Recipe Management

In this section, we will add the ability to create recipes that hold machine settings for the packaging line equipment. We will then download these settings to the line and monitor machine setpoint variance from actual.

The Recipe Management module provides support for managing machine settings for lines, cell groups, cells and location production items. Recipe values can be added to these production items and represent settings that may be written to a PLC or other controller via Ignition tags. The recipe values that are added at the line level are propagated down to production cells, cell groups and locations within the line. This provides a quick method for adding recipe values that are common to all machines (cells) within a line. It also allows for the ability to propagate a recipe value down to all production items within an area.

We have created a couple of templates and popup windows that we'll use during the recipe training that will speed up the development effort.

- Download MES_2.0_Training_Recipe_Base.proj and import into your project.
- Save your project.

Generally, location production items would only be used by Recipe when other production items are not available, due to not having OEE or T&T modules installed or licensed.

Help Manual: Recipe Management Overview

The Recipe Management Module manages and monitors recipes, and is ideal for quickly and accurately changing machine settings or process recipes. Powerful master recipe and sub-recipe management, recipe security, change log tracking, variance tracking and more empower you to take more control of your manufacturing process. The module provides a rich set of components and functions that reduces the time required to manage production recipes and track process variances.

This module helps enforce precision automation that prevent faults, increases throughput and yield, and adjusts processing in order to prolong the time between required maintenance activities. It is ideal for quickly and accurately changing machine, process or system recipes. Powerful master recipe and sub-recipe management, recipe security, change log tracking, variance tracking and more empower you to improve efficiency and quality, and take more control of your manufacturing facility.

In This Section

- Watch the Video
- Recipe Management Demo
- Managing Recipes
- Variance Tracking
- Recipe Scaling
- Recipe Security
- Recipe Change Management
- Recipe Analysis
- Recipe Scripting
- MES Integration
Managing Recipes

The Recipe module provides a framework that allows you to easily build and manage a hierarchy of recipes that can propagate machine settings down to equipment from default values or master recipes that pass their values down to descendant (child) recipes. When you change a setting in the master recipe, it will replicate down to all of its child recipes while still maintaining the specific values of each child recipe. With unlimited levels available for master recipes, you can organize recipes in a hierarchical manner, greatly reducing the effort to maintain recipes.

The visual Recipe Editor component allows you to:

- Create new recipes
- Read current machine settings into a recipe
- Import and Export recipes
- Manage security

Click on the links for more information about Default Recipe Values and Sub Recipes and Master Recipes and Descendants.

Variance Tracking

In manufacturing, it is important to know if the actual production values match the recipe values when the recipe is downloaded and throughout the run in the event they are changed from an outside source. Recipe values are written once when the recipe is first selected and it is important to confirm that the values were successfully set. In the case of the Recipe Module, when a recipe is selected, the values are written to the Ignition tags. This should happen successfully, but there can be expressions, scripts, etc. that prevent the value from being written correctly. This is more of an issue when the Ignition tag is configured as an OPC item connecting it to the PLC or other device. If a communication error occurs when the new recipe value was being written to the PLC or device, then it is very useful to know this before machinery is started.

It is very common to have operator interface terminals (OIT) or a standalone human machine interface (HMI) local to a machine that settings can be changed locally. Settings can also be changed from other sources besides the local OIT, and it is important to detect and log when any setting varies from the recipe value.

There are cases where it is normal for a live production value to vary after the initial recipe value has been written to the Ignition tag. In other cases, it might be okay for the live production value to change within a range. Recipe values can be configured to not monitor variances or to have a variance window that the live production value must fall outside of before the variance is logged. By default the variance monitoring is enabled for each recipe value but it can be disabled by recipe value in the designer. This allows for a mix of recipe values that variances will be monitored and other that will not to prevent irrelevant variances from being logged.

Refer to Recipe Values Settings - Enable Variance Logging for more information on setting up variance tracking.
After a recipe is selected and the initial recipe values are set, it is vital to monitor them for any variances to prevent quality issues, downtime or other production issues. During production, recipe values can be changed from systems outside of the recipe management system, such as an operator interface terminal local to a machine.

By monitoring the recipe values, the variance log in the Recipe Module lets you detect variances in real time or review variances by production run or date range. These capabilities make it possible to identify the root causes of production issues early on.

The variance log also lets you define limits for which variances to record. The following types of thresholds can be defined by recipe value:

- Percentage +/- of recipe value
- Fixed +/- values from recipe value
- Fixed values
- Custom

Recipe Scaling

When using recipes for batch or other processes that can change based on the amount that is produced, recipe scaling will adjust recipe values based on a recipe scale value. In the recipe value configuration, there is an Enable Scaling setting that can be selected. If enabled, whenever a recipe is selected, the recipe value will be scaled by the RecipeScale value.

Refer to Recipe Values settings - Enable Scaling for more information on setting up scaling.

Recipe Security

Now you can extend the strong protection provided by Ignition’s role-based security to your recipes. The Recipe module allows you to:

- Assign user roles
- Set permission for which roles can change which recipe values and by how much

For example, you can give the Administrator role permission to change a setting from 0–100, while limiting the Operator role’s permission to change the setting from 20–80.

Refer to Recipe Security for more information.
Recipe Change Management

Keeping an audit record of when recipes are changed, by who and why can be important especially in industries where regulatory compliance are in force. The Recipe Module records all changes to recipes whether the changes were made from the recipe editor, imported or through scripting. The only changes not automatically detected are changes made directly to the database and proper database security should be implemented if this is a risk.

Whenever a change is made to a recipe setting, the details are recorded in the Recipe module’s change log:

- Who made the change
- When the change was made
- What the previous setting was
- Why the change was made (you have the option to require an explanatory note)

The change log is valuable in normal production environments and is especially critical in industries with significant compliance requirements.

The Recipe Change Log Viewer component easily shows recipe change log history. It has properties to narrow in on what production item and recipes to show the change log for. Which columns are shown, are configurable through the table customizer. See Analysis and Reports - Recipe Change Log for more information.

Recipe Analysis

Each MES module has an analysis provider that works with the data collected. The Recipe Module, has four analysis providers, one of which is the Recipe Change Log. This can be used to query change log history information based on your selections. See Analysis and Reports for more information. The Recipe module provides built-in analysis tools to:

- Compare recipes
- Review recipe change logs
- Review production-run variances

When you add the Ignition Reporting Module, you can also create multi-page reports with the recipe analysis information, and more.

Recipe Scripting

The Recipe Module comes with complete scripting functions for you to:

- Add recipes
- Change recipe values
- Change a machine’s recipe
- Read recipe change history

If you need additional functionality beyond the base functionality of the Recipe Module, you can use the script functions to accommodate your production environment, instead of changing your production environment because of software limitations.
MES Integration

In a production process that fully employs the Sepasoft MES suite of modules, making a single product code selection can download recipe values, start a production run, track OEE, enable SPC sampling and track lots consumed and produced. During and after the production run, all of your manufacturing data can be analyzed in one unified system.

Trace graph from the Track & Trace Module shown with custom menu showing lot tracking, OEE, SPC, Process historian and Recipe data analysis menu selection.