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Operations Manual

DataStream™ v6.9 Software

Cost Effective Equipment

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1. Introduction

1.1 Confidentiality Statement

The information supplied is for use in the operation and/or maintenance of Cee® equipment. Neither this document nor the information it contains shall be disclosed to others for manufacturing or any other purpose without written authorization from Cost Effective Equipment, LLC.

1.2 Warranty

Cost Effective Equipment, LLC warrants to the original purchaser (Buyer) that equipment is free from defects in material and workmanship under normal use and service in accordance with Cee® instructions and specifications. Buyer shall promptly notify Cee® of any claim against this warranty, and any item to be returned to Cee® shall be sent with transportation charges prepaid by Buyer, clearly marked with a Return Authorization (RMA) number obtained from Cee® Customer Support. Cee's obligation under this warranty is limited to the repair or replacement, at Cee® option, of any equipment, component or part which is determined by Cee® to be defective in material or workmanship. This obligation shall expire one (1) year after the initial shipment of the equipment from Cee®. This warranty shall be void if:

- Any failure is due to the misuse, neglect, improper installation of, or accident to the equipment.
- Any major repairs or alterations are made to equipment by anyone other than a duly authorized representative of Cee®. Representatives of Buyer will be authorized to make repairs to the equipment without voiding warranty, on completion of the Cee® training program.
- Replacement parts are used other than those made or recommended by Cee®.

CEE® MAKES NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, WITH RESPECT TO EQUIPMENT. NO WARRANTY IS MADE AS TO THE MERCHANTABILITY OF THE EQUIPMENT NOR ITS FITNESS FOR ANY PARTICULAR PURPOSE. In no event shall Cee® be liable for consequential loss or damages, however caused. No person or representative of Cee® is authorized to assume for Cee® any liability in connection with equipment nor to make any change to this warranty unless such change or modification is put in writing and approved by an authorized representative of Cee® in writing.

This warranty shall be governed by the laws of the state of Missouri, U.S.A.

2. DataStream™ Software Interface Overview

2.1 User Profiles & Permissions

Apogee® equipment comes standard with four default user profiles:

Username	Password	Permissions
admin	admin2	▪ advanced recipe editing ▪ export log files ▪ manual tool control ▪ remote recipe preparation ▪ tool administrator ▪ user administrator
eng	eng0	▪ advanced recipe editing ▪ manual tool control ▪ tool administrator
tech	tech1	▪ basic recipe editing ▪ manual tool control
op	op6	▪ view recipe ▪ manual tool control

Permissions	Description of Access
Shared Account	Restricts the ability to update profile information when logging in under a shared profile.
Basic Recipe Editing	Ability to create and edit basic recipes.
Advanced Recipe Editing	Basic recipe editing access + the ability to create and edit advanced recipes.
Export Log Files	Ability to export process and system log files.
Manual Tool Control	Access to execute manual tool operations.
Remote Recipe Preparation	Ability to preset temperature without local control.
Tool Administrator	Full access to tool configuration settings.
User Administrator	Ability to add, update, and delete users – including shared accounts.

Controls for which a user does not have permissions will not be visible to the user.

2.2 Logging In

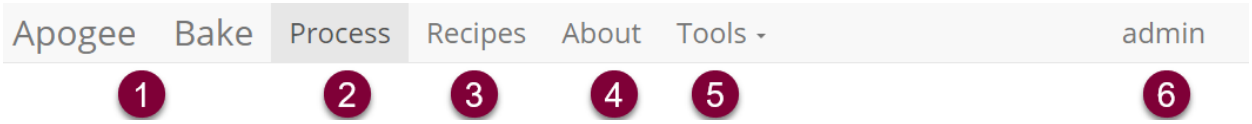
Upon powering up the machine, users will arrive at the login screen.

For initial set-up and orientation, the user should log-in with the ***admin*** profile credentials.

Demonstrations of processes outlined in the DataStream™ Manual assume that the user has full administrator privileges.

2.3 Navigation Bar

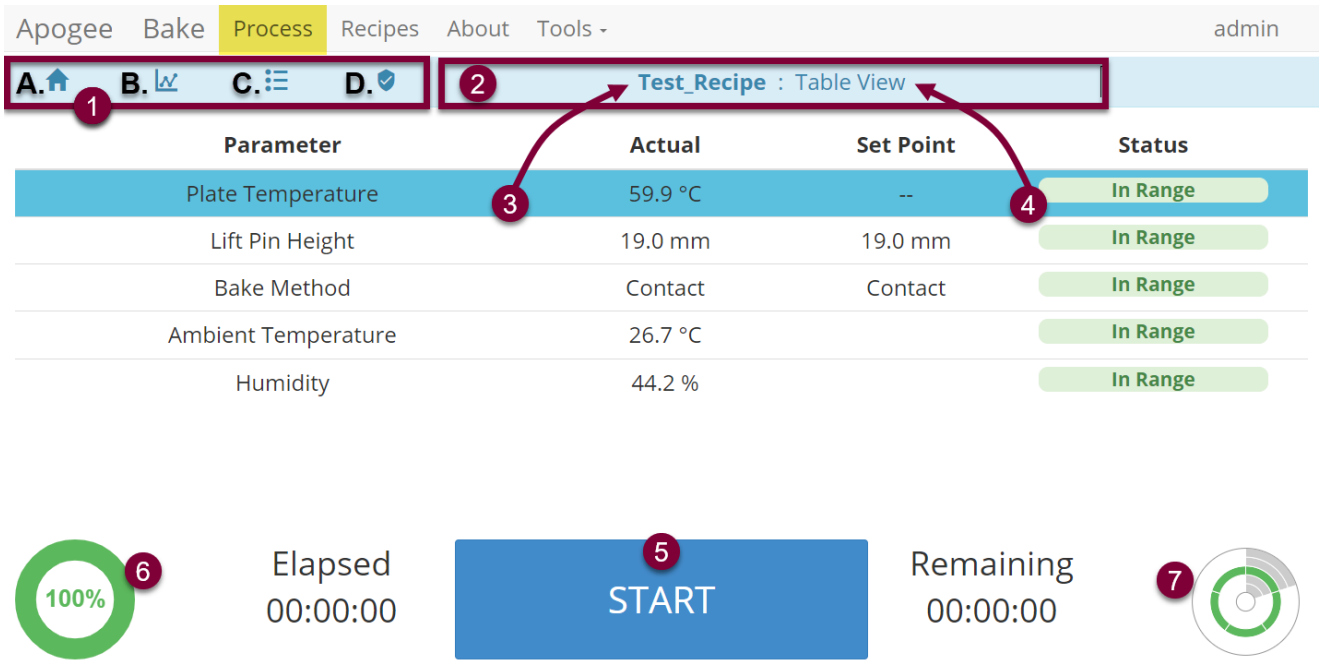
Located along the top of the screen, the navigation bar provides easy access to Apogee® features and functions.



1. *Apogee® Bake* ..... displays the Apogee® equipment name
2. Process ..... displays process parameter data and progress
3. Recipes ..... create, import, or export recipe data
4. About ..... system information and equipment specifications
5. Tools ..... logs, diagnostics, settings, and manual overrides
6. User ..... current logged in user or user profile

3. DataStream™ Process Page

Select the ***Process*** tab from the navigation bar to run recipes and view real-time equipment operation from within the ***Process*** page. The user must be logged in and have local control to run recipes. See section 7.3 on Local Presence for more information.



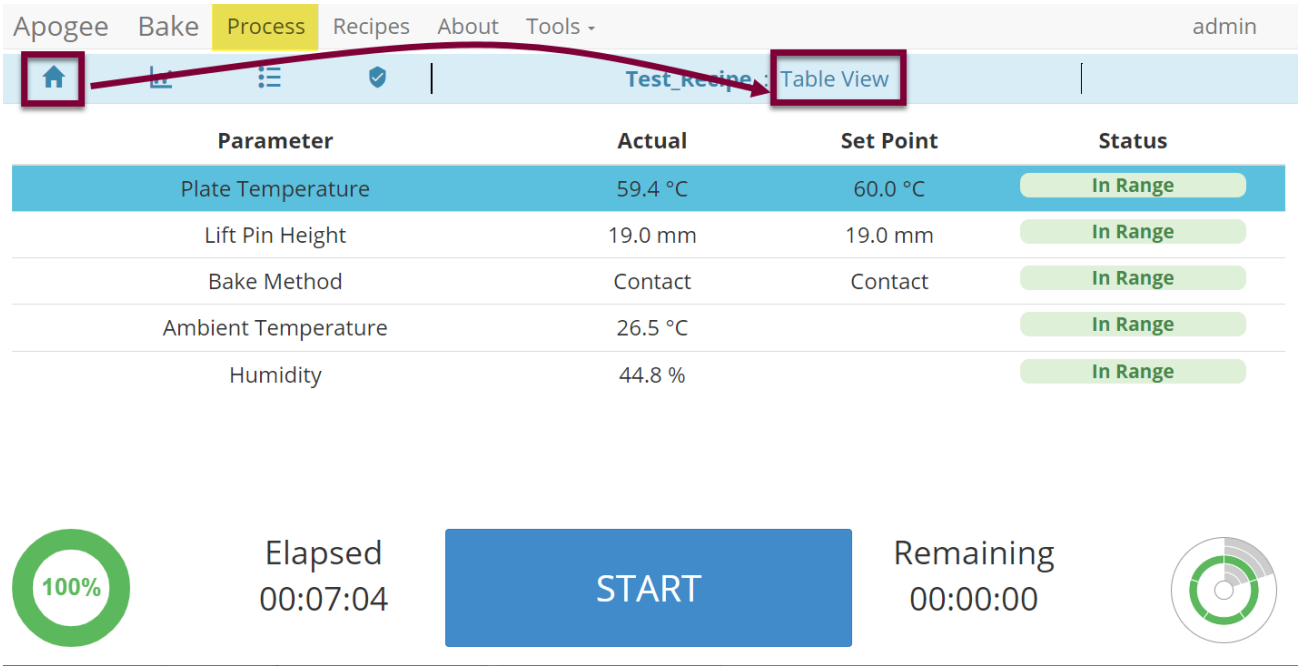
1. process view quick links ..... provides easy selection of available process views
   - *A. Table View*
   - *B. Graph View*
   - *C. Recipe Progress*
   - *D. Process Summary*
2. process view dropdown ..... tap for an alternative means of accessing process views
3. recipe name ..... at-a-glance verification of current recipe
4. process view ..... the process view screen currently displayed
5. omni-button ..... dependent on the state of the equipment (e.g., start/abort recipe)
6. process progress ..... graphical display of process progress
7. system parameter state ..... displays status (critical high/low, warning high/low, in-range)

3.1 Process View Window – Table View

Visualize real-time system parameters in table form. Each parameter has an ***Actual*** value depicting current state. Most parameters have a ***Set Point***, defined during recipe creation or via manual command. Some parameters, such as temperature controllers, can be manually disabled. When disabled, a ***Set Point*** of -- will be displayed as illustrated for *Plate Temperature* in the figure above.

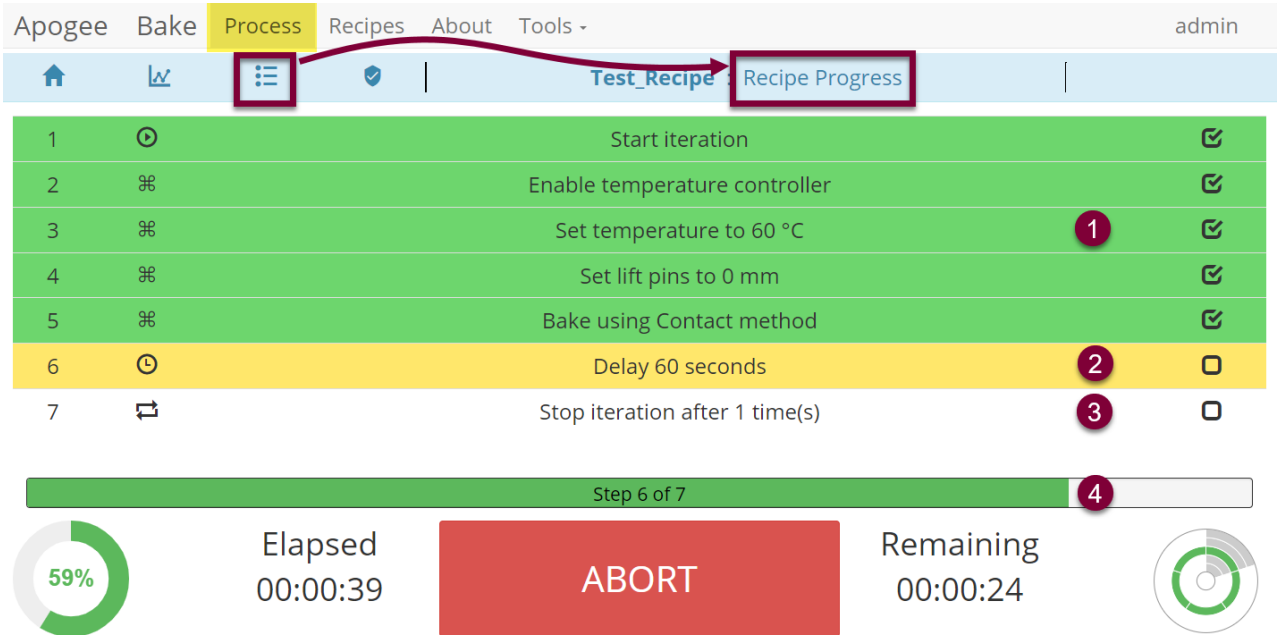
All parameters have an associated ***Status***; this column mirrors process alerts in warning level and associated color. ***Status*** ranges are pre-defined for all basic recipes and can be edited within the ***Advanced*** recipes menu covered in section 4.5.

Please note, individual parameters vary between equipment types. Refer to your Apogee® Operations Manual for equipment specific details.



3.2 Process View Window – Recipe Progress View

Recipe Progress view displays steps of the active recipe in advanced recipe format.

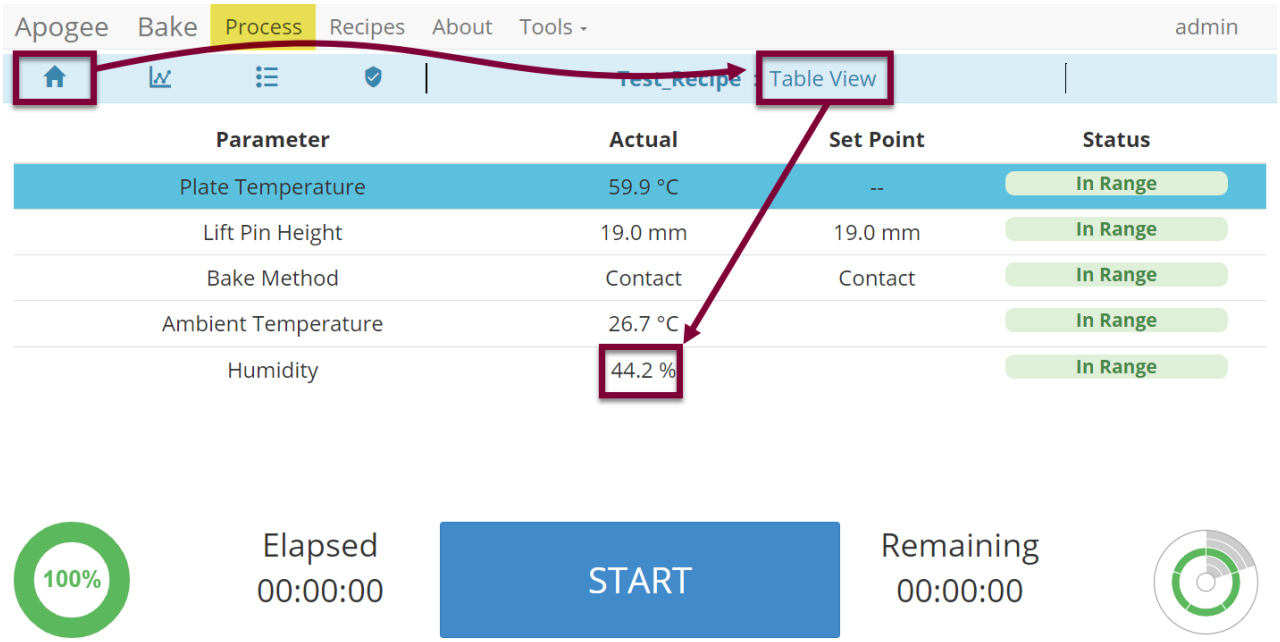


1. completed ..... rendered in green with a checkmark
2. in process ..... rendered in yellow awaiting checkmark
3. upcoming ..... rendered in white awaiting checkmark
4. recipe progress ..... graphical display of process progression

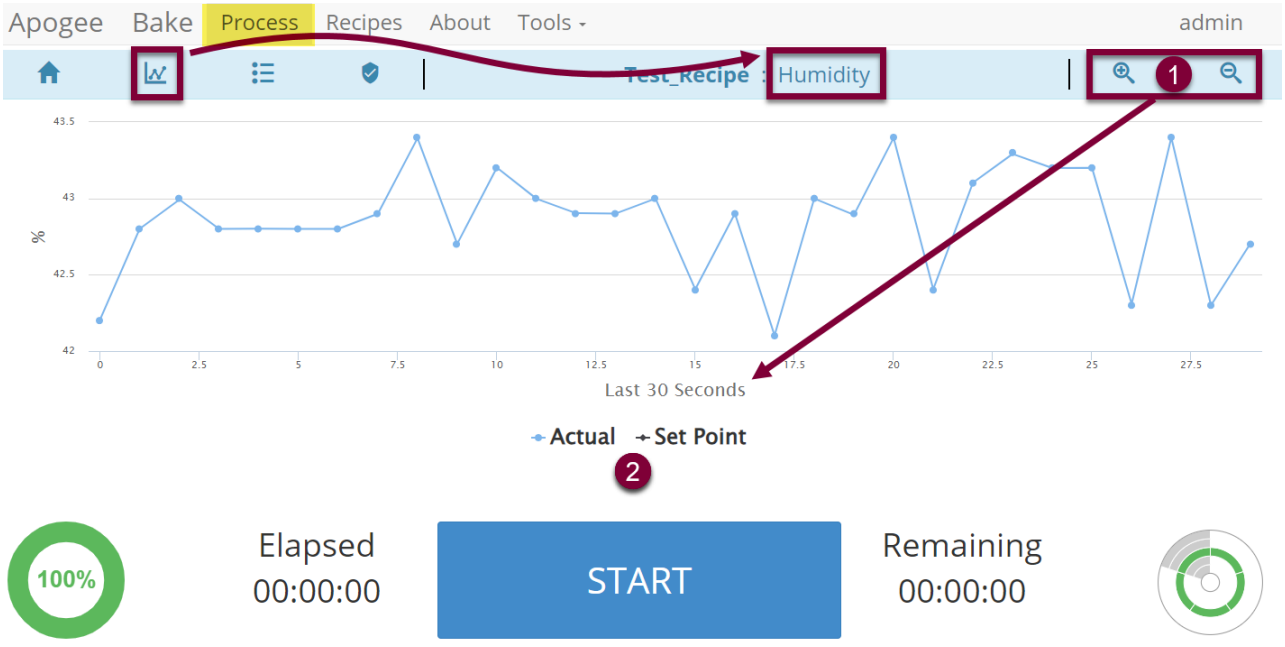
3.3 Process View Window – Graph View

For graphical representation of data for a given parameter, tap the parameter value in ***Table View.***

Graph View will auto-scale based on the data presented and updates in real time to provide immediate feedback. View current and desired values simultaneously or independently using the ***Actual*** and ***Set Point*** controls. ***Graph-View*** features a default lookback period of 30 seconds; however, users can display up to one hour of graph data using ***zoom*** controls.



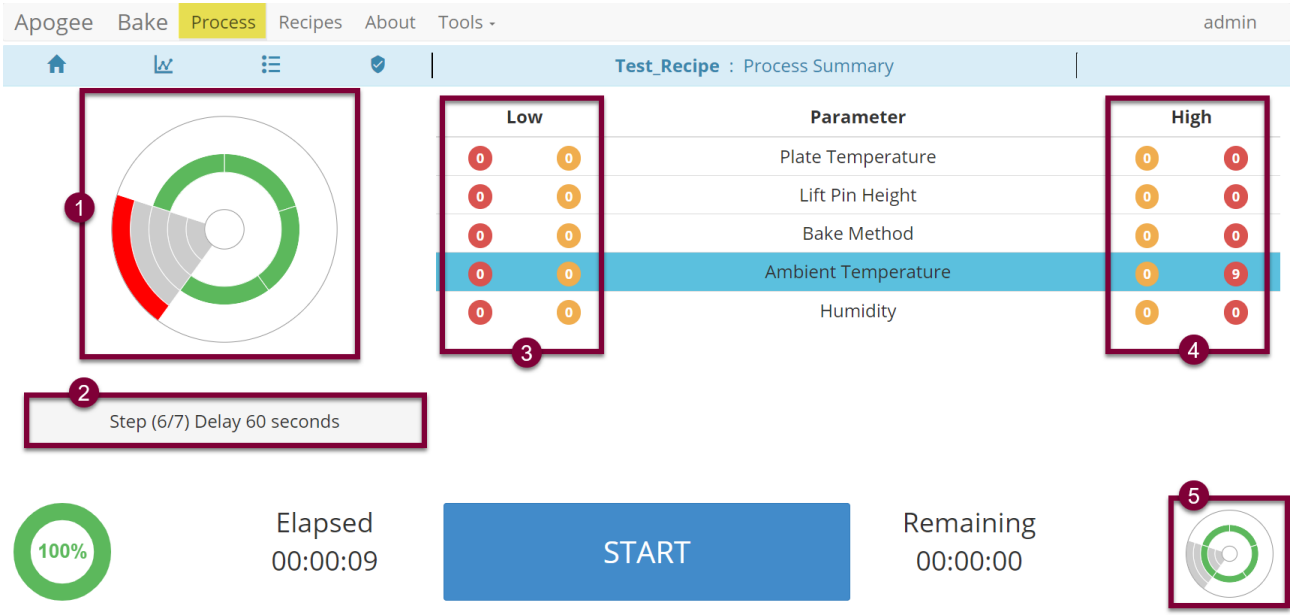
Alternatively, ***Graph View*** can be accessed by selecting the desired parameter in ***Table View*** and then tapping the ***Graph View*** quick link.



1. zoom ..... adjust graphical lookback period from 30 sec to one hour
2. data selection..... display Actual values, Set Point values, or both

3.4 Process View Window – Summary View

Summarizes the most recent process, including active processes. The ***Process View*** window will also appear once an active process is completed.



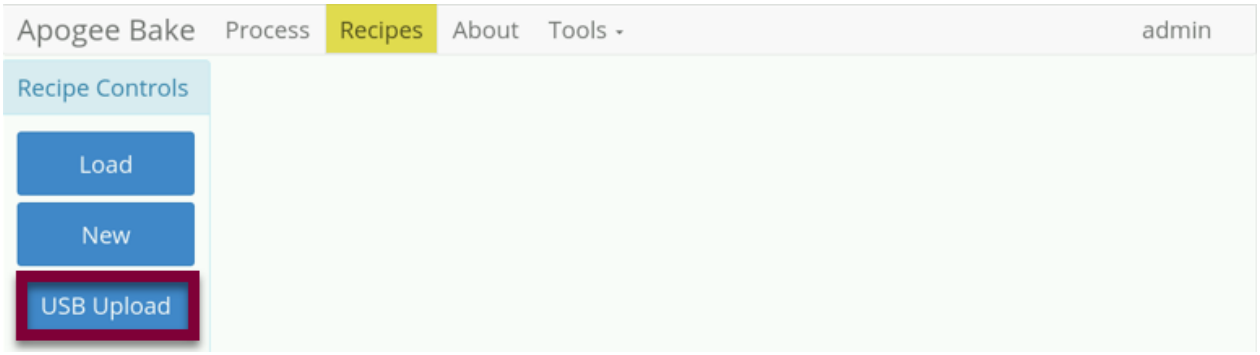
1. Process alert UI depicts parameter status indicators achieved during a given process.
2. Process state message describing most recent action and/or process errors encountered.
3. Seconds spent in critically low and warning low status.
4. Seconds spent in critically high and warning high status.
5. Process alert UI depicts current parameter status indicators (may differ from item 1).

4. DataStream™ Recipes Page

Easily view, edit, and create recipes locally via the DataStream™ graphical user interface or use the DataStream™ networking feature outlined in section 7 to upload and download recipes remotely.

4.1 Recipe Management

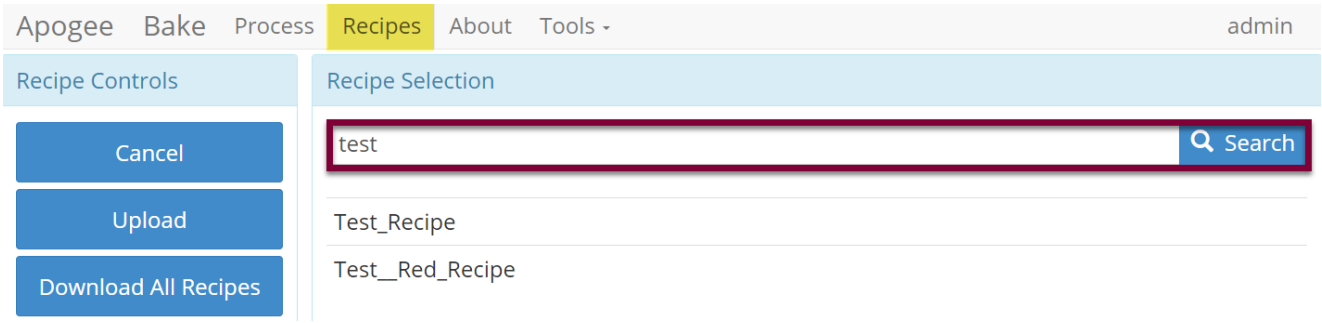
Access to ***Recipe Management*** is controlled at the user profile level. If a user does not have sufficient privileges for a specific activity, the button for that activity will not be displayed.



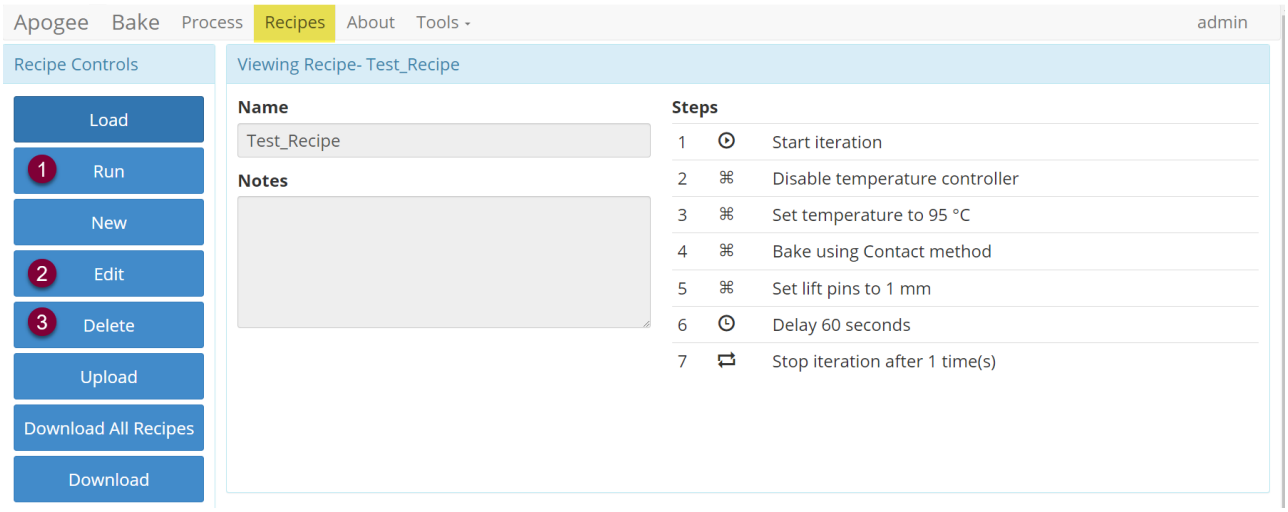
1. Load.....select an existing recipe to view, edit, or run
2. New.....initiates creation of a new recipe
3. USB Upload .....facilitates import of existing recipes

4.2 Load the Recipe List

Tap the ***Load*** button to access the recipe selection list which contains all available recipes by default. Use the ***Search*** field to refine the list then tap the name of the desired recipe to load it.



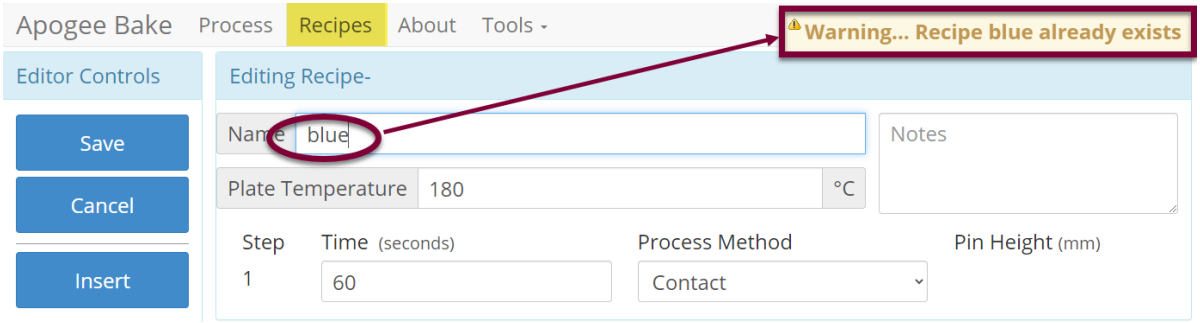
Once loaded, users can perform various actions on the recipe provided they have the necessary permissions and local control of the equipment. Note that recipes vary based on the type of equipment/recipe being loaded. For details on local control, review section 7.3 on Local Presence.



1. Run.....Directs user to the process page to begin the recipe.
2. Edit.....Allows for modification to existing recipes.
3. Delete.....Irreversible and requires action confirmation (see below).

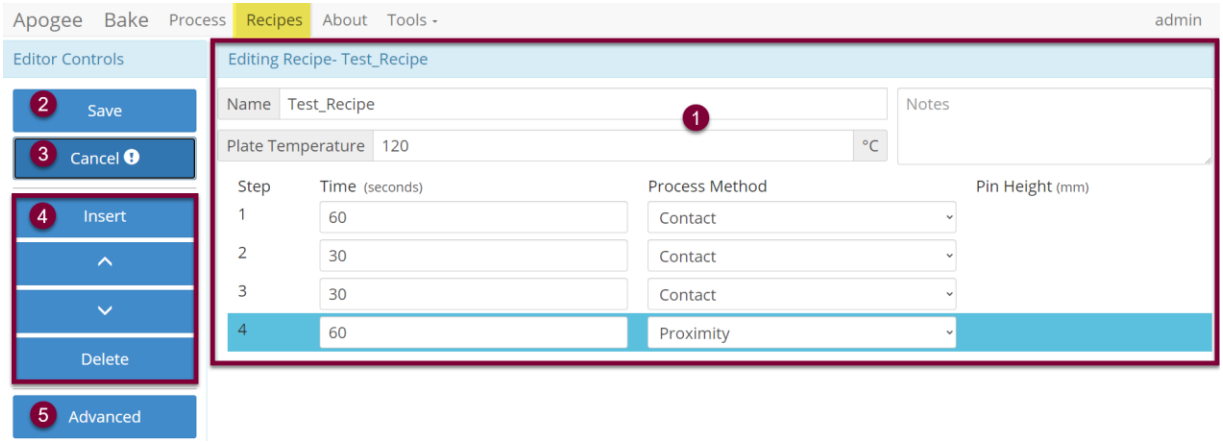
4.3 Creating New Recipes

During manual recipe entry, the user with control of the machine will receive a system warning if a duplicate recipe name is entered. ***This will not prevent overwrite***. Users should define and employ a unique nomenclature strategy to avoid potential for unintentional overwrite when duplicate names are entered.

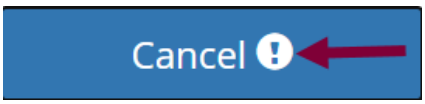


4.4 Basic Recipe Editor

All DataStream™ equipped tools share the same core recipe-editing platform. Recipes are entered into the editor as a basic recipe, then converted to advanced recipes once executed.



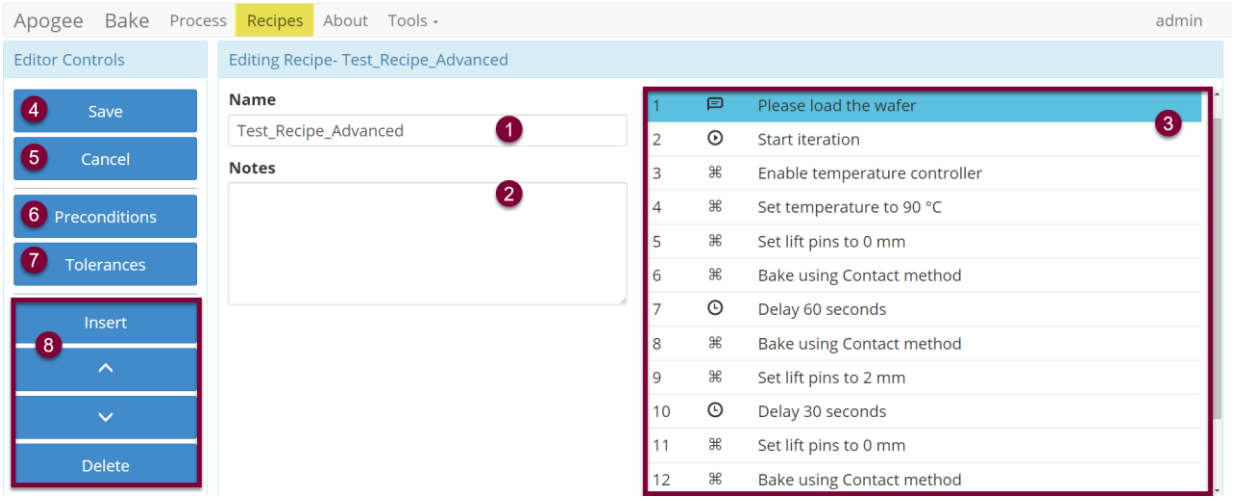
1. Recipe Editor UI ..... parameters and controls vary between equipment types
2. Save..... overwrites existing recipe
3. Cancel..... discard changes to the recipe
4. Editor Controls ..... vary with recipe/equipment type/selections in Recipe Editor UI
    - Insert ..... add a recipe step
    - Up/Down ..... reorder recipe steps
    - Delete ..... delete the selected recipe – *irreversible
5. Advanced[1] ..... convert basic recipe to advanced recipe



6. Action Confirmation ..... Presents when data loss is possible and requires a secondary *confirmation* click within 3 seconds to proceed with the action.

4.5 Advanced Recipe Editor

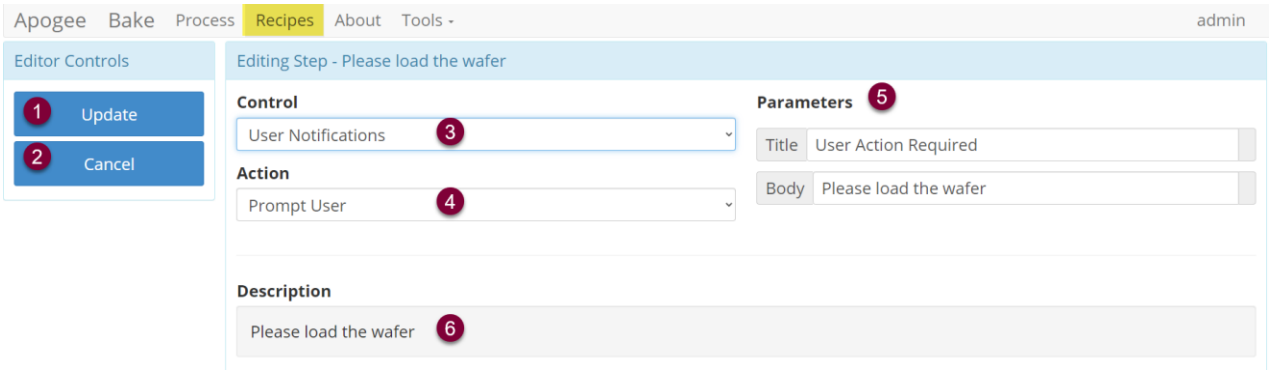
Advanced Recipe Editor access is reserved for expert users and employed when more detailed control over a process is necessary.



1. Recipe Name ..... identification of recipe via search and log files
2. Notes ..... field for additional process information, if desired
3. Steps..... click the desired row twice to open the Step Editor
4. Save[2] ..... overwrites existing recipe
5. Cancel..... discard changes to the recipe
6. Preconditions ..... launches *Precondition Editor*
7. Tolerances ..... displays *Runtime Tolerance Editor*
    - Editor Controls . *Recipe Editor UI* options vary between equipment
    - Insert ..... add a recipe step
    - Up/Down ..... reorder recipe steps
    - Delete ..... delete selected recipe – **irreversible*

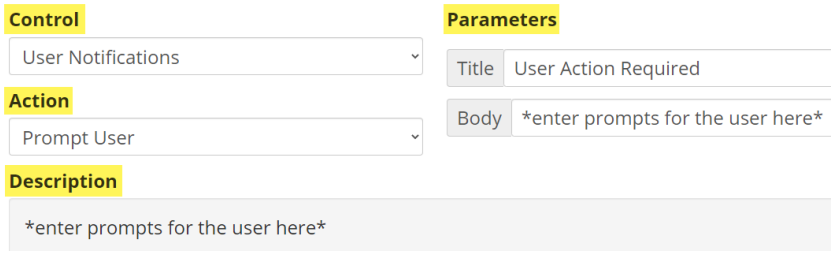
[1] Access to the Advanced Recipe Editor is governed by user permissions. Recipe conversion cannot be reverted. Users without advanced editor access will be unable to interact with the recipe upon conversion.
[2] Users should define and employ a unique nomenclature strategy to avoid potential for accidental overwrite of recipes in the event that a duplicate name is entered.

4.6 Recipe Step Editor

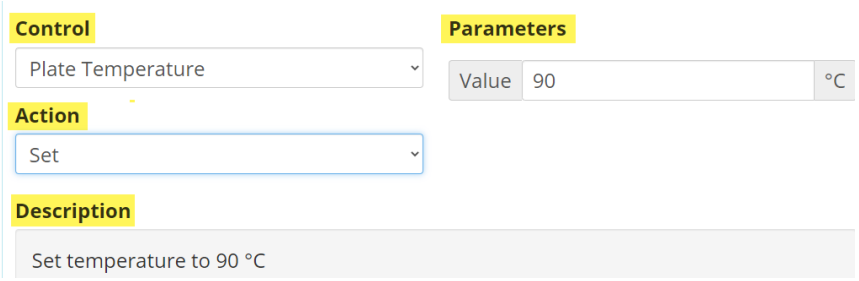


1. Update .....save values of recipe step and return to Advanced Recipe Editor
2. Cancel.....discard changes to the recipe step and return to Advanced Recipe Editor
3. Control .....dropdown menu selection to define area of control
4. Actions .....specifies the action a control will perform
5. Parameters .....defines instruction for the control/action combination
6. Description.....compilation of step details for logs and display during recipe execution

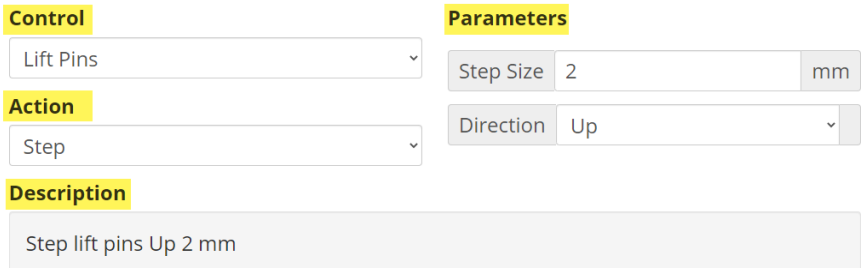
Examples:



Control: User Notification
Action: Prompt User
Parameters:
Title: User Action Required
Body: *enter prompts for user here*
Description: *enter prompts for user here*



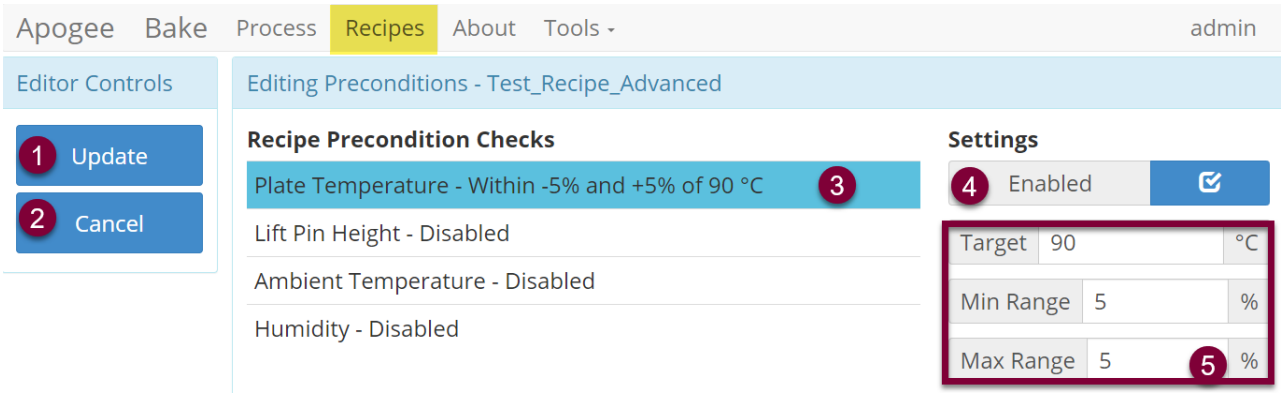
Control: Plate Temperature
Action: Set
Parameters:
Value: 90°C
Description: *Set Temperature to 90°C*



Control: Lift Pins
Action: Step
Parameters:
Step Size: 2mm
Direction: Up
Description: *Step lift pins up 2mm*

4.7 Preconditions

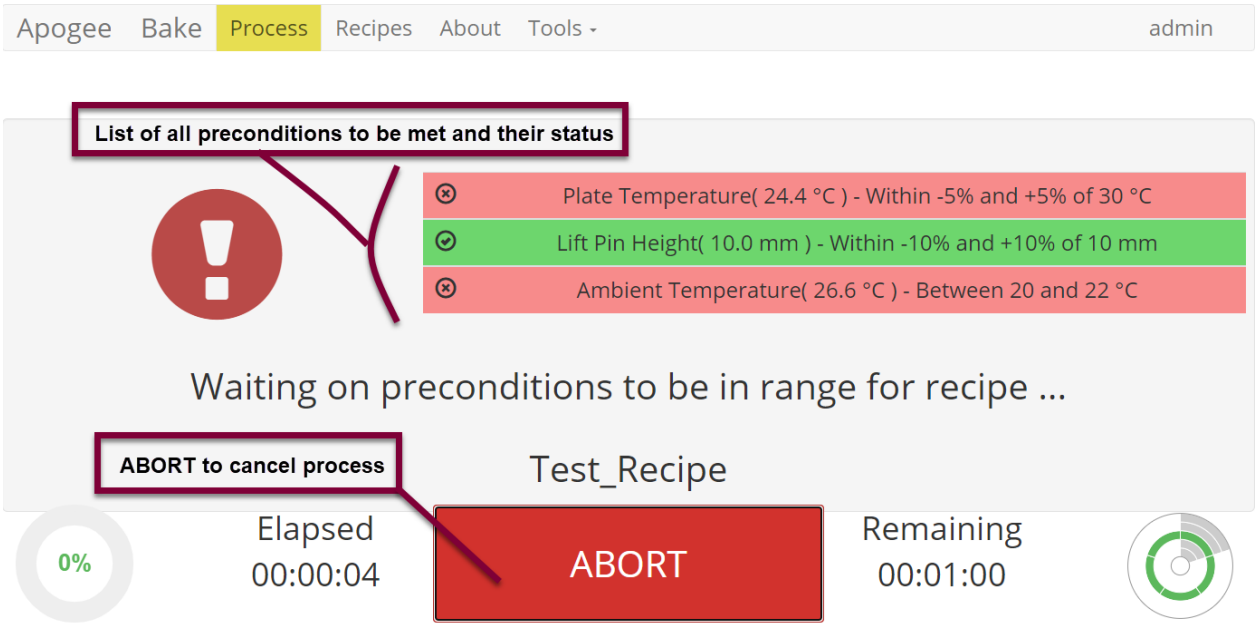
Preconditions are parameter/condition verifications that run prior to the start of a recipe. When preconditions are acceptable, the recipe will run normally. When preconditions are outside the specified range, the equipment will attempt to bring parameters inside the control range before beginning the process.



1. Update ..... save *all* preconditions and return to the *Advanced Recipe Editor*
2. Cancel..... discard changes and return to the *Advanced Recipe Editor*
3. Precondition..... specified parameter and details of requirement
4. Enabled/Disabled[3] ..... toggle switch dictates whether the condition is evaluated
5. Precondition Detail ..... define acceptable range –fields vary by parameter

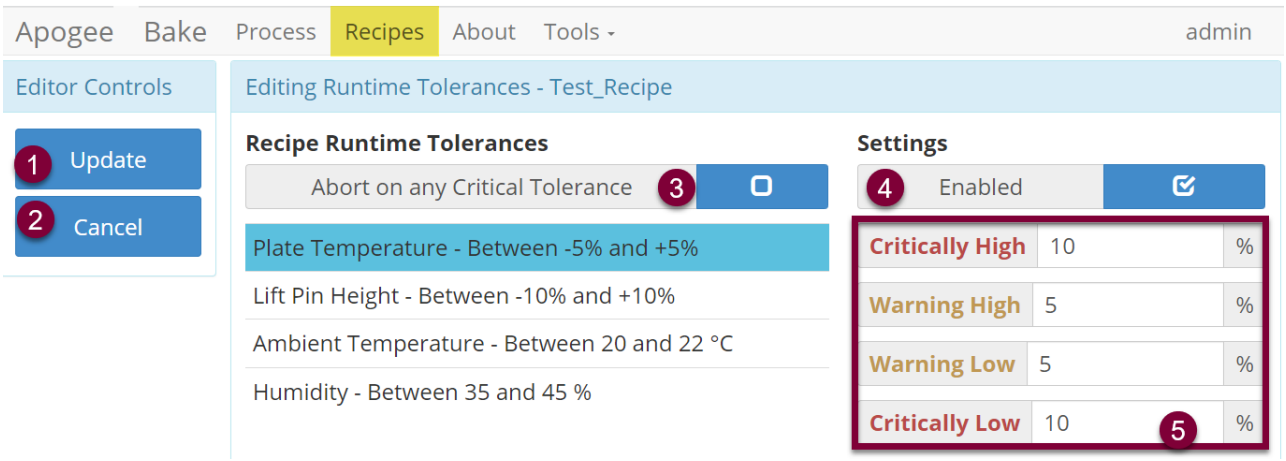
[3] When disabled, the description will read *Disabled.*

Precondition Verification Example:



4.8 Runtime Tolerance Editor

Runtime Tolerances drive process alerts on the ***Process*** and ***Manual Control*** pages. These are parameter/condition verifications that run during recipe execution.



1. Update ..... save *all* recipe tolerances and return to the Advanced Recipe Editor
2. Cancel..... discard changes and return to the Advanced Recipe Editor
3. Tolerance..... the system parameter and details of requirements
4. Enabled/Disabled[4] ..... toggle switch dictates whether the tolerance is evaluated
5. Tolerance Detail[5] ..... define tolerance range - fields vary between parameters

4.9 Process Alert User Interface

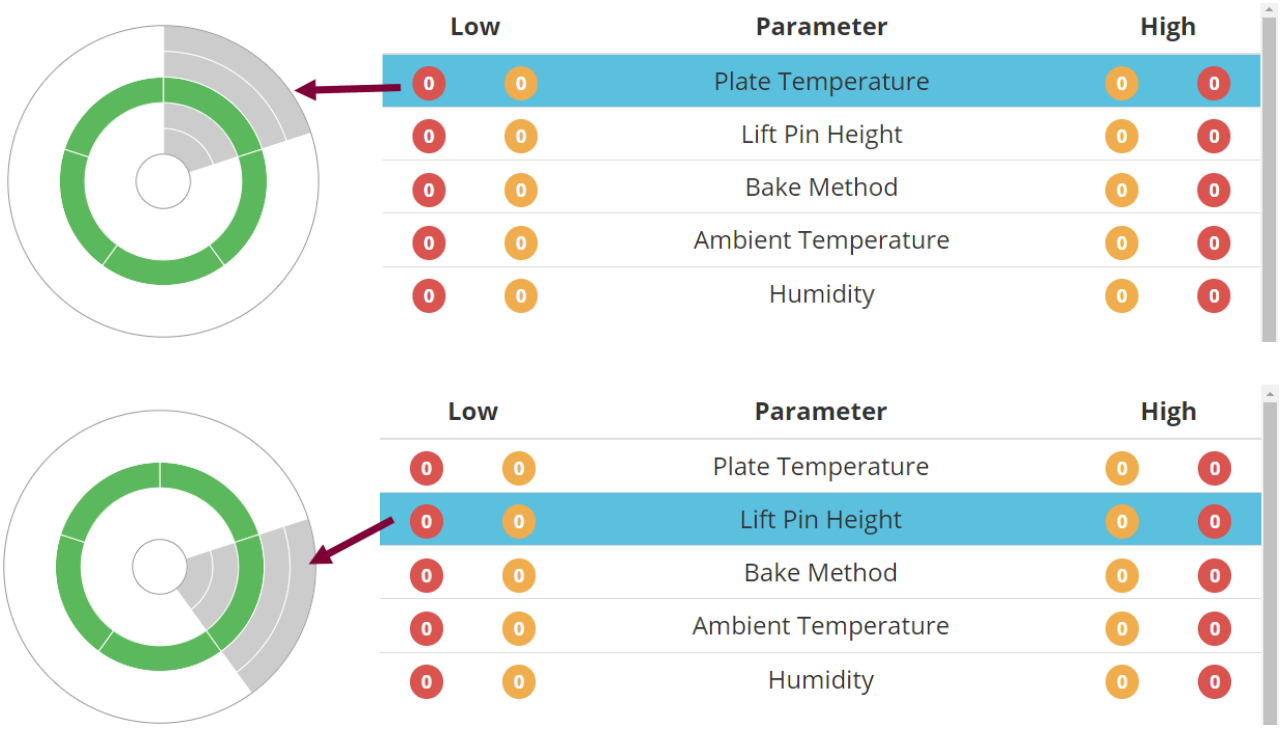
The ***Process Alert Element*** provides at-a-glance information regarding current system state(s) and leverages innate pattern recognition to facilitate quick identification of non-confirming data points. The

[4] When disabled, the description will display *Disabled* and Process Alerts will show as *In Range.*
[5] Run time parameters are considered relative to the current set point (when associated) other parameters are absolute values.

design employs both color and position variations ensuring that data is unambiguous to colorblind users.

Alert	Rendered if the system parameter is…
1. Critically High	above the allowable upper limit
2. Warning High	above target range but within allowable limits
3. In Range	within the target range
4. Warning Low	below target range but within allowable limits
5. Critically Low	below the allowable lower limit

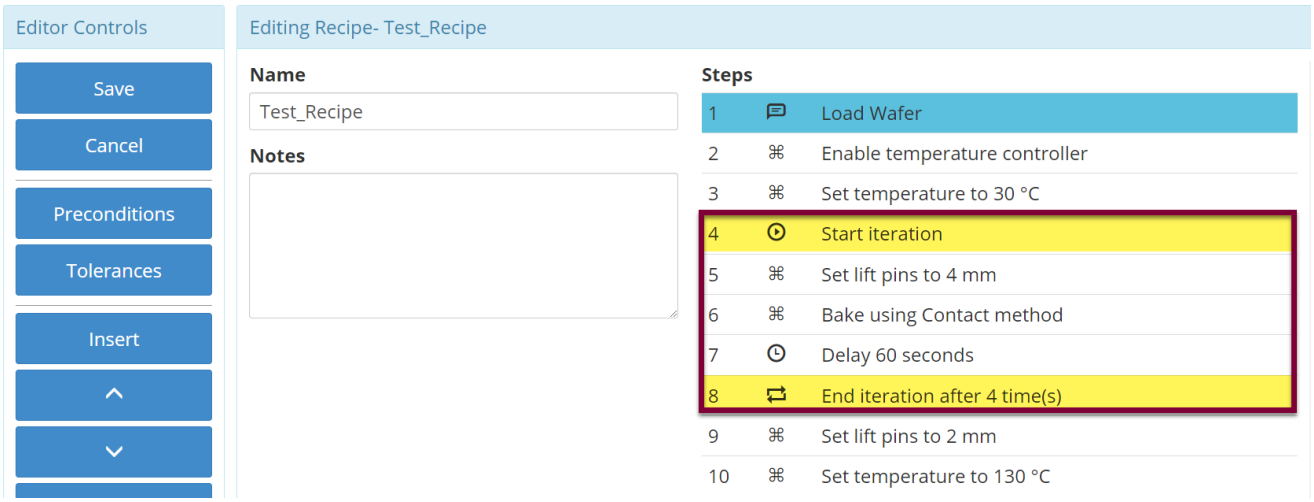
A complete green circle is rendered when all parameters are within range.



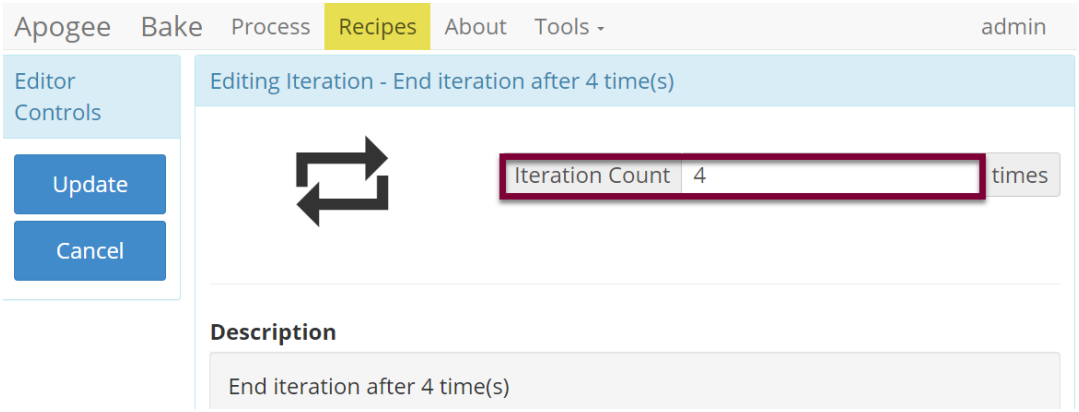
When a value from the parameter list is selected, the associated quadrant of the ***Process Alert Element*** is shaded in gray.

4.10 Iterations

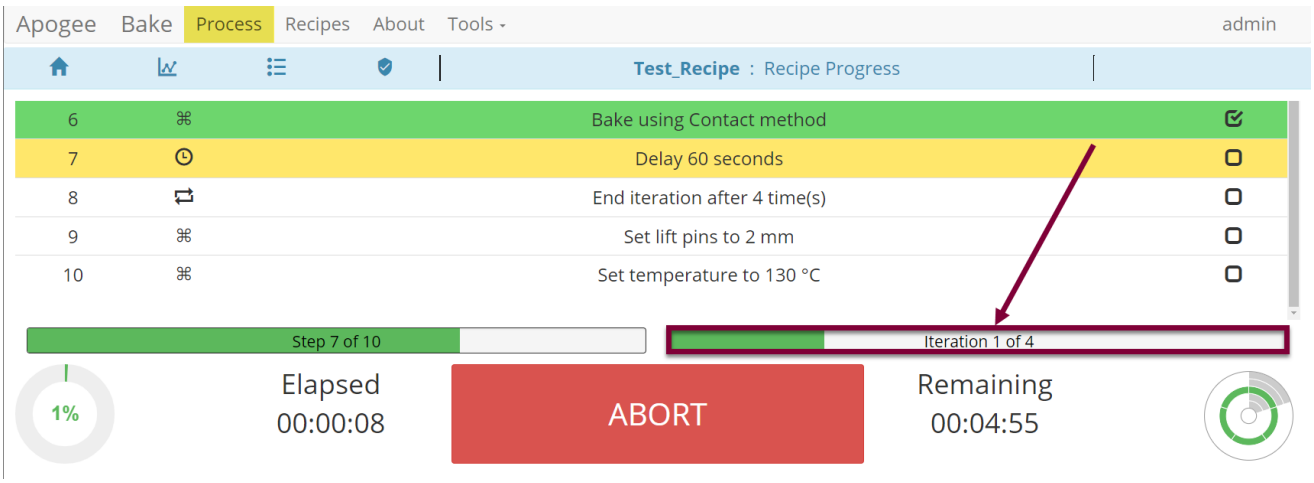
Recipe iterations are controlled by selecting where the loop starts and how many times it should repeat. When more than one iteration is defined, the recipe will repeat all steps between the *Start Iteration* and *End Iteration* steps.



The *Start Iteration* step can be moved or reordered within the recipe. The *End Iteration* step can be moved/reordered within the recipe and edited to define the number of desired iterations by double clicking the step.



The ***Process Summary > Recipe Progress*** page indicates how many iterations have been completed during a process.



Only advanced recipes support iterations. Steps within an individual iteration cannot be added or deleted.

4.11 Download Recipe Data

DataStream™ v6 enables operators with administrative privileges to download their Apogee® recipes for data preservation and for ease of transferring recipes to new Apogee® equipment. This can be accomplished in three ways: via USB, locally connected computer, or remote access.

USB

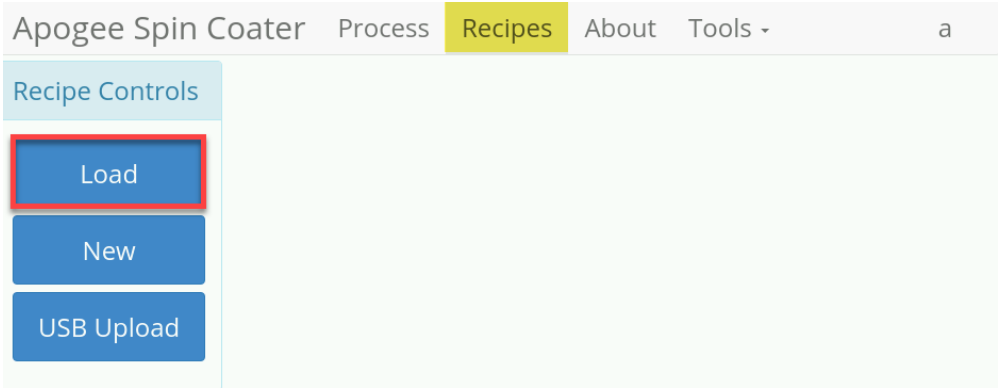
Useful for situations where the Apogee® equipment is not on the Local Area Network.

1. To begin, access the root of an approved FAT32 formatted thumb drive, and create a folder titled *DATASTREAM*. Insert the thumb drive into the [6]rear utility panel of your Apogee® Equipment.

   If the **USB Upload button is not displayed, remove the USB drive and reinsert.*

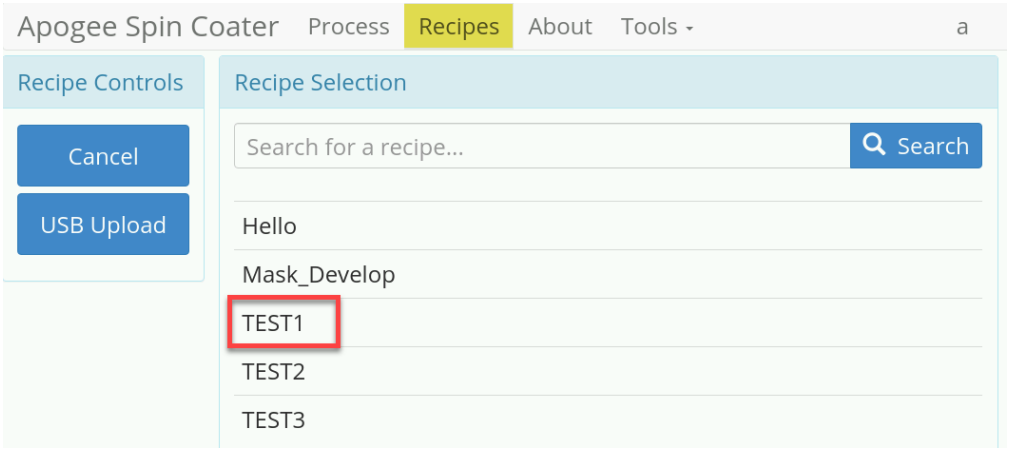
   Do **NOT** use the native internal Apogee® USB drive for recipe download – a secondary FAT32 formatted drive is required.

2. Navigate to the **Recipes** page of your DataStream™ screen and click **Load**.

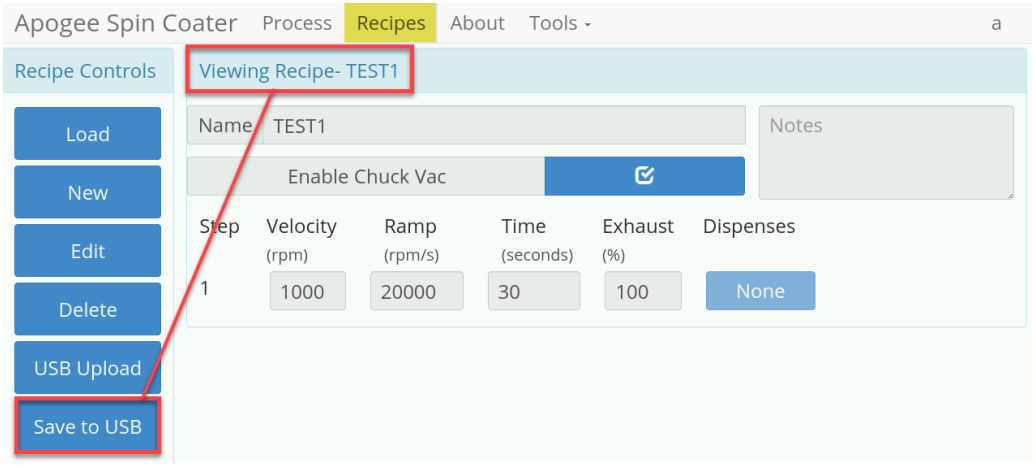


3. Select the recipe that you would like to download, then select **Save to USB**.

   *Recipes are saved to the DATASTREAM folder in json format.



[6] For Cee® X-Pro II Workstation process modules, insert USB into the port located beneath the display/control panel on the face of the X-Pro II Workstation. For Cee® Flange Mount process modules, insert the USB into the port located on the backside of the user interface.



4. Select **Load** to return to the recipe list and repeat these steps to save any additional recipes.

   When saving to USB, you can only save one recipe at a time.

Local/Remote Computer

Establishing Connection

1. For **local connection**, connect your computer or laptop to the ethernet port on the [7]rear utility panel of the Apogee® equipment, using an ethernet cable.
2. You'll need to establish a DHCP[8] server (see below) on the computer to connect to your Apogee®. Once this is completed, skip to step 4.

   Mac DHCP

   - Open System Preferences
   - Select *Sharing Preference* Pane
   - Enable *Internet Sharing* with the following settings:
     - To computers using **Ethernet**
     - Share your connection from **Wi-Fi**

   Windows DHCP

   Third-party DHCP server software will need to be installed in order to connect with the equipment.

3. For **remote connection**, review *Section 7 DataStream™ Remote Access*.

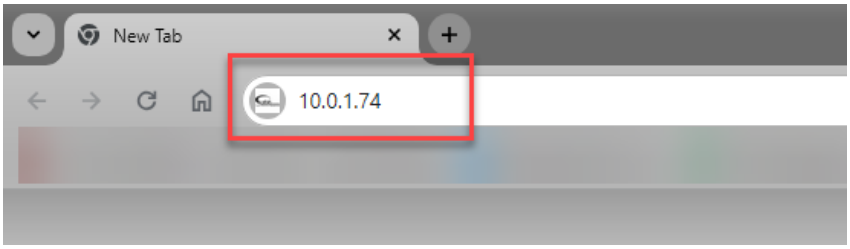
   If your Apogee® tool is already connected to your organization's network, proceed with the following instructions.

[7] For Cee® X-Pro II Workstation process modules, connect to the ethernet port located at the rear of the X-Pro II Workstation. For Cee® Flange Mount process modules, connect to the ethernet port located on the backside of the user interface.
[8] Please consult your Information Technology department for guidance on establishing a DHCP server.

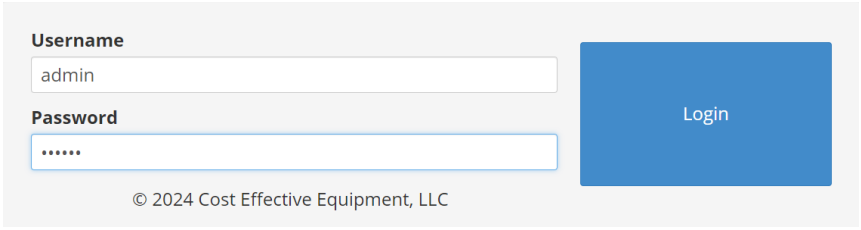
Download Recipes

4. On the Apogee® Module, navigate to the **About** screen and make a note of the tool's IP address. The IP address will be unique for each Apogee® tool.

5. Open your computer's browser and enter the IP address of the Apogee® into the URL bar.



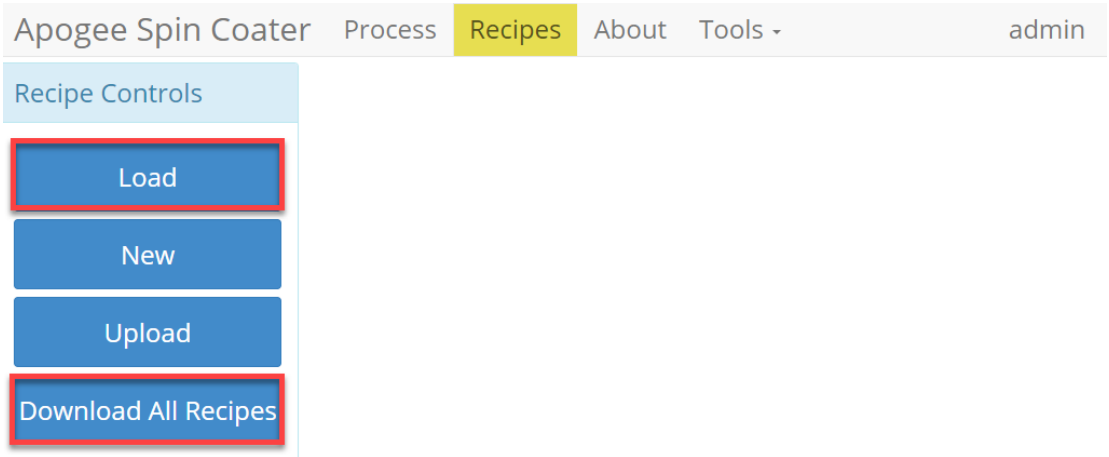
6. On your computer, enter administrator credentials and click **Login**.



7. Navigate to the **Recipes** screen and select from the following options.

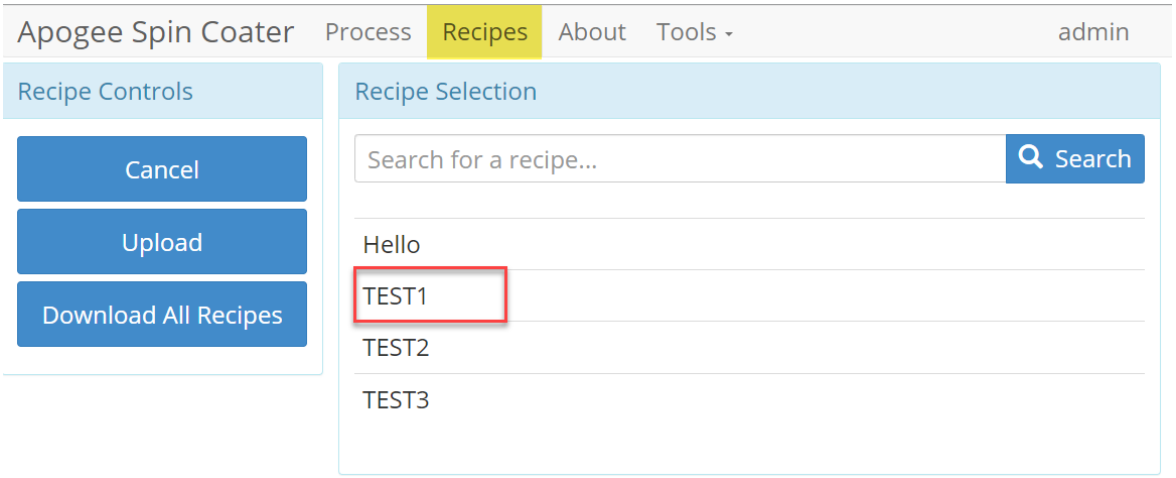
Load ..... Access a list of recipes for selective download.

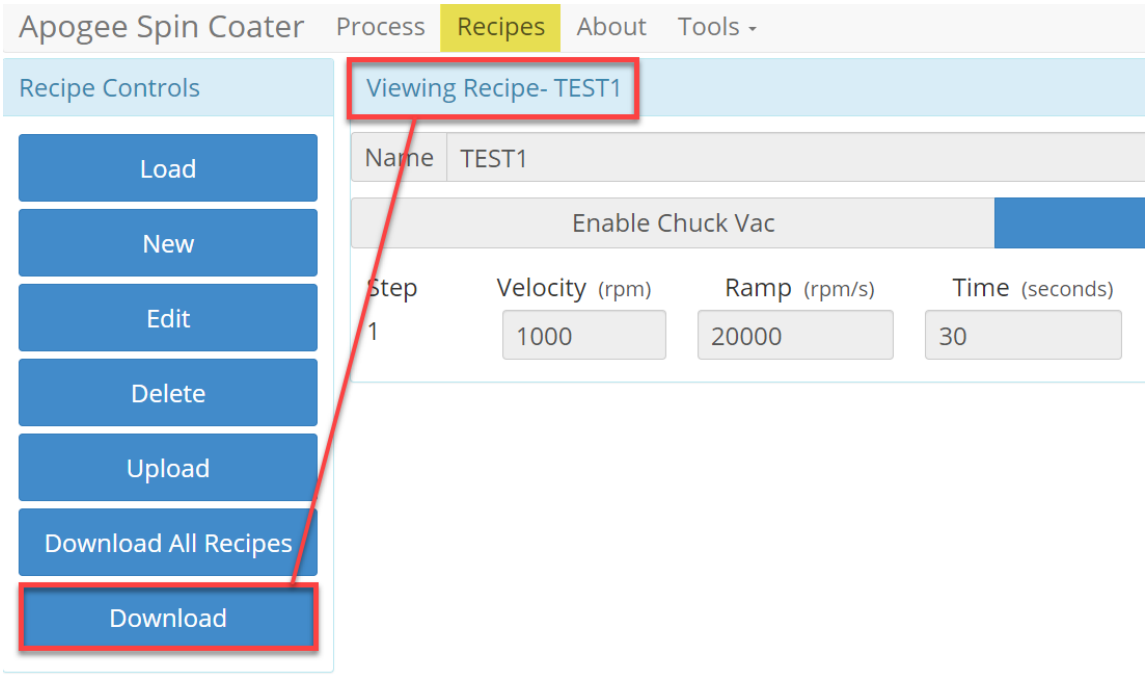
Download All..... Download a zip file of all recipes saved to this Apogee® device.



8. For selective recipe downloads, select **Load**, click the recipe you wish to download, and then click **Download**. Note that you can still **Download All Recipes** from this screen if you wish to do so.

   Recipes will be found in your computer's **Downloads** directory by default.





4.12 Upload Recipe Data

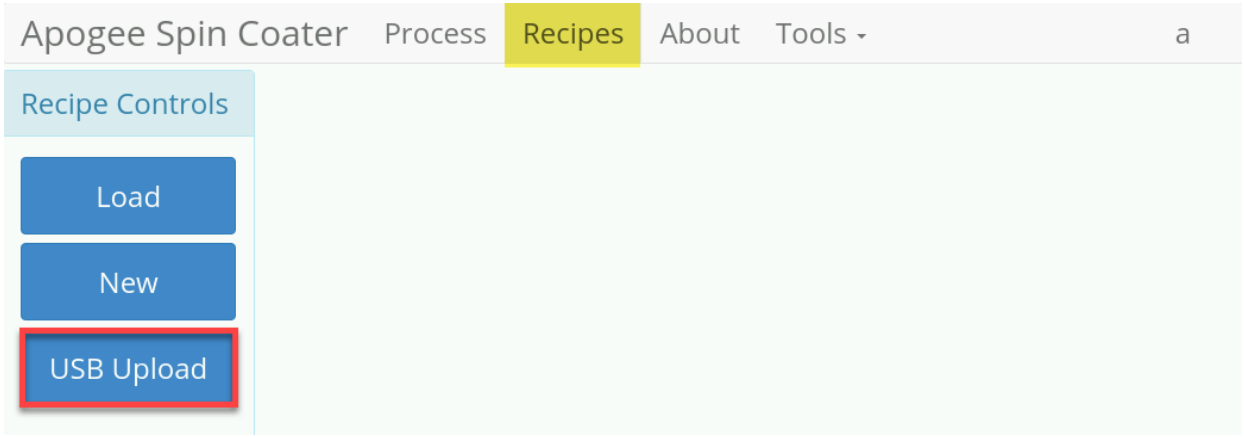
DataStream™ v6 enables operators with administrative privileges to upload their recipe data for ease of transfer to new Apogee® equipment. This can be accomplished in three ways: via USB, locally connected computer, or remote access.

Review section 4.11 Download Recipe Data before proceeding.

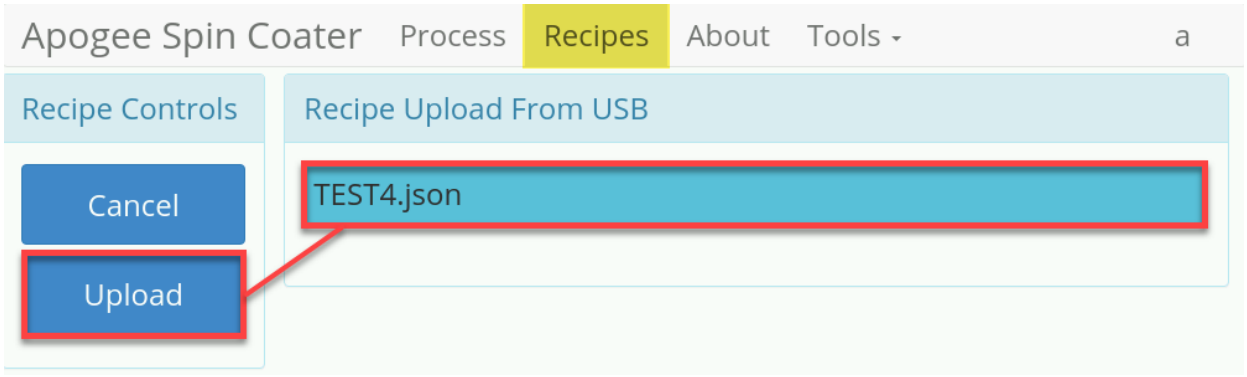
USB

1. Insert an approved FAT32 formatted thumb drive into the [9]rear utility panel of your Apogee® module.
2. Navigate to the **Recipes** tab of the DataStream™ screen and select **USB Upload**.

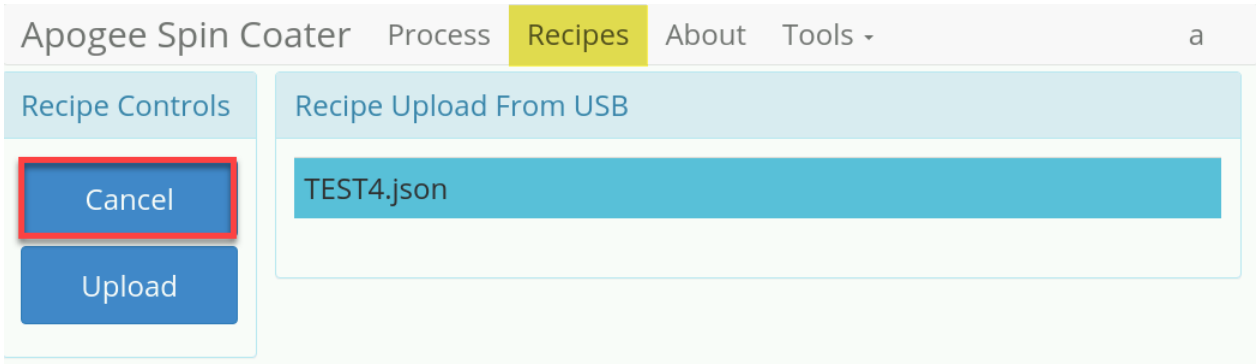
If the **USB Upload button is not displayed, remove the USB drive and reinsert.*



3. Select the recipe intended for upload and then select the **Upload** button.

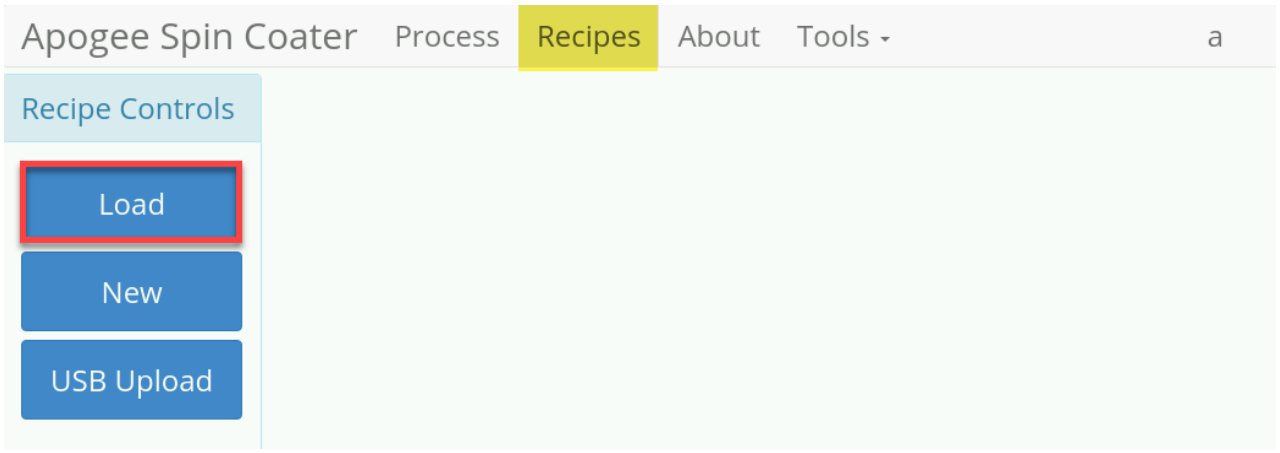


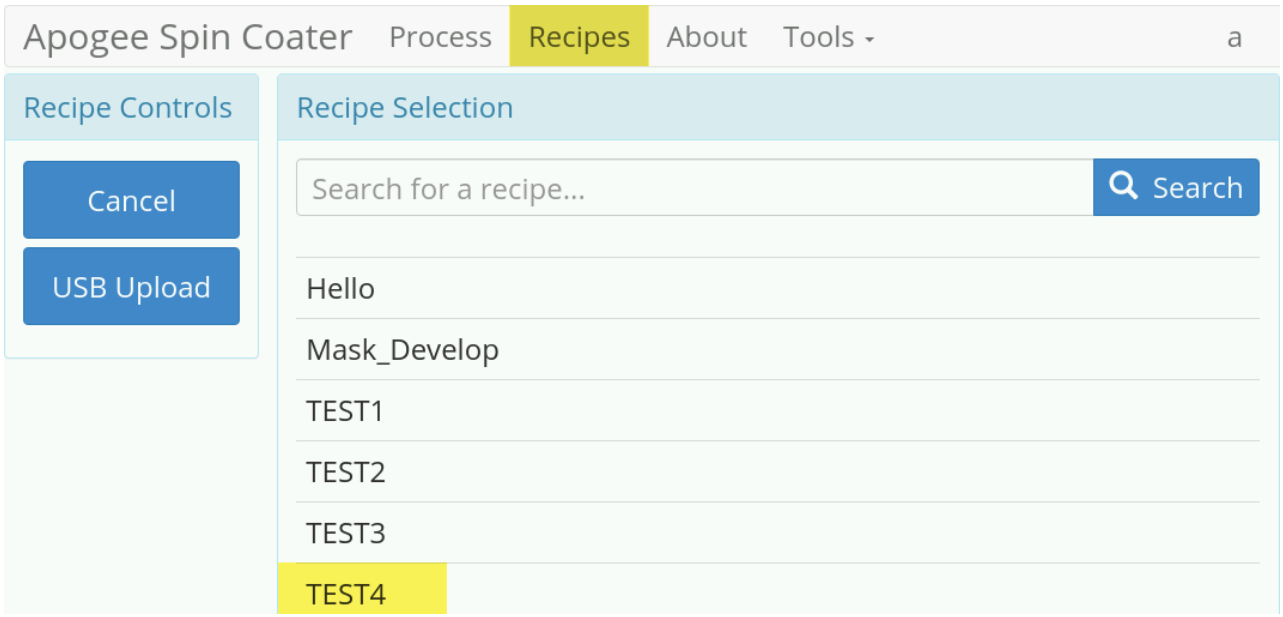
4. Repeat these steps to load additional recipes to your Apogee®. When finished, select **Cancel** to return to the previous screen.



5. Select **Load** to view the updated recipe list.

[9] For Cee® X-Pro II Workstation process modules, insert USB into the port located beneath the display/control panel on the face of the X-Pro II Workstation. For Cee® Flange Mount process modules, insert the USB into the port located on the backside of the user interface.


Apogee Spin Coater
Process
Recipes
About
Tools
a
Recipe Controls
Load
New
USB Upload


Apogee Spin Coater
Process
Recipes
About
Tools
a
Recipe Controls
Cancel
USB Upload
Recipe Selection
Search for a recipe...
Search
Hello
Mask_Develop
TEST1
TEST2
TEST3
TEST4

Local/Remote Computer

Establishing Connection

1. For local connection, connect your computer or laptop to the ethernet port on the [10]rear utility panel of the Apogee® equipment, using an ethernet cable.
2. Establish a DHCP server [11]on the computer to connect to the tool then skip to step 4.

   Mac DHCP

   - Open System Preferences
   - Select *Sharing Preference* Pane
   - Enable *Internet Sharing* with the following settings:
     - To computers using **Ethernet**
     - Share your connection from **Wi-Fi**

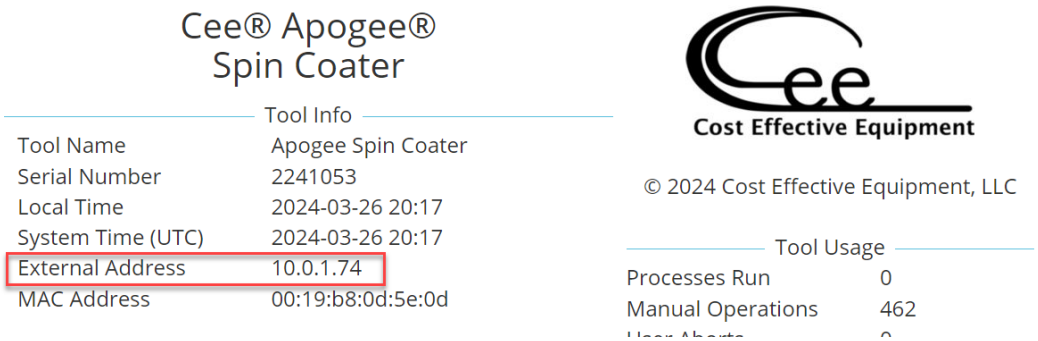
   Windows DHCP

   Third-party DHCP server software will need to be installed in order to connect with the equipment.
3. For remote connection, review *Section 7 DataStream™ Remote Access*.

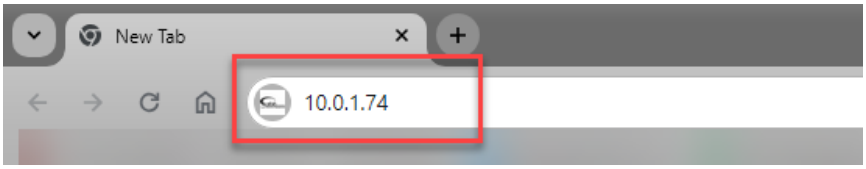
   If your Apogee® tool is already connected to your organization's network, proceed with the following instructions.

Download Recipes

4. On the Apogee® Equipment, navigate to the **About** screen and make a note of the tool's IP address. The IP address will be unique for each Apogee® tool.

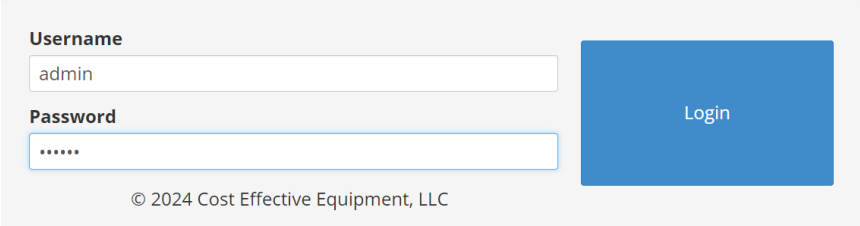


5. Open your computer's browser and enter the Apogee® IP address into the URL bar.

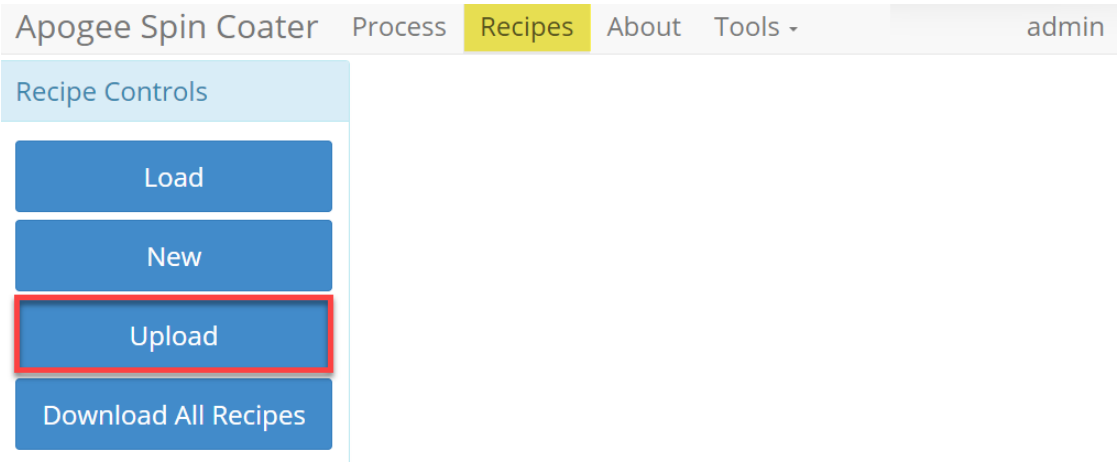


6. On your computer, enter admin credentials and click **Login**.

[10] For Cee® X-Pro II Workstation process modules, connect to the ethernet port located at the rear of the X-Pro II Workstation. For Cee® Flange Mount process modules, connect to the ethernet port located on the backside of the user interface.
[11] Please consult your Information Technology department for guidance on establishing a DHCP server.



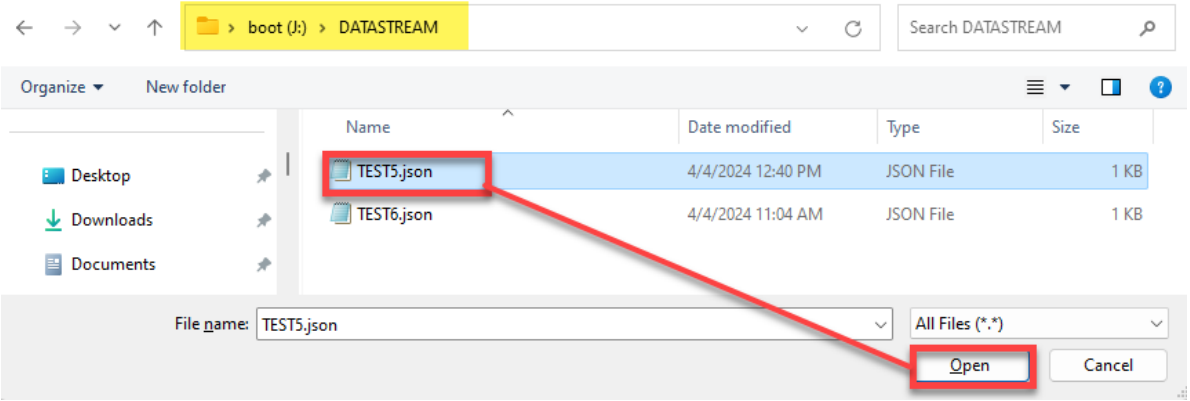
7. Navigate to the **Recipes** screen and select **Upload**.



8. Navigate to the directory on your computer where recipes files are stored, select the first recipe for upload, and click **Open**.

   *Only one recipe can be uploaded to DataStream™ at a time.

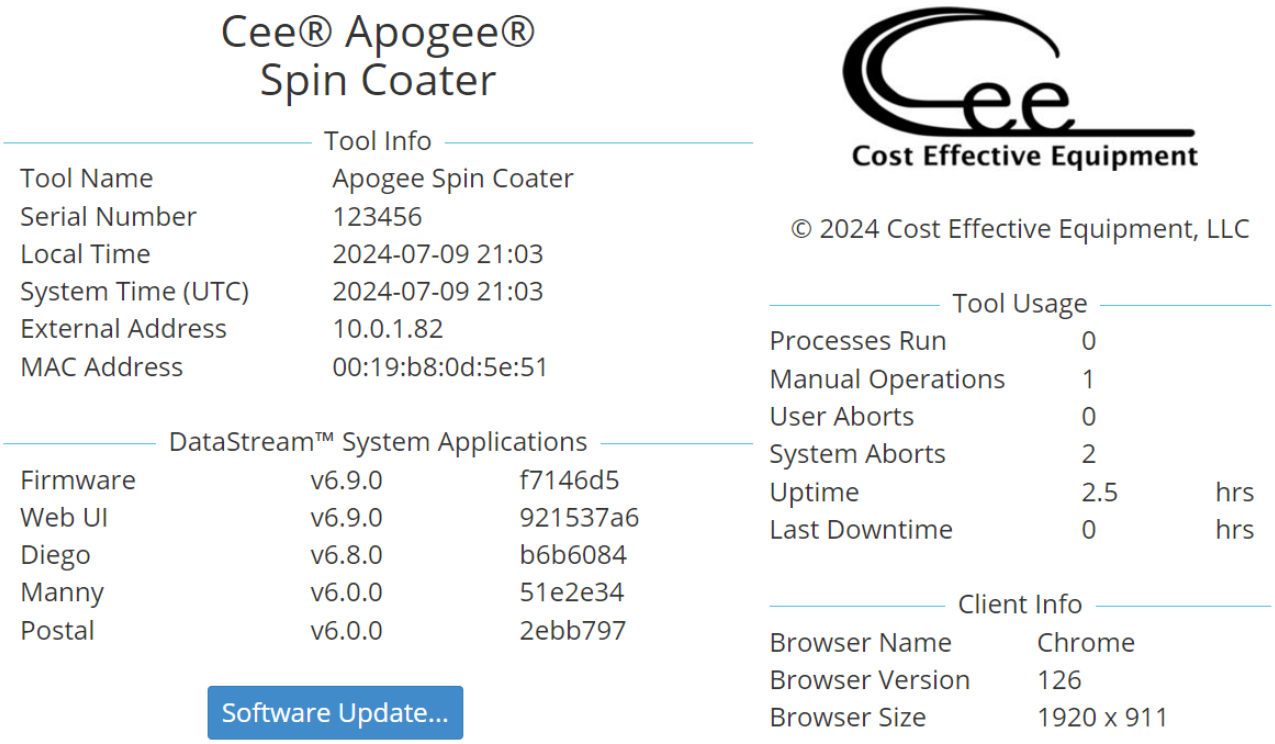
   **Zip files must be extracted before uploading to DataStream™.



   Note the alert in the upper right corner: 

9. Repeat these steps until all desired recipes have been uploaded to the Apogee®.

5. DataStream™ About Page



5.1 Tool Info

Tool Name ---------- equipment identifier displayed in upper left corner, *configured in settings

Serial Number -------- unique serial number assigned by Cee® during production

Local Time ---------- current time as defined by local time zone offset

System Time ---------- current coordinated universal time based on the equipment's system clock

External Address ---- DHCP IP address assigned when connected to a network

MAC Address --------- hardware MAC Address for the external Ethernet port

5.2 DataStream™ System Applications

A list of system applications is displayed alongside their respective version number(s). DataStream™ v6 features an updated versioning nomenclature for simplified tracking of software compatibility.

Firmware ---------- facilitates real-time process controls and recipe execution

Web UI ---------- manages all user interactions

Diego ---------- displays the equipment's graphical user interface

Manny ---------- controls user management activities

Postal ---------- used to route emails to a configured SMTP server

5.3 Tool Usage

Processes Run ------- total number of processes completed

Manual Operations-- total number of manual operations run by users

User Aborts ---------- total number of processes/commands aborted by users

System Aborts ------- total number of processes/commands aborted by the control system

Uptime ---------- runtime since the last reboot

Last Downtime ------- duration of time the equipment was powered off prior to boot up

5.4 Client Info

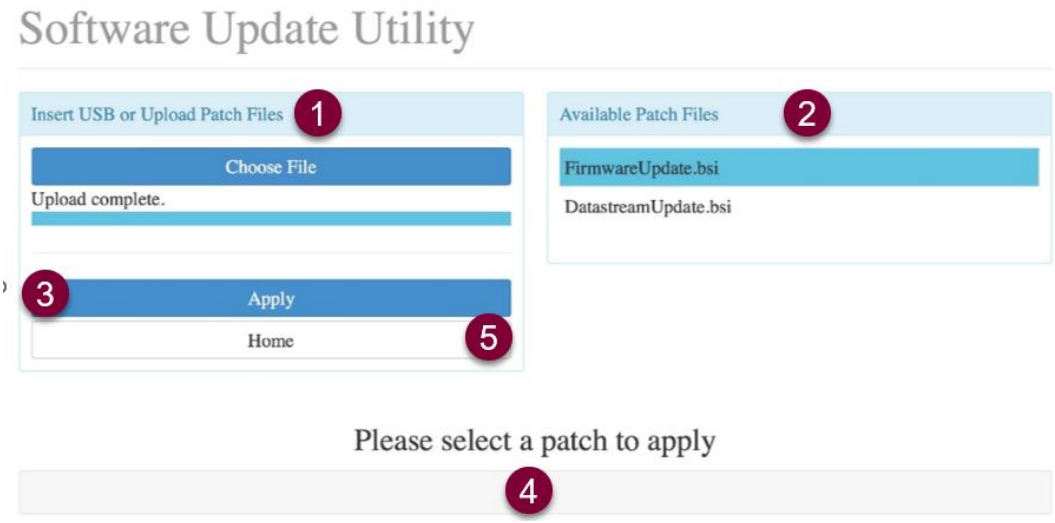
Contains browser specific information useful for troubleshooting purposes.

5.5 Software Update Utility

The Software Update Utility is accessible to equipment administrators by clicking the *Software Update* button located at the bottom of the ***About*** page.

Patch files are supplied to Apogee® equipment via upload from a remote computer (requires network connection) or files can be transferred to the root of a *FAT32 formatted* USB flash drive and manually loaded through the USB port on the equipment's rear utility panel.

Visit us online or contact customer support for details and to download the latest version of DataStream™.



1. When updating from a remote computer, select ***Choose File*** to browse for patch files and select **Open**. (*If updating via local USB, skip this step.)
2. Patch files identified by the equipment will be displayed under *Available Patch Files*.
3. Tap to highlight the desired patch file and click ***Apply***.
4. Installation status and a detailed output of the process is compiled at the bottom of the page.
5. Tap the ***Home*** button to exit the Software Update Utility and return to the main application.

Once updates are applied, the equipment must be restarted for changes to take effect.

5.6 Format USB for Tool Compatibility

Please follow all organizational policies and procedures related to the use and preparation of portable drives for Apogee® equipment.

Apogee® equipment requires an 8GB (max) FAT32 Formatted USB Drive. Please consult with your Information Technology Department for assistance or contact Cee® Customer Support.

Once formatted, add a folder to the USB drive named *DATASTREAM* to complete the process. Your USB is now compatible for use with Apogee® equipment.

6. DataStream™ Tools

6.1 Manual Control Activity

Tools > Manual Control

The Manual Control page is an advanced feature that allows users to run most operating processes outside of a recipe. This mode is useful for tasks such as prototyping processes, verifying equipment operation, and recovering from aborted processes. If the user has sufficient privileges, the ***Manual Control*** selection is available under the ***Tools*** menu. See sections 8-11 for details on equipment specific controls.

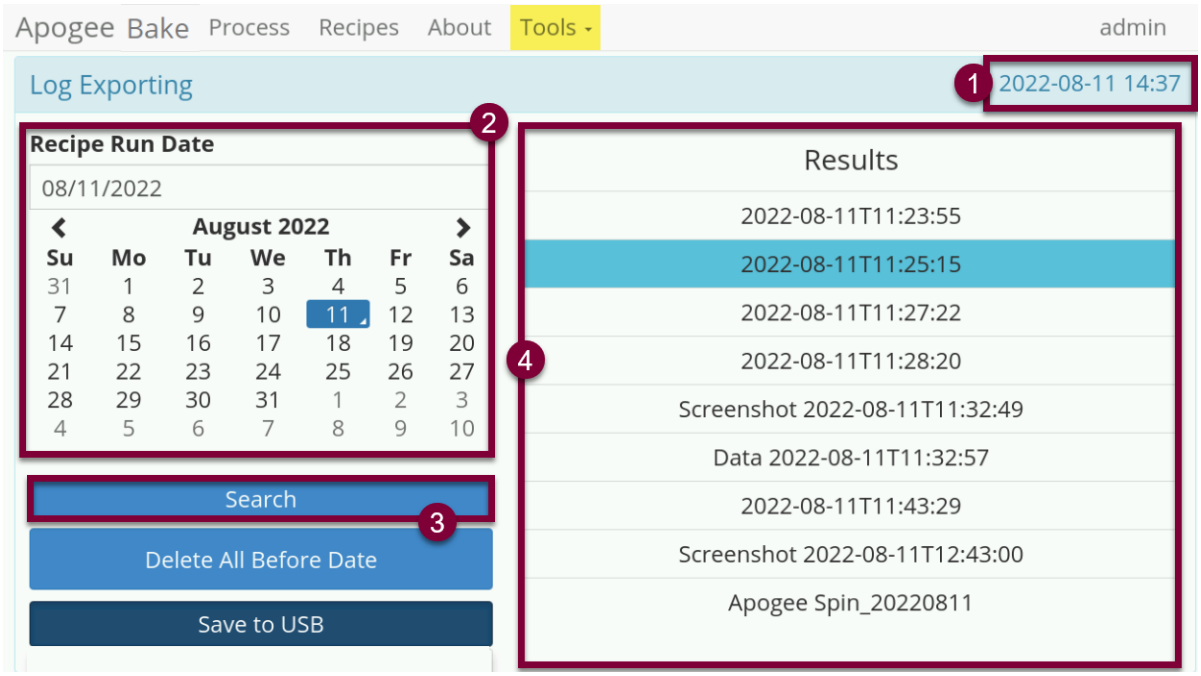
If using the remote feature, the user must have confirmed their local presence to execute manual commands. See section 7.3 for more detail on Local Presence.

6.2 Log Browser Activity

Tools > Log Browser

The ***Log Browser*** activity is an advanced feature that allows users to download process logs formatted as .xlsx or. json. Logs can be loaded to a USB inserted into the rear utility panel of the Apogee® equipment or accessed via remote connection (see section 7 on DataStream™ Remote Access for more detail.)

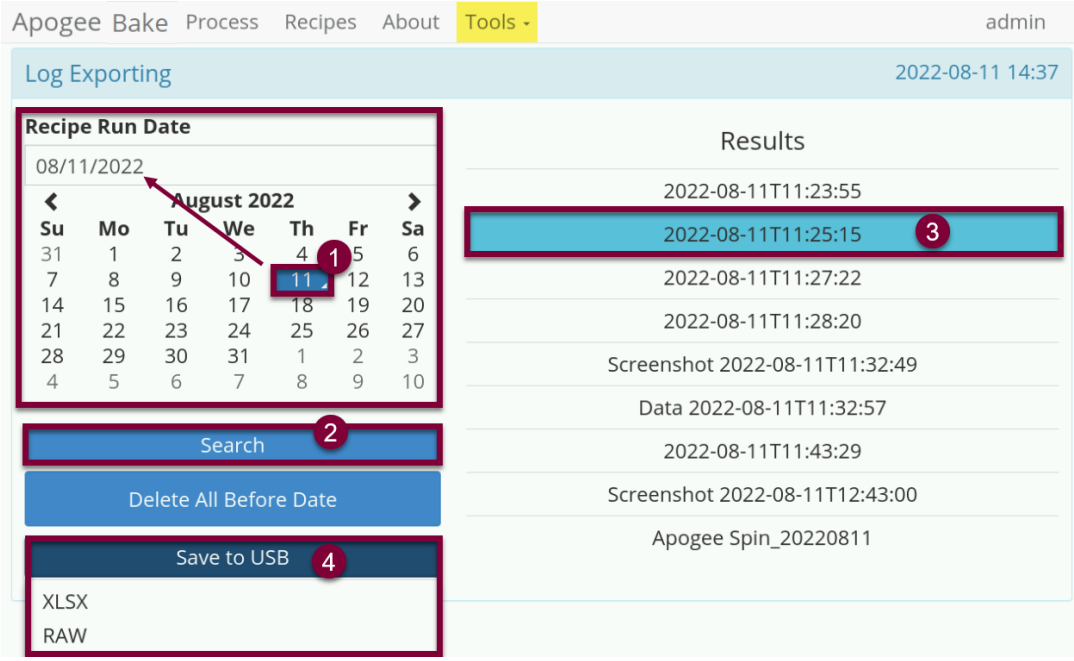
Search



1. Equipment local date & time serve as the reference point for all searches.
2. Manually key in the desired date or select one from the calendar widget.
3. Tap search to query the equipment for all records on the specified date.
4. Search results appear in a list format to the right of the screen.

Download

Users with sufficient permissions can export log files from the physical equipment to an appropriately formatted USB drive. Review section 5.6 for details on how to Format USB for Tool Compatibility.

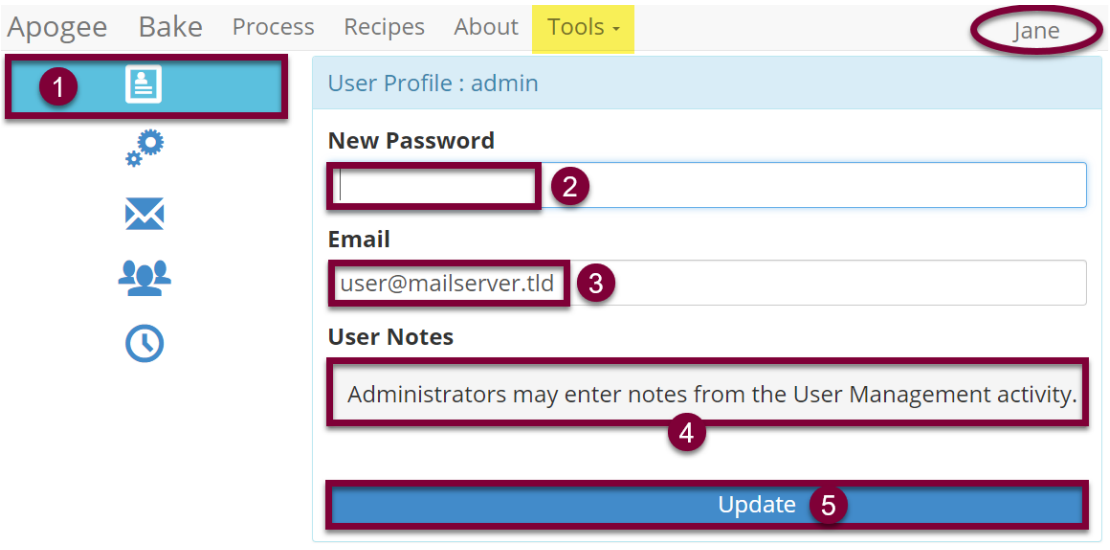


1. Select a date from the calendar widget.
2. Click ***Search*** to query for logs on the desired date.
3. Select the data log(s) from the list of results.
4. Select ***Save to USB*** and select the desired file format.
5. Remove USB & manually load files onto an approved local computer for review.

6.3 Settings

User Profile Settings

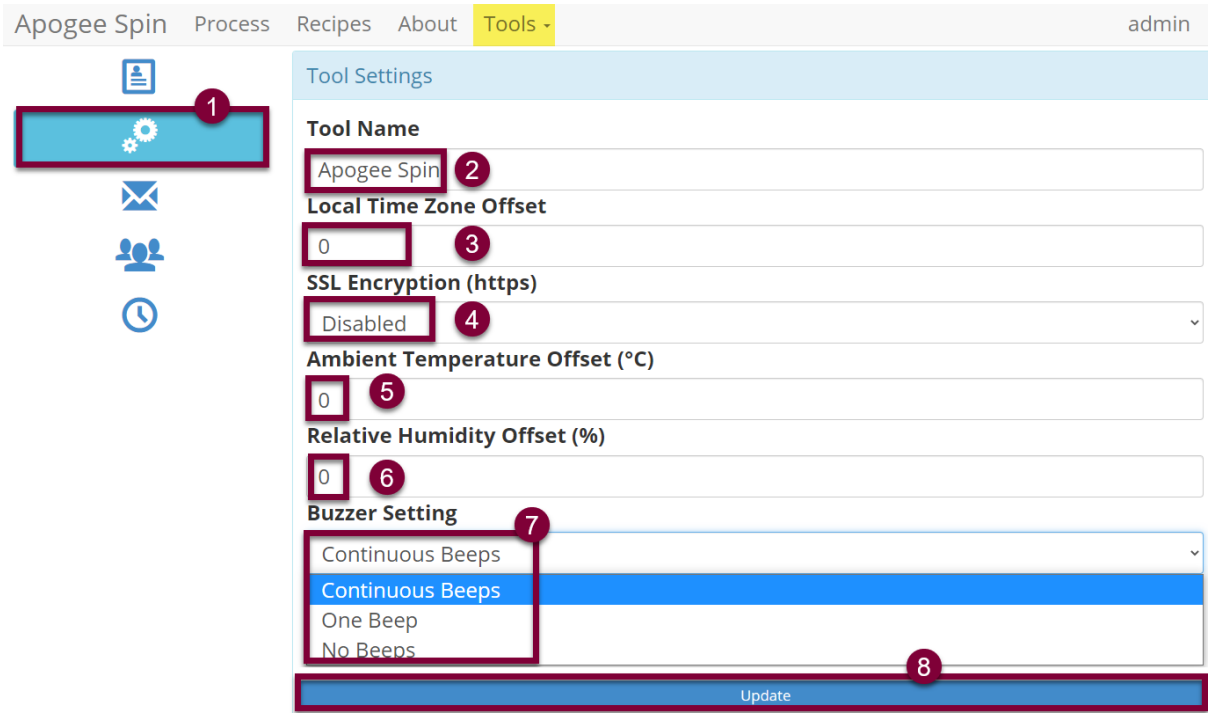
Users with individual (non-shared) access can edit their personal profiles.



1. Profile Settings ..... navigate to ***Tools > Settings*** then select the ***profile icon***
2. New Password[12] ..... enter password and satisfy validation prompt
3. Email ..... used throughout the system to send user defined notifications
4. User Notes ..... defined by user administrators (covered in the next section)
5. Update ..... saves ***all*** profile settings defined within the activity

***Changes are effective upon the user's next login.**

Tool Settings

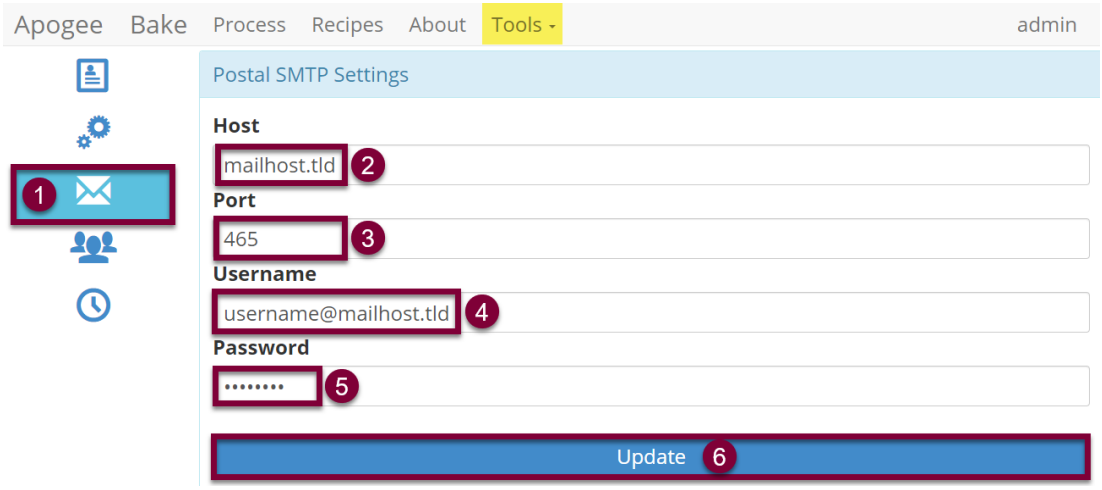


1. Tools Settings ..... navigate to ***Tools > Settings*** then select the gears icon
2. Tool Name[13] ..... identifier displayed in the upper left corner of the screen
3. Local Time Zone Offset ..... used to set the local time on the equipment according to UTC[14]
4. SSL Encryption[15] (https) ..... controls network access to the equipment.
5. Ambient Temp Offset ..... ambient temperature calibration of ±50°C
6. Relative Humidity Offset ..... relative humidity calibration of ±50%
7. Buzzer Setting ..... disable/enable end of process alarm (single vs continuous beep)
8. Update ..... saves all equipment settings defined within the activity

****Once updates are applied, the equipment must be restarted for changes to take effect.***

[12] Leave the password field blank while updating other settings to ensure the password is ***not*** changed
[13] If a name is not provided the tool will default to *Apogee*
[14] Find your UTC (Universal Coordinated Time) offset
[15] When enabled, the equipment can be accessed from both https and http.

Mail Settings



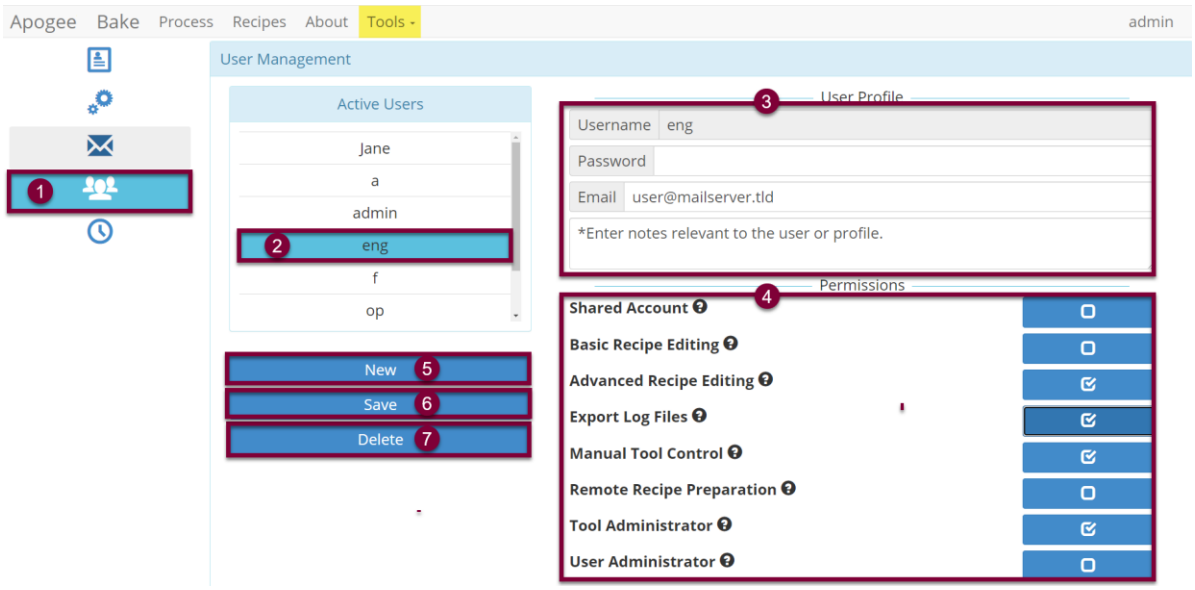
1. Mail Settings.....navigate to ***Tools > Settings*** then select the ***mail icon***
2. Host.....the SMTP server that mail is sent from
3. Port.....server defined - defaults for SMTP are 587 and 465 for SSL
4. Username.....defined by the mail server's administrator
5. Password .....sent to the server during mail submission
6. Update.....saves all mail settings defined within the activity

Once updates are applied, the equipment must be restarted for changes to take effect.

Cost Effective Equipment, LLC does not provide an SMTP server or access to a server for individual equipment.

User Management

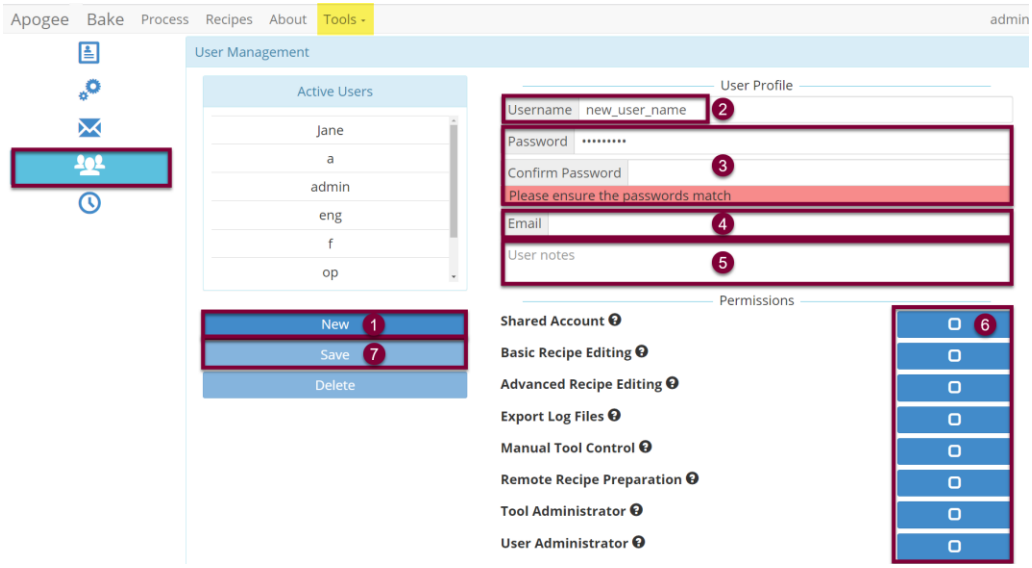
The User Management activity is a limited access permission that allows for administrative control over all individual and shared user accounts on the equipment.



1. User Settings..... navigate to ***Tools > Settings*** then select the ***users icon***
2. Active Users ..... all system users – select the user profile you wish to edit
3. User Profile ..... admin access to edit user information
4. User Permissions ..... define the activities a user will be able to access and perform
5. New ..... create a new user
6. Save ..... saves all user settings defined within the activity
7. Delete ..... remove users who no longer require access to the equipment

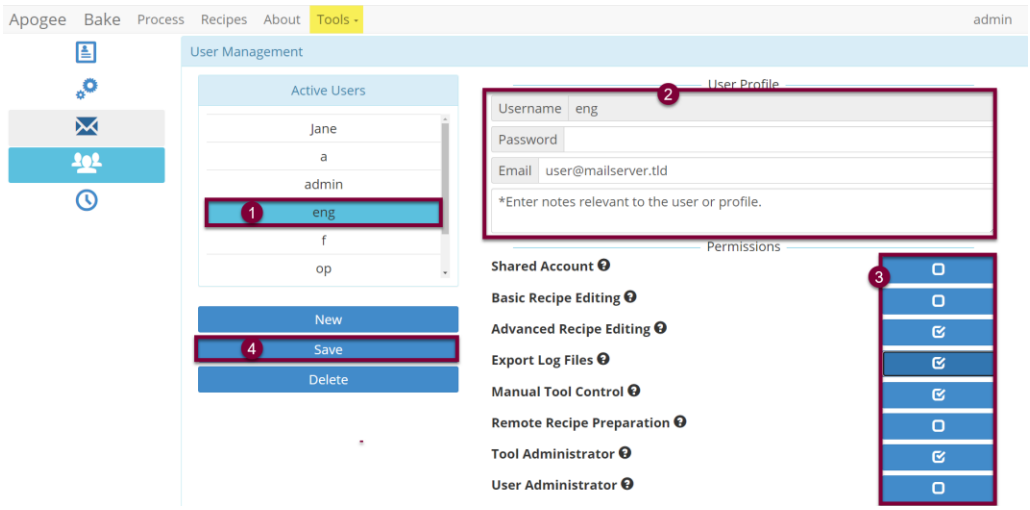
***Changes are effective upon the user's next login.**

Add New User



1. In the User Management activity, tap ***New.***
2. Enter a unique username (must be at least one character and contain no spaces).
3. Create the user's password & follow prompt to re-enter for verification purposes.
4. Enter the user's email address (if-applicable).
5. Enter relevant user notes (visible to the user within the user profile activity.)
6. Assign permissions by checking the box for each access need.
7. Click ***Save*** to move the user profile into production, facilitating access to the equipment.

Edit User Permissions

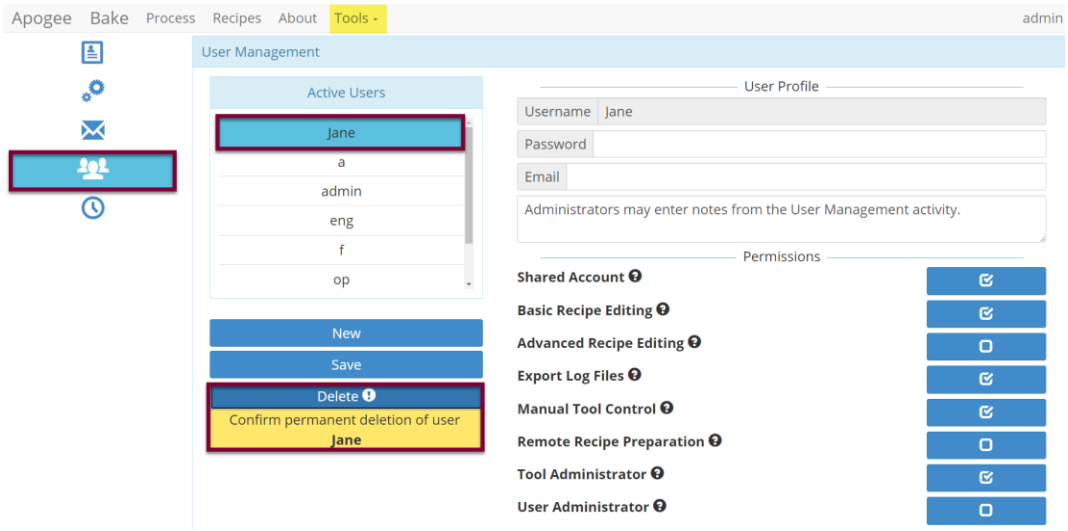


1. Select a user from the *Active Users* list.
2. Edit User Profile Data as needed.
   - Usernames cannot be modified.
   - Leave password field blank to prevent modification to current password.
3. Enable or disable permissions as needed.
4. Click ***Save*** to move changes into production.

***Changes are effective upon the user's next login.**

Delete a User

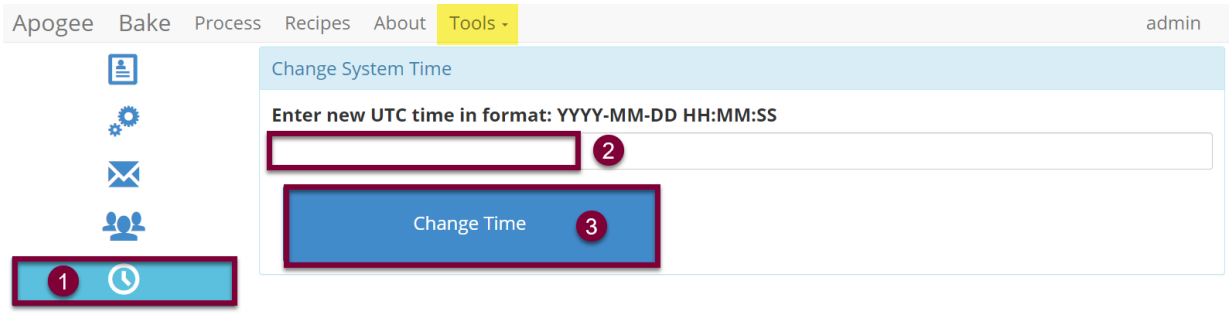
When deleting users, it's important to note that this change is irreversible. Users are unable to delete their own account. Before deleting an administrator's account, the administrator permissions must be removed.



1. Select a user from the Active Users list.
2. Click Delete.
   - Action Confirmation is required.

Change System Time

UTC timestamp is automatically established when the Apogee® tool is connected to a network. When network connection is not possible, the ***Change System Time*** activity provides a simple and straightforward method for accomplishing this task.



1. Time Settings ..... navigate to ***Tools > Settings*** then select the ***time icon***
2. UTC Field ..... enter the local time in the format defined
3. Change Time..... updates system time and moves entry into production

6.4 Diagnostics

Apogee® equipment features a read-only diagnostic interface to aid equipment administrators in troubleshooting potential equipment malfunctions. To access diagnostics, navigate to ***Tools > Diagnostics.***

The data output within the Diagnostic Interface varies by equipment and it is normal for some fields to indicate *null* or *undefined*. Please contact *Cee® Customer Support* with questions or for specific guidance in interpreting this data.

7. DataStream™ Remote Access

A key feature of the DataStream™ system is the ability to remotely view and control the equipment. Remotely connected users can view real-time parameters, create & edit recipes, view equipment information, and download log files. Every function available from the local user console is available via remote network connection. Additionally, there are some functions only available by remote connection.

7.1 Connecting to DataStream™

In this section, *host* refers to the Apogee® Equipment and *client* refers to the remote workstation.

Setting up a DataStream™ network connection is a relatively straightforward process, however those inexperienced with configuring network assets or lacking necessary privileges, should contact their local system administrator for assistance.

To utilize the DataStream™ network feature, the host must be connected to an active network via the Ethernet port on the rear of the equipment. The host and client must be on the same subnet. If the network has a firewall, a port must be opened to allow the host and client to communicate.

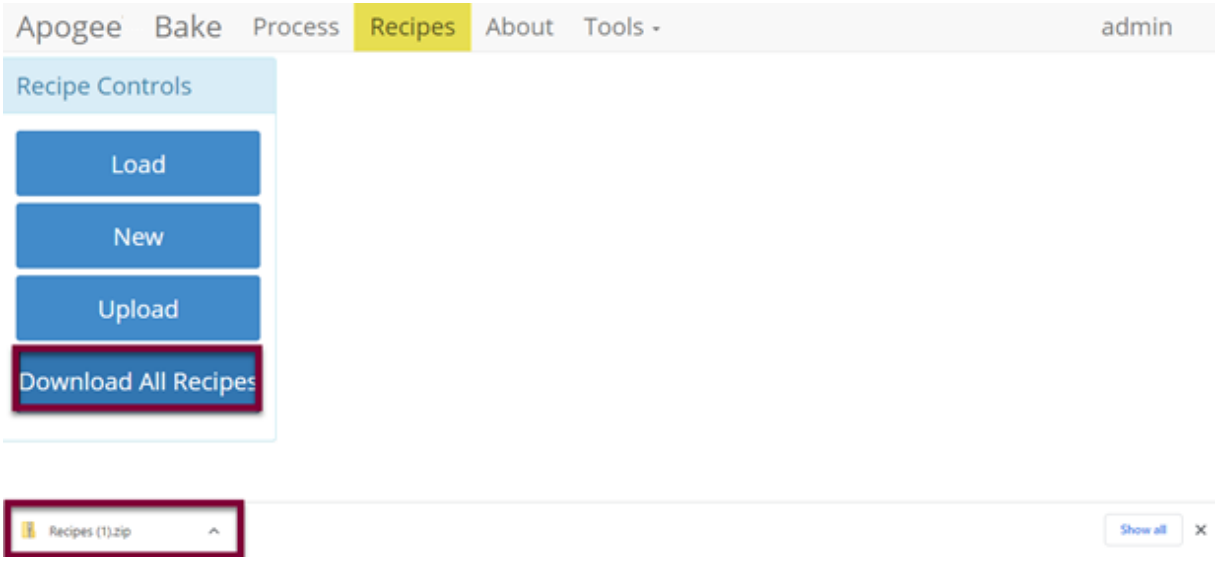
Equipment is configured as DHCP by default meaning the network will assign the host an IP address once connected. The IP address can be found under the ***About*** tab on the DataStream™ GUI. Once connected to the network, the DataStream™ network can be accessed by opening a browser window and entering the host IP address. The user will be required to enter their login credentials to access host functions.

7.2 Remote Recipe Editing

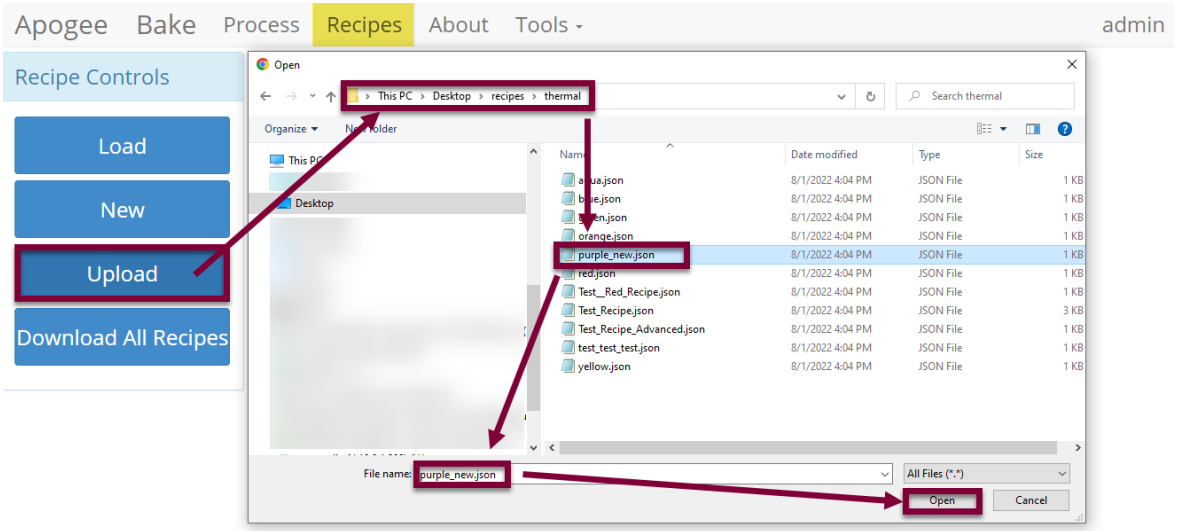
Remote users retain their local recipe editing capabilities. In addition, they are able to download recipes from the host equipment to their local client and upload recipes from their local client to the host machine. This provides an effective method of ensuring recipes are available and consistent across all equipment's.

Download Recipes

From the Recipes tab select ***Download All Recipes*** to extract a zip file of all recipes on the equipment or select **Load** to select individual recipes for download.

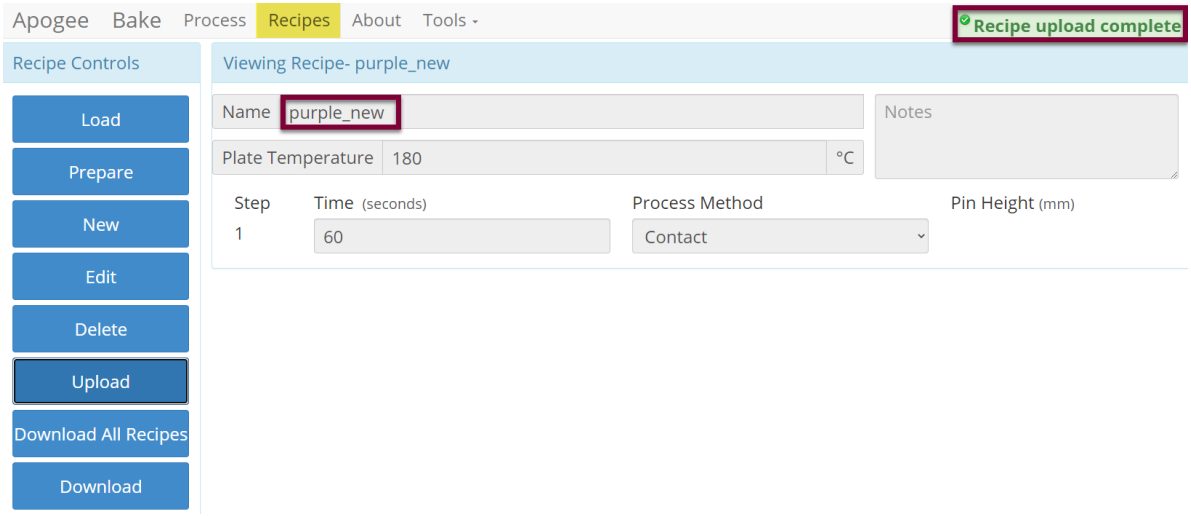


Upload Recipes

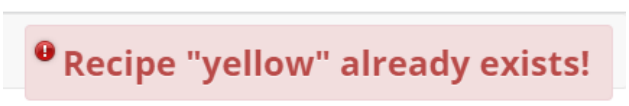


1. Navigate to the Recipes Tab.
2. Select upload and navigate to the desired folder or files.
3. Select the recipes to upload and click ***Open.***

Upon successful import, the *Basic Recipe Editor* activity for the imported recipe will open and a *Recipe upload complete!* message is displayed.



If the imported recipe already exists on the equipment, the import will fail, and the following message will display:

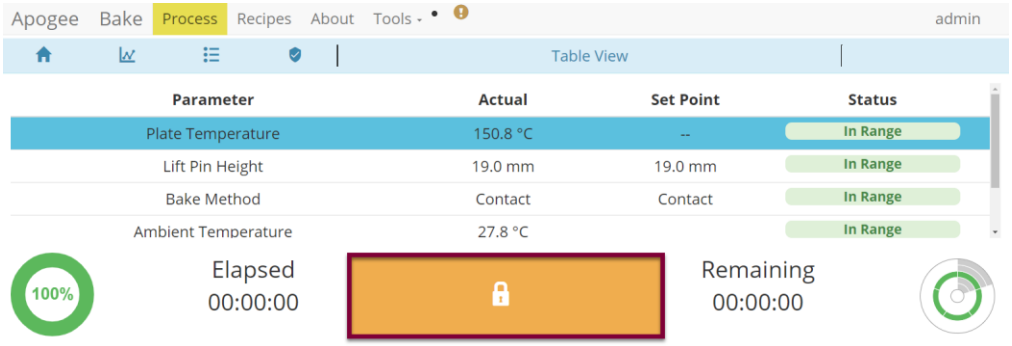


7.3 Local Presence

For safety reasons, users must verify their presence locally before running recipes or executing manual commands. Only one user can have control of the equipment at a given time.

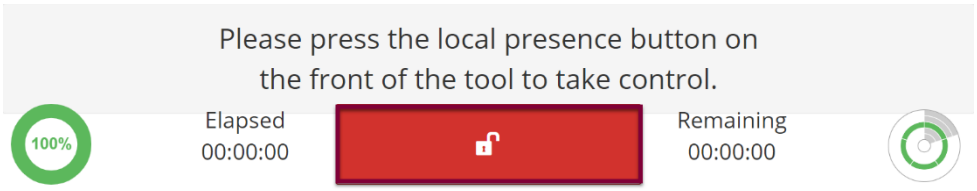
When using the equipment without a verified local presence, the omni-button will be locked. All actions that impact equipment conditions are disabled. Blocked actions include running recipes, aborting recipes, and executing manual commands.

Local Presence Unverified – the orange *locked* omni-button indicates that the user does not have control of the machine



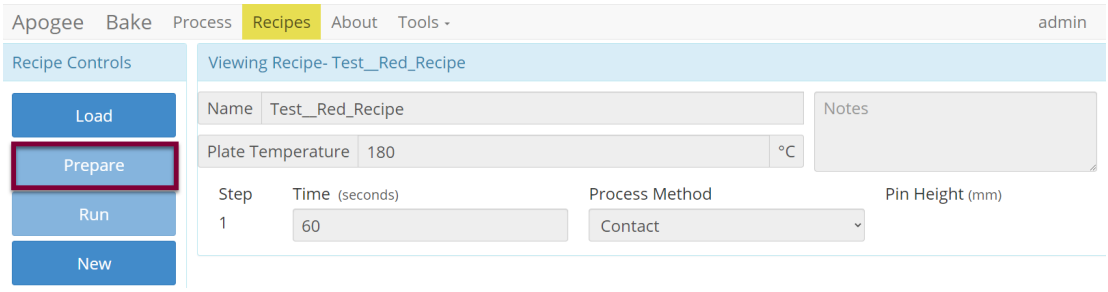
Verifying Local Presence – Click the omni-button to initiate the request for control of the equipment. The red *unlocked* omni indicates that a request is in process and triggers the blue local presence button on the Apogee® machine to flash. Press the flashing Local Presence button to finalize the control request.

When multiple users are seeking simultaneous local control of a single device, the user who most recently requested control will receive access when the local presence button is pressed.



7.4 Remote Preparation

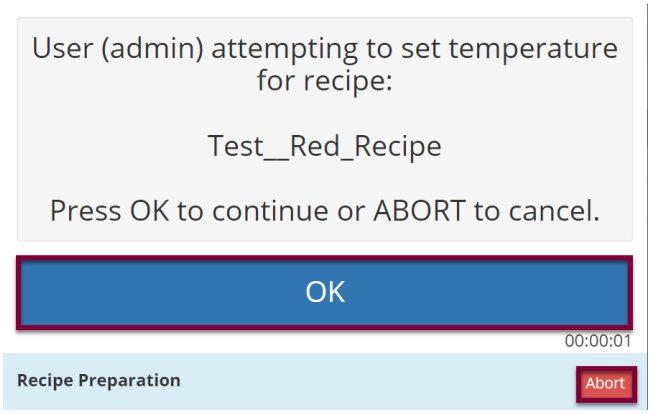
Users with sufficient privileges can remotely prepare equipment to run a recipe. This feature is useful for preconditions and parameters that take a significant amount of time such as hot plate and platen temperatures. To initiate this feature, navigate to the ***Recipes*** tab, click ***Load*** to access the recipes list, and select the desired recipe, then click ***Prepare***.



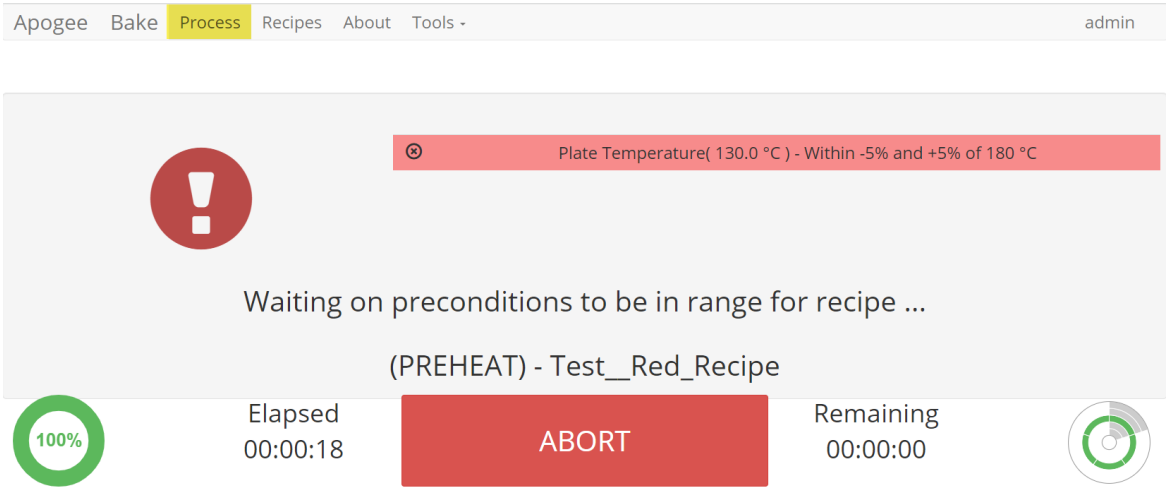
Preparation processes cannot be initiated when the equipment is already in use.

Local Display – When a ***Prepare*** command is entered, the user or device with active control of the machine receives an alert. This prompt includes the user and recipe to be prepared. The user with active control of the machine can refuse the request by selecting ***Abort*** or accept the request by tapping ***OK***.

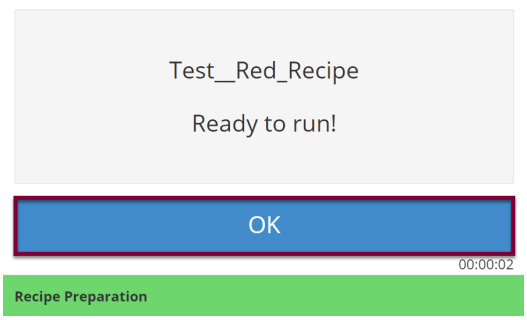
In the absence of a response, the request is auto accepted after two minutes.



Preparation In Process – progress toward the specified precondition(s) is displayed to the user with verified local presence.



Preparation Complete – indicates that the equipment has reached all specified preconditions and the recipe can be initiated. Upon clicking ***OK*** the user is directed to the *Process* screen to begin the recipe.

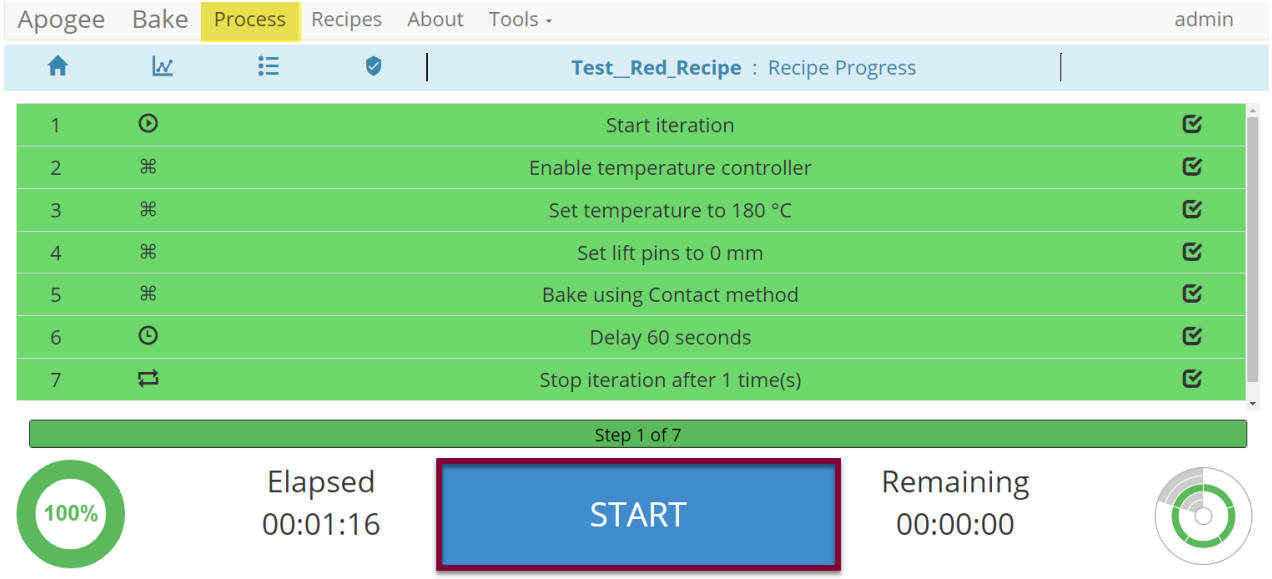


During recipe preparation the Prepare and Run commands are disabled to ensure no interruption to precondition processes.

7.5 Remotely Running a Recipe

For safety reasons, users must verify their presence locally before running recipes or executing manual commands. Only one user can have control of the equipment at a given time. Please review section 7.3 on Local Presence to familiarize with the local presence feature.

Following completion of recipe preparation, the user will be directed to the *Process* page to initiate the recipe by clicking ***Start***.



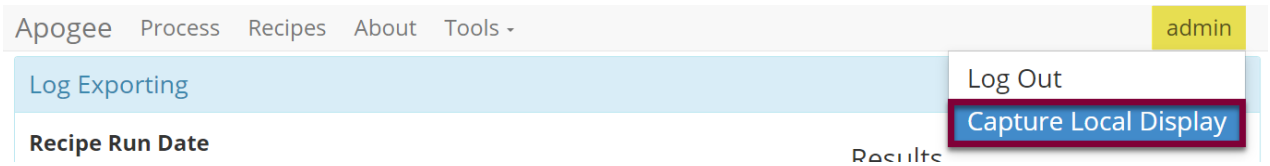
When recipe preparation is unnecessary, the user will navigate to the Recipes tab, click ***Load*** to access the recipe list, select the desired recipe, and click ***Run***. From here, they are directed to the *Process* page pictured above to initiate the recipe by clicking ***Start***.

When a recipe is initiated Prepare and Run commands are disabled to prevent interruption to the process.

7.6 Capture Local Display

With remote connection to the Apogee® equipment, click the user's name in the upper right corner and select ***Capture Local Display*** to view a capture of the physical machine's display.

This will not capture your view, but the view of a user who is physically present at the machine and can be useful for troubleshooting issues and/or providing guidance to users when your presence in the cleanroom isn't possible.

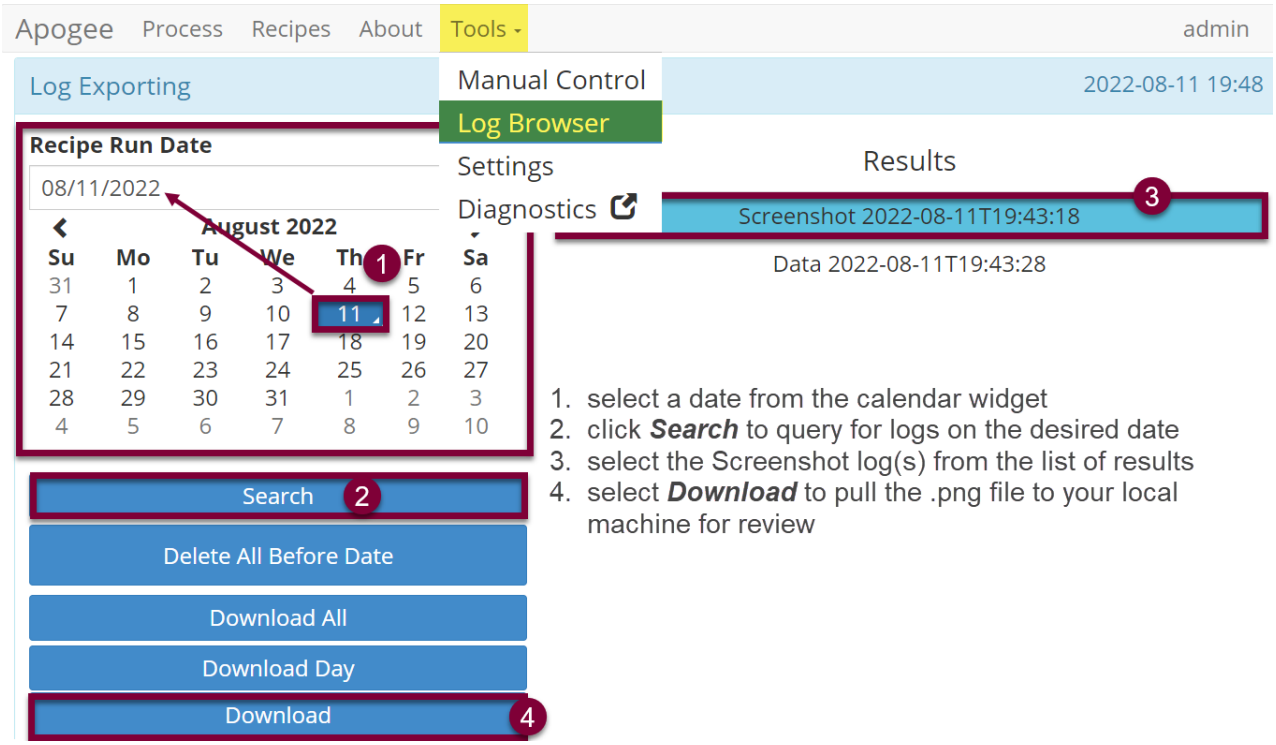


7.7 Review Screenshot

From the physical Apogee® Equipment, a local user can capture a view of their current display by tapping the user's name in the upper right corner and selecting ***Take Screenshot***. This screenshot is then compiled into the log list in the ***Log Browser*** activity for export to USB or download of a .png file for review via remote connection.

For remote review of screen capture:

Tools > Log Browser

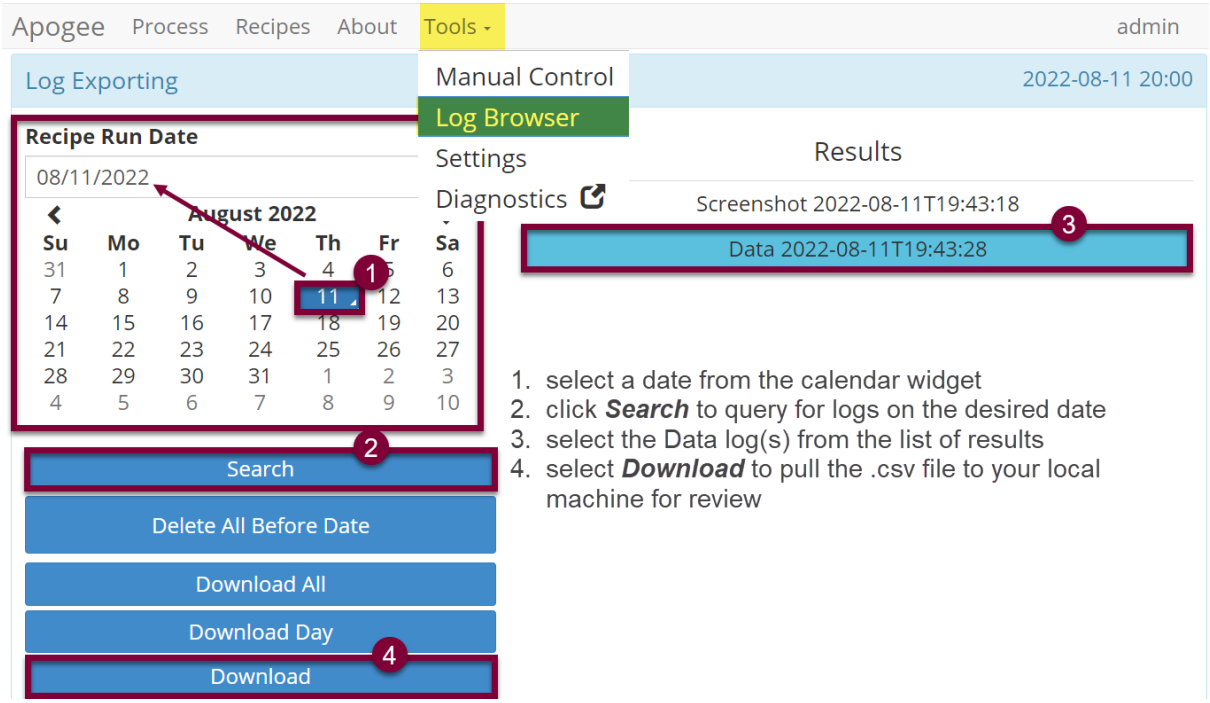


7.8 Review Diagnostic Data

From the physical Apogee® Equipment, a local user can capture a real-time snapshot of diagnostic data by tapping the user's name in the upper right corner and selecting ***Export Diag Page***. This capture is then compiled into the log list in the ***Log Browser*** activity for export to USB or download of a .csv file for review via remote connection.

For remote review of diagnostic capture:

Tools > Log Browser



7.9 DataStream™ API

Introducing the DataStream™ API, the comprehensive solution for seamless integration, automation, and remote management in your operations. Our flexible and customizable API allows you to tailor your integration to suit your specific requirements.

Improve productivity, increase efficiency, and streamline operations with actions like barcode scanning, robotic handler integration, and remote user profile interaction. The possibilities are limited only by your imagination.

All Cee® Apogee® tools come equipped with DataStream™ Technology, which offers HTTP endpoints for remote management of the tool.

Visit the Cee® GitHub here: http://github.com/CostEffectiveEquipment/DataStream-API/wiki for a repository providing detailed documentation of DataStream™ Software endpoints and examples to help you get started. For questions, contact our API support team.

To ensure access to the full set of commands, we recommend updating to the latest version of DataStream™.

8. Apogee® Spin Coater

8.1 System Parameters

Parameter	Actual	Set Point
Spin Speed	0 rpm	0 rpm
Spin Acceleration	500 rpm/s	500 rpm/s
Percent Exhaust	100 %	100 %
Exhaust Airflow	-1.2 CFM	-1.0 CFM
Active Dispenses	None	None
Dispense Source Empty	None	
Chuck Vac	99.1 kPa	101.3 kPa
Waste Bottle Full	False	
Ambient Temperature	25.9 °C	
Humidity	44.1 %	
Vibration	4	

Spin Speed---------- measured rotational speed of the spin chuck in revolutions per minute (rpm)

Spin Acceleration[16]---------- dictates how fast the spin chuck will accelerate in revolutions per minute per second (rpm/s)

Percent Exhaust---------- displays the valve opening percentage of the optionally equipped programmable exhaust module

Exhaust Airflow[17] displays current exhaust pressures and, if set, controls exhaust pressures

Active Dispenses---------- indicates which dispenses are enabled

Dispense Source Empty--- indicates when dispense sources are low or empty

Chuck Vac---------- measurement of the vacuum pressure holding the substrate against the spin chuck in kPa

Waste Bottle Full---------- indicates whether the sensors detect a full waste bottle

Ambient Temperature------ the air temperature of the environment where the equipment is housed

Humidity[18]---------- the ambient relative humidity in the environment where the equipment is housed

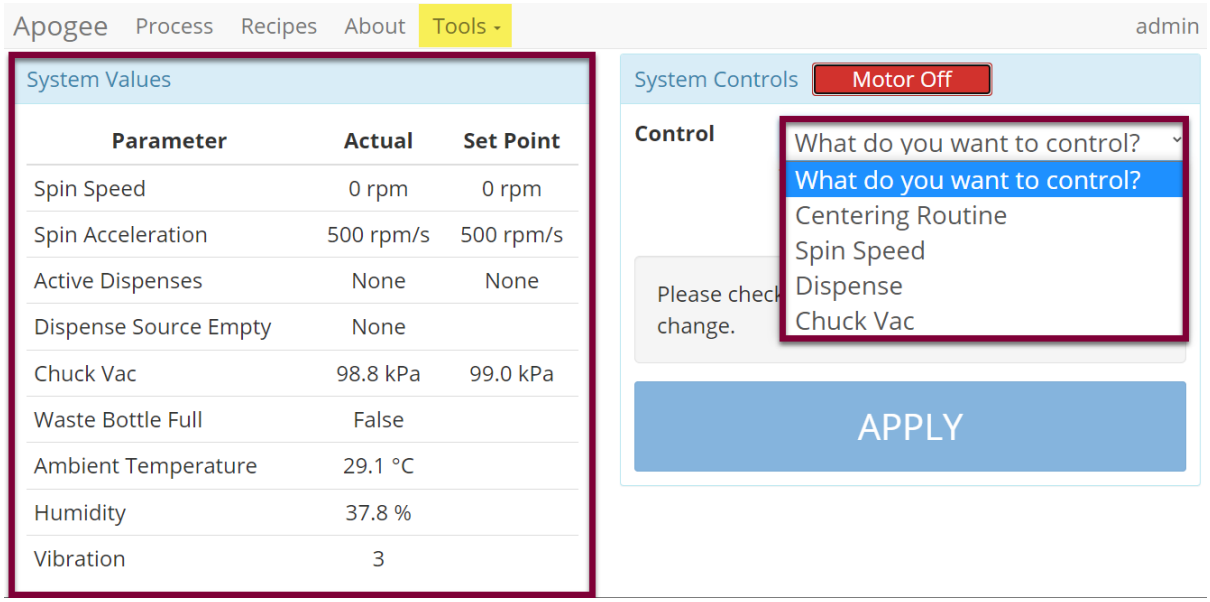
[16] ***Spin Acceleration*** settings are dependent on the presence of a ***Spin Speed*** set point.
[17] Displays a set point of -1 when automated control is disabled.
[18] Both Ambient Temperature and Humidity are measured via a custom sensor board mounted next to a ventilation inlet inside the tool. If sensor is disconnected, default of -1.1 is displayed.

Vibration---------- unitless measurement of g-forces at the spindle block; can be used to detect off-center substrates at high speeds

8.2 Manual Controls – Apogee® Spin Coater

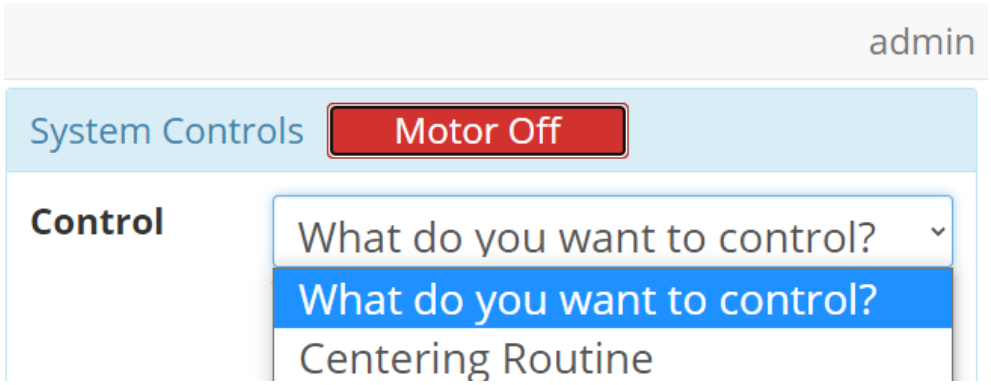
The Manual Control activity is an advanced feature that allows users to run most operating processes outside of a recipe. This mode is useful for tasks such as prototyping processes, verifying equipment operation, and recovering from aborted processes. To access the activity, navigate to ***Tools > Manual Control***. Actual and set point parameter values are displayed on the left. A drop-down menu of available controls is located on the right.

If using remote feature, the user must confirm local presence to execute manual commands. See section 7.3 for more detail on Local Presence.

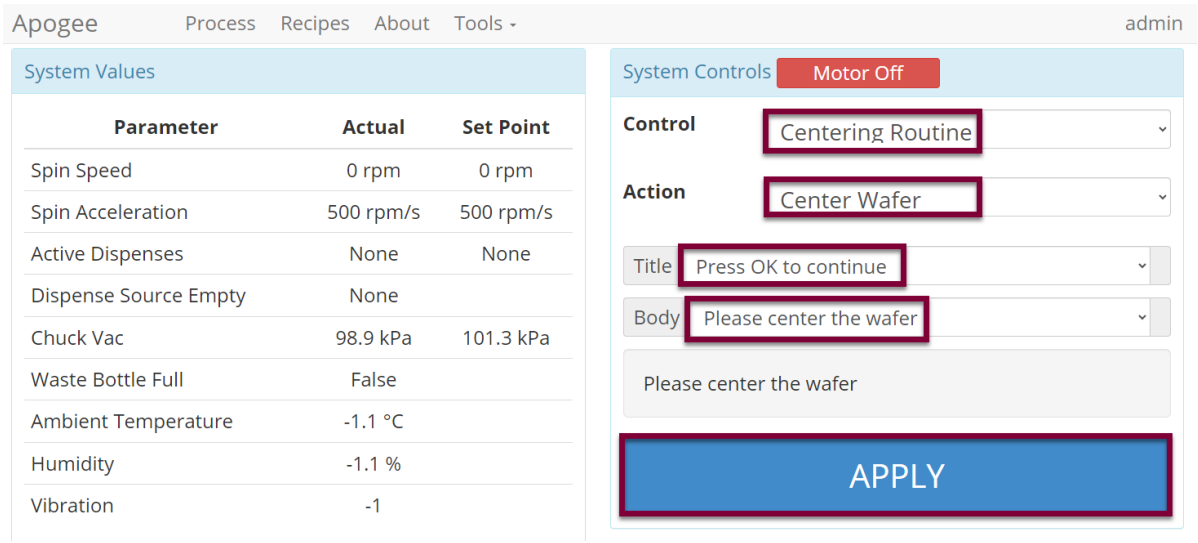


Motor Off Functionality

DataStream™ v6 introduced the Motor Off functionality for one-click, instant motor shutdown within the Manual Controls menu. Please note that this will not act as a brake for the spin chuck but when pressed, will disengage the motor allowing the spin chuck to coast down. Motor-off functionality is especially useful for applications involving large substrates with significant momentum.



Centering Routine



Select a **Control** of *Centering Routine* and the **Action** will default to *Center Wafer*.

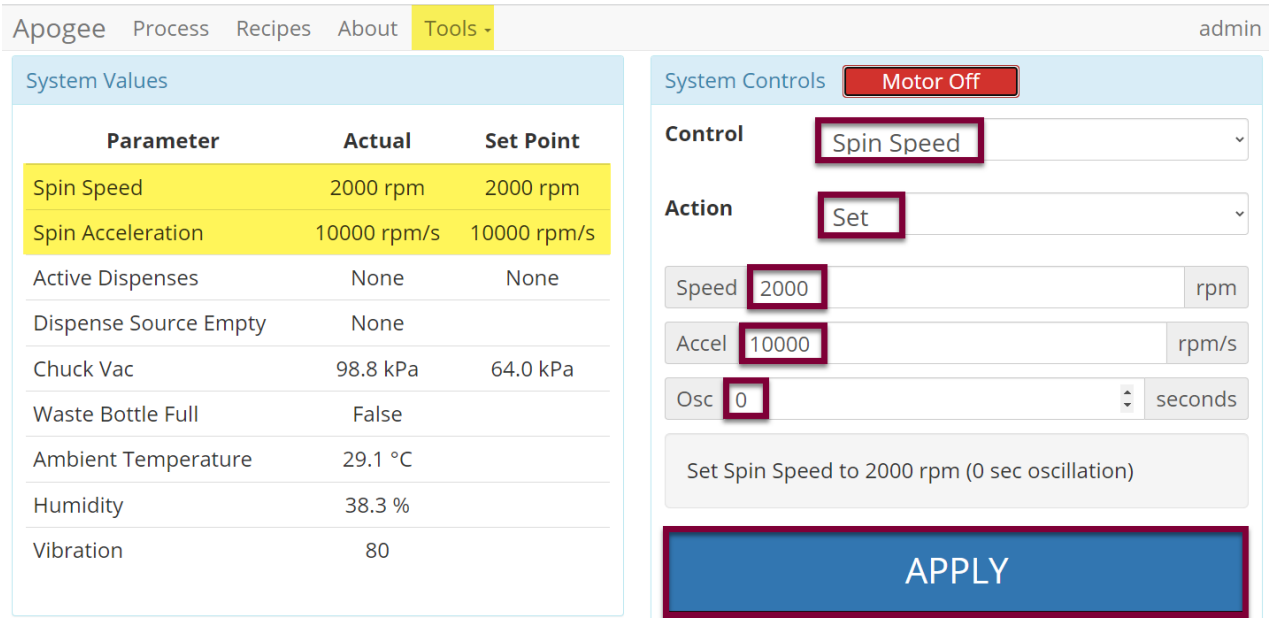
Select an option from the **Title** dropdown menu.

Select an option from the **Body** dropdown menu.

Click APPLY

Allows users to test and view configuration of the Centering Routine Display window outside of the Advanced Recipe Editor Activity.

Spin Speed:



Select a **Control** of *Spin Speed.*

*T*he **Action** will default to *Set*.

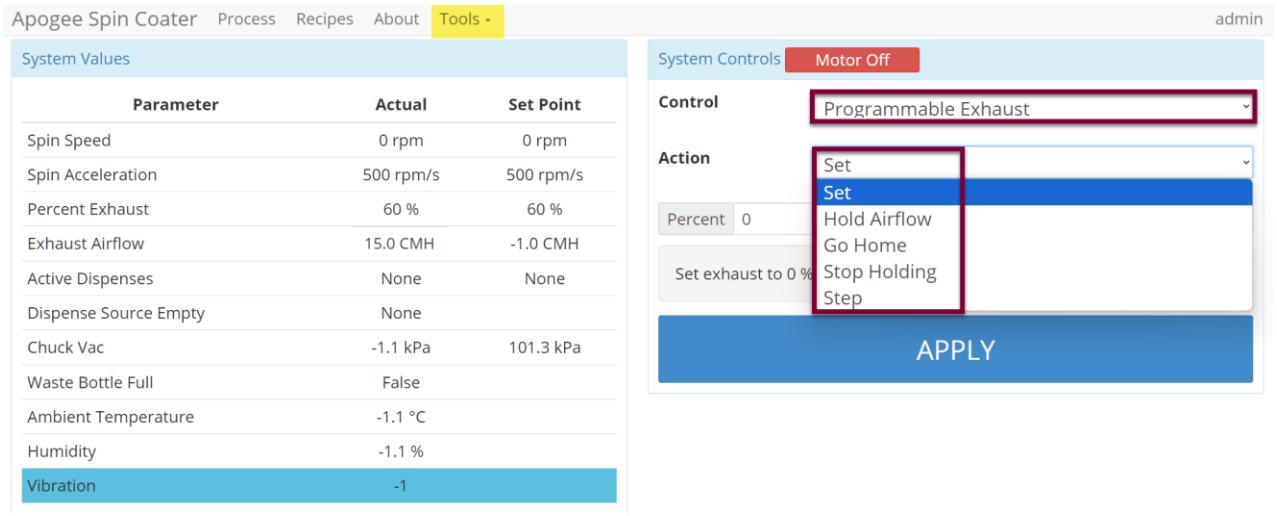
Close the spinner lid and enter desired values for spin speed, acceleration, and oscillation within the supported range for each setting:

Speed	**1-12,000 rpm** (standard spinner) **1-6,000 rpm** (450 spinner)
Acceleration	**1-30,000 rpm/s**
Oscillation[19]	**0-99 seconds**

Click APPLY

Note that the actual and set point values have populated on the system values list.

Programmable Exhaust:

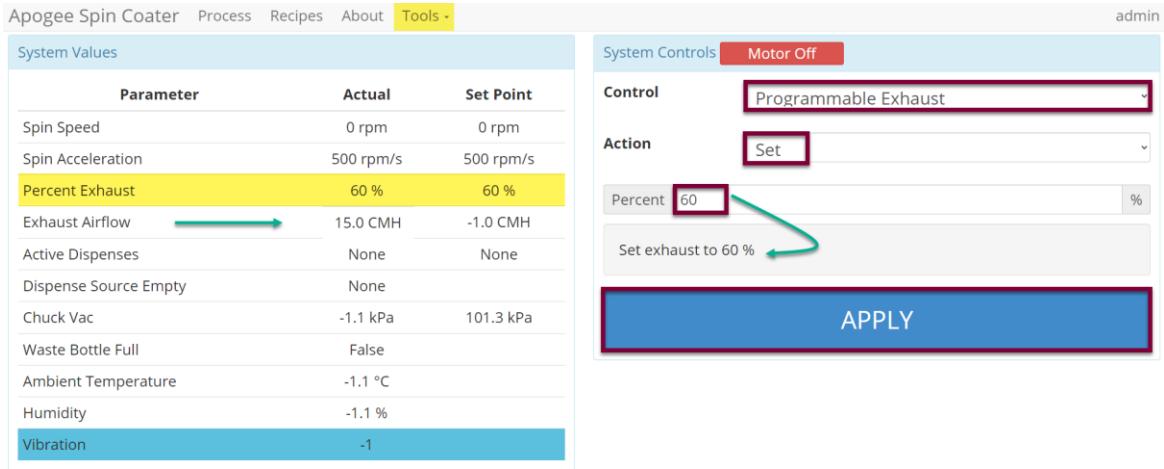


Select a **Control** of *Programmable Exhaust*

Select an **Action** of *Set*, *Go Home*, *Hold Airflow*, or *Step*

Click APPLY

Programmable Exhaust - Set:



[19] reverses spin direction for the period specified

Select a **Control** of *Programmable Exhaust*

Select an **Action** of *Set*

Enter the target exhaust *percentage*.

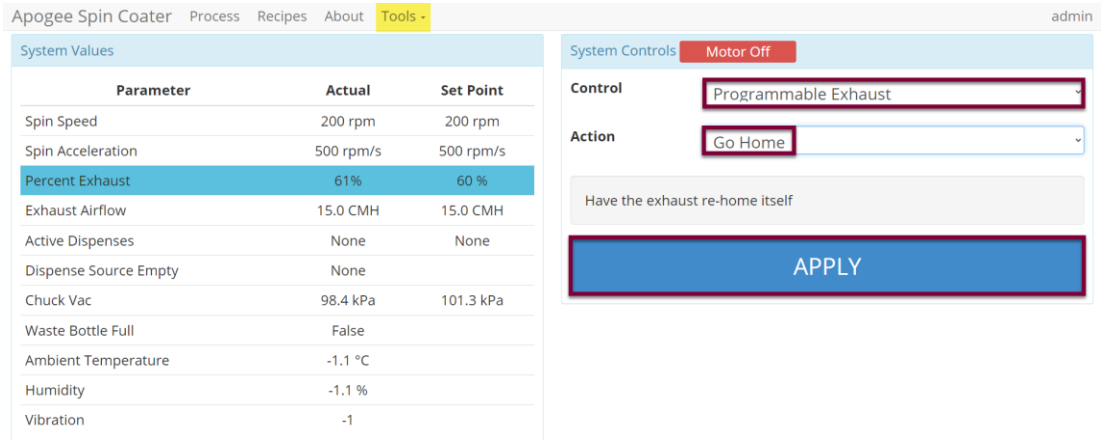
Click APPLY

Opens or closes the programmable exhaust valve to the desired position.

Refer to the Exhaust Airflow parameter to determine the rate (CMH) that air is exhausted from the spin bowl.

**Must Stop 'Holding Airflow', if set, before setting programmable exhaust. (See below.)*

Programmable Exhaust - Go Home:



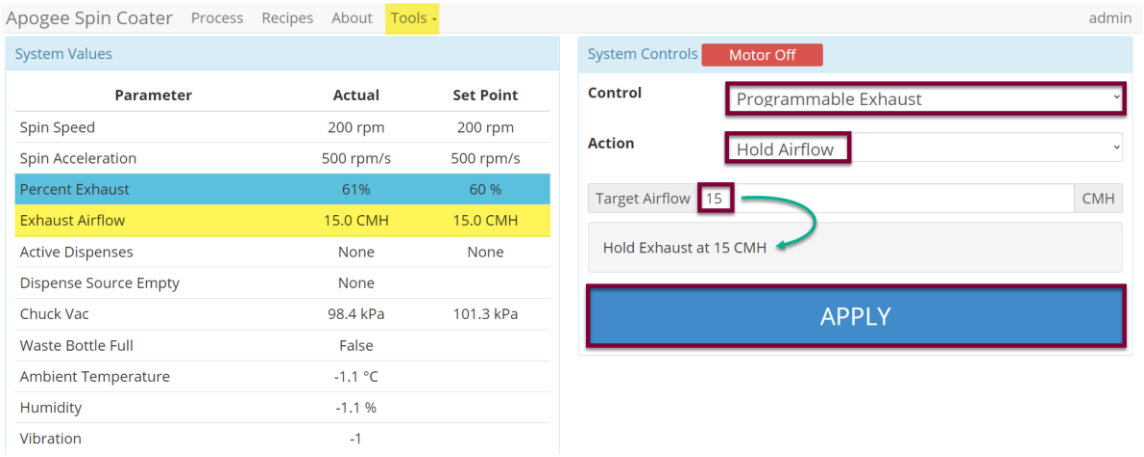
Select a **Control** of *Programmable Exhaust*

Select an **Action** of *Go Home*

Click APPLY

Used to recalibrate programmable exhaust positioning.

Programmable Exhaust – Hold Airflow:



Select a **Control** of *Programmable Exhaust*

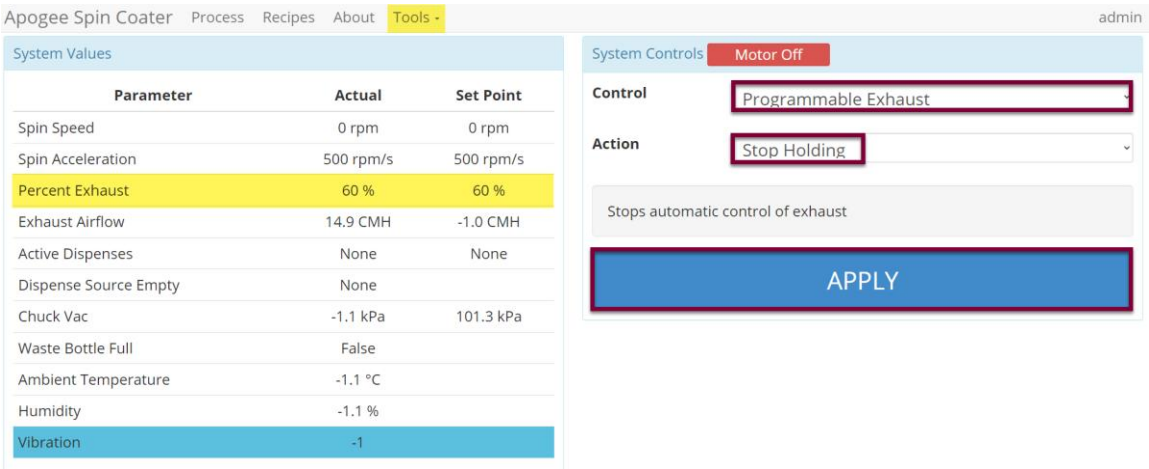
Select an **Action** of *Hold Airflow*

Enter the target airflow *CMH*

Click APPLY

Automates programable exhaust to reach and maintain a desired airflow.

Programmable Exhaust – Stop Holding:



Select a **Control** of *Programmable Exhaust*

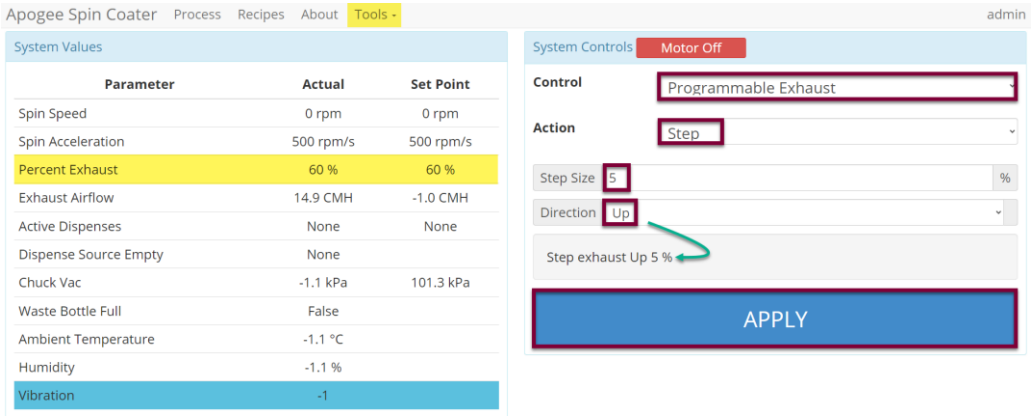
Select an **Action** of *Stop Holding*

Click APPLY

Stops automated control of exhaust air flow.

**Must Stop 'Holding Airflow', before setting programmable exhaust. (See above.)*

Programmable Exhaust – Step



Select a **Control** of *Programmable Exhaust*

Select an **Action** of *Step*

Enter *the* **Step Size** *percentage*

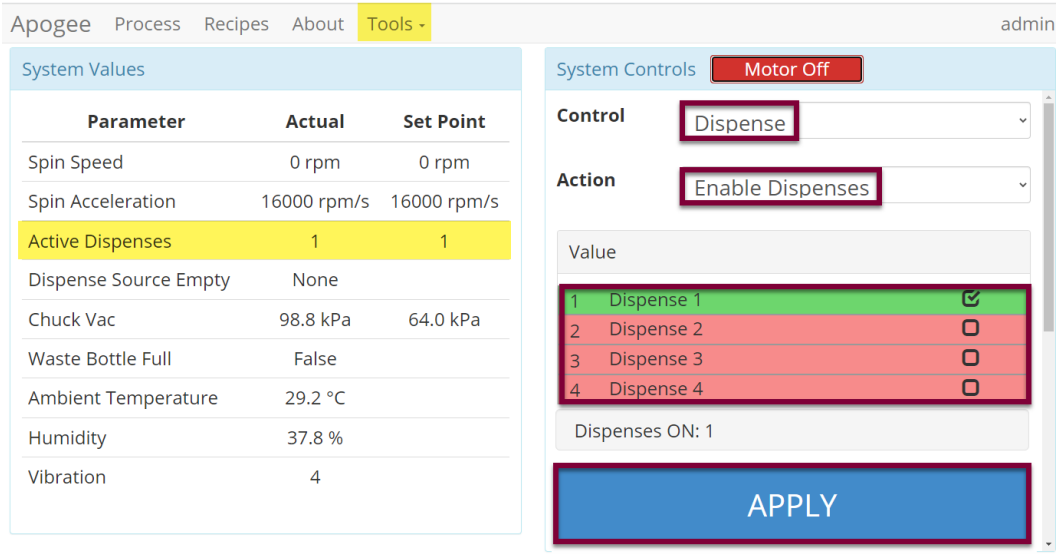
Enter a step **Direction** of *Up* or *Down*

Click APPLY

Increments or decrements the exhaust position by a given percentage.

**Must Stop 'Holding Airflow', before using this control.*

Dispense *(*if equipped)*



Select a **Control** of *Dispense*

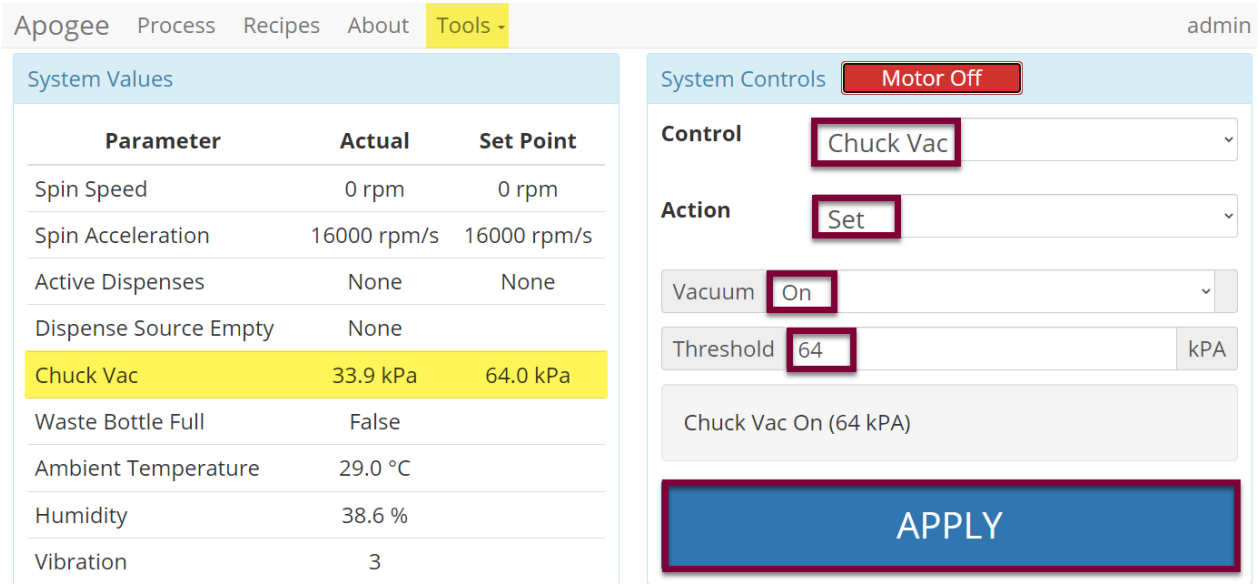
The **Action** will default to *Enable Dispenses*.

Check the box for the desired dispenses - selections are rendered in green

Click APPLY

Note that the actual and set point values for enabled dispenses have populated on the system values list.

Chuck Vac **ensure source vacuum is on*



Select a **Control** of *Chuck Vac.*

The **Action** will default to *Set*.

Set **Vacuum** to *On* or *Off.*

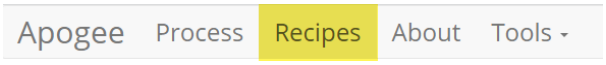
Set **Threshold** to the desired value in kPa.

Click APPLY

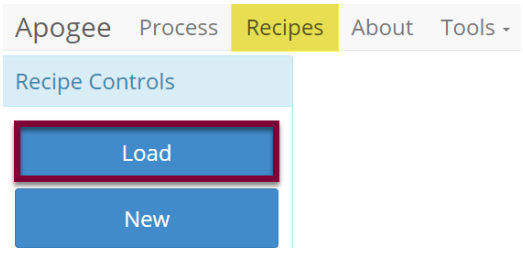
Note that the actual and set point values have populated on the system values list.

8.3 Running Recipes

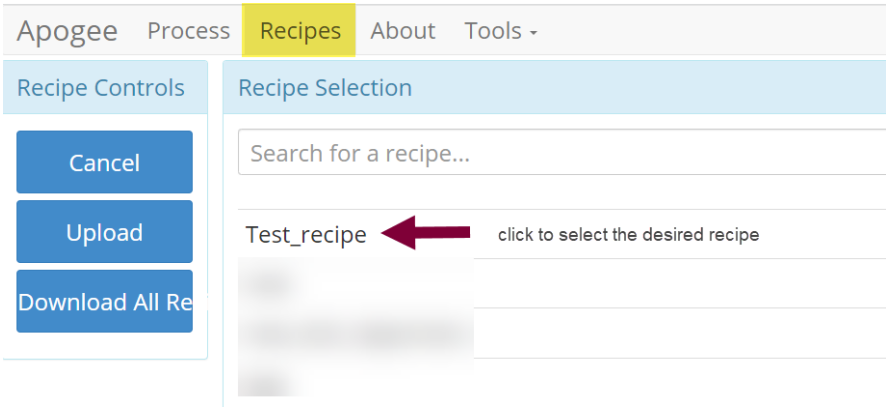
1. Navigate to the *Recipes* page.



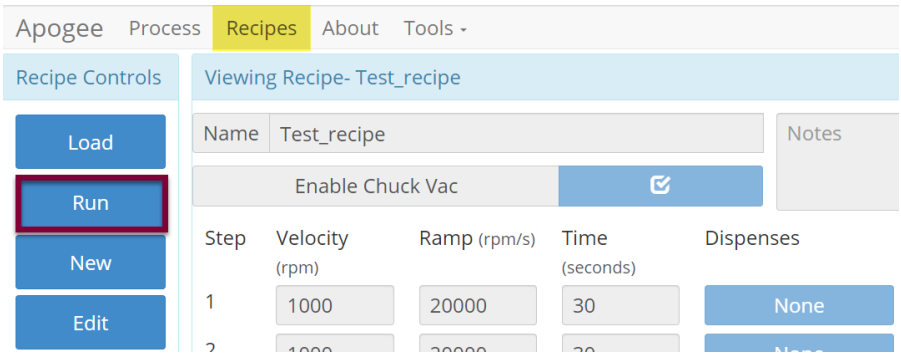
2. Click ***Load*** to access the recipes list.



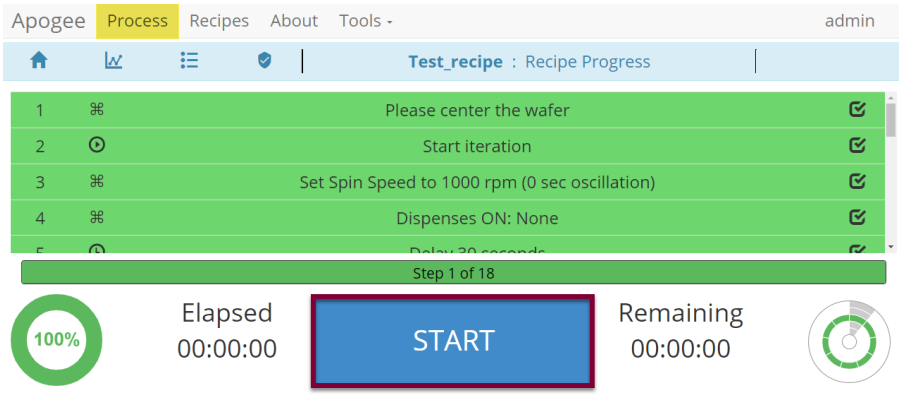
3. Search for, identify, & select the preferred recipe.



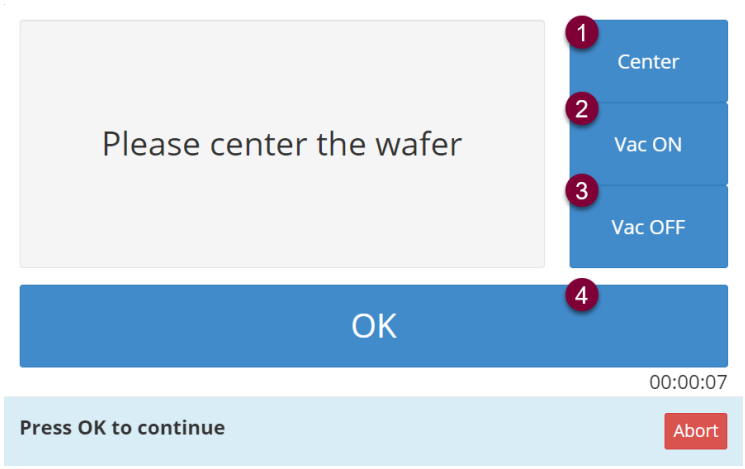
4. Click ***Run***.



5. Click ***Start*** to initiate the recipe process.



6. Use the centering activity to center the substrate.



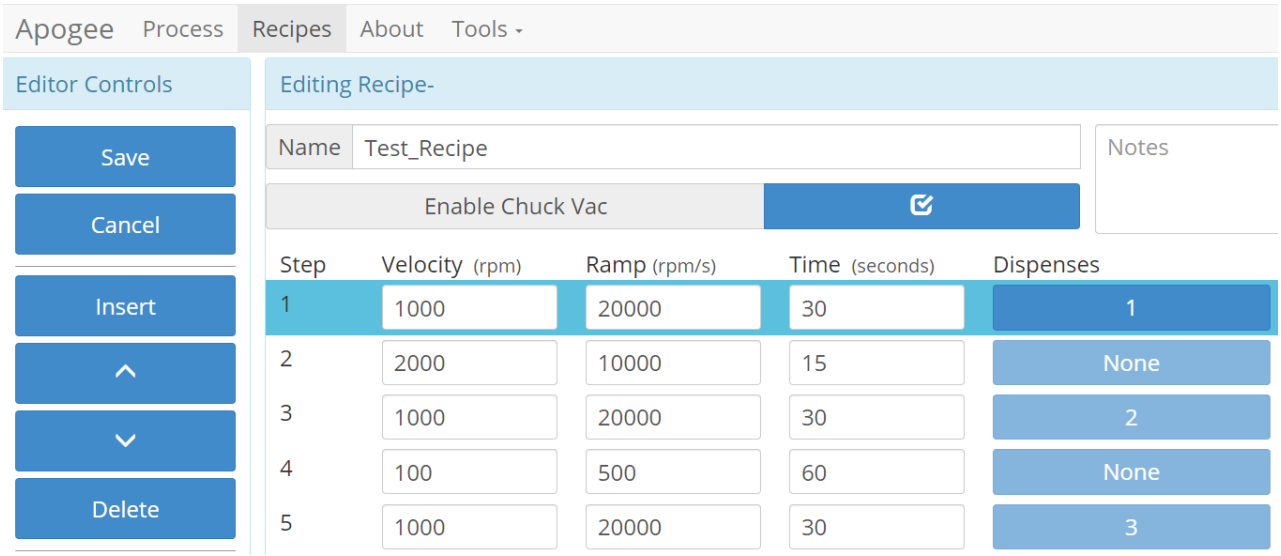
1. Spin chuck rotates slowly with vacuum on for a prescribed amount of time then stops rotation & vents vacuum.
2. Toggle chuck vacuum on.
3. Toggle chuck vacuum off.
4. Resume recipe.

7. Recipe execution.

*Users may be required to follow prompts on the screen during recipe execution.

8.4 Editing Recipes

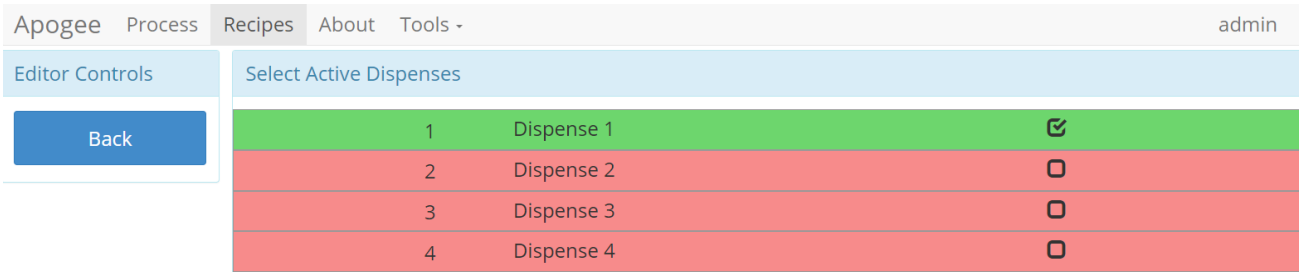
Spin coater recipes may enlist an unlimited number of steps, each capable of defining spin speed, acceleration, spin time, percent exhaust opening, and dispense triggers. Users can easily insert new steps, reorder existing steps, and/or delete a selected step via the *Step Context Menu*.



Name----------	recorded in log files and used as criteria when searching for recipes
Enable Chuck Vac[20]---------	used when the substrate requires vacuum to remain on the spin chuck; the user must center the substrate prior to spinning
Step Velocity[21]----------	speed in rpms the spin chuck will achieve on a given step
Step Ramp----------	rate in rpm/s the spin chuck will ramp on a given step
Step Time----------	the duration in seconds for a given step
Exhaust[22]----------	percent of exhaust opening
Dispense----------	the dispense triggered during a given step

8.5 Editing Dispense Selection

Enabled dispenses are rendered in green and display a checkmark. Multiple dispenses may be selected within the same step.



8.6 Tool Specific Settings - Apogee® Spin Coater

Vac Threshold (kPa)----------	minimum vacuum threshold that must be reached before spinning a substrate
Centering Speed (rpm) ----------	how fast the substrate spins during a centering routine
Centering Time (milliseconds) ----------	how long the substrate spins during a centering routine
Idle Exhaust (%)[23] ----------	default exhaust position when not running a process
Chuck Home[24]----------	facilitates loading/removal of substrates from a single position (0 to disable, 1 to enable)
Exhaust Sensor Offset----------	Sensor calibration setting to offset ambient pressures detected within the Apogee® cabinet.

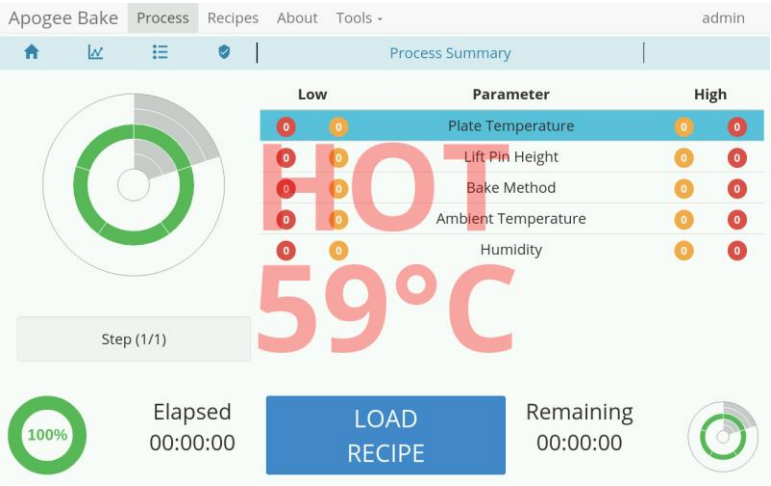
[20] Only available to users with advanced recipe editor permissions.
[21] preconditions default to ± 5% of the target speed
[22] field is only present on tools equipped with optional programmable exhaust
[23] Idle Exhaust does not apply to tools not equipped with Programmable Exhaust
[24] When enabled, position is static.

9. Apogee® Bake Plate

9.1 Safety Temperature Warning

The safety temperature warning feature is intended as a safeguard against operator injury. When the bake surface exceeds the temperature threshold specified by the equipment administrator, a Hot (~°C) watermark is displayed on all screens. When bake surface temperatures cool to temperatures less than the threshold specified by the equipment administrator, the watermark is cleared.

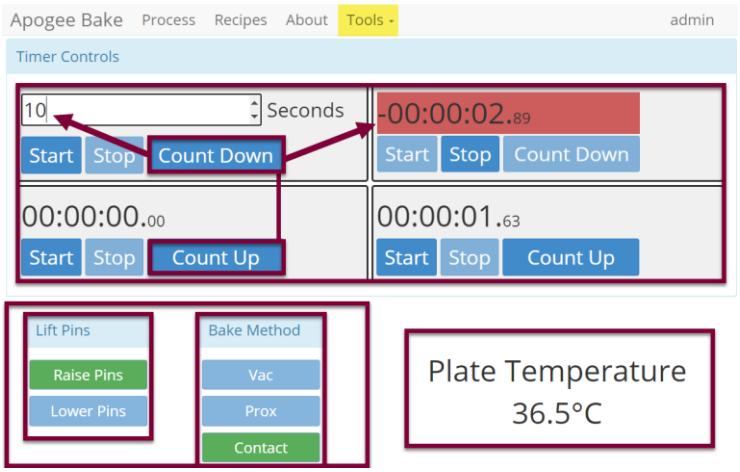
See Section 9.8 - Tool Specific Settings – Apogee® Bake Plate for details on how to enable and configure this setting.



9.2 Timer Controls

Located under the Tools menu, the timer controls feature provides convenient access to and tracking of manual process controls. Individual timers can be initiated concurrently, and users can toggle between count up and count down functions by tapping the button. On tapping *Start*, the *Count Up* timer will initiate. The *Count Down* timer allows for a user specified starting value (default is 10 seconds.) When the countdown hits zero the tool will elicit an audible alarm, the timer will continue to countdown into the negative, and the timer will turn red to further indicate that time has expired.

From the Timer Controls screen, users can raise/lower lift pins and select the desired bake method. Green indicates the current mode. Lift pins will lower to zero and raise to the lift pin idle position configured in system settings. (See Section 9.8 - Tool Specific Settings – Apogee® Bake Plate for details on how to configure the lift pin idle position.)



9.3 System Parameters

Parameter	Actual	Set Point	Status
Plate Temperature	59.4 °C	60.0 °C	In Range
Lift Pin Height	19.0 mm	19.0 mm	In Range
Bake Method	Contact	Contact	In Range
Ambient Temperature	26.5 °C		In Range
Humidity	44.8 %		In Range

Plate Temperature[25]--------- current temperature of the hot chuck displayed against target set point in degrees Celsius

Lift Pin Height---------- height of exposed lift pins in relation to chuck in millimeters; precision control settings range from 0.0-19.0

Bake Method---------- dictates manner in which substrate is heated; vacuum, contact, proximity, lift pins; refer to Apogee® Bake Plate Operations Manual for more information

Ambient Temperature------ air temperature of environment where equipment is housed

Humidity[26]---------- ambient relative humidity of environment where equipment is housed

9.4 Manual Controls – Apogee® Bake Plate

The Manual Control activity is an advanced feature that allows users to run most operating processes outside of a recipe. This mode is useful for tasks such as prototyping processes, verifying equipment operation, and recovering from aborted processes. To access the activity, navigate to ***Tools > Manual Control***. Actual and set point parameter values are displayed on the left. Available controls will be selected from the dropdown menu on the right.

If using remote feature, the user must have confirmed their local presence to execute manual commands. See section 7.3 for more detail on Local Presence.

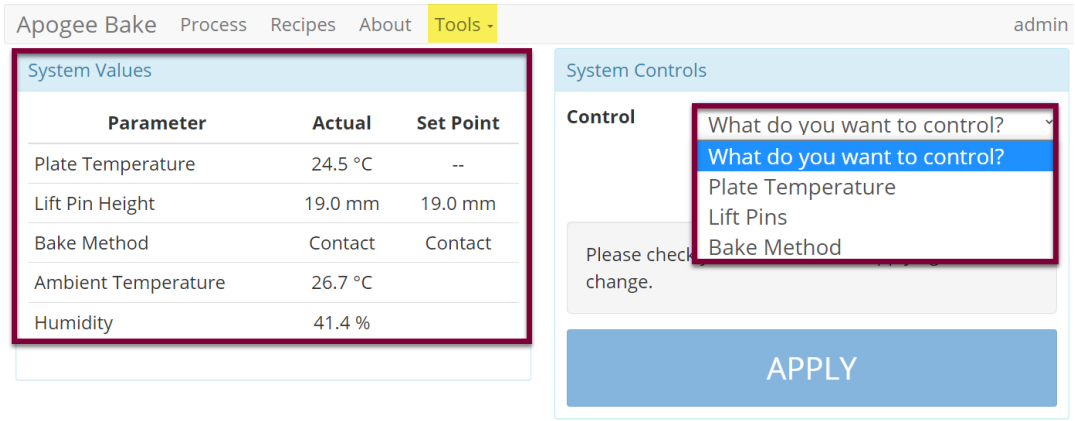
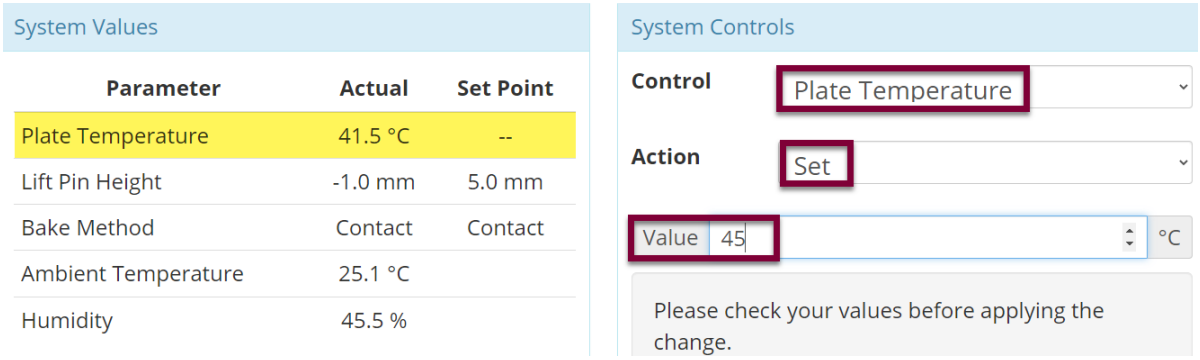


Plate Temperature

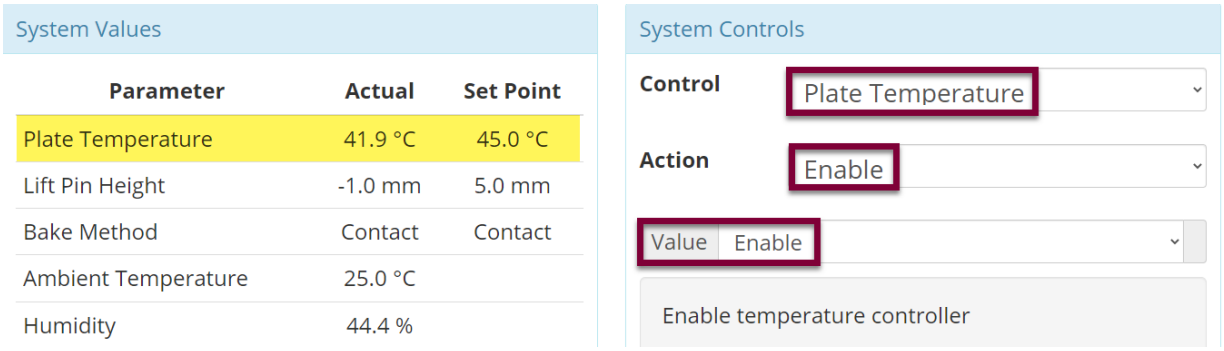
[25] A process will not wait to achieve desired temperatures before moving onto the next step. Utilize preconditions or manual controls to ensure platen temperatures are in range before a process is initiated.
[26] Both Ambient Temperature and Humidity are measured via a custom sensor board mounted next to a ventilation inlet inside the tool. If sensor is disconnected, default of -1.1 is displayed.



Select a **Control** of *Plate Temperature.*
Select an **Action** of *Set.*
Enter the desired value in °C.

Click APPLY

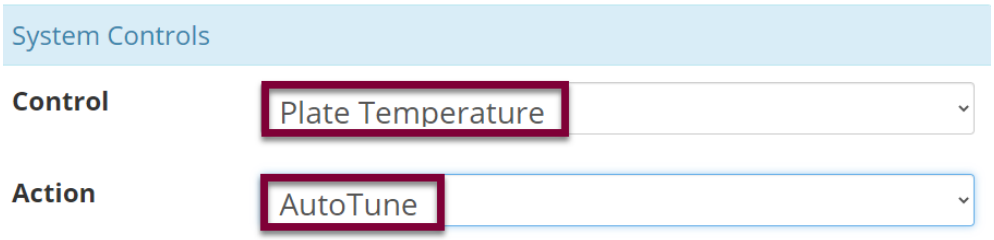
The Temperature Controller must be enabled to initiate the heating process. See next step.



Select an **Action** of *Enable.*
Select a **Value** of *Enable* or *Disable* to activate or deactivate the temperature controller.

Click APPLY

Note that the heating process has been initiated and a plate temperature set point has populated on the system values list. When a value of *Disabled* is selected, a Set Point of - - is displayed and the heating process is terminated.

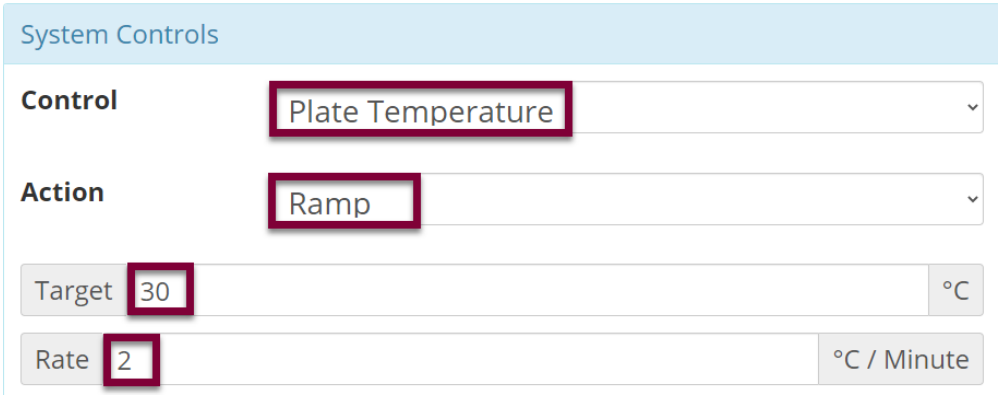


Select an **Action** of *AutoTune.*

Click APPLY

User must first define the set point and enable temperature controller.

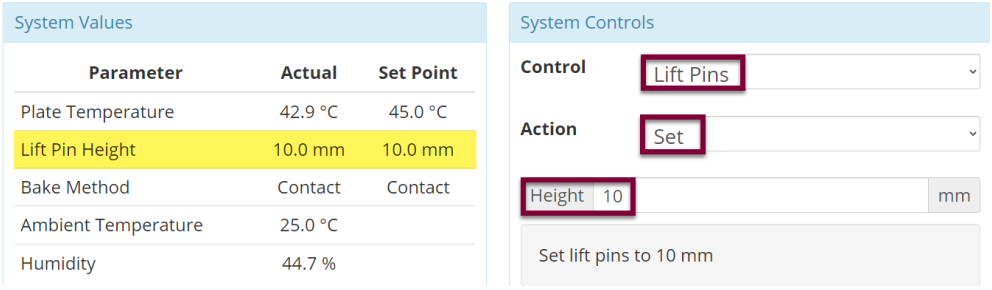
Useful for refining the temperature control for a given setting – note that this may take a significant amount of time.



Select an **Action** of *Ramp.*
Enter the **Target** temperature.
Enter the desired ramp **Rate**[27] (between 1-6°C per minute).

Click APPLY

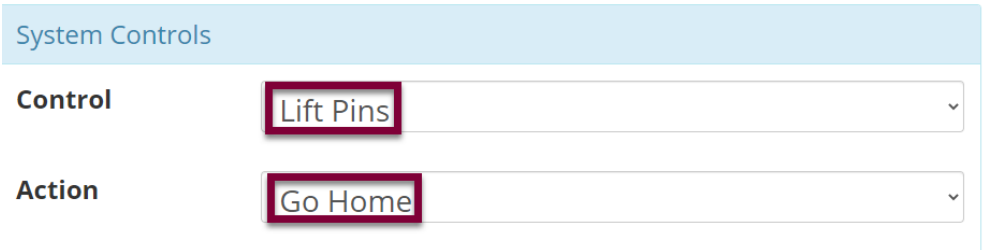
Lift Pins



Select a **Control** of *Lift Pins.*
Select an **Action** of *Set.*
Enter the target height (between 0-19mm).

Click APPLY

Note that the lift pin height set point has populated on the system values list.

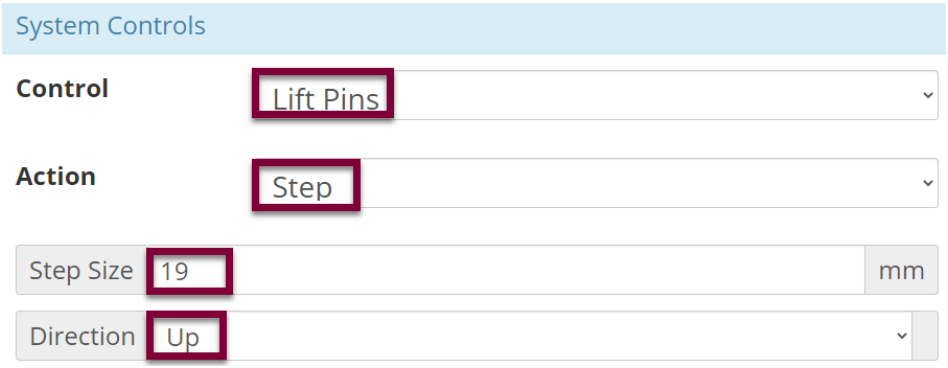


Select an **Action** of *Go Home.*

[27] Cee® does not offer active cooling on bake plates however, the ramp feature can be used to reduce the rate of cooling beyond what ambient conditions allow.

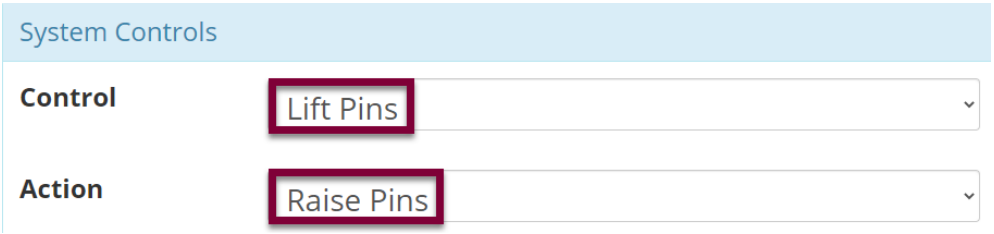
Click APPLY

Lift pins recede beneath the surface of the hot plate until they contact the homing flag for recalibration of position.



Select an **Action** of *Step.*
Enter the desired **Step** Size (between 0-19mm).
Select the preferred **Direction.**

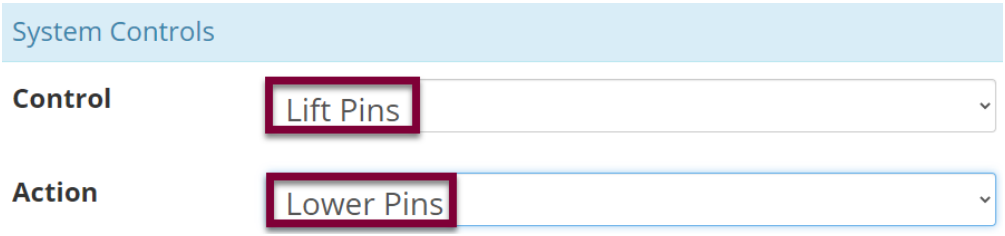
Click APPLY



Select an **Action** of *Raise Lift Pins.*

Click APPLY

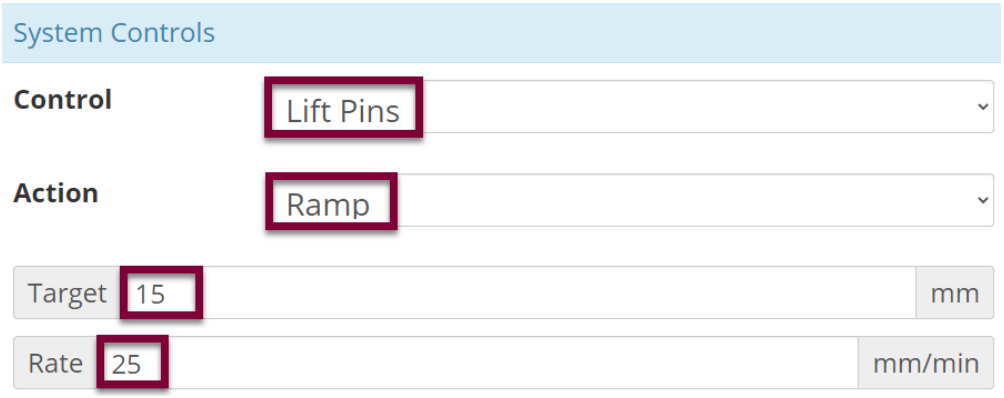
Set pins to the Lift Pin Idle Position specified in. Review the Apogee® Bake Plate Operations Manual for more information.



Select an Action of *Lower Lift Pins*

Click APPLY

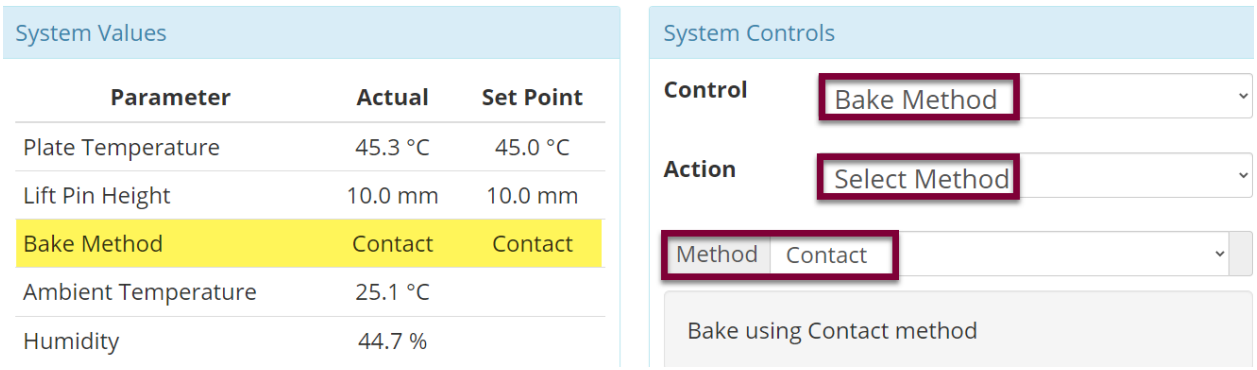
Lift pins recede just beneath the surface of the hot plate to facilitate contact with the substrate.



Select an Action of *Ramp*
Enter the Target (between 0-19mm)
Select the preferred ramp Rate (between 0-200mm/min)

Click APPLY

Bake Method



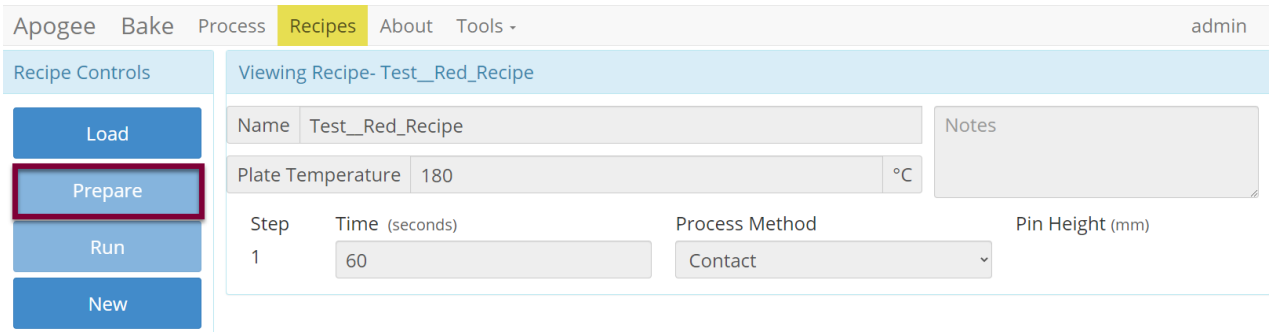
Select a Control of Bake Method
Select the desired Method (Vacuum, Proximity, or Contact)

Click APPLY

Review the Apogee® Bake Plate Operations Manual for more information on Bake Methods.

9.5 Preparation

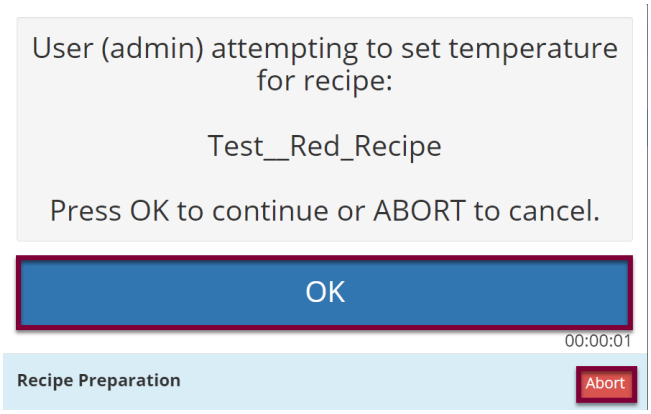
Users with sufficient privileges can ***Prepare*** equipment to run a recipe. This feature is useful for preconditions and parameters that take a significant amount of time such as hot chuck and platen temperatures. To initiate this feature, navigate to the ***Recipes*** tab, click ***Load*** to access the recipes list and select the desired recipe, then click ***Prepare***.



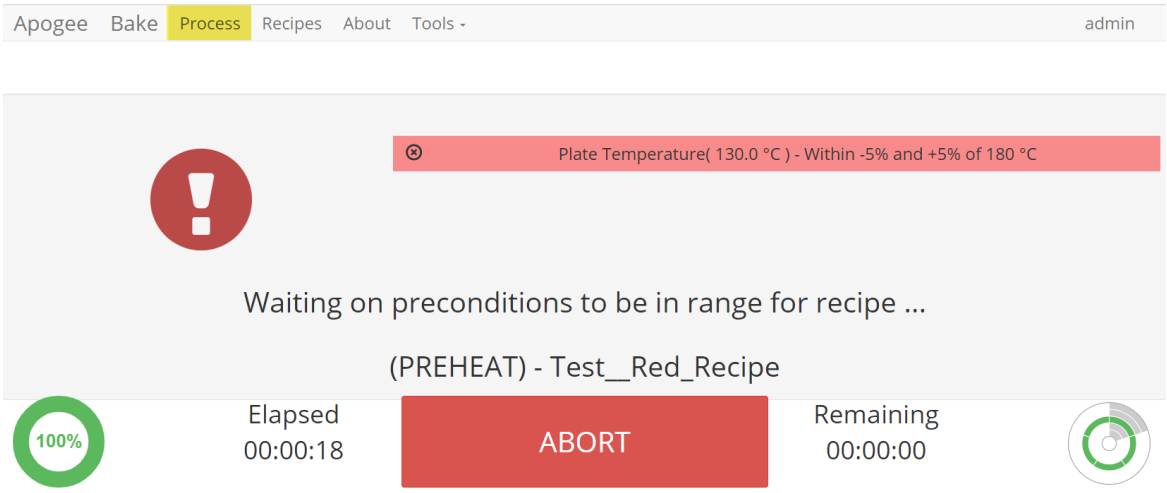
Preparation processes cannot be initiated when the equipment is already in use.

Local Display – When a ***Prepare*** command is entered, the user or device with active control of the machine receives an alert. This prompt includes the user and recipe to be prepared. The user with control of the machine can refuse the request by selecting ***Abort*** or accept the request by tapping ***OK***.

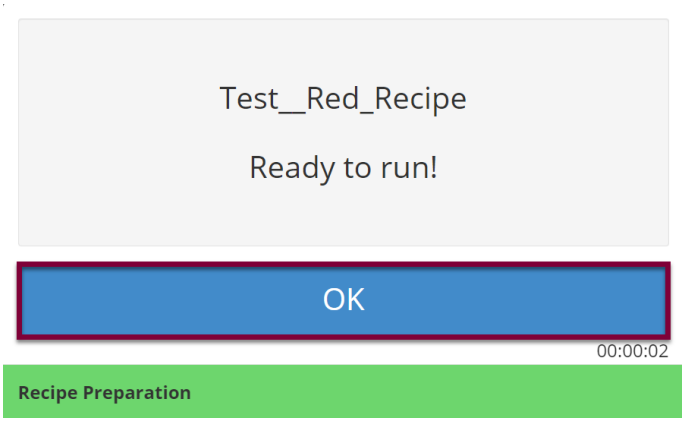
In the absence of a response, the request is auto accepted after two minutes.



Preparation In Process – progress toward the specified precondition(s) is displayed to the user with verified local presence.



Preparation Complete – indicates that the equipment has reached all specified preconditions and the recipe can be initiated. Upon clicking ***OK*** the user is directed to the *Process* screen to begin the recipe.

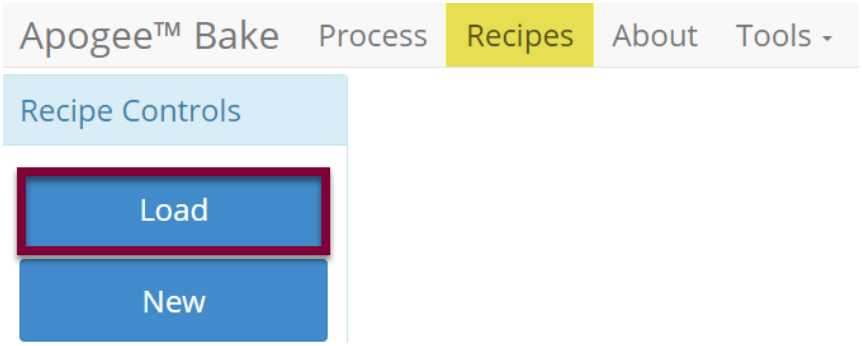


During recipe preparation the Prepare and Run commands are disabled to ensure no interruption to precondition processes.

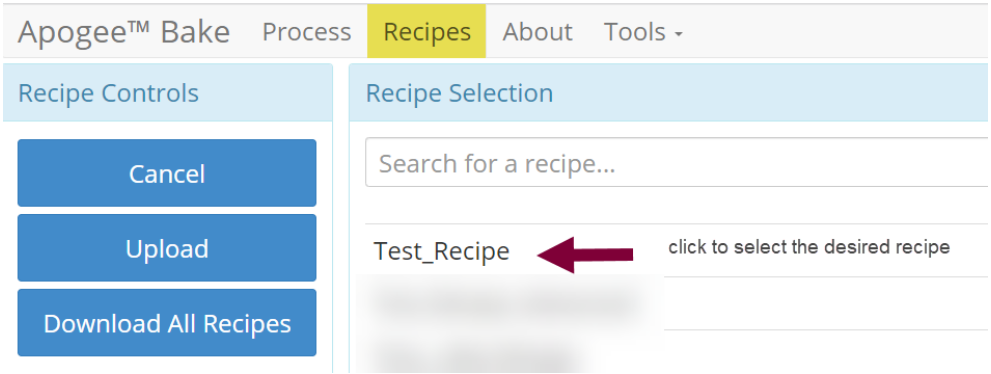
9.6 Running Recipes

1. Select Recipe Page

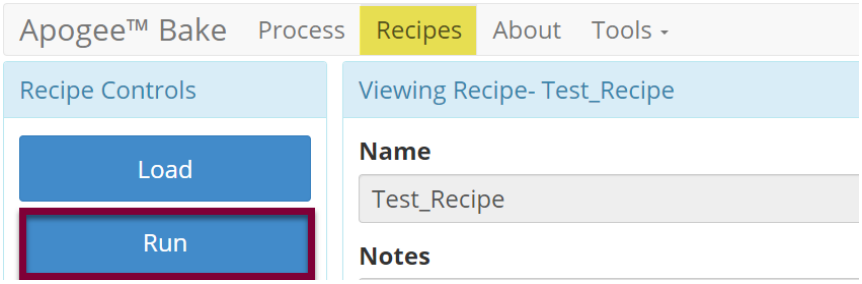
2. Load Recipe



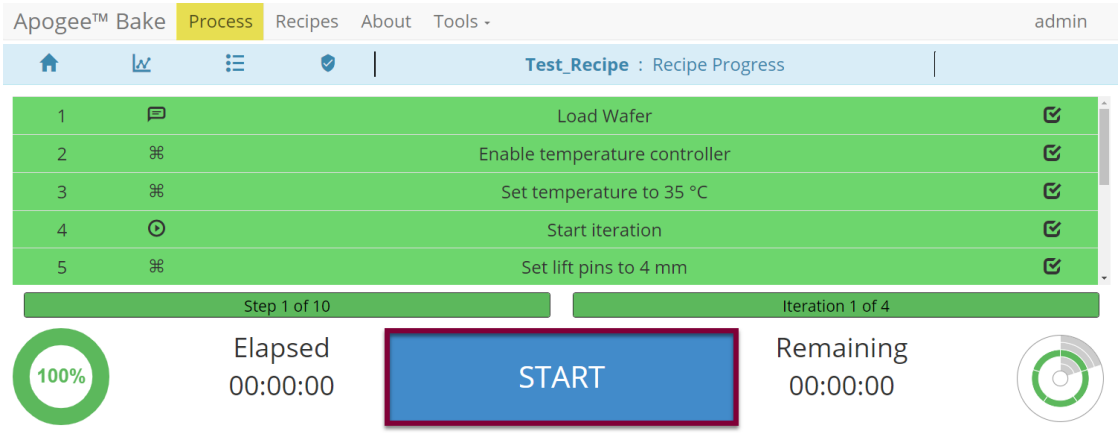
3. Search For, Identify, & Select Recipe



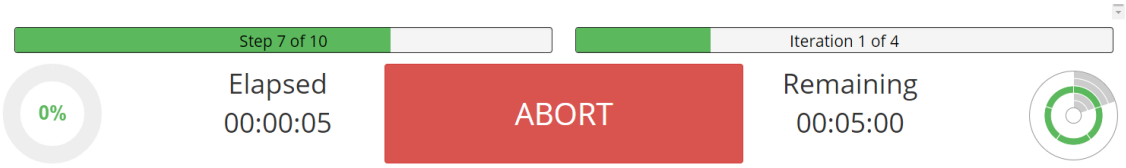
4. Run Recipe



5. Start Recipe

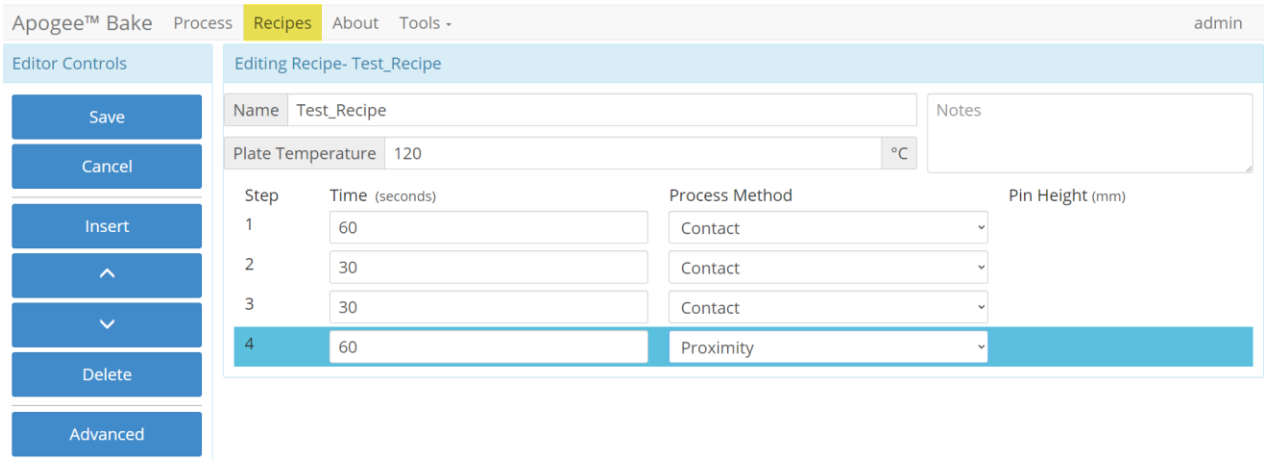


6. Recipe Progression



*Users may be required to follow prompts on the screen during recipe execution.

9.7 Editing Recipes



9.8 Tool Specific Settings – Apogee® Bake Plate

Temperature Offset Calibration (°C)	offset used by temperature controller to calibrate reported chuck temperature
Lift Pin Idle Position	specify default position of lift pins between processes
Lift Pin Offset	offset used for calibration of lift pin positioning
Safety Temp(°C)[28]	when hot plate temperature exceeds this value, *HOT(°C)* watermark is displayed on all screens
Idle Temp(°C)[29]	specify temperature equipment will reduce to during periods of inactivity[30]
Time Before Idle(minutes)[31]	length of time (minutes) between processes before the thermal controller reverts to idle temperature specified

[28] A value of 0 will disable the safety temperature watermark.
[29] A value of 0 will disable the thermal controller (temperature off) after specified *Time Before Idle(minutes)* – *specified* idle temperature settings will only facilitate *reduction* in temperature.
[30] Inactivity is defined as time since last manual or recipe-controlled process – screen interactions will not delay idle temperature.
[31] A value of 0 in the Time Before Idle(minutes) field will disable the idle temperature feature and the bake surface will remain at the most recently specified temperature indefinitely or until a new temperature is specified.

10. Apogee® Bonder

10.1 System Parameters

Parameter	Actual	Set Point	Status
Lower Platen Temp	25.0 °C	25.0 °C	In Range
Upper Platen Temp	25.0 °C	25.0 °C	In Range
Chamber Pressure	97.5 kPA	97.5 kPA	In Range
Bond Force	0.0 N	0.0 N	In Range
Position	Load Top	Load Top	In Range
Ambient Temperature	32.7 °C		In Range
Humidity	73.9 %		In Range

Lower Platen Temperature--- current temperature of lower platen displayed against target set point in degrees Celsius

Upper Platen Temperature--- current temperature of upper platen displayed against target set point in degrees Celsius

Chamber Pressure---------- absolute pressure measured inside bond chamber in kPa

Bond Force[32]---------- calculated force between upper and lower platens measured in newtons

Position---------- refers to physical location and state of lower platen assembly; see Apogee® Bonder Operations Manual for further detail

Ambient Temperature--------- air temperature of environment where equipment is housed

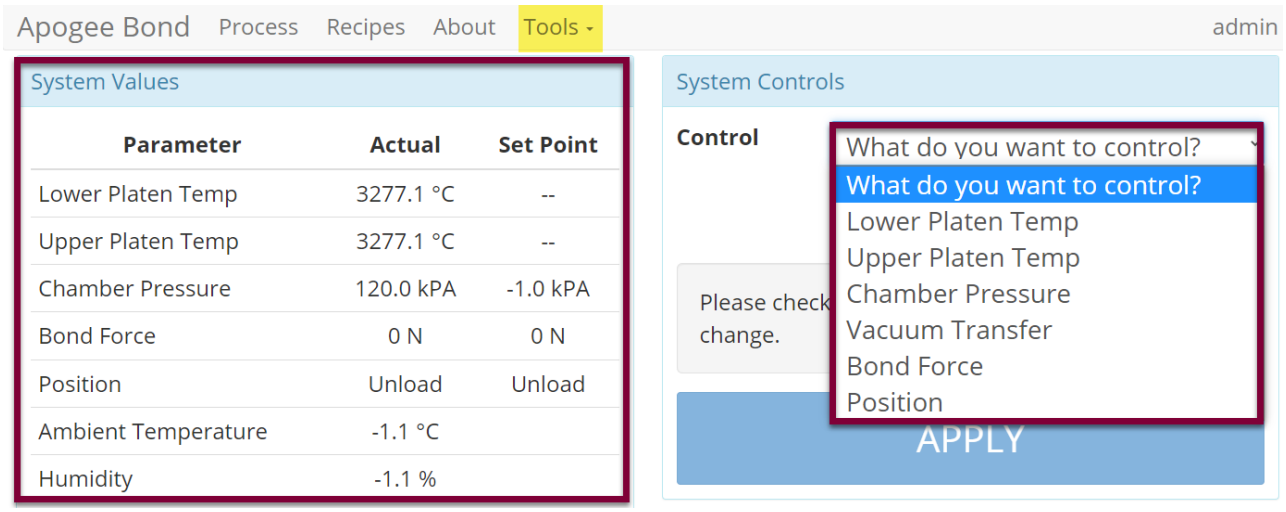
Humidity[33]---------- ambient relative humidity of environment where equipment is housed

10.2 Manual Controls – Apogee® Bonder

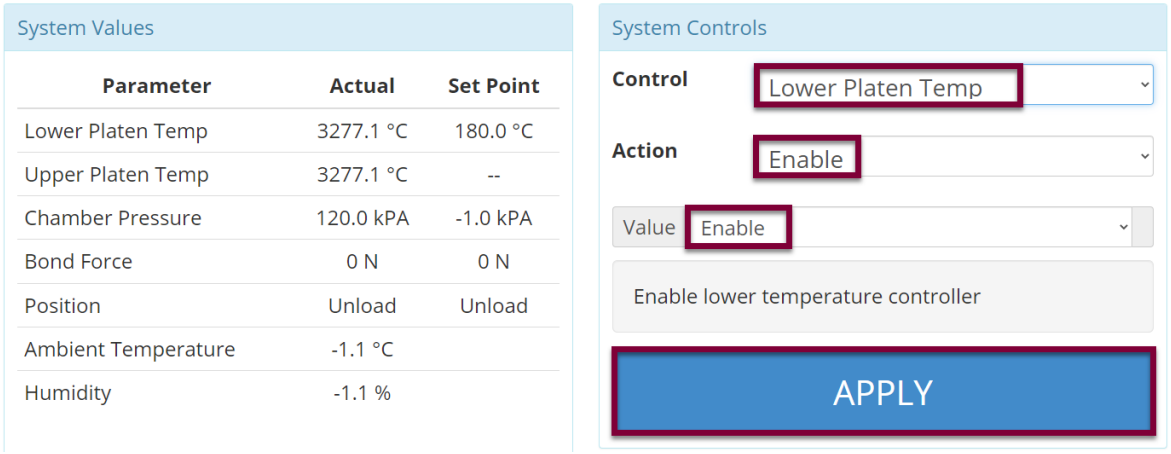
The Manual Control activity is an advanced feature that allows users to run most operating processes outside of a recipe. This mode is useful for tasks such as prototyping processes, verifying equipment operation, and recovering from aborted processes. To access the activity, navigate to ***Tools > Manual Control***. Actual and set point parameter values are displayed on the left. Available controls will be selected from the dropdown menu on the right.

If using remote feature, the user must have confirmed their local presence to execute manual commands. See section 7.3 for more detail on Local Presence.

[32] Does not take substrate size into account.
[33] Both Ambient Temperature and Humidity are measured via a custom sensor board mounted next to a ventilation inlet inside the tool. If sensor is disconnected, default of -1.1 is displayed.

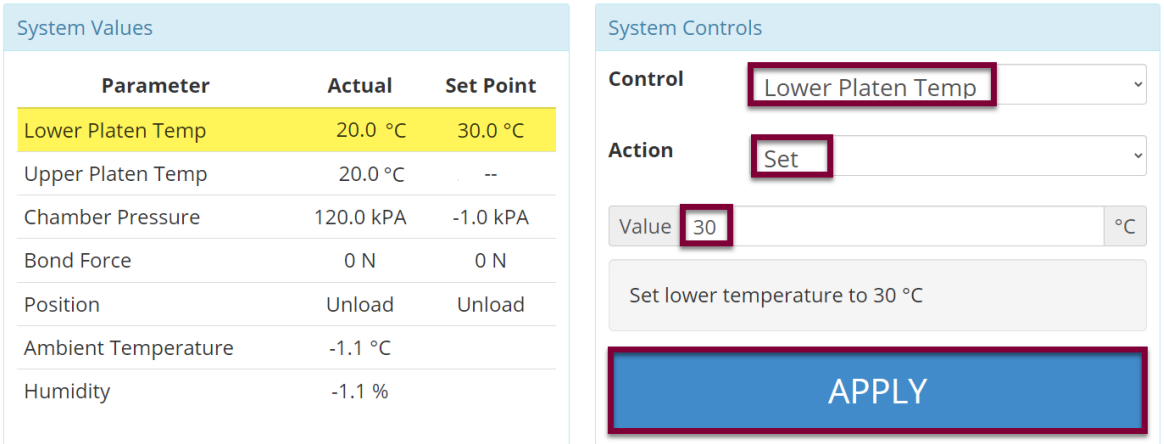


Platen Temperature



Select a **Control** of *Upper* or *Lower Platen Temp.*
Select an **Action** of *Enable.*
Select a **Value** of *Enable* or *Disable* to activate or deactivate the temperature controller.

Click APPLY

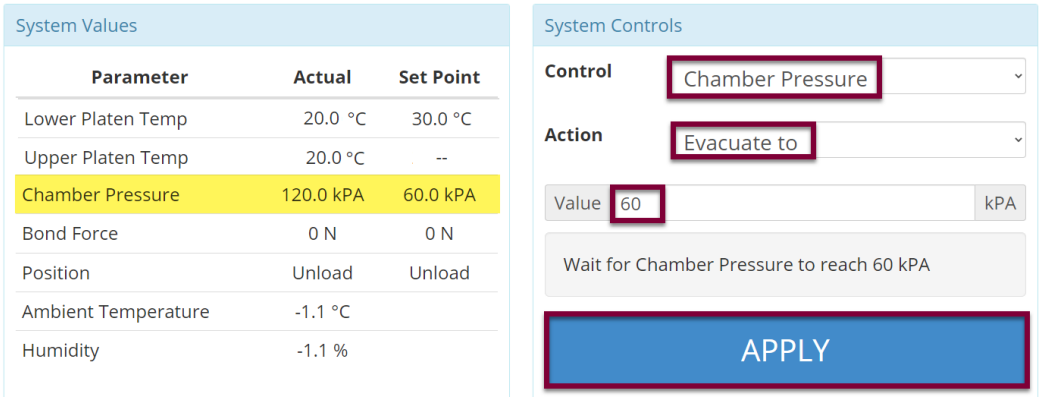


Select a **Control** of *Upper* or *Lower Platen Temp.*
Select an **Action** of *Set.*
Enter the desired **Value** in °C.

Click APPLY

Note that the heating process has been initiated and a platen temperature set point has populated on the system values list. When a value of *Disabled* is selected, a Set Point of - - is displayed and the heating process is terminated.

Chamber Pressure

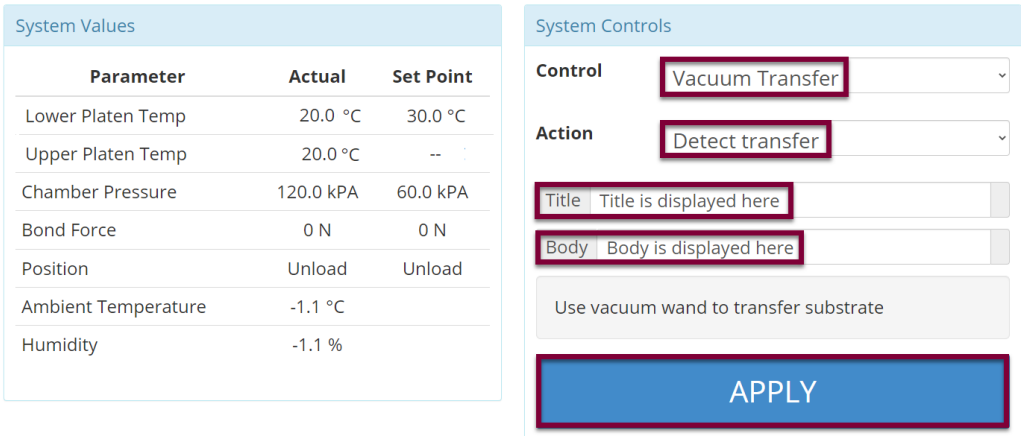


Select a **Control** of *Chamber Pressure.*
Select an **Action** of *Evacuate To.*
Enter the desired threshold **Value** in K*Pa.*

Click APPLY

Note that the evacuation process has been initiated and a Chamber Pressure set point has populated on the system values list.

Vacuum Transfer



Select a **Control** of *Vacuum Transfer* and the **Action** will default to *Detect Transfer.*

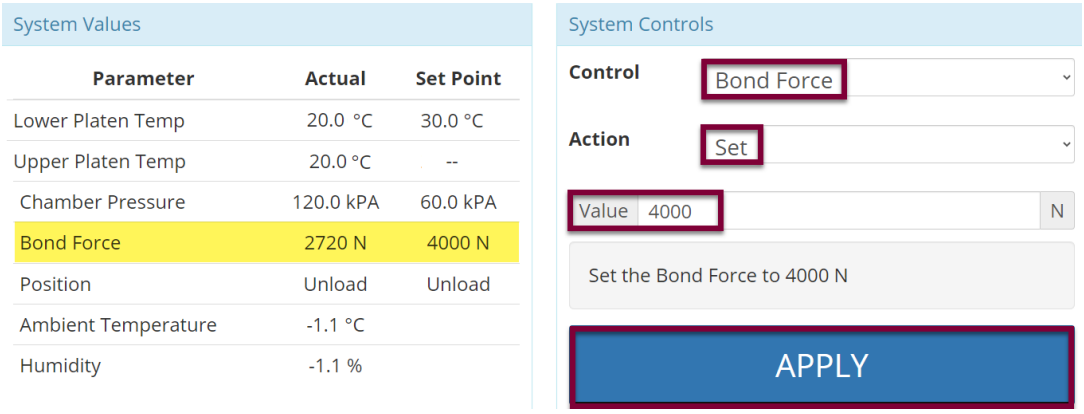
Enter the desired value in the **Title** field.

Enter the desired value in the **Body** field.

Click APPLY

Allows users to test and view configuration of the Vacuum Transfer Display window outside of the Advanced Recipe Editor activity.

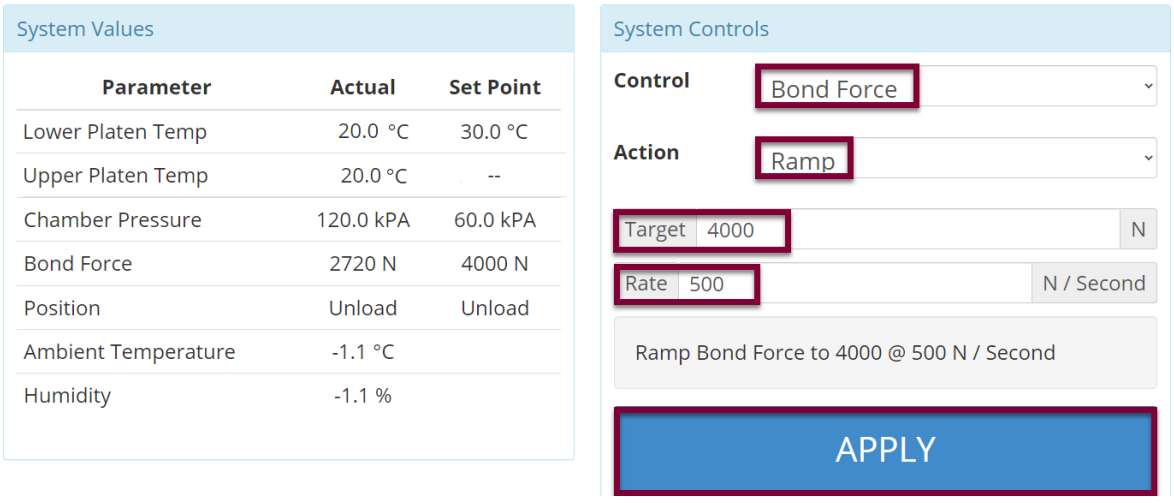
Bond Force



Select a **Control** of *Bond Force.*
Select an **Action** of *Set.*
Enter the desired **Value** between 1-12,000 N.

Click APPLY

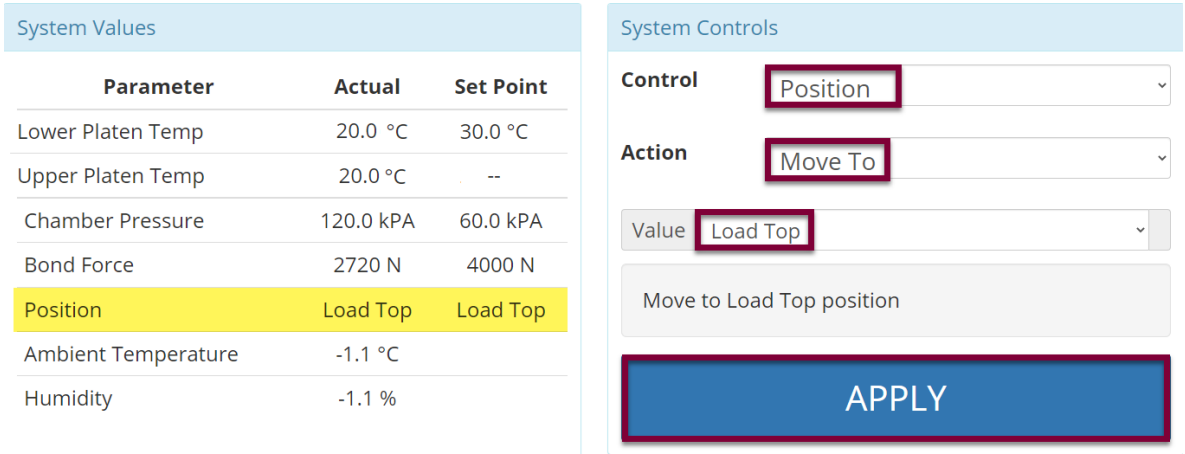
Note that the process has initiated, and a Bond Force set point has populated on the system values list.



Select an **Action** of *Ramp.*
Enter the desired **Target** value in N.
Enter the desired **Rate** value between 1-1000N/second.

Click APPLY

Position



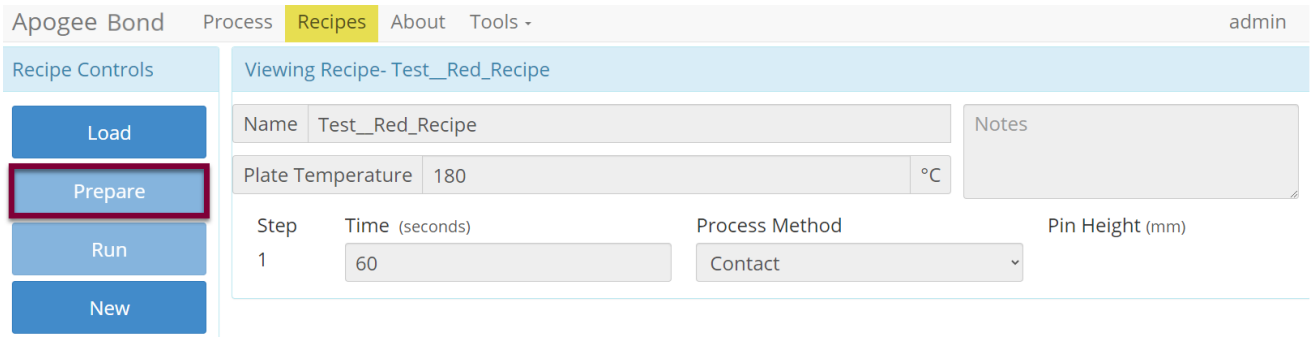
Select a **Control** of *Position.*
Select an **Action** of *Move To.*
Select the desired **Value** from the dropdown menu (Load Top, Load Bottom, Process, or Unload).

Click APPLY

Note that the position process has initiated, and the desired position set point is reflected on the system values list.

10.3 Preparation

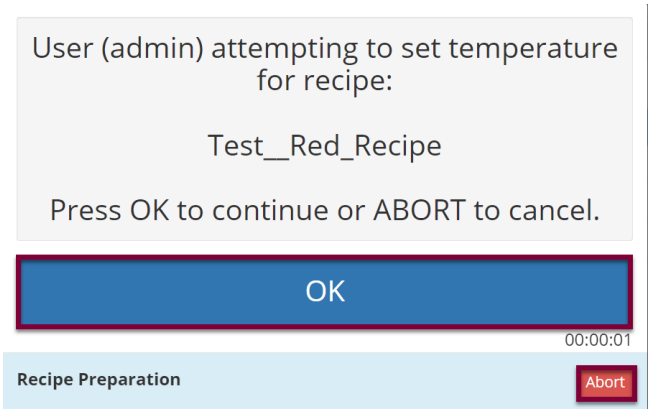
Users with sufficient privileges can remotely prepare equipment to run a recipe. This feature is useful for preconditions and parameters that take a significant amount of time such as bake plate and platen temperatures. To initiate this feature, navigate to the ***Recipes*** tab, click ***Load*** to access the recipes list, and select the desired recipe, then click ***Prepare***.



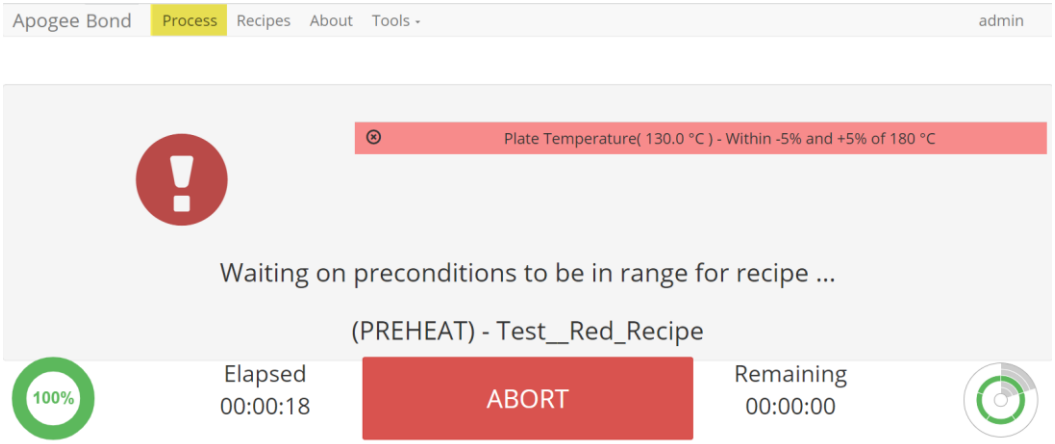
Preparation processes cannot be initiated when the equipment is already in use.

Local Display – When a ***Prepare*** command is entered, the user or device with active control of the machine receives an alert. This prompt includes the user and recipe to be prepared. The user with active control of the machine can refuse the request by selecting ***Abort*** or accept the request by tapping ***OK***.

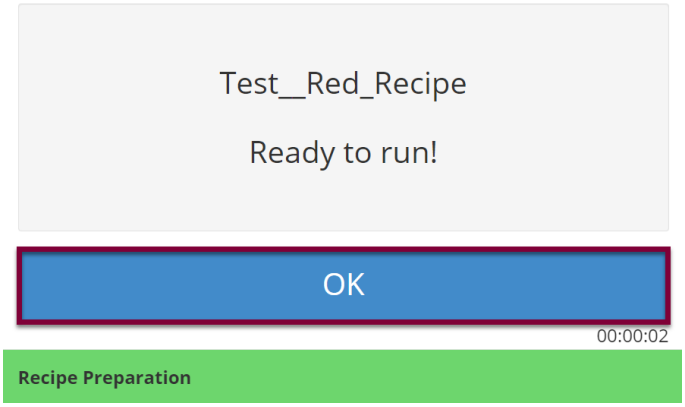
In the absence of a response, the request is auto accepted after two minutes.



Preparation In Process – progress toward the specified precondition(s) is displayed to the user with verified local presence.



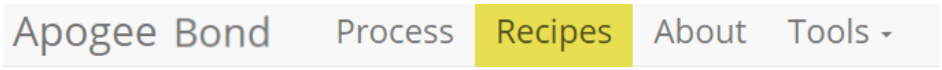
Preparation Complete – indicates that the equipment has reached all specified preconditions and the recipe can be initiated. Upon clicking ***OK*** the user is directed to the *Process* screen to begin the recipe.



During recipe preparation the Prepare and Run commands are disabled to ensure no interruption to precondition processes.

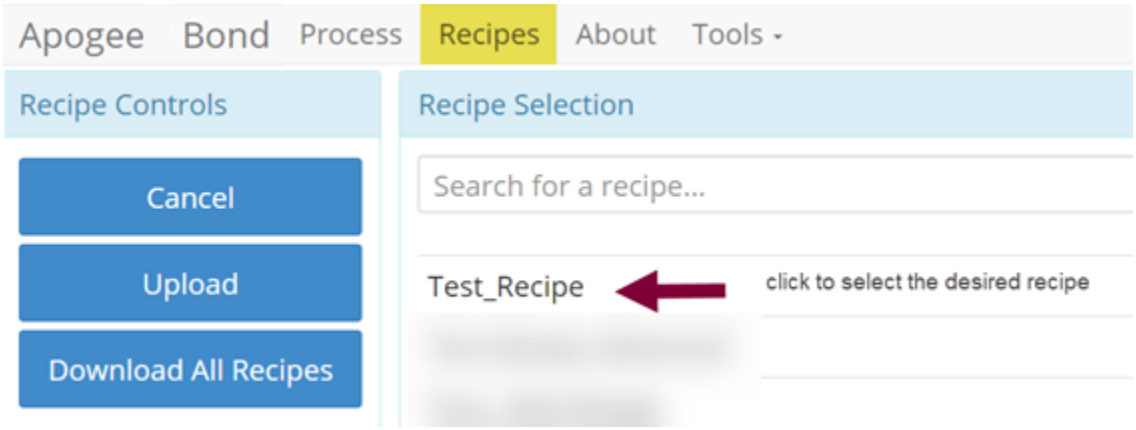
10.4 Running Recipes

1. Select Recipes Page.

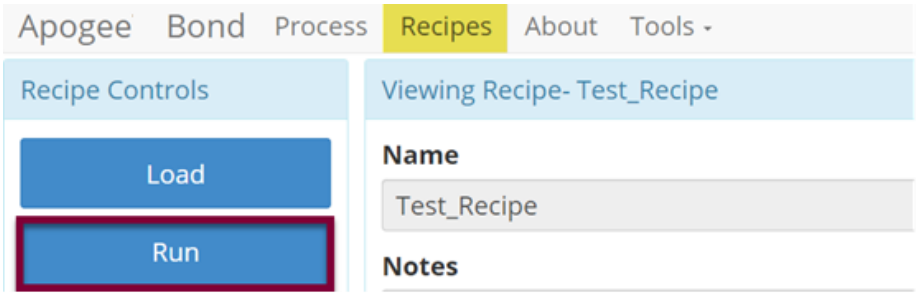


2. Load Recipe.

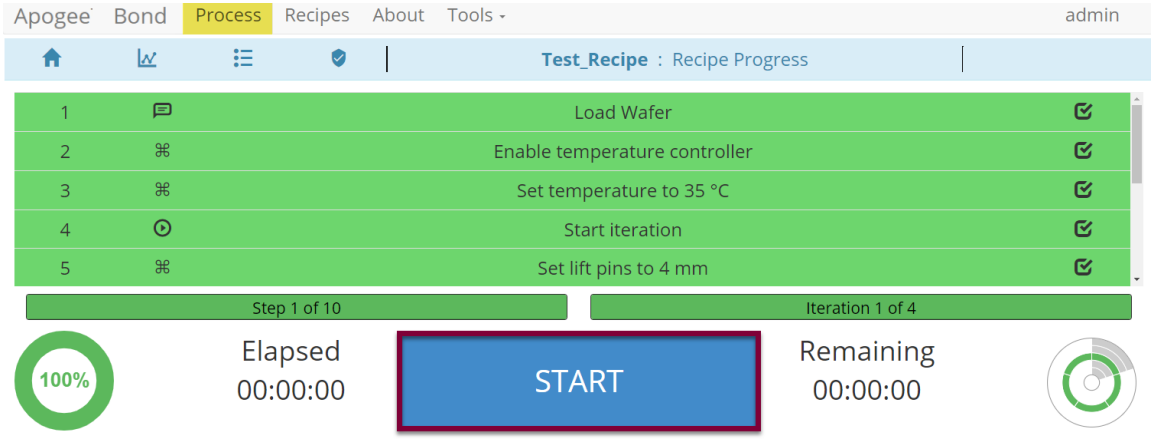
3. Search For, Identify, & Select Recipe.



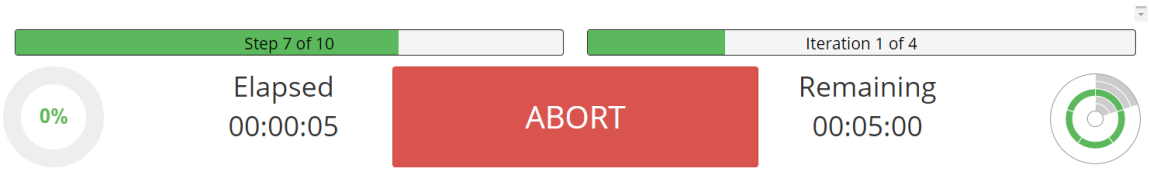
4. Run Recipe.



5. Start Recipe.

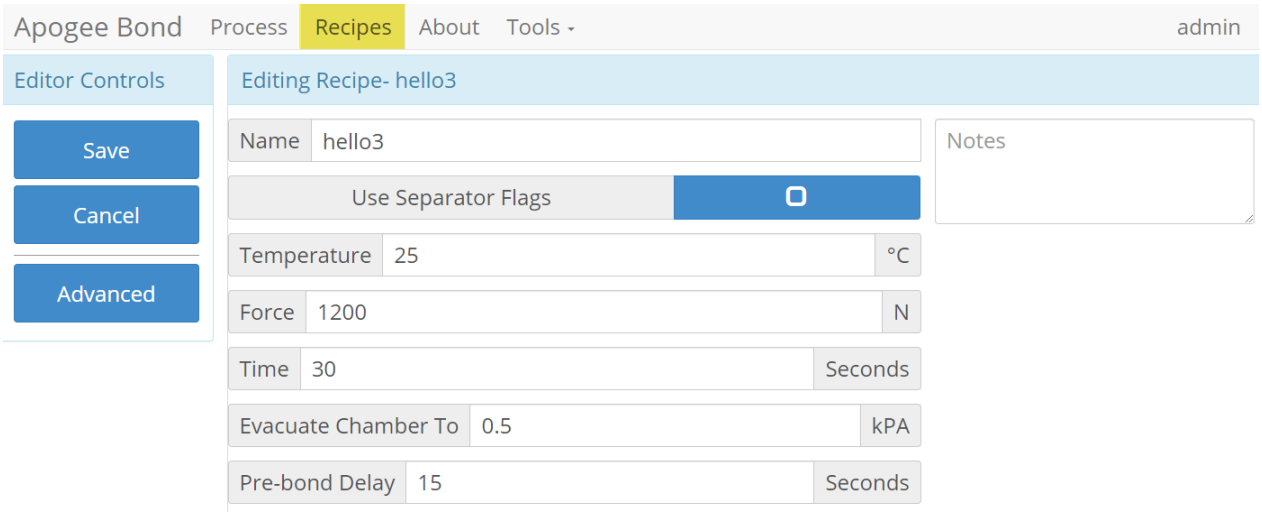


6. Recipe Progression.



10.5 Editing Recipes

Bonder recipes may enlist an unlimited number of steps, each capable of defining a bake time and method. Users can easily insert new steps, reorder existing steps, and/or delete a selected step.



Name---------- recorded in log files and used as criteria when searching for recipes

Use Separator Flags---------- enable to prevent contact between substrates pending evacuation of the chamber

Temperature---------- target temperature or *set point* of platens for a given process

Force---------- target force between upper and lower platens measured in newtons

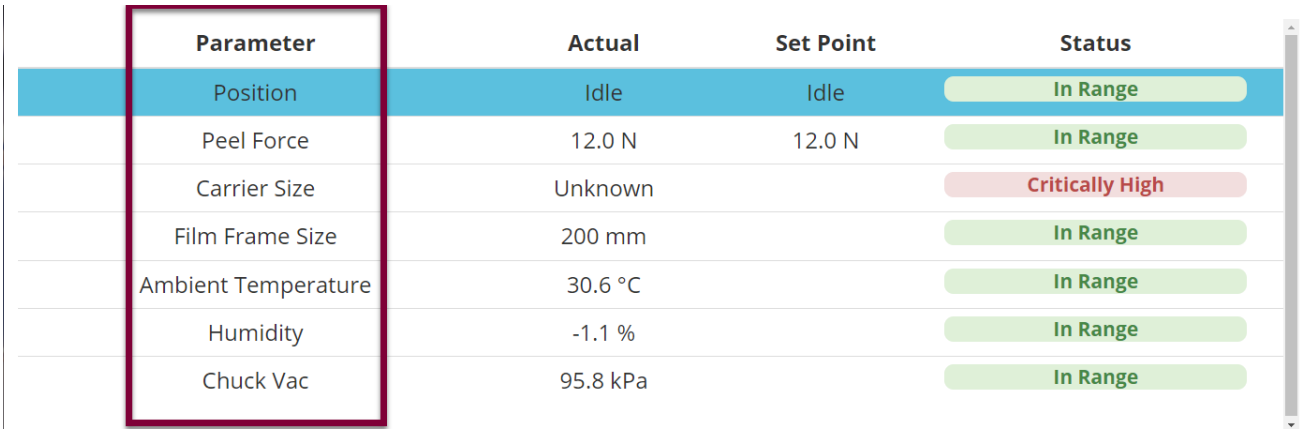
Time----------	time for which bond force should be applied in seconds with precision to one tenth of a second
Evacuate Chamber To---------	defines minimum chamber pressure required before a bond process can continue
Pre-Bond Delay----------	duration of delay following placement of bottom substrate

10.6 Tool Specific Settings – Apogee® Bonder

Lower Platen Temperature Calibration Offset (°C)	offset used by temperature controller to calibrate reported chuck temperature of lower platen
Upper Platen Temperature Calibration Offset (°C)	offset used by temperature controller to calibrate reported chuck temperature of upper platen

11. Apogee® Mechanical Debonder

11.1 System Parameters



Parameter	Actual	Set Point	Status
Position	Idle	Idle	In Range
Peel Force	12.0 N	12.0 N	In Range
Carrier Size	Unknown		Critically High
Film Frame Size	200 mm		In Range
Ambient Temperature	30.6 °C		In Range
Humidity	-1.1 %		In Range
Chuck Vac	95.8 kPa		In Range

Position---------- operational position of debond process

Peel Force---------- force in newtons imparted on substrate by way of gripper

Carrier Size---------- detected gripper size

Film Frame Size---------- detected vacuum chuck size

Ambient Temperature---------- air temperature of environment where equipment is housed

Humidity[34]---------- ambient relative humidity of environment where equipment is housed

Chuck Vac---------- measurement of vacuum pressure securing film frame against vacuum chuck in kPa

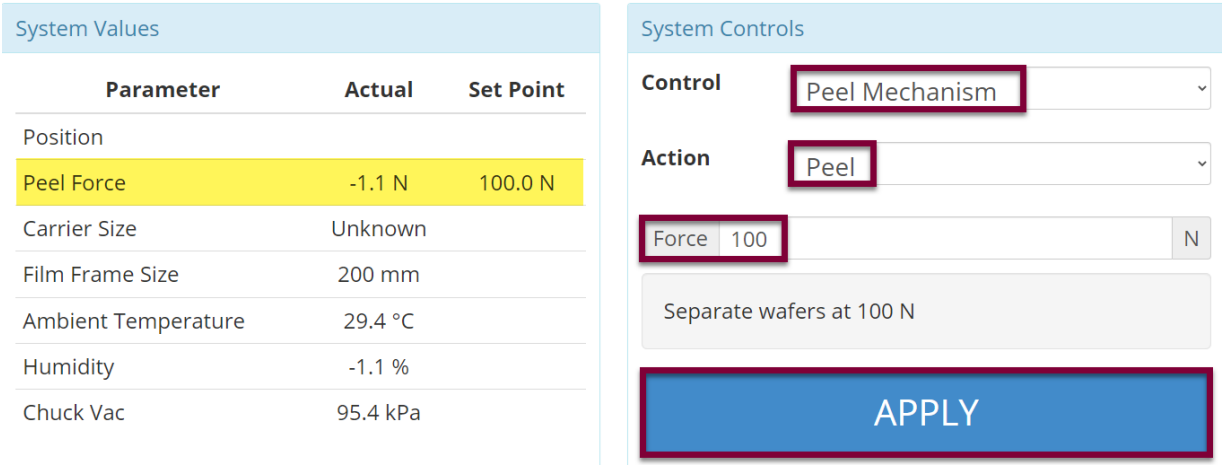
11.1 Manual Controls – Apogee® Mechanical Debonder

The Manual Control activity is an advanced feature that allows users to run most operating processes outside of a recipe. This mode is useful for tasks such as prototyping processes, verifying equipment operation, and recovering from aborted processes. To access the activity, navigate to ***Tools > Manual Control***. Actual and set point parameter values are displayed on the left. Available controls will be selected from the dropdown menu on the right.

If using remote feature, the user must have confirmed their local presence to execute manual commands. See section 7.3 for more detail on Local Presence.

[34] Both Ambient Temperature and Humidity are measured via a custom sensor board mounted next to a ventilation inlet inside the tool. If sensor is disconnected, default of -1.1 is displayed.

Peel Mechanism



Select a **Control** of *Peel Mechanism*

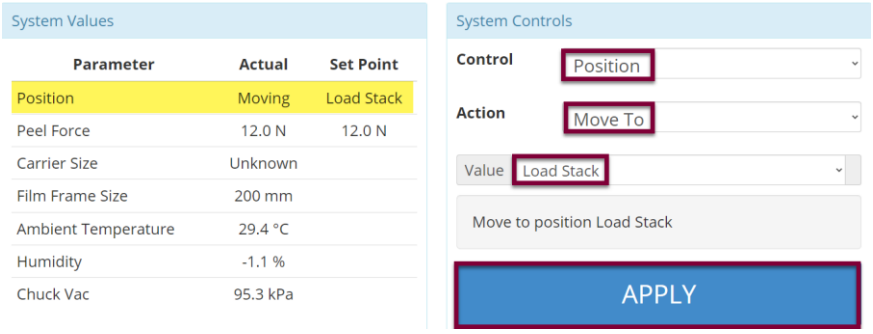
Select an **Action** of *Peel*

Enter the desired **Force** between *1-150N*

Click APPLY

Note that the actual and set point values have populated on the system values list.

Position

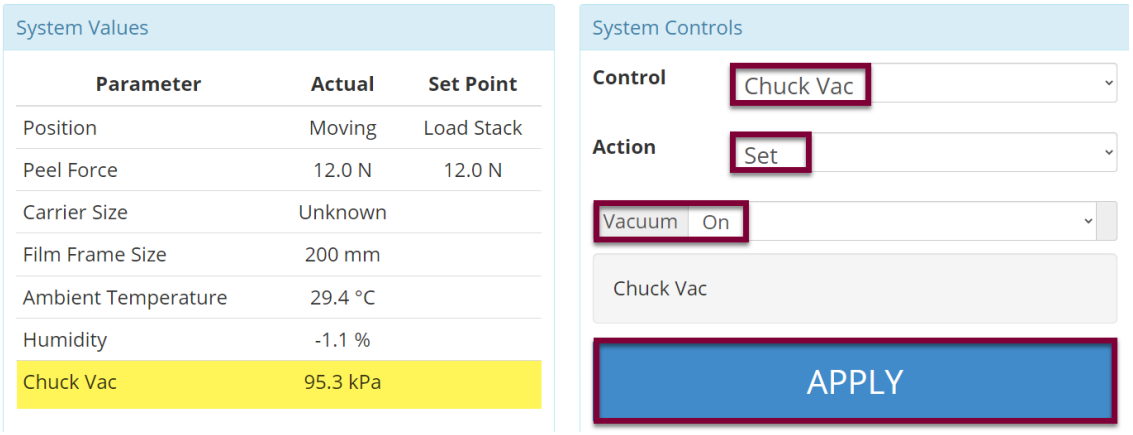


Select a **Control** of *Position*
Select an **Action** of *Move To*
Select the desired **Value** from the dropdown menu (Load Stack, Centering, Process, Unload Carrier, Unload Device)

Click APPLY

Note that the position process has initiated, and the desired position set point is reflected on the system values list.

Chuck Vac



Select a **Control** of *Chuck Vac*

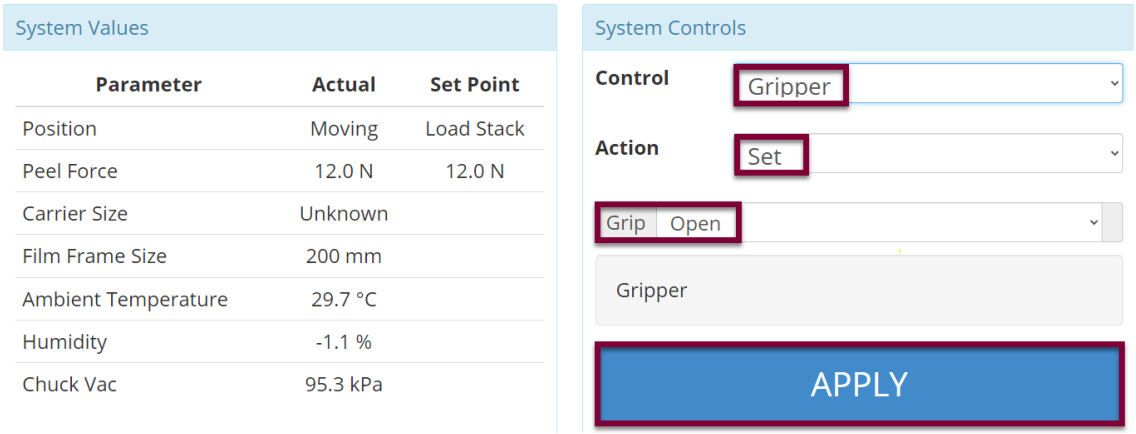
The **Action** will default to *Set*.

Set **Vacuum** to *On* or *Off.*

Click APPLY

Note that the Mechanical Debonder's vacuum threshold is hard coded at <12 kPa and cannot be altered.

Gripper

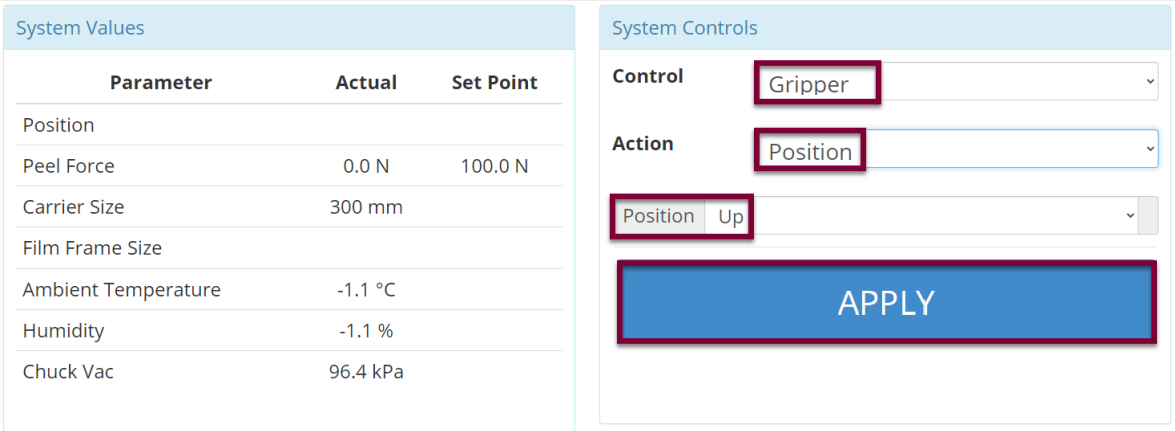


Select a **Control** of *Gripper*

Select **Action** of *Set*.

Set **Grip** to *Open* or *Closed.*

Click APPLY



Select a **Control** of *Gripper*

Select **Action** of *Position*

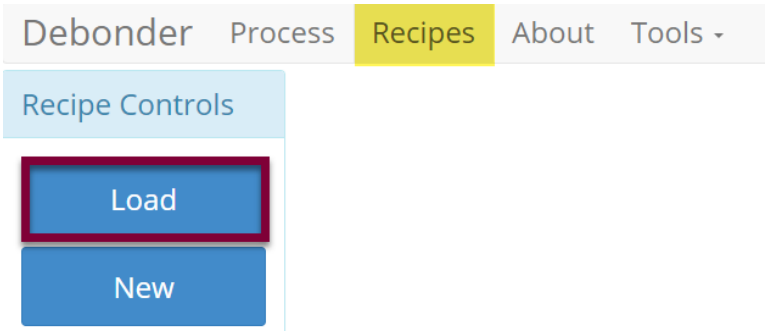
Set **Position** to *Up* or *Down*

Click APPLY

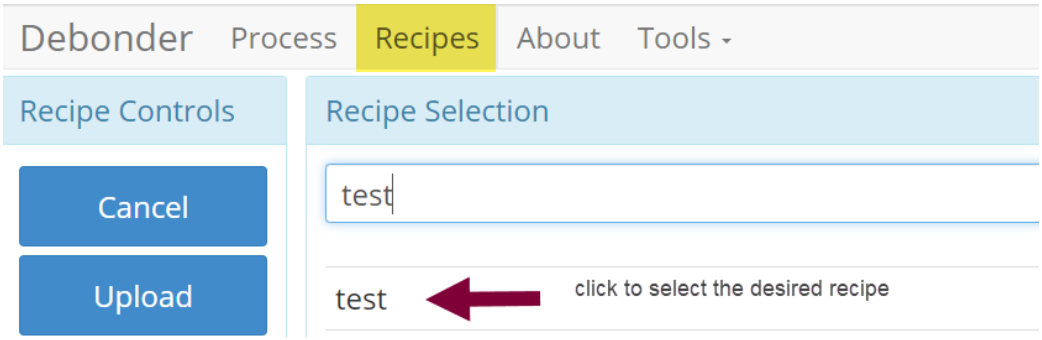
11.2 Running Recipes

1. Select Recipes Page.

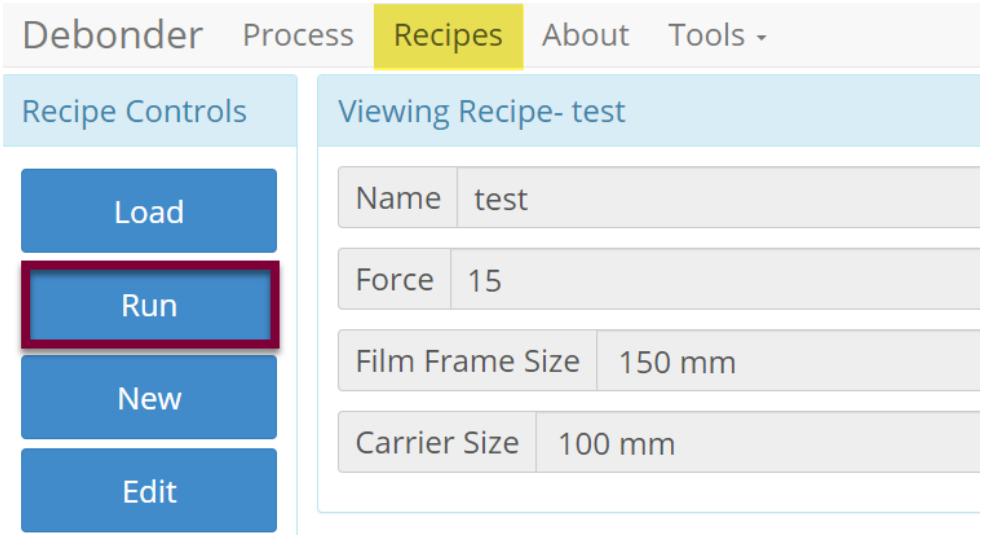
2. Load Recipe.



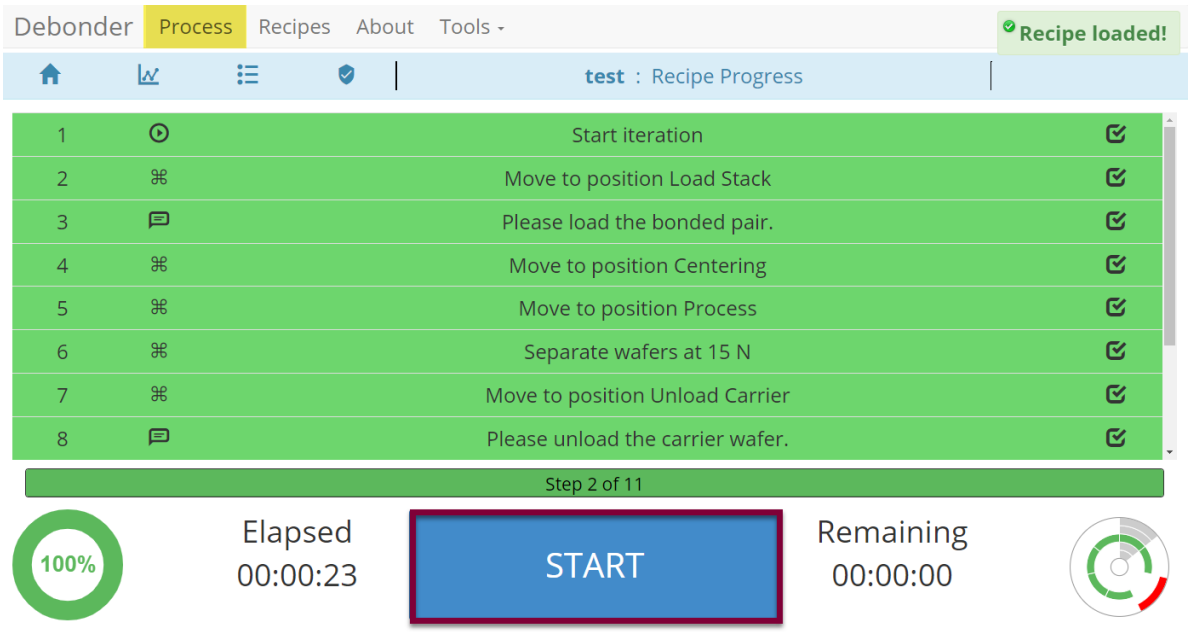
3. Search For, Identify, & Select Recipe.



4. Run Recipe.



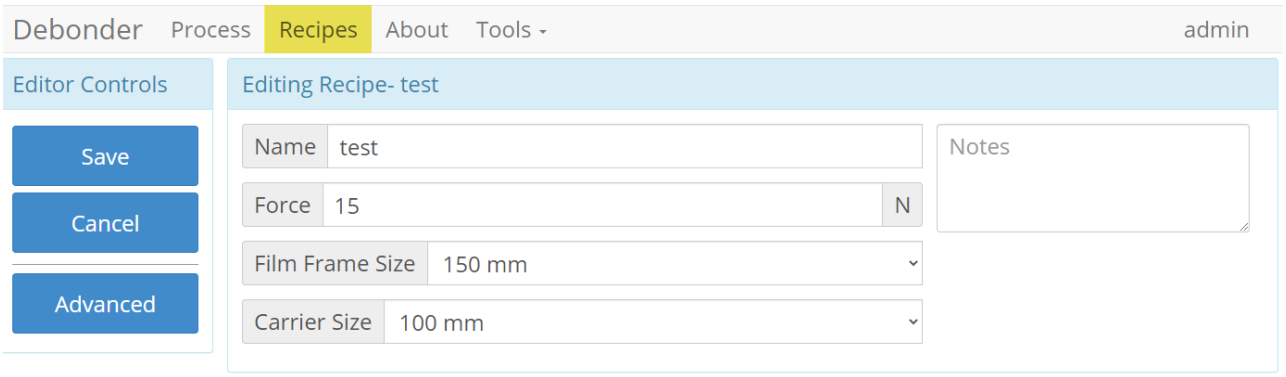
5. Start Recipe.



*Press the two flashing buttons on the front of the Apogee® Mechanical Debonder and follow the prompts on the screen during recipe execution.

6. Recipe Progression.

11.3 Editing Recipes



Name---------- recorded in log files and used as search criteria when searching for recipes

Force---------- maximum force in newtons allowed on substrate by way of gripper

Film Frame Size---------- specify diameter of film frame

Carrier Size---------- specify diameter of carrier substrate

11.4 Tool Specific Settings – Apogee® Mechanical Debonder

Wafer Sensor Enabled--------- sensor can be disabled or enabled to detect presence of carrier substrate in gripper and verification of debond

12. Table of Revisions

Doc Rev #	Author	Description of Change(s)	Reviewed/Approved By	Date
3.6	J. Adams	- Updated Section 4.11 Download Recipe Data - Updated Section 5 DataStream™ About Page - Updated Section 8.2 Manual Controls – Apogee® Spin Coater - Updated Section 8.6 Tool Specific Settings - Apogee® Spin Coater	D. Tanksley B. Waterworth	7/09/2024
3.5	J. Adams	- Updated Section 5 DataStream™ About Page - Added Section 4.11 Download Recipe DataDownload Recipe Data - Added Section 4.12 Upload Recipe Data - Revised Section 8.2 Manual Controls – Apogee® Spin Coater with Motor Off details.	B Waterworth	4/04/2024
3.4	J. Adams	- Updated Section 5 DataStream™ About Page - Updated Section 8.1 System Parameters - Updated Section 8.2 Manual Controls – Apogee® Spin Coater - Updated Section 8.3 Running Recipes - Updated Section 11.1 System Parameters	B Waterworth	12/28/2023
3.3	J. Adams	- Updated Section 5 DataStream™ About Page with versioning information - Update Apogee to reflect registered trademark.	B Waterworth	8/02/2023

3.2	J. Adams	- Update Section 5 DataStream™ About Page with versioning information - Added Section 7.9 DataStream™ API	B. Waterworth D. Tanksley	4/3/2023
3.1	J. Adams	- Update copyright detail Section 2.2 Logging In - Added Section 9.1 Safety Temperature Warning - Added Section 9.2 Timer Controls - Safety Temp, Idle Temp, Time before Idle settings added to Section 9.8 Tool Specific Settings – Apogee® Bake Plate	B. Waterworth D. Tanksley	1/16/2023
3.0	J. Adams	- Add Section 4.3 Creating New Recipes - Add Section 7.6 - 7.8 summarizing Local Capture features - update 8.2 Manual Controls – Apogee® Spin Coater with deservo details updates to section 12 Table of Revisions	B. Waterworth J. Strothmann	9/22/2022
2.0	J. Adams	- Update format - Section 3 details updated Process View and Graph View features - Add Section 5.6 Format USB for Tool Compatibility - add sections 8.2, 9.4, and 10.2 outlining tool specific manual controls - Add Section 11 Apogee® Mechanical Debonder Add Section 12 Table of Revisions	B. Waterworth J. Strothmann	8/18/2022