Factor:". For example, "Factor:Operator". A filter will allow the user to see all of the data points in the analysis provider as it pertains to a specific *area*, shift, etc. For more information on filters, see the Filter By paragraph in the Analysis Screen section.

**Area**

**Enterprise**

**Line**

**Package Count**

**Product Code**

**Production Units**

**Run**

**Shift**

**Site**

### Compare By

These are the comparisons that are available in the OEE Downtime and Scheduling Module. However, in addition to these comparisons, additional factors may be available if they are string data type. All additional factors start with "Factor:". For example, "Factor:Operator". A comparison allows one data point to be compared between all *areas*, days, etc. For more information on comparisons, see the Compare By paragraph in the Analysis Screen section.

**Area**

**Enterprise**

**Line**

**Package Count**

**Product Code**

**Production Units**

**Site**

### **Data Points**

These are the data points that are available in the OEE Downtime and Scheduling Module. However, in addition to these comparisons, additional factors may be available if they are string data type. All additional factors start with "Factor:". For example, "Factor: Operator". Data points are the different values that will be presented or compared on a graph or chart. For more information on data points, see the Data Point paragraph in the Analysis Screen section.

**Actual Finish Time**

**Actual Run Start Time**

**Actual Start Time**

**Area**

**Enterprise**

**Line**

**Package Count**

**Product Code**

**Product Code Description**

**Production Units**

**Run**

**Scheduled Finish Time**

**Scheduled Quantity**

**Scheduled Run Start Time**

**Scheduled Start Time**

**Site**

## 7.5 TEEP

### Description

The TEEP Analysis Provider is used to analyze utilization data.

### Provider Name

TEEP

### Filters

These are the filters that are available in the OEE Downtime and Scheduling Module. However, in addition to these filters, additional factors may be available if they are string



data type. All additional factors start with "Factor:". For example, "Factor:Operator". A filter will allow the user to see all of the data points in the analysis provider as it pertains to a specific *area*, shift, etc. For more information on filters, see the Filter By paragraph in the Analysis Screen section.

**Area**

**Enterprise**

**Line**

**Package Count**

**Product Code**

**Production Units**

**Run**

**Site**

### **Compare By**

These are the comparisons that are available in the OEE Downtime and Scheduling Module. However, in addition to these comparisons, additional factors may be available if they are string data type. All additional factors start with "Factor:". For example, "Factor:Operator". A comparison allows one data point to be compared between all *areas*, days, etc. For more information on comparisons, see the Compare By paragraph in the Analysis Screen section.

**Area**

**Enterprise**

**Line**

**Package Count**

**Product Code**

**Production Units**

**Run**

**Site**

### **Data Points**

These are the data points that are available in the OEE Downtime and Scheduling Module. However, in addition to these comparisons, additional factors may be available if they are string data type. All additional factors start with "Factor:". For example, "Factor: Operator". Data points are the different values that will be presented or compared on a graph or chart. For more information on data points, see the Data Point paragraph in the Analysis Screen section.

**Area**

**Enterprise**

**Line**

**Loading (Actual)**

**Loading (Scheduled)**

**OEE**

**OEE Availability**

**OEE Performance**

**OEE Quality**

**Package Count**

**Product Code**

**Production Units**

**Run**

**Shift**

**Site**

**TEEP (Actual)**

**TEEP (Scheduled)**



# Miscellaneous

Part VIII

## 8 Miscellaneous

This section contains additional information to be used for reference.

### 8.1 Additional Factors

The OEE Downtime and Scheduling Module collects and logs a number of downtime and production data values. However, what if other values outside of downtime and production values are of interest? Additional factors are the solution.

Additional Factors are user defined data points that are logged along with the production and downtime information. Once they are logged, they can be shown in charts, tables and reports. Additionally, other analyses can be done by filtering and/or setting up comparisons by their values.

Any value that can be read from an Ignition SQLTag can be added as a additional factor. This includes values derived from scripts, or from barcode readers, databases, calculations, PLCs, etc.

Example: An additional factory named cardboard manufacturer can be added. The operator can select the manufacturer that provided the cardboard or it can be obtained from some other source. Now, OEE and downtime results can be shown for each cardboard manufacturer. This can identify quality problems with raw material that directly affect efficiencies.

In the OEE Demo, the operator is setup as an additional factor. The operator's name will be logged along with the production and downtime data. By doing so, OEE and downtime information can be filtered and grouped by the operator name. But this could just as well be the production crew, supervisor, maintenance crew or any other user defined value that can be monitored or entered into the system.

### 8.2 Auto Waste Calculation

#### Rate per Minute

If auto waste calculation is used, then the waste count is calculated by taking the difference between the production line infeed count and the outfeed count. But before this is calculated, the production counts are adjusted for package count. The accumulation of product on the production *line* is also taken into account. The accumulation is estimated by tracking the number of units that entered the infeed over the transient time.

This is not a precise calculation and in cases where there are accumulation sections between cells on a production *line*, it will not be accurate.

Product Waste:

Name	
Inspection Reject	Line 5/PLC/Inspection

Auto Calc Waste: ☒

Auto Calc Waste

Option

The Auto Waste Calculation option can be found at the bottom of the **OEE** tab of a *Line*, under the Product Waste box.

8.3 Production Rate Calculation

Rate per Minute

The production rate per minute is calculated from the change between the current production count and the production count from the prior minute.

Rate per Hour

The production rate per hour is calculated by recording the production count every minute. Then the hourly rate is calculated from the change between the current production count and the production count from an hour ago. When a production *line* first starts up and there are no production counts from one hour ago, a project calculation is used.





---

# Index

## - A -

Adding a Workday Routine Entry 51

## - D -

Deleting a Workday Routine Entry 51

## - E -

Editing a Workday Routine Entry 51

Endnotes 2... (after index)

Back Cover