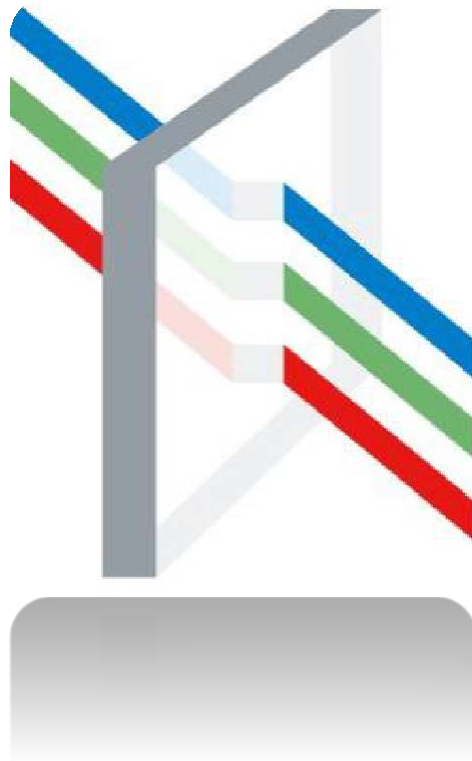




Dry Film Thickness QA Measurement System Installation & Operation Manual



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1 General Information

1.1 System Overview

The *SpecMetrix*[®] Dry Film Thickness Quality Assurance (DFT QA) Station is an innovative, real-time, non-contact measurement platform primarily designed to measure the thickness of applied top coat layers on metal coil as well as other coatings such as primers, back coats and several other coatings.

SA Offline is the film thickness measurement software used by the *SpecMetrix* DFT QA Station for transparent and semi-transparent layers or coatings.

All *SpecMetrix* 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 film or coating such as Refractive Index, to measure the film or 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 required if the desired units of measurement are coat weight units such as mg/in² or mg/4in² or g/m².

2 System Summary

2.1 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.

2.2 Performance Specifications

1. Coating Thickness Range 0.5 to 350 microns
2. Typical Accuracy 1 %
3. Non-contact measurement range 15-33mm

2.3 Environmental Specifications

1. Electrical mains input 120-240 VAC 50-60 Hz
2. *SpecMetrix* DFT QA Station 15-amp dedicated circuit 120 – 240 volts
3. Operating Temperature 5 C – 50 C
4. Operating Humidity 10% - 90% relative, non-condensing
5. *SpecMetrix* Display Protection IP30

2.4 *SpecMetrix* DFT QA Station Requirements

1. Windows 7 64-bit (SP 1)
2. 16GB Memory
3. 250 GB SSD

2.5 Installation and Site Requirements

The *SpecMetrix*[®] system should be set up on a suitable table top or laboratory bench. The tabletop or bench must be able to support at least 100 lbs. of weight. 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.)

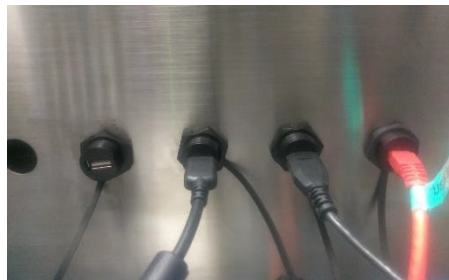
System Contents:

1. (1) DFT QA Measurement System
2. (1) Keyboard
3. (1) Mouse
4. (2) 12 Volt Power Supply
5. (1) Proprietary TVU containing NIST traceable standard
6. Operation Manual

Unpack and identify all listed items upon arrival.

3 Using the System

To begin setting up the *SpecMetrix* system, connect the keyboard and mouse to the USB ports on the bottom side of the *SpecMetrix* DFT QA Station.



3.1 Network and Machine Communications

The *SpecMetrix* DFT QA Stations are designed with one Ethernet port for plant network access. 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* DFT QA Station 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.

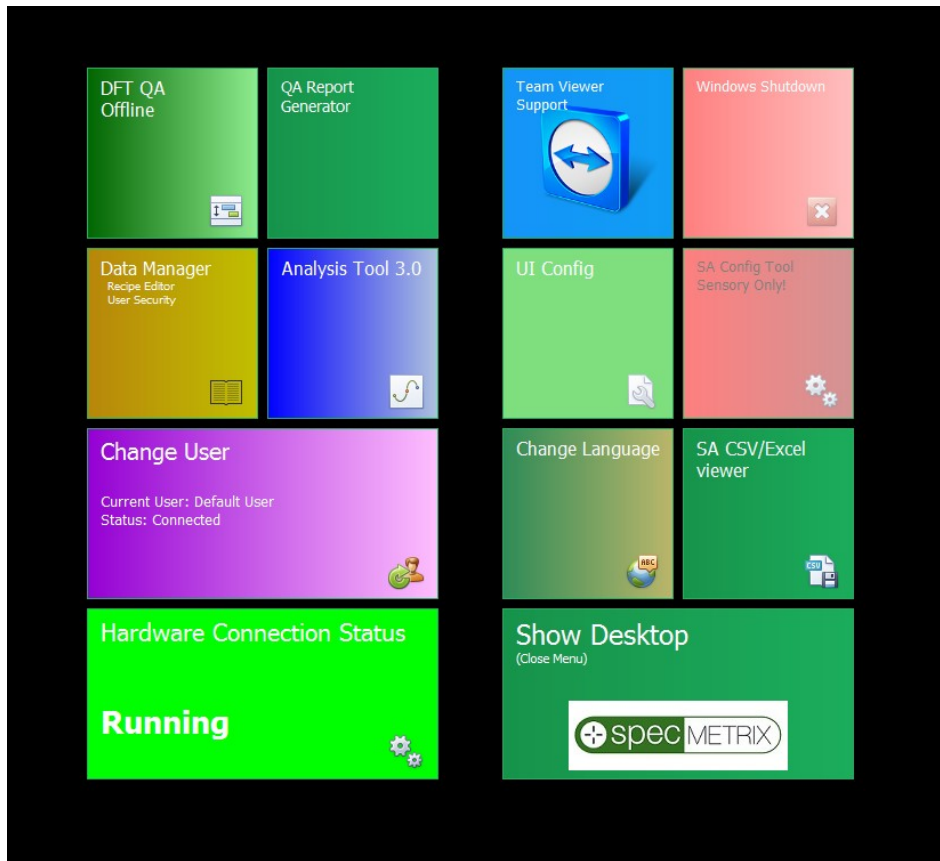
A network connection is not needed to run the DFT QA Software.

3.2 Power-Up Procedures

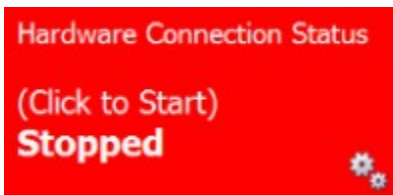
1. Connect the 12V power supply on the bottom of the *SpecMetrix* DFT QA Station, and push the master power button to the “ON” position. Check to ensure that the green power LED turns “ON”.
2. The system then Boots into Windows. Allow a few seconds for the boot-up process to take place before continuing.

3.3 Signing On

1. Double-click the Sensory Menu icon on the desktop. This will open SA Menu window shown below:



2. Make sure the Hardware Connection Status is running (Indicated by a Green Color). If it is Stopped (Red Color) click the Hardware Connection Status button once.



3. Click the DFT QA Offline button. This will start the SA Offline software as the default user.



The *SpecMetric*[®] System should now be ready for measuring. Refer to the Taking Measurements section of the manual for more detail.

3.4 User Access Levels

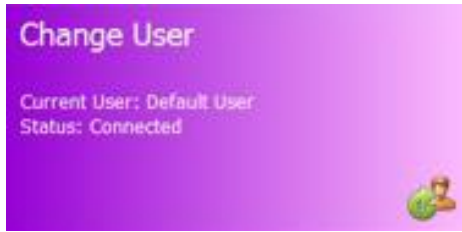
The *SpecMetric* Measurement System will come preconfigured with two user levels, each with different credentials.

- **User:** This user ID will have the default password “user” and will only have enough permission to operate the SA Offline software but will not be able to make any changes in the SA Data Manager or Analysis Tool. More specifically, the default user will not have permission to create, modify, or delete recipes used in the SA Offline software or have access to the User Configuration utility to make changes to the user interface. The user can take debug files within the SA Offline software as well as analyze the files but will not be able to make changes to recipes.

Admin: This user ID will have a default password of “admin” and will be able to perform all actions that a standard user can but will have the necessary credentials to make and save changes in the SA Data Manager, Analysis Tool, and User Configuration. More users and user types can be added by anyone with administrative level privileges and above in the SA Data Manager. Users with these privileges can also change the default passwords or the passwords of any lower level user.



3.1 SA Menu Buttons



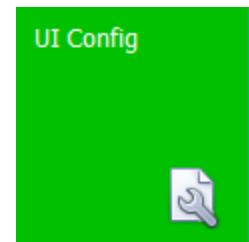
Change User - When the SA Menu is accessed, click on this button to open the User Security window to enter user credentials. The default user can be set in the User Configuration. Each user will have different credentials that will determine accessibility within the SA software.

Data Manager - Integrates to a SQL database where all recipes are stored and tracked. Additionally, this interface supports a fresh new user-friendly interface for Adding/Editing recipes, lane definitions for traversing systems, User security, and the all new 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 coatings & films measurements. Collect debug files by clicking the “debug” check-box in the UI settings. The version number may be displayed.

UI Configuration – Grants users with local admin level credentials access to the UI 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 to set your graphs to be tabbed or side-by-side in multi-line systems.



Change Language – Used to change the default language to one of fourteen languages. All text in the SA Menu and applications will change to the chosen language. Text that is entered by the user will remain the default language of the Windows Operating System.

SA CSV/Excel viewer – Opens a blank spreadsheet that mimics the Microsoft Excel program. Measurement results, which are saved automatically in CSV format at the end of each finished run, can be set to open up using this application.



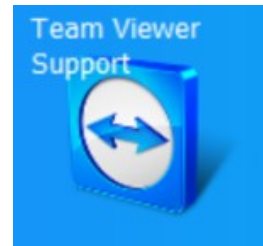
QA Report Generator – Allows users to create printable reports that contain information about each measurement run which includes start and end time of the measurement run, the maximum, minimum, average, and standard deviation of thicknesses recorded, wavelength range, probe information, IOR, conversion rate, units of measurement, and work order number.

Show Desktop (Close Menu) - This button 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.



Windows Shutdown – Used to close the *SpecMetrix*® Server so that all hardware is properly closed. You must first stop the Hardware Connection 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 technical support remote access to our customers' *SpecMetrix* DFT QA System so we can offer immediate solutions to 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* unit without the plant providing this information.



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

3.2 Power-Down Procedures

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

1. Stop all measuring, and exit the SA offline software.
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.

3.3 SA User Configuration

The screenshot displays a web-based configuration interface for the SA User. The interface is organized into several sections, each with a set of configuration options. A 'Save' button is located in the bottom right corner.

Section	Option	Value
Admin Security	Inactivity Timeout	0
	Average Reads Tab	
Average Reads Tab	Posted Readings Averaged	5
	ColorBands	
ColorBands	Green Colorband	50
	Red Colorband	25
	Yellow Colorband	25
CrossWeb	CrossWeb Line Count	2
	Default User	
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	Logging Interface	Logging Interface Options
	Probe Colors	
Probe Colors	High color	Blue
	Low color	Red
SA Menu	Menu Scaling	170
	Shutdown Method	Shutdown
System Support	Logging Level	None
	UI Performance	
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 at 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 buttons. Default value is set to 150.

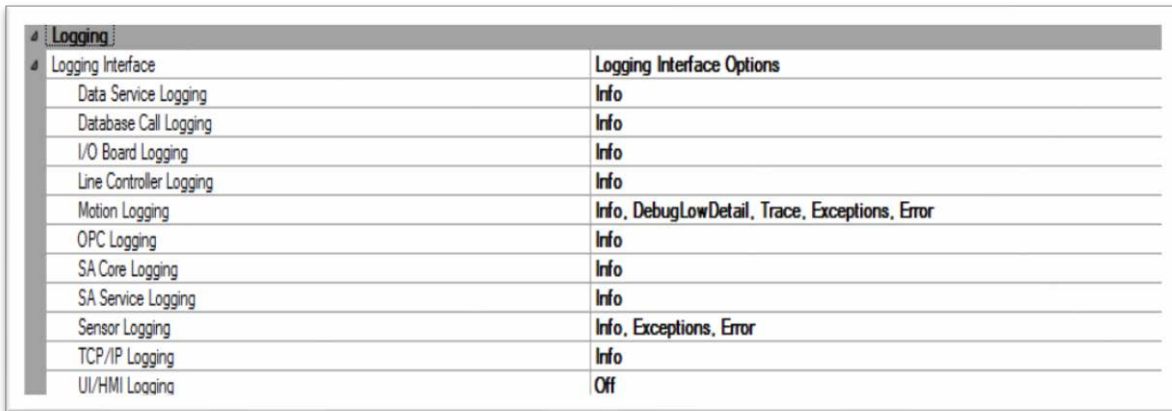
[Shutdown Method](#)

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

System Support

Logging

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**.

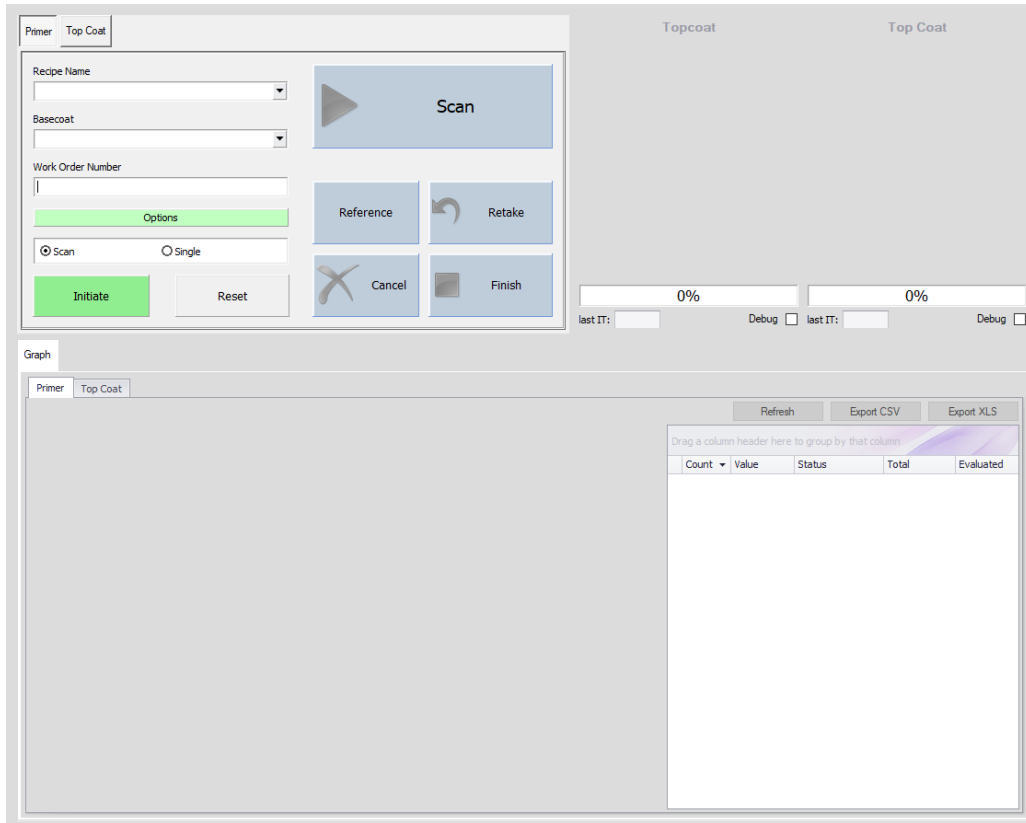


Logging Interface	Logging Interface Options
Data Service Logging	Info
Database Call Logging	Info
I/O Board Logging	Info
Line Controller Logging	Info
Motion Logging	Info, DebugLowDetail, Trace, Exceptions, Error
OPC Logging	Info
SA Core Logging	Info
SA Service Logging	Info
Sensor Logging	Info, Exceptions,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

3.4 Main User Interface



The image above is an example of what users see when the **SA Offline** software is initiated. The interface is largely dependent on settings chosen in the User Configuration tool. Before measurements can be taken, the following information must be entered:

1. **Recipe:** This drop-down menu is a list of all recipes available to the user for the appropriate sensor. This means that each recipe is set up to work for a specific sensor. Recipes are created, edited, and deleted in the SA Data Manager.
2. **Base Coat:** Drop-down menu items are generated when “*Also, used as dry Basecoat?*” option is checked on the Recipe Assistant’s General Information page.
3. **Work Order:** This field populates itself automatically when the measurement process starts unless the user specifies the Work Order # manually. The automatic WO# is in the format: WO_YYYY_MM_DD_HHMMSS (WO_YEAR_MONTH_DAY_TIME).
4. **Options (SA Offline Options Window):**
 - a. **Count:** The number of measurements that will be taken during the measurement series.
 - b. **Scan Time (Seconds):** The amount time (in seconds) the probe will be spend taking each measurement.
 - c. **Integration Time (milliseconds):** time in milliseconds used to sample the optical package detector array once. Displayed below the Reflectance bar.

- d. **Static Integration Time:** Sets the I.T. to a specific value and keeps it at that value for the duration of the measurement series.
 - e. **Static Reference:**
 - f. **Self-Referencing Probe:**
- 5. Select Mode**
- a. **Scan Mode:** Measurements will be taken as long as the chosen Scan Time permits.
 - b. **Single Mode:** Point to point mode; measurements will be taken individually each time the Read button is clicked.
- 6. Line Tabs:** The top two tabs in the example represent each sensor available in the system and are determined by customers' specifications in the SA User Configuration. They can be named whatever the customer chooses and the line setup will coincide with the orientation of the probes connected to the DFT QA unit:
- a. 600um Fiber Ruggedized Stainless-Steel probe
 - b. 200um Fiber Ruggedized Stainless-Steel probe
- 7. Scan/Read:** Begins taking measurements for the probe(s) on that line/tab.
- 8. Initiate:** Enters the chosen measurement mode.
- 9. Reset:** The Reset button clears all of the information entered in the Recipe, Basecoat, and Work Order fields.

3.4.1 Taking Measurements

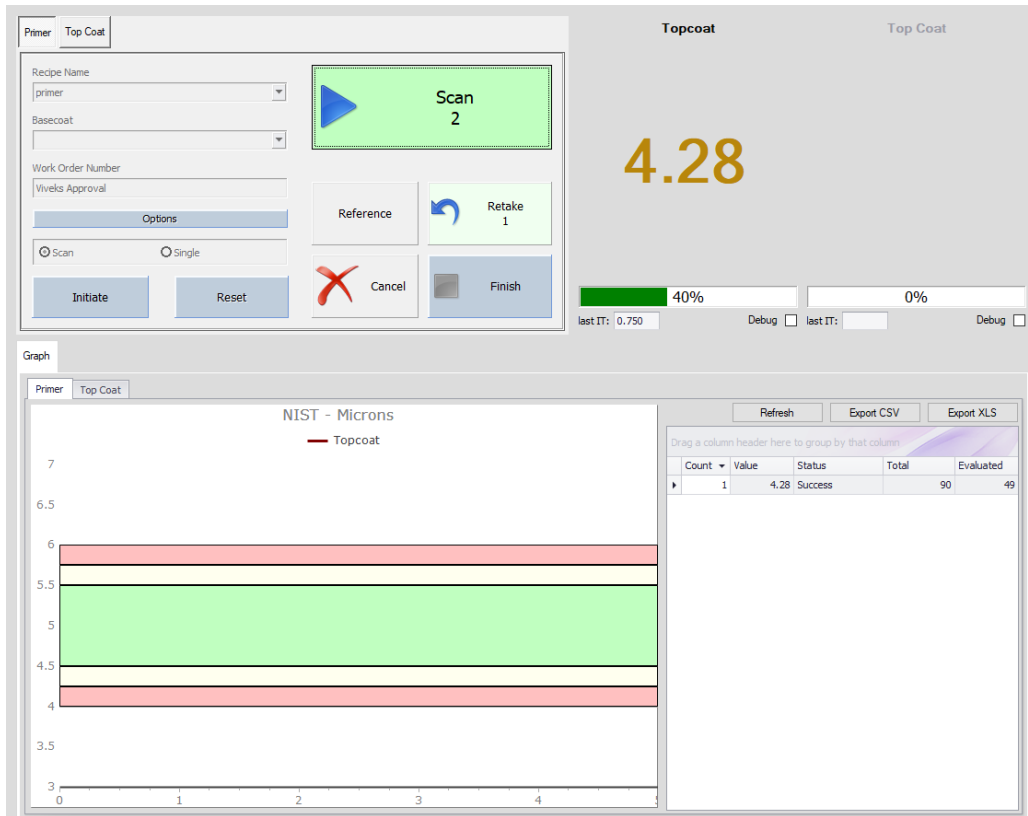
1. Click on the tab that corresponds to the desired probe. Given the previous example:
 - a. **Primer:** Uses a Near Infra-Red sensor with an operating range of 900-1700nm
 - b. **Top Coat:** Uses the Extended Range (ER) sensor with a photon energy operating range of 485-1375.
2. Choose a recipe from the *Recipe* drop-down menu.
3. If using a Basecoat subtractive recipe, choose the recipe from the *Basecoat* drop-down menu. Again, recipes must be set up to be basecoat recipes in the SA DataManager.
4. Enter work order # information in the *Work Order* text field. Again, if nothing is entered, one will be generated automatically.
5. Click the *Options* button to set up measurement count, scan time, and I.T. information in the appropriate fields.
6. Select Mode of measurement (Scan or Single Mode).
7. Click the *Initiate* button to enter measuring mode.

In Scan Mode:

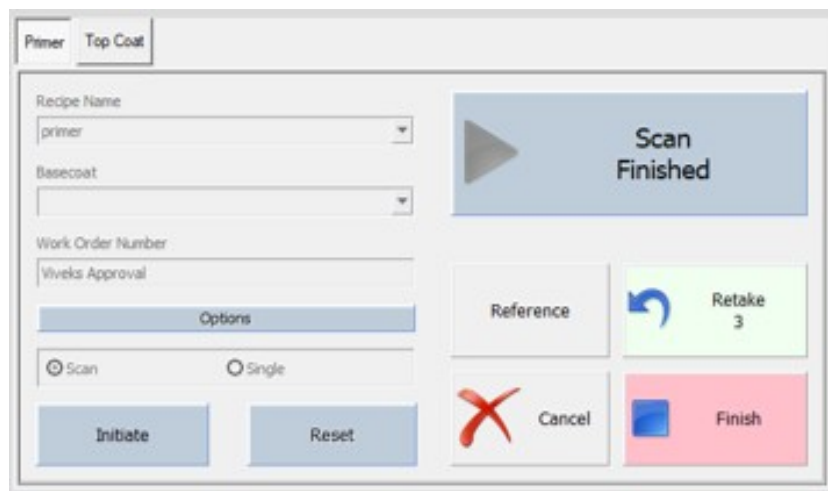
The screenshot shows a software interface for a scanning process. It features a tabbed interface with 'Primer' and 'Top Coat' tabs. The 'Top Coat' tab is active. The interface includes several input fields: 'Recipe Name' (dropdown), 'Basecoat' (dropdown), and 'Work Order Number' (text input). Below these is a green 'Options' bar with radio buttons for 'Scan' (selected) and 'Single'. At the bottom left are 'Initiate' (green) and 'Reset' (grey) buttons. On the right, there is a large 'Scan' button with a play icon. Below it are 'Reference' and 'Retake' buttons, and at the bottom right are 'Cancel' and 'Finish' buttons.

1. Click on the *Scan* button to begin taking measurements.
 - a. Measurements will be taken for a given amount of time. The end result is the average of the measurements taken.
 - b. The *Scan* button needs to be clicked to progress to the next reading in the measurement series.

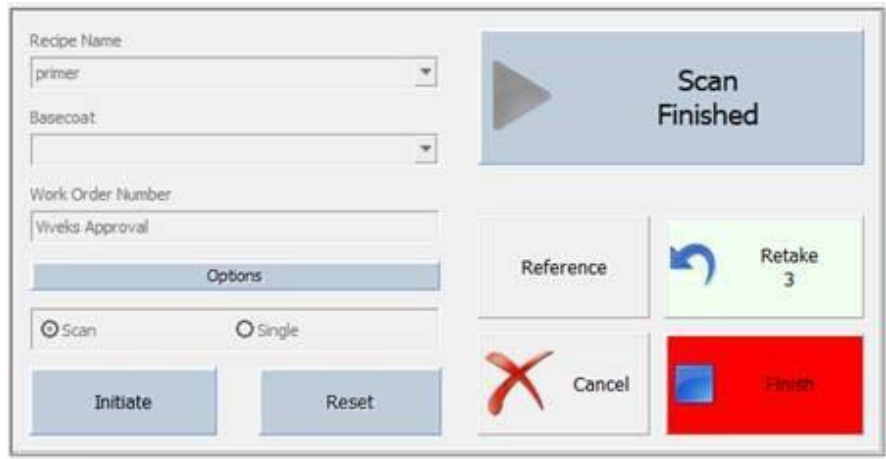
After a scan is executed, the “Next” number will display in the *Scan/Single* button under the text. The “Last” number shows up in the *Retake* button under the text. The *Finish* button is completely disabled until the last scan is taken.



- c. The *Retake* button can be pressed to repeat and replace the most recent measurement taken. During a series of good measurements, the system may come across a bad spot on the sample (a fingerprint for example) resulting in a No Read (NR), or an invalid measurement. The *Retake* button allows the user to repeat the same measurement on a different spot.
- d. The *Cancel* button can be used to abort the measurement series at any time.
- e. The measurement series will continue until it is aborted or the user has reached the chosen measurement count.



- f. When the measurement series count has been reached, the *Finish* button becomes enabled (becomes light red) and can be clicked to return to the Initiate screen.

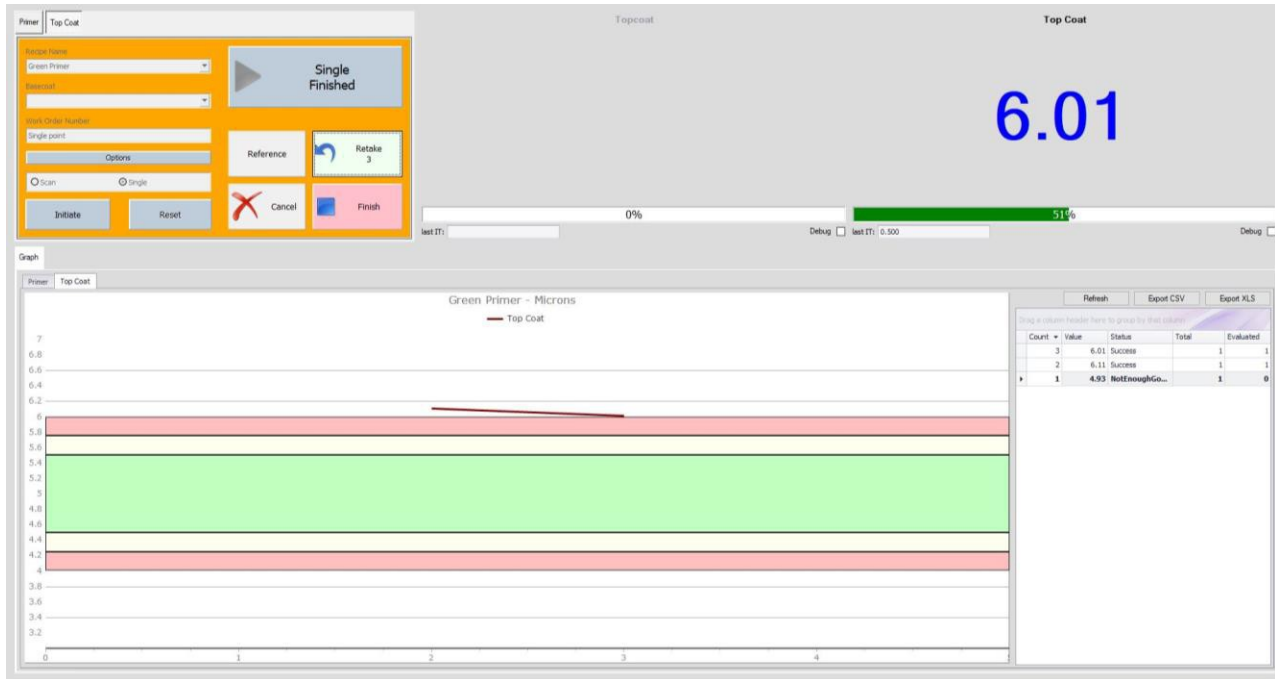


In Single Mode:



1. Put the system in Single Mode by clicking the *Single* bubble button below the *Options* menu.
2. Click on the green *Single* button to begin taking measurements.
 - a. Measurements will be taken each time the *Read* button is pressed. The *Single* button needs to be clicked for each individual measurement in the measurement series.
 - b. The *Retake* and *Cancel* buttons function as they do in Scan Mode.
 - c. Again, the measurement series will continue until it is aborted or the user has reached the chosen measurement count, displayed below the *Read* button.
 - d. The *Finish* button functions as it does in Scan Mode, returning the user back to the Initiate screen.

3.4.2 Measurement Results



The image above shows the measurement results in three regions after taking a series of three measurements (Single Mode is used in this example).

Probe Reading Region

Displays the current thickness value after every click of the *Scan/Read* button for each sensor.

Reflectance bar: Displayed underneath the thickness value and represents the reflectance percentage at that moment when a measurement is taken. This value may appear green or red.

Last I.T.: Displayed below the reflectance bar. This is the I.T. of the current measurement reading.

Debug: This checkbox allows users to collect data to be analyzed in the Analysis Tool.

Line Graph

With each reading displayed in the probe reading region, this graph is a plot of thickness measured as a process. A single reading is produced every time the Scan/Read button is clicked. The graph specifications are entered in the Data Manager Recipe Tab and consists of values chosen for Target Thickness (Target Spec), the Thickness Range (above and below Target Spec), and the Thickness Maximum and Minimum. The Graph Top and Bottom values are should be

logically chosen based on the prior values entered. The thickness ranges are represented by three color bands in the graph. The default percentages of the graph that each color band occupies are preset by *SpecMetrix*[®] technicians but can be adjusted in the User Configuration. The color band percentages and their respective meanings are as follows:

- **Green (50%):** Within acceptable range of the chosen Target.
- **Yellow (25%):** Either just above or just below the range of the chosen Target.
- **Red (25%):** Outside of the acceptable range of the Target.

Thickness Grid

Each individual thickness reading is recorded in the grid to the right of the Line Graph.

Count: The measurements order in the measurement series.

Value: The thickness of the sample at the time the measurement was taken.

Status: Tells the user if the measurement was successful or unsuccessful. Users can determine whether or not a new measurement needs to be taken in a different spot of the sample.

Total: The total number of measurements taken for each measurement.

Evaluated: The number of readings successfully evaluated in order for a reading to be displayed.

3.4.3 Thickness Grid buttons

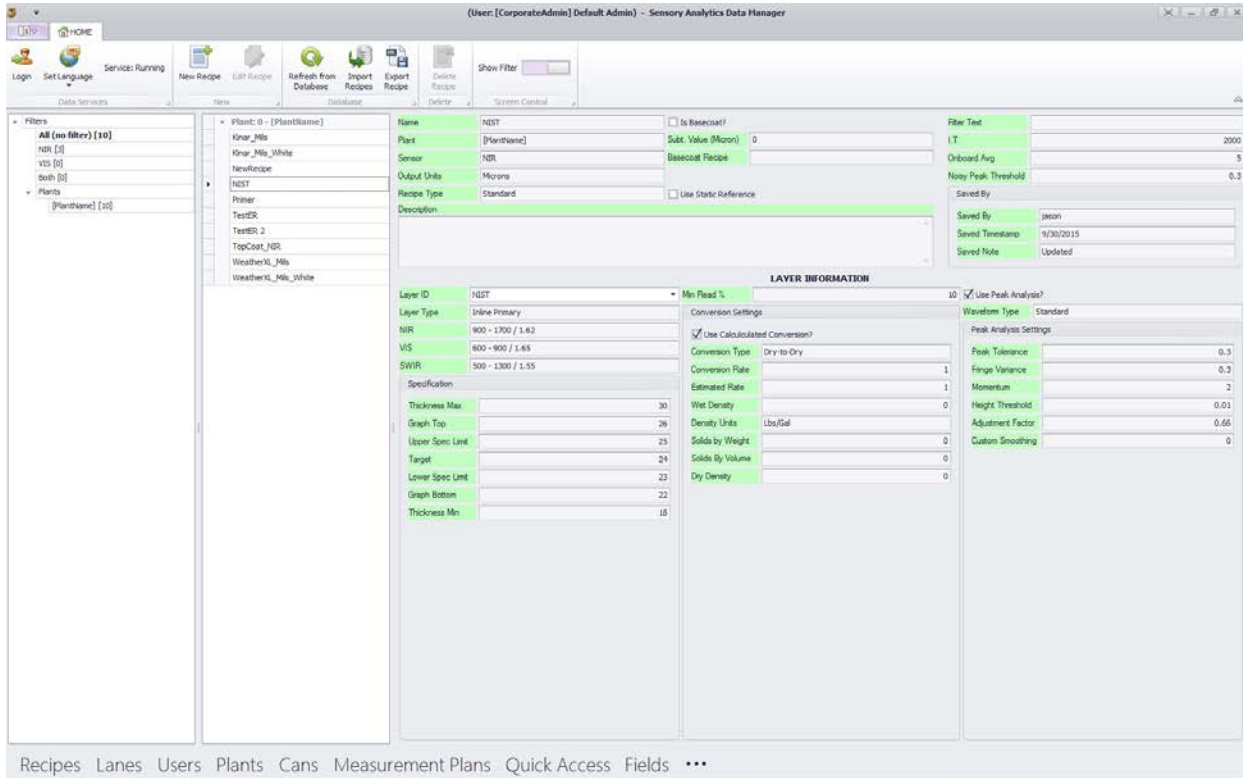
Refresh: Clears the measurement data in the Thickness Grid.

Export CSV: Exports the measurement data as a CSV (Comma Separated Value) spreadsheet.

Export XLS: Exports the measurement data as an Excel Spreadsheet.

Count	Value	Status	Total	Evaluated
3	6.01	Success	1	1
2	6.11	Success	1	1
1	4.93	NotEnoughGo...	1	0

3.5 SA Data Manger

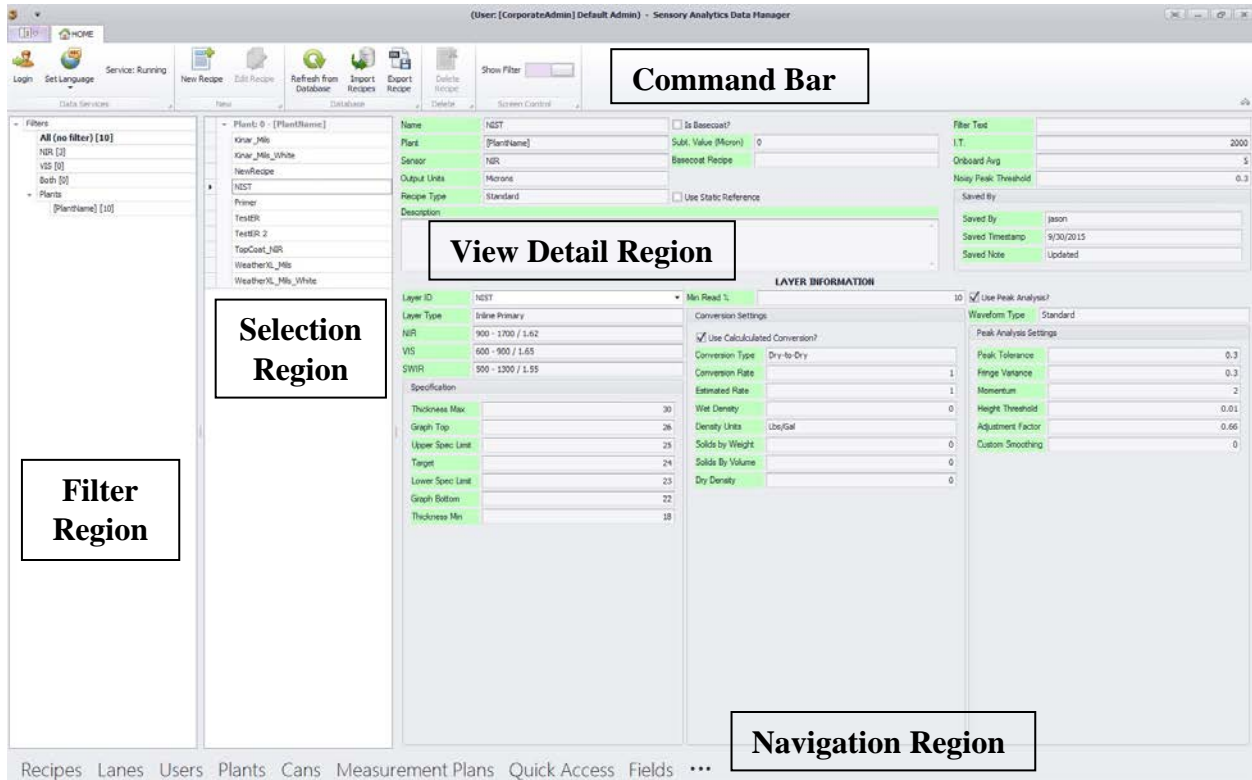


The SA Data Manager does more than edit recipes. This interface integrates to a SQL database where all recipes are stored and tracked. Additionally, this interface supports a user-friendly way of Adding/Editing not only recipes, but Lane definitions for traversing systems, User Security, and the Plant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

3.5.1 User Interface

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) Region

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 an 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* 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.

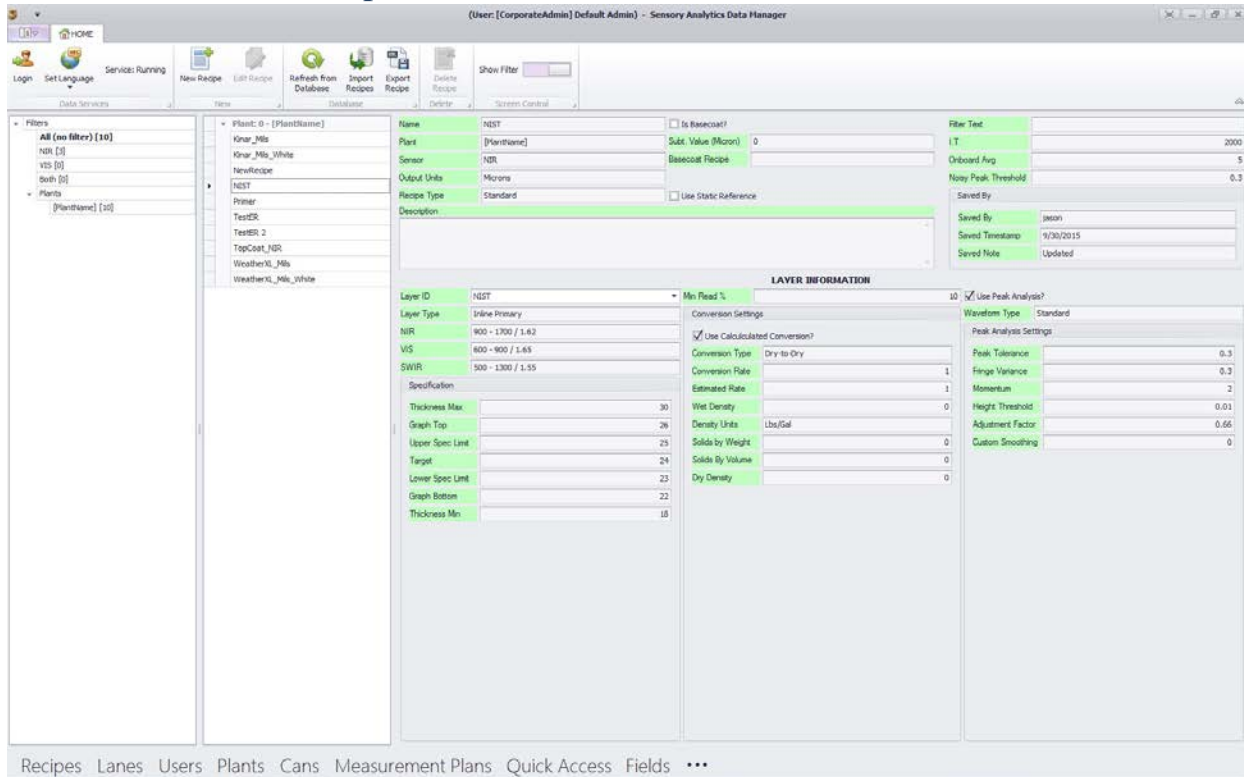
View Detail Region

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.

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.

3.5.2 Recipes



The most important part of the *SpecMetric*[®] 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 enhanced solution has validation that takes place when an attempt is made to save the recipe. If not all of 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 Recipe Wizard/Assistant 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 *SpecMetric* 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.

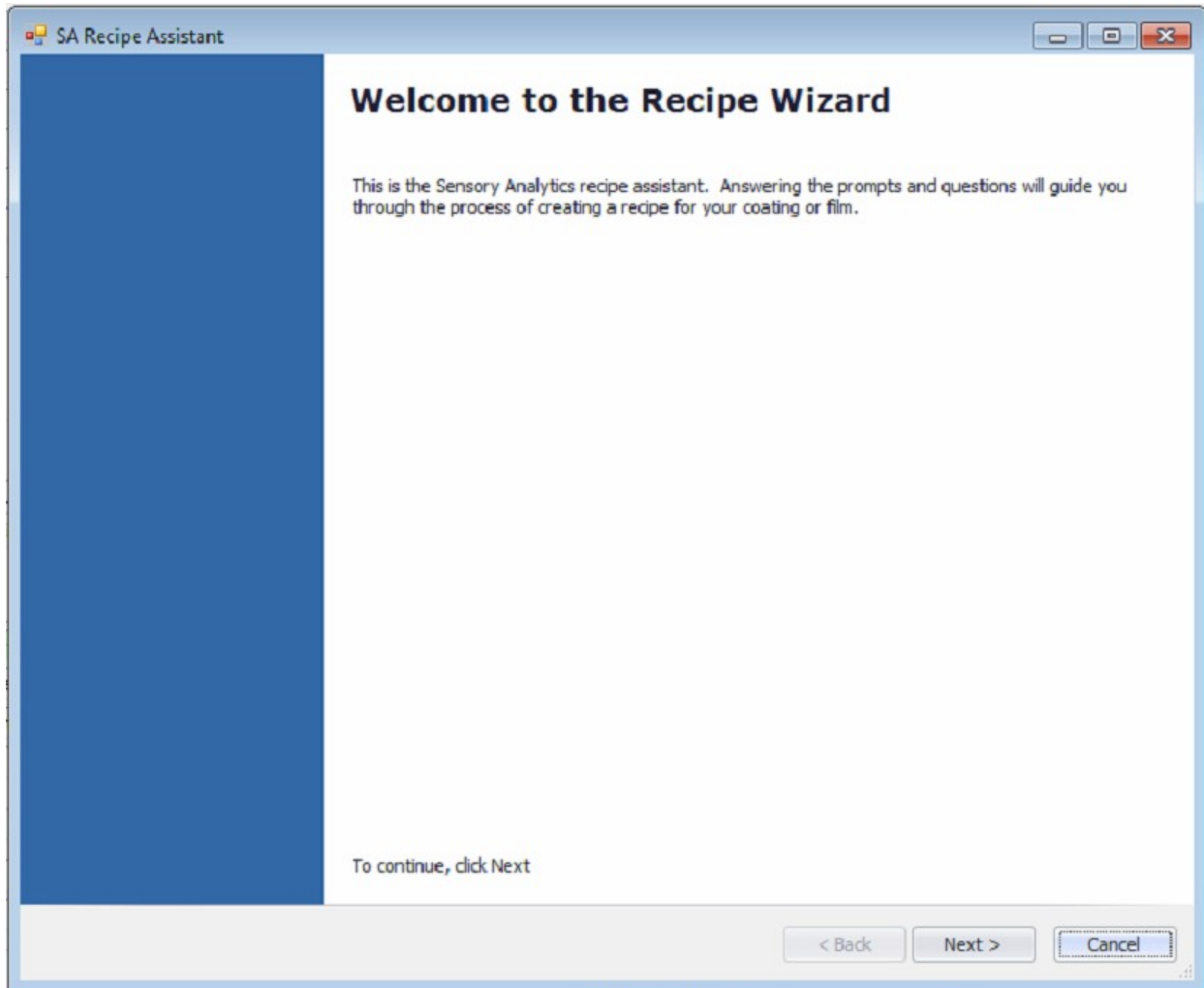
Recipe Wizard



Recipe Wizard is a user-friendly way to create new coating recipe for *SpecMetrix*[®] Measurement Systems. Having a good recipe for a given coating is critical and it is a one-time setup that should only take a few minutes for a given coating. The task of creating new recipes has been simplified compared to earlier versions and by answering a few questions. Creating a recipe can be effectively achieved. 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.

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.



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

spec METRIX

Recipe Name: 9

Units of Measure: Microns

Sensor Type: ER

Recipe Type: Sensor Type
NIR
VIS
Both
VisNir
ER

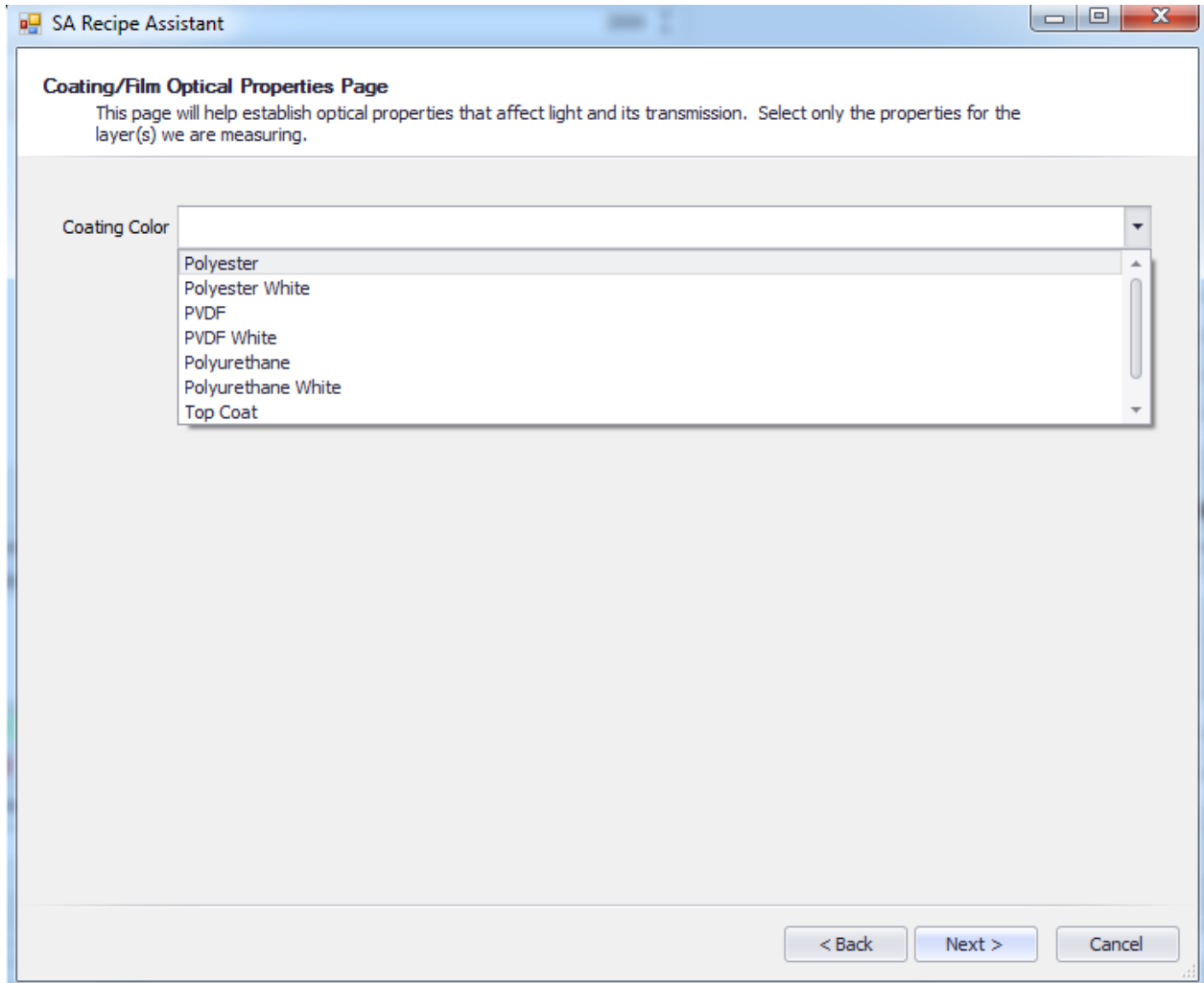
Measured State?

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** – VIS, NIR or ER. 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.

The screenshot shows a software window titled "SA Recipe Assistant" with the following content:

Recipe Assistant - Conversion for Weight / State
 The data for this page can be found from the Coating Data Sheet provided by the coating supplier. This page MUST be filled out for weight based measurement, or if you converting from Wet state measurements to Dry state results.

Layer name:

Calculation Option: Wet Density Calculation Dry Density Calculation

lcgWeightConversion

Wet Density: Wet Density Units:


% Solids by Weight:

Dry Density (g/cm3)

Dry Density (g/cm3):

lcgWetToDryConversion

% Solids by Volume:

 Solids By Volume Assistant

< Back Next > Cancel

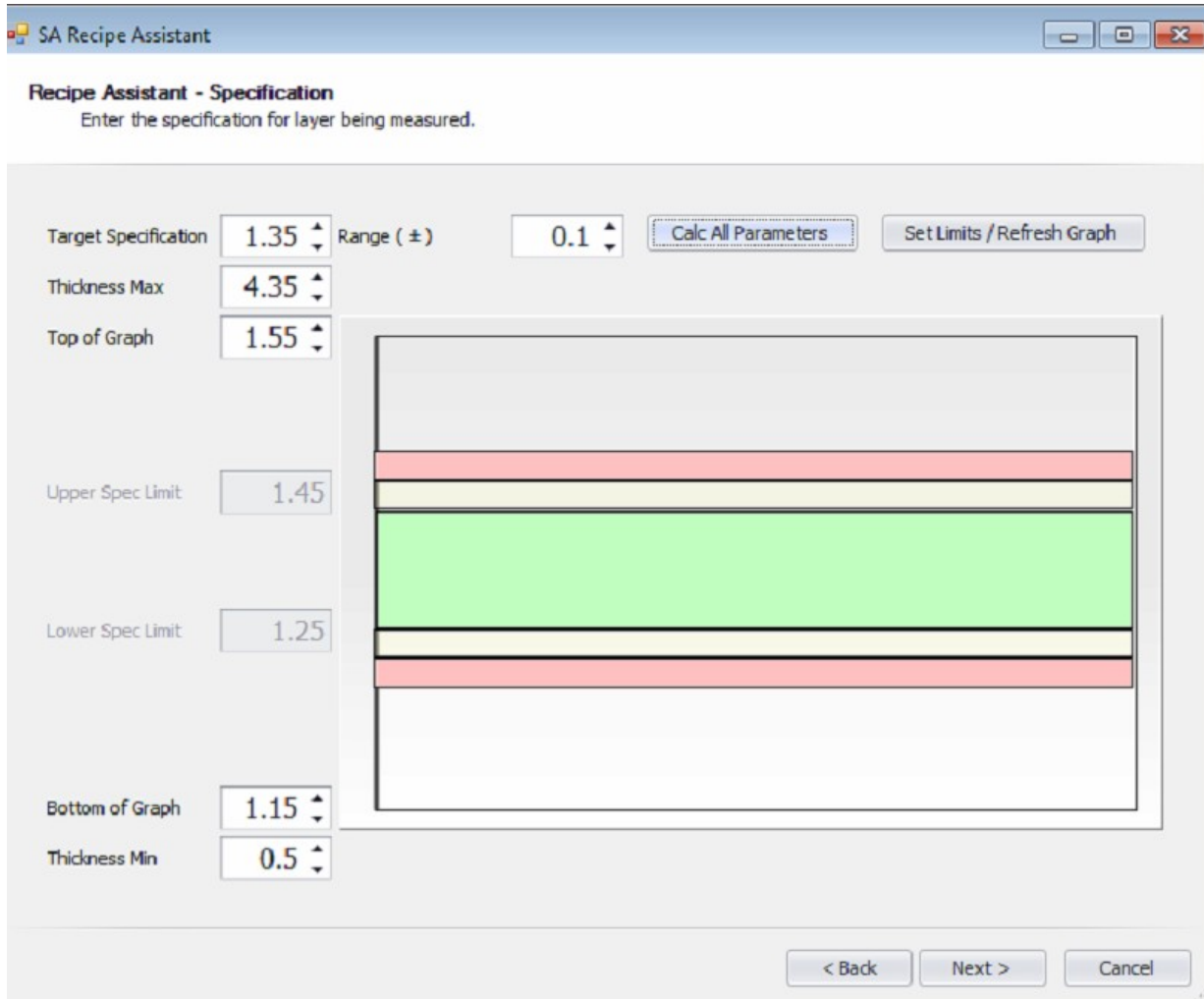
A micron to weight conversion often requires coating specific properties which is generally found in the Coating Specification Sheet from the coating supplier. The most difficult piece of information that is typically missing from the Coating Specification Sheet is the [% of Solids by Volume]. A simple 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 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.



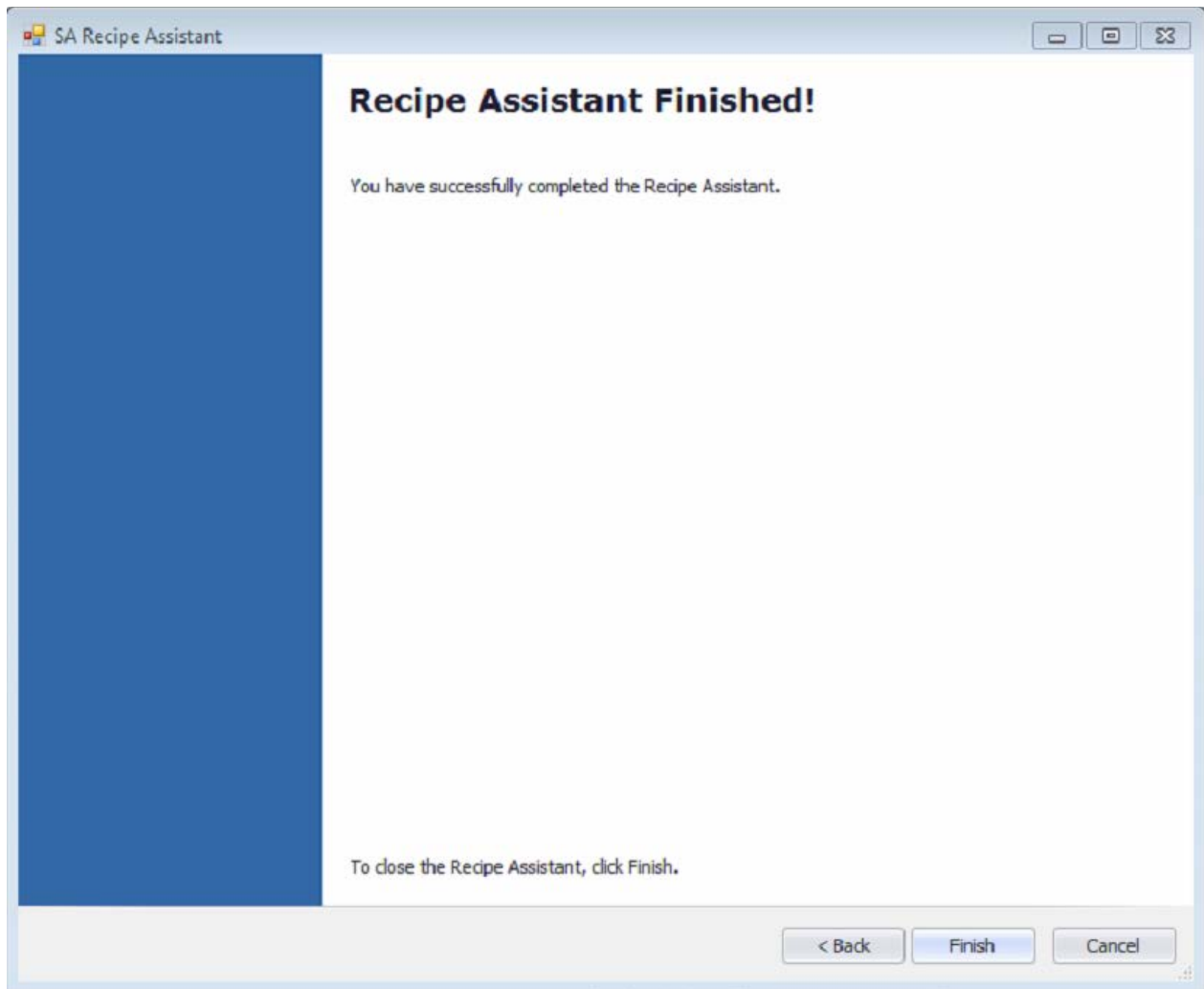
The easiest way to finish up the specification is to enter the desired target specification, select the appropriate range for the specification tolerance, then click the “Calc All Parameters” button. This will present the graph in the best logical layout with SPC (Statistical Process Control) banding, 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 an “upper limit” and “lower limit” by entering the values in accordance with the formula:

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

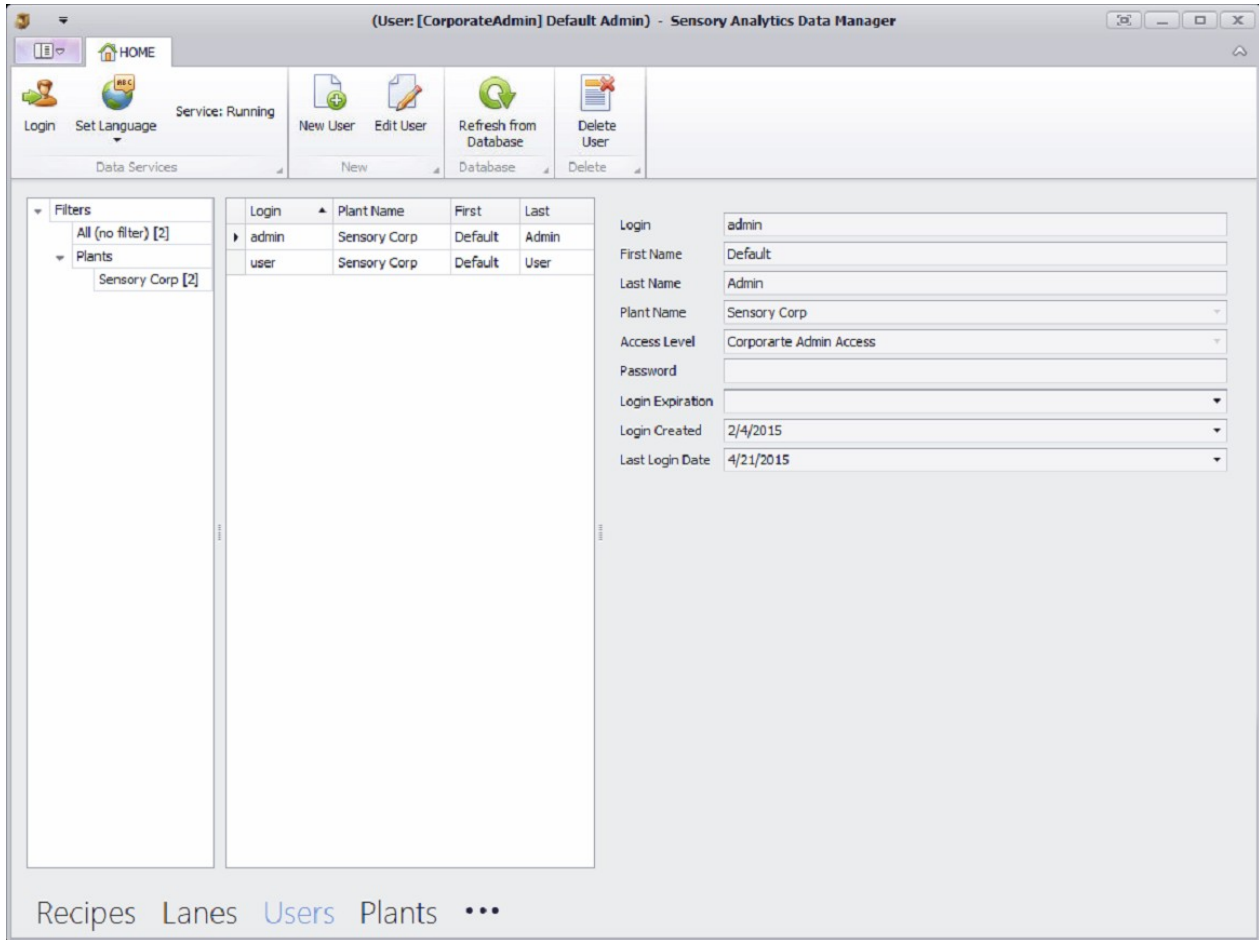
$$\text{Range} = (\text{Upper Limit} - \text{Lower Limit}) / 2$$

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.

3.5.3 Users



User security is a critical aspect of 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

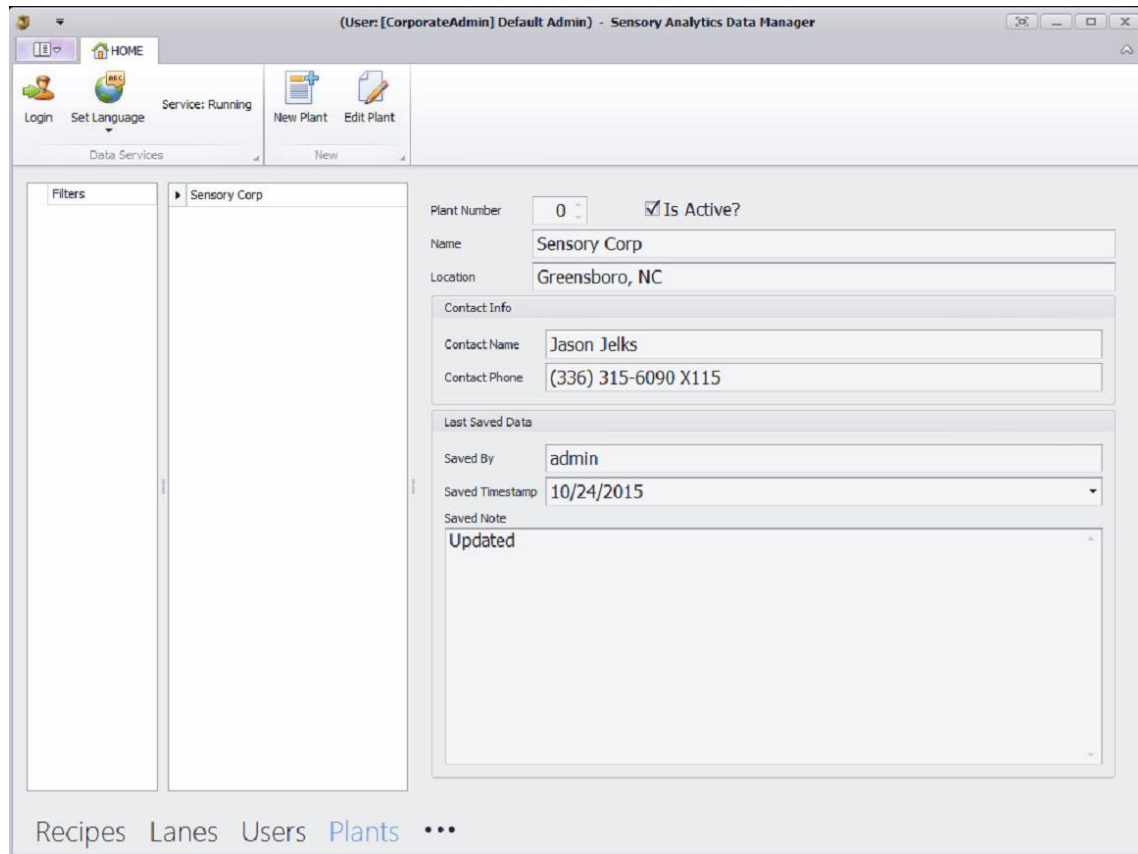
- **User** – This is a base level user. They have access to “Read” but not update any element. In the Data Manager, this access level can only review [Recipes] and [Lanes]. A user can open and operate the *SpecMetrix*[®] software, as well as the Analysis tool. However, recipe changes will not be available 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.*

3.5.4 Plants



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. 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.

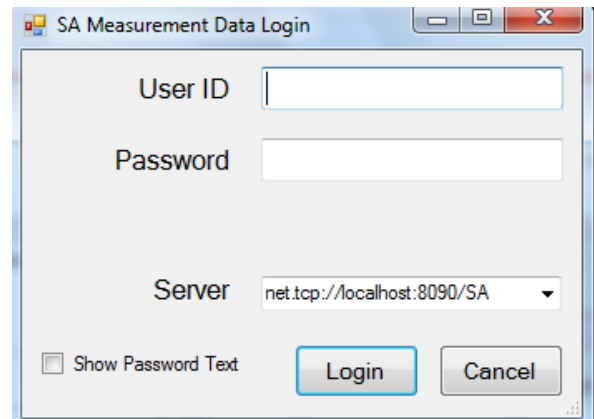
3.6 SA Analysis Tool

To get started you must first turn on and run the *SpecMetrix*® SA Offline 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.

3.6.1 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.

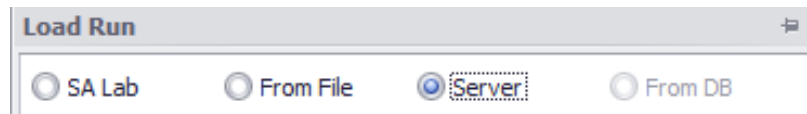
By default, the user will be logged into Analysis Tool with the current user’s level of credentials, however, users can change credential levels within Analysis Tool.



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

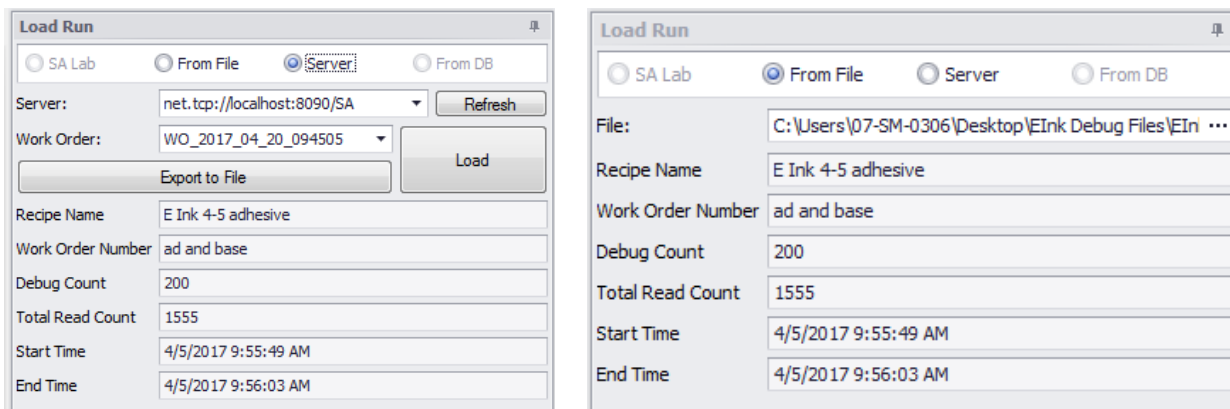
3.6.2 Loading Files

There are 3 ways to review a debug set:



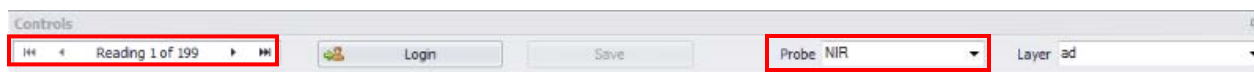
1. The primary, and best way to work with the data, is to access the server directly. Select “From Server”, and use the drop down to select which SA server you wish to work with. For *SpecMetrix* system, there will only be 1 server: net.tcp://localhost:8090/SA
2. Select the option of “From File” if you 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).

3.6.3 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. SA Analysis Tool 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.

3.6.4 Calculated Thickness



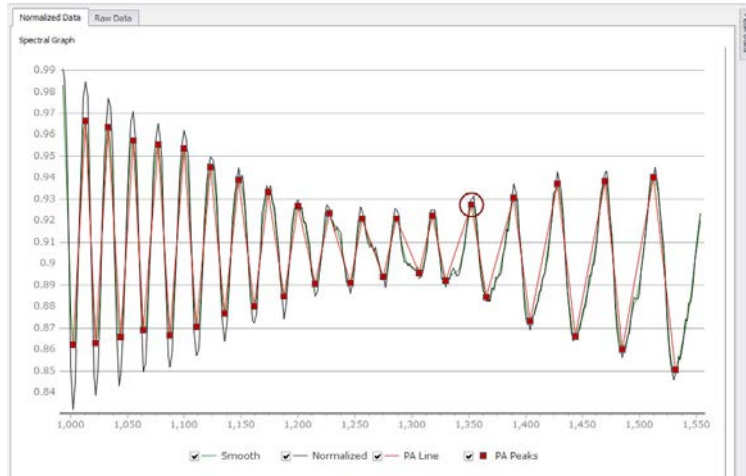
A Peak graph that shows the thickness or film-weight peaks within the Min/Max evaluation range.

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.

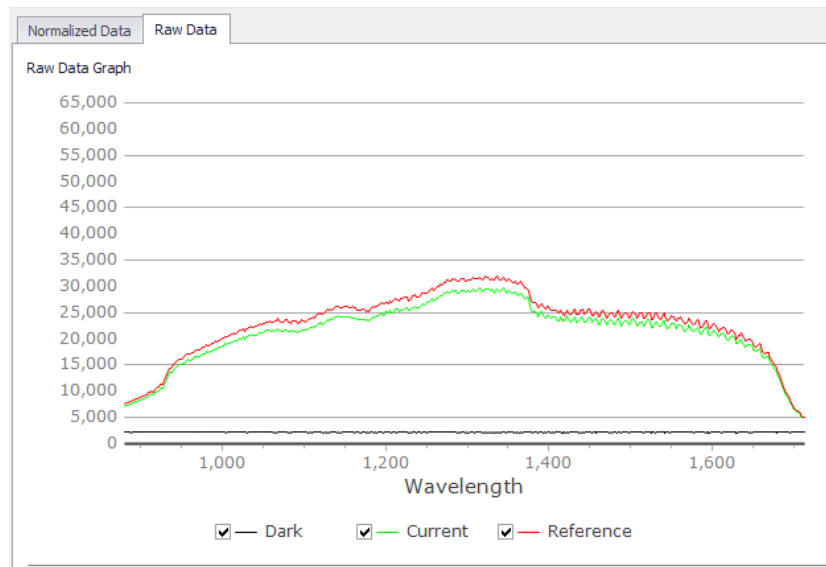
3.6.5 Normalized Data

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



3.6.6 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.

3.6.7 Peak Data

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

Peak Data			
Info	Peaks	Manual Est	Options
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. It 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 (μ m):** 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 following image contains data for wavelength, height (distance from one peak point to its adjacent peak to the right), and thickness (in microns and converted units). Peaks must be in sequence. It also contains subtractive layer information based on the debug information used in this example.

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

3.6.8 Manual Est.
 Allows users to adjust the following values:

Peak Data			
Info	Peaks	Manual Est	Options
Start Wavelength	1,496.49		
End Wavelength	1,526.38		
Ior	1.23		
Height	0.0025		
Estimated Microns	31.06		
Mils	1.223		

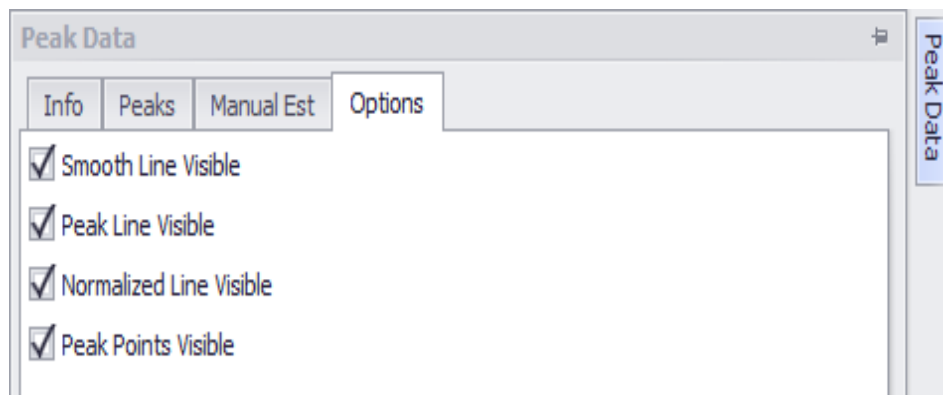
- **Starting/Ending Wavelength:** The wavelength is the range of light spectrum that is being measured to produce a reading. SpecMetrix[®] software currently measures in 3
- different spectral ranges:
 - a. Visible spectrum (VIS) which ranges from 400 nm – 1000 nm (can also detect in the 200-400nm wavelength region if a UV light source is included).
 - b. Near-Infrared (NIR) which is from 900 nm – 1700 nm.
 - c. Extended Range (ER) which operates in the 485-1785 photon energy range.

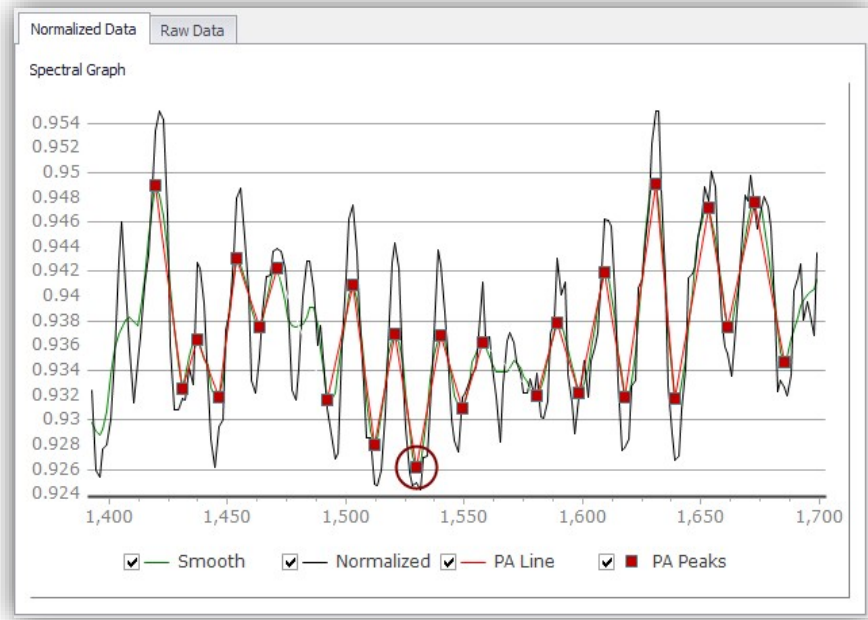
When you adjust, the wavelength ranges you are narrowing the available spectrum in which is measured. This becomes apparent in the Spectral graph as you slide the Start or End wavelength indicator.

- **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.

3.6.9 Options

Controls the visibility of the Normalized graph lines:



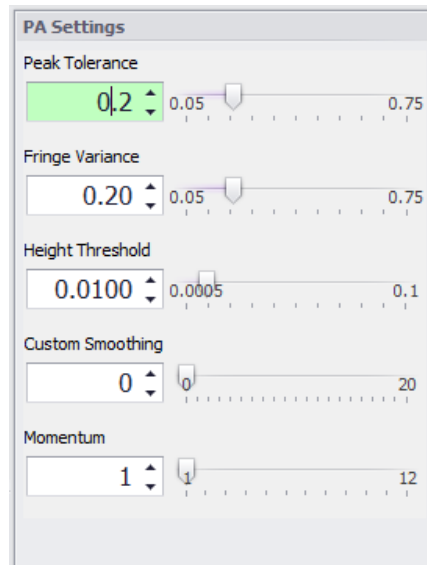


Checking or unchecking the line display boxes will hide or unhide the respective lines in the Wave Graph.

- **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.

3.6.10 PA Settings

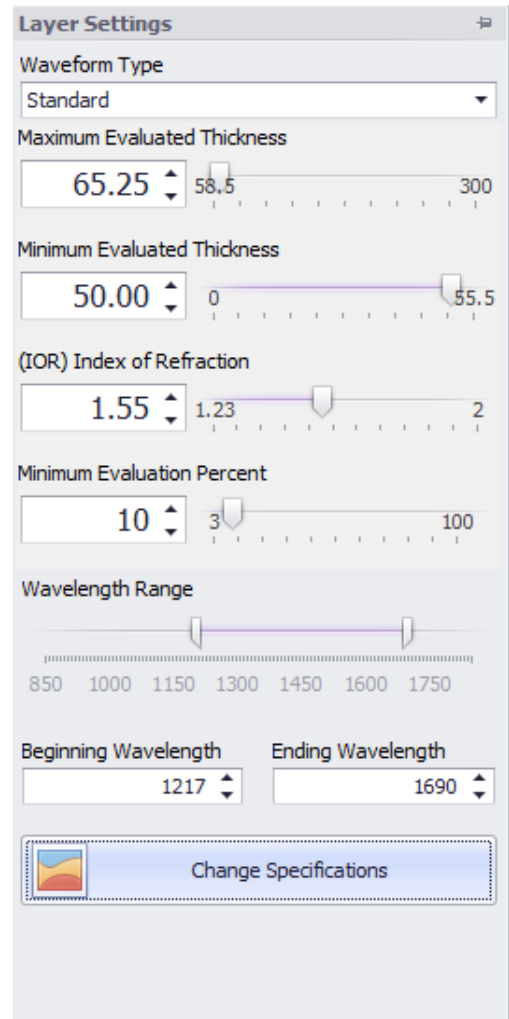
Peak Analysis values can be changed as follows:



- **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. 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.

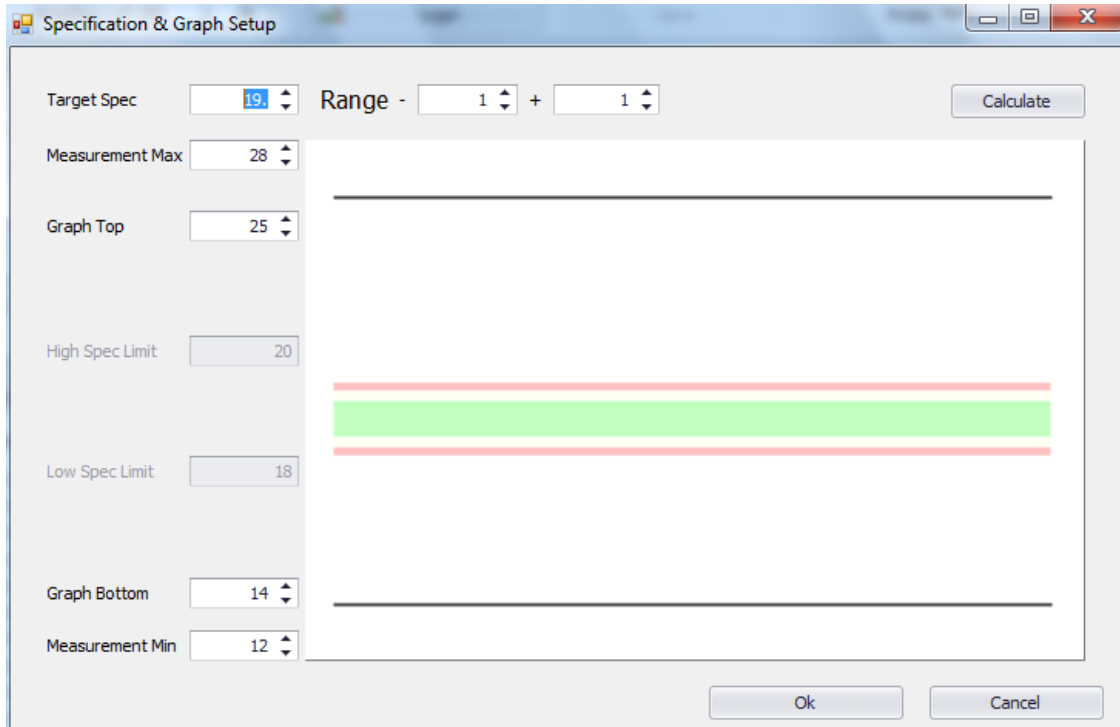
3.6.11 Layer Settings

- **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.
- **Index of Refraction:** 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.



3.6.12 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:



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).

3.6.13 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

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.

Gravimetric Weight Adjustment

Original Weight 30.030

Conversion Factor 1.50000

...in microns: 20.020



Gravimetric Weights

Average 0.0

New Conversion Factor 0.00000

Apply Cancel

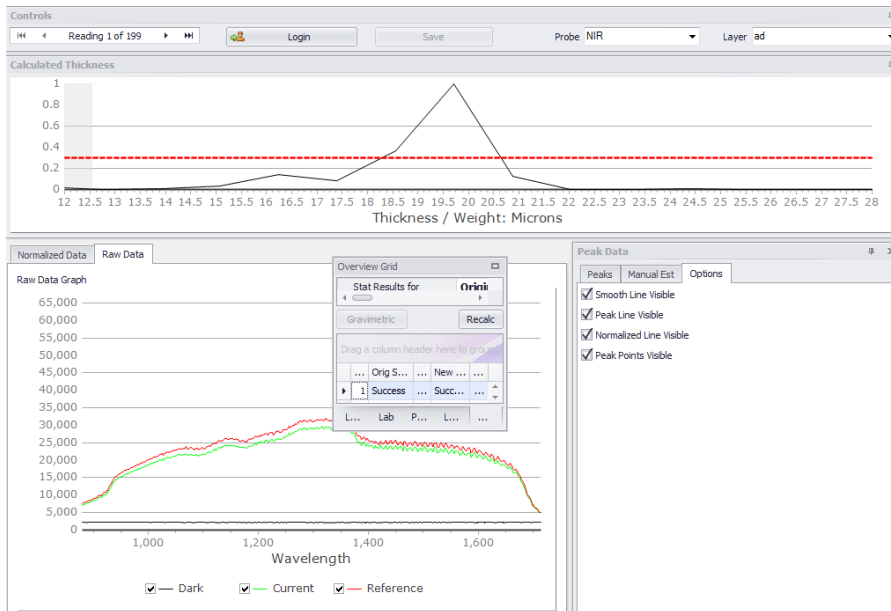
The Gravimetric form allows the user to manually adjust the correlation factor of absolute thickness, as measured by the *SpecMetrix*[®] system, to film-weights that are determined by weight analysis or other comparative measurements.

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.

3.6.14 UI Customization

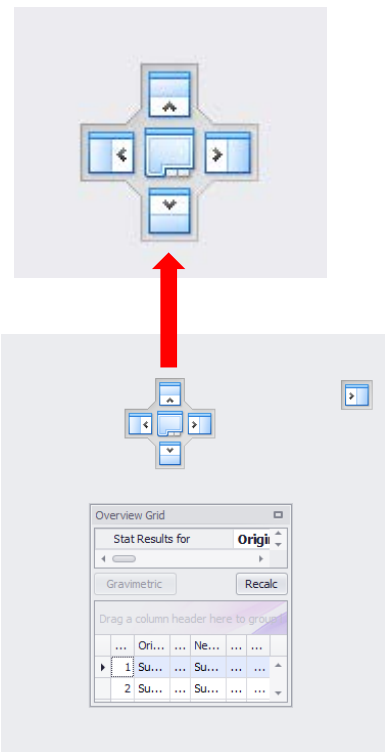
Most of the windows in the Analysis Tool can be moved and resized by the user. They can be rearranged and docked in more convenient locations to make other windows easier to work within. This allows for a great degree of user interface customization. The only window that is permanently docked is the 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 Tool will reset all positions to defaults.



4 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.

5 System Maintenance

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.

5.1 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 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

5.2 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.

5.2.1 Suggested Cleaning Interval

Equipment	Environment	Maintenance Interval
DFT QA	Clean Room	Quarterly
DFT QA	Factory Environment	Monthly
DFT QA	Harsh Factory Environment	2-4 weeks
DFT QA	Office / Lab Environment	Quarterly

5.2.2 Probe Cleaning

The probe needs to be cleaned from time to time, as it will collect coating and other particulates.

To clean the probe:

1. To clean the lens, use a cotton swab or other soft cloth that has been dipped in a cleaning solution such as Acetone or MEK.



5.3 Lamp Replacement

There is a 5-volt halogen lamp in the system for each optical probe. These lamps can be found in the aluminum blocks.

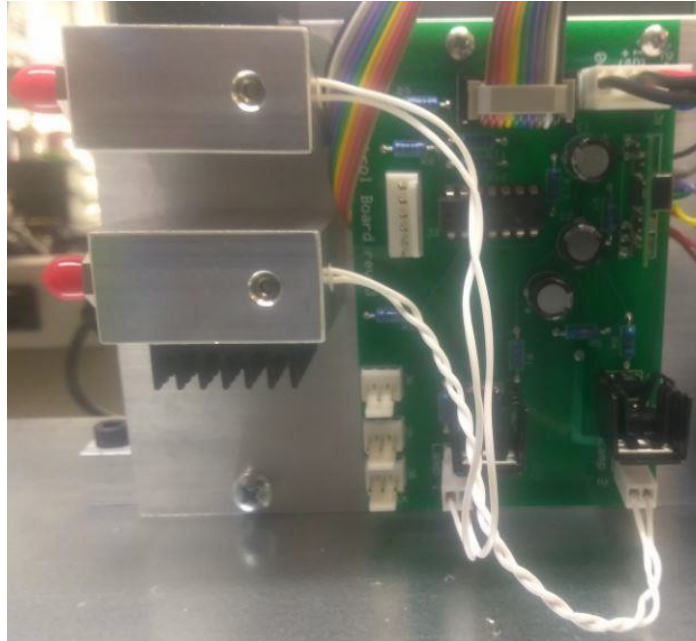
Note: Never touch the glass of a halogen bulb with your bare hands or a dirty rag. Oils and other contaminants can greatly reduce the bulb life.

To Remove a Lamp:

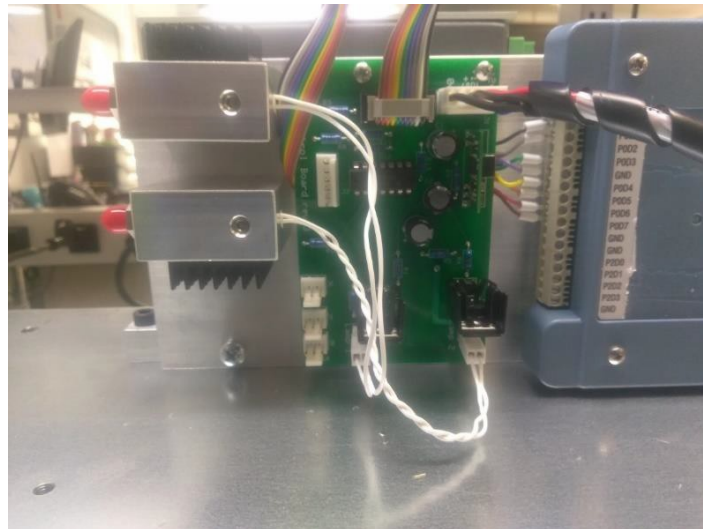
1. Remove the 2 bolts in the top corners and 2 bolts in bottom corner that mount the imbedded PC, to gain access to the lamp blocks.



2. Use a 3/32 Allen key to loosen the set screws in the aluminum blocks that hold the lamps. Pull the lamp from the aluminum block.



3. To disconnect the lamp from the system, unplug from the circuit board.



4. To install a new lamp, reverse the steps, **being extremely careful not to tighten the set screw in the aluminum housing so tight that it damages the lamp.** The set screw should just be snug with very little torque.

*** The spare lamp is located on the opposite side of the lamp block mounting plate.**

6 Calibration

There is no requirement for calibration on individual coating standards on daily basis. A NIST traceable measurement coupon is provided to check the gauge's accuracy. A thickness verifier unit (TVU) can be supplied by Sensory Analytics, and can be used to verify the calibration of the optics inside the unit.

The calibration process is used to verify the calibration of optics inside the *SpecMetrix*[®] unit. The standard recommendation is to perform calibration at least once every 6 months but the frequency can be higher depending on the internal quality requirements of specific plants. To verify calibration of the *SpecMetrix* optical package and probe:

1. Take a NIST traceable standard puck (*See Image at Right*) and place it below the probe head.
2. Turn on the *SpecMetrix* software.
3. Select the appropriate NIST Recipe for the standard.
4. Run the NIST recipe to make sure the values being read are within an acceptable tolerance range to the NIST traceable value shown on the puck.



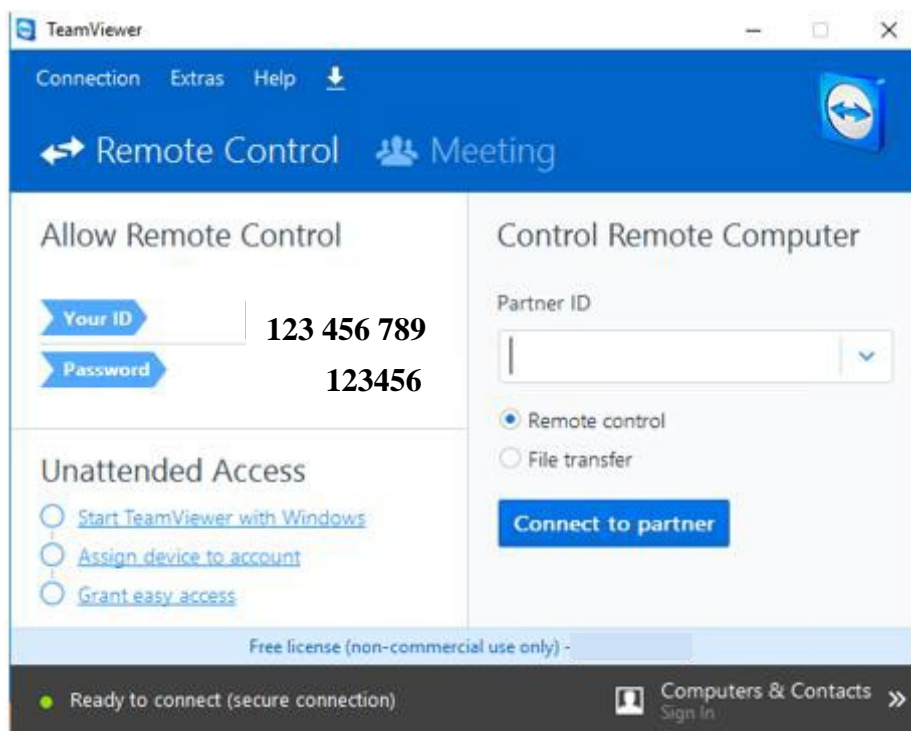
It is important to make sure that the sample is manually moved while the measurement is being taken.

7 *SpecMetric* On-Line Support

To facilitate with any technical support needs that may arise, the *SpecMetric* unit includes provisions to connect remotely with technical support 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