Administrator Manual

Surface Analyst™ XA-Kit

Archer 8.15

IMPORTANT SAFETY NOTE!

In addition to reading this manual, read and understand the User Manual for important safety information before using the Surface Analyst.

Failure to do so can result in personal injury, property damage or both.

This English language document is the original Administrator Manual.

Document Version #1

Contents

1 Introduction

1.1 Purpose and Scope of this Manual

The purpose of this Administrator Manual is to give advanced instructions for the person who is an administrator for the Surface Analyst XA-Kit.

The images presented in this manual may differ from the actual appearance of your Surface Analyst.

1.2 Important Notes

Important information that is not safety-related is shown in a note message like one of the following:

This note gives information on how to avoid equipment malfunctions or property damage. If you do not follow this note, your warranty may be voided or you may receive incorrect measurements or both.

This note gives other useful, important information.

1.3 Contact Us

Contact us for general inquiries, technical support, and sales:

Brighton Science
4914 Gray Road
Cincinnati, OH 45232
513.469.1800
service@brighton-science.com

Visit us at brighton-science.com

2 Overview of Functions and Settings

To access the advanced functions and settings and perform most tasks in this manual, you must first log in as an administrator (Menu screen 1). The password is provided in the Welcome Letter which is shipped with the Surface Analyst.

For systems configured with Remote API Control: While most functions will work with robot mode on, turn robot mode off for full functionality of the touchscreen and pop up messages. To turn robot mode off, use the RD command **RobotModeOff>** followed by a system reboot. Turn robot mode back on with the command **RobotModeOn>** followed by a system reboot.

Pages 1-3 of the Menu screen are available to all users, although only an administrator can manage surface profiles on page 1 (Fig. 1.) There are five additional screens available to administrators only (Fig. 2-Fig. 6). See the chapter references listed in the table "Administrator Functions and Settings" on the next page for more detailed explanations.

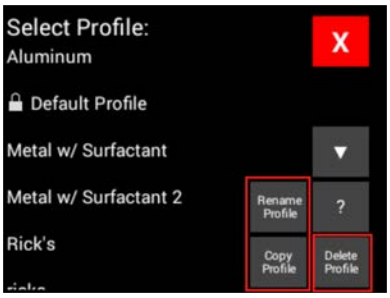


Fig. 1 - Menu screen page 1
Surface profile rename, copy and delete

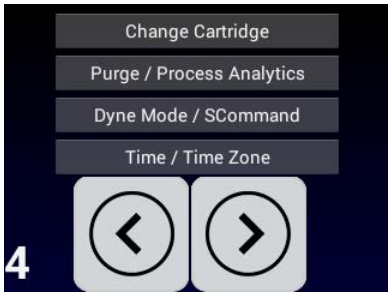


Fig. 2 - Menu screen page 4

Fig. 3 - Menu screen page 5

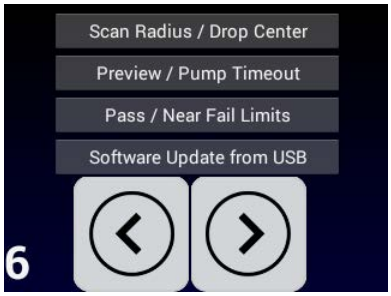


Fig. 4 - Menu screen page 6

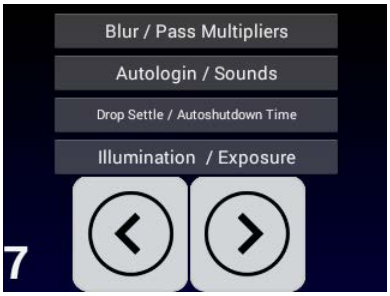


Fig. 5 - Menu screen page 7

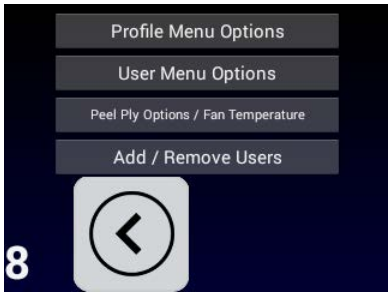


Fig. 6 - Menu screen page 8

Administrator Functions and Settings

Menu Screen Page #	Function / Setting	Chapter Reference
1	Copy, rename or delete a surface profile	"Surface Profile Management" on page 9
4	Change a cartridge	Refer to the Integrator Manual N/A
	Purge the system	Refer to the Integrator Manual N/A
	Set up Process Analytics Not available with XA-Kit models	N/A
	Enable/disable Dyne Mode and set parameters Only available with the Dyne Mode option	"Dyne Mode" on page 46
	Activate new purchasable options (SCommand)	"Activating New Purchasable Options" on page 21
	Change time and time zone	"Changing the Time or Time Zone" on page 12
5	Re-analyze the last measurement	"Re-analyzing the Last Measurement" on page 41
	Set image saving options	"Image Saving" on page 26
	Delete data	"Deleting Data" on page 27
	Set image processing parameters	"Image Processing Parameters" on page 31
	Merge database files provided by Brighton Science	"Database Merging" on page 20
	Enable or disable automatic drop detection (SmartDrop)	"Setting Drop Detection Accept / Reject Options" on page 40
	Enable or disable Wetting Analytics Only available with the Wetting Analytics option	"Wetting Analytics" on page 43
6	Drop center settings	"Auto Center " on page 32 "Crosshairs Position" on page 33
	Set preview and pump timeouts	"Setting Preview and Pump Timeouts" on page 40
	Set pass and near fail limits	"Setting Pass and Near Fail Limits" on page 40
	Update Archer software	"Updating the Software" on page 13

Menu Screen Page #	Function / Setting	Chapter Reference
7	Enable or disable autologin	"Enabling and Disabling Auto Login" on page 12
	Set the drop settle time	"Drop Settle Time" on page 31
	Set the automatic shutdown time	"Setting Auto Shutdown Time" on page 12
	Enable or disable sounds Not available with XA-Kit models	N/A
	Set the illumination level of the LED lights and the camera exposure	"LED Illumination Level" on page 30 "Camera Exposure" on page 31
8	Profile menu options--Select surface profile upon startup	"Auto Surface Profile Prompting" on page 10
	Profile menu options--PP designated items	Brighton Science special use
	User menu options--Add/remove user	"Adding and Removing a User" on page 11
	User menu options--Enable/disable passwords	"Enabling and Disabling Passwords" on page 12
	User menu options--Display/hide user list	"Displaying and Hiding User Accounts" on page 11
	Peel Ply Options	Brighton Science special use
	Fan temperature settings Not available with XA-Kit models	N/A
	Add/remove users	"Adding and Removing a User" on page 11

3 Surface Profile Management

Surface profiles are customized collections of settings that are applicable to a particular surface type or application.

You can create new profiles (by copying an existing profile) to save settings that work best for your situation. You can edit and delete any existing profile, except for the Default Profile and locked profiles.

Contact Brighton Science if you need assistance in creating a new profile for a particular surface application. See "Database Merging" on page 20 for more information.

3.1 Creating a New Surface Profile

Menu screen page 1 ⇨ **Surface Profile**

Create a new surface profile (by copying an existing profile) if you want to save a set of parameter settings.

Touch **Copy Profile**, and follow the directions on the screen.

You are asked if you want to keep the same drop size as the current loaded profile. In most cases, it is recommended to use the same size. If you are measuring a very small surface where the normal drop size is too large, you may choose a smaller number of droplets.

Using very small drop sizes can lead to reduced measurement accuracy. Contact Brighton Science for assistance.

When prompted, you can add a note that is attached to your profile. This note is available to users when they touch the question mark button in the Surface Profiles menu. Touch Edit to add the note.

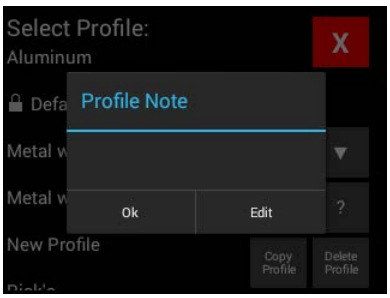


Fig. 7 - Prompt for adding a surface profile note

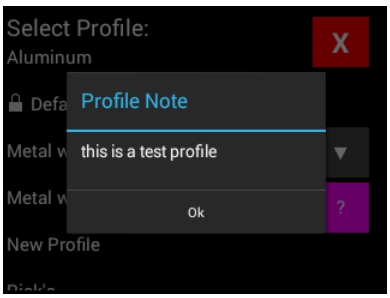


Fig. 8 - Profile note viewed from Surface Profile menu

The newly created profile is automatically loaded after you create it. It inherits the previously loaded profile's parameter settings. You can individually edit the profile-specific parameter settings, and they will be saved to your new profile. See "Changing the Process Parameters" on page 29.

3.2 Renaming a Surface Profile

Menu screen page 1 ⇨ **Surface Profile**

Touch **Rename Profile**, and then select a profile to rename. Enter the new name at the prompt.

You cannot rename the Default profile. You also cannot rename locked profiles that display a lock icon. These are special surface profiles created by Brighton Science.

3.3 Deleting a Surface Profile

Menu screen page 1 ⇨ **Surface Profile**

Touch **Delete Profile**, and follow the directions on the screen.

If you delete the currently loaded profile, the Default profile is loaded automatically.

You cannot delete the Default profile.You also cannot delete locked profiles that display a lock icon  . These are special surface profiles created by Brighton Science.

3.4 Adding or Changing a Profile Note

A profile note is a note attached to a surface profile. The profile note is viewable in the Surface Profile menu .

Menu screen page 1 ⇨ **Surface Profile**

Touch the question mark box and select a profile to which you want to either add a profile note or change an existing note. Enter the new profile note in the dialog box.

.You cannot add or edit profile notes for locked profiles that display a lock icon  . These are special surface profiles created by Brighton Science.

3.5 Auto Surface Profile Prompting

You can set Archer to prompt the user to select a surface profile after login and prior to taking a measurement.

Go to Menu screen page 8 ⇨ **Profile Menu Options**. Set **Select profile on startup** to true. To disable this feature (and allow access to the Measurement screen prior to selecting a surface profile), set to false.

This function only affects user accounts. Admin accounts are not prompted to select a surface profile when this function is enabled.

4 General Administrative Functions

4.1 Adding and Removing a User

You can add multiple user accounts with passwords to control access to the Surface Analyst. User login activity is stored in the system log.

Menu screen page 8 ⇨ **Add / Remove Users**

Touch **Add User** to add a new user. Type in a name for the user and assign a password. You must assign a password to the user, but you can set whether or not the password is required for logging in to a user-level account (see "Enabling and Disabling Passwords" on the next page). Select either "user" or "admin" rights to the new user.

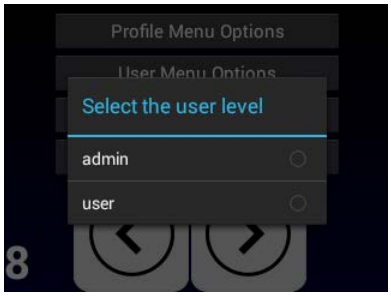


Fig. 9 - Assigning admin or user permissions

"User" permissions are limited to accessing only Menu screen pages 1-3. "Admin" permissions allow access to Menu screen pages 1-8.

Touch **Remove User** to remove any user.

Users cannot remove their own accounts.

4.2 Displaying and Hiding User Accounts

This feature allows you to display or hide a list of all available user accounts in the Users screen.

Menu screen page 8 ⇨ **User Menu Options**. Touch **User List Selection**. Enabling this feature allows selection of a user account from a list at login:

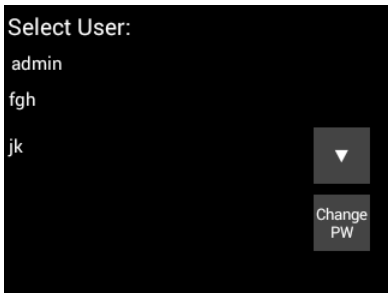


Fig. 10 - Users screen: User List Selection enabled

Disabling this feature hides the list of user accounts when a user logs in:

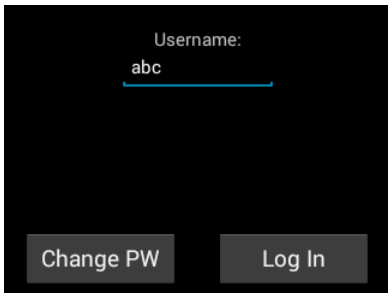


Fig. 11 - Users screen: User List Selection disabled

4.3 Enabling and Disabling Passwords

Menu screen page 8 ⇨ **User Menu Options**

You can set whether or not a password is required for a user to log in. Touch **Passwords for users**. Enable or disable the prompt for a password upon login.

Administrator accounts always require a password to log in.

4.4 Enabling and Disabling Auto Login

Menu screen page 7 ⇨ **Autologin**

The auto login feature enables a user to begin taking measurements without having to log in upon startup of the Surface Analyst. This setting applies to one active user at a time.

Touch **Enable** and select a user from the list.

Other users may log in, but after the Surface Analyst is re-started, the user originally set will be automatically logged in until auto login is changed to a different user or is disabled.

Touch **Disable** to disable the auto login feature.

4.5 Setting Auto Shutdown Time

Menu screen page 7 ⇨ **Drop Settle / Autoshutdown Time** ⇨ **Autoshutdown Time**

Touch **Autoshutdown Time** to set the time (in minutes) that the Surface Analyst automatically shuts itself off after the set minutes of inactivity.

If you do not want the Surface Analyst to shut down automatically at all, you can disable the feature by entering **0**.

4.6 Changing the Time or Time Zone

Menu screen page 4 ⇨ **Time / Time Zone**

Follow the directions on the screen to change the time or time zone.

4.7 Updating the Software

When a new release of the Archer software is available, you will automatically be contacted by Brighton Science via email. If you are eligible to receive software updates, the email will contain instructions for you to follow. You can either use a USB flash drive (preferred method) or the Surface Analyst Manager (SAM) software to download the update.

If you purchased new features for your Surface Analyst, you may activate them by following the instructions in "Activating New Purchasable Options" on page 21.

4.7.1 Updating with a USB Flash Drive

Downloading the latest version of Archer with a USB flash drive is the preferred method for updating.

1. Follow the link provided in the email sent by Brighton Science to download the update .zip file onto a computer.This zip file contains the update as well as the EULA and licensing information.
2. Uncompress the zip file, and copy the .sa_update file into the root of the USB flash drive.
3. Turn on the Surface Analyst.
4. Plug the USB flash drive into the USB-A port of the Surface Analyst. (See "Accessing the USB Port" on page 1 .)
5. On page 6 of the Menu screen of the Surface Analyst, touch **Software Update from USB**.
6. Touch **Continue** when asked if you want to update software from the USB flash drive.
7. You may see a message asking if you would like to update the Archer software or the head firmware. Choose **Archer** or **Head Firmware**. Only the software or the firmware may be installed at one time. After installation of the first, you will need to select **Software Update from USB** to install the other.

Fig. 12 - Choose Update prompt

8. Select the update file from the list. Usually, only one is visible.
9. A dialog box asks if you want to back up system data before updating. Backing up the system data takes a long time and is not a required step, as the software update will leave the database and results intact. If you want a backup, it is recommended to back up your data before updating.

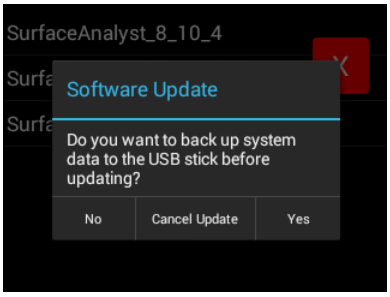


Fig. 13 - Data backup prompt

10. If you have purchased additional options and/or additional surface profiles, then a message appears asking if you want to apply them. If you would like to apply them, touch **Yes** and follow the prompts. Otherwise, touch **No** to perform just the software update.

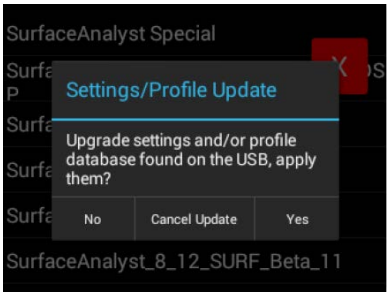


Fig. 14 - Software updating options

11. The system updates and reboots.
12. For best results, shut down and restart the Surface Analyst.
13. Go to the About page (Menu screen page 2 ⇨ **About**) and check to make sure that the correct software version is displayed.

4.7.2 Updating with Surface Analyst Manager (SAM)

If you prefer not to use a USB flash drive for updating, you must install Surface Analyst Manager (SAM) onto a computer if you have not already done so. The update can then be downloaded onto the computer and then transferred to the Surface Analyst.

The system requirements are as follows:

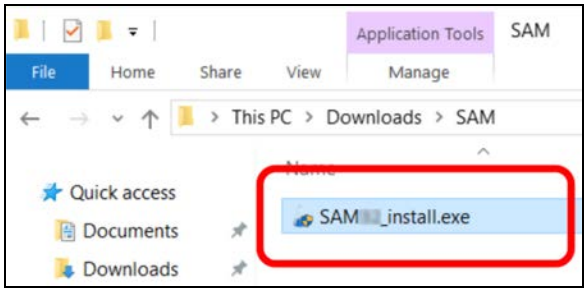
- Operating system: Windows 7 or later
- Memory: 250 MB RAM, 250 MB hard drive space

4.7.2.1 Install SAM

If you will not be using a USB flash drive to download the update, then SAM must be downloaded and installed on a computer. If you have previously installed SAM, then this step can be safely skipped.

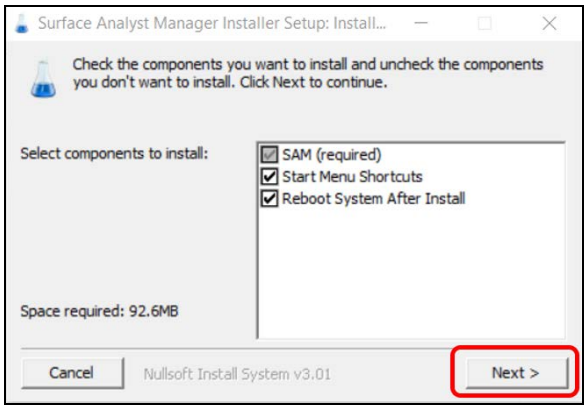
1. Follow the link provided in the email sent by Brighton Science to download SAM onto a computer.

2. Click on the **.exe** file to begin installation

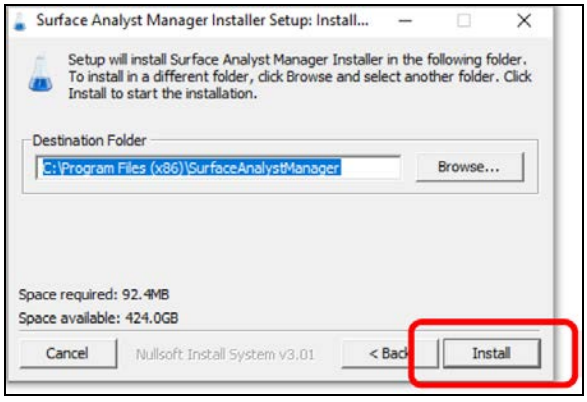


3. Make sure all three checkboxes are checked.

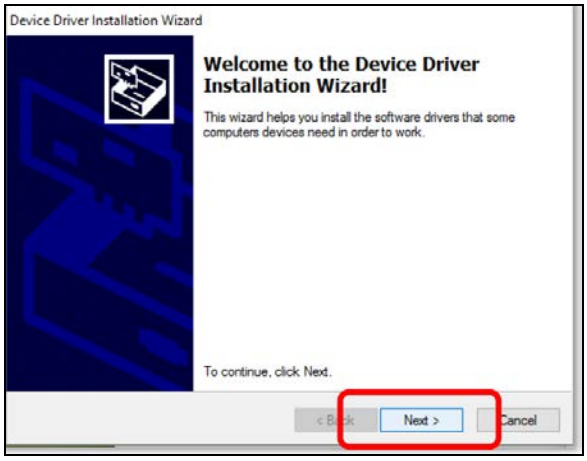
   Click **Next**.



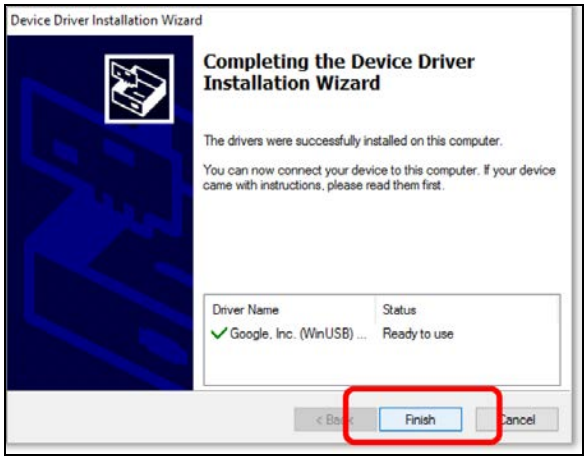
4. Click **Install**.



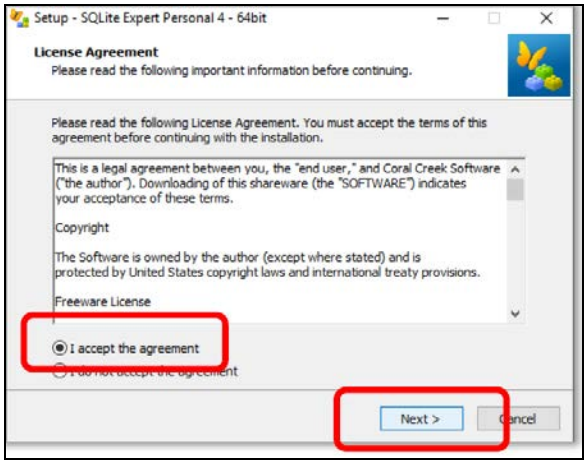
5. Click **Next**.



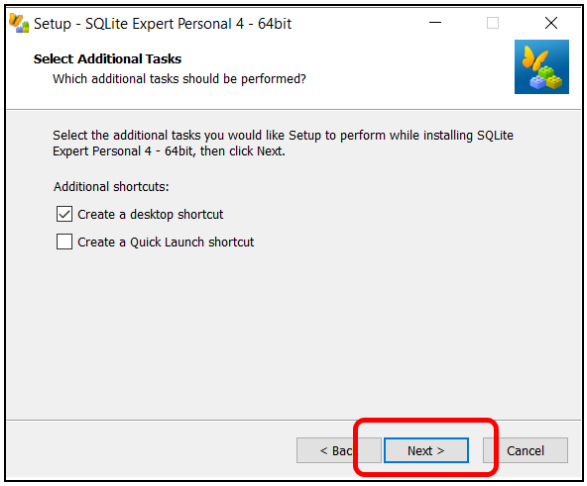
6. Click **Finish**.



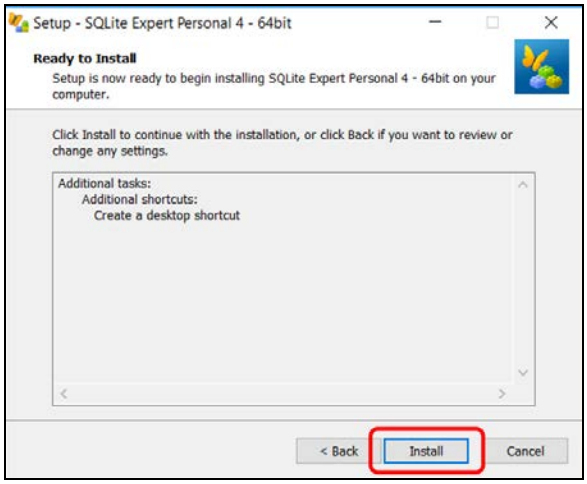
7. Mark the box **I accept the agreement**, and click **Next**.



8. Check a box to create a shortcut, if desired.Click **Next**.

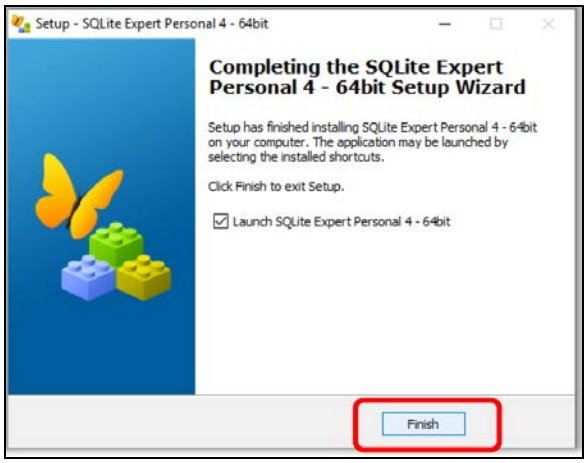


9. Click **Install**.

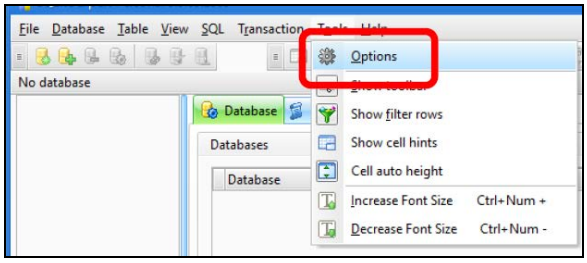


10. Click **Finish**.

SQLite opens.



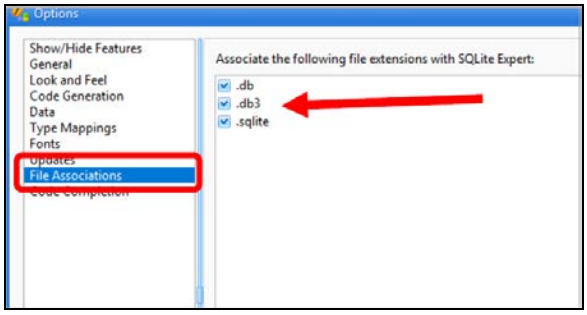
11. In the Tools dropdown, select **Options**.



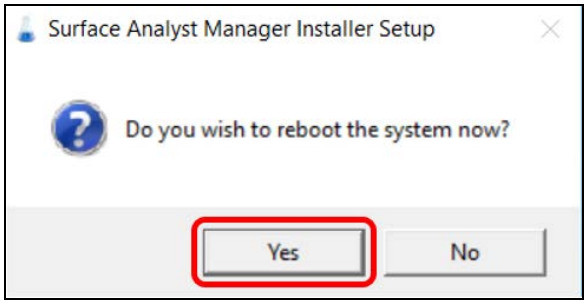
12. Click **File Associations**, and check all three boxes: .db, .db3, .sqlite.

Click **OK**.

Close SQLite.



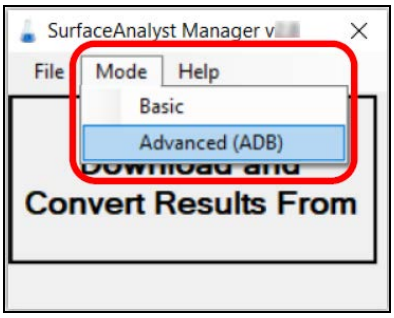
13. Click **Yes** to reboot.



4.7.2.2 Download and Install the Update

1. Follow the link provided in the email sent by Brighton Science to download the update onto the computer that has SAM installed.
2. From your Downloads folder, drag the downloaded file to the desktop.
3. Turn on the Surface Analyst.
4. Use the micro USB cable to connect the Surface Analyst with the computer.
5. On your computer, open Surface Analyst Manager (SAM).

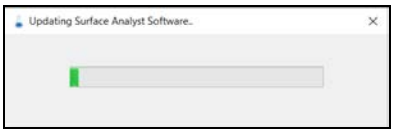
   Click **Mode**, and then click on **Advanced (ADB)**.



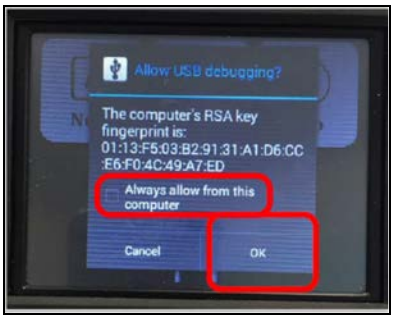
6. Choose **Update Tool Software from Local File**.

7. When the open file folder appears, locate the downloaded update file in the Desktop folder. Click on it, and click **Open**.

8. A progress bar displays during the updating process.

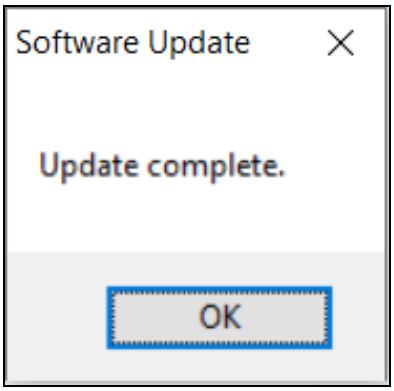


9. If there is a message on the Surface Analyst screen that asks "Allow USB debugging?", check the box to **Always allow from this computer**, and touch **OK** to continue.



10. The Surface Analyst reboots and a message appears that the update is complete

    For best results, shut down and restart the Surface Analyst.



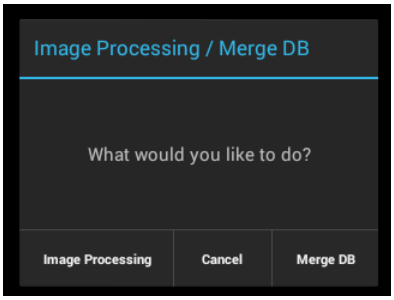
11. Go to the About page (Menu screen page 2 ⇨ **About**) and check to make sure that the correct software version is displayed.

4.8 Database Merging

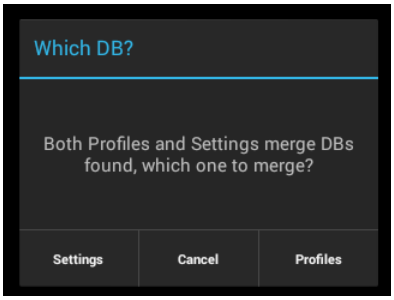
Database merging is only used in situations where you are receiving technical support from Brighton Science. For example, if Brighton Science creates a new surface profile for you, that profile needs to be merged into the database on your Surface Analyst. Additionally, there may be a situation where you may need to merge a settings database onto your Surface Analyst. In either case, Brighton Science will send you a database file for you to install.

1. Copy the database file(s) (.db) onto a USB flash drive.
2. Insert the flash drive into the Surface Analyst. (See "Accessing the USB Port" on page 1 .)
3. Go to Menu screen page 5 ⇨ **Image Processing / Merge DB**.

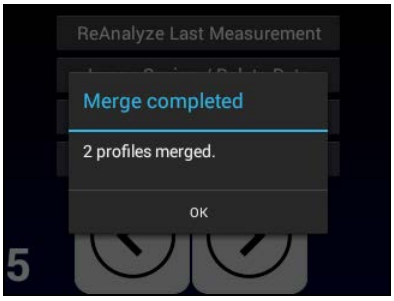
4. Select **Merge DB**.



5. If there is more than one type of database on the USB drive, you are asked which one to merge.



6. When finished, a message displays how many items were merged.

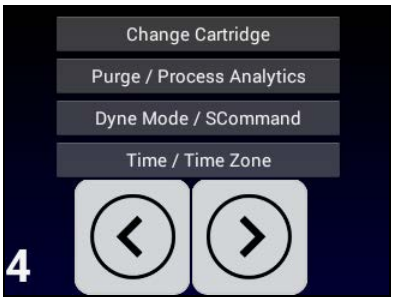


4.9 Activating New Purchasable Options

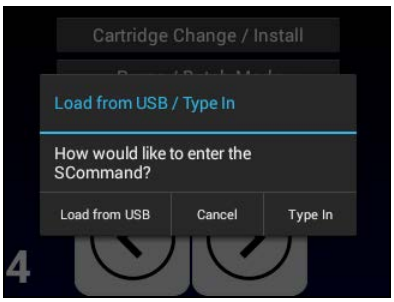
If you purchased additional options, then you will receive a secure command text file (or a series of commands to enter) from Brighton Science. Follow these directions to activate the new features.

1. Copy the command text file you received from Brighton Science onto a USB flash drive (preferred method). If desired, you may instead enter the command text into the Surface Analyst manually.

2. Menu screen page 4 ⇨ **Dyne Mode / SCommand** ⇨ **SCommand**

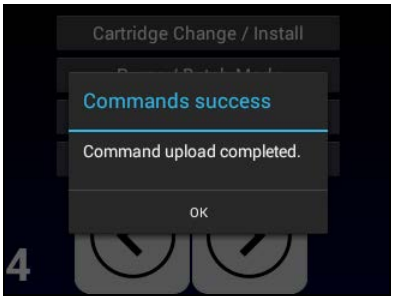


3. To enter the text file with a USB flash drive, insert the USB drive into the Surface Analyst.(See "Accessing the USB Port" on page 1.) Select **Load from USB**.



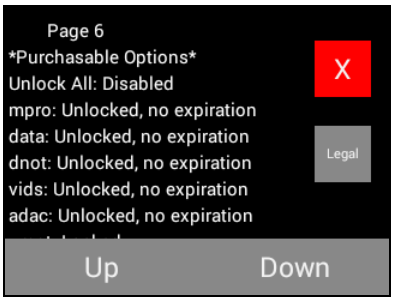
To enter the command text manually, select **Type In**. A keyboard appears for you to type in the text.

4. A **Command successful** message appears when the feature is activated.



5. To view the purchasable options that are installed on your Surface Analyst, go to Menu screen page 2 ⇨ **About**. Scroll to page 6.

   Options installed on your Surface Analyst are indicated by the word **Unlocked**. Option codes followed by the word **Locked** are not installed. Unlocked options may have an expiration date. Archer alerts you to expiring options ahead of time with a pop-up message.



The following table describes the purchasable option codes.

Purchasable Options Codes

Code	Feature
adac	SmartDrop
aipr	Enhanced Image Processing
batc	Process Analytics
data	Data Collection
dnot	Drop Note
dynd	Dynamic Detection
dyne	Dyne Mode
fawl	Pass/Fail Mode
mpro	Surface Profiles
pbcr	Auto Profile Selection via QR Code
pchk	Brighton Science internal use
ppdt	Brighton Science internal use
serl	RS232 Output
shnd	Single-Hand Operation Only available with the Surface Analyst 5001
srft	Wetting Analytics
uloc	Brighton Science internal use

Code	Feature
umnt	User Management
vids	Live Videoscope
port	Detatchable Portable Option

5 Results and Image Management

5.1 Understanding the Images

While in the Measurement screen after taking a measurement, you can view different images of the drop by touching the image on the screen. Each time you touch the image, you see a different image type.

If you choose to save all analyzed images (see "Image Saving" on page 26), then you can also view these images in the Drop History screen.

Result image

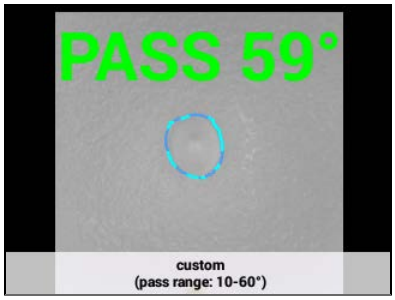


Fig. 15 - Result image

The result image shows the image of the substrate and the drop along with the drop detection and result. If Outlier Rejection is enabled, interpolated dots appear dark blue.

Result analysis image

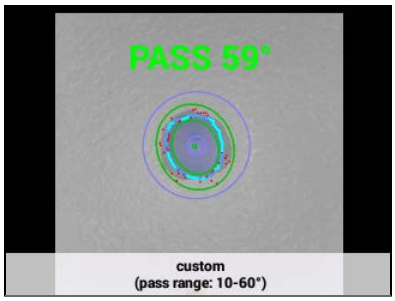


Fig. 16 - Result analysis image

The result analysis image shows the result image with overlay graphics. The meanings of the graphics are described in Fig. 19.

Subtracted image

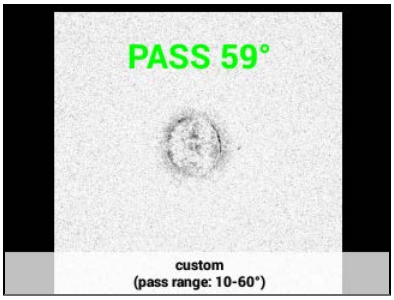


Fig. 17 - Subtracted image

The subtracted image shows a subtracted image of only the drop. The picture taken with just the substrate has been subtracted from the picture of the substrate and the drop.

Subtracted analysis image

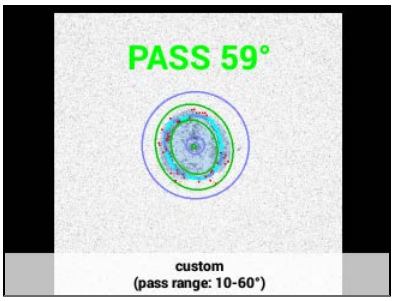
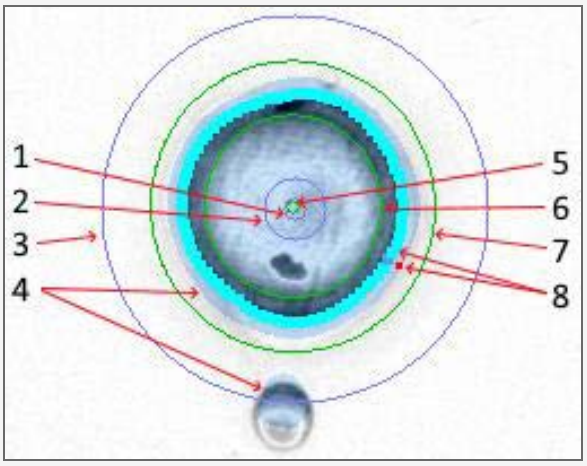


Fig. 18 - Subtracted analysis image

The subtracted analysis image shows the subtracted image with overlay graphics visible.

The following table gives the meanings of the overlay graphics:



1	Center found by object finding tools	2	Inner end of where dots can be found for first pass of edge tools See "Pass Multipliers" on page 36
3	Outer end of where dots can be found for first pass of edge tools "Pass Multipliers" on page 36	4	Location and outline of objects found This transluscent violet overlay is useful for degugging center-finding issues
5	Center found by last pass of edge tools	6	Inner end of where dots can be found for the last pass of edge tools See "Pass Multipliers" on page 36
7	Outer end of where dots can be found for the last pass of edge tools See "Pass Multipliers" on page 36	8	Edge dots found Light blue: acceptable found edge dots Dark blue: interpolated dots Red: rejected by Outlier Rejection (if enabled)

Fig. 19 - Overlay graphics meanings

5.2 Image Saving

Menu screen page 5 ⇨ **Image Saving / Delete Data** ⇨ **Image Saving**

Image saving allows you to save images for each drop measurement so that you can view them later.

Touch the checkbox to place a checkmark for saving all analyzed images or saving raw images or both.

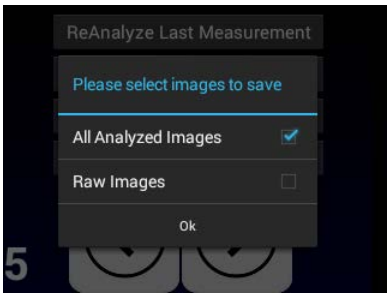


Fig. 20 - Image saving

Selecting **All Analyzed Images** allows you to view the four different types of images (see "Understanding the Images" on page 1) in the Drop History screen and to upload them onto a USB flash drive.

It is recommended to keep this feature turned on so that you can review all the analyzed images at a later time. If you do not save analyzed images, you will only be able to review or upload the results images.

Selecting **Raw Images** saves the original raw images of the substrate and the drops.

It is generally not recommended to keep this feature turned on, as it increases the processing time and the file sizes are large. Raw images are generally used by Brighton Science Service.

5.3 Deleting Data

Menu screen page 5 ⇨ **Image Saving / Delete Data** ⇨ **Delete Data**

Touch **Delete Data** to permanently delete all of the results data and images on the Surface Analyst. Make sure you first back up anything you want to keep.

It is recommended to delete all data after 30,000 measurements or following a cartridge change (whichever comes first). Failure to do this will result in slower run times.

5.4 Uploading Data to USB Drive

Insert a USB flash drive into the Surface Analyst before beginning a data upload. (See "Accessing the USB Port" on page 1.)

Menu screen page 2 ⇨ **USB Upload**

When logged in as an administrator, you are prompted to choose what to upload:

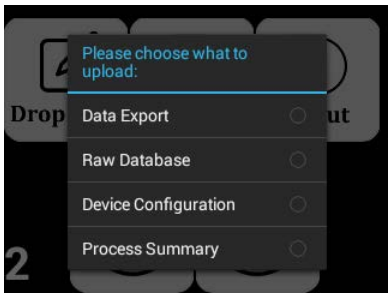


Fig. 21 - USB upload options for administrators

- Choose **Data Export** to upload data (in the form of a CSV file, HTML file, and image files) associated with individual measurements and results. See the Integrator Manual Appendix for instructions.
- Choose **Raw Database** to upload the entire contents of the Surface Analyst results database in the form of a DB file.

5 The Surface Analyst Process Parameters

Between the time you initiate a measurement with the Surface Analyst and the time you receive your result is a short period of time. However, there is a lot of processing that Archer does in that time.

Fig. 22 shows the process flow when taking a measurement with a Surface Analyst

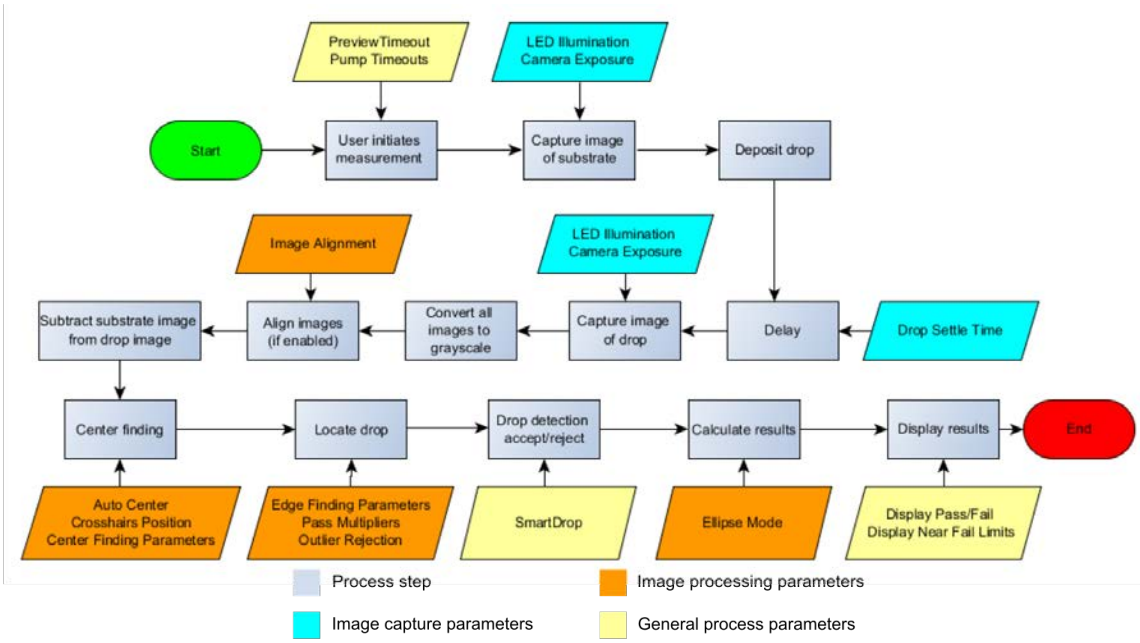


Fig. 22 - Surface Analyst process flow diagram
(Purchasable options are excluded from this diagram)

The parameters affecting the process which an administrator can set are described in the following chapters:

- "Image Capture Parameters" on the next page
- "Image Processing Parameters" on page 31
- "General Process Parameters" on page 39

5.5 Changing the Process Parameters

You can change the settings of the process parameters in order to optimize the measurement process for your particular surface conditions.

In order to make adjustments to a locked surface profile, you first need to copy it and create a new surface profile. See "Creating a New Surface Profile" on page 9.

All parameters settings are one of the following:

- Profile specific (apply to the current loaded surface profile only)
- Global (apply to the entire Surface Analyst device)
- Can be applied either to the current loaded profile or to multiple profiles

To find out what the parameters are set at for the currently loaded surface profile, go to Menu screen page 2 ⇨ **About** ⇨ pages 3-5.

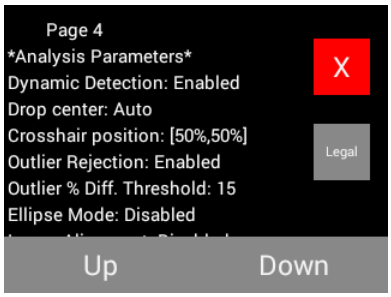


Fig. 23 - About screen

Some of the parameters listed in the About screen are for Brighton Science Service use and are not editable by an Administrator.

Refer to the following sections for information on changing the process parameters:

Topic	Reference
Image capture parameters	"Image Capture Parameters" below
Image processing parameters	"Image Processing Parameters" on the next page
General process parameters such as setting timeouts, SmartDrop, and pass/fail limits	"General Process Parameters" on page 39
Testing the effect of changing parameters using the re-analyze function	"Re-analyzing the Last Measurement" on page 41

5.6 Image Capture Parameters

The parameters in this section affect the image capturing process of the Surface Analyst.

5.6.1 LED Illumination Level

Menu screen page 7 ⇨ **Illumination / Exposure** ⇨ **Illumination**

Parameter Scope:	Profile specific
Description:	The LED Illumination Level changes the current supplied to the LED lights to make them brighter or dimmer.
Uses:	The following are situations to increase Illumination: • Increase contrast • Decreases the camera exposure which decreases motion blur and noise Decrease illumination when you need to decrease the heat of the head.
Considerations:	Increasing the illumination increases the heat of the inspection head.

Touch **Illumination** to enter a new illumination (as a percentage of maximum allowable illumination).

5.6.2 Camera Exposure

Menu screen page 7 ⇨ **Illumination / Exposure** ⇨ **Exposure**

Parameter Scope:	Profile specific
Description:	Camera Exposure changes the sensitivity of the sensor to light
Uses:	Change the Camera Exposure setting when you need to change the brightness of an image.
Considerations:	Higher exposures have increased noise. Lower exposures have a lower overall brightness, but less noise.

Touch **Exposure** to change the exposure on a scale of 1 to 984. The higher the number, the more sensitive the sensor is to light.

In normal operation, it is recommended to use automatic exposure. To set automatic exposure, enter a value of **0**.

5.6.3 Drop Settle Time

Menu Screen 7 ⇨ **Drop Settle / Autoshutdown Time** ⇨ **Drop Settle**

Parameter Scope:	Can be applied either to the current loaded profile or to multiple profiles
Description:	The Drop Settle Time is a necessary time delay which allows the drop to settle between the end of the drop deposition and the image capture.
Uses:	If a vapor ring is present and is causing detection problems, a longer drop settle time can decrease the vapor ring by giving it time to evaporate.

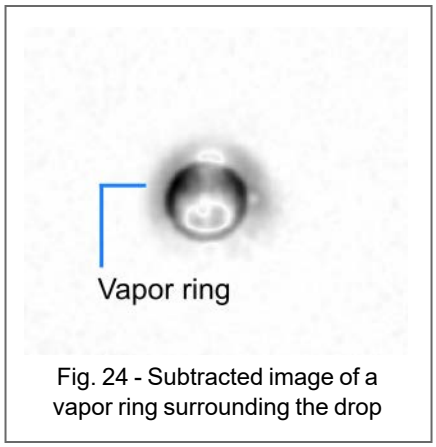


Fig. 24 - Subtracted image of a vapor ring surrounding the drop

Considerations:	For longer drop settle times, take extra care to keep the head still during the measurement.

Touch **Drop Settle** to enter the settle time (in seconds).

5.7 Image Processing Parameters

You can set many of the image processing parameters by going to Menu screen page 5 ⇨ **Image Processing / Profile Merge** ⇨ **Image Processing**.

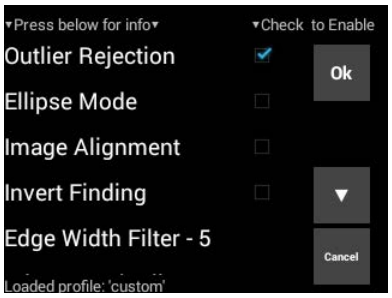


Fig. 25 - Image processing parameters screen

Touching a parameter name displays a description of its function. Use the arrow icons to scroll up and down to see all of the parameters. Touching a checkbox to add a checkmark enables the function.

All image processing settings are profile specific (apply to the current loaded surface profile only).

5.7.1 Image Alignment

Menu screen page 5 ⇨ **Image Processing / Profile Merge** ⇨ **Image Processing**

Parameter Scope:	Profile specific
Description:	In situations where there is movement during the measuring process, Image Alignment moves and rotates the grayscale substrate image so that it aligns better with the grayscale drop image. This allows for more complete removal of the backgound and a more accurate contact angle calculation.

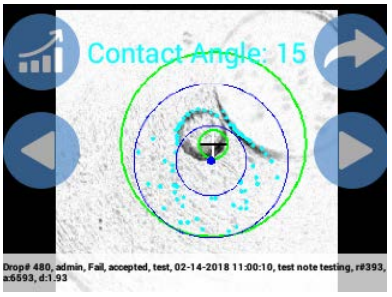


Fig. 26 - No image alignment. Background not properly subtracted.

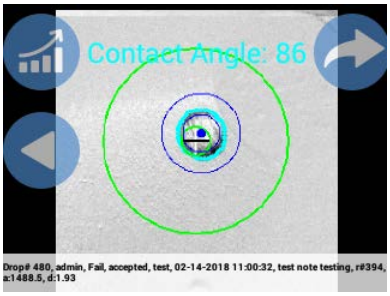


Fig. 27 - Image alignment enabled. Background is properly subtracted.

Uses:	Image Alignment is used in situations where it is difficult to keep the inspection head still during measuring.
Considerations:	This feature is only recommended when there is movement during measurement. It works best when the background has high contrast features. Image Alignment increases the processing time.

Touch the checkbox for **Image Alignment** to activate this function.

5.7.2 Auto Center

Menu screen page 6 ⇨ **Scan Radius / Drop Center** ⇨ **Drop Center**

Parameter Scope:	Can be applied either to the current loaded profile or to multiple profiles

Description:	The Auto Center function uses object analysis to determine the center and approximate initial size of the drop.
Uses:	It is generally recommended for the Auto Center function to always be enabled.
Considerations:	Auto Center may be disabled if the Surface Analyst has difficulty finding the drop center.

Touch **Auto Center** to enable or disable the automatic drop center feature.

5.7.3 Crosshairs Position

Menu screen page 6 ⇨ **Scan Radius / Drop Center** ⇨ **Drop Center** ⇨ **Crosshairs**

Parameter Scope:	Can be applied either to the current loaded profile or to multiple profiles
Description:	Use this function to set the position of the crosshairs on the Measurement screen.

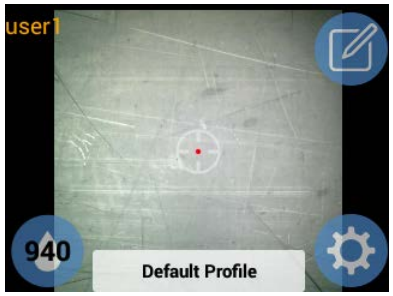


Fig. 28 - Crosshairs on the Measurement screen

Uses:	If the drop is consistently not depositing in the center of the screen, you can move the crosshairs to match with where the drop is depositing.
Considerations:	If Auto Center is disabled (not generally recommended), the crosshairs are used to determine the center of the drop.

When you touch **Change Crosshairs**, you are asked which direction you want to change.

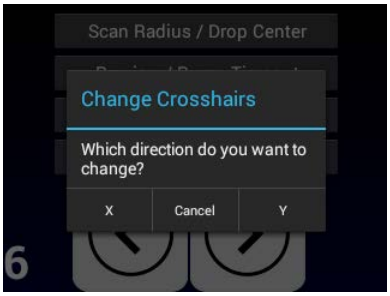


Fig. 29 - Change crosshairs

Enter a number from 0-99 for either the x-direction or y-direction or both. The position (50, 50) is the center of the screen. The position (0,0) is in the upper left-hand region of the screen. (Note that Archer uses a square image that is centered on the rectangular display.)

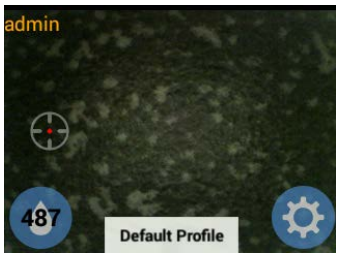


Fig. 30 - Example: X=0; Y=50

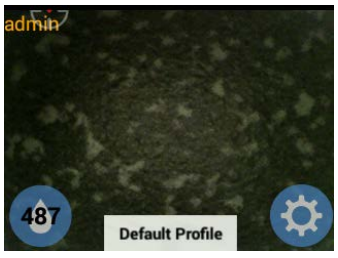


Fig. 31 - Example: X=0; Y=0

Fig. 32 - Example: X=99;Y=99

5.7.4 Dynamic Detection Center Finding Parameters

Menu screen page 5 ⇨ **Image Processing / Profile Merge** ⇨ **Image Processing**

Parameter Scope: Profile specific

Description: The set of parameters listed in the following table control the behavior of the center finding algorithms.

Parameter	Application	
Center Minimum Diameter	Settings:	Min: 0, Max: 999 Expressed in pixels of diameter (image is 480 x 480 pixels). Default: 15
	Description:	Found objects which have smaller diameters in pixels (width or height) than this parameter will be removed during the non-relevant object removal process.
	Uses:	Filter out noise and satellites (small droplets).
	Considerations:	This parameter is useful when the main drop is off center and there are satellites (small droplets) which occur in the center.
Center Maximum Diameter	Settings:	Min: 0, Max: 999 Expressed in pixels of diameter (image is 480 x 480 pixels). Default: 370
	Description:	Found objects which have larger diameter in pixels (width or height) than this parameter will be removed during the non-relevant object removal process.
	Uses:	Filter out artifacts from movement or uneven lighting.
	Considerations:	This setting may need to be increased when working with extremely low contact angle inspections.

Parameter	Application	
Center Merge All	Settings:	True, False Boolean value representing the merge method. Default: False
	Description:	Treat all remaining objects as a single object for the purpose of center location and drop size estimates. This takes the minimum and maximum dimensions of the individual object bounding boxes and makes a new bounding box which holds all the objects then uses that resulting larger box as the drop center and size.
	Uses:	When movement, lighting artifacts, or satellites are not expected to be present then this can be an easy way to merge objects which form a single drop (due to low contrast or lighting issues).
Center Merge Distance	Settings:	Min: 0, Max: 500 Expressed in integer pixels of growth (image is 480 x 480 pixels). Default: 7
	Description:	Objects are grown by this amount and then whatever objects are left over after the growth cycle are then shrunk by this amount. Nearby objects are often merged into an unrecognizable mass which then shrinks back to the original size with a connection between the original found objects.
	Uses:	This is useful when there is expected that there might be clutter or movement artifacts which should be ignored, but the central drop is broken into pieces which need to be merged.

5.7.5 Edge Finding Parameters

Menu screen page 5 ⇨ **Image Processing / Profile Merge** ⇨ **Image Processing**

Parameter Scope: Profile specific

Description: The set of parameters listed in the following table control the behavior of the drop edge finding algorithms.

Parameter	Application	
Invert Finding	Settings:	Enable, Disable Default: Disable
	Description:	This changes the edge finding so it looks for the opposite intensity edges from normal finding.
	Uses:	This might be useful if the drop is always lighter than the background and so a white ring is always present at the edge of the drop.
	Considerations:	This parameter is rarely used.

Parameter	Application	
Edge Width Filter	Settings:	Min: 1, Max: 99 – MUST BE AN ODD NUMBER Number of pixels to be averaged together across the width of the edge Default: 5
	Description:	This parameter provides filtering along the perimeter of the drop edge and will provide smoothing to the location of the found dots.
	Uses:	This provides the ability for bridging small gaps in the drop edge.
Edge Length Filter	Settings:	Min: 3, Max: 99 – MUST BE AN ODD NUMBER Number of pixels to be averaged together across the length of the edge Default: 9
	Description:	This parameter is the kernel size used in the initial derivative calculation to find edges. This functionally works as a filter along the length of the edge.
	Uses:	This parameter makes the edge less sensitive to noise and "white snake" type edges parallel to the drop perimeter.

5.7.6 Pass Multipliers

Menu screen page 7 ⇨ **Blur / Pass Multipliers** ⇨ **Pass Multipliers**

Parameter Scope: Profile specific

Description: The pass multipliers limit the area of drop edge detection by defining an area bounded by a minimum and maximum radius. The first pass of edge detection uses the center and diameter found by the center finding algorithm (see "Dynamic Detection Center Finding Parameters" on page 34). The remaining two passes use as their basis the results of the previous pass. These passes are denoted by1 Near, Far, 2 Near,Far and 3 Near,Far Pass Multipliers.

Uses: The Near Pass Multipliers limit the chance of finding an edge inside the drop.

The Far Pass Multipliers limit the chance of finding an edge outside the drop.

Considerations: The drop detection may not work properly if there is significant background noise, especially near the edge of the drop.

Enter values for the near and far pass multipliers. The values are presented as fractions of the drop radius calculated from the previous pass' found dots.

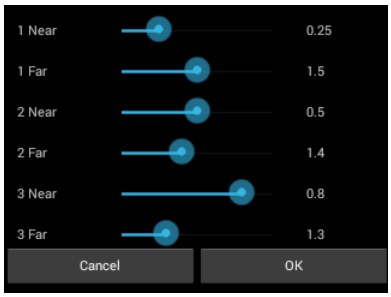


Fig. 33 - Near and Far Pass Multiplier settings

Parameter	Application	
1 Near, 1 Far	Settings:	Near Min: 0, Max: 1 Far Min: 0, Max: 2 Multiplier based upon the center locator size estimation. Default: Near .25, Far 1.5
	Description:	The 1 Near, 1 Far parameters use the center finding estimated size . The edge tools will only return results in between the two circles generated by these parameters.
	Uses:	The Near Pass Multipliers limit the chance of finding an edge inside the drop. The Far Pass Multipliers limit the chance of finding an edge outside the drop.
	Considerations:	Normally the near parameter will be a number < 1 so it is inside the estimated drop size. Normally the far parameter will be a number > 1 so it is outside the estimated drop size.

Parameter	Application	
2 Near, 2 Far 3 Near, 3 Far	Settings:	Near Min: 0, Max: 1 Far Min: 0, Max: 2 Multiplier based upon the last edge finding pass. Default: 2nd Near 0.5, 2nd Far 1.4 Default: 3rd Near 0.8, 3rd Far 1.3
	Description:	These parameters use the last finding pass.The edge tools will only return results in between the two ellipses generated by these parameters.
	Uses:	The Near Pass Multipliers limit the chance of finding an edge inside the drop. The Far Pass Multipliers limit the chance of finding an edge outside the drop.
	Considerations:	The third pass near and far parameter is also used when more than three passes are required for the drop edge to become stable. Normally the near parameter will be a number < 1 so it is inside the estimated drop size. Normally the far parameter will be a number > 1 so it is outside the estimated drop size.

5.7.7 Outlier Rejection

Menu screen page 5 ⇨ **Image Processing / Profile Merge** ⇨ **Image Processing**

Parameter Scope: Profile specific

Description: Outlier Rejection replaces dots that are statistically different in position from their neighbors with dots that have a similar distance from the center as the nearest neighbors. The new interpolated dots appear in dark blue, while dots that were unchanged remain light blue.

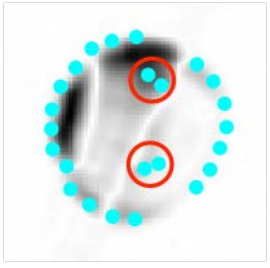


Fig. 34 - Outlier dots to be moved are circled in red

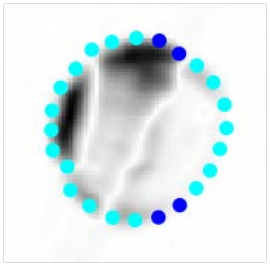


Fig. 35 - Outlier dots that moved appear in dark blue

Fig. 36 - Outlier Rejection disabled

Fig. 37 - Outlier Rejection enabled

Uses:	Outlier Rejection is used to improve the drop detection so that it more closely follows the edge of the drop. It is generally recommended to have Outlier Rejection enabled.
Considerations:	There are no meaningful downsides to using Outlier Rejection.

Touch the checkbox for **Outlier Rejection** to enable this feature. You may set the outlier percent difference between the location of an individual point and the points around it. Larger values make outlier rejection less sensitive. Smaller values make it more sensitive. A good starting point is a value of 15.

5.7.8 Ellipse Mode

Menu screen page 5 ⇨ **Image Processing / Profile Merge** ⇨ **Image Processing**

Parameter Scope:	Profile specific
Description:	Instead of calculating the area of the drop with the default method using the location of the found dots, Ellipse Mode calculates the area of a best-fit ellipse using the dots of the drop detection.
Uses:	Ellipse Mode filters out dots in the drop detection that do not fit within an elliptical pattern. It can be used with Outlier Rejection.
Considerations:	Ellipse Mode smooths out irregularly-shaped drops which can make the contact angle calculation less accurate. This mode should not be used on rough surfaces such as composites where the expected drop shape is not elliptical.

Touch the checkbox for **Ellipse Mode** to activate this function.

Your Surface Analyst may have Major Axis Ellipse Mode configured. This mode uses the major axis of the best-fit ellipse as the diameter of a circle from which the contact angle is calculated. This method is used in specialized applications where a drop is deposited on a narrow cylindrical object and the contact angle result is affected by the surface curvature. If you think that this method is a good fit for your application, contact Brighton Science for assistance and for special instructions on how to use the Major Axis Ellipse Mode.

5.8 General Process Parameters

The parameters described in this section are general parameters that affect the behavior of the Surface Analyst during operation.

5.8.1 Setting Preview and Pump Timeouts

Menu screen page 6 ⇨ **Preview / Pump Timeout**

Parameter Scope: Global

Preview Timeout

Touch **Preview Timeout** to set the time (in seconds) that a user can be in the Measurement screen before the screen reverts to the Menu screen and the pump shuts off. You can disable the preview timeout by entering **0** so that it will not time out at all.

Pump Timeout

Touch **Pump Timeout** to set the time (in seconds) that the pump will run after a measurement is taken. The screen remains as the Measurement screen after the pump times out.

5.8.2 Setting Drop Detection Accept / Reject Options

Menu screen page 5 ⇨ **SmartDrop / Wetting Analytics** ⇨ **SmartDrop**

Parameter Scope: Can be applied either to the current loaded profile or to multiple profiles

This function sets how the drop detections are accepted or rejected.

The following choices are available:

- **User Accept / Reject**: The user must manually accept or reject the drop detection when prompted by the Surface Analyst. SmartDrop is disabled.
- **SmartDrop**: Enables SmartDrop. The drop detection is accepted or rejected automatically by Archer. If the drop detection is unacceptable, a message is displayed for the user to take another measurement.
- **Accept all**: All drop detections are accepted automatically.

SmartDrop settings

If you choose **SmartDrop**, then there are additional settings available.

Touch **This Profile Only** or **All Profiles**

- Choose **Use Default** if you want to accept the default limits for the automatic accept / reject function.
- Choose **Specify (Advanced)** if you want to set your own limit.
    - Set the accept / reject limit to a value between 0.1 and 1.0.
    - The number you set is the ratio of the perimeter of the drop detected (sum of the polygon sides) to the perimeter of a circle with the same area.
    - The default value is 0.7.

5.8.3 Setting Pass and Near Fail Limits

Menu screen page 6 ⇨ **Pass/Near Fail Limits**

Parameter Scope: Profile specific

Pass Limits

Touch **Pass Limit** to set the maximum and minimum limits. If the Surface Analyst calculates a result that falls inside these limits, it displays a green "Pass" message along with the result. If the result falls outside these limits, it displays a red "Fail" message along with the result.

If you do not want a pass or fail message to display during measurements, then change the minimum angle to 0 and the maximum angle to 180. (For dynes, enter a minimum of 0 and a maximum of 200).

Near Fail Limits

Touch **Near Fail Limit** to warn users that results are passing but are nearing the maximum or minimum allowed value. Enter a value for a distance from your minimum and maximum acceptable values that will trigger the warning. The Surface Analyst displays a yellow "Pass" message when the result is in the near fail warning range.

The following examples show a pass limit of 0-80° with a near fail limit of 1. Fig. 38 shows how the result appears when the result is within the pass limit and outside of the near fail limit. Fig. 39 shows how the result appears when the result is within the pass limit and within the near fail limit.

Fig. 38 - Passing result outside of the near fail warning range

Fig. 39 - Passing result inside the near fail warning range

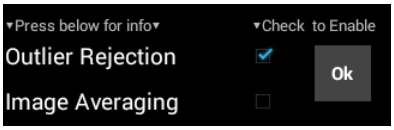
5.9 Re-analyzing the Last Measurement

Menu screen page 5 ⇨ **ReAnalyze Last Measurement**

Use ReAnalyze Last Measurement to test out different processing parameters to see the affect they have on a single measurement.

1. Take a measurement. In this example, Outlier Rejection is disabled.

2. Change one or more processing parameters as desired. In this example, Outlier Rejection is changed to enabled.



3. Go to **ReAnalyze Last Measurement** to see the difference made by changing the parameter.

When images are re-analyzed, the drop number stays the same, but the results number (r#) is incremented. The original drop data as well as the re-analyzed drop data are stored in the database.

6 Purchasable Options

The features described in this chapter are available with the Surface Analyst XA-Kit if you purchased them. If you have not purchased these features, but are interested in having them installed on your Surface Analyst, contact Brighton Science.

For a listing of all the purchasable options currently installed on your Surface Analyst, see "Activating New Purchasable Options" on page 21.

6.1 Wetting Analytics

Wetting Analytics determines if the contact angle decreases over a period of time from the initial dispense. Wetting Analytics works by taking an additional image of the drop after the normal drop image. The contact angles of the two images are compared. If a surface has high wettability, the drop continues to spread out on the surface after the drop deposition.

6.1.1 Enabling and Disabling Wetting Analytics

Menu screen page 5 ⇨ **SmartDrop / Wetting Analytics** ⇨ **Wetting Analytics**

Touch **Enable / Disable** to turn Wetting Analytics on or off for the current loaded profile.

6.1.2 Setting Wetting Analytics Parameters

The parameters for Wetting Analytics have been pre-set, but you can change them, if desired.

The overall time delay ("t") is the time elapsed (in seconds) between when the first and last images of the drop are taken.

The delta is the contact angle difference between when the drop is first deposited and after it has settled after a "t" second delay. The delta threshold is the value at which the Surface Analyst fails the measurement for wetting.

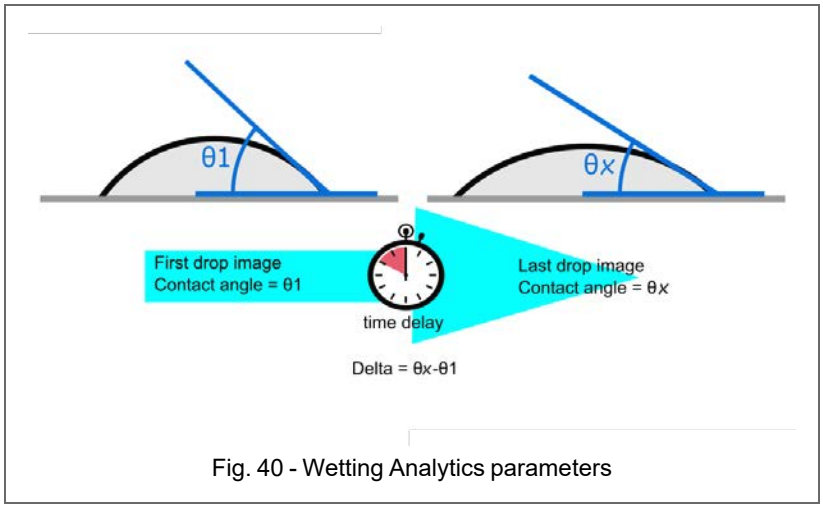


Fig. 40 - Wetting Analytics parameters

Menu screen page 5 ⇨ **SmartDrop / Wetting Analytics** ⇨ **Wetting Analytics**

Parameter Scope: Profile specific

Delta threshold

Touch **Change Delta** to change the delta threshold. Increasing this value decreases the sensitivity of Wetting Analytics.

Time and interval

Touch **Change Capture** to access parameters that control the time delay between the first image and last image taken. You can set a time delay that captures images at the beginning and end of the time span, or you can set a time delay that captures several images within the time span.

Touch **Overall Time** to change the time from the first image taken to the last image taken. This is the amount of time used for the overall wetting pass/fail determination. Increasing the overall time increases the sensitivity of Wetting Analytics.

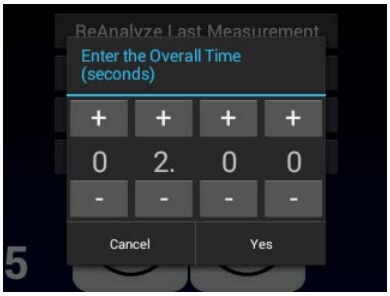
Touch **Image Interval** to set the length of time between individual captured images in the overall time span. This parameter is useful if you want to gain more granular information about how the drop wets the surface over time. This information is stored in the Surface Analyst database and can be exported.

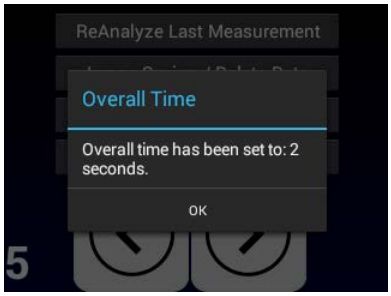
- Due to camera frame rate limitations, intervals are available in 66.7 ms increments.
- Setting the interval to 0 disables the capture of any additional images between the initial and final images. This is the recommended setting for most applications.
- The number of images is calculated from the overall time and the interval selected.

Example:

Set an overall time of 2 seconds, with intervals having a time of 200 ms each.

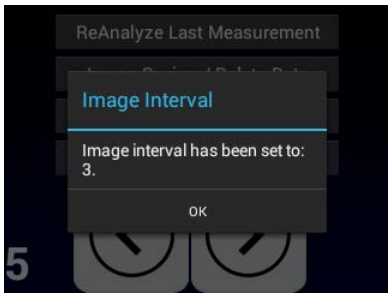
1. Set the **Overall Time** to 2 seconds



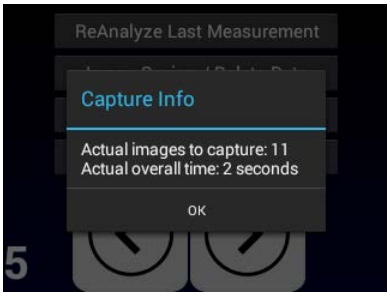


2. Set the **Image Interval** to 3

   (200 ms ÷ 66.7 ms/increment = 3 increments)



3. The capture information is displayed.



For a total time of 2 seconds, and intervals of 200 ms, the number of actual images that will be captured is 11, as illustrated in .Fig. 41.

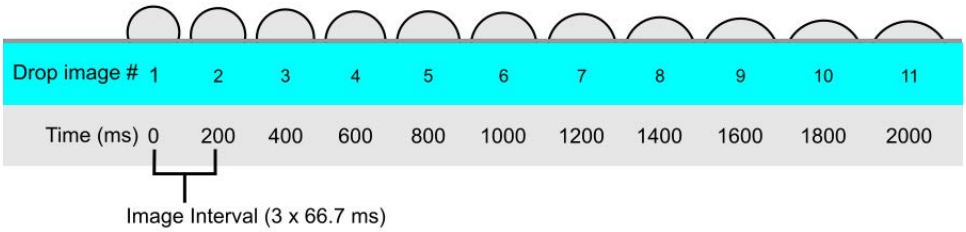


Fig. 41 - Wetting Analytics image captures over time

The maximum number of image captures per measurement is 200.

6.1.3 Wetting Analytics Results

Fig. 42 shows the results screens when using Surface Analyst.

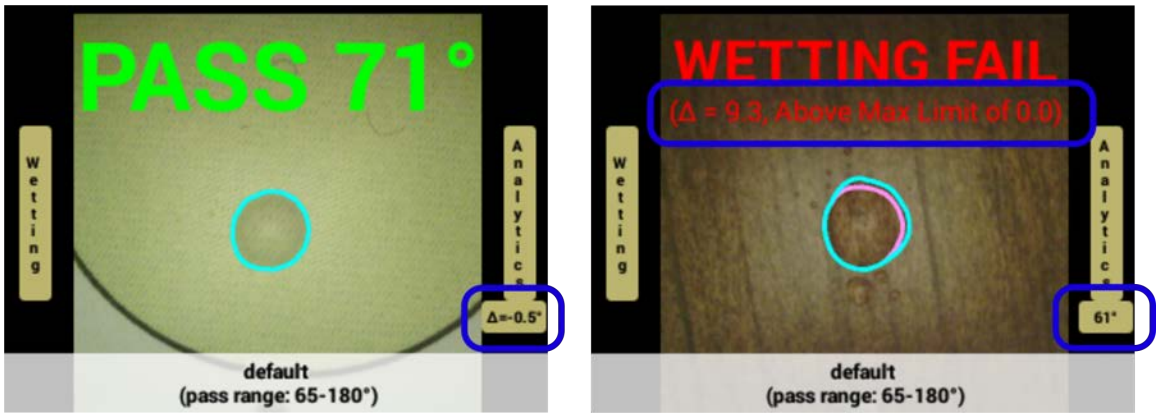


Fig. 42 - Wetting Analytics Results

When a measurement passes, the delta angle is displayed for reference.

When a measurement fails due to wetting, the delta angle and maximum limit (threshold) are displayed. The initial drop is shown in pink, while the larger blue outline represents the drop after it spreads out after the time delay. The contact angle of the initial drop (before spreading) is also displayed, for reference.

Archer stores results information for the measurements using Wetting Analytics. Fig. 43 shows the database results for a single measurement having a 3-second overall time, and an image interval of 667 ms (image interval set to 10). See "Uploading Data to USB Drive" on page 27 for how to upload the results from the Surface Analyst.

CD	CE	CF	CG	CH	CI
WettingImagesTotal	WettingImageNumber	WettingMsSinceFirst	WettingDelta	WettingPassOrFail	WettingDeltaAngleTolerance
6	1	0	0		10
6	2	667	3.5		10
6	3	1333	4.9		10
6	4	2000	5.8		10
6	5	2667	6.3		10
6	6	3000	6.6	Pass	10

Fig. 43 - Wetting Analytics results

6.2 Dyne Mode

Dyne Mode changes the displayed result from contact angle to dynes.

6.2.1 Enabling and Disabling Dyne Mode

Menu screen page 4 ⇨ **Dyne Mode / SCommand** ⇨ **Dyne Mode**

Touch **Enable/Disable** to turn Dyne Mode on or off . Touch **Only Current Profile** to affect the current loaded profile only. Touch **ALL profiles** to have the change affect all profiles.

6.2.2 Setting Dyne Parameters

Menu screen page 4 ⇨ **Dyne Mode / SCommand** ⇨ **Dyne Mode** ⇨ **Parameters**

Parameter Scope: Can be applied either to the current loaded profile or to multiple profiles

You can change parameters that alter the dynes calculation based upon your specific surface application.

The dynes parameters (A,B,C,D) are derived by lab testing of a particular surface with differing surface treatments applied. For each surface condition, a dynes measurement is plotted against the contact angle result in an Excel spreadsheet. A best fit polynomial is derived in the form:

$Dynes = Ax^3 + Bx^2 + Cx + D.$

An example graph of dynes and contact angle for a particular glass surface is shown below:

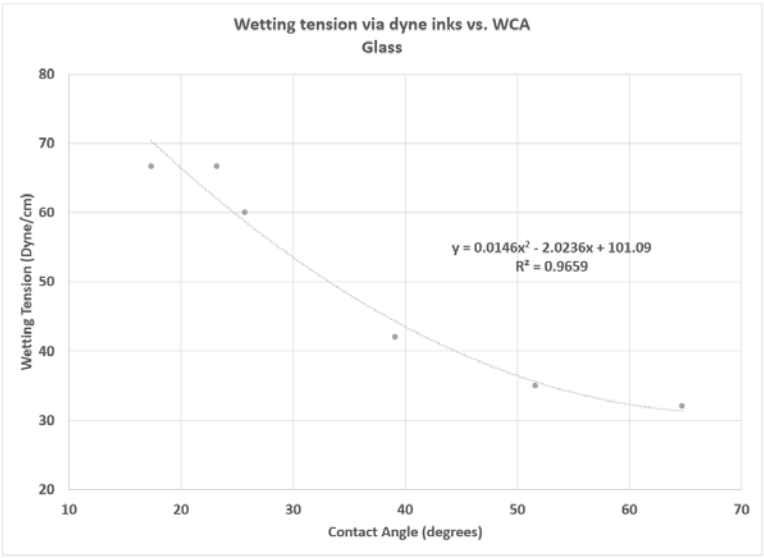


Fig. 44 - Dynes and contact angle best fit polynomial

Since the best fit polynomial in this example is $y = 0.0146x^2 - 2.0236x + 101.09$, the parameters for this particular surface profile are entered as follows:

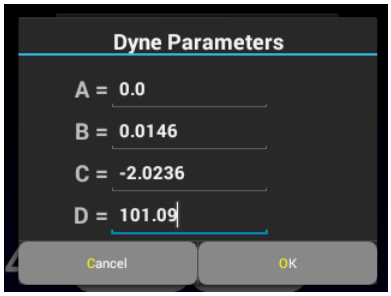


Fig. 45 - Dynes parameters

Only use the correct parameters that are based upon verified lab testing. Otherwise, your results will be innacurate.

6.3 Data API

The Data API option facilitates the communication of the Surface Analyst with external devices. There are two available methods of communication:

- Communication Option 1 : Subscription (real time data)

  Users subscribe to specific message types which are sent out in real time as the events happen. For example, a user can subscribe to receive the CSV result line each time an inspection is completed. Other subscriptions are available. See the Data API Guide for more information.

- Communication Option 2: Result Queries (historical data)

Users query the results database to get individual records and images. This method allows the user to perform search queries to find particular sets of records which match desired criteria. Any record which is stored on the Surface Analyst may be retrieved.

For further information, refer to the Data API Guide that is included on the USB flash drive.

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