



ACS Container Coating Thickness Measurement System

Installation & Operation Manual



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General Information

System Description and Usage

The *SpecMetrix*® ACS Container Coating Thickness Measurement System is primarily designed to measure the thickness of applied layers on metal containers such as over varnish and inside spray. It is an automated system that will measure the coating thickness or coat weight of the coatings on the outside straight wall, inside straight wall, and dome of the container. All *SpecMetrix* ACS Measurement Systems incorporate proprietary ruggedized optical interference technology to measure the absolute coating thickness. This is a non-contact and non-destructive technology that only requires minimal prior knowledge about the coating such as Refractive Index of the coating, which is a material property to measure the coating thickness. There are no requirements for calibration coupons or known thickness standards or databases. A NIST traceable measurement standard is provided to periodically verify the instrument's accuracy. Additional information on some coating specific parameters is needed if the desired units of measurement are coat weight units such as mg/in^2 or $mg/4in^2$ or g/m^2 .

Product Safety

All *SpecMetrix* systems are very safe to use; however, like all electronic equipment you must follow these common-sense guidelines to ensure that the personal safety of the operator and future integrity of the unit are not compromised:

- **Please read and follow all instructions**
It will be helpful if you review this document completely before you attempt to install and use the *SpecMetrix* system.
- **Retain this manual for future reference**
Keep this manual handy for others to read and refer to when they operate the unit.
- **Obey Warnings**
Please follow all the precautions described in this manual. If you modify or use the *SpecMetrix* system in a manner not intended, the built-in safety features may be impaired.
- **Protect from water and moisture**
Do not use the *SpecMetrix* system in an area where there is a potential hazard of electric shock from spilled water or other uncontrolled moisture.
- **Not intended for use in an explosive environment.**
The *SpecMetrix* system contains electrical components which would present a hazard in an explosive environment.
- **The Equipment will not operate if the door is open.**
- **Do not override the door interlock switches.**

System Specifications

Performance Specifications

- | | |
|----------------------------------|--------------------|
| 1. Coating Thickness Range | 0.5 to 250 microns |
| 2. Typical Accuracy | 3% |
| 3. Non-contact measurement range | 15-33mm |

Environmental Specifications

- | | |
|---|----------------------------------|
| 1. Electrical mains input | 120-240 VAC 50-60 Hz |
| 2. <i>SpecMetrix</i> ® <i>MKII</i> display unit | 16 amps 12Volts |
| 3. Operating Temperature | 5 C – 50 C |
| 4. Operating Humidity | 10%-90% relative, non-condensing |
| 5. <i>SpecMetrix</i> Display Protection | IP30 |

SpecMetrix MKII Display Unit Requirements

1. Windows 7 64-bit (SP 1) (provided)
2. 16GB Memory (provided)
3. SSD (provided)

Packing List

SpecMetrix MKII Display Unit

12-volt Power supply, 16A

Mains cable

Keyboard & Mouse

Lab Probe

Lab Probe Stand Assembly

2.0μ NIST Standard Calibration Assembly

4.0μ NIST Standard Calibration Assembly

Operation Manual

TA100 Automatic Can fixture

USB A-to-B Cable

12-volt Power supply, 8.5A

Mains cable

Spare Parts

Spare Parts
Numbers

Part

Lamp: 5.0 volt	12-000004
Fuse: 8A (ACS)	31-000110
Fuse: 15A (MKII)	31-000126
2.0 μ NIST Standard Calibration Assembly	25-000309
4.0 μ NIST Standard Calibration Assembly	25-000310

SpecMetrix[®] Display Unit Requirements

1. Windows 7 64-bit (SP 1) (provided)
2. 16 GB Memory (provided)
3. 160 GB SSD (provided)

Installation and Site Requirements

System Installation

The *SpecMetrix* ACS Measurement System should be set up on a suitable table top or laboratory bench. The system requires a clean computer grade 120 – 240-volt AC grounded power supply (i.e. a clean circuit back to the fuse box with no spurs to heavy duty electrical equipment such as thyristor controlled motors or heaters on industrial equipment as this may cause electrical interference.)

System Contents:

1. (1) *SpecMetrix* MKII display unit
2. (1) *SpecMetrix* Automatic Can Stand unit
3. (1) Keyboard
4. (1) Mouse
5. (2) 12 Volt Power Supply
 - a. (1) 16A for *SpecMetrix* MKII Display Unit
 - b. (1) 8.5A for ACS Unit
6. (1) USB A-to-B cable
7. Proprietary puck(s) containing NIST traceable Standard
 - a. (1) 2 Micron (μ)
 - b. (1) 4 Micron (μ)

Unpack and identify all listed items. Upon arrival, the Can Stand will be securely bolted in a “Transport” position as illustrated below. Prior to use, ensure that the bolts connecting the transport bracket to the vertical motor shaft have been removed.



Note: If you need to ship the unit for any reason then it is imperative to position probe tower into transport mode, and secure the probe tower to the stationary bracket as illustrated below (more on this in the [Setup Tab](#) section).

Getting Started

ACS Connections to *SpecMetrix*® MKII display unit

Setting up the System

To begin setting up the *SpecMetrix* ACS Measurement System, connect the keyboard and mouse to the USB ports on the left-hand side of the *SpecMetrix* MKII display unit. The ACS Can Fixture has three connections back to the MKII, a USB A-to-B connector, and two fiber optic connectors. The fiber optic connections from the ACS to the MKII need to match labels for the wavelength range (i.e. the Near Infra-red detector or the Visible detector).



1. **USB cable:** Connect one end of the provided USB A-B cable to the ACS unit and the other to the MKII.

2. **Patch cables:** The patch cables come fastened to the ACS unit upon delivery. Attach one of each to the VIS and NIR connections on the ACS and the other ends to the corresponding VIS and NIR connections of the MKII.

Network and Machine Communications

The *SpecMetrix*® display unit motherboards are designed with 2 or 3 Ethernet ports for various network & peripheral communication needs. The Ethernet ports are configured for communication by Sensory Analytics technicians or by plant IT engineers. When multiple devices need to communicate across different networks or subnets it is imperative to make sure the correct Ethernet cables are plugged into the appropriate Ethernet port.

Plant network engineers are permitted to change the login configuration to use plant network authentication. The requirement for any user account that will be given access to the *SpecMetrix* display unit is to have local admin access as well as proper access to read/write to any network path that is defined as a file repository. It is permitted, and recommended, to use file mapping to network paths.

1. Connect the MKII SA Network port to the SA Network port with an Ethernet cable.
2. Make sure the internally mounted Ethernet hub has a connection to the SA Network port, the Ethernet NIR spectrometer, and the Ethernet MCC I/O board.
3. Connect the MKII to a dedicated 120 VAC/240 VAC 50-60 Hz outlet.
4. Run a properly terminated (Line, Neutral, and Ground) power cable into the bottom to the internal disconnect (connections are labeled).

Initial Power-Up Procedures

1. Connect the 12V power supply on the left side of the *SpecMetrix* Mark II and switch the master toggle switch or push button into the “ON” position. Check to ensure that the red power LED turns on.
2. Press the power button on the front of the unit. The system will then boot into Windows. Allow a few seconds for the boot-up process to take place before continuing.



Power-Down Procedures

It is recommended to power down the *SpecMetrix*® display unit by closing all applications first, then accessing the Start menu and choosing Shut Down from the power options list. Pressing the main power button on the unit will cut all power immediately but may cause errors.

1. Stop all measuring by pressing “STOP” or “STOP ALL” button
NOTE: If all lines are not appropriately stopped the sensor could fail to initialize properly on next start up.
2. Close all running applications
3. Shut down Windows in one of two ways:
 - a. Click on the “Show Desktop” button in the SA Menu to return to the desktop and shut down Windows from the Start Menu.
 - b. Press the “Windows Shutdown” button to power off system immediately.

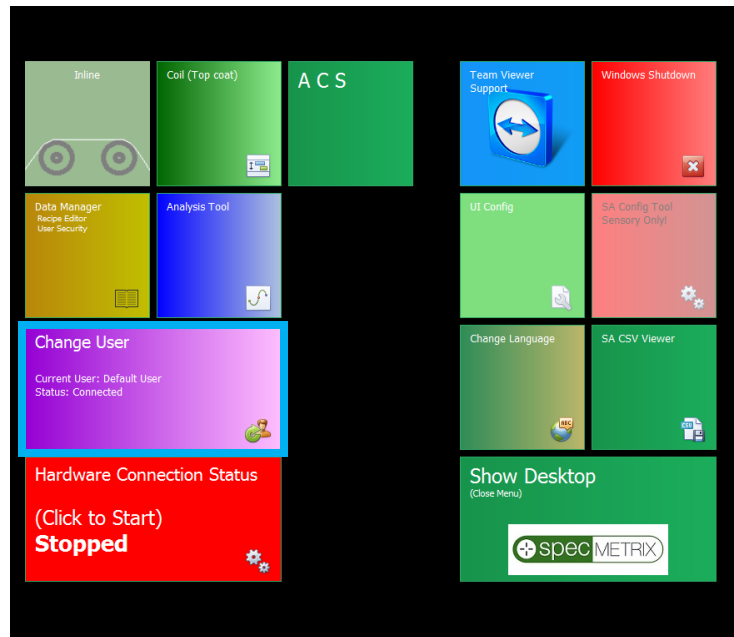
SA 2.9 and newer:

The button below will allow users to minimize the SA Menu window and return to the Windows desktop environment without shutting down the *SpecMetrix* software. This will not be an option for SA software packages older than revision 2.9. If this button is not visible in the SA Menu, the shortcut to return to the Windows desktop environment is Control + Alt + X.



Signing On

1. Double-click the *Sensory Menu* icon on the desktop. This will open the SA Menu window and prompt the user to enter login credentials by clicking the *Change User* button below (outlined in blue):

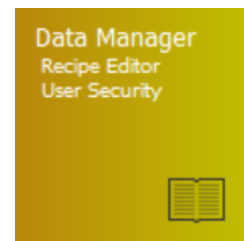


2. Make sure the Hardware Connection Status is running (indicated by the green color). If Hardware Connection Status is Stopped (red color) click the tile once.
3. Click the ACS button, this will start the ACS application.

The *SpecMetrix*® ACS Measurement System should now be ready for measuring.

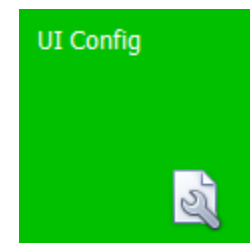
SA Menu Buttons

Data Manager - Integrates to a SQL database where all recipes are stored and tracked. Additionally, this interface supports a user-friendly interface for Adding/Editing not only recipes, but lane definitions for traversing systems, User Security, and the Plant database.



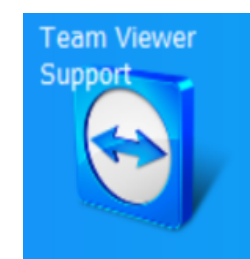
Analysis Tool – Used to analyze collected debug files during a measurement cycle by using optimized algorithms for faster analysis and validation of your measured coatings & films. Collect debug files by clicking the “debug” check-box in the UI.

UI Configuration – Grants users with local admin level credentials access to the SA User Interface settings. Users can adjust graph settings, minimum and maximum measurement ranges, as well as change aspects of the system such as the color of the High/Low measurement on the display, or to apply alternative smoothing to a graph, and even if you wish to set your graphs to be tabbed or side-by-side in multi-line systems.



Windows Shutdown – Used to close the *SpecMetrix*® Server in a ‘Friendly’ way (so that all hardware is properly closed), you must first stop the SA Data Service before shutting down or restarting Windows. If the service is running, you will receive an error prompt indicating this as well. Depending on how you requested the system be setup with the sensory technician, the system will either shutdown or restart.

Team Viewer Support – Team Viewer is a secure remote support tool that gives Sensory Analytics personnel remote access to our customers’ *SpecMetrix* display unit so we can offer immediate solutions to the more challenging issues. For Sensory Analytics to provide remote support you will need to provide the **9-digit Team Viewer ID** as well as the **Team Viewer password**. There is no way for Sensory (or anyone else) to access your *SpecMetrix* display unit without the plant providing this information.



For specific information about Team Viewer visit them online at (www.teamviewer.com).

SA User Configuration

Category	Sub-category	Value
Admin Security	Inactivity Timeout	0
Average Reads Tab	Posted Readings Averaged	5
ColorBands	Green Colorband	50
	Red Colorband	25
	Yellow Colorband	25
CrossWeb	CrossWeb Line Count	2
Default User	Default Password	user
	Default User Id	user
Differential Inline System	Show Base Value	True
	Show Total Value	True
Inline	Cross Web Config	Graph Configuration
	Decimal Places	2
	Die Graph Config	Graph Configuration
	Down Web Config	Graph Configuration
	Downweb Graph count	120
	Lane Graph Config	Graph Configuration
Lab System	Has Self-Referencing Probe	False
Logging	Logging Interface	Logging Interface Options
Probe Colors	High color	Blue
	Low color	Red
SA Menu	Menu Scaling	170
	Shutdown Method	Shutdown
System Support	Logging Level	None
UI Performance	Position Update Rate	5

Cross Web Config
Configuration options for Cross Web

Save

Admin Security

Inactivity Timeout

The number of minutes of inactivity before Admin Timeout; Default is set to **0 (Never Timeout)**.

Average Reads Tab

Posted Readings Averaged

Count of reading cycles to use for calculating held average. Only used for Average Reads Tab; Default is set to **5**.

Color Bands

Percentage of the graph that the band occupies. By default, **GREEN = 50, YELLOW = 25, RED = 25**.

Default User

User account used when the application is initialized. Operators can press the Change User tab when Administrative privileges are needed; default is set to *User*.

Probe Colors

Drop-down menu to change the color of the Probe Readings where **by default high values are Blue** and **low values are Red**. Operators can use the drop-down menu to pick any color desired.

SA Menu

Menu Scaling

Changes the scale size, by percentage, of the SA Menu tiles. Default value is set to **150**.

Shutdown Method

Shutdown method when the *System Shutdown* button is pressed from the SA Menu. Options include *Shutdown* and *Restart*.

System Support

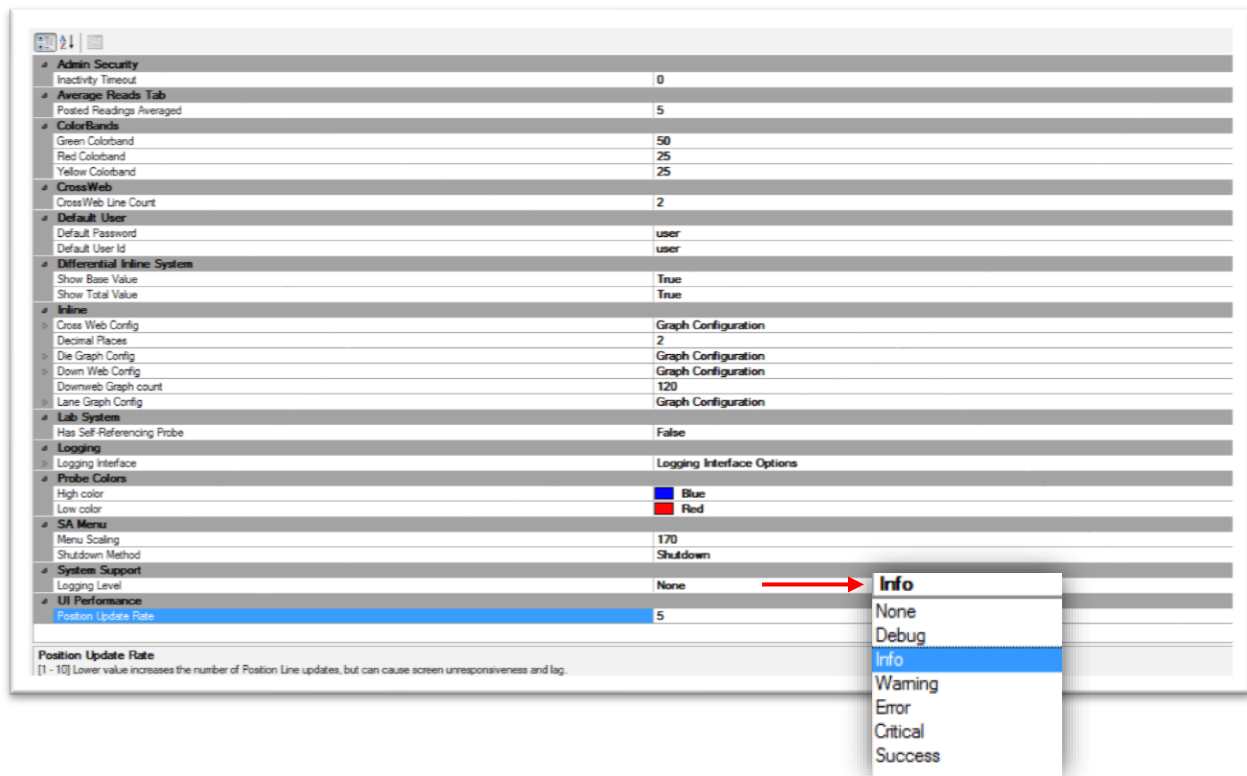
Logging (SA 2.9 and newer)

Lowest Logging Level that will be saved in the “temps” logs. Drop-down options for each Logging Interface Option include *Off*, *Info (Default)*, *Warning*, *DebugLowDetail*, *DebugHighDetail*, *Trace*, *Exceptions*, and *Error*.

Logging	
Logging Interface	Logging Interface Options
Data Service Logging	Info
Database Call Logging	Info
I/O Board Logging	Info
Line Controller Logging	Info
Motion Logging	Info, DebugLowDetail, Trace, Exceptions, Error
OPC Logging	Info
SA Core Logging	Info
SA Service Logging	Info
Sensor Logging	Info, Exceptions, Error
TCP/IP Logging	Info
UI/HMI Logging	Off

Logging Interface Options

1. **Data Service Logging:** Sets condition level for Data Service core functions.
2. **Database Call Logging:** Sets condition for Database operations.
3. **I/O Board Logging:** Sets conditions level for I/O Boards.
4. **Line Controller Logging:** Sets conditions level for line controllers.
5. **Motion Logging:** Sets the condition level for Motion Control.
6. **OPC Logging:** Sets the condition level for OPC/LPC Based Integration.
7. **SA Core Logging:** Sets the condition level for SA Core.
8. **SA Service Logging:** sets the condition level for SA Service.
9. **Sensor Logging:** Sets the condition level for the optical sensors.
10. **TCP/IP Logging:** Sets the condition level for TCP/IP Integration.
11. **UI/HMI Logging:** Sets the condition level for UI controls attached to the SA Service.



SA Data Manager

User: [CorporateAdmin] Default Admin - Sensory Analytics Data Manager

Navigation: Home, Login, Set Language, Service: Running, New Recipe, Edit Recipe, Refresh from Database, Import Recipes, Export Recipe, Delete Recipe, Show Filter

Filters: All (no filter) [10], NIR [3], VIS [0], Both [0], Plants [PlantName] [10]

Plant: 0 - [PlantName]

Plants: Kinar_Mls, Kinar_Mls_White, NewRecipe, NIST, Primer, TestHER, TestHER 2, TopCoat_NIR, WeatherXL_Mls, WeatherXL_Mls_White

Recipe Form:

- Name: NIST
- Plant: [PlantName]
- Sensor: NIR
- Output Units: Microns
- Recipe Type: Standard
- Description:

LAYER INFORMATION

Layer ID	Layer Type	Min Read %	Max Read %
NIR	Inline Primary	900 - 1700 / 1.62	
VIS		600 - 900 / 1.65	
SWIR		500 - 1300 / 1.55	

Conversion Settings:

- Use Calculated Conversion? ☒
- Use Peak Analysis? ☒

Peak Analysis Settings:

- Peak Tolerance: 0.3
- Fringe Variance: 0.3
- Momentum: 2
- Height Threshold: 0.01
- Adjustment Factor: 0.66
- Custom Smoothing: 0

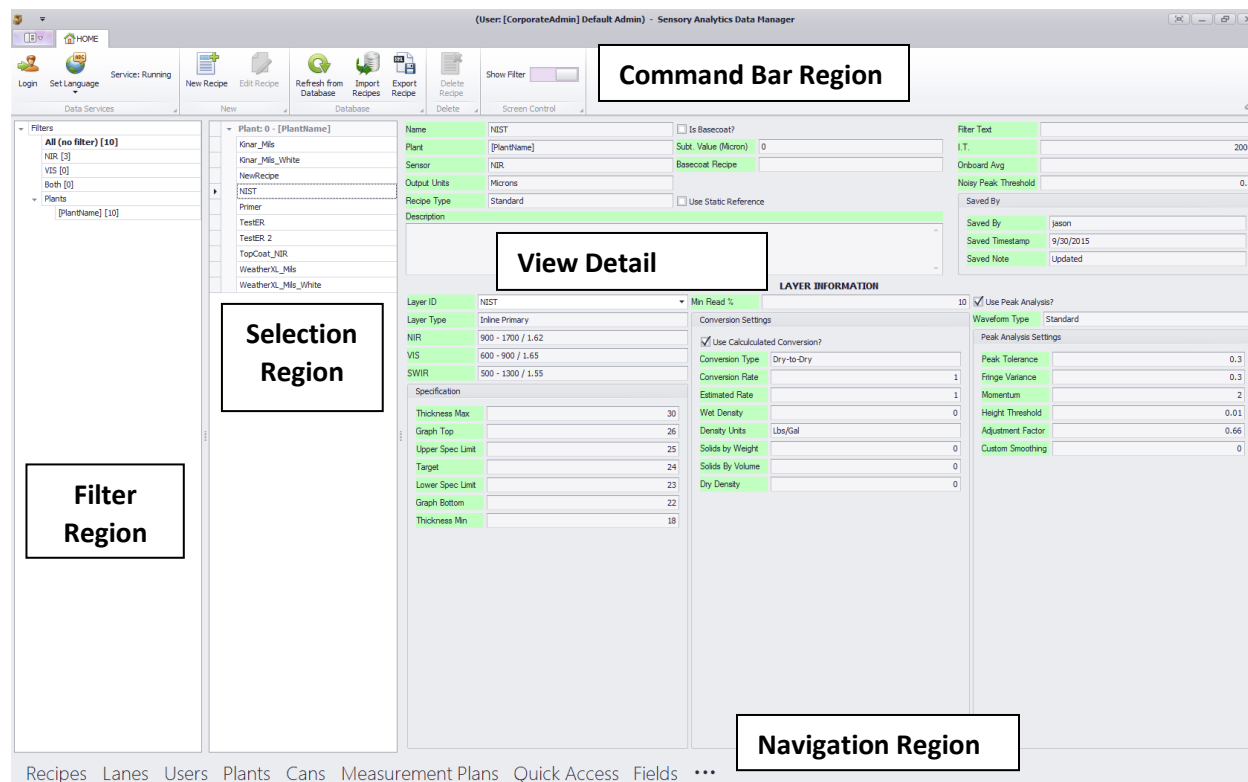
Navigation: Recipes, Lanes, Users, Plants, Cans, Measurement Plans, Quick Access, Fields

The SA Data Manager does more than edit recipes. This interface integrates to a SQL database where all recipes are stored and tracked. Additionally, this interface supports a user-friendly interface for Adding/Editing not only recipes, but lane definitions for traversing systems, User security, and the Plant database.

General Information

The Data Manager structure and flow functions very similarly to Microsoft Outlook in terms of navigation which is quite familiar to many users. The layout of the data manager is broken down into 5 main visible sections as shown below.

Region Layout



Command Bar (Ribbon Bar)

The Command Bar is itself divided into sub groups, and except for the “Data Services” section, will change depending on which module is being viewed by the user.

Data Services Group

Login – This will allow the user to use different login credentials, or if clicked and ‘cancelled’ then the system will automatically log out of the current user and into a [default user] which does not have any editing privileges.

Set Language – This is a real-time action that will allow you to change the currently displayed language on the screen. This will only affect the current instance of the Data Manager. Subsequent entries from SA Menu will display in the language that is currently defined as the default language (This is changed in the SA Menu [Change Language] option).

Service: {Running/Stopped} – This indicates the current connection status to the Data Manager Service. The Data Manager UI cannot be accessed if the Service is in a ‘Stopped’ state. However, if the Service becomes unresponsive or is stopped while the Data Manager UI is currently active, the status will change from ‘Running’ to ‘Stopped’, and likewise will change from ‘Stopped’ to ‘Running’ once the service is restored. *Database transactions (Save/Delete) cannot take place when the service is ‘Stopped’.*

New Group

Each Module can add a ‘NEW’ item, or ‘Edit’ and existing item. These buttons are disabled if the user does not have sufficient security login credentials to perform the action. Clicking on either of the options, when enabled, will open the corresponding editor screen.

Database Group

If multiple people are working with the data, a user may need to periodically “Refresh from Database” to ensure that he/she is working with the most current data.

The ‘Recipes’ and ‘Lanes’ modules have an Import and Export feature. The ‘Lanes’ feature is only applicable to *SpecMetrix*® In-line Traversing systems.

The import wizard (described in more detail later in this manual) will validate and make available, an XML transport/backup file, with recipes or lanes to add to the current plant database.

Highlighting one or more recipe or lane ID’s in the Selection window and then clicking the Export button will allow the user to create a backup XML that can be used to import to another plant or transfer recipes to another *SpecMetrix*® ACS Measurement System.

Delete Group

The Delete button will remove the selected item from the “Active” item list, and will no longer display that item in the selection options. For Recipes and Lanes, it is recommended that these items are archived in the database and not permanently deleted.

Screen Control (Recipe Module Only)

The screen control has a toggle: “Show Filter” that by default is ‘on’ which displays the [Filter region](#). When this is toggled off then the Filter region is hidden and the Selection region and recipe view region is scrolled to the left. This is not needed for English, or most languages, however some fields after translation end up having longer words/phrases in some languages to describe the field information. In those cases, the Recipe View is scrolled off the right-hand side of the screen. This toggle will provide enough room on the screen to allow for full visibility of all recipe data by hiding filter panel on the left.

Filter Region

Plants have asked for a filtering mechanism to see recipes in groups/filters and Sensory Analytics listens to what our customers ask for, now here it is. Recipes have long had a 'Group' field, and now that group field is called "Filter Text", which allows a plant to enter a [string] in the filter text field, which in turn gets rendered as a selectable filter. Clicking on the filter will change the recipe Selection region to display only the associated recipes with that filter.

Next to each filter is a number inside of brackets (for example: [5]), in this case, that indicates that there are 5 items that match that filters criteria. Selecting that filter would display those items in the Selection Region.

Selection Region

The available recipe list is seen in the Selection Region. This list can/will change if the user selects a different filter. A filtered list is a subset of the full list which can be seen by choosing the filter labeled "All (no filter)".

A user can only edit one item at a time, therefore selecting multiple items and clicking the 'Edit' button will not change all items at once. Multi-selection is only applicable to Exporting Recipes or Lanes.

View Detail Region

The details of an item are visible in the larger section in the middle-right side. This is a Read-Only section and does not allow changes directly in this screen. In the Recipe Detail View, if a recipe has multiple layers defined, a user can review the layers by selecting the layer within the dropdown.

Module Navigation Region

To navigate and view different modules, simply mouse over and click on the module name. When you mouse over the module name will change color to indicate the selection. If the login is changed, the screen will automatically reset to the 'Recipes' module.

Recipes

The screenshot shows the 'Recipes' management interface. The top navigation bar includes 'HOME', 'Login', 'Set Language', 'Services: Running', 'New Recipe', 'Edit Recipe', 'Refresh from Database', 'Import Recipes', 'Export Recipe', 'Delete Recipe', 'Show Filter', and 'Screen Control'. The left sidebar contains a 'Filters' section with 'All (no filter) [10]', 'NIR [3]', 'VIS [0]', 'Both [0]', and 'Plants [PlantName] [10]'. The main area displays a list of recipes under 'Plant: 0 - [PlantName]', including 'Kmar_Mls', 'Kmar_Mls_White', 'NewRecipe', 'NIST', 'Primer', 'TestER', 'TestER 2', 'TopCoat_NIR', 'WeatherXL_Mls', and 'WeatherXL_Mls_White'. The detailed view for the 'NIST' recipe shows fields for Name, Plant, Sensor, Output Units, Recipe Type, and Description. Below this is a 'LAYER INFORMATION' section with a table of layer specifications. The right sidebar includes a 'Filter Test' section, a 'Saved By' section, and a 'Peak Analysis Settings' section.

The most important part of the *SpecMetrix*[®] ACS Measurement System is the coating recipe. This contains all the critical information about the coating/layer/film that is being measured. This User Interface allows all the information about the recipe and its layer(s) to be viewed on a single screen.

There is a lot of information on this screen, and while all of it may be relevant, not all of it is “required”. For fields that are required or that have dependency properties, this new solution has validation that takes place when an attempt is made to save the recipe. If not all the required information is entered, an appropriate alert will be displayed as (Red circle with ‘X’) or (Yellow caution with “!”). Hovering over the icon will provide a description of what is required to fulfill the validation. If the required information is not available, the recipe cannot be finalized and saved.

The most exciting and useful feature to the Recipe Editor is the Recipe Wizard/Assistant. This button is the largest feature on the screen because it is critically important for setting up new baseline recipe (There is an entire chapter devoted to the Recipe Wizard in a subsequent section). Activating this function will start a simple dialog that will take the user through all the required prompts, and ‘ask’ some simple, but important, questions about the coating/film that is being measured. Once the user answers these questions and responses finalized, a baseline recipe will be automatically generated and all the user needs to do next is “Save”. While the recipe wizard will generate a very good baseline recipe and sufficient for most

Coating combinations, there will still be room for optimization depending on the application and a trained *SpecMetrix*® ACS Measurement Systems user can edit and optimize the recipe parameters as necessary.

Editing/Creating a recipe

The fastest, easiest and best way to create a new recipe is to use the Recipe Wizard. This will guide the user through all the required information in a user friendly guided questionnaire, as well as calculate the optimal starting recipe parameters for getting measurements.

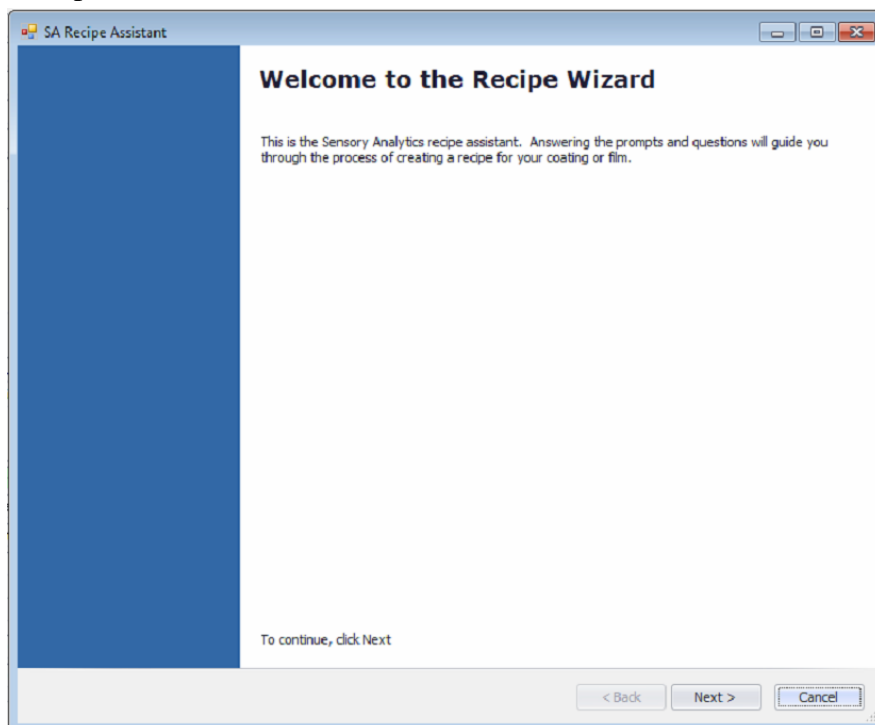
The recipe editor is a ‘busy’ screen, but the information is logically laid out, and once the user understands the process, recipe changes will be quick and simple.

Recipe Wizard



Recipe Wizard is a user-friendly way to create a new coating recipe for the *SpecMetrix* ACS Measurement System. Having a good recipe for a given coating is critical and it is a one-time setup that takes few minutes for a given coating. The task of creating new recipes has been much more simplified compared to earlier versions and by answering a few questions almost anyone can create a recipe and achieve good measurements. As noted earlier, while a significant percentage of recipes created with the recipe

wizard will get measurements right away, there is often the need to review some of the fine-tuning details of a recipe in the SA Analysis Tool to dial-in the recipe for the purposes of final optimization of recipes.



Getting Started with the Recipe Wizard

Once the user is in the editor the Recipe Wizard Button will be displayed in the upper-right side of the screen.

SA Recipe Assistant

Recipe Assistant - General information
The recipe assistant will guide you through creating a new recipe.

spec METRIX

Recipe Name: Laminating

Units of Measure: lbs / ream

Sensor Type: NIR

Recipe Type: Standard

Measurement State?
☐ Measured Wet
☒ Measured Dry

Output State?
☒ Results as Dry
☐ Results as Wet

☐ Also used as dry Basecoat?

< Back Next > Cancel

There are only 4 screens with entry questions. The first screen is gathering some general information such as:

- **Recipe Name** – This is the Recipe ID that is used for recipe selection and is unique identifier
- **Units of Measure** – (Default: Microns) this represents the desired output units. The units of measure could be thickness units such as microns or mils or coat weight units such as mg/in², mg/4in², g/m², lbs./ream etc.
- **Sensor Type** – NIR or VIS. The recipe wizard directs its results to one or the other detector/sensor.
- **Measurement State** – This determines whether the coating is being measured in the wet state or dry state.
- **Output State** – How does the user want the results converted for output? Wet or Dry

- **Also, used as dry Basecoat?** – If this recipe will be used as a base coat for a 2nd pass coating where we will be subtracting a fixed result then check this box. This does not apply to differential or multi-layer subtractive coatings.

The optical properties page is asking about the opacity (color) of the coating, and if the coating is clear/gold and there is a base coat underneath, what is the opacity (color) of the base coat.

- **Coating Color** – There are 5 choices {Clear, Gold, White, Pigmented, Metallic}. Choose the most appropriate one for the primary layer being measured. If none of these are applicable for the specific coating, the closest option should be chosen.

Clear Top Coat Group box

- **This is a Top Coat** – This is asking if the layer being defined is a top coat being applied over the top of another layer of coating (for example: base coat). If “Yes”, then put a check mark in this box and proceed to answer the ‘Base Opacity’.

- **Base Opacity** - There are 5 choices {Clear, Gold, White, Pigmented, and Metallic}. Choose the most appropriate one for the Base coat underneath the measured layer.

A micron to weight conversion often requires coating specific properties which is generally found in the Coating Specification Sheet from the coating supplier. The most difficult piece of information that is typically missing from the Coating Specification Sheet is the [% of Solids by Volume]. A simple assistant screen is provided to help the estimation of the %solids by volume field, however this is only an *estimation* based on user entered values and it is highly recommended to obtain this value from the coating supplier. It is important to understand that % of solids by volume is required only for measuring dry coating in coating weight units and not coating thickness units. It is not required either while measuring wet coatings or while measuring the coating in the units of thickness such as microns.

Layer/Coating Name – this is a required field. This prints on reports, graphs and is part of the selection tool in the SA Analysis Tool.

Some conversions can apply a Dry Density Calculation in lieu of percent solids by volume.

For Wet-to-Dry conversions the user must enter the data in the Weight Conversion Group.

For Dry-to-Dry base coat conversion you must enter the appropriate conversion for Dry Density or percent solids by volume.

SA Recipe Assistant

Recipe Assistant - Specification
Enter the specification for layer being measured.

Target Specification: 1.35 Range (±): 0.1 Calc All Parameters Set Limits / Refresh Graph

Thickness Max: 4.35

Top of Graph: 1.55

Upper Spec Limit: 1.45

Lower Spec Limit: 1.25

Bottom of Graph: 1.15

Thickness Min: 0.5

< Back Next > Cancel

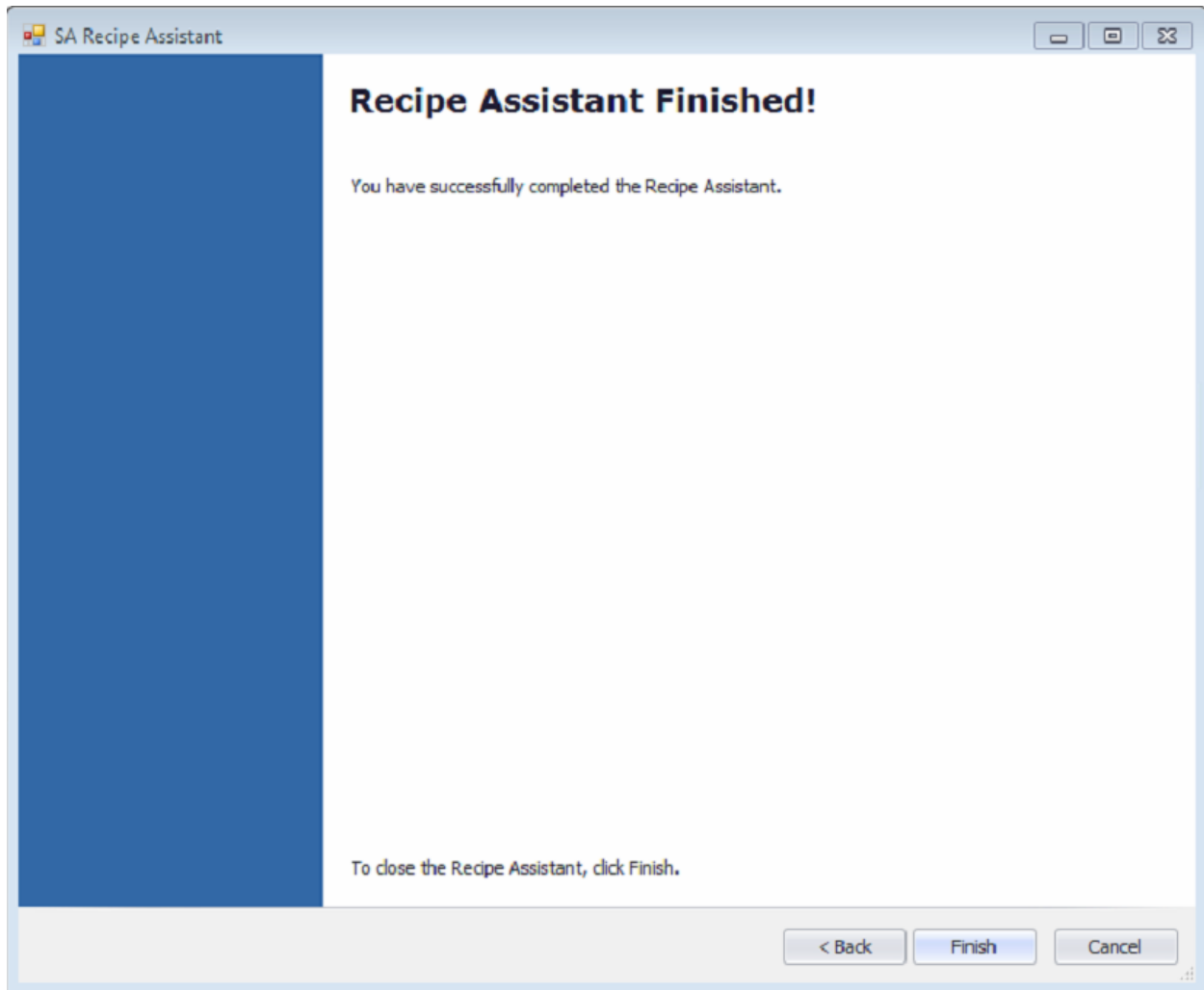
The easiest way to finish up the Specification is to enter the desired target specification, and select the appropriate range for the specification tolerance, then click the “Calc. all Parameters” button. This will present the graph in the best logical layout with SPC banding, and based on the specification will attempt to isolate to an appropriate thickness min/max, graph bottom/top, and show the limit specs.

A user can adjust your target specification and range to reflect and “upper limit” and “lower limit” by entering the values in accordance with the formula:

$$\text{Target Specification} = (\text{Upper Limit} + \text{Lower Limit}) / 2$$

$$\text{Range} = (\text{Upper Limit} - \text{Lower Limit}) / 2$$

The Thickness Min/Max values may need to be adjusted when measuring multi-layer applications to prevent multiple thicknesses from invalidating each other.



The Recipe Wizard is now complete. The user can navigate [Back] to review the questions or click on [Finish] to finalize and generate the new recipe.

Once the user clicks on [Finish], the Recipe Editor will be back into view and focused. The user should click [Save] and that will write the new recipe to the database.

Users

Login	Plant Name	First	Last
admin	Sensory Corp	Default	Admin
user	Sensory Corp	Default	User

Form fields for user 'admin':

- Login: admin
- First Name: Default
- Last Name: Admin
- Plant Name: Sensory Corp
- Access Level: Corporate Admin Access
- Password: [empty]
- Login Expiration: [empty]
- Login Created: 2/4/2015
- Last Login Date: 4/21/2015

Navigation: Recipes Lanes **Users** Plants ...

User security is (or at least should be) at the forefront of thinking in any plant. Ensuring that the right people have access to make changes, or not, will ensure that the data remains secure and accurate.

User Permission levels and their privileges

- **User** – This is a base level user. They have access to “Read” but not update any element. In the Data Manager, this access level can only review [*Recipes*] and [*Lanes*]. A user can open and operate the SA software, as well as the Analysis Tool. However, recipe changes will not be available for this access level.
- **Supervisor** – This access level has permission to add new recipes & lanes. They can also edit recipes provided the minimum access level for the recipe is set to Supervisor. Supervisor level can add/remove user & supervisor level users to the User Security. These users have visibility to [*Recipes*], [*Lanes*] & [*Users*] modules.
- **Local Admin** – Previously this was the highest level of access. This remains the highest level of access for a defined [*Plant*]. This access level can add/edit recipes provided the minimum access level for the recipe is set to Local Admin. Local Admin level can

add/remove user, supervisor & local admin level users to the User Security. These users have visibility to [Recipes], [Lanes] & [Users] modules.

- **Corporate** – Corporate users are the equivalent of a Supervisor; however, they access to the currently established “Corporate” defined recipes and lanes (The corporate defined account is the account who’s Plant ID = 0). This level of access does however possess the ability to add/modify/remove ANY user, regardless of assigned plant, whose credentials are ‘Corporate’ or less.
- **Corporate Admin** – This is the highest-level user on the system, but still has restrictions on some aspects of the recipe editor. First, this is the minimum level user that is required to add, modify or inactivate a [Plant]. Corporate Admin’s can view all plant recipes, but can only make modifications to the ‘Corporate plant’ recipes and lanes. This level of access does however possess the ability to add/modify/remove ANY user, regardless of assigned plant.
- **Support** – This level of access is strictly limited Sensory Analytics Technical personnel.

** **Note:** Login name is a unique field. If a login name already exists on the system (regardless of visibility in the editor) then you will need to select a different name as there cannot be 2 logins with the same.*

Plants

The screenshot shows the 'Sensory Analytics Data Manager' web application. The title bar indicates the user is '[CorporateAdmin] Default Admin'. The interface has a top navigation bar with icons for 'HOME', 'Login', 'Set Language', 'Service: Running', 'New Plant', and 'Edit Plant'. Below this is a sidebar with 'Filters' and 'Sensory Corp'. The main content area displays the details for the 'Sensory Corp' plant. Fields include: Plant Number (0), Name (Sensory Corp), Location (Greensboro, NC), Contact Name (Jason Jelks), Contact Phone ((336) 315-6090 X115), Saved By (admin), Saved Timestamp (10/24/2015), and Saved Note (Updated). A bottom navigation bar includes 'Recipes', 'Lanes', 'Users', 'Plants', and a dropdown menu.

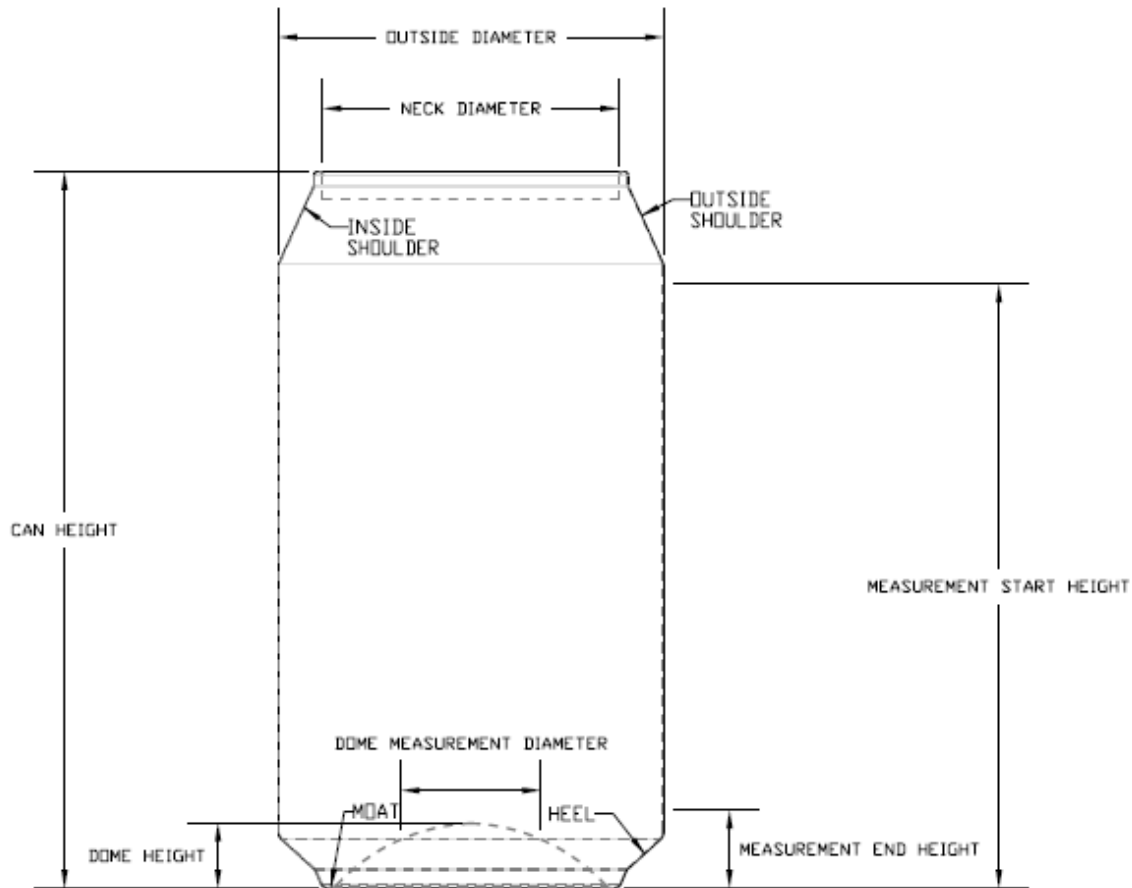
For almost all systems installed in the field the recipe data base will reside locally on the *SpecMetrix*® unit. This is also the recommendation of Sensory Analytics®. When this is the case, then there is only one plant and it will be the ‘Corporate’ plant.

*** The corporate plant cannot be deactivated.**

For those corporate facilities who wish to host the Data Manager on their server, there are some requirements that need to be fully asserted. First, the server/pc MUST be a Windows 7 (or newer), or MS Server 2008 R2 (or newer). Secondly, you MUST allow the *SpecMetrix* Data Service to be installed and run (automatically) on the server. Additionally, Sensory Analytics technical personnel may require access to the Database to perform scripts for updates or maintenance. Lastly, the plant/client must be able to maintain 100% up-time of the server for any *SpecMetrix* unit that will be accessing it during production (this means using the In-line function). It is the responsibility of the plant to ensure that all connections and network settings are properly configured and accessible for all users who access and use a *SpecMetrix* unit that connects to a remote Data Manager host. Sensory Analytics cannot manage or make changes to a plants network at any time.

For additional information regarding Data Manager hosting please contact Sensory Analytics®.

Cans



Can Dimensions

The diagram above depicts all measurement positions on a standard necked can. The dimensions of each can must be measured prior to creating a part recipe. The *SpecMetrix* Mark II display unit will most likely come preloaded with recipes based on customer specifications and provided can information. However, if a user needs to either create a new parts recipe or modify an existing recipe, the *Cans* tab is where to start.

A parts recipe is comprised of information on the physical dimensions of the can, select properties of the coating, the number of measurements taken, and the desired units of measurement. This information is easily entered and stored on the *Cans* tab shown in the following illustration.

Can Information

Name

Description

Container Type

Volume

Dimensions

Height Diameter

Neck Height Neck Diameter

Base Height Rim Diameter

Wall Height

Dome Height



Surface Area

Outside Inside

layoutControlGroup1

Saved By Saved Date

Note

 Save  Cancel

The following fields must be completely populated to create a recipe for a specific can:

Can Information

Name: Users can choose any name to create a can to use in a recipe.

Description: This allows users to differentiate between cans that may have comparable properties or dimensions.

Container Type: A drop-down menu that includes all possible can types such as 2 Piece Can, 3 Piece Can, Bottle, and Aerosol.

Volume: The capacity of the can. This will usually be printed on the can. Examples are 12 oz., 16 oz., 200ml, etc.

Dimensions

Refer to the Can Dimensions diagram:

Height: The entire length of the can from the top of the lid to the bottom of the rim.

Neck Height: The entire length of the inside/outside shoulder.

Base Height: The entire length of the heel. This is the opposite position of the shoulder.

Wall Height: The length of the can between the top of the base/heel to the bottom of the shoulder.

Dome Height: The vertical distance from the bottom center of the can to the absolute bottom of the can.

Diameter: The outside diameter; the width of the can from wall to opposite wall

Neck Diameter: The distance from the inside of the neck to the opposite side.

Rim Diameter: The distance from the center of the moat to the opposite center of the moat.

Surface Area

The outside and inside surface are in mm squared of the can. This is usually proved by the plant.

Layout Control Group

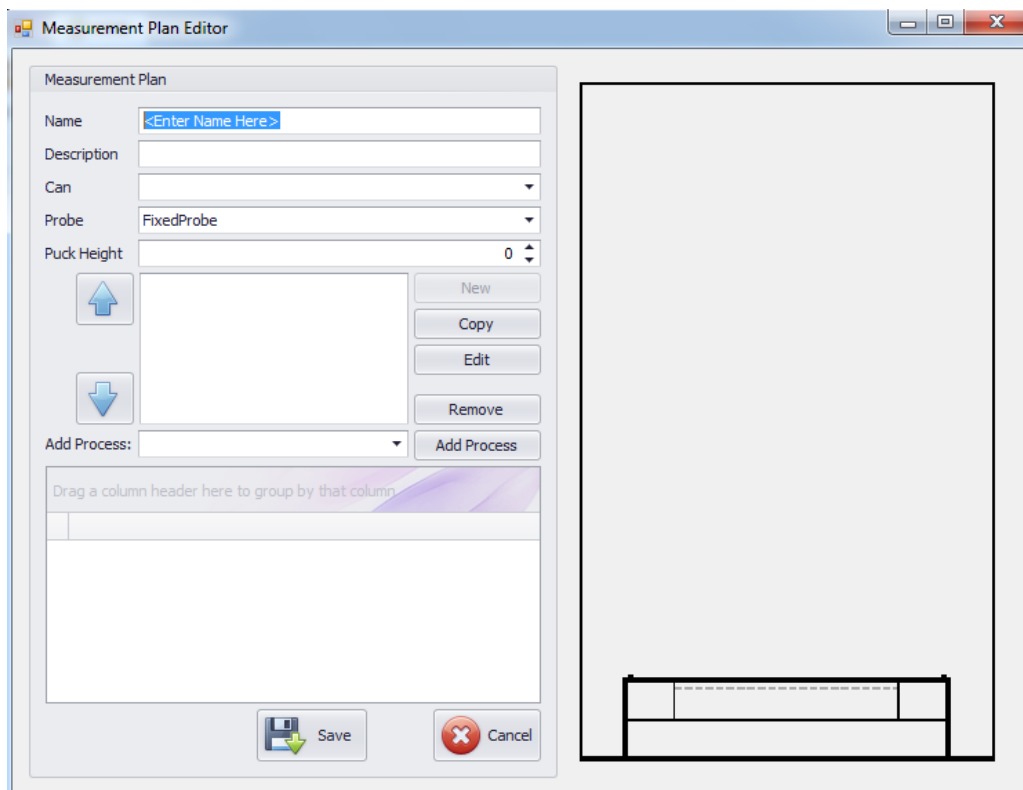
Saved by: The user that made the most recent changes to the can information may be the original creator.

Saved Date: The last date any changes were made to the can information.

Note: Any information about the can that may be pertinent for identification.

Measurement Plans

A Measurement Plan is a collection of processes, each process being a collection of measurement positions on a can. In this section, users can determine which positions on the can the probe(s) will be measuring on each run. Users can include up to 7 positions on the can to measure but have the flexibility of changing the measurement plan for each run per socket. For example, one run may include all possible positions on a can for one socket but only include 2 positions for the next socket in the run. This is most useful when using a multi-can stand that contains multiple sockets.



Measurement Plan Editor

Name: Unique name for Measurement Plan

Description: Brief explanation of where the can will be measured

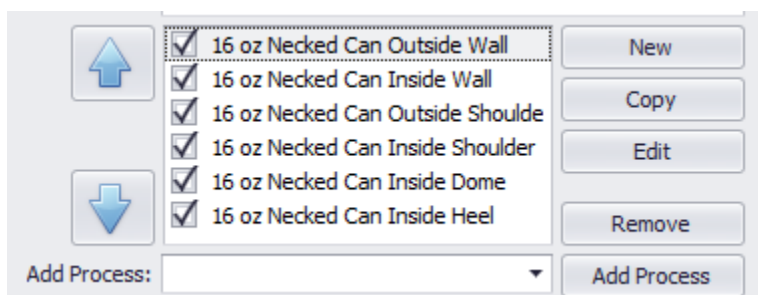
Can: Size of the can

Probe: Type of probe used for measuring

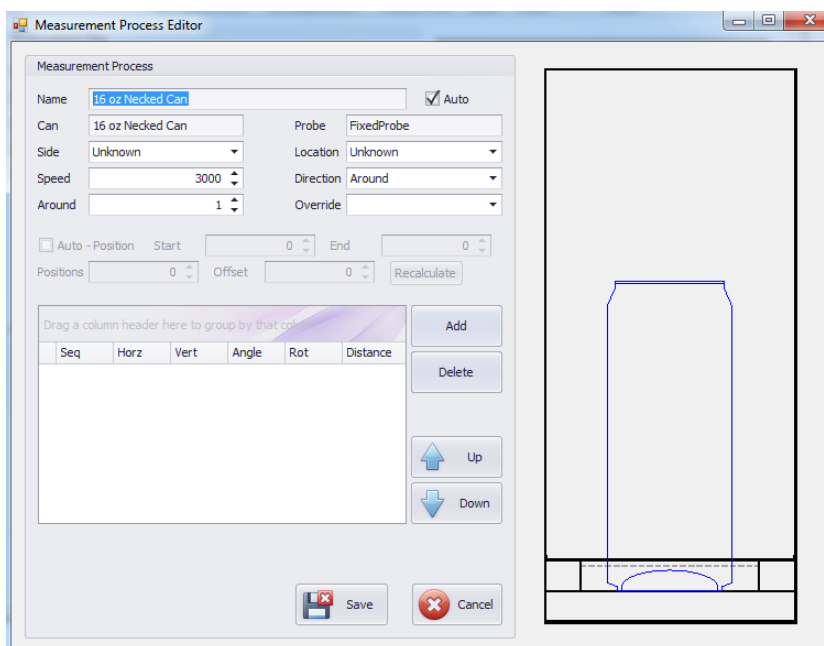
Puck Height: Default height of zero. A pedestal may be added.

Add Process

A drop-down menu of all available positions.



Check boxes are used to determine which positions are included in the measurement plan. To add a new position, the user must click the “New” button to open the Measurement Process Editor.



Name: The name given to the process.

Can: The can type chosen in the Measurement Plan Editor (cannot be changed).

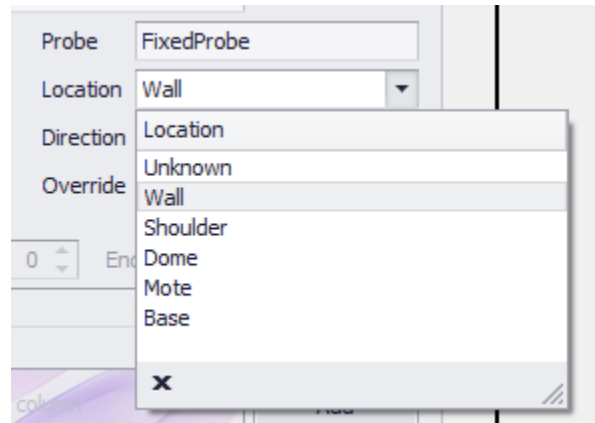
Side: Drop-down to choose between “Inside” or “Outside” of the can.

Speed: The rotational speed of the socket in milliseconds. The default speed is preset for measurement optimization, so it is recommended that this value not be adjusted without prior consultation with *SpecMetrix* technicians.

Around: The number of sectors measured in one rotation. Each sector gives an average of each measurement taken within that sector.

Probe: The type of probe installed in the ACS. This cannot be changed.

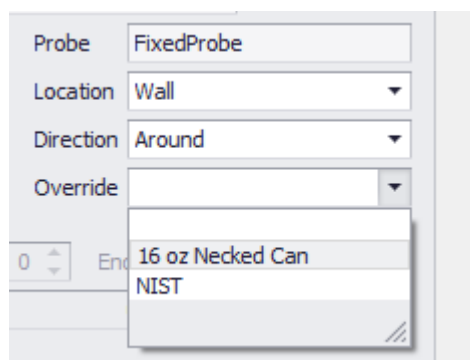
Location: A drop-down menu of positions that can be used.



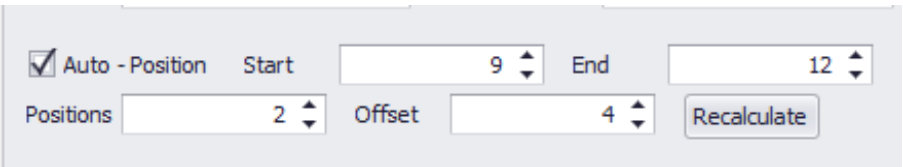
By default, the Measurement Process Editor gives new processes the same name as the Measurement Plan when the Auto check box is selected. As the Side and Location positions are determined, they will be added to the name automatically unless the Auto check box is unchecked. In this case, the user can give the Measurement Process any name they choose.

Direction: A drop-down menu in which the user can choose to measure vertically, horizontally, or around the can.

Override: A drop-down menu of alternative recipes that can be used if one is needed for a specific location of the can. This is helpful if a recipe with different specifications is necessary to give a more accurate reading.

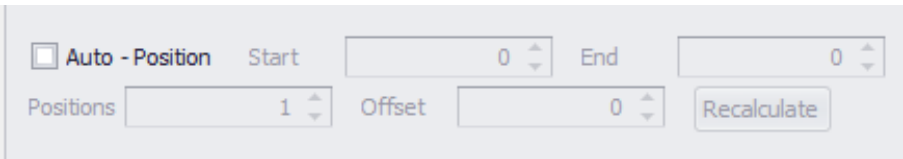


There is an Auto-Position check box that when checked, users can determine the Start and End measurement locations, the number of vertical or horizontal positions, and the offset of the probe during the measurement run.



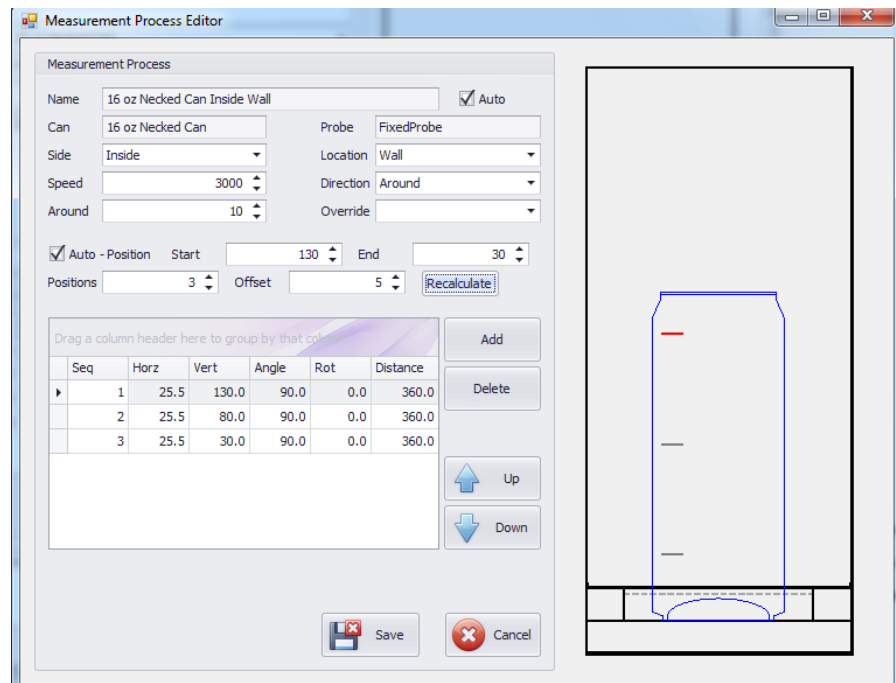
This screenshot shows a control panel for the 'Auto-Position' feature. The checkbox is checked. The 'Start' value is 9 and the 'End' value is 12. The 'Positions' value is 2 and the 'Offset' value is 4. A 'Recalculate' button is present.

When this box is unchecked, these factors are inaccessible and cannot be modified.



This screenshot shows the same control panel, but the 'Auto-Position' checkbox is unchecked. The 'Start' and 'End' values are both 0, 'Positions' is 1, and 'Offset' is 0. The 'Recalculate' button is still visible.

The Measurement Process Editor shows a graphic of the positions selected for measurement.



The screenshot shows the 'Measurement Process Editor' window. It contains a form for setting measurement parameters and a table of selected positions.

Measurement Process

Name: 16 oz Necked Can Inside Wall ☒ Auto

Can: 16 oz Necked Can Probe: FixedProbe

Side: Inside Location: Wall

Speed: 3000 Direction: Around

Around: 10 Override:

☒ Auto - Position Start: 130 End: 30

Positions: 3 Offset: 5

Drag a column header here to group by that column

Seq	Horz	Vert	Angle	Rot	Distance
1	25.5	130.0	90.0	0.0	360.0
2	25.5	80.0	90.0	0.0	360.0
3	25.5	30.0	90.0	0.0	360.0

The right side of the window shows a graphic of a can with a blue outline and a red line indicating the measurement path.

A completed Measurement Plan will show all the positions that have been created. The process that is selected among the added fields is highlighted in red in the graphic.

Measurement Plan

Name

16 oz Monster

Description

All Positions

Can

16 oz Necked Can

Probe

FixedProbe

Puck Height

0

↑

↓

☒ 16 oz Necked Can Outside Wall
☒ 16 oz Necked Can Inside Wall
☒ 16 oz Necked Can Outside Shou
☒ 16 oz Necked Can Inside Shoul
☒ 16 oz Necked Can Inside Dome
☒ 16 oz Necked Can Inside Heel

New

Copy

Edit

Remove

Add Process:

Add Process

Drag a column header here to group by that column

Seq	Horz	Vert	Angle	Rot	Distance
1	-35.5	130.0	90.0	0.0	360.0
2	-35.5	94.0	90.0	0.0	360.0
3	-35.5	58.0	90.0	0.0	360.0
4	-35.5	22.0	90.0	0.0	360.0

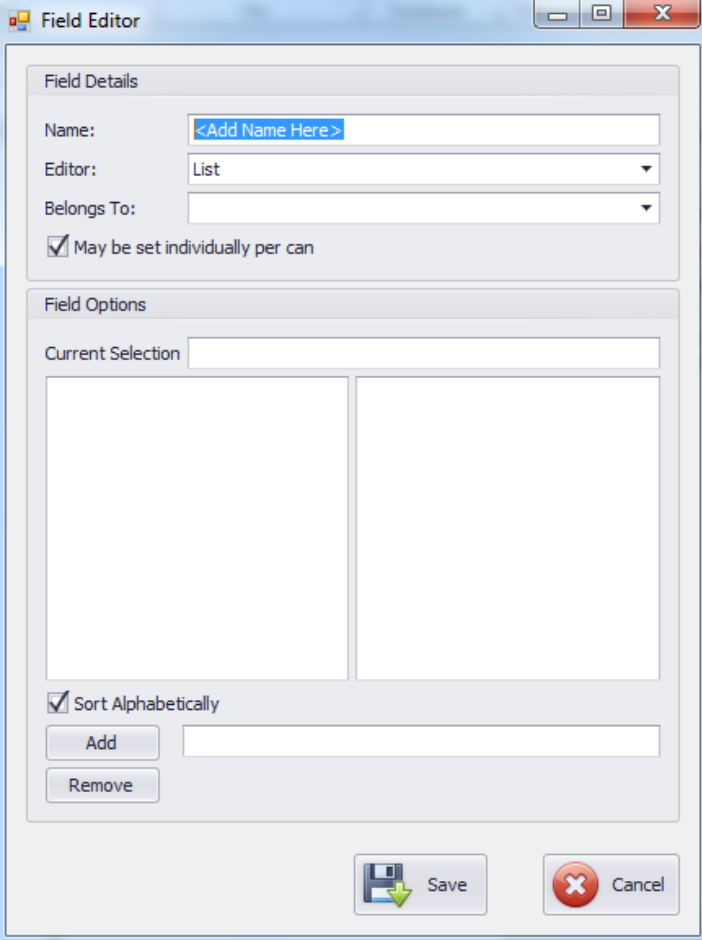
Save

Cancel

Fields

This section is where a plant can define their requirements for user inputs to operate the *SpecMetrix*® ACS Measurement system. For example, plants can define the names of their coating sprayers (inside and outside), the name of production lines, and differentiates between shifts and users.

To create a new Field, select the New Field tab.



The screenshot shows the 'Field Editor' dialog box with the following sections and controls:

- Field Details:**
 - Name:** A text field containing '<Add Name Here >'.
 - Editor:** A dropdown menu currently set to 'List'.
 - Belongs To:** A dropdown menu.
 - ☒ May be set individually per can
- Field Options:**
 - Current Selection:** A text field.
 - Two large empty rectangular boxes for input.
 - ☒ Sort Alphabetically
 - Add:** A button next to a text input field.
 - Remove:** A button.
- Buttons:** At the bottom right, there are 'Save' (with a floppy disk icon) and 'Cancel' (with a red X icon) buttons.

Users will give the new Field a name and then add inputs that belong to that Field. For instance, the user can create production lines that contain one or more guns or shifts that contain multiple users or operators. It is like creating a directory and assigning fields that belong to that directory.

Field Details

Name: Shifts
Editor: List
Belongs To:
☒ May be set individually per can

Field Options

Current Selection Shift A

Shift A
Shift B
Shift C

☒ Sort Alphabetically

Add Shift C
Remove

Save

Cancel

Field Details

Name: Users
Editor: List
Belongs To:
☒ May be set individually per can

Field Options

Current Selection Operator #1

Operator #1
Operator #2
Operator #3
Operator #4
Operator #5
Operator #6

☒ Sort Alphabetically

Add Operator #6
Remove

Save

Cancel

In the examples, we have created new directories for Shifts and Users. Each directory contains multiple fields.

Field Details

Name:
Editor:
Belongs To:
☒ May be set ind

Field Options

Current Selection

Operator #6

Operator #1

Operator #2

Operator #3

Operator #4

Operator #5

Operator #6

☐ Shift A
☐ Shift B
☒ Shift C

☒ Sort Alphabetically

Add
Remove

Save

Cancel

In the picture above, we connected the two fields together by designating Shifts as a parent directory and Users as the child directory by using the *Belongs to* drop-down menu. From here we will assign Operators 1-6 within *Users* to a Shifts A-C within the Shifts directory by clicking the check boxes.

Login

Set Language

Service: Running

New Field

Edit Fields

Refresh From Database

Delete Field

Data Services

File

Database

Del...

Name

Filters

All (no filter) [5]

Plants

Plant

Name

Inside Sprayer

Lines

Outside Sprayer

Shifts

Users

Field Details

Name:
Editor:
Belongs To:
☐ May be set individually per can

Field Options

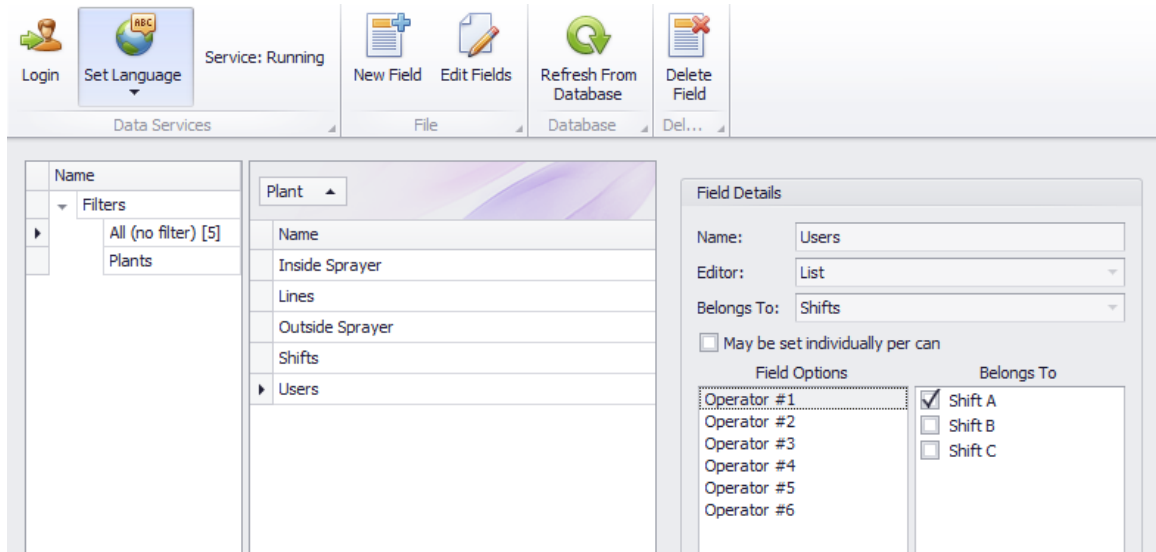
Shift A

Shift B

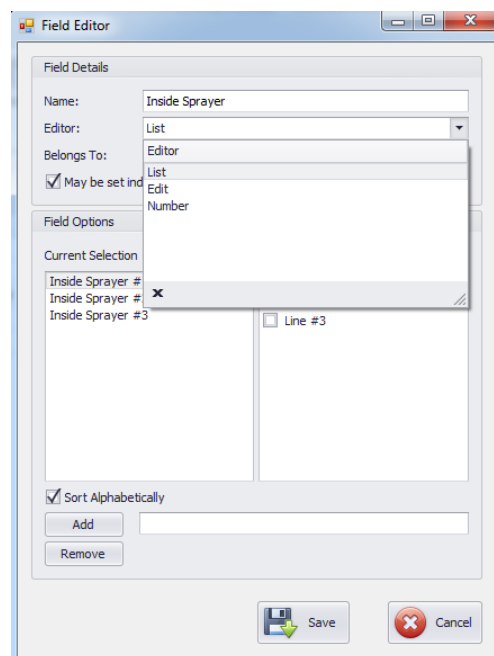
Shift C

Belongs To

From the picture above, we can see that *Shifts* does not belong to any other Field while picture below, you can see that *Users* belongs to *Shifts*.



Under the Field Details section of the Field Editor, there is an Editor drop-down menu used to determine what type of box will appear in the Quick Access menu.



List: Will create a drop-down menu of the Fields created.

Edit: Will create a text box to be used to enter Work Order or other typed information.

Number: Will create a number box that can be used to designate a Lot Number for each measurement run.

Taking Measurements

Login Change Language

Initialized as an ACS10 with a FixedProbe.

Configure Cans

Start Stop

Socket: Side: Location: Row: Size: Plan: Recipe: Can #:

RightAngle

0%

IT Debug ☐

Configure Cans Measurements Review Calibrate

Count 1 Quick Access: (None)

Reset Initialize

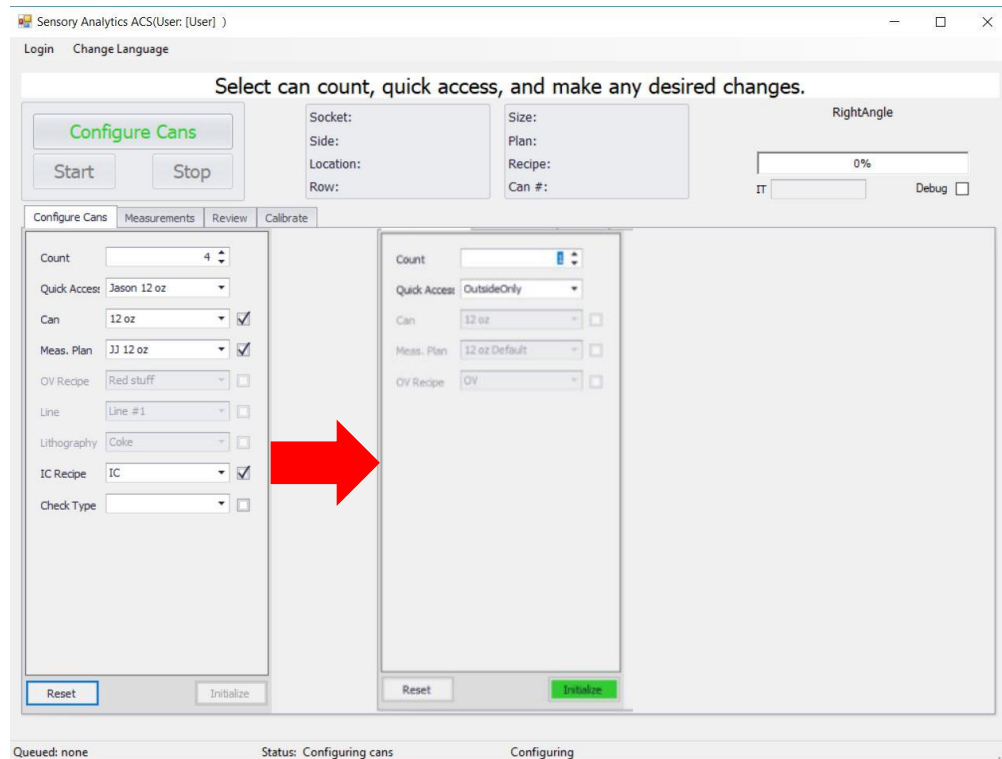
Queued: none Status: Resting

After pressing the ACS button in the SA Menu, users will see the screen above. The following steps need to be taken to successfully perform a series of measurements. There will be prompts on the screen highlighted in green to help users get through the measurement process.

1. To begin measuring a can, the user must press the *Configure Cans* button to activate the *Configure Cans* tab. In this window, users will have two options to choose from:
 - a. **Count:** The number of sockets that will be active for the measurement process, generally the number of cans that will be measured.
 - b. **Quick Access:** The predefined settings created by the administrator in the SA Data Manager. This will determine which other options will appear at the Master

level. Only fields that have been set up to be changed at the Master level will be shown.

Select the Count, Quick Access set, and make any desired changes that are available at the Master level. Admins can choose to either have different fields changeable at the Master level, or none at all. This restricts the options for other users whom may not need to have access to certain settings. The following picture shows a Quick Access set with multiple Master-level options versus one with no Master-level options:



After the Master-level settings have been chosen, press the now active green *Initialize* button to view the Socket-level settings. Again, these settings will only appear if the admin has already preconfigured them to be changeable at the socket level in Data Manager. As stated earlier, the value entered in the Count field previously, will determine how many sockets are accessible in this window.

When fields have been set up to be changeable at the socket level in the Data Manager, those fields will appear in each socket's box.

Login Change Language

Edit each socket, if desired, then ACCEPT.

Configure Cans

Start Stop

Socket:

Side:

Location:

Row:

Size:

Plan:

Recipe:

Can #:

RightAngle

0%

IT Debug

Configure Cans Measurements Review Calibrate

<p>Socket #1, Can 1 of 1 Ready</p>	<p>Socket #2, Empty</p>	<p>Socket #3, Empty</p>	<p>Socket #4, Empty</p>	<p>Socket #5, Empty</p>
<p>Socket #6, Empty</p>	<p>Socket #7, Empty</p>	<p>Socket #8, Empty</p>	<p>Socket #9, Empty</p>	<p>Socket #10, Empty</p>

Show All Fields Cancel Accept

If no fields are set up to be changeable at this level, each box will appear empty as they do in the above picture. If there are fields set up to be changeable at this level, the window will appear as it does below:

Edit each socket, if desired, then ACCEPT.

Configure Cans

Start Stop

Socket:

Side:

Location:

Row:

Can Size:

Plan:

Recipe:

Can #:

RightAngle

0%

IT Debug

Configure Cans Measurements Calibrate

<p>Socket #1, Can 1 of 3 Ready</p> <p>Line Line #1</p> <p>Machine Gun #1</p>	<p>Socket #2, Can 2 of 3 Ready</p> <p>Line Line #1</p> <p>Machine Gun #1</p>	<p>Socket #3, Can 3 of 3 Ready</p> <p>Line Line #1</p> <p>Machine Gun #1</p>	<p>Socket #4, Empty</p>	<p>Socket #5, Empty</p>
<p>Socket #6, Empty</p>	<p>Socket #7, Empty</p>	<p>Socket #8, Empty</p>	<p>Socket #9, Empty</p>	<p>Socket #10, Empty</p>

Show All Fields Cancel Accept

If using a multi-can system, users can choose to turn any number of sockets off or simply proceed to measure with all sockets active. Another option is to disable a socket in the event that the user does not want it used in the measurement series at any point, such as in the case of it being under repair.

A socket can be disabled by simply holding the *Control* button on the keyboard and then pressing the left mouse button. After these settings are chosen, measurements are ready to be taken.

Login Change Language

Edit each socket, if desired, then ACCEPT.

Configure Cans

Start Stop

Socket:

Side:

Location:

Row:

Can Size:

Plan:

Recipe:

Can #:

RightAngle

0%

IT Debug

Configure Cans Measurements Calibrate

<div>Socket #1, Can 1 of 3 Ready</div> <div>Line: Line #2 Machine: Gun #2</div>	<div>Socket #2, Can 2 of 3 Ready</div> <div>Line: Line #3 Machine: Gun #3</div>	<div>Socket #3</div>	<div>Socket #4, Can 3 of 3 Ready</div> <div>Line: Line #1 Machine: Gun #1</div>	<div>Socket #5, Empty</div>
<div>Socket #6, Empty</div>	<div>Socket #7, Empty</div>	<div>Socket #8, Empty</div>	<div>Socket #9, Empty</div>	<div>Socket #10, Empty</div>

☐ Show All Fields Cancel **Accept**

2. Click the *Accept* button on the bottom right-hand side of the user interface to enter measurement mode. There will be a prompt across the top to inform users that the measurement process is ready to begin.

Login Change Language

Ready to START the measurement process.

Configure Cans

Start Stop

Socket:

Side:

Location:

Row:

Can Size:

Plan:

Recipe:

Can #:

RightAngle

0%

IT Debug

Configure Cans Measurements Calibrate

<div>Socket #1, Can 1 of 3 Placed</div> <div>Line: Line #2 Machine: Gun #2</div>	<div>Socket #2, Can 2 of 3 Placed</div> <div>Line: Line #3 Machine: Gun #3</div>	<div>Socket #3</div>	<div>Socket #4, Can 3 of 3 Placed</div> <div>Line: Line #1 Machine: Gun #1</div>	<div>Socket #5, Empty</div>
<div>Socket #6, Empty</div>	<div>Socket #7, Empty</div>	<div>Socket #8, Empty</div>	<div>Socket #9, Empty</div>	<div>Socket #10, Empty</div>

☐ Show All Fields Cancel **Accept**

Queued: 3 of 3 Status: Ready ReadyToMeasure

- To activate the Measurement Plan, press the *Start* button.

The following picture shows what the user interface looks like when the measurement process begins:

The screenshot shows a software interface for measuring a can. The title bar reads "Measuring can #1 in socket #1, 16 oz unnecked Outside Wall". The interface is divided into several sections:

- Configure Cans:** Contains "Start" and "Stop" buttons.
- Measurements:** Displays "Location: Can #1, 16 oz unnecked Outside Wall" and "Track Measurements" (checked). It also shows "Partitions" and a "Lock Partitions" checkbox.
- Statistics:** A section for statistical data, currently empty.
- Graph:** A graph titled "Can Information" with "Thickness" on the y-axis and "Sequence" on the x-axis.
- RightAngle:** A gauge showing a reading of 3.79 and 43%.

There are several areas of the screen to take note of:

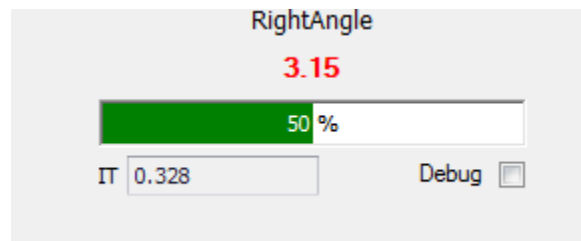
The configuration fields are as follows:

Socket: 5	Can Size: 16 oz unnecked
Side: Outside	Plan: Gage R and R
Location: Wall	Recipe: OV
Row: 1	Can #: 5

- **Socket:** This is the socket or can being measured at the time.
- **Side:** The area of the can being measured, either outside or inside.
- **Location:** The specific position in the can being measured.
- **Row:** The vertical position in the can measurement. Only relevant if more than one row is included in the measurement plan.
- **Can Size:** The size of the can as defined in the recipe.

- Plan: The measurement plan being used to measure.
- Recipe: The type of recipe based on the measurement plan, OV or IC.
- Can #: Usually the same as the socket number unless one socket is disabled as explained earlier.

The top right of the screen displays the thickness value of the coating in real-time. Beneath the thickness value is the reflectance bar as well as the Integration Time and a check box to collect debug files to observe in the Analysis Tool.



Can Data: Can Data for each socket is shown on the far left of the user interface as measurements are being taken. Each socket will display its can number, socket number, and measurement plan as it is being measured. Clicking on the arrows to the left of each listed item will hide that item. When one can is clicked on, the measurements for that can are displayed in the Measurements section to the right.

Can Data	
▼	Can #1, Socket #1
	16 oz unnecked Outside Wall
▼	Can #2, Socket #2
	16 oz unnecked Outside Wall
▼	Can #3, Socket #3
	16 oz unnecked Outside Wall
▼	Can #4, Socket #4
	16 oz unnecked Outside Wall

Measurements: The data shown in the Measurements area is the thickness value at every sector of the can at each position measured as shown below.

Measurements

Location

Can #4, 16 oz unnecked Outside Wall

☒ Track Measurements

Partitions: 10

☐ Lock Partitions

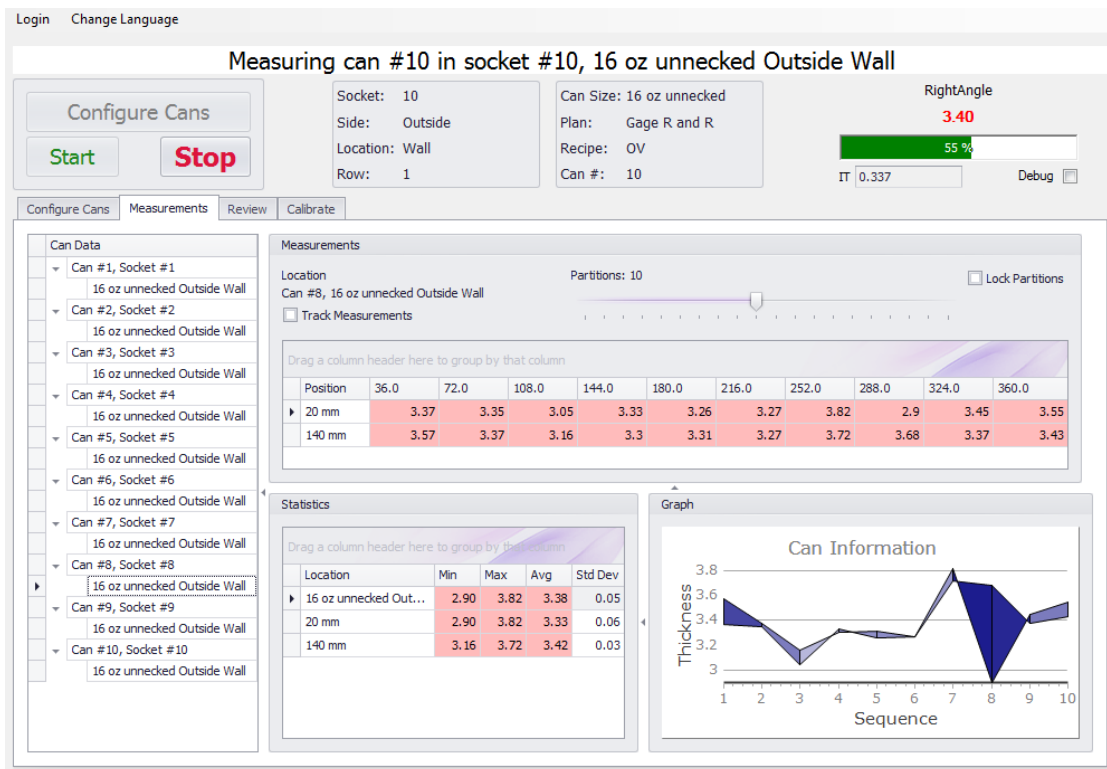
Drag a column header here to group by that column

	Position	36.0	72.0	108.0	144.0	180.0	216.0	252.0	288.0	324.0	360.0
▶	20 mm	3.22	3.21	3.09	3.34	3.07	3.48	3.48	2.96	3.54	3.49

The track Measurements check box is checked by default and allows the measurement information for all cans to be displayed in real-time.

When a particular can is selected in the Can Data area, the Track Measurements check box is automatically unchecked and only the data for the chosen can is shown.

The partitions scroll bar changes the number of can sectors shown. Each partition, or sector is divide up evenly around the can. For example, if the bar is set to four partitions, each sector will represent 90 degrees of a 360 degree can.



Statistics: The Statistics area shows the location of the current can being measured along with Minimum, Maximum, Average thickness of the can at that location. It also shows the Standard Deviation.

Graph: Displays a 3D contour graph of the can as measurements are taken. It consists of thickness values of all horizontal and vertical points of the can. As more measurement are taken, the graph will become more detailed. The graph can be rotated up to 360 degrees for easier viewing.

The color of the cells in both the Measurements and Statistics areas are dependent on the Target Spec information entered in the recipe.

- **Green:** Value is in spec, meaning it fits within the chosen range of the target value.
- **Red:** Value is below the minimum value of the target range.
- **Blue:** The value is above the maximum value of the target range.

Measurements

Location: Can #4, Posters 750 Inside Wall

Partitions: 11

Track Measurements

Position	32.7	65.5	98.2	130.9	163.6	196.4	229.1	261.8	294.5	327.3	360.0
25 mm	3.36	3.52	3.23	3.1	3.6	3.6	3.55	3.61	3.09	3.12	3.08
60 mm	3.07	3.23	3.03	2.75	2.51	2.5	2.7	2.7	2.47	2.44	2.94
95 mm	2.4	2.1	1.91	1.88	2.1	1.81	1.82	1.97	2.3	2.2	2.39
130 mm	3.02	2.81	2.47	2.43	2.44	2.43	2.23	2.47	2.87	2.77	2.84

Statistics

Location	Min	Max	Avg	Std Dev
Posters 750 Inside Wall	1.81	3.61	2.70	0.28
25 mm	3.08	3.61	3.35	0.05
60 mm	2.44	3.23	2.76	0.07
95 mm	1.81	2.40	2.08	0.04
130 mm	2.23	3.02	2.62	0.06

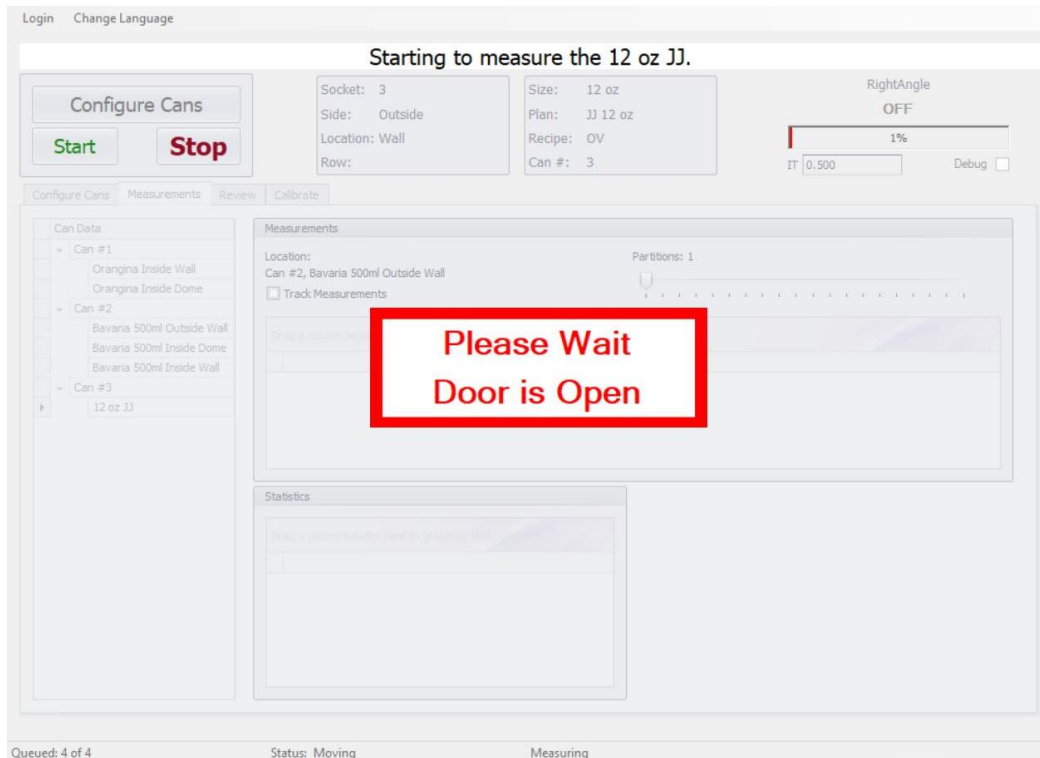
The *Review* tab allows users to load data from previous measurement runs. Users can choose to load any number of cans or specific sectors of the cans that were previously measured. A date range can be chosen to narrow down a search. Files can be exported to other locations as CSV or Excel spreadsheets.

Configure Cans | Measurements | **Review** | Calibrate

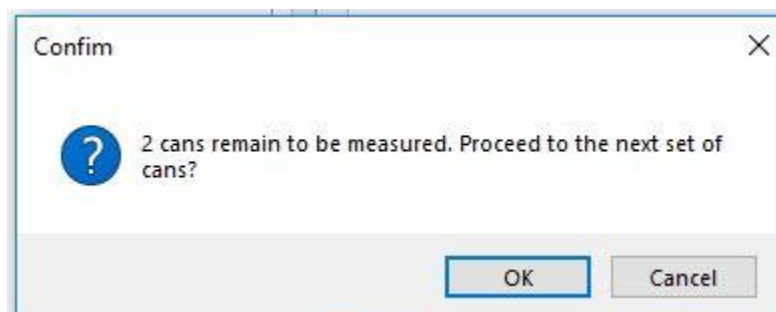
Date:	Friday , December ▼	Load Cans	OR	Select Date Range:
Start Date:	Friday , December ▼	End Date:	Friday , December 15, ▼	Load Cans
Batch Ids:		Load Filter		
Can Numbers:	▼	Segments:	▼	Load Can Detail

CAN Information: Can Number : 0

Export to CSV | Export to XLS | **Reset**



Whenever the ACS door is opened while the application is in use, the message above is displayed. If this occurs during the measurement process, all measurements cease until the door is closed again. If the door is opened during the measuring process and the probe has not reached its destination in the measurement plan, the probe will continue to that destination once the door is closed. If the probe has already started taking measurements when the door is opened, the rest of the measurement plan will be aborted and the probe will move to the next can in the series. When the entire measurement series is complete, a window will appear notifying the user that parts of the measurement plan were aborted.



At this point, the user can decide whether or not to proceed to the next set of cans or to go back and measure any cans that were aborted during the series.

SA Analysis Tool

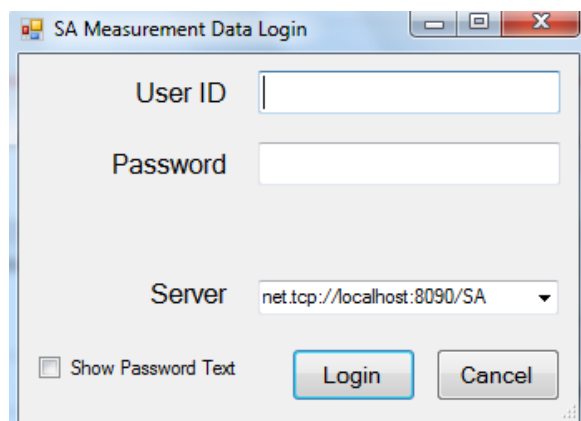
Analyzing Data

To get started you must first turn on and run the *SpecMetrix*® ACS software, and collect “debug” records in a run. Once you have collected debug files and stopped the run, the data can be accessed via the SA Analysis Tool. If the run is less than 7 days old, you can access the debug directly in the database record. To review a run that is older than a week you must export the debug to its zip file prior to the data being purged. Because of database size restrictions Sensory Analytics cannot guarantee data to remain in the system for longer than 7 days.

Logging In

Like all other SA utilities, Analysis Tool requires different credentials to accomplish certain things. In this case the only difference between a user level and administrative level is the ability to save changes to the recipe within Analysis Tool when logged in with administrative privileges.

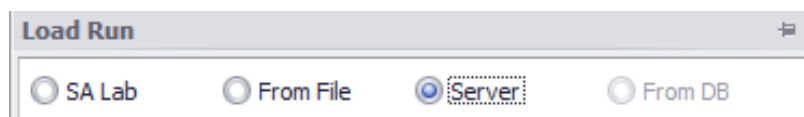
By default, the user will be logged into Analysis Tool with the current user’s level of credentials, however, users can change credential levels within Analysis Tool.



Log in with a user ID and password. Be sure to connect to the appropriate server.

Loading Files

There are 3 ways to review a debug set:



1. The primary, and best way to work with the data, is to access the server directly. Select “From Server”, and use the drop down to select which SA server you wish to work with. For *SpecMetrix*® display units, there will only be 1 server: net.tcp://localhost:8090/SA
2. Select the option of “From File” if you are working with an exported debug zip file
 - a. Click on the ellipse “...” button to open the file selection window
 - b. Navigate to the folder and select the file to analyze
3. Select the option “From DB” if you wish to work with the SA Database.
 - a. **DO NOT** Use this option if you are working directly with the SA database. Only use if you have copied **NOT** ‘CUT’ the database to a remote location from the original.
 - b. Click “Change DB” if you have an archived database you wish to work with. Navigate to the folder and select the SA database (*.mdf) to work with.

- c. The drop-down window will display the list of Work Order numbers for each run
 - d. When working with the DB, the details will be displayed below the “Load” button
 - e. If Debug Readings = 0, then there are no debug records for the given run there will be no readings in which to analyze. Select a different Work order number.
4. SA Lab will be explained in the SA Lab Manual.

Regardless of which option, once you have selected a debug set, click the “Load” button. Within a few seconds the spectral data should be displayed in the graphs. If you do not see any graphs, then make sure you have selected the correct “Probe” and “Layer” (top of the screen).

Controls

From left to right:

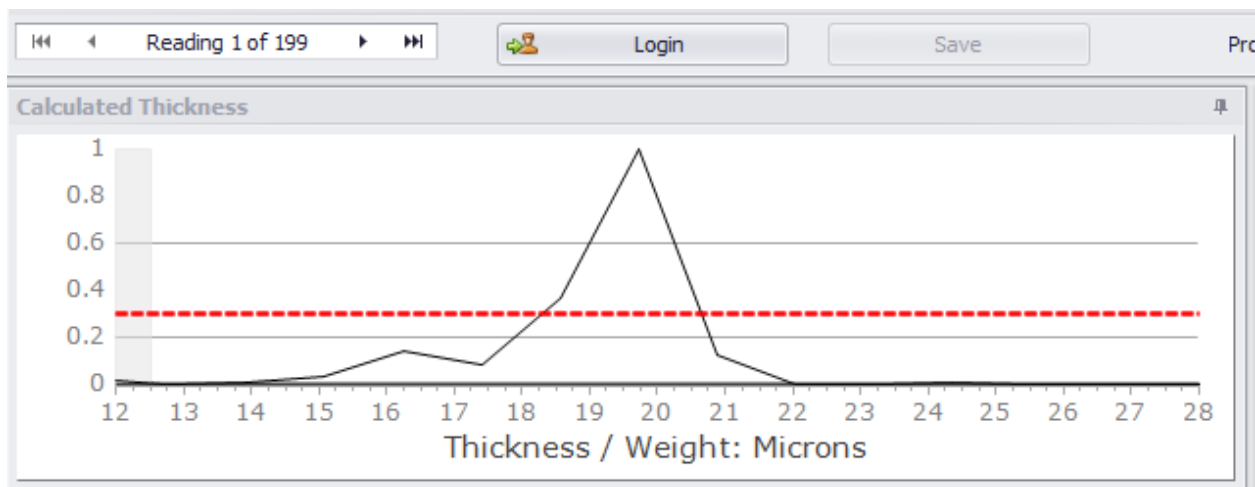
- **Reading Navigator:** Using the navigation arrows on each side of the reading navigator to see the different debug readings. You can go backwards and forwards or enter the number of the reading directly.
- **Language:** Displays a selection window to change the language without having to exit
- **Probe Drop-down menu:** Selector used to choose between probes.
- **Layer Drop-down menu:** Selector used to choose between layers.

If the run selected was defined as a 2-layer recipe at the time of the run, then you can select, analyze and modify each layer individually. Our improved *SpecMetrix*® Analysis Tool software technology now can analyze up to 2 layers at the same time with the *SpecMetrix* Measurement System.

If a defined line has more than 1 probe that has had analysis (Debug) readings taken, you can select which probe analysis data you wish to review.

**** Note: All probes on a line are measuring the same coating. Any changes made to the coating will be reflected for all probes on that line.**

Calculated Thickness



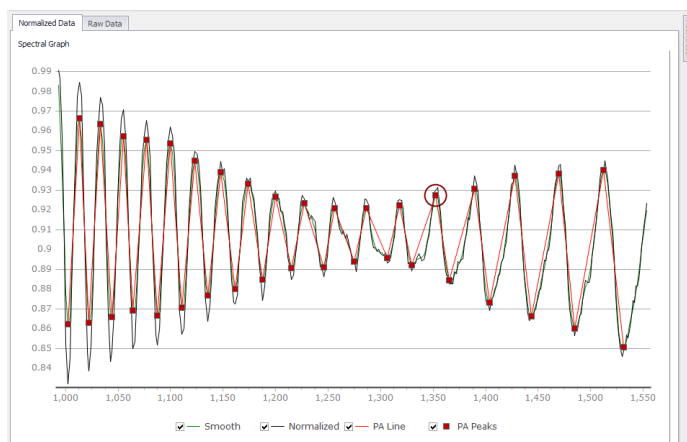
A Peak graph that shows the thickness or film-weight peaks within the Min/Max evaluation range.

On a scale of 0.0 to 1.0 (0 to 100%), the y-axis of this graph shows the normalized probability of the thickness/weight for the particular measurement. Unless measuring a multi-layer material, there should only be one obvious peak. Multiple peaks usually occur when there are multiple layers or when there is “noise” present in the light signal. This optical noise can be caused by the scattering of light hitting solid particles in the coating, when the light hits a material with a rough surface, or improperly focused probe.

Changes to the PA Settings or Layer Settings section will have an impact on the peak graph.

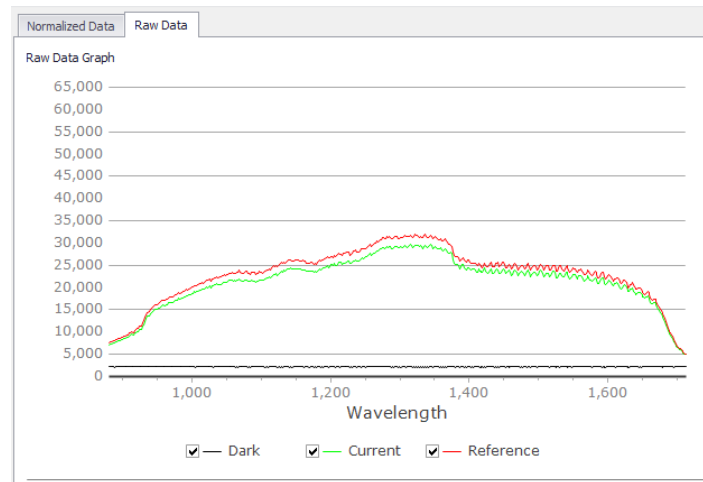
Normalized Data

The Spectral graph displays the normalized reflectance used to calculate thickness of a coating/film across a wavelength range.



Raw Data Graph

The y-axis shows the reflectance energy entering the probe at the respective integration time. The x-axis is the wavelength of light in nanometers (nm).



The checkboxes at the bottom are used to add/remove to each of their respective readings.

Peak Data

Accessed by clicking on the Peak Data Tab on the top right side of the Normalized Data Window.

The figure shows a 'Peak Data' window with four tabs: 'Info', 'Peaks', 'Manual Est', and 'Options'. The 'Info' tab is selected. It contains several input fields and their values:

Integration Time	4994 μ s (4.994 ms)
Saturation	52 %
Reflectance Flag	Normal
Thickness (μ m)	19.96 μ m
PA Thickness (μ m)	20.00 μ m
Converted Thickness	29.94 g / m ²
PA Conv Thickness	30.01 g / m ²
Conversion Rate	1.5000
Actual Peak Variance	0.002 (0.2 %)
Subtractive Amount	No Subtraction Performed

- **Integration Time (IT):** time in milliseconds used to sample the optical package detector array once.
- **Saturation:** Percentage of reflectance
- **Reflectance Flag:** The percentage of saturation. Will either be Low, Normal, or High.
- **Thickness (μ m):** The thickness of the material shown in microns.
- **Converted Thickness:** The thickness of the material converted into another unit of thickness or weight. This conversion can also be for a wet layer measurement converted into the projected dry thickness or film-weight.

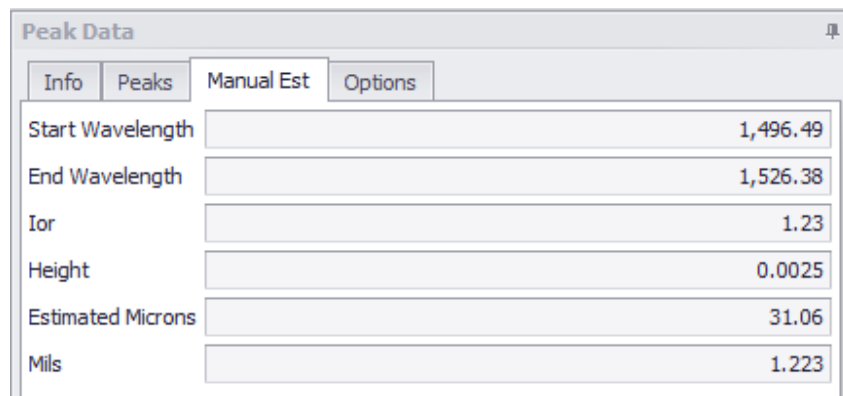
- **PA Thickness (μm):** A secondary validation calculation to support the thickness calculation.
- **PA Conv. Thickness:** The PA thickness value converted into another unit of thickness or weight.
- **Conversion Rate:** From measurement thickness in microns, converted to desired units of measure.
- **Actual Peak Variance:** Ratio of Thickness and PA Thickness estimate
- **Subtractive Amount:** Only shows information if a Differential configuration is being used. This will show the thickness of the applied coating.

The data for each of the peak points of the Normalized Graph separated by top points and bottom points. The image below contains data for wavelength, height (distance from one peak point to its opposite peak side to the right. Must be contiguous), thickness (in microns and converted units). It also contains subtractive layer information based on the debug information used in this example.

Peak Data								
Info Peaks Manual Est Options								
Is Top ▾								
Thickness (μm)	Subt Est. (μm)	Mils	Est (Subt)	Wavelength	Height	Y-Axis		
28.86	23.94	1.136	0.94	1,482.69	0.0095		0.99	
32.12	27.20	1.264	1.07	1,514.32	0.0117		0.99	
30.93	26.01	1.218	1.02	1,543.91	0.0126		0.99	
31.37	26.45	1.235	1.04	1,575.89	0.0127		0.99	
30.58	25.66	1.204	1.01	1,608.74	0.0119		0.98	
31.07	26.15	1.223	1.03	1,643.90	0.0147		0.98	
0.00	0.00	0.000	0.00	1,680.04	0.0095		0.98	
Is Top: Unchecked								
0.00	0.00	0.000	0.00	1,225.18	0.0045		1.00	
32.97	28.06	1.298	1.10	1,267.58	0.0073		1.00	
37.33	32.42	1.470	1.28	1,287.70	0.0038		1.00	
25.26	20.35	0.995	0.80	1,306.01	0.0041		1.00	
32.22	27.30	1.268	1.07	1,334.05	0.0035		1.00	
33.66	28.75	1.325	1.13	1,356.89	0.0046		1.00	
24.83	19.92	0.978	0.78	1,379.49	0.0069		0.99	
32.80	27.89	1.291	1.10	1,411.36	0.0058		0.99	
27.70	22.79	1.091	0.90	1,436.49	0.0090		0.99	
29.39	24.47	1.157	0.96	1,467.42	0.0097		0.98	
29.69	24.78	1.169	0.98	1,497.82	0.0097		0.98	
31.49	26.58	1.240	1.05	1,529.18	0.0087		0.98	
31.84	26.92	1.254	1.06	1,559.97	0.0105		0.98	
28.61	23.70	1.127	0.93	1,591.67	0.0098		0.97	
30.36	25.45	1.195	1.00	1,628.49	0.0105		0.97	
37.65	32.73	1.482	1.29	1,664.79	0.0148		0.97	
0.00	0.00	0.000	0.00	1,695.26	0.0000		0.97	

Manual Est.

Allows users to adjust the following values:

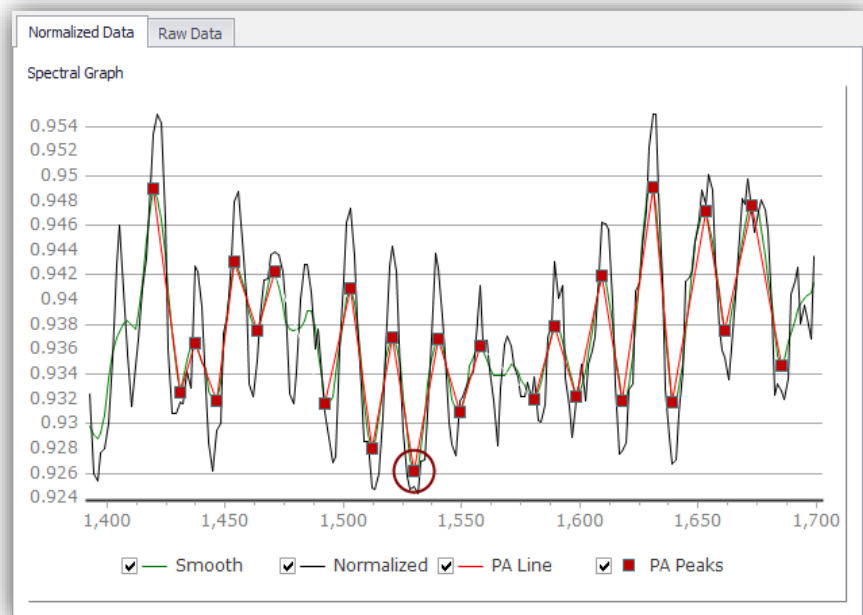
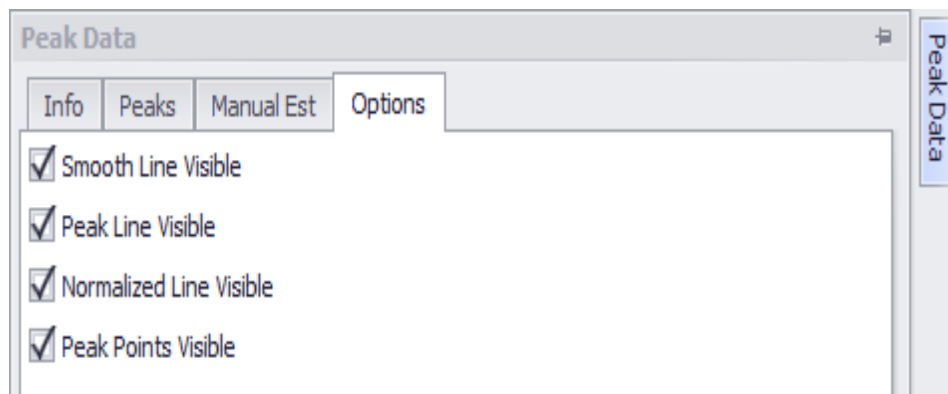


Field	Value
Start Wavelength	1,496.49
End Wavelength	1,526.38
Ior	1.23
Height	0.0025
Estimated Microns	31.06
Mils	1.223

- **Starting/Ending Wavelength:** The wavelength is the range of light spectrum that is being measured to produce a reading. Sensory Analytics® currently measures in 2 different spectral ranges: Visible spectrum which ranges from 400 nm – 1000 nm (can also detect in the 200-400nm wavelength region if a UV light source is included), and Near-Infrared (NIR) which is from 900 nm – 1700 nm. When you adjust, the wavelength ranges you are narrowing the available spectrum in which is measured. This becomes apparent in the Spectral graph as you slide the Start or End wavelength indicator.
- **Index of Refraction (IOR):** Changing the IOR will not change the wavelength or wave graph, but will have a direct impact on the peak graph and the resulting thickness.
- **Height (Height Threshold):** This is the minimum amount of height (distance from the bottom point to the top point for a given interference cycle) required to consider the interference wave as valid. If the peak to valley distance is less than the height threshold value, then that is not considered as a valid interference cycle. Typical value for this field is between 0.002 to 0.01.
- **Estimated Microns:** The estimated thickness of the material at a specific point on the graph
- **Estimated Conversion Factor:** The conversion rate to convert from microns to another unit of thickness or weight.

Options

Controls the visibility of the Normalized graph lines:

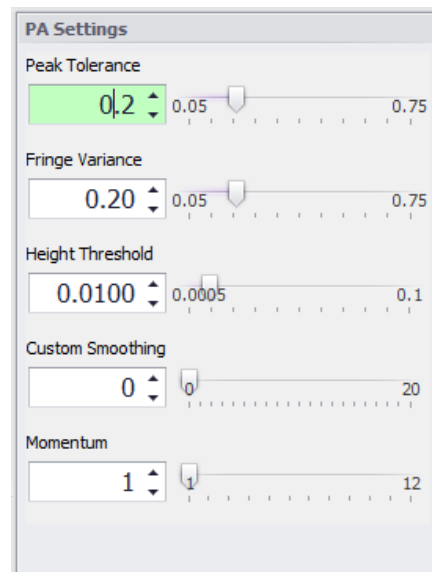


Checking or unchecking the line display boxes will hide or unhide the respective lines in the Wave Graph.

- **Normalized line** – (Black line) the normalized spectral array for the wavelength range.
- **Smoothing Line** – (Green line) smoothing line to improve ‘readability’ of the normalized spectral array.
- **Peak Line** - (Red line) line that graphs from peak to peak that identifies valid peak ranges.
- **Peak points** – (Red dots) points that identify each peak within a range.

PA Settings

Peak Analysis values can be changed as follows:



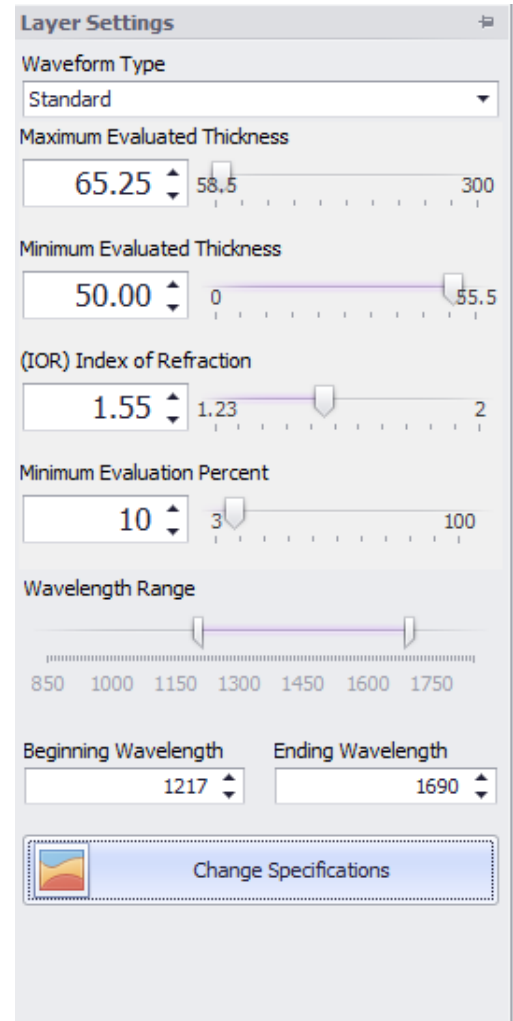
The screenshot shows a 'PA Settings' dialog box with five parameters, each with a numeric input field and a corresponding slider:

- Peak Tolerance:** Input field shows 0.2, slider range from 0.05 to 0.75.
- Fringe Variance:** Input field shows 0.20, slider range from 0.05 to 0.75.
- Height Threshold:** Input field shows 0.0100, slider range from 0.0005 to 0.1.
- Custom Smoothing:** Input field shows 0, slider range from 0 to 20.
- Momentum:** Input field shows 1, slider range from 1 to 12.

- **Peak Tolerance:** This is the amount of acceptable variation in percentage between the final estimated thickness by the peak analysis algorithm and the thickness displayed by the software. If a value of 0.2 is used in this field, then a 20% variation is acceptable between the calculated thickness by the software and the estimated thickness by the peak analysis. If the variation is more than what is acceptable as defined by the acceptance tolerance value, then the software will flag the measurement as a “No Read”. Typical range for this parameter is 0.1 to 0.5.
- **Fringe Variance:** This is the amount of variation allowed in thickness between the calculated thickness and individual peak estimates. (See Section 9 for an example of estimating thickness using peak estimate tool. In general, as a rule of thumb, the default value is 0.3. Depending on the nature of the samples and the quality of interference, this parameter might have to be modified.
- **Height Threshold:** This is the minimum amount of height (distance from the bottom point to the top point for a given interference wave) that is required in order to consider the interference wave as valid.
- **Custom Smoothing:** Attempts to “smooth” the spectral data curve as the value increases to fit the original interference curve better.

Layer Settings

- **Waveform Type:** *Standard* is typically used and allows the peak analysis to track the major waveform pattern. *Amplitude Modulated* may be used in certain instances if there is a thin layer being measured with interference from a film substrate also present. Amplitude Modulated will attempt to track “over” the thicker wave curves, as the thinner layer waveform may be superimposed over the thicker curves. Amplitude Modulated would create the peak analysis curve to match the thin coating waveform.
- **Maximum/Minimum Evaluated Thickness:** The minimum and maximum range of thickness that are evaluated during measurement.
- **IOR:** Changing the IOR will not change the wavelength or wave graph, but will have a direct impact on the peak graph and the resulting thickness.
- **Minimum Evaluated Percent:** The required minimum percentage of readings that are successfully evaluated in order for a reading to be displayed.
- **Wavelength Range:** Increase or decrease the wavelength range by using the slide bars.
- **Beginning/Ending Wavelength:** Change the wavelength range by either typing in the values or by using the arrow up/down buttons.
- **Change Specifications:** Opens the Specifications & Graph setup window allowing users to change the following parameters such as Target Spec, Measurement Max/Min, Graph Top/Bottom, High Spec/Low Spec limit.



The screenshot shows the 'Layer Settings' dialog box with the following controls:

- Waveform Type:** A dropdown menu set to 'Standard'.
- Maximum Evaluated Thickness:** A numeric input field showing '65.25' with a range slider from 58.5 to 300.
- Minimum Evaluated Thickness:** A numeric input field showing '50.00' with a range slider from 0 to 55.5.
- (IOR) Index of Refraction:** A numeric input field showing '1.55' with a range slider from 1.23 to 2.
- Minimum Evaluation Percent:** A numeric input field showing '10' with a range slider from 3 to 100.
- Wavelength Range:** A horizontal range slider with labels at 850, 1000, 1150, 1300, 1450, 1600, and 1750.
- Beginning Wavelength:** A numeric input field showing '1217'.
- Ending Wavelength:** A numeric input field showing '1690'.
- Change Specifications:** A button with a small icon to the left.

Specification & Graph Setup

To provide continuity and accurate graphical representation we have moved the specification editors into its own editor. This editor functions the same whether you see it embedded in the Recipe Assistant, or as a popup window for Recipe Editor. The Specification & Graph Setup window is pictured below:

The image shows a 'Specification & Graph Setup' dialog box. On the left, there are input fields for various parameters: Target Spec (19), Measurement Max (28), Graph Top (25), High Spec Limit (20), Low Spec Limit (18), Graph Bottom (14), and Measurement Min (12). To the right of these fields is a 'Range' section with two input boxes, each containing '1', separated by a minus and a plus sign. A 'Calculate' button is located to the right of the Range section. On the right side of the dialog is a large graph area. The graph shows a horizontal green bar centered between two horizontal red lines. The green bar's height corresponds to the 'Low Spec Limit' value of 18, and its position is determined by the 'High Spec Limit' value of 20. The graph area is bounded by horizontal lines at the 'Graph Top' (25) and 'Graph Bottom' (14) levels. At the bottom of the dialog are 'Ok' and 'Cancel' buttons.

Additionally, the Range has been split out from a single +/- value, to a (-) range and a (+) range. The range allowance is dependent on the Target Spec. For any Target Spec whose calculated conversion is greater than 7 μm the allowable range is 50% of the target spec in either direction. If the conversion is less than or equal to 7 μm , then the Low range allows a value which will set the Low Spec Limit at the sensor minimum, and a High range value which will allow the High spec limit to be no greater than 12 μm (or equivalent).

Overview Grid

Overview Grid

Stat Results for	Original	New
Unit of Measure	g / m ²	g / m ²
Success Rate	100.00	100.00
Count (All)	79	79
Count (Qualified)	79	79
Count (Unqualified)	0	0
Average	30.07	30.07
Average (μ)	20.04	20.04
Standard Dev	0.00	0.00

Gravimetric

Recalc

☐ View Micron Equivalent

Drag a column header here to group by that column

	Count	Orig Status	Orig	New Status	New	Total
▶	1	Success	29.94	Success	29.94	29.94
	2	Success	30.28	Success	30.28	30.28
	3	Success	29.96	Success	29.96	29.96
	4	Success	29.92	Success	29.92	29.92
	5	Success	30.10	Success	30.10	30.10
	6	Success	30.09	Success	30.09	30.09
	7	Success	30.08	Success	30.08	30.08
	8	Success	30.00	Success	30.00	30.00
	9	Success	30.05	Success	30.05	30.05
	10	Success	29.92	Success	29.92	29.92
	11	Success	30.00	Success	30.00	30.00
	12	Success	29.87	Success	29.87	29.87
	13	Success	29.96	Success	29.96	29.96
	14	Success	30.06	Success	30.06	30.06
	15	Success	30.06	Success	30.06	30.06

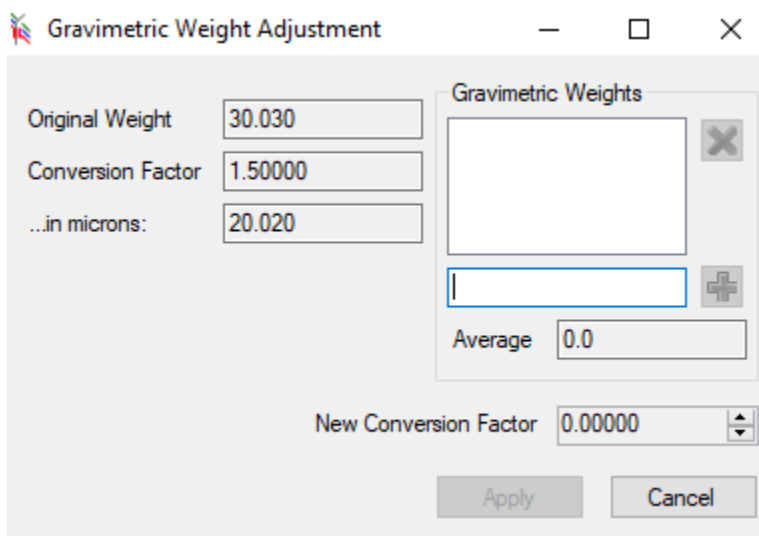
Once a recipe has been changed, you can see the impact across all the analysis readings to determine if the change has improved the reading success or decreased the success rate. You can see the reading success rate for the Original result set as it was performed during the measurement run, and next to it you can see the new results (New Status). You can still select which Probe or Layer you wish to analyze, keeping in mind that only the probes with analysis data will reflect results.

You can also click and drag column headers to group by those columns as indicated in the figure above. This helps to group together bad readings to better investigate them.

NOTE: the value with (μ) next to it is the micron thickness that is calculated. If a conversion has been applied, then the conversion value will be displayed in the adjacent column.

Above the results grid you will see what the determined success rates are, along with Average microns for this set of data and the average of the calculated units (displayed under “Average”).



The “Gravimetric” button will pop-up a new edit assist window to allow an adjustment to the theoretical conversion rate in order to correlate measured thickness to empirically tested film-weights.



The dialog box is titled "Gravimetric Weight Adjustment" and has standard window controls (minimize, maximize, close). It contains the following fields and controls:

- Original Weight:** A text box containing "30.030".
- Conversion Factor:** A text box containing "1.50000".
- ...in microns:** A text box containing "20.020".
- Gravimetric Weights:** A list box containing one empty entry. To the right of the list box is a close button (X) and a plus button (+).
- Average:** A text box containing "0.0".
- New Conversion Factor:** A text box containing "0.00000" with a small up/down arrow to its right.
- Buttons:** "Apply" and "Cancel" buttons at the bottom.

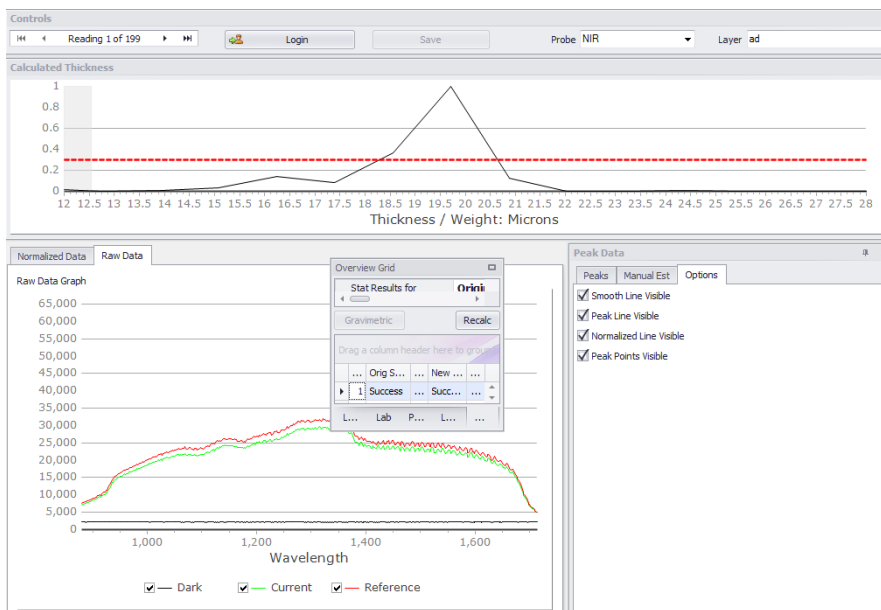
The Gravimetric form allows the user to manually adjust the correlation factor of absolute thickness, as measured by the *SpecMetrix* ACS Measurement System, to film-weights that are determined by weight analysis or other comparative measurements.

You will enter all the weights, one at a time, in the text field next to the  symbol. You will click the  symbol to add your Gravimetric sample reading. The system will insert the value in the list box above and then average the values and calculate a new conversion factor based on the series. You have 3 options on how you wish to proceed with the calculation.

- **Apply** – This will make the temporary change to the recipe for analytical purposes, but will not save the change to the recipe database.
- **Cancel** – will abort anything performed in this window and return you to the previous screen.

UI Customization

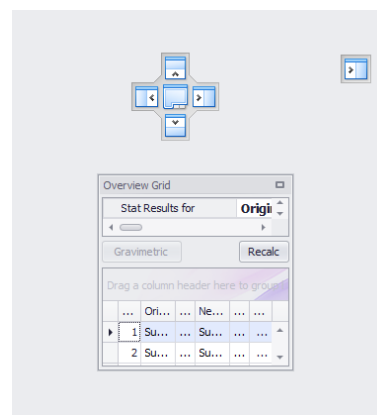
Most of the windows in the Analysis Tool can be moved and resized by the user. They can be rearranged and docked in more convenient locations to make other windows easier to work within. This allows for a great degree of user interface customization. The only window that is permanently docked is the Normalized Graph window that shows the Spectral data or the Raw data.



The image above is an example of the Overview Grid window being minimized. At this point, it can be docked in one of four locations (top, bottom, left, or right) on the screen or it can be maximized to fill the entire screen. Right click (and hold) in the controls title, and drag the control over the directional arrows (as shown on the right) to dock the control in the desired location on the screen.

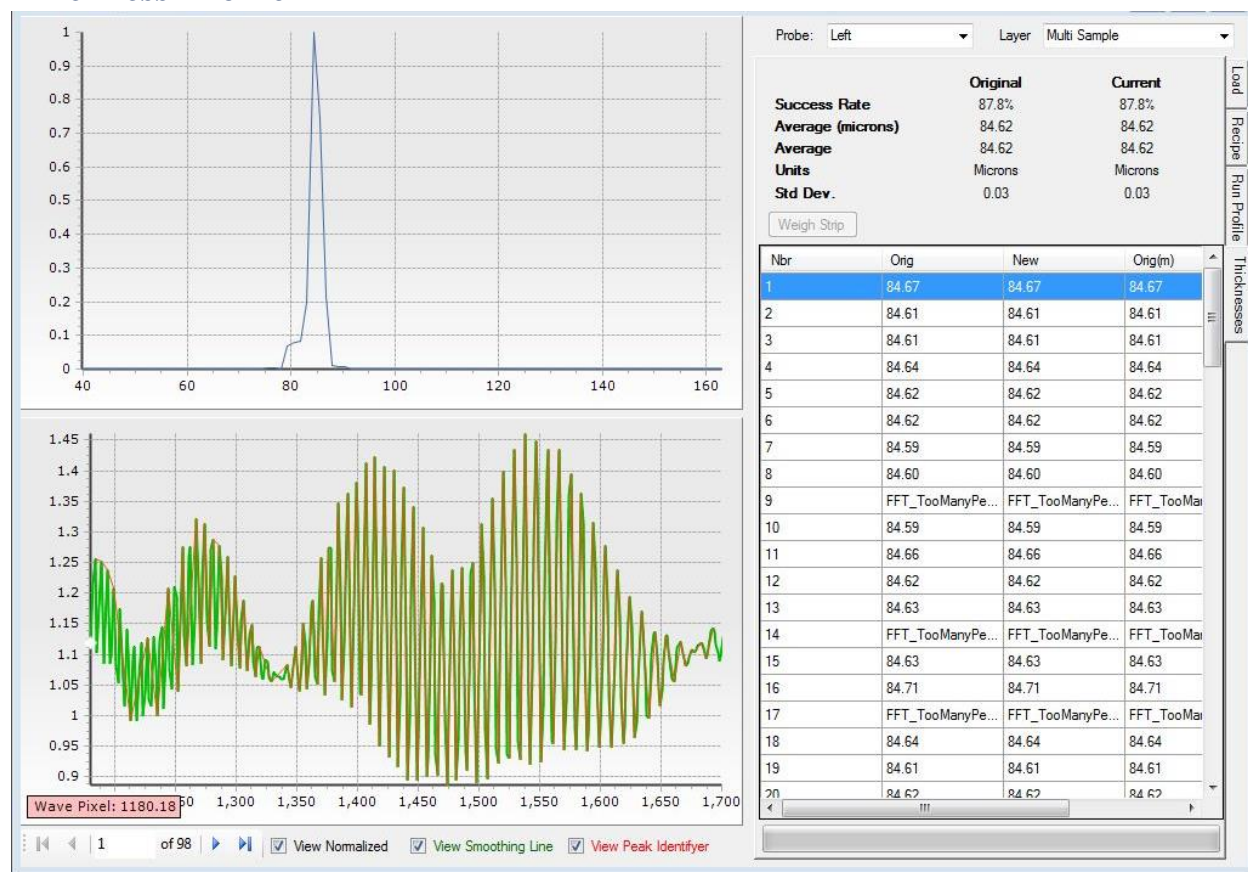


For example, users can click on the title bar of the Overview Grid window and hold the mouse button down. The window will minimize (as shown above) and the directional arrows will appear. You can drag and drop the minimized window over one of the directional arrows and the window will dock itself in that location. You will know exactly where the window will dock beforehand because there will be a shaded area indicating the new space the window will fill on the screen.



By simply double-clicking on the window title bar, it can be returned to its original size and location within Analysis Tool. Restarting Analysis

Thickness Profile



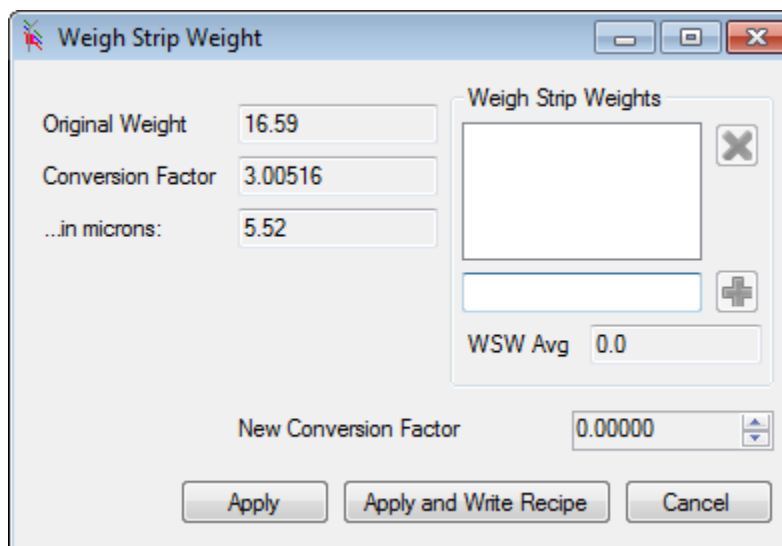
Once a recipe has been changed in the Run Profiler or the Recipe tab, you can see the impact across all the analysis readings to determine if the change has improved the reading success or decreased the success rate. You can see the reading success rate for the Original result set as it was performed during the measurement run, and next to it you can see the “Current” results (Current Success Rate). Across the top, you can still select which Probe or Layer you wish to analyze, keeping in mind that only the probes with analysis data will reflect results.

NOTE: the value with (m) next to it is the micron thickness that is calculated. If a conversion has been applied, then the conversion value will be displayed in the adjacent column.

Above the results grid you will see what the determined success rates are, along with Average microns for this set of data and the average of the calculated units (displayed under “Average”).



The Weigh strip button will pop-up a new edit assist window to allow an offset calculation where lacquer/varnish/paint variations are high due to additive thinners or solvents.

WSW Assistant



When the WSW assistant is invoked from the Analysis tool, the values for measuring are already added in provided the “Debug” checkbox was checked during the run. Otherwise, you will need to use the WSW tool from within the Recipe Editor and enter the Average Microns measured by the *SpecMetrix*® ACS Measurement System for the WSW sample.

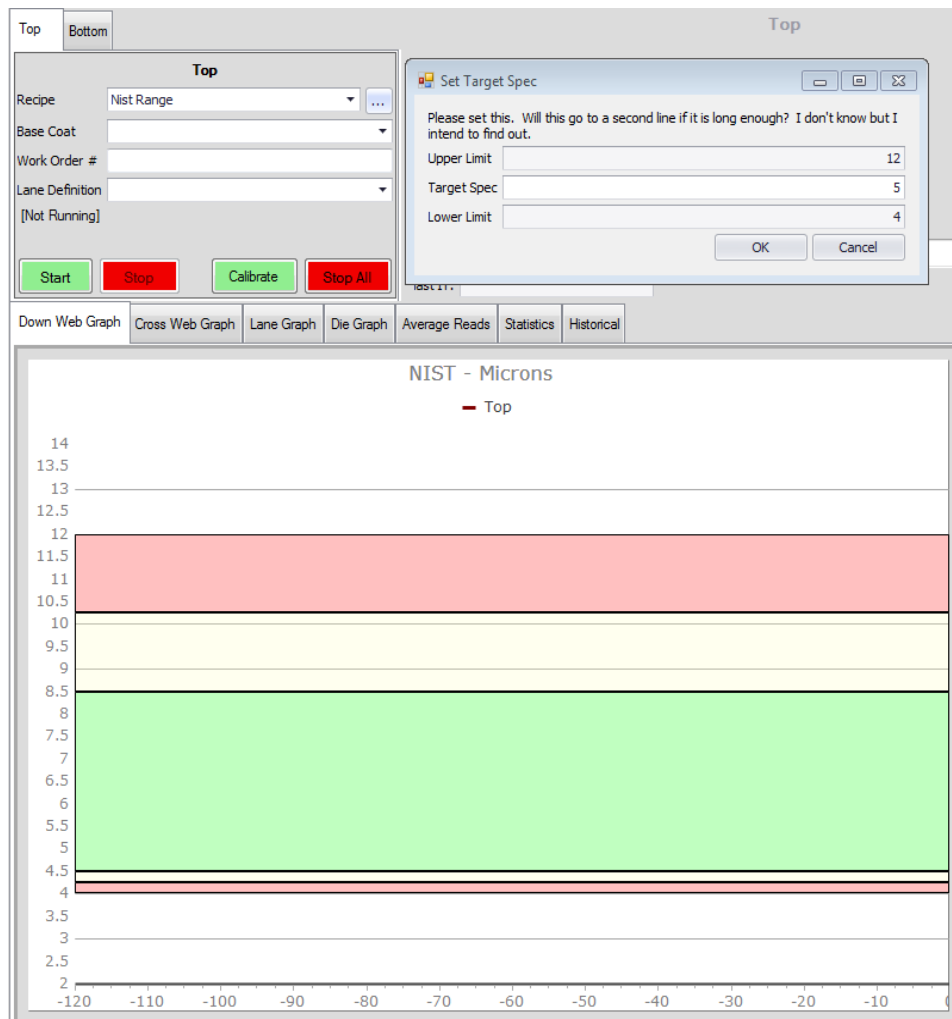
When used here the “...in microns” value is provided from the Original Average Microns calculation and cannot be altered from this function.

You will enter all the weights, one at a time, in the text field next to the  symbol. You will click the  symbol to add a WSW sample reading. The system will insert the value in the list box above and then average the values and calculate a new conversion factor based on the series. You have 3 options on how you wish to proceed with the calculation.

- **Apply** – This will make the temporary change to the recipe for analytical purposes, but will not save the change to the recipe database.
- **Apply and Write Recipe** – This will update the recipe database with the current recipe along with this new conversion value.
- **Cancel** – will abort anything performed in this window and return you to the previous screen.

Adjustable Target Spec

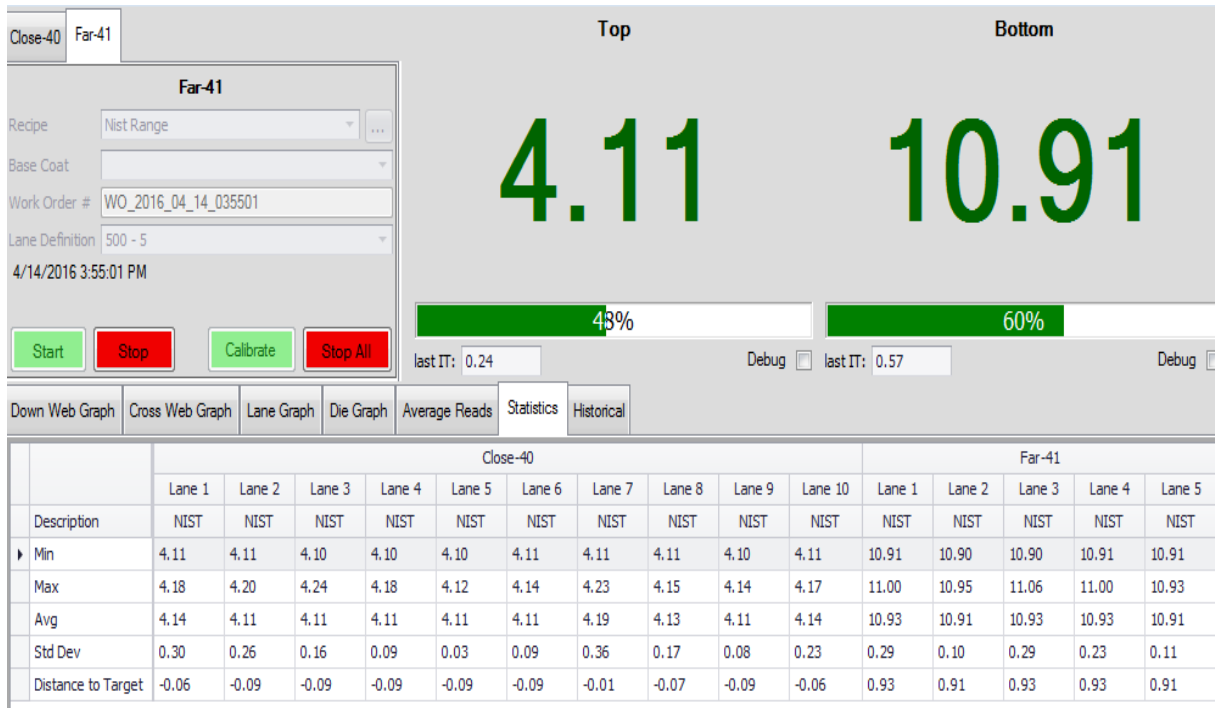
In the image below, the [...] (ellipsis) button to the right of the Recipe gets enabled when the selected recipe qualifies as an Adjustable Target Recipe. When the ellipsis button is clicked, a popup window is displayed showing the recipe defined Upper Limit and Lower Limit (These are not adjustable), as well the current Target Spec is displayed and is adjustable within the range of “Greater than” but not equal to Lower Limit, and “Less than” but not equal to Upper Limit. When you click the “OK” button, the graph will recalculate the SPC bars as seen below with the original graph on right side (small image) and the new graph on the left.



Not all recipes qualify as Adjustable Target Spec recipes. The recipe must be a ‘simple’ single layer recipe, not defined as basecoat or subtractive, and cannot be set if used in a differential system.

Statistics Tab

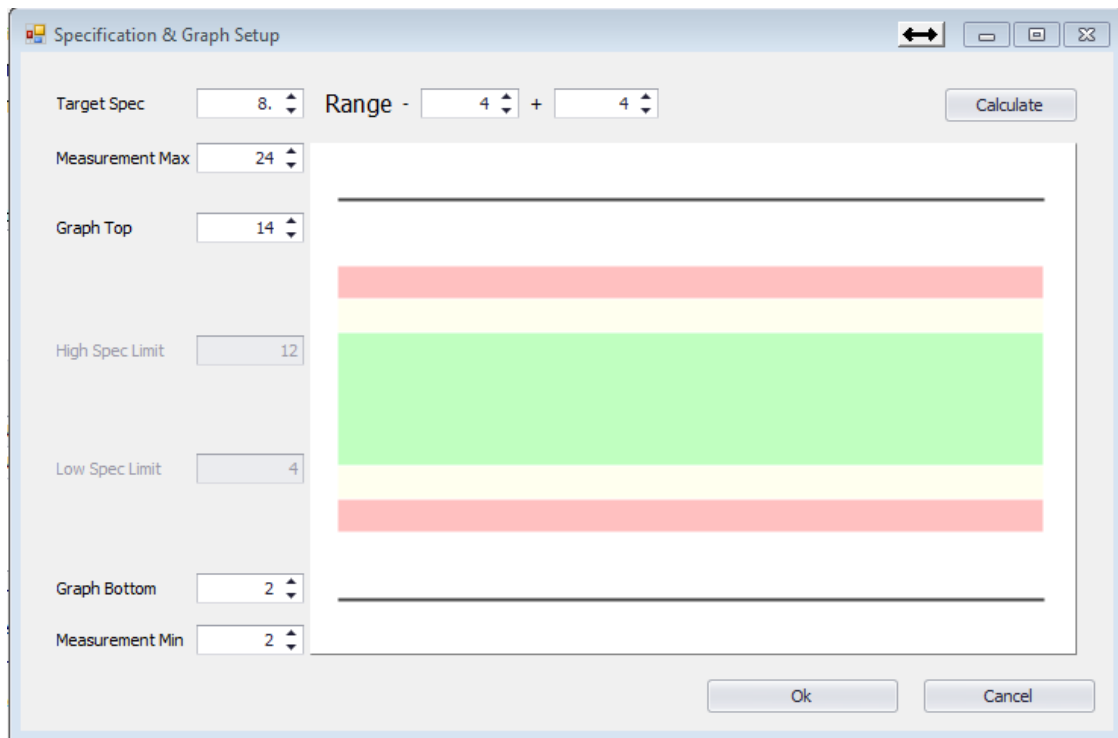
The Statistics tab is dynamic and if the system uses fixed probes, then each probe will be displayed with the Probe Name listed instead of Lane # for the respective “Line”. For traversing, each Lane will have its own column of data. Likewise, if there is a lane definition selected the Line will adjust its Lane count accordingly. As seen below the “Top” line is defaulted with 10 lanes, and the “Bottom” line has a lane definition selected which overrides the default 10 (with a lesser number of lanes), in this case to 5 lanes.



Distance to Target

The Distance to Target value takes the “Target Spec” from the recipe, or adjusted target spec if overridden, and provides a relative thickness (or weight) to target. In the case of (**Error! Reference source not found.**) above the Top line had an overridden target spec at 4.2, and the Bottom line had an overridden spec at 10.0.

Recipe Editor & Assistant Specification Editor



The image shows a software window titled "Specification & Graph Setup". It contains several input fields and a graphical representation of a specification range.

Input fields on the left:

- Target Spec: 8. (with up/down arrows)
- Measurement Max: 24 (with up/down arrows)
- Graph Top: 14 (with up/down arrows)
- High Spec Limit: 12 (with up/down arrows)
- Low Spec Limit: 4 (with up/down arrows)
- Graph Bottom: 2 (with up/down arrows)
- Measurement Min: 2 (with up/down arrows)

Range input: "Range - 4 + 4" (each 4 has up/down arrows). A "Calculate" button is to the right.

Graphical representation: A central area showing a vertical scale from 2 to 24. Horizontal lines are drawn at 2, 14, and 24. Colored bands represent specification limits: a red band from 2 to 4, a yellow band from 4 to 12, a green band from 12 to 14, a yellow band from 14 to 24, and a red band from 24 to 26. The green band is the widest, indicating the target specification range.

Buttons at the bottom: "Ok" and "Cancel".

To provide continuity and accurate graphical representation we have moved the specification editors into its own editor. This editor functions the same whether you see it embedded in the Recipe Assistant, or as a popup window for Recipe Editor.

Additionally, the Range has been split out from a single +/- value, to a (-) range and a (+) range. The range allowance is dependent on the target spec. For any Target Spec whose calculated conversion is greater than 7 μm the allowable range is 50% of the target spec in either direction. If the conversion is less than or equal to 7 μm , then the Low range allows a value which will set the Low Spec Limit at the sensor minimum, and a High range value which will allow the High spec limit to be no greater than 12 μm (or equivalent).

Glossary of Terms

Peak Tolerance

This is the amount of acceptable variation in percentage between the final estimated thickness by the peak analysis algorithm and the thickness displayed by the software.

If a value of 0.2 is used in this field, then a 20% variation is acceptable between the calculated thickness by the software and the estimated thickness by the peak analysis.

If the variation is more than what is acceptable as defined by the acceptance tolerance value, then the software will flag the measurement as a “No Read”. Typical range for this parameter is 0.1 to 0.5.

Fringe Variance

This is the amount of variation allowed in thickness between the calculated thickness and individual peak estimates. (See Section 9 for an example of estimating thickness using peak estimate tool. In general, as a rule of thumb, this value should be set within 10 to 15% of the expected thickness. Depending on the nature of the samples and the quality of interference, this parameter might have to be modified. Typical range for this parameter is 0.1 to 0.5.

Height Threshold

This is the minimum amount of height (distance from the bottom point to the top point for a given interference cycle) required not to consider the interference wave as noisy. If the peak to valley distance is less than the height threshold value, then that is not considered as a valid interference cycle. Typical value for this field is between 0.002 to 0.01.

Custom Smoothing

Attempts to “smooth” the analysis curve as the value increases to fit the original interference curve better.

Momentum

This is the number of adjacent points that are required to show change in peak direction. The minimum number of points to make a line is 2.

Waveform Type

Standard is typically used and allows the peak analysis to track the major waveform pattern. **Amplitude Modulated** is used if there is a thin layer being measured with a thick layer present. Amplitude Modulated will attempt to track “over” the thicker wave curves, as the thinner layer waveform may be superimposed over the thicker curves. Amplitude Modulated would create the peak analysis curve to match the thin coating waveform.

Starting/Ending Wavelength

The wavelength is the range of light spectrum that is being measured to produce a reading. Sensory Analytics currently measures in 2 different spectral ranges: Visible spectrum which ranges from 200 nm – 1000 nm, and Near Infra-red (NIR) which is from 900 nm – 1700 nm. When you adjust, the wavelength ranges you are narrowing the available spectrum in which is measured. This becomes apparent in the Wave graph as you slide the Start or End wavelength indicator.

Index of Refraction

[Explanation of IOR]. Changing the IOR will not change the wavelength or wave graph, but will have a direct impact on the peak graph and the resulting thickness.

Min/Max Thickness

Minimum and Maximum thickness are what define the absolute thickness parameters. If a value produced is outside of the range of the min/max thickness the result will not be accepted. These values are typically adjusted to isolate a layer from other layers, or to prevent anomalies like “double refraction”.

Target Spec

This is the defined target from the recipe. If Target is changed, the Min/Max Thickness values will automatically change.

+/- Tolerance

This is the defined target range from the recipe. If the tolerance zone is modified, the Min/Max Thicknesses will adjust automatically.

Advanced settings will need to be altered in the Recipe tab.

System Maintenance

Suggested Cleaning Interval

The cleaning intervals are based upon general factory condition. If the box is placed in areas where significant dust or particle density is high, or should you notice performance or temperature issues and you may need to shorten the suggested interval cleaning cycle.

Equipment	Environment	Maintenance Interval
In-Line System	Clean Room	Quarterly
In-Line System	Factory Environment	Monthly
In-Line System	Harsh Factory Environment	2-4 weeks
Lab System/ACS/DFT QA	Office / Lab environment	Quarterly
Lab System/ACS/DFT QA	Factory Environment	Monthly
Lab System/ACS/DFT QA	Harsh Factory Environment	2 weeks

Maintenance Procedures for Lab, ACS, and In-line systems

We suggest using compressed canned air for dust/particle removal. Never use water or liquids to clean electronic components.

***** WARNING: Make sure power is turned off to electronics before performing any maintenance. *****

- 1) Clean fan ports with compressed air (blow outward).
- 2) Check particle filter, replace if necessary.
- 3) Using Compressed air, blow off all circuit boards and electronics. Make sure dust is evacuated from the box.
- 4) Visually check wires for damage/fray and bad or loose connections.

Lamp Replacement

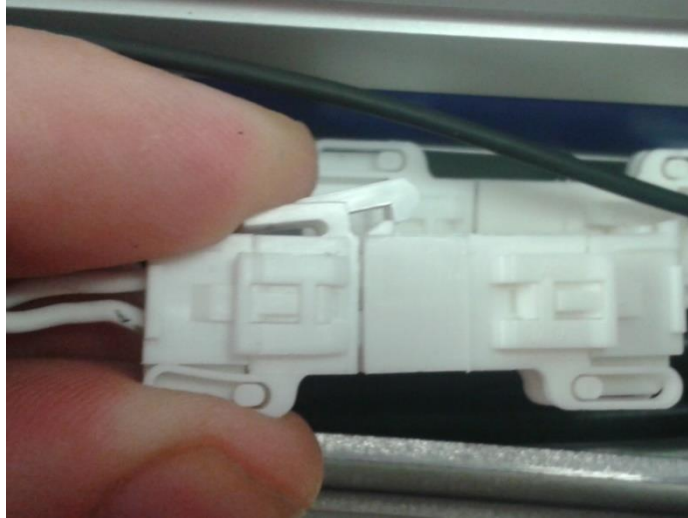
In the unlikely event of a lamp failure, lamps can easily be replaced by the user. Remove the top cover using a flat blade screw driver. Please do not loosen any other screws.



Remove top cover using flat blade screw driver

The lamp block is located in the center of the top plate as shown below. A 3/32" hex key is required to loosen the set screws securing the lamps. Remove the old lamps and insert new ones making sure to reconnect the lamps correctly following the labels on the connectors, and then tighten the set screws.





General Maintenance Checklist

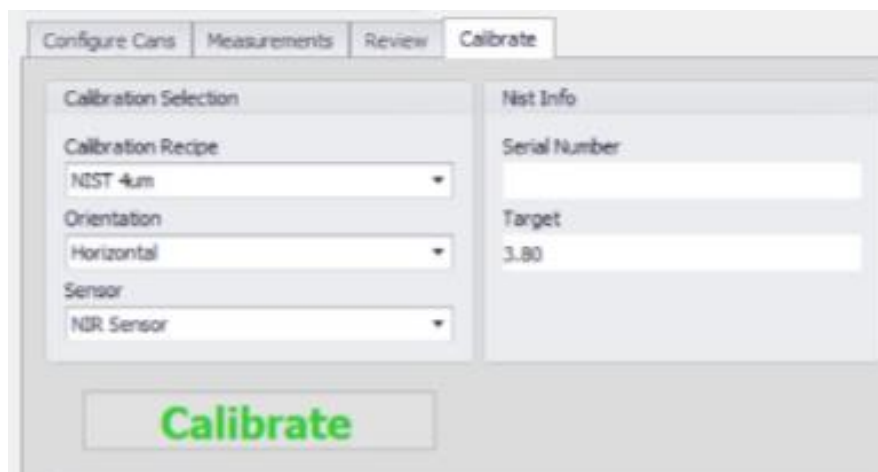
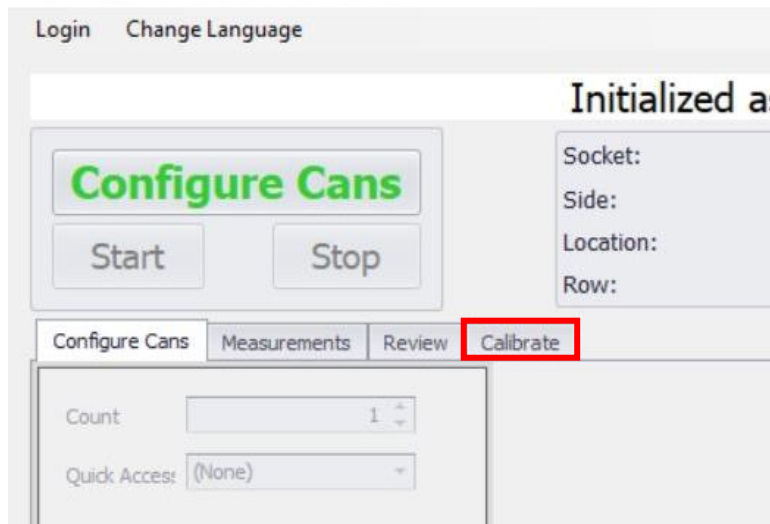
1. Check all electrical connectors to ensure proper connectivity
2. Ensure all power buttons/switches are functional
3. Check keyboard is functional and that all keys are in place
4. Check touch screen is operational
5. Verify the Windows operating system starts correctly
6. Start each software package and verify correct functionality of lamps and measurements
7. Visually inspect system for damage
8. Check all probes, Lab, ACS, or In-line for damage
9. Clean probes if necessary
10. Clean filters
11. Check for any visual damage to cable conduit that is protecting fiber optical cables
12. Check for any heat related damage due to equipment placement near any ovens

Calibration

The *SpecMetrix*® ACS Measurement System comes equipped with a specific login designated for conducting measurement verification tests. By using a proprietary calibration apparatus that utilizes a NIST traceable film standard (shown below), operators can verify the accuracy and functionality of the optical probes and sensors. With this system, the measurements are based on inherent optical properties of the coating alone, and therefore there are no physical adjustments that affect the measurement function. The calibration standard shown below is designed to perform calibration measurements on the optical probe(s) using the same film standard. A serial number along with a specified thickness value in units of microns is labeled on each calibration standard. Documentation of the NIST certificate will also be furnished along with each calibration standard.

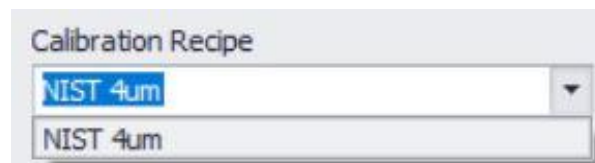


To access the Calibration mode, click the “Calibrate” tab that appears on the main screen.



To perform a calibration, users must select settings in the Calibration Selection drop-down menus:

- **Calibration Recipe:** Contains pre-set recipes, created in Data Manager, specific to the NIST pucks provided with the system.

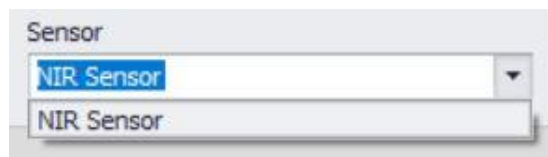


- **Orientation:** Used to determine which probe will measure the NIST puck, the Straight or Right-Angle probe.



It is **very critical** that the standard is placed flat into the socket rotary table for the calibration routine. The insert pins should be pushed all the way into the recessed alignment holes (see illustration above). If an additional spacer is in use then it should be removed for calibration. A CAD image will illustrate the proper placement of the calibration standard into the socket for each orientation option.

- **Sensor:** List of available spectrometers provided there are more than one installed in the *SpecMetrix* display unit.



The Serial Number of the calibration standard appears in the NIST Info section once the “Calibrate” button has been clicked. Please verify that the standard being used is labeled with the corresponding serial number that is displayed here (pass/fail limits are hard coded into the configuration based on the certified thickness of the specific standard being used).

Initialized as an ACS10 with a FixedProbe.

Configure Cans: Start Stop

NIST Info: Serial Number Target 3.80

Calibrate

Results

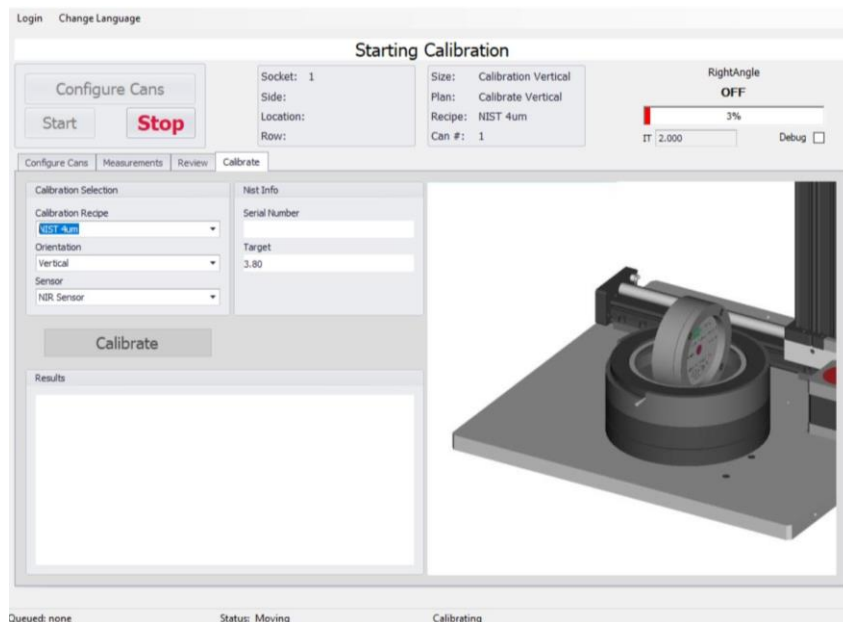
Queued: none Status: Resting RightAngle 0% IT Debug

Socket: 1	Size: Calibration Vertical
Side:	Plan: Calibrate Vertical
Location:	Recipe: NIST 4um
Row:	Can #: 1

The fields above will be populated with the NIST puck information created in the Data Manager. Each NIST pick will be created in the same manner as a normal can, meaning they will have a defined can size, measurement plan, as well as recipe. The can # will always be the same.

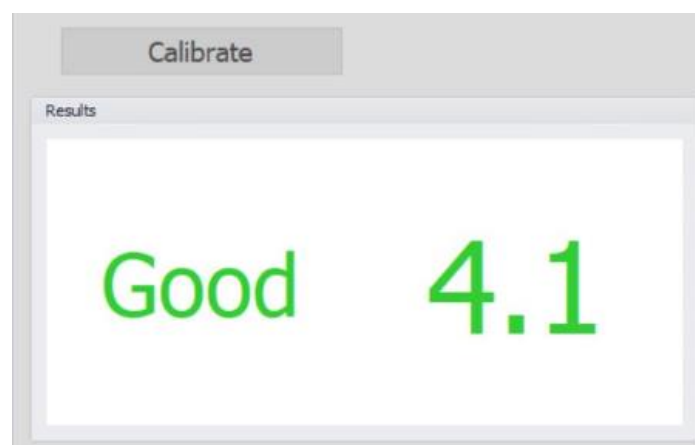
- **Size:** The size will be preconfigured by *SpecMetrix*® technicians and should never need to be modified.
- **Plan:** The measurement plan will contain a measurement process for each probe, Vertical (Straight) and Horizontal (Right-Angle).

- **Recipe:** The measurement parameters set for each NIST puck that will be preconfigured by *SpecMetrix* technicians.



The top right corner will show the measurement status of the calibration process just like any other can measurement, complete with a Reflectance bar, current I.T. and a checkbox to collect debug data.

Once this process is completed a pass or fail notification will appear in the Results section. A pass will appear in green text and mean that the actual measurement is within the acceptable specification range of the NIST recipe. A fail will appear in red text and mean that the actual measurement is outside of the acceptable specification range.



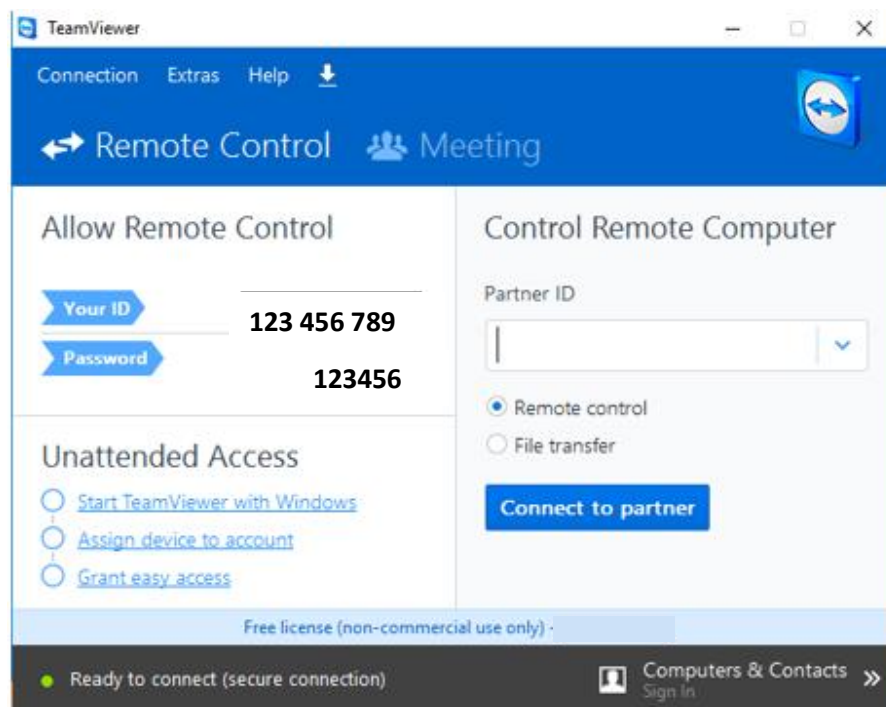
It is recommended to perform a monthly measurement verification test using the NIST traceable film standard on the ACS system to maintain optimal system performance and accuracy.

SpecMetrix® On-Line Support

To facilitate with any technical support needs that may arise, the *SpecMetrix*® unit includes provisions to connect remotely with support personnel at Sensory Analytics via the “TeamViewer” program. If the unit has an internet connection, establishing a remote connection with Sensory Analytics can be achieved by double clicking on the Team Viewer Support icon located on the desktop as shown below:



Clicking this icon will result in a pop-up window opening as shown below:



It is then necessary to contact Sensory Analytics with the 9-digit ID # as it appears in the Team Viewer Support window. This will allow the technical staff to remotely access the unit to assist with any operational needs.

We trust that the above information will be sufficient to meet your training and troubleshooting needs. However, in the unlikely case of any difficulties encountered in the operation of the SpecMetrix[®] software package, please contact your area representative for immediate service, or contact SpecMetrix Technical Support at:

(336) 315-6090 or support@specmetrix.com