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Operations Manual

DataStream™ v6 Software



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1. Introduction

1.1 Confidentiality Statement

Information supplied is for the 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:

<u>Username</u>	<u>Password</u>	<u>Permissions</u>
admin	admin2	<ul style="list-style-type: none">▪ advanced recipe editing▪ export log files▪ manual tool control▪ remote recipe preparation▪ tool administrator▪ user administrator
eng	eng0	<ul style="list-style-type: none">▪ advanced recipe editing▪ manual tool control▪ tool administrator
tech	tech1	<ul style="list-style-type: none">▪ basic recipe editing▪ manual tool control
op	op6	<ul style="list-style-type: none">▪ 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.

Cee® Apogee™

Bake Plate

Username

Username

Password

Password

Login

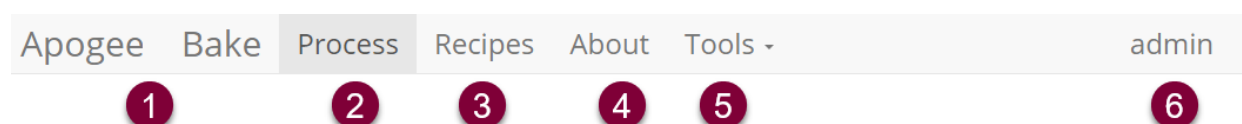
© 2022 Cost Effective Equipment, LLC

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

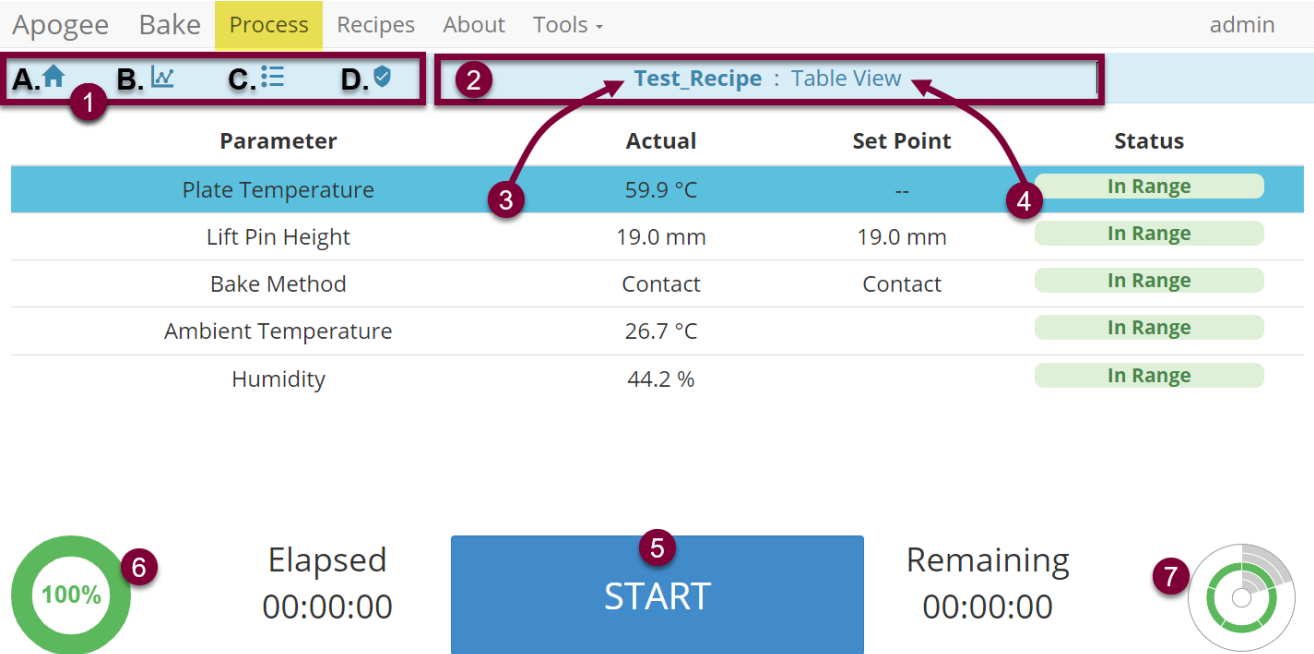
Located along the top of the screen, the navigation bar provides easy access to Apogee™ features and functions.



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-buttondependent on the state of the equipment (e.g., start/abort recipe)
6. process progressgraphical display of process progress
7. system parameter state.....displays status (critical high/low, warning high/low, in-range)

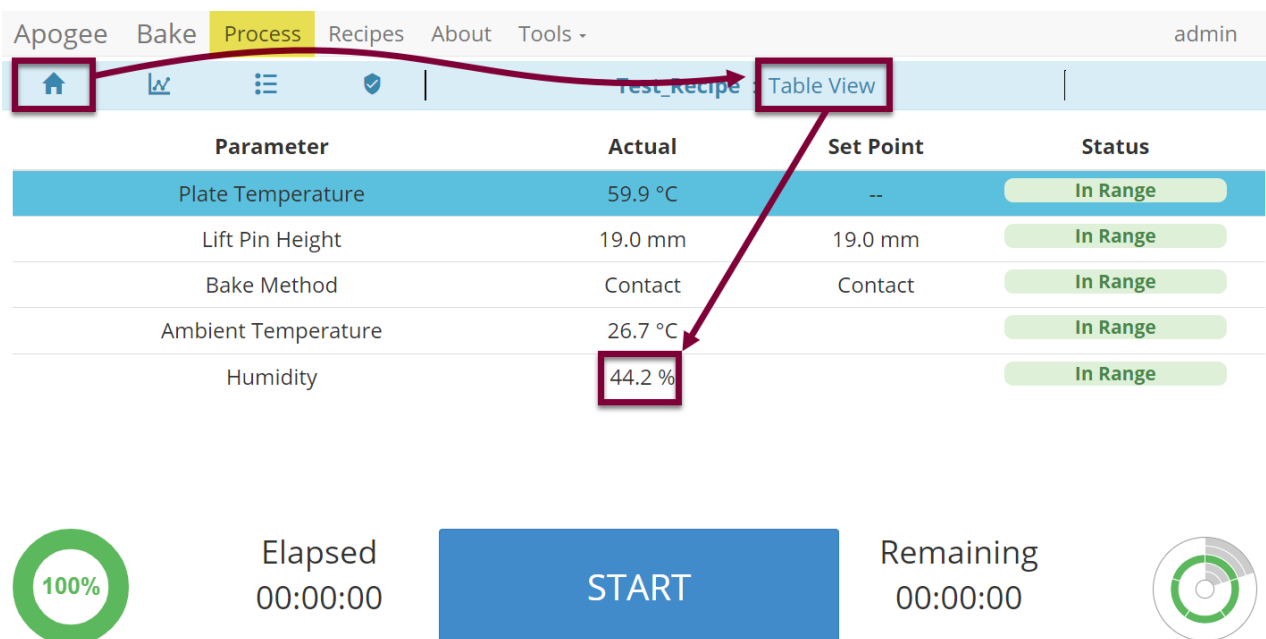
3.1 Process View Window – Table View

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.

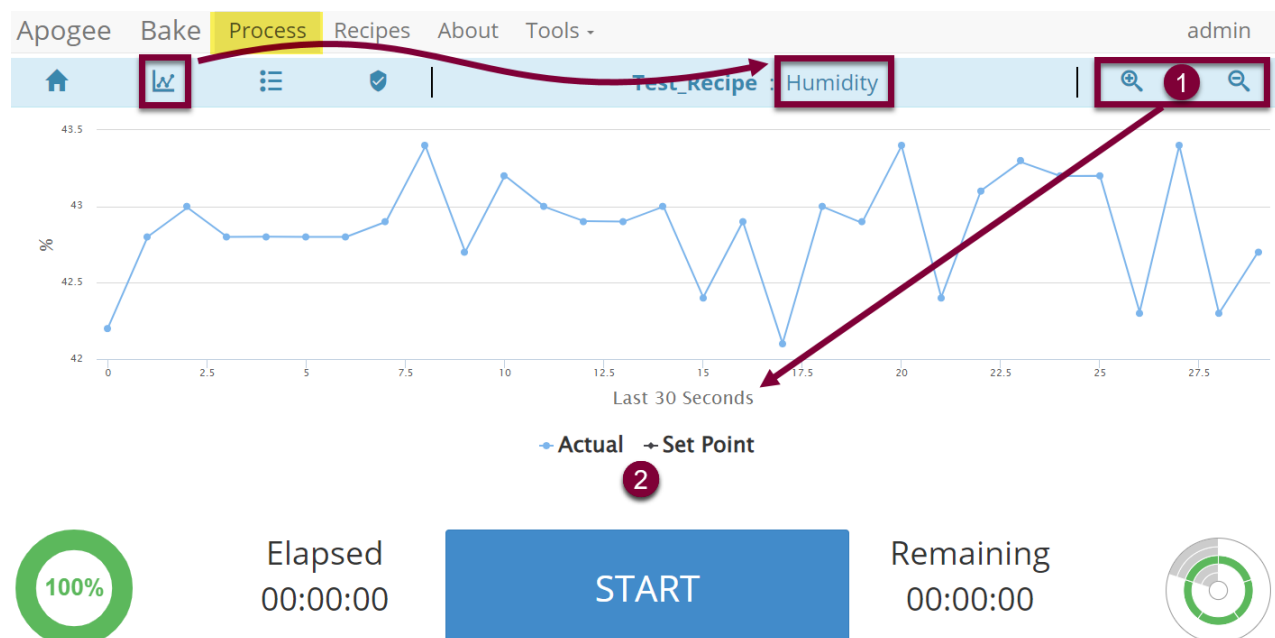
All parameters have an associated **Status**; this column mirrors process alerts in warning level and associated color. **Status** ranges are pre-defined for all basic recipes and can be edited within the **Advanced** recipes menu covered in section 4.5.

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

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.



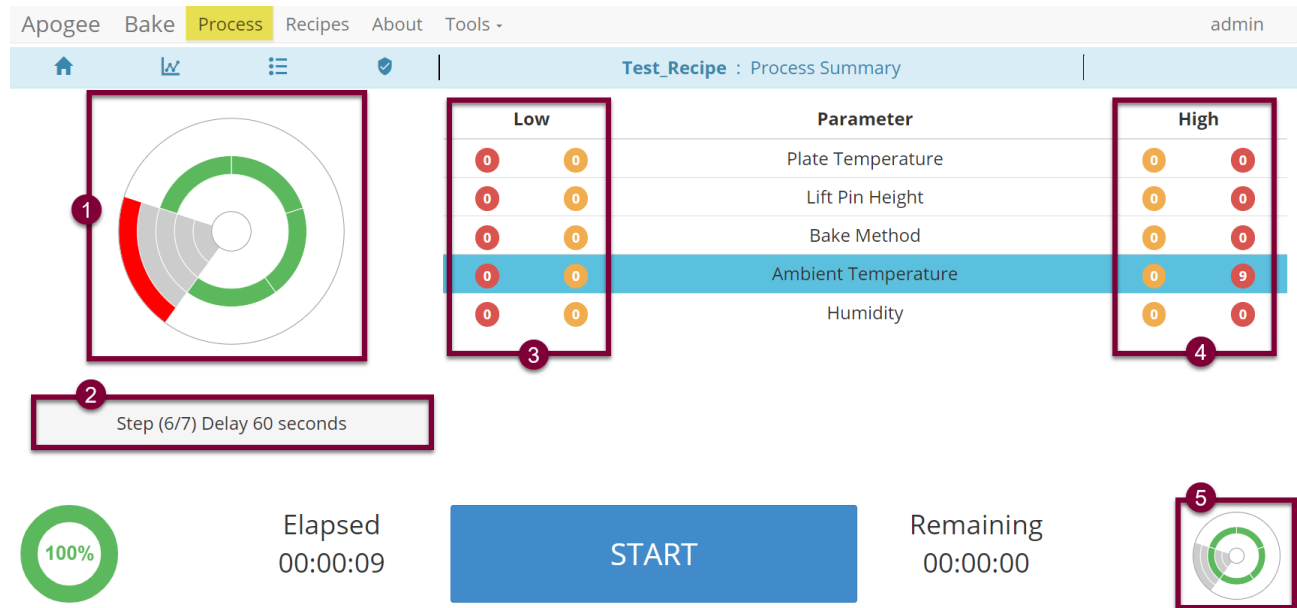
Alternatively, **Graph View** can be accessed by selecting the desired parameter in **Table View** and then tapping the **Graph View** quick link.



1. zoomadjust graphical lookback period from 30 sec to one hour
2. data selectiondisplay 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.



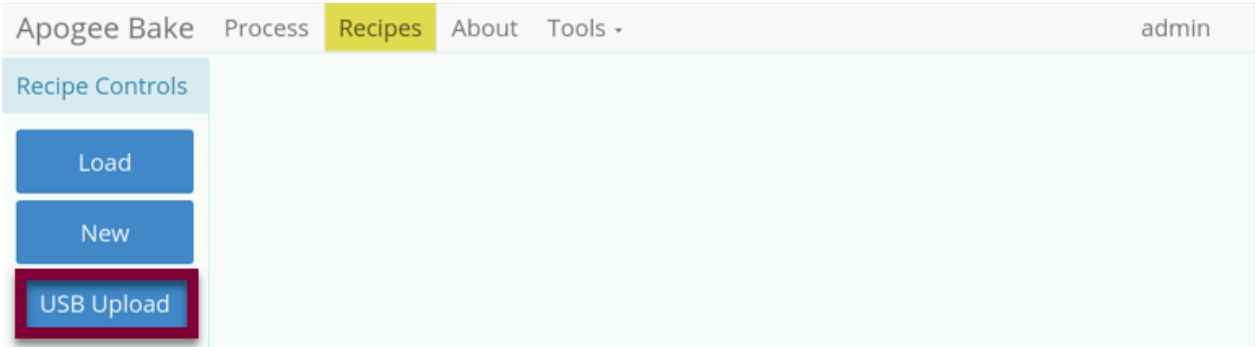
1. Process alert UI depicts parameter status indicators achieved during a given process.
2. Process state message describing most recent action and/or process errors encountered.
3. Seconds spent in critically low and warning low status.
4. Seconds spent in critically high and warning high status.
5.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

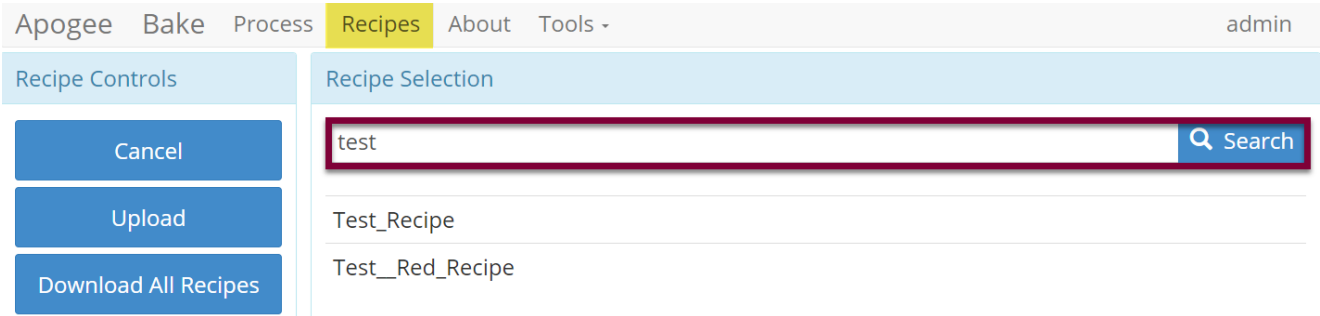
Access to **Recipe Management** is controlled at the user profile level. If a user does not have sufficient privileges for a specific activity, the button for that activity will not be displayed.



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.

Apogee Bake Process **Recipes** About Tools - admin

Recipe Controls

Load

1 Run

New

2 Edit

3 Delete

Upload

Download All Recipes

Download

Viewing Recipe- Test_Recipe

Name Test_Recipe

Notes

Steps

1	Start iteration
2	Disable temperature controller
3	Set temperature to 95 °C
4	Bake using Contact method
5	Set lift pins to 1 mm
6	Delay 60 seconds
7	Stop iteration after 1 time(s)

1. RunDirects 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.

Apogee Bake Process **Recipes** About Tools -

Warning... Recipe blue already exists

Editor Controls

Save

Cancel

Insert

Editing Recipe-

Name blue

Plate Temperature 180 °C

Notes

Step	Time (seconds)	Process Method	Pin Height (mm)
1	60	Contact	

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.

Apogee Bake Process **Recipes** About Tools - admin

Editor Controls

2 Save

3 Cancel

4 Insert

5 Advanced

Editing Recipe- Test_Recipe

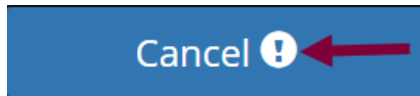
Name Test_Recipe

Plate Temperature 120 °C

Notes

Step	Time (seconds)	Process Method	Pin Height (mm)
1	60	Contact	
2	30	Contact	
3	30	Contact	
4	60	Proximity	

1. Recipe Editor UIparameters and controls vary between equipment types
2. Saveoverwrites existing recipe
3. Cancel.....discard changes to the recipe
4. Editor Controlsvary with recipe/equipment type/selections in Recipe Editor UI
 - Insert.....add a recipe step
 - Up/Downreorder recipe steps
 - Delete.....delete the selected recipe – *irreversible
5. Advanced¹.....convert basic recipe to advanced recipe



6. Action ConfirmationPresents 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 Nameidentification of recipe via search and log files
2. Notesfield for additional process information, if desired
3. Stepsclick the desired row twice to open the Step Editor
4. Save²overwrites existing recipe
5. Cancel.....discard changes to the recipe
6. Preconditionslaunches *Precondition Editor*
7. Tolerancesdisplays *Runtime Tolerance Editor*
 - Editor Controls..*Recipe Editor UI* options vary between equipment
 - Insert.....add a recipe step
 - Up/Downreorder 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

Apogee Bake Process **Recipes** About Tools - admin

Editor Controls

1 Update

2 Cancel

Editing Step - Please load the wafer

Control

3 User Notifications

Action

4 Prompt User

Parameters 5

Title User Action Required

Body Please load the wafer

Description

6 Please load the wafer

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 Notifications

Parameters

Title User Action Required

Action

Prompt User

Body *enter prompts for the user here*

Description

enter prompts for the user here

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

Parameters

Value 90 °C

Action

Set

Description

Set temperature to 90 °C

Control: Plate Temperature

Action: Set

Parameters:

Value: 90°C

Description: Set Temperature to 90°C

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

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.

Apogee	Bake	Process	Recipes	About	Tools	admin
Editor Controls						
Editing Preconditions - Test_Recipe_Advanced						
<div>1 Update</div> <div>2 Cancel</div>		Recipe Precondition Checks			Settings	
		<div>3</div> Plate Temperature - Within -5% and +5% of 90 °C			<div>4</div> Enabled	
		Lift Pin Height - Disabled				
		Ambient Temperature - Disabled				
		Humidity - Disabled				
					<div>5</div> Target 90 °C	
					Min Range 5 %	
					Max Range 5 %	


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/Disabled³ 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:

Apogee Bake **Process** Recipes About Tools - admin

List of all preconditions to be met and their status



⊗	Plate Temperature(24.4 °C) - Within -5% and +5% of 30 °C
✔	Lift Pin Height(10.0 mm) - Within -10% and +10% of 10 mm
⊗	Ambient Temperature(26.6 °C) - Between 20 and 22 °C

Waiting on preconditions to be in range for recipe ...

ABORT to cancel process

Test_Recipe

0%

Elapsed
00:00:04

ABORT

Remaining
00:01:00

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.

Apogee Bake Process **Recipes** About Tools - admin

Editor Controls

1 Update

2 Cancel

Editing Runtime Tolerances - Test_Recipe

Recipe Runtime Tolerances

Abort on any Critical Tolerance 3

Plate Temperature - Between -5% and +5%

Lift Pin Height - Between -10% and +10%

Ambient Temperature - Between 20 and 22 °C

Humidity - Between 35 and 45 %

Settings

4 Enabled

Critically High	10	%
Warning High	5	%
Warning Low	5	%
Critically Low	10	5

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/Disabled⁴..... toggle switch dictates whether the tolerance is evaluated
5. Tolerance Detail⁵..... 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.

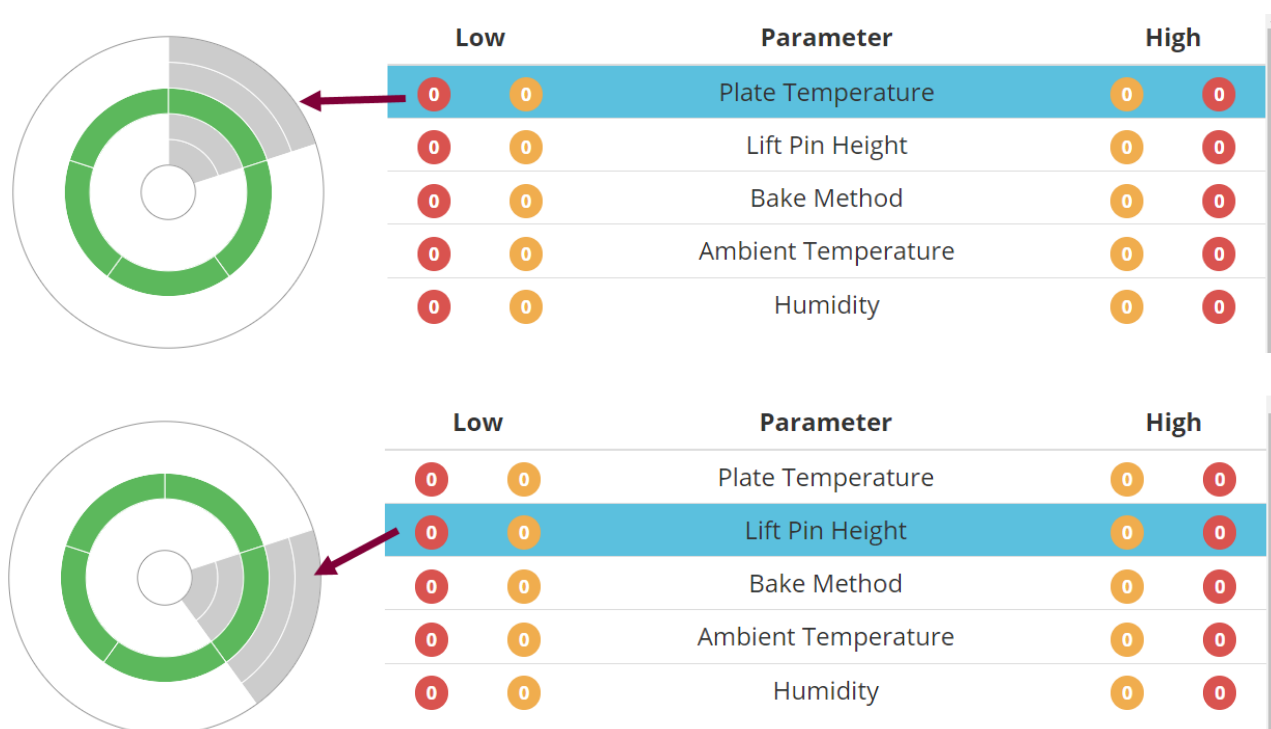


Alert

1. Critically Highabove the allowable upper limit
2. Warning Highabove target range but within allowable limits
3. In Rangewithin the target range
4. Warning Lowbelow target range but within allowable limits
5. Critically Low.....below the allowable lower limit

Rendered if the system parameter is...

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.

Editor Controls

Save

Cancel

Preconditions

Tolerances

Insert

^

v

Editing Recipe- Test_Recipe

Name

Test_Recipe

Notes

Steps

1	🔊	Load Wafer
2	⌘	Enable temperature controller
3	⌘	Set temperature to 30 °C
4	🕒	Start iteration
5	⌘	Set lift pins to 4 mm
6	⌘	Bake using Contact method
7	🕒	Delay 60 seconds
8	🔄	End iteration after 4 time(s)
9	⌘	Set lift pins to 2 mm
10	⌘	Set temperature to 130 °C

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.

Apogee Bake Process Recipes About Tools - admin

Editor Controls

Update

Cancel

Editing Iteration - End iteration after 4 time(s)

🔄

Iteration Count 4 times

Description

End iteration after 4 time(s)

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

Apogee Bake Process Recipes About Tools - admin

🏠 🔍 ⌵ 🛡️

Test_Recipe : Recipe Progress

6	⌘	Bake using Contact method	☑
7	🕒	Delay 60 seconds	☐
8	🔄	End iteration after 4 time(s)	☐
9	⌘	Set lift pins to 2 mm	☐
10	⌘	Set temperature to 130 °C	☐

Step 7 of 10

Iteration 1 of 4

1%

Elapsed 00:00:08

ABORT

Remaining 00:04:55

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

5. DataStream™ About Page

Cee® Apogee™ Bake Plate



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Tool Info	
Tool Name	Apogee Bake
Serial Number	123456
Local Time	2022-09-23 19:02
System Time (UTC)	2022-09-23 19:02
External Address	10.0.1.114
MAC Address	00:19:b8:03:9a:56

DataStream™ System Applications		
Firmware	v6.2.1	4d0e208
Web UI	v6.2.1	3d301a4f
Diego	v6.2.0	b6b6084
Manny	v6.0.0	51e2e34
Postal	v6.0.0	2ebb797

[Software Update...](#)

Tool Usage	
Processes Run	19
Manual Operations	87
User Aborts	33
System Aborts	3
Uptime	0 hrs
Last Downtime	0.1 hrs

Client Info	
Browser Name	Chrome
Browser Version	105
Browser Size	1920 x 937

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.

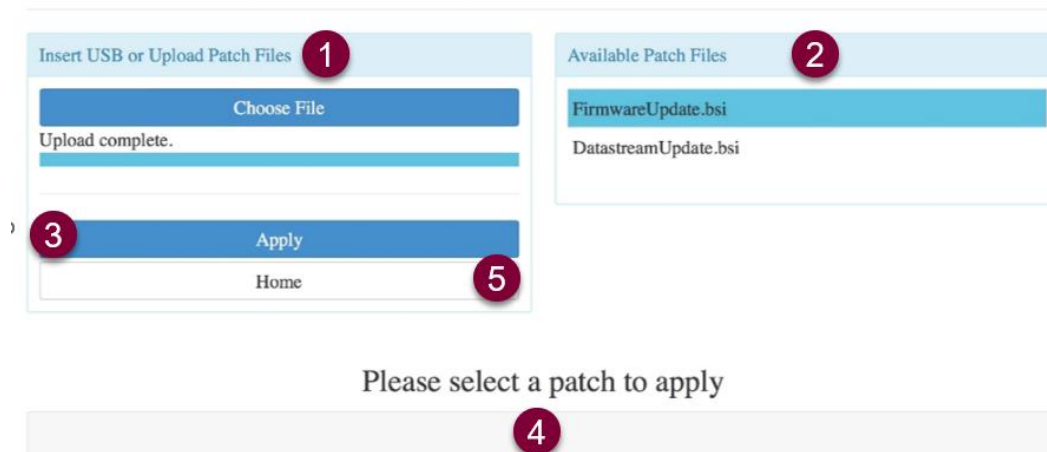
5.5 Software Update Utility

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™.

Software Update Utility



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

Apogee Bake Process Recipes About Tools - admin

Log Exporting 1 2022-08-11 14:37

Recipe Run Date

08/11/2022

2

August 2022

Su	Mo	Tu	We	Th	Fr	Sa
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3
4	5	6	7	8	9	10

3 Search

Delete All Before Date

Save to USB

4

Results

- 2022-08-11T11:23:55
- 2022-08-11T11:25:15
- 2022-08-11T11:27:22
- 2022-08-11T11:28:20
- Screenshot 2022-08-11T11:32:49
- Data 2022-08-11T11:32:57
- 2022-08-11T11:43:29
- Screenshot 2022-08-11T12:43:00
- Apogee Spin_20220811

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.

Apogee Bake Process Recipes About Tools - admin

Log Exporting 2022-08-11 14:37

Recipe Run Date

08/11/2022

August 2022

Su	Mo	Tu	We	Th	Fr	Sa
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3
4	5	6	7	8	9	10

Search

Delete All Before Date

Save to USB

XLSX

RAW

Results

2022-08-11T11:23:55
2022-08-11T11:25:15
2022-08-11T11:27:22
2022-08-11T11:28:20
Screenshot 2022-08-11T11:32:49
Data 2022-08-11T11:32:57
2022-08-11T11:43:29
Screenshot 2022-08-11T12:43:00
Apogee Spin_20220811

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.

Apogee Bake Process Recipes About Tools - Jane

1

User Profile : admin

New Password

Email

User Notes

Update

1. Profile Settingsnavigate to **Tools > Settings** then select the **profile icon**
2. New Password⁶enter password and satisfy validation prompt
3. Email.....used throughout the system to send user defined notifications
4. User Notesdefined by user administrators (covered in the next section)
5. Updatesaves **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 Name⁷identifier displayed in the upper left corner of the screen
3. Local Time Zone Offsetused to set the local time on the equipment according to UTC⁸
4. SSL Encryption⁹ (https).....controls network access to the equipment.
5. Ambient Temp Offset.....ambient temperature calibration of $\pm 50^{\circ}\text{C}$
6. Relative Humidity Offsetrelative humidity calibration of $\pm 50\%$
7. Buzzer Settingdisable/enable end of process alarm (single vs continuous beep)
8. Updatesaves all equipment settings defined within the activity

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

⁶ Leave the password field blank while updating other settings to ensure the password is **not** changed

⁷ If a name is not provided the tool will default to *Apogee*

⁸ Find your [UTC \(Universal Coordinated Time\)](#) offset

⁹ When enabled, the equipment can be accessed from both https and http.

Mail Settings

The screenshot shows the 'Tools' menu with 'Settings' selected. On the left sidebar, the mail icon is highlighted with a red box and a '1'. The main area is titled 'Postal SMTP Settings'. It contains fields for 'Host' (mailhost.tld, callout 2), 'Port' (465, callout 3), 'Username' (username@mailhost.tld, callout 4), and 'Password' (masked with dots, callout 5). At the bottom is an 'Update' button (callout 6).

1. Mail Settings.....navigate to **Tools > Settings** then select the **mail icon**
2. Hostthe SMTP server that mail is sent from
3. Portserver defined - defaults for SMTP are 587 and 465 for SSL
4. Username.....defined by the mail server's administrator
5. Passwordsent to the server during mail submission
6. Updatesaves 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.

The screenshot shows the 'Tools' menu with 'Settings' selected. On the left sidebar, the user management icon is highlighted with a red box and a '1'. The main area is titled 'User Management'. It features a list of 'Active Users' (Jane, a, admin, eng, f, op) with 'eng' highlighted (callout 2). Below the list are 'New' (callout 5), 'Save' (callout 6), and 'Delete' (callout 7) buttons. On the right, the 'User Profile' section (callout 3) shows fields for 'Username' (eng), 'Password', and 'Email' (user@mailserver.tld), with a note to enter relevant notes. Below this is the 'Permissions' section (callout 4) with a table of permissions for 'eng'.

Permission	Status
Shared Account ?	<input type="checkbox"/>
Basic Recipe Editing ?	<input type="checkbox"/>
Advanced Recipe Editing ?	<input checked="" type="checkbox"/>
Export Log Files ?	<input checked="" type="checkbox"/>
Manual Tool Control ?	<input checked="" type="checkbox"/>
Remote Recipe Preparation ?	<input type="checkbox"/>
Tool Administrator ?	<input checked="" type="checkbox"/>
User Administrator ?	<input type="checkbox"/>

1. User Settings.....navigate to **Tools > Settings** then select the **users icon**
2. Active Usersall system users – select the user profile you wish to edit
3. User Profileadmin access to edit user information
4. User Permissionsdefine 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.

The screenshot shows the 'User Management' section of the Apogee software. On the left, a sidebar contains icons for various functions, with the 'Users' icon (a group of people) highlighted with a red box and the number 1. The main area is titled 'User Management' and contains two panels. The left panel, 'Active Users', lists users: Jane, a, admin, eng, f, and op. The 'Jane' user is highlighted with a red box. Below this list are buttons for 'New', 'Save', and 'Delete'. The 'Delete' button is highlighted with a red box and the number 2. A yellow confirmation box below the 'Delete' button says 'Confirm permanent deletion of user Jane'. The right panel, 'User Profile', shows fields for 'Username' (Jane), 'Password', and 'Email'. Below these is a 'Permissions' section with a list of permissions and checkboxes: 'Shared Account', 'Basic Recipe Editing', 'Advanced Recipe Editing', 'Export Log Files', 'Manual Tool Control', 'Remote Recipe Preparation', 'Tool Administrator', and 'User Administrator'. The 'Delete' button is highlighted with a red box and the number 2.

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.

The screenshot shows the 'Change System Time' activity in the Apogee software. The top navigation bar includes 'Apogee', 'Bake', 'Process', 'Recipes', 'About', and 'Tools'. The 'Tools' menu is highlighted. On the left sidebar, the 'Time' icon (a clock) is highlighted with a red box and the number 1. The main area is titled 'Change System Time' and contains a text input field labeled 'Enter new UTC time in format: YYYY-MM-DD HH:MM:SS'. The input field is highlighted with a red box and the number 2. Below the input field is a blue button labeled 'Change Time', which is highlighted with a red box and the number 3.

1. Time Settingsnavigate 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 feature 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.

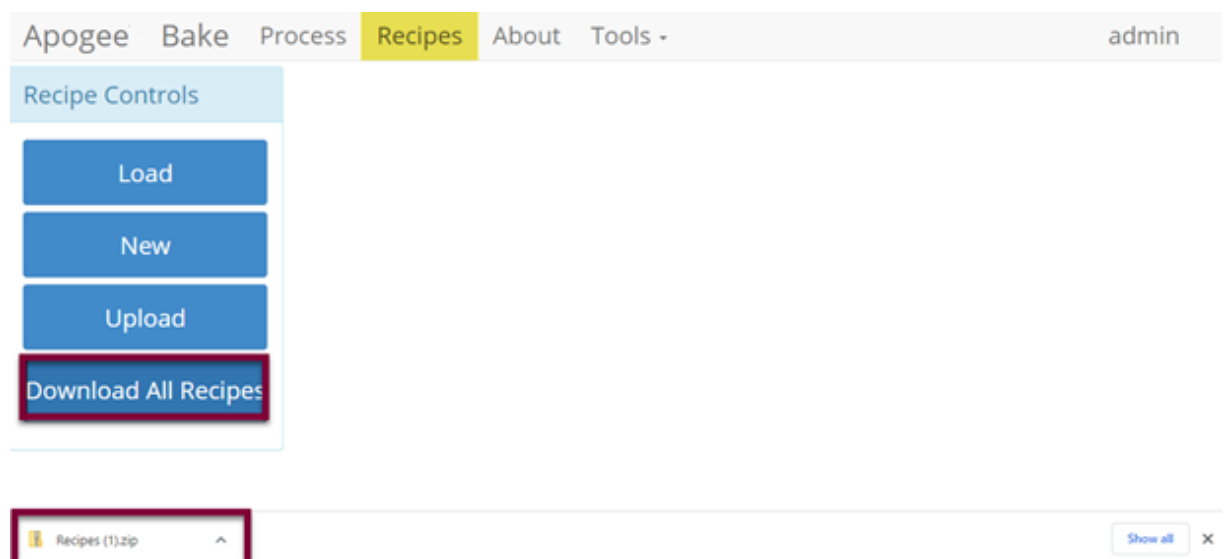
Equipment is configured as DHCP by default meaning the network will assign the host an IP address once connected. The IP address can be found under the **About** tab on the DataStream™ GUI. Once connected to the network, the DataStream™ network can be accessed by opening a browser window and entering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

7.2 Remote Recipe Editing

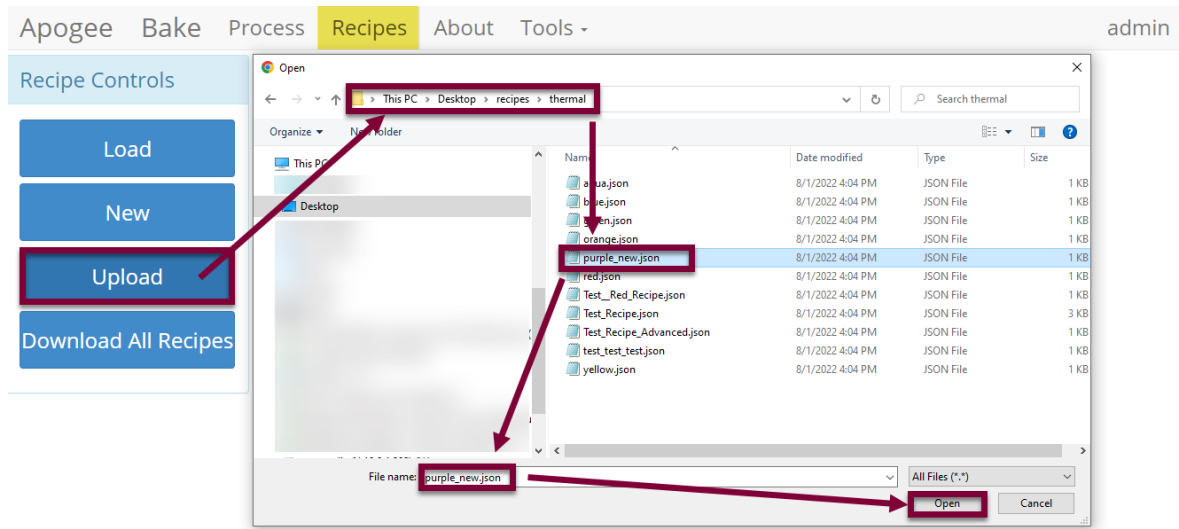
Remote users retain their local recipe editing capabilities. In addition, they are able to download recipes from the host equipment to their local client and upload recipes from their local client to the host machine. This provides an effective method of ensuring recipes are available and consistent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

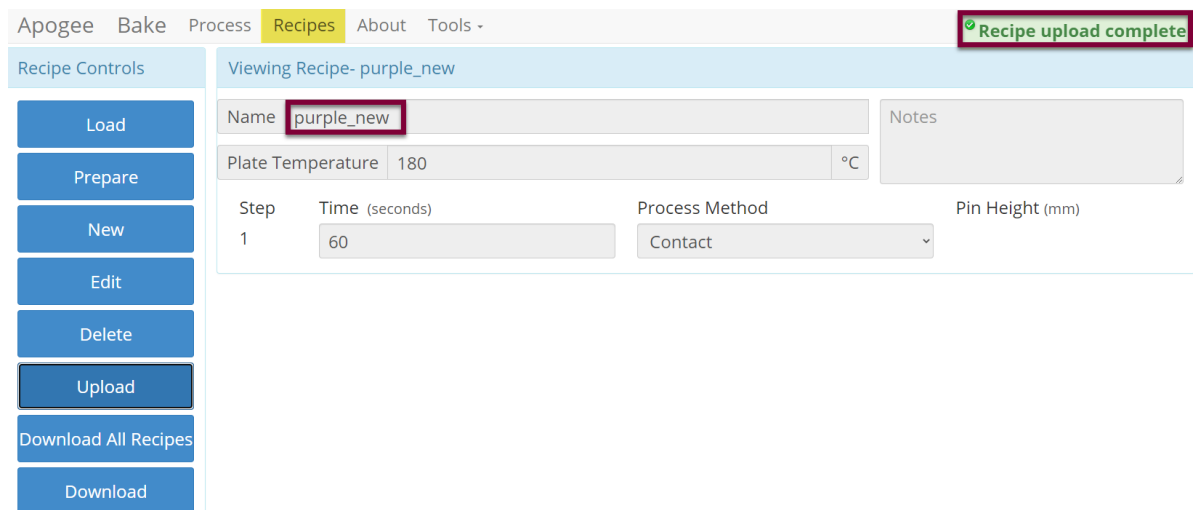


Upload Recipes

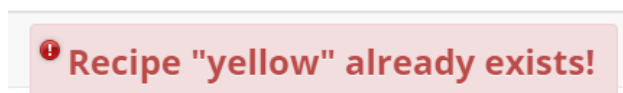


1. Navigate to the Recipes Tab.
2. Select upload and navigate to the desired folder or files.
3. Select the recipes to upload and click **Open**.

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:

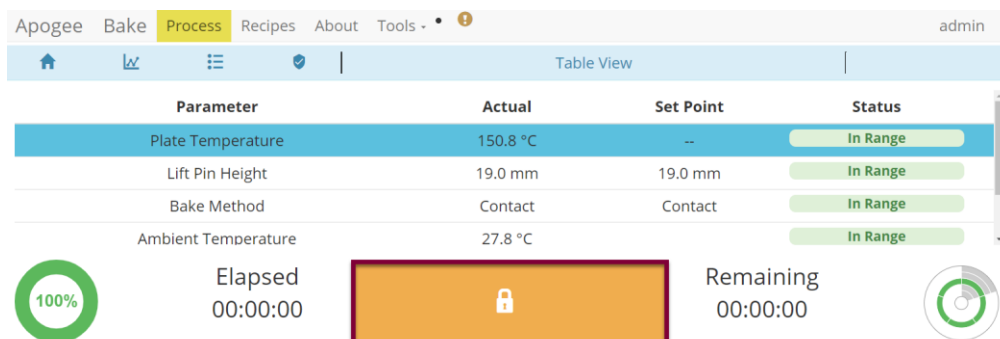


7.3 Local Presence

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.

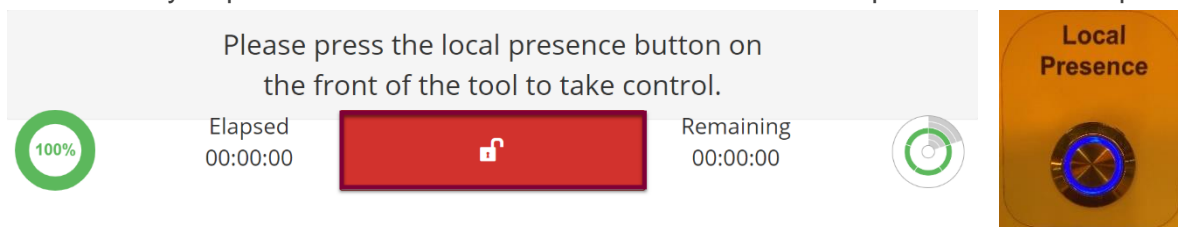
When using the equipment without a verified local presence, the omni-button will be locked. All actions that impact equipment conditions are disabled. Blocked actions include running recipes, aborting recipes, and executing manual commands.

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**.

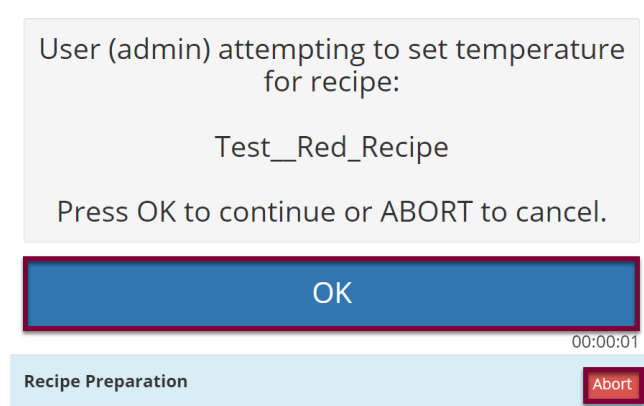
The screenshot shows the Apogee Bake Recipes interface. At the top, there are tabs for Apogee, Bake, Process, Recipes (selected), About, and Tools. A user icon and the name 'admin' are in the top right. Below the tabs is a 'Recipe Controls' section with buttons for Load, Prepare (highlighted), Run, and New. To the right of the buttons, there is a form for 'Viewing Recipe- Test_Red_Recipe'. The form contains the following fields:

- Name: Test_Red_Recipe
- Notes: (empty)
- Plate Temperature: 180 °C
- Step: 1
- Time (seconds): 60
- Process Method: Contact
- Pin Height (mm): (empty)

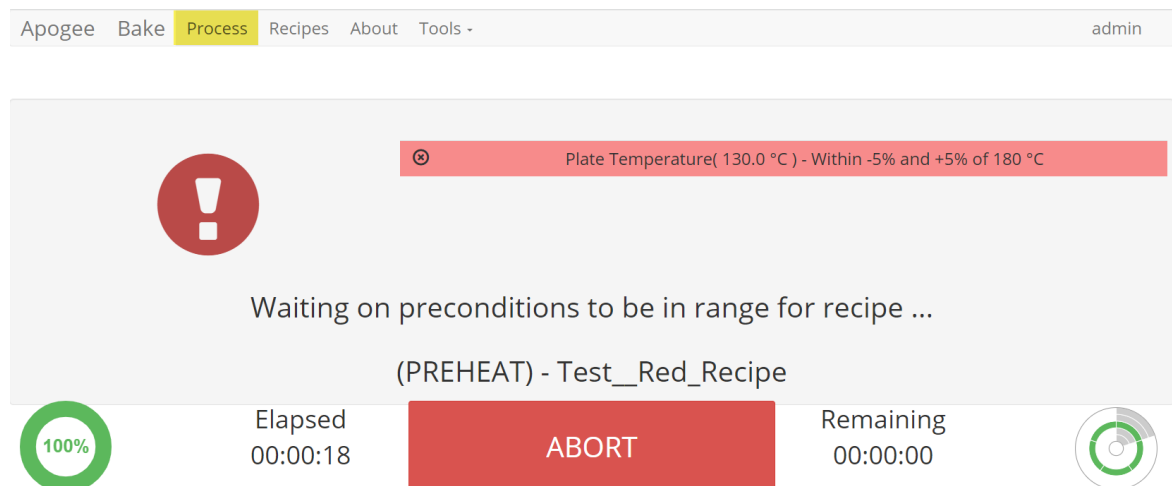
***Preparation processes cannot be initiated when the equipment is already in use.**

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**.

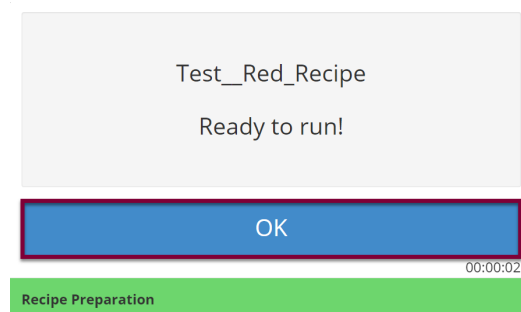
In the absence of a response, the request is auto accepted after two minutes.



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**.

The screenshot shows the Apogee web interface. The top navigation bar includes 'Apogee', 'Bake', 'Process' (highlighted), 'Recipes', 'About', and 'Tools'. The user 'admin' is logged in. Below the navigation bar, the page title is 'Test_Red_Recipe : Recipe Progress'. A table lists 7 steps of the recipe, each with a status icon and a checkmark:

Step	Status	Action	Checkmark
1	Start iteration	Start iteration	✓
2	Enable temperature controller	Enable temperature controller	✓
3	Set temperature to 180 °C	Set temperature to 180 °C	✓
4	Set lift pins to 0 mm	Set lift pins to 0 mm	✓
5	Bake using Contact method	Bake using Contact method	✓
6	Delay 60 seconds	Delay 60 seconds	✓
7	Stop iteration after 1 time(s)	Stop iteration after 1 time(s)	✓

Below the table, a progress bar indicates 'Step 1 of 7'. At the bottom, there is a large blue 'START' button. To the left of the button is a green circular progress indicator showing '100%'. To the right of the button, the text 'Elapsed 00:01:16' and 'Remaining 00:00:00' is displayed.

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.

The screenshot shows the Apogee web interface. The top navigation bar includes 'Apogee', 'Process', 'Recipes', 'About', and 'Tools'. The user 'admin' is logged in. Below the navigation bar, the page title is 'Test_Red_Recipe : Recipe Progress'. A table lists 7 steps of the recipe, each with a status icon and a checkmark:

Step	Status	Action	Checkmark
1	Start iteration	Start iteration	✓
2	Enable temperature controller	Enable temperature controller	✓
3	Set temperature to 180 °C	Set temperature to 180 °C	✓
4	Set lift pins to 0 mm	Set lift pins to 0 mm	✓
5	Bake using Contact method	Bake using Contact method	✓
6	Delay 60 seconds	Delay 60 seconds	✓
7	Stop iteration after 1 time(s)	Stop iteration after 1 time(s)	✓

Below the table, a progress bar indicates 'Step 1 of 7'. At the bottom, there is a large blue 'START' button. To the left of the button is a green circular progress indicator showing '100%'. To the right of the button, the text 'Elapsed 00:01:16' and 'Remaining 00:00:00' is displayed.

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

The screenshot shows the Apogee Log Browser interface. At the top, there is a navigation bar with 'Apogee', 'Process', 'Recipes', 'About', and 'Tools -'. The 'Tools -' menu is open, showing 'Manual Control', 'Log Browser' (highlighted), 'Settings', and 'Diagnostics'. The 'Log Browser' section has a 'Recipe Run Date' field set to '08/11/2022'. Below this is a calendar for August 2022. The date '11' is selected, indicated by a red circle and arrow labeled '1'. To the right of the calendar is a 'Results' section with a list of logs. The first log is 'Screenshot 2022-08-11T19:43:18', highlighted with a red circle and arrow labeled '3'. Below the calendar are four buttons: 'Search' (labeled '2'), 'Delete All Before Date', 'Download All', and 'Download' (labeled '4'). The 'Search' button is highlighted with a red circle and arrow. The 'Download' button is also highlighted with a red circle and arrow. The 'Results' section shows 'Data 2022-08-11T19:43:28'.

Su	Mo	Tu	We	Th	Fr	Sa
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3
4	5	6	7	8	9	10

- select a date from the calendar widget
- click **Search** to query for logs on the desired date
- select the Screenshot log(s) from the list of results
- select **Download** to pull the .png file to your local machine for review

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

Apogee

Process

Recipes

About

Tools -

admin

Log Exporting

Manual Control

2022-08-11 20:00

Recipe Run Date

08/11/2022

August 2022

Su	Mo	Tu	We	Th	Fr	Sa
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3
4	5	6	7	8	9	10

Log Browser

Settings

Diagnostics

Results

Screenshot 2022-08-11T19:43:18

Data 2022-08-11T19:43:28

Search

Delete All Before Date

Download All

Download Day

Download

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 **Download** to pull the .csv file to your local machine for review

8. Apogee™ Spin Coater

8.1 System Parameters

Parameter	Actual	Set Point	Status
Spin Speed	0 rpm	0 rpm	In Range
Spin Acceleration	500 rpm/s	500 rpm/s	In Range
Active Dispenses	None	None	In Range
Dispense Source Empty	None		In Range
Chuck Vac	98.8 kPa	101.3 kPa	In Range
Waste Bottle Full	False		In Range
Ambient Temperature	27.9 °C		In Range
Humidity	44.4 %		In Range
Vibration	3		In Range

Spin Speed -----	measured rotational speed of the spin chuck in revolutions per minute (rpm)
Spin Acceleration ¹⁰ -----	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
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 ¹¹ -----	the ambient relative humidity in the environment where the equipment is housed
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

¹⁰ **Spin Acceleration** settings are dependent on the presence of a **Spin Speed** set point.

¹¹ 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.

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.

Apogee Process Recipes About Tools - admin

System Values

Parameter	Actual	Set Point
Spin Speed	0 rpm	0 rpm
Spin Acceleration	500 rpm/s	500 rpm/s
Active Dispenses	None	None
Dispense Source Empty	None	
Chuck Vac	98.8 kPa	99.0 kPa
Waste Bottle Full	False	
Ambient Temperature	29.1 °C	
Humidity	37.8 %	
Vibration	3	

System Controls

Motor Off

Control

What do you want to control?
What do you want to control?
Centering Routine
Spin Speed
Dispense
Chuck Vac

Please check change.

APPLY

Centering Routine

Apogee Process Recipes About Tools - admin

System Values

Parameter	Actual	Set Point
Spin Speed	0 rpm	0 rpm
Spin Acceleration	100 rpm/s	100 rpm/s
Active Dispenses	None	None
Dispense Source Empty	None	
Chuck Vac	98.7 kPa	64.0 kPa
Waste Bottle Full	False	
Ambient Temperature	28.7 °C	
Humidity	38.9 %	
Vibration	3	

System Controls

Motor Off

Control

Centering Routine

Action

Center Wafer

Title

Press OK or close the lid to continue.

Body

Please center the wafer

Please center the wafer

APPLY

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:

Apogee

Process

Recipes

About

Tools

admin

System Values

Parameter	Actual	Set Point
Spin Speed	2000 rpm	2000 rpm
Spin Acceleration	10000 rpm/s	10000 rpm/s
Active Dispenses	None	None
Dispense Source Empty	None	
Chuck Vac	98.8 kPa	64.0 kPa
Waste Bottle Full	False	
Ambient Temperature	29.1 °C	
Humidity	38.3 %	
Vibration	80	

System Controls

Motor Off

Control

Spin Speed

Action

Set

Speed

2000

rpm

Accel

10000

rpm/s

Osc

0

seconds

Set Spin Speed to 2000 rpm (0 sec oscillation)

APPLY

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

The **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 ¹²	0-99 seconds

Click APPLY

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

¹² reverses spin direction for the period specified

Dispense (*if equipped)

Apogee Process Recipes About Tools - admin

System Values

Parameter	Actual	Set Point
Spin Speed	0 rpm	0 rpm
Spin Acceleration	16000 rpm/s	16000 rpm/s
Active Disperses	1	1
Dispense Source Empty	None	
Chuck Vac	98.8 kPa	64.0 kPa
Waste Bottle Full	False	
Ambient Temperature	29.2 °C	
Humidity	37.8 %	
Vibration	4	

System Controls Motor Off

Control Dispense

Action Enable Disperses

Value

1	Dispense 1	<input checked="" type="checkbox"/>
2	Dispense 2	<input type="checkbox"/>
3	Dispense 3	<input type="checkbox"/>
4	Dispense 4	<input type="checkbox"/>

Disperses ON: 1

APPLY

Select a **Control** of *Dispense*

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

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

Apogee Process Recipes About Tools - admin

System Values

Parameter	Actual	Set Point
Spin Speed	0 rpm	0 rpm
Spin Acceleration	16000 rpm/s	16000 rpm/s
Active Disperses	None	None
Dispense Source Empty	None	
Chuck Vac	33.9 kPa	64.0 kPa
Waste Bottle Full	False	
Ambient Temperature	29.0 °C	
Humidity	38.6 %	
Vibration	3	

System Controls Motor Off

Control Chuck Vac

Action Set

Vacuum On

Threshold 64 kPa

Chuck Vac On (64 kPa)

APPLY

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

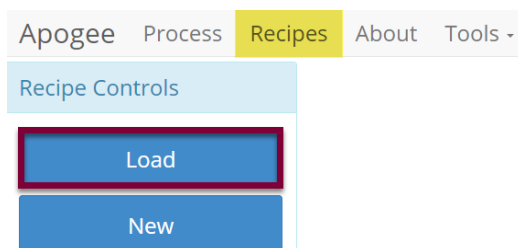
Note that the actual and set point values have populated on the system values list.

8.3 Running Recipes

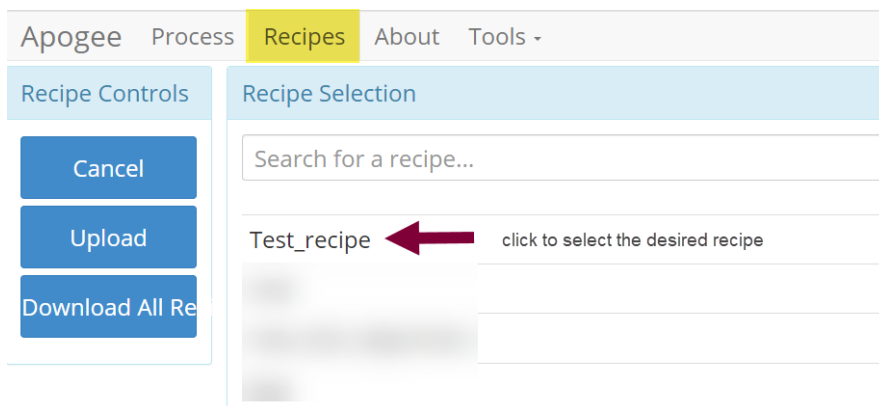
1. Navigate to the *Recipes* page.



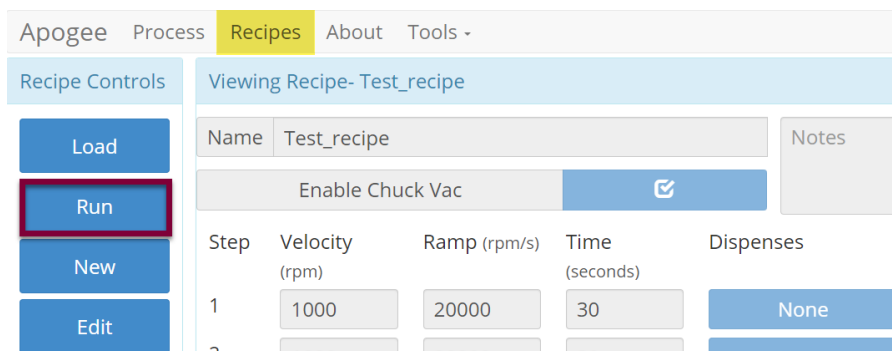
2. Click **Load** to access the recipes list.



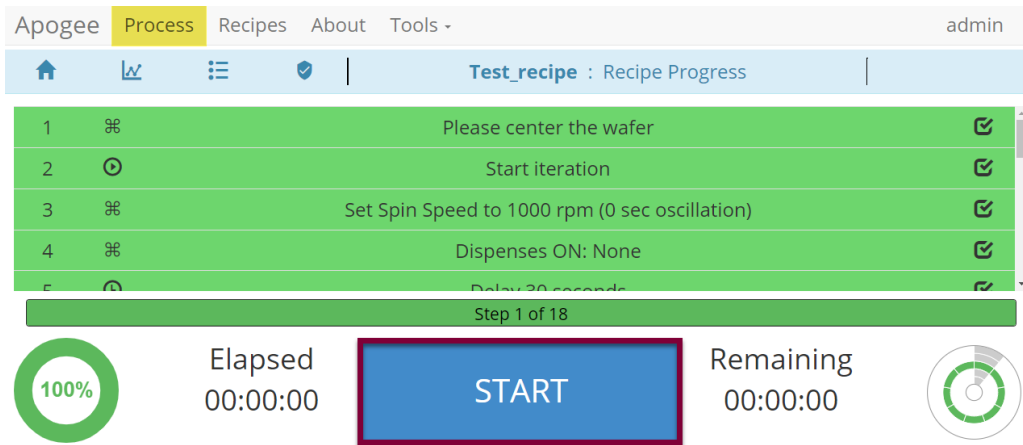
3. Search for, identify, & select the preferred recipe.



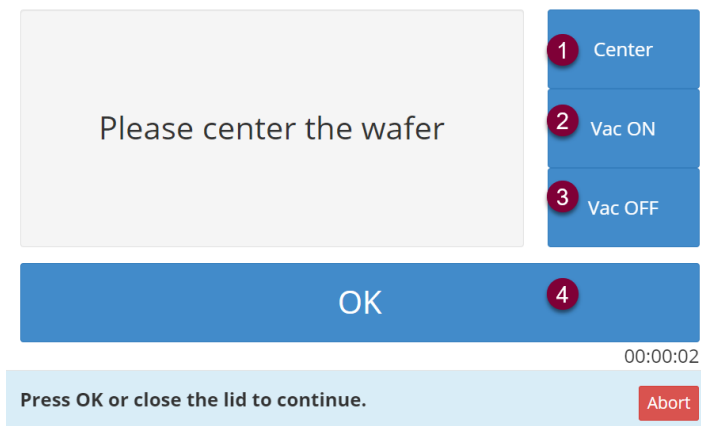
4. Click **Run**.



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*.

Apogee Process Recipes About Tools -

Editor Controls

Save

Cancel

Insert

^

v

Delete

Editing Recipe-

Name

Test_Recipe

Notes

Enable Chuck Vac

☒

Step	Velocity (rpm)	Ramp (rpm/s)	Time (seconds)	Dispenses
1	1000	20000	30	1
2	2000	10000	15	None
3	1000	20000	30	2
4	100	500	60	None
5	1000	20000	30	3

- Name**----- recorded in log files and used as criteria when searching for recipes
- Enable Chuck Vac**¹³----- used when the substrate requires vacuum to remain on the spin chuck; the user must center the substrate prior to spinning
- Step Velocity**¹⁴----- 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**¹⁵----- 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.

Apogee Process Recipes About Tools - admin

Editor Controls

Back

Select Active Dispenses

1	Dispense 1	<input checked="" type="checkbox"/>
2	Dispense 2	<input type="checkbox"/>
3	Dispense 3	<input type="checkbox"/>
4	Dispense 4	<input type="checkbox"/>

¹³ Only available to users with advanced recipe editor permissions.

¹⁴ preconditions default to $\pm 5\%$ of the target speed

¹⁵ field is only present on tools equipped with optional programmable exhaust

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 (%) ¹⁶ -----	default exhaust position when not running a process
Chuck Home ¹⁷ -----	facilitates loading/removal of substrates from a single position (0 to disable, 1 to enable)

¹⁶ Idle Exhaust does not apply to tools not equipped with Programmable Exhaust

¹⁷ When enabled, position is static.

9. Apogee™ Bake Plate

9.1 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**¹⁸----- 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**¹⁹----- ambient relative humidity of environment where equipment is housed

9.2 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.

Apogee Bake Process Recipes About Tools - admin

System Values

Parameter	Actual	Set Point
Plate Temperature	24.5 °C	--
Lift Pin Height	19.0 mm	19.0 mm
Bake Method	Contact	Contact
Ambient Temperature	26.7 °C	
Humidity	41.4 %	

System Controls

Control

What do you want to control?
What do you want to control?
Plate Temperature
Lift Pins
Bake Method

Please check
change.

APPLY

¹⁸ 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.

¹⁹ 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.

Plate Temperature

System Values		
Parameter	Actual	Set Point
Plate Temperature	41.5 °C	--
Lift Pin Height	-1.0 mm	5.0 mm
Bake Method	Contact	Contact
Ambient Temperature	25.1 °C	
Humidity	45.5 %	

System Controls	
Control	Plate Temperature
Action	Set
Value	45 °C
Please check your values before applying the change.	

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.

System Values		
Parameter	Actual	Set Point
Plate Temperature	41.9 °C	45.0 °C
Lift Pin Height	-1.0 mm	5.0 mm
Bake Method	Contact	Contact
Ambient Temperature	25.0 °C	
Humidity	44.4 %	

System Controls	
Control	Plate Temperature
Action	Enable
Value	Enable
Enable temperature controller	

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.

System Controls	
Control	Plate Temperature
Action	AutoTune

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.

System Controls

Control

Plate Temperature

Action

Ramp

Target

30

°C

Rate

2

°C / Minute

Select an **Action** of *Ramp*.
Enter the **Target** temperature.
Enter the desired ramp **Rate**²⁰ (between 1-6°C per minute).

Click APPLY

Lift Pins

System Values

Parameter	Actual	Set Point
Plate Temperature	42.9 °C	45.0 °C
Lift Pin Height	10.0 mm	10.0 mm
Bake Method	Contact	Contact
Ambient Temperature	25.0 °C	
Humidity	44.7 %	

System Controls

Control

Lift Pins

Action

Set

Height

10

mm

Set lift pins to 10 mm

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.

²⁰ 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.

System Controls	
Control	<div>Lift Pins</div>
Action	<div>Go Home</div>

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

Click APPLY

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

System Controls	
Control	<div>Lift Pins</div>
Action	<div>Step</div>
Step Size	<div>19</div> mm
Direction	<div>Up</div>

Select an **Action** of *Step*.

Enter the desired **Step Size** (between 0-19mm).

Select the preferred **Direction**.

Click APPLY

System Controls	
Control	<div>Lift Pins</div>
Action	<div>Raise Pins</div>

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.

System Controls

Control

Lift Pins

Action

Lower Pins

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.

System Controls

Control

Lift Pins

Action

Ramp

Target

15

 mm

Rate

25

 mm/min

Select an Action of *Ramp*

Enter the Target (between 0-19mm)

Select the preferred ramp Rate (between 0-200mm/min)

Click APPLY

Bake Method

System Values

Parameter	Actual	Set Point
Plate Temperature	45.3 °C	45.0 °C
Lift Pin Height	10.0 mm	10.0 mm
Bake Method	Contact	Contact
Ambient Temperature	25.1 °C	
Humidity	44.7 %	

System Controls

Control

Bake Method

Action

Select Method

Method

Contact

Bake using Contact 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.

9.3 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**.

Apogee Bake Process **Recipes** About Tools - admin

Recipe Controls

Viewing Recipe- Test_Red_Recipe

Name Test_Red_Recipe Notes

Plate Temperature 180 °C

Step Time (seconds) Process Method Pin Height (mm)

1 60 Contact

Load Prepare Run New

****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.

User (admin) attempting to set temperature for recipe:

Test_Red_Recipe


Press OK to continue or ABORT to cancel.

OK

00:00:01

Recipe Preparation Abort


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



Waiting on preconditions to be in range for recipe ...

(PREHEAT) - Test_Red_Recipe

⊗ Plate Temperature(130.0 °C) - Within -5% and +5% of 180 °C



100%


Elapsed

00:00:18

ABORT

Remaining

00:00:00



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.

Test_Red_Recipe

Ready to run!

OK

00:00:02

Recipe Preparation

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

9.4 Running Recipes

1. Select Recipe Page

2. Load Recipe

Apogee™ Bake Process **Recipes** About Tools ▾

Recipe Controls

Load

New

3. Search For, Identify, & Select Recipe

Apogee™ Bake Process **Recipes** About Tools ▾

Recipe Controls

Cancel

Upload

Download All Recipes

Recipe Selection

Search for a recipe...

Test_Recipe ← click to select the desired recipe

4. Run Recipe

Apogee™ Bake Process **Recipes** About Tools ▾

Recipe Controls

Load

Run

Viewing Recipe- Test_Recipe

Name

Test_Recipe

Notes

5. Start Recipe

Apogee™ Bake **Process** Recipes About Tools ▾ admin

Test_Recipe : Recipe Progress

1 Load Wafer

2 Enable temperature controller

3 Set temperature to 35 °C

4 Start iteration

5 Set lift pins to 4 mm

Step 1 of 10

Iteration 1 of 4

100% Elapsed 00:00:00

START

Remaining 00:00:00

6. Recipe Progression

Step 7 of 10

Iteration 1 of 4

0% Elapsed 00:00:05

ABORT

Remaining 00:05:00

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

9.5 Editing Recipes

Apogee™ Bake Process **Recipes** About Tools - admin

Editor Controls

Save

Cancel

Insert

^

v

Delete

Advanced

Editing Recipe- Test_Recipe

Name

Test_Recipe

Notes

Plate Temperature

120

°C

Step	Time (seconds)	Process Method	Pin Height (mm)
1	<div>60</div>	<div>Contact</div>	
2	<div>30</div>	<div>Contact</div>	
3	<div>30</div>	<div>Contact</div>	
4	<div>60</div>	<div>Proximity</div>	

9.6 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

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 Force²¹----- 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

Humidity²²----- 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.

²¹ Does not take substrate size into account.

²² 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.

System Values

Parameter	Actual	Set Point
Lower Platen Temp	3277.1 °C	--
Upper Platen Temp	3277.1 °C	--
Chamber Pressure	120.0 kPA	-1.0 kPA
Bond Force	0 N	0 N
Position	Unload	Unload
Ambient Temperature	-1.1 °C	
Humidity	-1.1 %	

System Controls

Control

What do you want to control?
What do you want to control?
Lower Platen Temp
Upper Platen Temp
Chamber Pressure
Vacuum Transfer
Bond Force
Position

Please check
change.

APPLY

Platen Temperature

System Values

Parameter	Actual	Set Point
Lower Platen Temp	3277.1 °C	180.0 °C
Upper Platen Temp	3277.1 °C	--
Chamber Pressure	120.0 kPA	-1.0 kPA
Bond Force	0 N	0 N
Position	Unload	Unload
Ambient Temperature	-1.1 °C	
Humidity	-1.1 %	

System Controls

Control

Lower Platen Temp

Action

Enable

Value

Enable

Enable lower temperature controller

APPLY

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

System Values

Parameter	Actual	Set Point
Lower Platen Temp	20.0 °C	30.0 °C
Upper Platen Temp	20.0 °C	--
Chamber Pressure	120.0 kPA	-1.0 kPA
Bond Force	0 N	0 N
Position	Unload	Unload
Ambient Temperature	-1.1 °C	
Humidity	-1.1 %	

System Controls

Control

Lower Platen Temp

Action

Set

Value

30

 °C

Set lower temperature to 30 °C

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

System Values		
Parameter	Actual	Set Point
Lower Platen Temp	20.0 °C	30.0 °C
Upper Platen Temp	20.0 °C	--
Chamber Pressure	120.0 kPA	60.0 kPA
Bond Force	0 N	0 N
Position	Unload	Unload
Ambient Temperature	-1.1 °C	
Humidity	-1.1 %	

System Controls	
Control	Chamber Pressure
Action	Evacuate to
Value	60 kPA
Wait for Chamber Pressure to reach 60 kPA	
APPLY	

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

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

System Values		
Parameter	Actual	Set Point
Lower Platen Temp	20.0 °C	30.0 °C
Upper Platen Temp	20.0 °C	--
Chamber Pressure	120.0 kPA	60.0 kPA
Bond Force	0 N	0 N
Position	Unload	Unload
Ambient Temperature	-1.1 °C	
Humidity	-1.1 %	

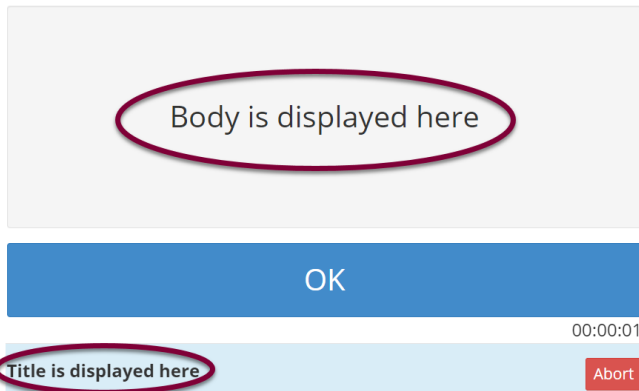
System Controls	
Control	Vacuum Transfer
Action	Detect transfer
Title	Title is displayed here
Body	Body is displayed here
Use vacuum wand to transfer substrate	
APPLY	

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

Parameter	Actual	Set Point
Lower Platen Temp	20.0 °C	30.0 °C
Upper Platen Temp	20.0 °C	--
Chamber Pressure	120.0 kPa	60.0 kPa
Bond Force	2720 N	4000 N
Position	Unload	Unload
Ambient Temperature	-1.1 °C	
Humidity	-1.1 %	

System Controls	
Control	Bond Force
Action	Set
Value	4000 N
Set the Bond Force to 4000 N	
APPLY	

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.

Parameter	Actual	Set Point
Lower Platen Temp	20.0 °C	30.0 °C
Upper Platen Temp	20.0 °C	--
Chamber Pressure	120.0 kPa	60.0 kPa
Bond Force	2720 N	4000 N
Position	Unload	Unload
Ambient Temperature	-1.1 °C	
Humidity	-1.1 %	

System Controls	
Control	Bond Force
Action	Ramp
Target	4000 N
Rate	500 N / Second
Ramp Bond Force to 4000 @ 500 N / Second	
APPLY	

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

Click APPLY

Position

System Values		
Parameter	Actual	Set Point
Lower Platen Temp	20.0 °C	30.0 °C
Upper Platen Temp	20.0 °C	--
Chamber Pressure	120.0 kPa	60.0 kPa
Bond Force	2720 N	4000 N
Position	Load Top	Load Top
Ambient Temperature	-1.1 °C	
Humidity	-1.1 %	

System Controls	
Control	Position
Action	Move To
Value	Load Top
Move to Load Top position	
APPLY	

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

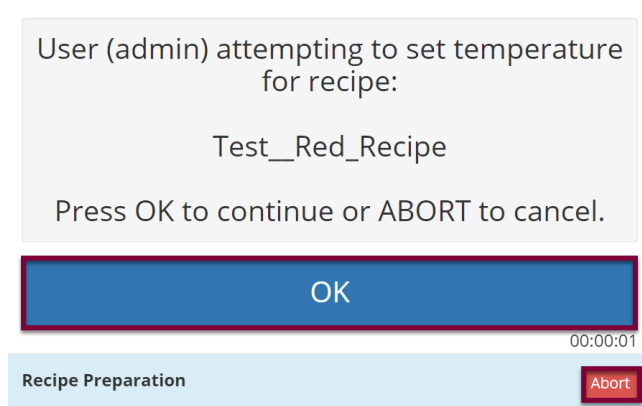
Users with sufficient privileges can remotely prepare equipment to run a recipe. This feature is useful for preconditions and parameters that take a significant amount of time such as bake plate and platen temperatures. To initiate this feature, navigate to the **Recipes** tab, click **Load** to access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

Apogee Bond					Process		Recipes		About		Tools -		admin		
Recipe Controls															
<div>Load</div> <div>Prepare</div> <div>Run</div> <div>New</div>															
Viewing Recipe- Test_Red_Recipe															
Name										Test_Red_Recipe				Notes	
Plate Temperature										180				°C	
Step		Time (seconds)		Process Method				Pin Height (mm)							
1		60		Contact											

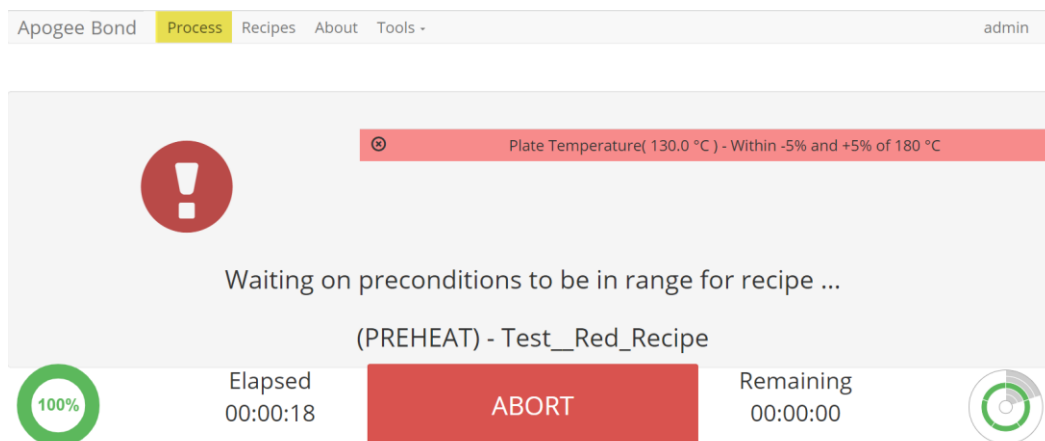
***Preparation processes cannot be initiated when the equipment is already in use.**

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**.

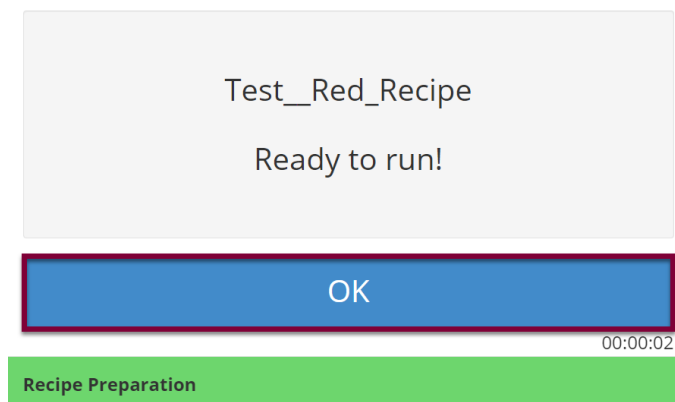
In the absence of a response, the request is auto accepted after two minutes.



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.



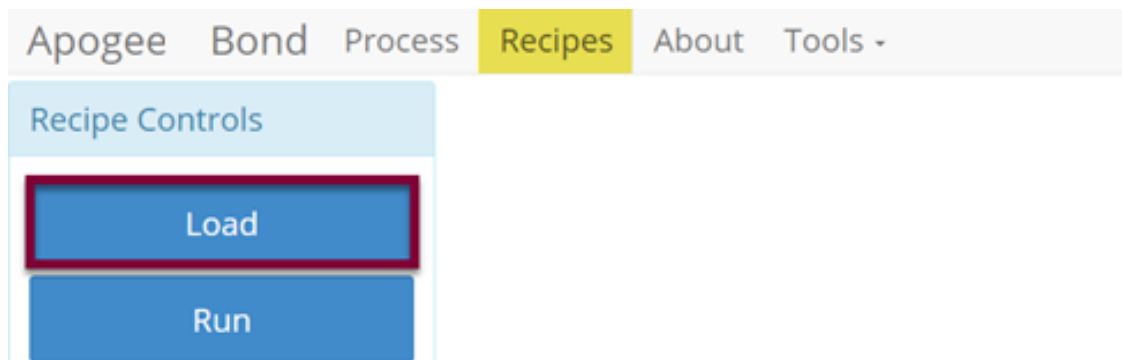
**During recipe preparation the Prepare and Run commands are disabled to ensure no interruption to precondition processes.*

10.4 Running Recipes

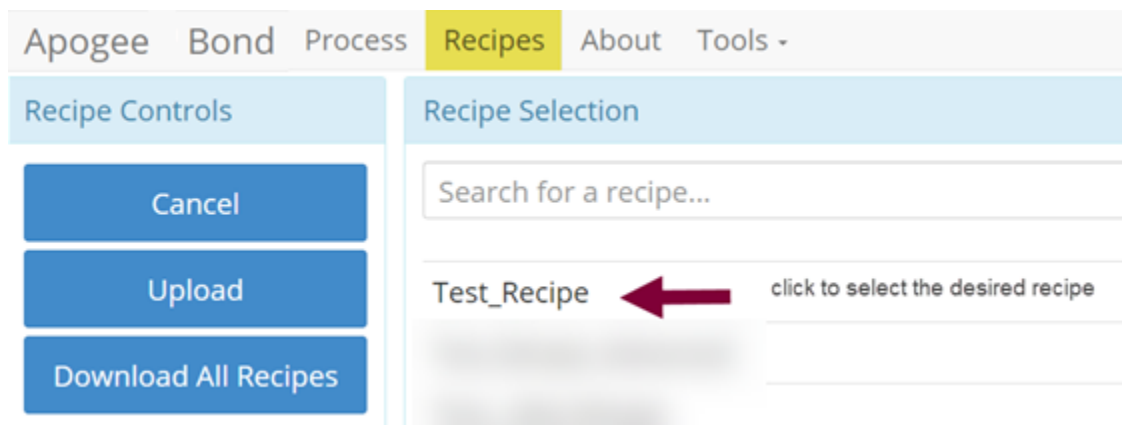
1. Select Recipes Page.



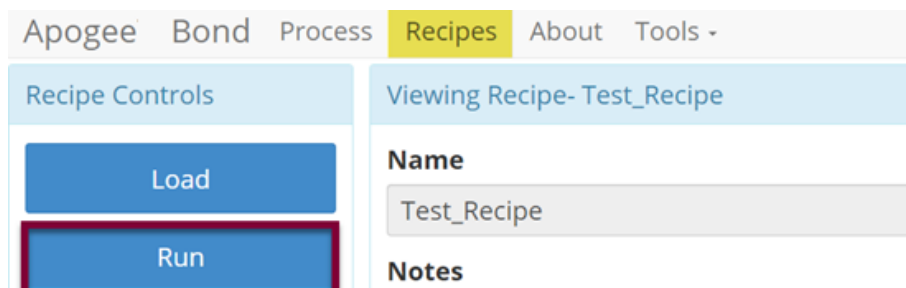
2. Load Recipe.



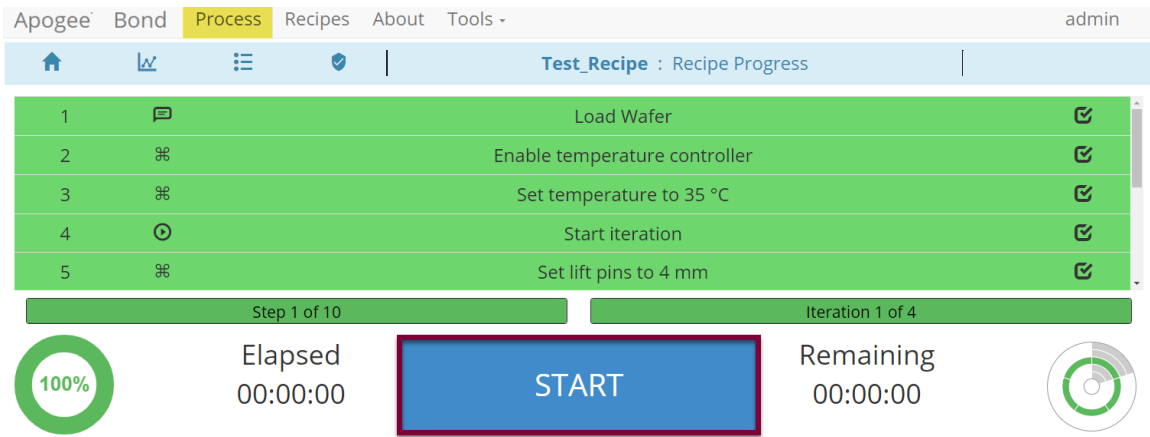
3. Search For, Identify, & Select Recipe.



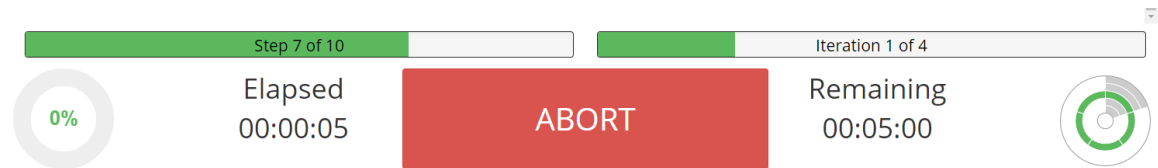
4. Run Recipe.



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 Temperature 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**²³----- 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.

²³ 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

System Values		
Parameter	Actual	Set Point
Position		
Peel Force	-1.1 N	100.0 N
Carrier Size	Unknown	
Film Frame Size	200 mm	
Ambient Temperature	29.4 °C	
Humidity	-1.1 %	
Chuck Vac	95.4 kPa	

System Controls	
Control	Peel Mechanism
Action	Peel
Force	100 N
Separate wafers at 100 N	
APPLY	

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

System Values		
Parameter	Actual	Set Point
Position	Moving	Load Stack
Peel Force	12.0 N	12.0 N
Carrier Size	Unknown	
Film Frame Size	200 mm	
Ambient Temperature	29.4 °C	
Humidity	-1.1 %	
Chuck Vac	95.3 kPa	

System Controls	
Control	Position
Action	Move To
Value	Load Stack
Move to position Load Stack	
APPLY	

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

System Values		
Parameter	Actual	Set Point
Position	Moving	Load Stack
Peel Force	12.0 N	12.0 N
Carrier Size	Unknown	
Film Frame Size	200 mm	
Ambient Temperature	29.4 °C	
Humidity	-1.1 %	
Chuck Vac	95.3 kPa	

System Controls	
Control	Chuck Vac
Action	Set
Vacuum	On
Chuck Vac	
APPLY	

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

System Values		
Parameter	Actual	Set Point
Position	Moving	Load Stack
Peel Force	12.0 N	12.0 N
Carrier Size	Unknown	
Film Frame Size	200 mm	
Ambient Temperature	29.7 °C	
Humidity	-1.1 %	
Chuck Vac	95.3 kPa	

System Controls	
Control	Gripper
Action	Set
Grip	Open
Gripper	
APPLY	

Select a **Control** of *Gripper*

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

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

Click APPLY

11.2 Running Recipes

1. Select Recipes Page.

2. Load Recipe.

Debonder Process **Recipes** About Tools ▾

Recipe Controls

Load

New

3. Search For, Identify, & Select Recipe.

Debonder Process **Recipes** About Tools ▾

Recipe Controls

Cancel

Upload

Recipe Selection

test

test ← click to select the desired recipe

4. Run Recipe.

Debonder Process **Recipes** About Tools ▾

Recipe Controls

Load

Run

New

Edit

Viewing Recipe- test

Name	test
Force	15
Film Frame Size	150 mm
Carrier Size	100 mm


5. Start Recipe.

Debondor **Process** Recipes About Tools - ✔ Recipe loaded!


test : Recipe Progress

1	🕒	Start iteration	✔
2	⌘	Move to position Load Stack	✔
3	💬	Please load the bonded pair.	✔
4	⌘	Move to position Centering	✔
5	⌘	Move to position Process	✔
6	⌘	Separate wafers at 15 N	✔
7	⌘	Move to position Unload Carrier	✔
8	💬	Please unload the carrier wafer.	✔

Step 2 of 11


Elapsed 00:00:23

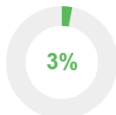
START

Remaining 00:00:00



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

6. Recipe Progression.

Step 2 of 10


Elapsed 00:00:02

ABORT

Remaining 00:01:23


11.3 Editing Recipes

Debondor Process **Recipes** About Tools - admin

Editor Controls

Save

Cancel

Advanced

Editing Recipe- test

Name	test	Notes
Force	15 N	
Film Frame Size	150 mm	
Carrier Size	100 mm	

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
3.0	J. Adams	<ul style="list-style-type: none">- 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