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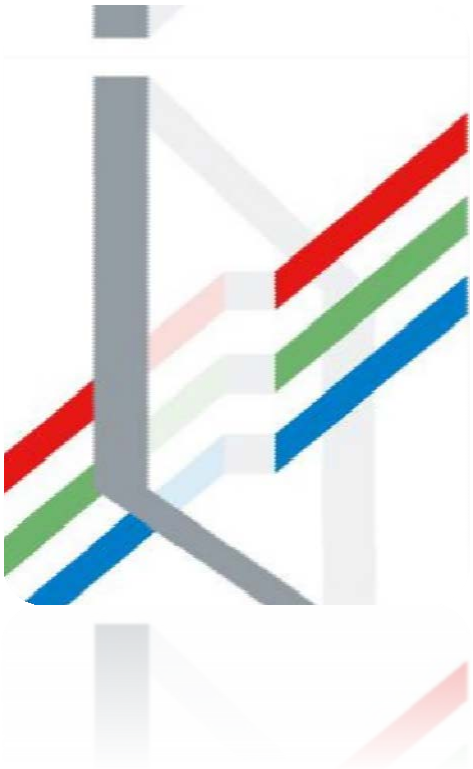
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SA Traversing In-line Coating Thickness Measurement System

Installation & Operation Manual



SENSORY ANALYTICS™

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System Description and Usage

The *SpecMetrix®* In-line coating thickness measurement system is designed to measure the thickness or coat weight of wet or dry coatings applied to flat sheets, continuous coil or plastic film and coatings on many other substrates. Each system is comprised of one or multiple probes connected by fiber optic cable to a controls enclosure mounted near the coating line so that the supplied probe cables can terminate in the controls enclosure. The probes are usually mounted between the coater and the oven for wet coating measurement and after the oven for dry coating measurement. The enclosure has a data connection to the *SpecMetrix®* Display Unit, which can be up to 150 feet (~50 meters) away.

SpecMetrix® systems use proprietary ruggedized optical interference technology to measure the absolute wet or dry coating thickness. This is a non-contact and non-destructive technology that only requires minimal prior knowledge of the refractive Index of the coating to evaluate the coating thickness measurement in microns. When measuring wet coatings, the dry coat weight in units such as MgSI, Mg4SI, lbs./ream or GSM is then calculated from the wet or dry thickness using data from the coating manufacturer such as wet density (lbs./gallon or gram/liter) and % solids by weight and %solids by volume.

Product Safety

Before using your *SpecMetrix®* System

Your *SpecMetrix®* System is very safe to use. However, like all electronic equipment, you must follow these common-sense guidelines to ensure your safety and future integrity of the unit.

- **Please read and follow instructions**
  It will be helpful if you review this document completely before you attempt to install and use your *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 your *SpecMetrix®* System in an area where there is a potential hazard of electric shock from spilled water or other uncontrolled moisture.

-  Electrical Warning

  A professional licensed electrician should perform all electrical work/installation.



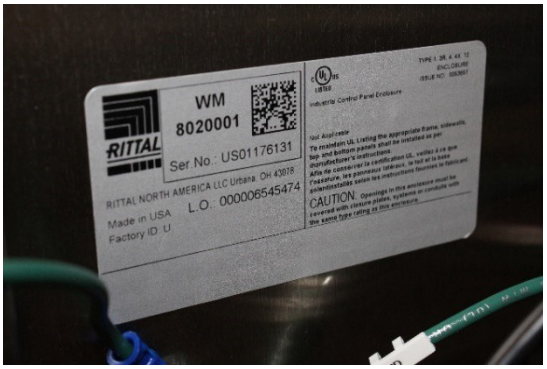
- Installation Requirements
  1. SpecMetrix traversing systems must be installed inside a cage.
  2. Indoor and dry location use only
  3. Environmental temperature: 0-50C (32-122F)
  4. System mounting elevation: Max 2m (6.5ft)
  5. The weight of total system ~1000lbs (453kg, ICU weight 125lbs)

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-Customer must provide:



- Dedicated Circuit
- Single-Phase with neutral and ground
- 50/60Hz
- 120/240VAC
- 15Amp Circuit (min 14AWG (1.63mm diameter wire)
- SpecMetrix ICU can be hard-wired to the main power input or a wall socket
- Primary Operator Workstation will require one or two wall sockets depending on the configuration that must be in the same dedicated circuit
- All Ethernet cables must be minimum CAT 6 **Shielded**
- ICU can be maximum of 65.5 feet (~20 meters) “cable-routing” distance away from actuators
- Ethernet cables with a distance more than 45.72m/150ft **MUST** be converted to an armored fiber optic multi-mode
- Highly Recommended to use a 1000VA or better UPS.

1.	SpecMetrix® Display Unit	6 amps @ 120VAC, 4 Amp @ 240VAC
2.	Operating Humidity	10%-90% relative, non-condensing
3.	ICU enclosure protection	IP65/66
4.	SpecMetrix® display protection	IP65/66

SpecMetrix® Display Unit Requirements

SpecMetrix® will provide a display unit with at least the minimal requirements installed which are Windows 7 64-bit (SP 1), 16GB Memory, and SSD storage.

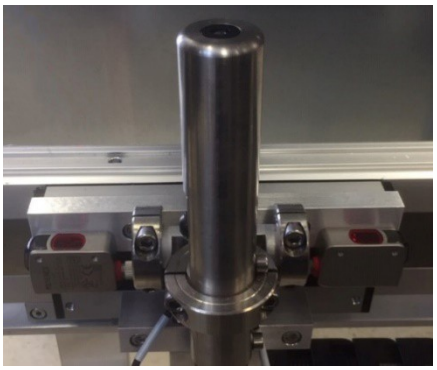
Installation and Site Requirements

Utilities

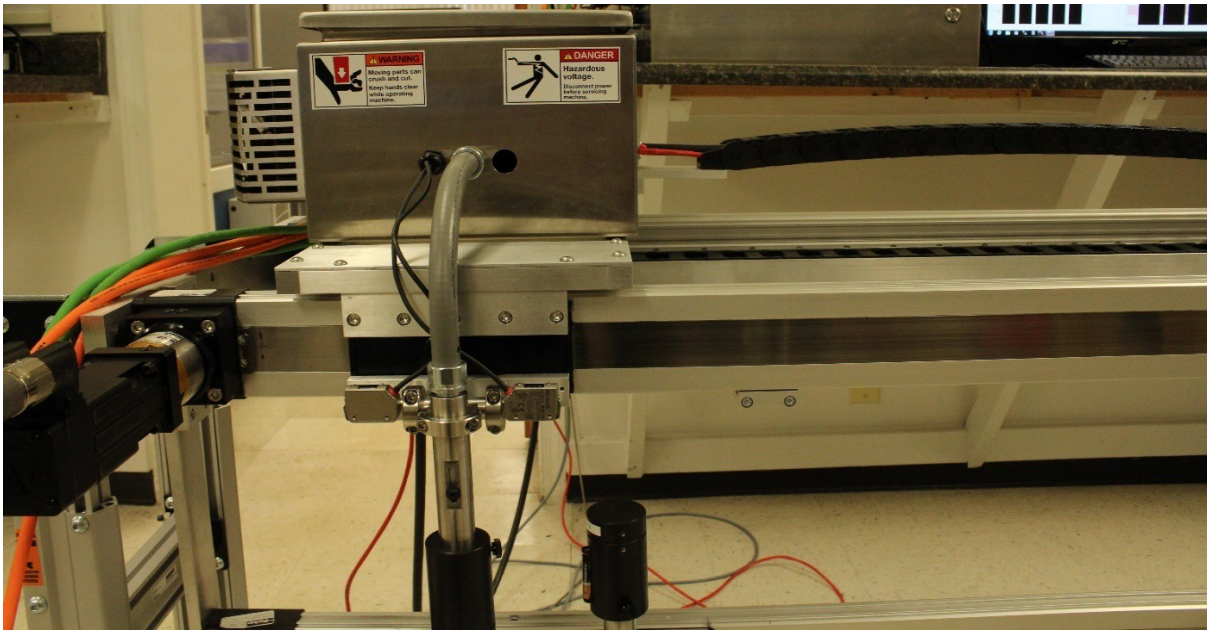
The *SpecMetrix*® In-line system requires a *dedicated* 120VAC/240VAC AC 15-amp grounded mains supply adjacent to the Display Unit and the In-line Control Unit. This means a direct connection back to the fuse Unit.

The instrumentation should not be spurred off a thyristor-controlled heater or motor due to the electrical interference this would cause.

The Control Unit and Display Unit can be run on the same 15-amp circuit. The Display Unit requires a standard 120VAC/240VAC receptacle; the Control Unit can either be directly connected via conduit or use a standard 120VAC/240VAC single-phase receptacle.



Ruggedized Probe Assembly



Electronics Mounting and Conduit Work

An on-site maintenance technician needs to be available to work with SA personnel to mount the probe holder fixtures to the equipment frame. These attachments will vary depending on the type of system purchased, and machine configuration.

The control Unit will require four 3/8” holes on a 20” x 20” area to mount.

The *SpecMetrix®* Display Unit can either be mounted to a supplied pedestal frame or a supplied swing-arm mount system.

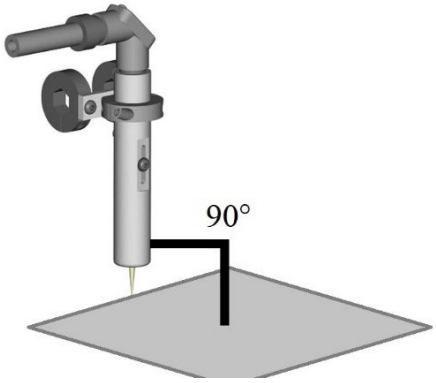
Sensory Analytics will supply the flexible conduit to be installed between the probes and Control Unit, with the customer providing the means to tie or clamp the conduit down.

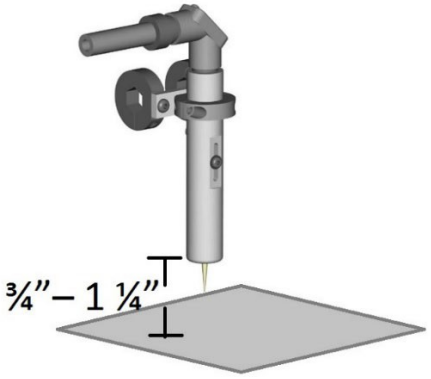
The customer is expected to supply and install conduit for an Ethernet connection between the Display Unit and the Control Unit, and from the Control Unit to the customer’s network if external data storage is required. **Must use minimum CAT 6 Shielded Cable**.

SA will supply, install and terminate the Ethernet cable unless agreed otherwise with plant personnel. The probes are optical devices with no electrical connections and so can be mounted in an explosive environment. The Control Unit, however, contains electrical components and is not designed for use in an explosive environment. The fiber optic cables have a standard length of 30 feet and can be up to 60 feet long, and so the Control Unit can be mounted up to 50 feet from the probes and production line. The Display Unit can be mounted up to 150 feet from the Control Unit.

Probe Installation

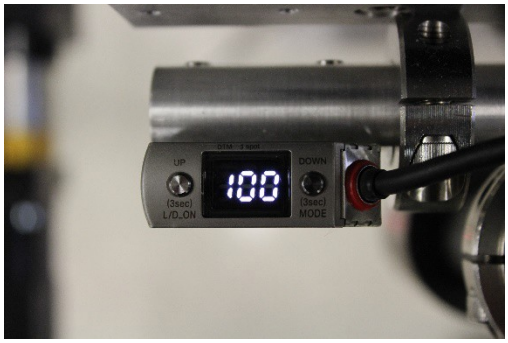
Typically, Sensory Analytics technicians will install the probes ¾” – 1 ¼” over the web at a 90° angle using a Hex bar and collar clamps. If a plant has constructed their own mechanism for probe mounting, the mechanism must allow for probe height adjustment from ½ inch to 2 inches from the web.





Laser Detection Setup

Make sure laser is set to factory settings. (Hold the down button and press the up button 5 times you should see an “RST” on the LCD of the sensor, press up to get a “no” on the LCD, then press “up” again and you will see “yes”, then press “down” this will get you back to factory settings).



Move the sensor off of film, press the side button for 1 sec. (It will flash “set”). Then press and hold side button till “set” goes away. Do this for both sensors.

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.

For the main electrical cable, run a properly terminated (Line, Neutral, and Ground) power cable to the side of the ICU to the clamshell connector provided on the panel mount. (connections are labeled). All internal power is already wired appropriately.

Emergency Stop



SpecMetrix Traversing systems come with an Emergency Stop (E-Stop) push button (refer to provided electrical schematics for wiring).

When the E-Stop is engaged, it will disengage controls to the servo drives causing them to cease motion. A signal is also sent to ‘Stop’ the Inline software from measuring.

While the E-Stop is engaged the servo drives will not be able to move the probe head, and SA Inline cannot measure. The probe head can be moved by hand when the E-Stop is engaged.

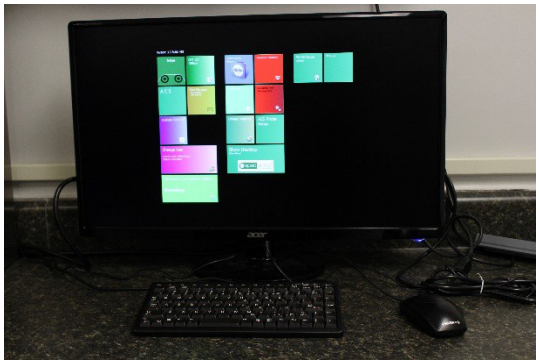
Ensure the probe is free from obstruction before releasing the E-Stop. The E-Stop is released by turning the red mushroom head to the “right” which will release the button and pop it out. Once the E-Stop is released, the probes will move to their park position.

System Start-Up Procedure



Turn the Disconnect on the main electrical cabinet to the “ON” position. The green light on the front should illuminate.







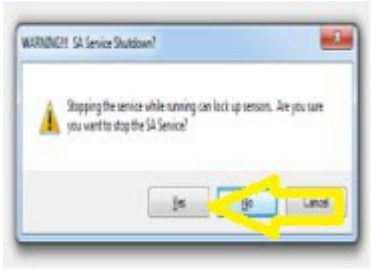
Wait a minute for the background services to start. Then press the SA service red tile. The screen will gray out while starting the service.

Once the SA service tile goes green, the system is ready to use.



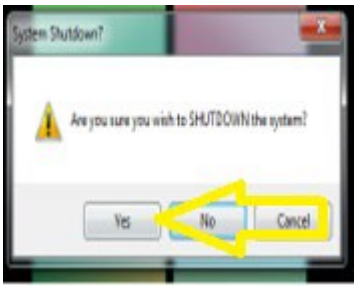
System Shut down Procedure





Select the green “SA Service” Tile. Then Select “Yes” to properly shut down the SA service.





Select the red “Windows Shutdown” tile. This will start the computer shutdown process. Then select “Yes” to shut down the computer.



Turn the Disconnect to the “OFF” position to power down the ICU.

Signing On



Double-click the Sensory Menu icon on the desktop.
Full SA Menu window will open as seen in the image below. The arrangement of your tiles may vary slightly.

Full SA Menu window will open as seen in the image below. The arrangement of your tiles may vary slightly.



SA Services

Make sure the Server Status is running (Indicated as a Green Color). If Server Status is Stopped (Red Color), click the Server Status Tile once.

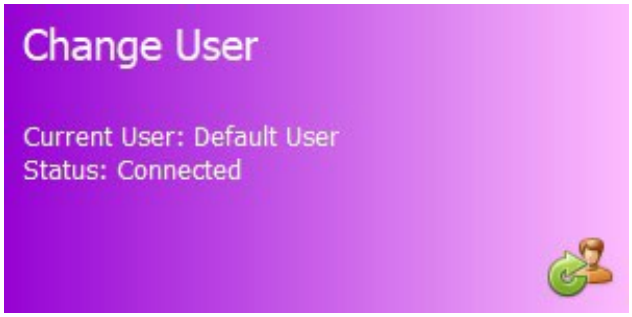


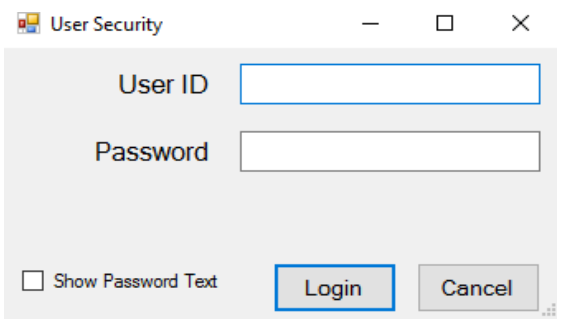


Change User

By Default, SA will be logged in as a Base Level User named Default. This allows for limited view only rights into SA.

To log in as a different user click on the “Change User” Tile. You will see a popup window appear in the upper left corner of the screen for you to enter your credentials.





There are five different user levels one can have. There is a User, Supervisor, Local Admin, Corporate, and Corporate Admin. This will be discussed in greater detail later in this guide.

SA UI Configuration



SA UI Configuration – Used to adjust graph settings, minimum and maximum measurement ranges, target specifications. They are also used to change aspects of the In-line system such as the color of the High/Low measurement on the display, or to apply alternative smoothing to a graph, and the option to set your graphs to be tabbed or side-by-side in multi-line systems. In most cases, values can be changed by clicking on the value field until the desired setting appears. Select the SAVE button to save any changes made. *Requires Local Admin Access or higher.*

ColorBands

ColorBands	
Green Colorband	50
Red Colorband	25
Yellow Colorband	25

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

CrossWeb

CrossWeb	
CrossWeb Line Count	2

CrossWeb Line Count

Number of Cross Lines to display

Default User

Default User	
Default Password	user
Default User Id	user

Default Password

Enter a valid password for assigned PlantID auto login when SA initializes

Default User Id

Enter a valid username for assigned PlantID auto login when SA initializes

Inline

Graphing options for CrossWeb Graph, Die Graph, DownWeb Graph, and Lane Graph

Inline	
Cross web Position Update Rate	5
Decimal Places	2
Downweb Graph count	120
Graph Config (Cross Web)	Graph Configuration
Graph Config (Die)	Graph Configuration
Graph Config (Down web)	Graph Configuration
Graph Config (Lanes)	Graph Configuration
Graph Config (Polar)	Graph Configuration
Multi-line Graph Display	SideBySide
Posted Readings Averaged	100
Status Display Type	Original
Traverse Left-side Name	
Traverse Right-side Name	

Cross web Position Update Rate

[1-10] Lower value increases the number of Positions Line updates but can cause screen unresponsiveness and lag.

Decimal Places

The number of decimal places measurement readings will display.

Downweb Graph Count

Scrolling size: the graph number of graph points displayed for each probe on the down web graph. *Note: Setting this value very high will cause the graph to respectively draw across very slowly (Max 3600; 1-hour of date for single probe).

Graph Configs Cross Web / Die / Down Web / Lanes / Polar

Configuration options

Display Thickness on Bar Graph	False
Invert Crossweb Graph	False
Smooth?	True
Smoothing Count	3
Smoothing Level	High

Display Thickness on Bar Graph

Display the thickness of the region inside the Bar on the graph.

Invert Crossweb Graph

This will flip the graph on its x-axis.; Options are **True** or **False**.

Smooth?

Setting this to True will apply a smoothing algorithm to the averages. This may cause slight differences between numbers plotted on a graph and the value displayed in the Probe Reading. Options are **True** or **False.**

Smoothing Count

Increasing this number will smooth the plot lines from point to point on graphing displays. Set to 5 by default.

Smoothing Level

A higher level will show more stable results but will take longer to show changes in the coating.

Multi-line Graph Display

How multiple graphs are drawn in relation to one another. Options include ***None, SidebySide, Tabbed, and Combination****. * Combination Type exclusively for Traversing systems.

Posted Readings Averaged

Count of reading cycles to use for calculating the held average. Only used for Average Reads Tab. Values shown may not represent recent data. The default is set to **5**.

Polar Graph Config

This portion of the config file does not pertain to the Traversing System

Status Display Type

Configuration options for Cross Web

Traverse Left-side Name

A label for the left side of traversing sides

Traverse Right-side Name

A label for the right side of traversing sides

Logging

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

Logging Interface

Set condition levels for the following Logging Interface; Data Service, Database Call, I/O Board, I/O Boards, Line Controller, Motion, OPC/PLC, SA Core, SA Service, Optical Sensor, TCP/IP, and UI/HMI.
Logging Conditions: OFF, FULL, INFO, WARNING, DEBUG LOW DETAIL, DEBUG HIGH DETAIL, TRACE, EXCEPTIONS, ERROR, STANDARD, LOW DEBUGGING

Login Security

Login Security	
Login Timeout	0

Login Timeout

The number of minutes before login will timeout back to [User-level]. Valid range is 1-20. A value of 0 will set at 10 minutes, anything over 20 will set at 20 minutes.

Probe Colors

Probe Colors	
High color	Blue
Low color	Red

Change the color of the Probe Readings where **by default high values are Blue** and **low values are Red**. Operators can click on value field to pick any color desired from the pull-down menu.

SA ACS

This portion of the config file does not pertain to the Traversing System

SA Blown Film Settings

This portion of the config file does not pertain to the Traversing System

SA Inline (Fixed Differential)

Differential Inline System	
Show Base Value	True
Show Total Value	True

Show Base Value

Shows the Base Value in probe control

Show Total Value

Shows the Total Value in probe control.

SA Menu

SA Menu	
Menu Scaling	150
Shutdown Method	Shutdown

Menu Scaling

Changes the scale size of the SA Menu Tiles

Shutdown Method

Shutdown method when [System Shutdown] button is selected from SA Menu

SA Offline (DFT-QA)

This portion of the config file does not pertain to the Traversing System

SA PLC Traverse Settings

SA PLC Traverse Settings	
PlcTraverseUserOptions	L-33.33 C-33.34 R-33.33
(Fixed Width) Lane Width	25
(Left/Right) Web Percentage	33.33
Constant Lane Count	1
Relative Distance Unit	Millimeters
Web Division Type	LeftCenterRight

Pic Traverse User Options

(Fixed Width) Lane Width

Equidistant length for each lane to divide web starting at ‘detected’ edge. All webs may not divide evenly, and the last LANE may only be a portion of the distance.

(Left/Right) Web Percentage

Equidistant length for each lane to divide web starting at ‘detected’ edge. All webs may not divide evenly, and the last LANE may only be a portion of the distance.

Constant Lane Count

All webs will be divided equidistantly into this specific number of lanes. Unless the number of divisions is less than 1-inch (25mm) widths.

Relative Distance Unit

Distance Units for setting Fixed Width Length

Web Division Type

(Left-Center-Right) - Segments Left and Right side of the detected web by 'Web Percentage' with a remaining percentage for the center. (Fixed Width) - Once the Web Width is determined, the web will be divided equidistantly on the 'Lane Width' distance.

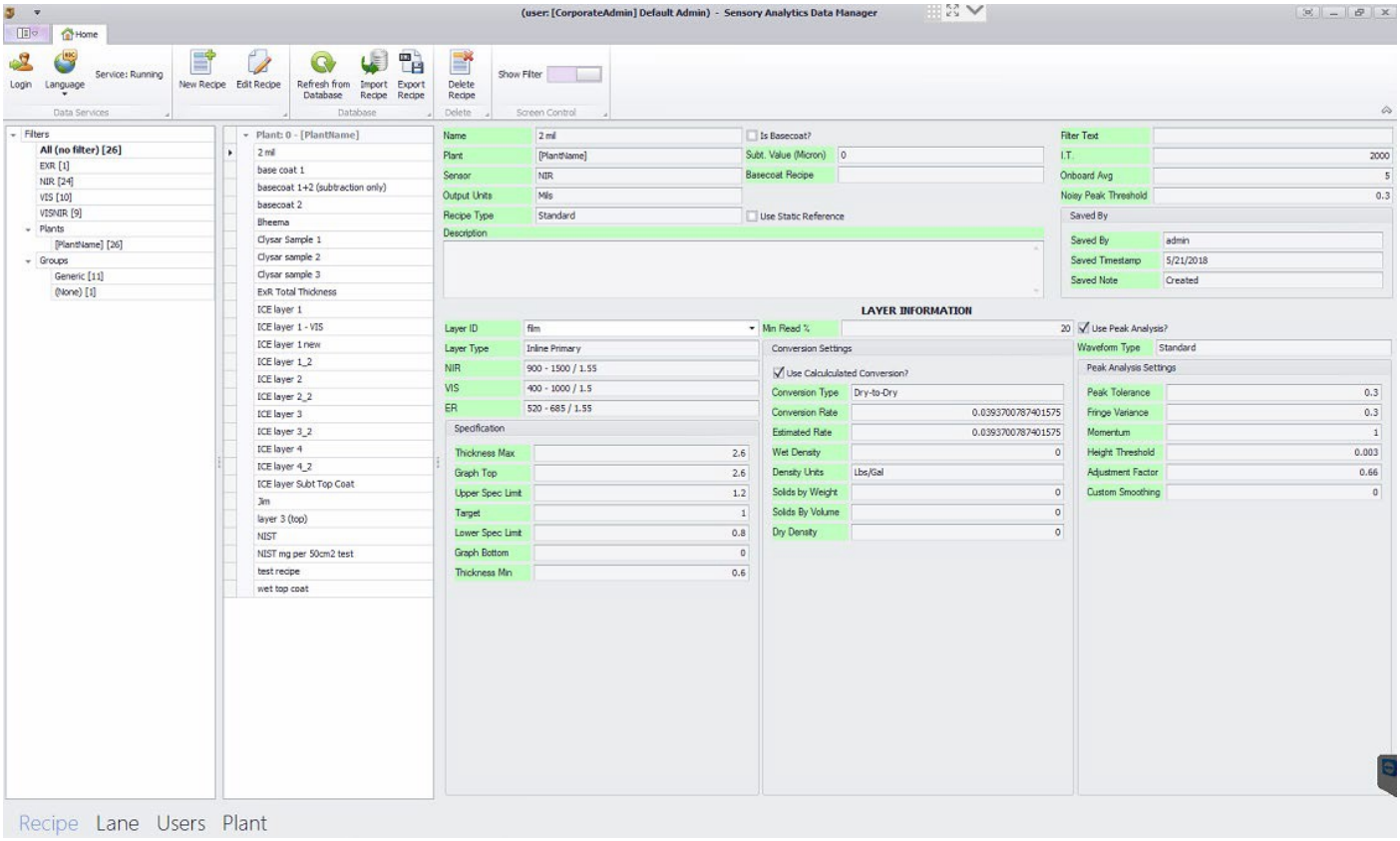
SA Sheet Type Settings

This portion of the config file does not pertain to the Traversing System

SpecMetrix® SA Data Manager



SA Data Manager – Add and edit recipes, User security, Lane and Plant configurations. Function access will vary depending on User Access Level.



The SA Data Manager interface allows you to Add/Edit recipes, setup lane definitions for traversing systems, User security, and the Plant Database.

General Information

The layout of the data manager is broken down into five main sections. Command Bar, Filter, Selection, Detail, and Navigation.

Command Bar



The Command Bar is itself divided into subgroups, 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 'canceled' 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. The item shown depends on what is selected in the Navigation Region at the bottom of the page. It may be for Receipt, Lane, Users, etc. 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® S*ystem.

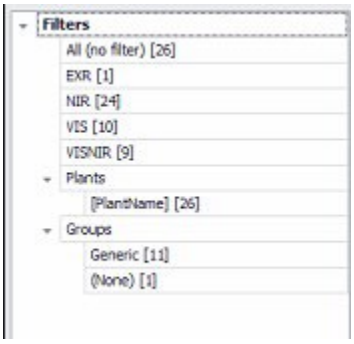
Delete Group

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 have longer words/phrases in some languages to describe the field information. In those cases, the Recipe View has 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.

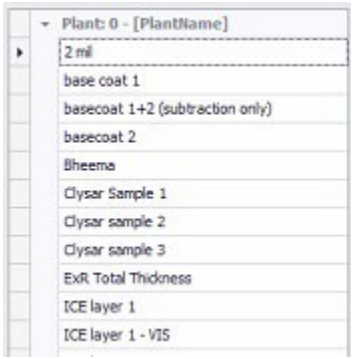
Filter Region



Filtering mechanism to see recipes in groups/filters. This allows a plant to enter an [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, which indicates that 5 items match that filters criteria. Selecting that filter would display those items in the Selection Region.

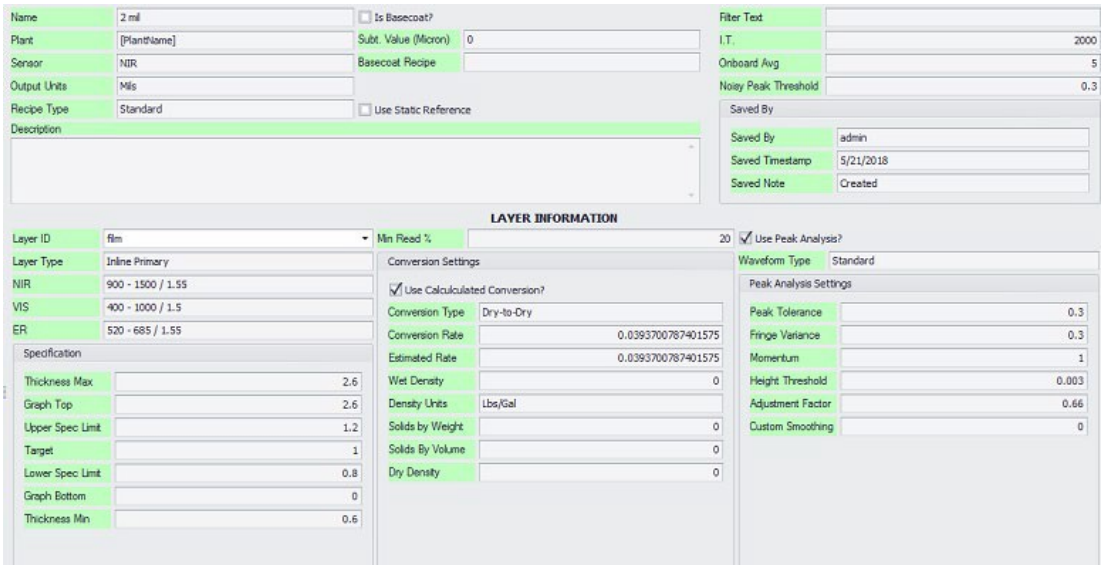
Selection Region



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).”

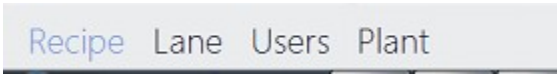
A user can only edit one item at a time, therefore selecting multiple items and clicking the ‘Edit’ button will not change all items at once. Multi-selection is only applicable to Exporting Recipes or Lanes.

View Detail Region



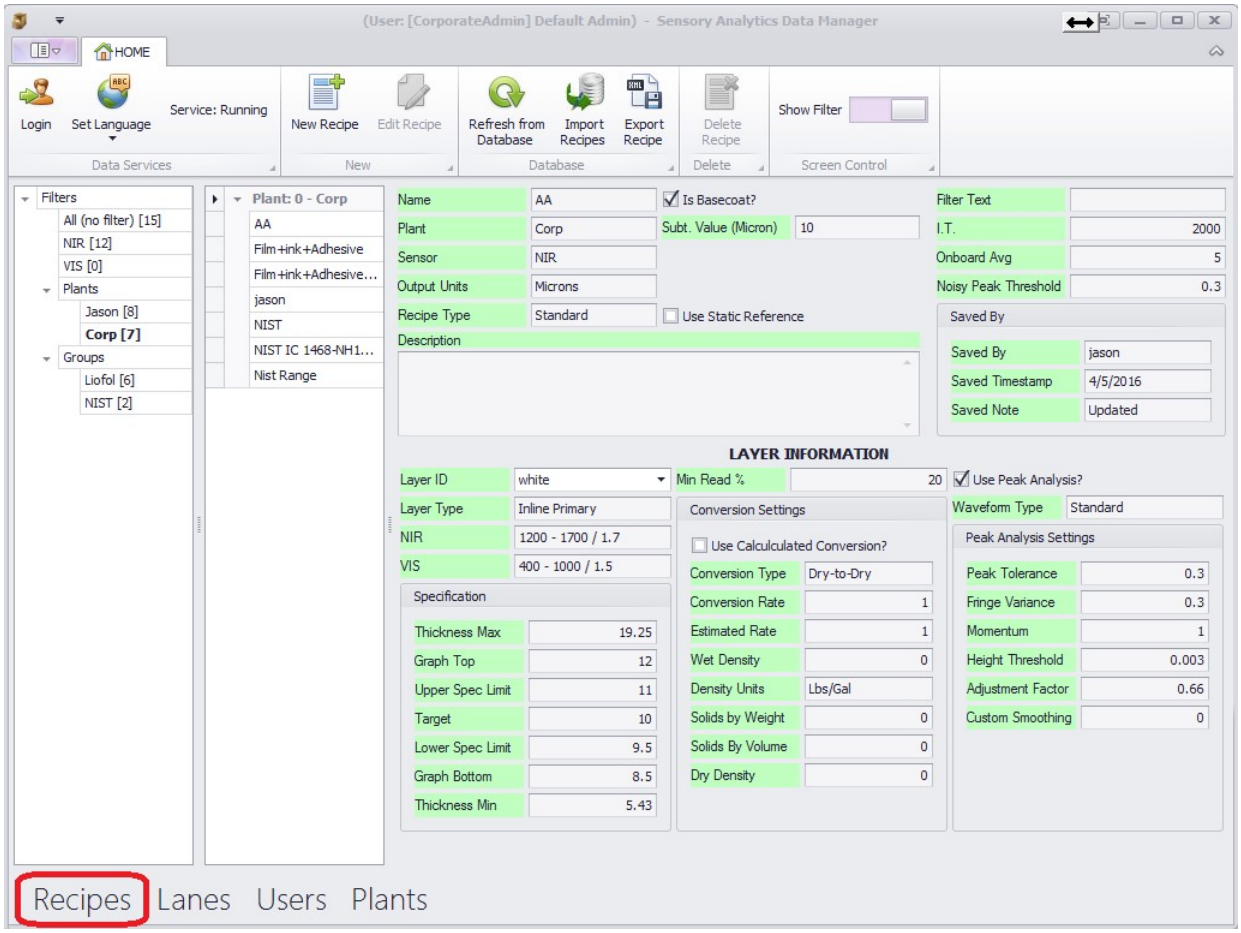
The details of an item are visible in the larger section on the middle-right side. This is a Read-Only section and does not allow changes directly in this screen. In the Recipe Detail View, if a recipe has multiple layers defined, a user can review the layers by selecting the layer within the drop-down.

Module Navigation Region



To navigate and view different modules, 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. What options are available can vary depending on your User Level Access and System Configuration.

Recipes



The most important part of the *SpecMetrix*® System is the coating recipe. This contains all the critical information about the coating/layer/film that is being measured. The 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 to your needs, not all of it is "required." For fields that are required or that have dependency properties 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 describe what is required to fulfill the validation. If the required information is not available, the recipe cannot be finalized and saved.

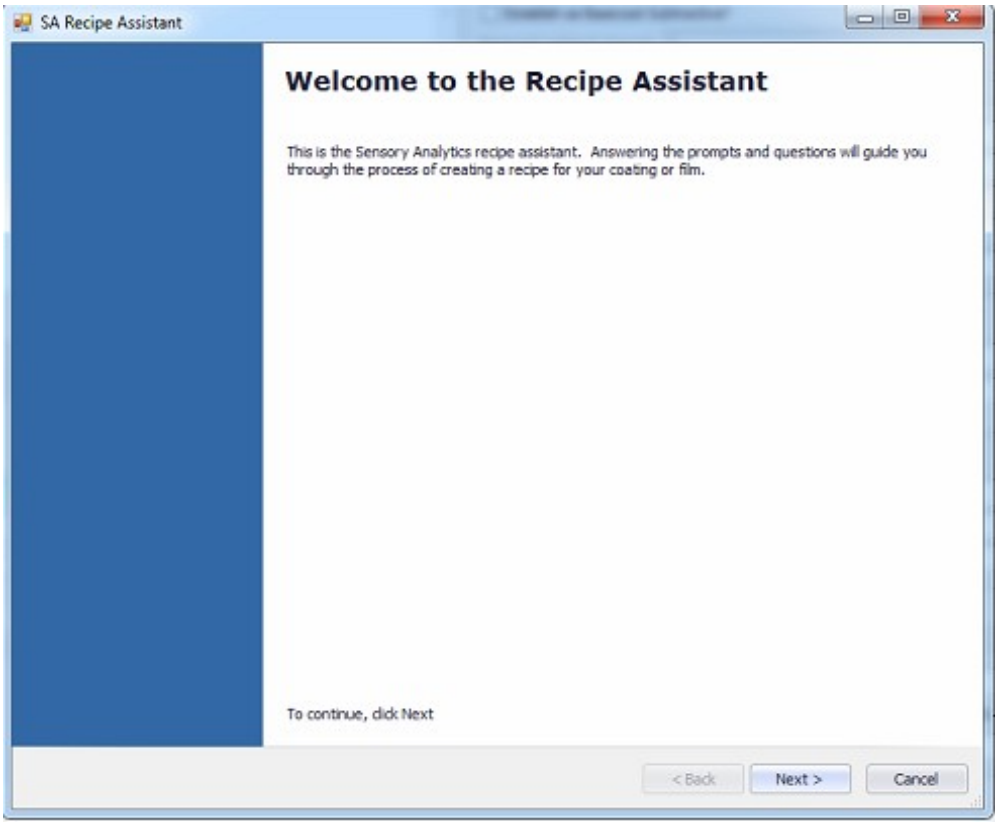
Recipe Assistant

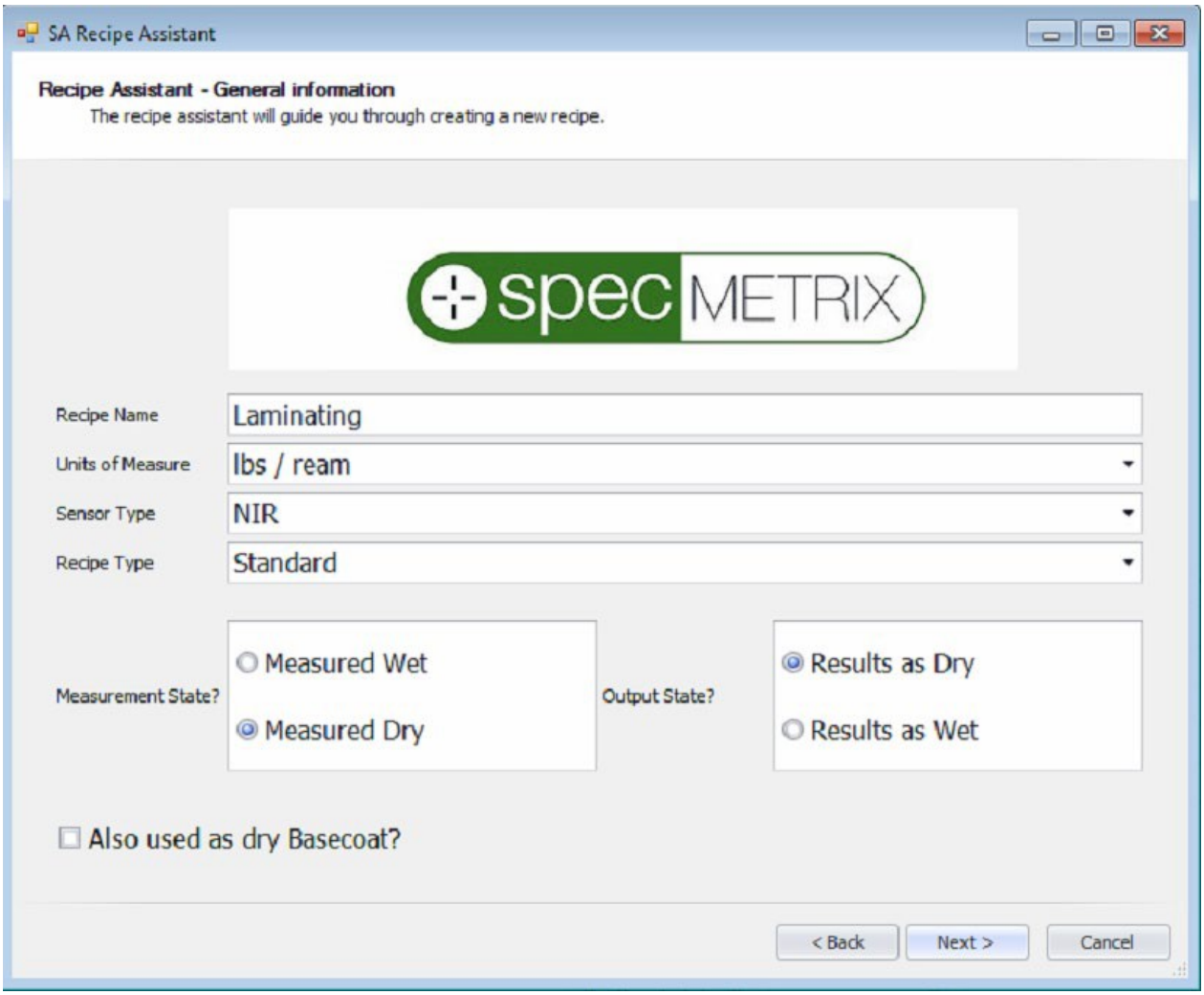


Recipe Assistant is a user-friendly way to create a new coating recipe for *SpecMetrix® S*ystems. Having a good recipe for a given coating is critical and it is a one-time setup that takes a few minutes for a given coating. By answering a few questions, the Recipe Assistant will generate a very good baseline recipe which will be sufficient for most coating combinations. There will still be room for further optimization as needed to dial in the recipe for final optimization.

Getting Started with the Recipe Assistant

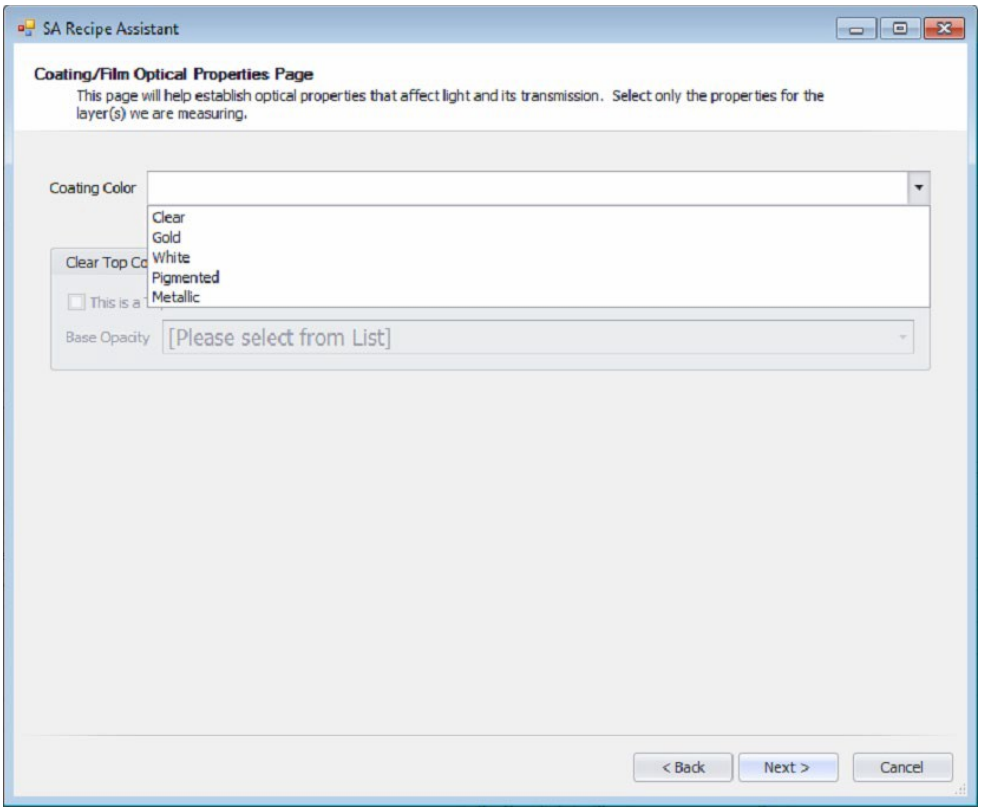
Once the user is in the editor, the Recipe Assistant Button will be displayed in the upper-right side of the screen.





There are only four 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 a 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/in^2, mg/4in^2, g/m^2, 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.

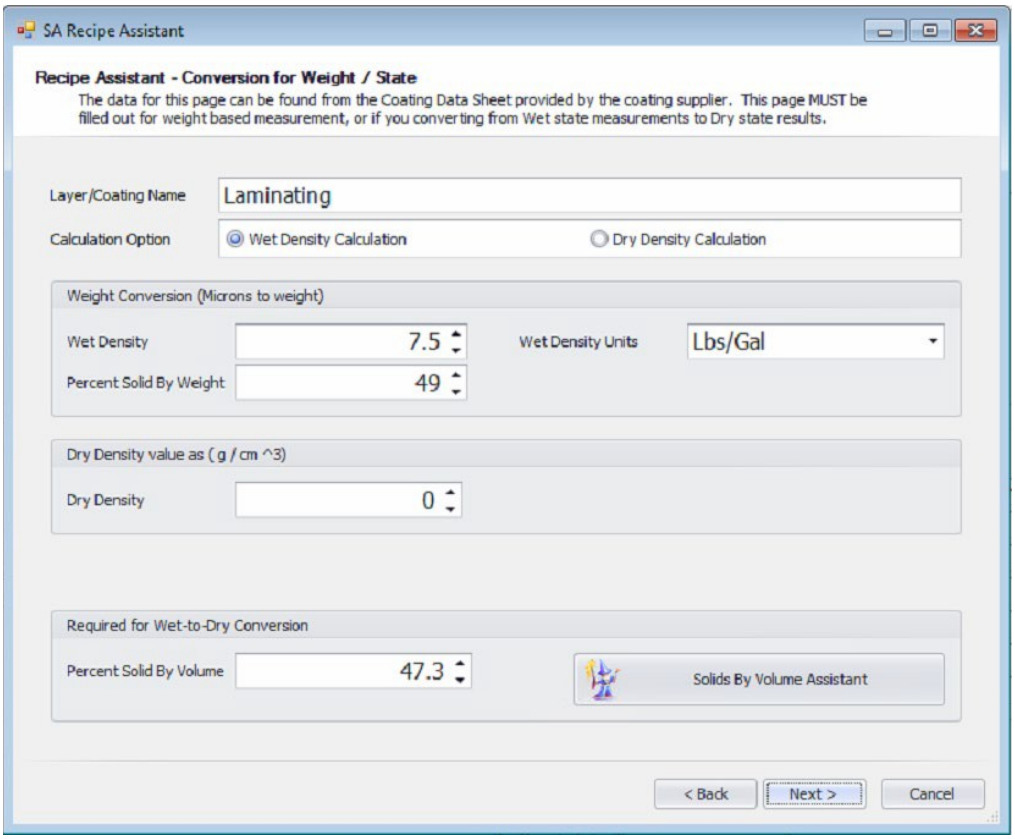


The optical properties page is asking about the opacity (color) of the coating, and if the coating is clear/gold and there is a base coat underneath, what is the opacity (color) of the base coat.

- **Coating Color** – There are five 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 five choices {Clear, Gold, White, Pigmented, Metallic}. Choose the most appropriate one for the Base coat underneath the measured layer.



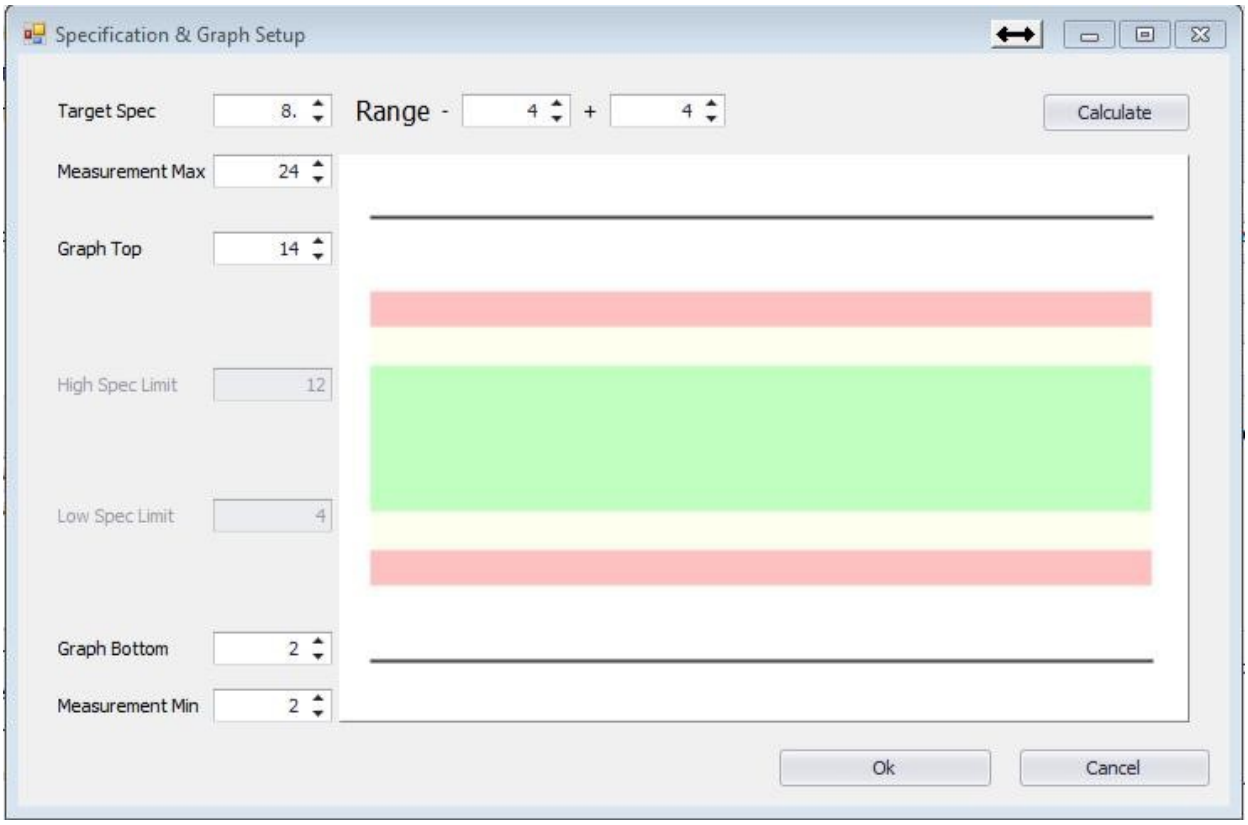
Microns to weight conversion often requires coating specific properties which are generally found in the Coating Specification Sheet from the coating supplier. The most difficult piece of information that is typically missing from the Coating Specification Sheet is the [% of Solids by Volume]. A simple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

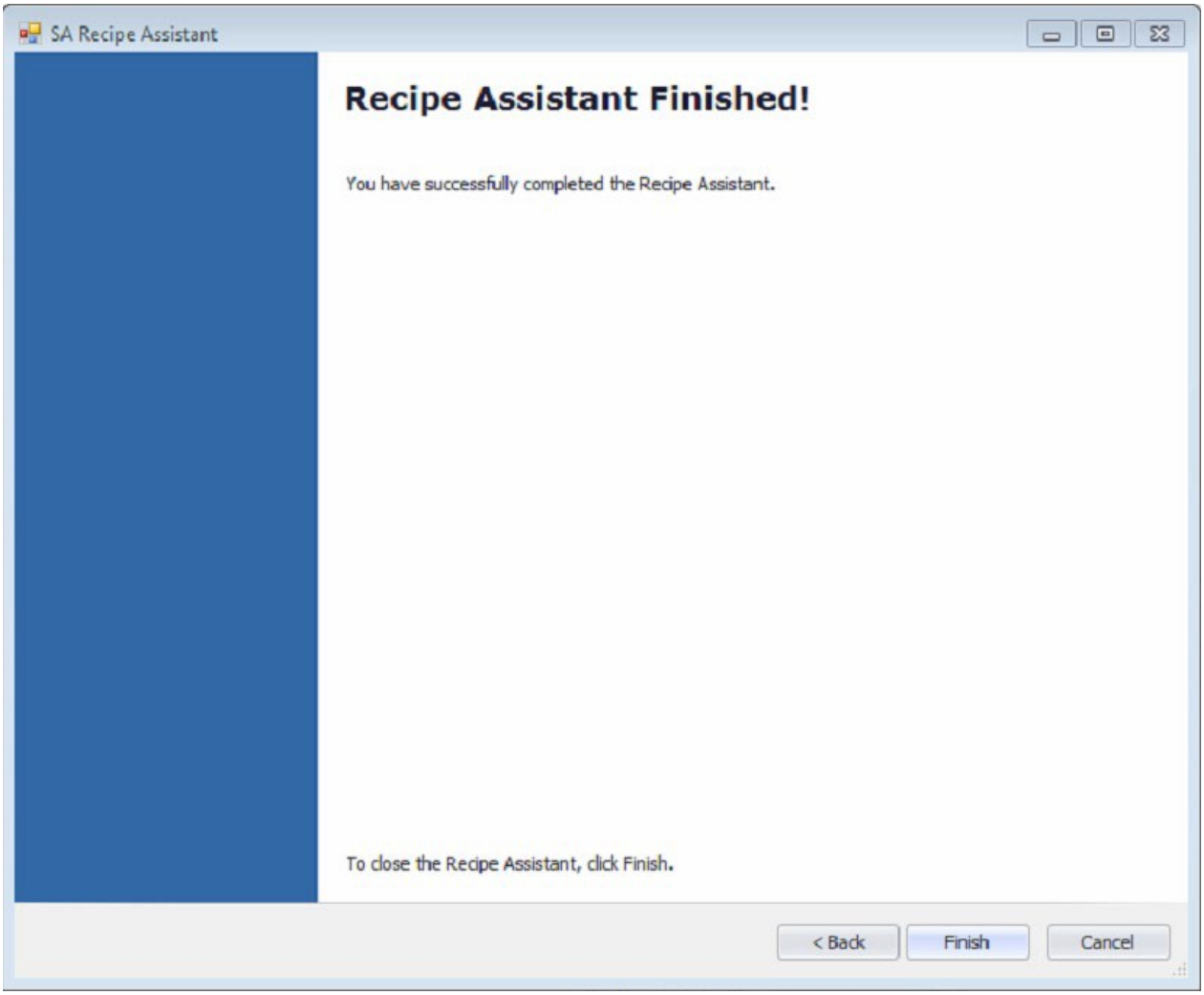
For Wet-to-Dry conversions, the user must enter the data in the Weight Conversion Group.

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



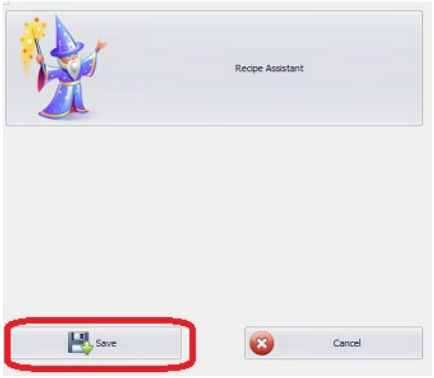
To provide continuity and accurate graphical representation we have moved the specification editors into its own editor. This editor functions the same whether you see it embedded in the Recipe Assistant, or as a popup window for Recipe Editor.

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).



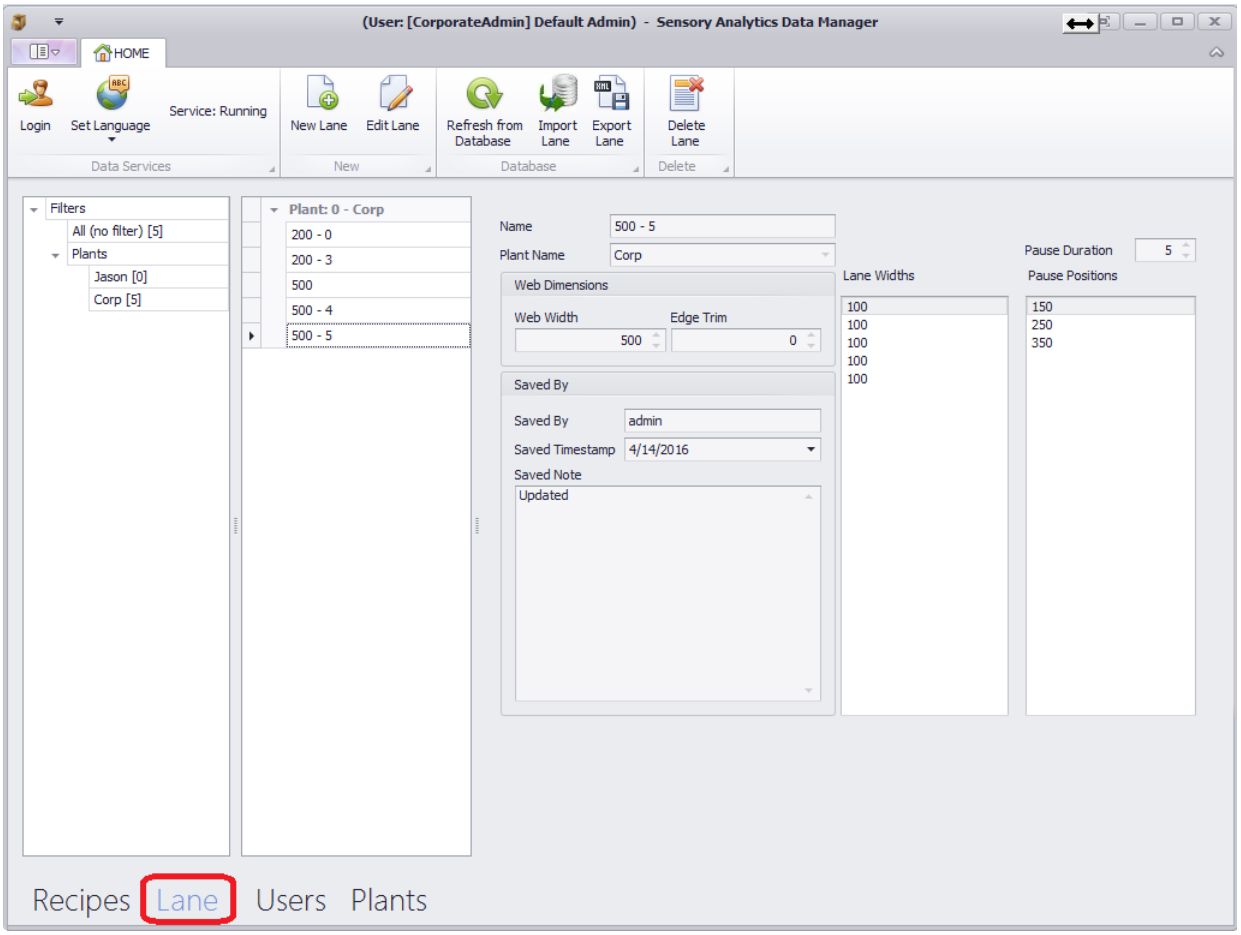
The Recipe Wizard is now complete. The user can navigate [back] to review the questions or click on [Finish] to finalize and generate the new recipe.

Once the user clicks on [Finish], the Recipe Assistant will close, and the Editor will now be populated with the data based on what you put into the Assistant.



IMPORTANT NOTE: You must tap [Save] before exiting the editor else all data entered will be discarded.

Lanes (*SpecMetrix*® Traversing Only)

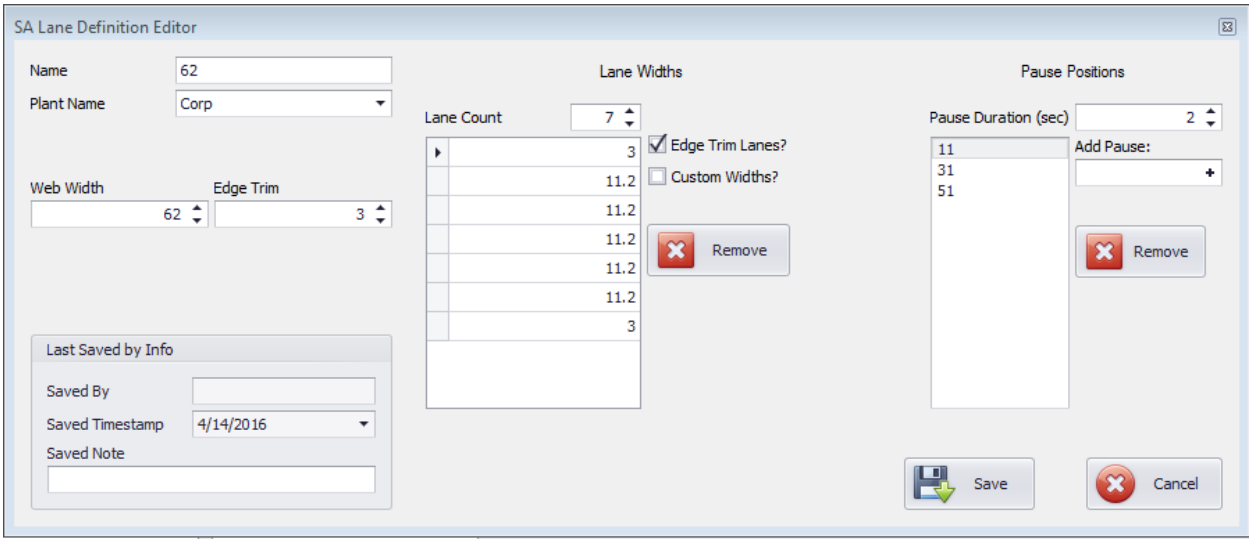


As with the Recipe editor, there is a filter section. However, the filter only separates out based on plants as of the current release.

The Selection grid functions the same as the Recipe module.

The Detail view shows the pertinent information regarding the currently selected Lane Definition.

Adding / Editing a Lane Definition



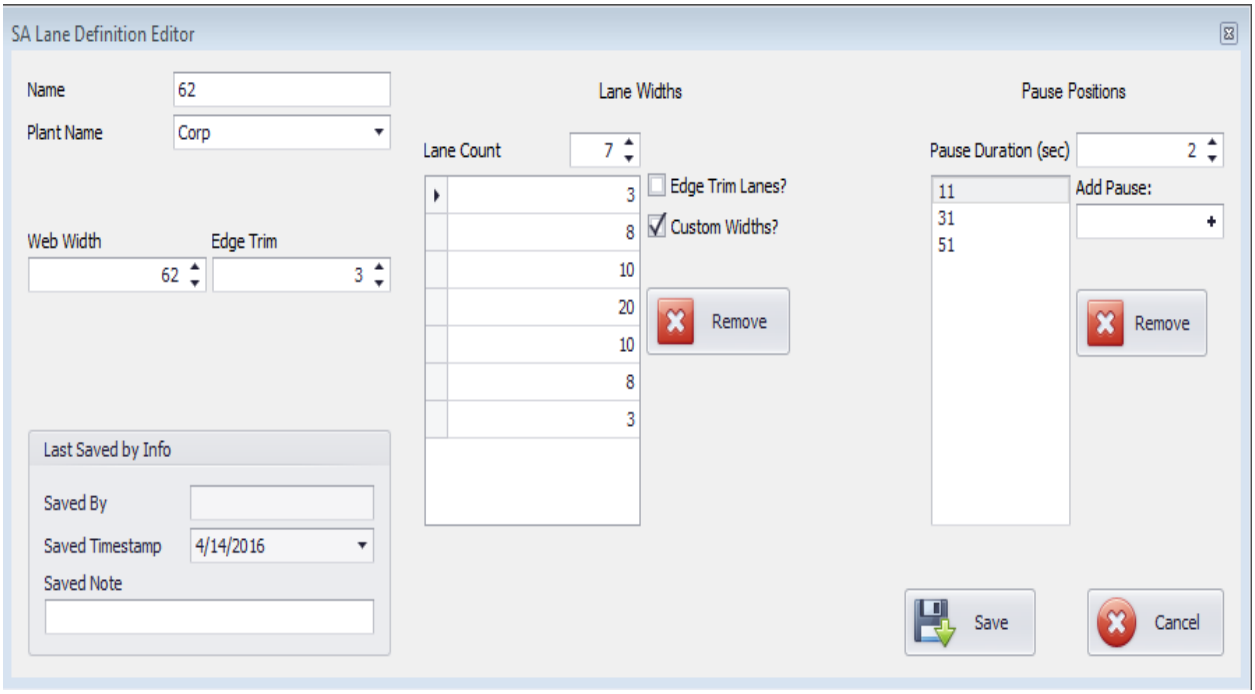
Naming a lane is entirely up to how the 'user' (or the plant) decides to name the identifying Lane Definition. This is what will be displayed within the drop-down selection of the In-line system during production.

**Naming tips – It is best to name the lane definition after the width of the material. If there are multiple variations of web division for the same web width, then it is recommended naming the Lane Definition with something more distinguishable such as [WebWidth]. [LaneCount] (i.e. 62.10).*

- **Web Width** – This is the full web width from edge to edge.
- **Edge Trim** – This is the distance from each side of the web which you wish the probe to remain inside while traversing.

**Note: With SA Traversing Edges are static once the initial edge is found, the system will not continually check to determine if the edge is moving. With PLC Traversing the edge is detected with each pass using Photo Eyes mounted to left and right of the probe.*

- **Lane Count** – This is how many divided lanes the user wishes to separate out the material into. It is required that 100% of the web width be accounted for, and therefore represented. Changing this value will automatically calculate divided lanes into equidistant lengths if Custom Widths is not checked. The traversing system will produce an *average* reading for every reading taken within each respective lane. If only specific lanes are intended to be monitored by the plant, it is the plant's responsibility to either establish the lanes by their desired output or extract the data as they need for their reporting or review.
- **Edge Trim Lanes?** – Checking the box will automatically ensure that there are at least three lanes, where the first and last lanes are the width of the Edge trim. If this is checked then, Custom Widths cannot be. This will automatically divide all remaining interior lanes evenly.



- **Custom Widths?** – Checking this box will allow the user to enter variable widths for their desired lanes. The SUM of all the widths must exactly equal the full web width field. When editing values directly in the grid, the final value will change its value to balance the sum of the equation (add all values, except for last, and subtract from provided Web Width to give the new value of the last [LaneWidth]). If the last [LaneWidth] is a value less than 0.0, then the value will be set to 0.0. The width customization must be rectified so that none of the individual value is <= 0.0, and that ALL values sum up to equal the full Web Width.

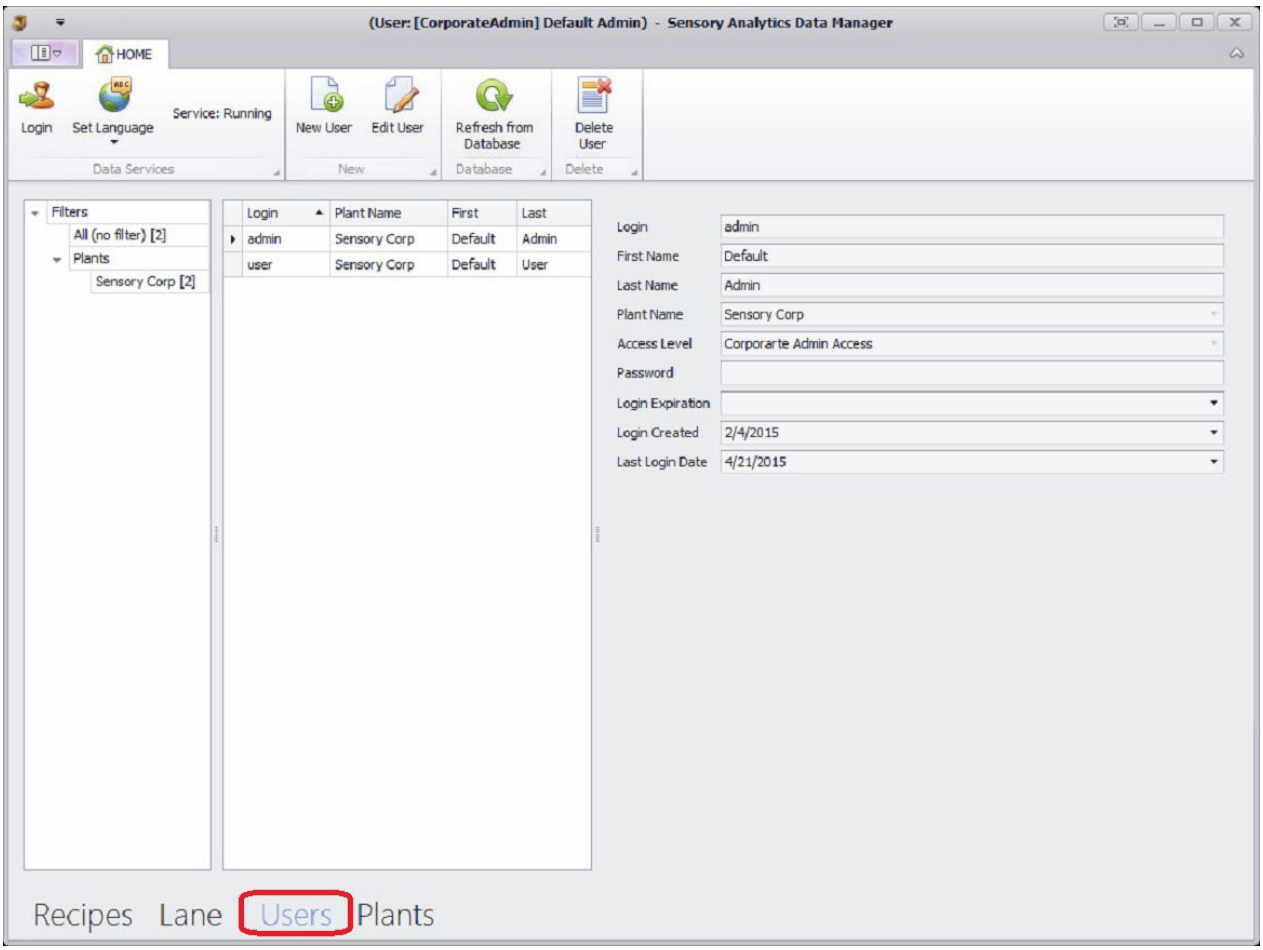
Incremental motion stops the probe head at specific points across the web, relative to the detected web edge, which is defined as Pause Positions in the Lane Definition of the Data Manager.

The pause position forces the probe head to pause at specific points on the web, relative to the detected web edge.

To add a pause position, type in the distance from the edge of the web (specifically the edge that is closest to the SpecMetrix® Traversing Home position) in the [Add Pause] field and click the "+" symbol at the end of the editor. If the value entered is within the defined traverse area (**Traverse area** is from the [(Detected Web Edge) + (Edge Trim)] to [(Web Width) – (Edge Trim)]), then the value will be displayed in the "Pause List." The In-line software will automatically set the outer Traverse Area positions as a pause position when the web edge is detected and will not allow you to enter a pause value for that location.

If you adjust the (Web Width) field or (Edge Trim) field, the Data Manager will automatically remove any pause positions that fall outside of the newly defined traverse area.

Users



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

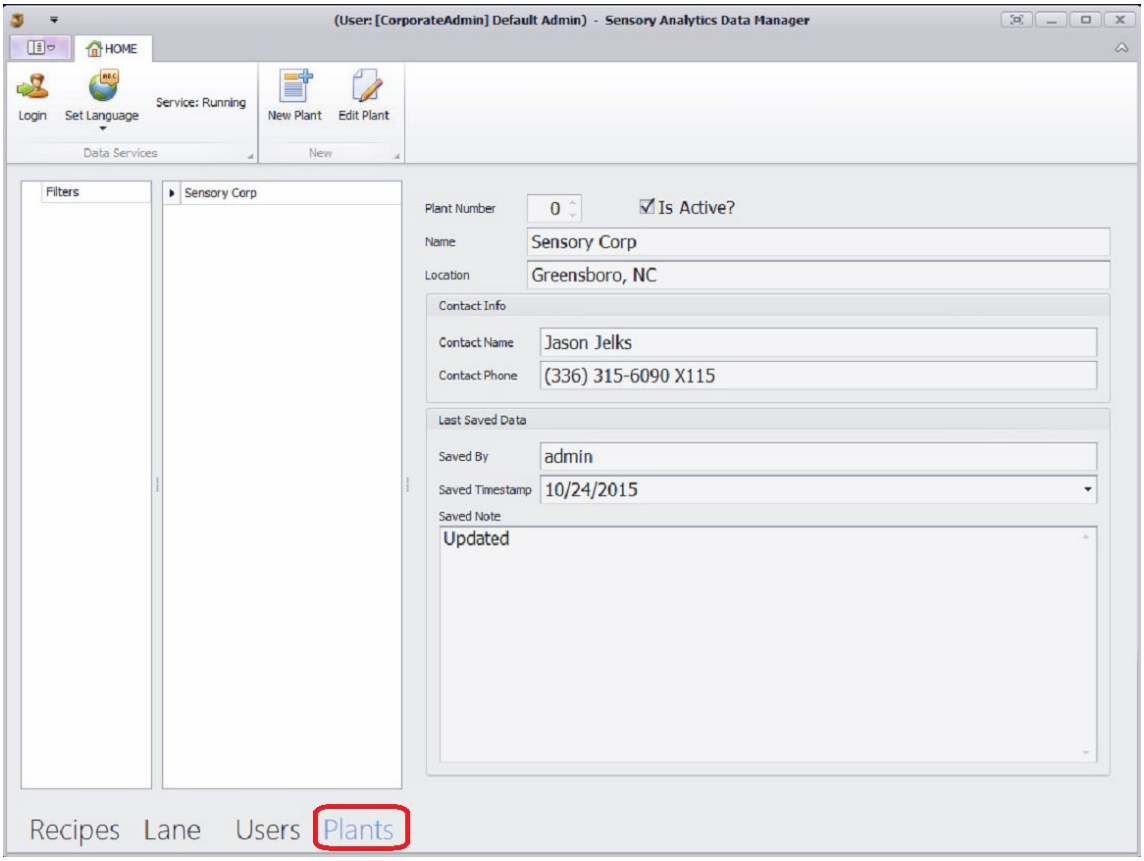
- **User** – This is a base level user. They have access to "Read" but not update any element. In the Data Manager, this access level can only review [Recipes] and [Lanes]. A user can open and operate the In-line software, as well as the Analysis tool. However, recipe changes will not be available for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

Plants



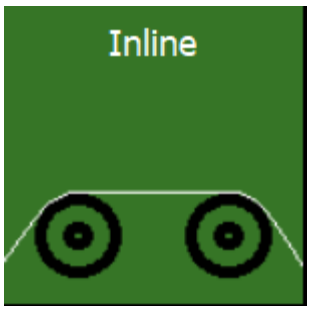
Plant Viewer (Corporate)

For almost all systems installed in the field the recipe database 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. *** <u>The corporate plant cannot be deactivated</u>**.

For those corporate facilities who wish to host the Data Manager on their server, some requirements 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.

SpecMetrix® SA Inline Measurements



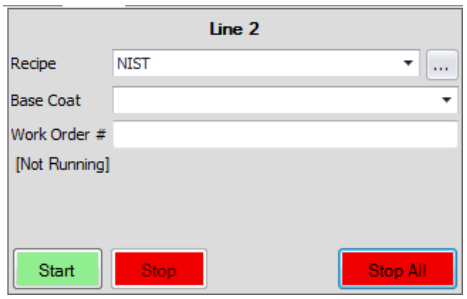
SA Inline Measurement Manager – This interface allows you to monitor measurements taken from your probes. The interface is largely dependent on settings are chosen in the User Configuration tool.

Main User Interface

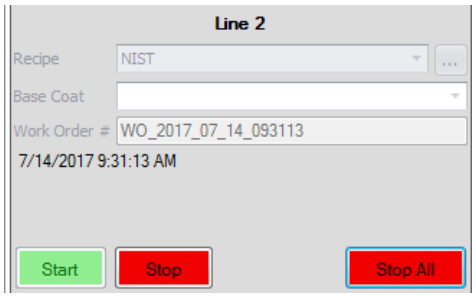
Click the "In-line" Tile; this will open the Inline UI. Verify the correct Line by selecting the appropriate tab (for multi-line systems only). Click the drop-down arrow in the "Recipe Name" selection box and select the correct recipe for the coating or film being measured. Click the "Start" button The *SpecMetrix*® System should now be measuring.

The image above is an example of what users see when the SA Inline application is initiated. The image below offers a closer look at the drop-down menus for recipe selection in a 2-line system:

1. **Recipe**: This 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 (see the previous section).
2. **Basecoat**: Drop-down 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).
   Below is an example of what these fields look like when idol and when active:
4. **Line Tabs**: The top two tabs in the example represent each line running in the system and are



Work Order field (unpopulated)



Work Order field (populated)

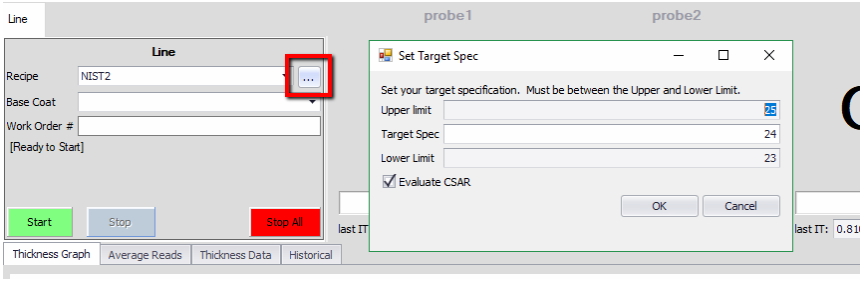
   determined by customers' specifications in the SA User Configuration. They can be named whatever the customer chooses and can be a single or multiple line configurations. The line setup will coincide with the orientation of the probes in the system.
5. **Start**: Begins taking measurements for the probe(s) on that line/tab. Separate lines must be started independently of each other in multi-line configurations.



6. **Stop**: Stops measuring of the active probe on that line/tab.
7. **Stop All**: Stops measuring on all active lines.

Note: During measuring, users can click on the probe name to isolate that probe.

Adjustable Target Set



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. The original graph on Right side (small image), the new graph on the left (shown in In-line).

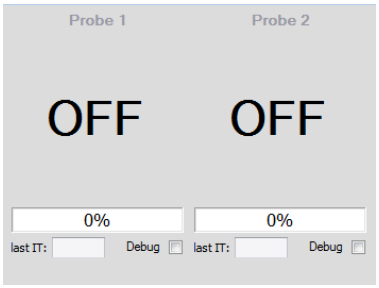
Not all recipes qualify as Adjustable Target Spec recipes. The recipe must be a 'simple' single layer recipe, not defined as basecoat or subtractive, and cannot be set if used in a differential system.

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 ten 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.

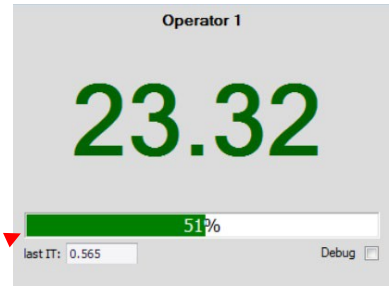
Distance to Target

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.



The image to the left shows how measurement output is displayed (in real-time) when the probe, or probes, in this case, are inactive.

The image to the right takes a closer look and shows how measurement output is displayed (in real-time) when each probe is active.

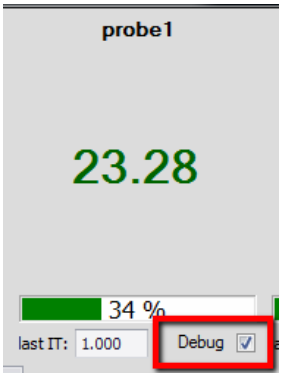


Keep in mind that in both cases, probe names are arbitrary and will be chosen by the customer.

The bar underneath the thickness value may appear green or red. It represents the Reflectance percentage at that moment when a measurement is taken.

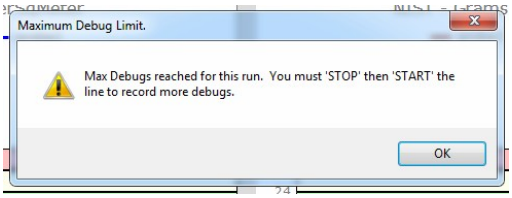
Reflectance bar

Debug



From time to time you may need to do a more in-depth analysis of your measurement readings in our Analysis Tool. You will want to create a debug file to load into the Analysis Tool. To do this, you open your Inline panel and select the "Debug" tick box closest to the Reflectance bar of the probe you want to take debug readings of. This will collect detailed information of the next 100 readings made by your probe and then it will fall out of debug. This means the box will only stay selected for a few seconds before it turns off.

You can make up to five debug readings per probe before you get a warning message that no more debug logs can be created until Stop and then Restart the line. This is to prevent too many debugs logs being created and perhaps filling up your hard drive to capacity.

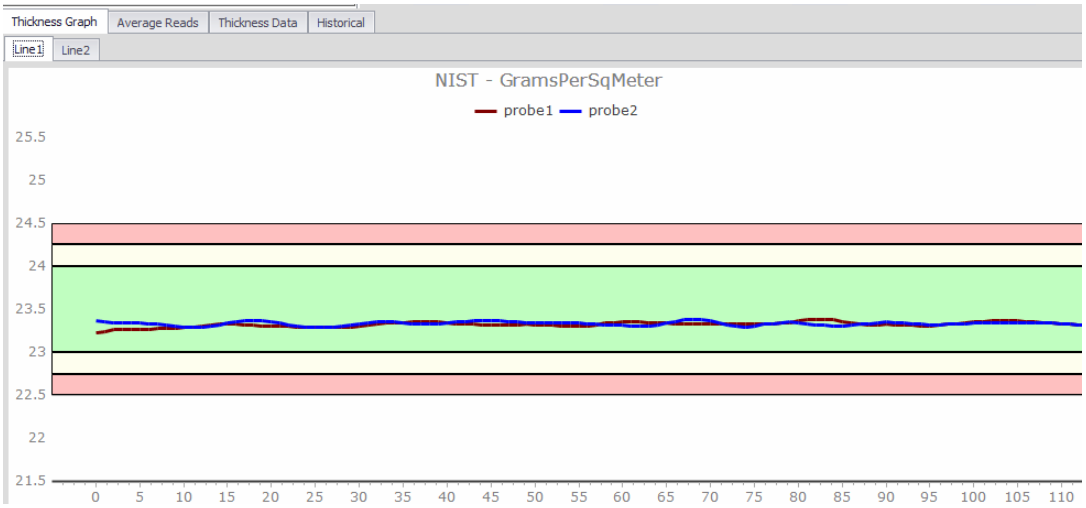


See *In-Line Wave Analysis Tool* section below for more information on how to use Debug Files.

User Interface Tabs

Thickness Graph

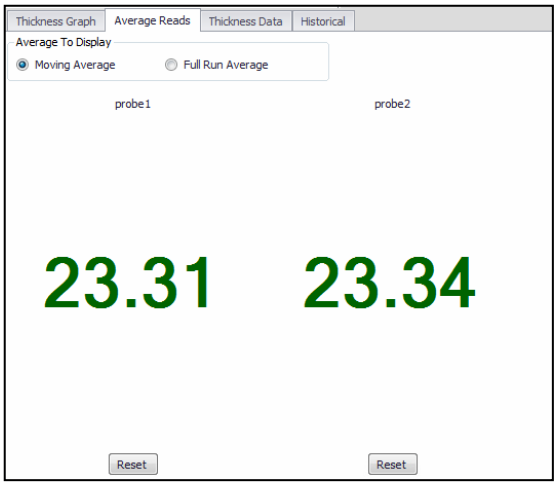
With each reading displayed in the probe reading region, this graph is a plot of thickness measured as a process. A reading is produced once every probe cycle (Default = 1.0 second).



Thickness Graph Tab

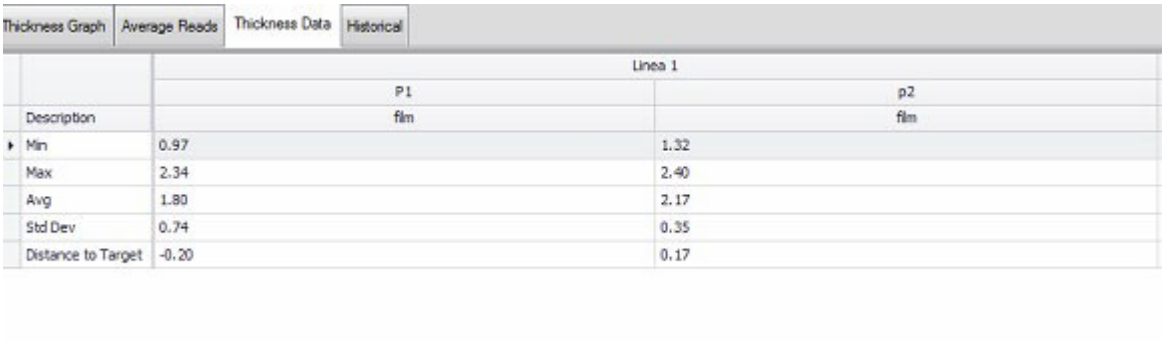
Average Reads

Displays the Moving Average, the average value for measurements taken over a certain period or the Full Run Average, the average value for measurements taken from the beginning of the probe cycle. This will hold an average of the last five probe cycle readings that had a yielded value greater than 0.0.



Average Reads Tab

Thickness Data



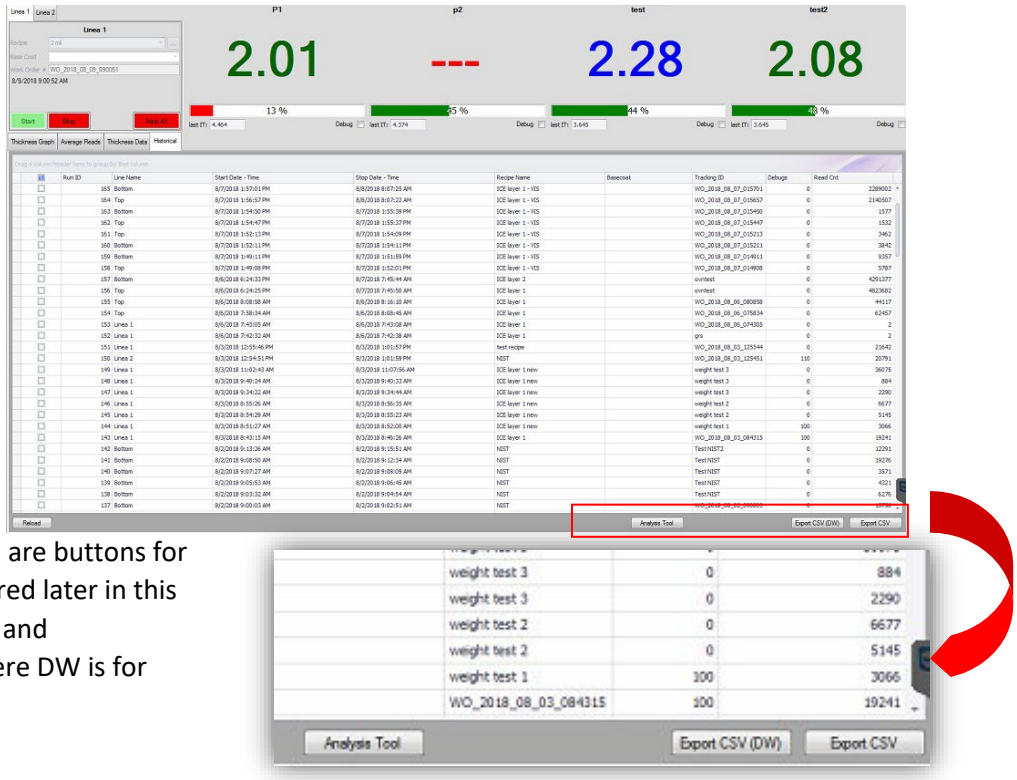
	Linea 1	
	P1	p2
Description	film	film
Min	0.97	1.32
Max	2.34	2.40
Avg	1.80	2.17
Std Dev	0.74	0.35
Distance to Target	-0.20	0.17

Thickness Data provides reading statistics. Traversing systems will yield statistics per lane. Non-traversing systems will yield statistics per probe cycle.

1. **Min** – The value of the lowest measurement taken during the probe cycle.
2. **Max** - The value of the highest measurement taken during the probe cycle.
3. **Average** – The average value of all measurements taken during the probe cycle.
4. **Standard Deviation** -A measure of the amount of variation from the Target Specification taken during the probe cycle.
5. **Distance to Target** – The distance (- or +) from the average to the Target Specification as defined in the recipe.

Historical

Quick reference to view general run occurrences, with the ability to select run for manual CSV output, as well as selection for debug exporting.



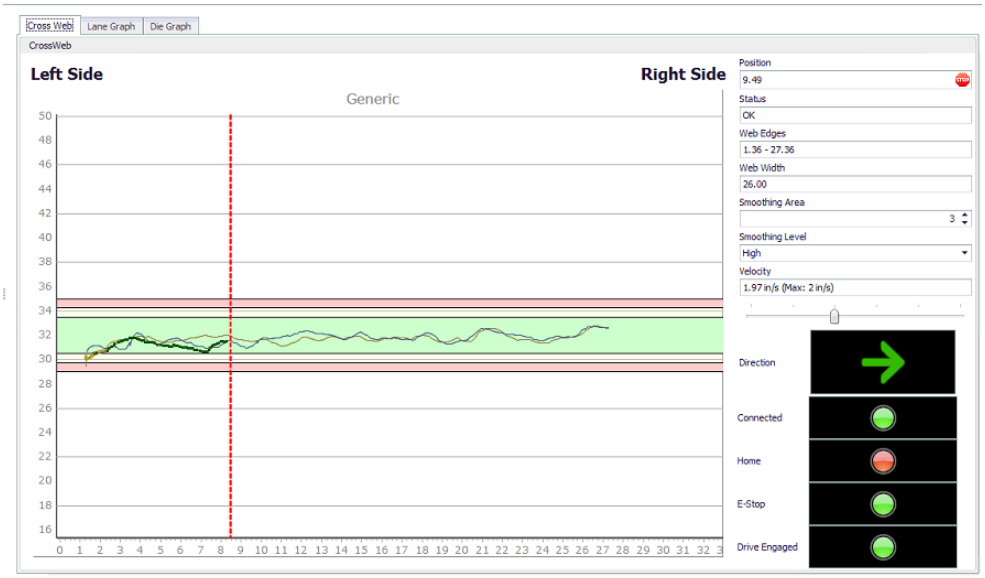
In lower right there are buttons for Analysis Tool (covered later in this guide), Export CSV, and Export CSV (DW) here DW is for Thickness Graph.

Traversing



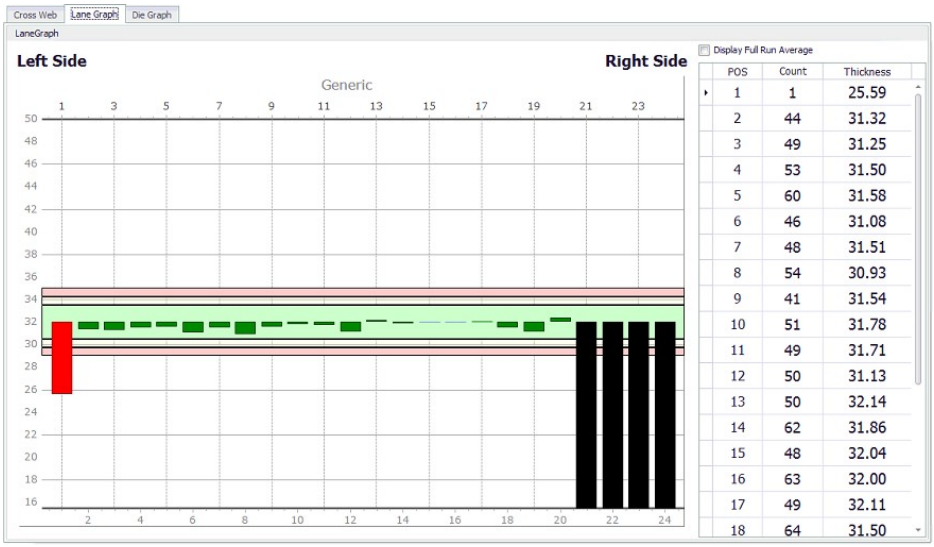
Cross Web

This is a near real-time plot which graphs each independent reading based on a running smoothing average. The graph is updated once per probe cycle with all independent location evaluations. The cross-web points are plotted individually based on location and are not removed based on probe cycle evaluation.



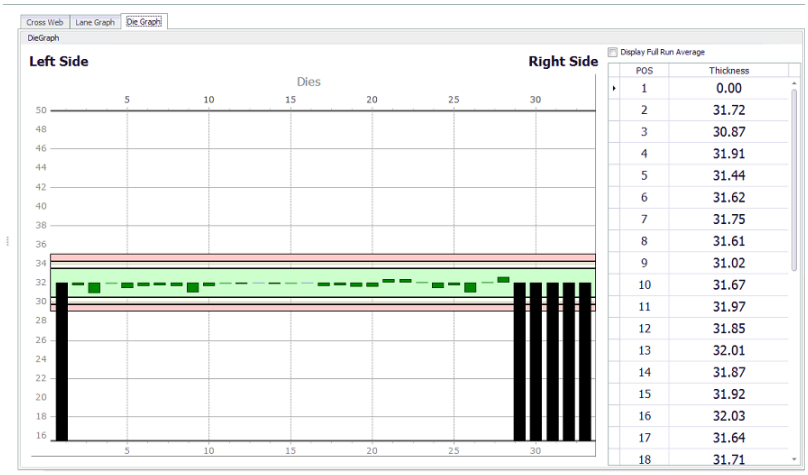
Lane Graph

If there is a [Lane Definition] provided, then this will represent the material from edge to edge (as discovered by reflectance for SA Traversing or Photo Eyes used by PLC Traversing). If no [Lane Definition] is provided, then this will represent the total width defined across the machine, and the material evaluation will be a subset of the default number of lanes. Every individual light reading taken and evaluated while the probe is in each “Lane” will be averaged together to yield a single lane average. Each change of direction the traverse head makes will reset the ‘current traverse’ calculation as the probe moves across the web. If the probe is stopped in a lane, the data will be recorded as a single value regardless of how long the probe is motionless.



Die Graph

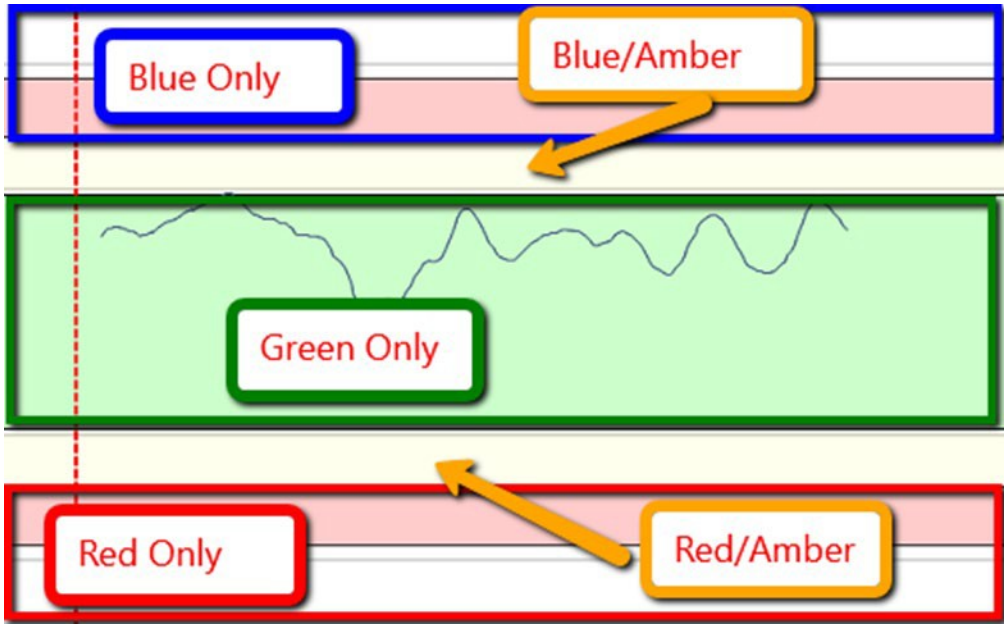
This represents the total width of the machine/roller, which is divided into a predetermined number of regions/lanes/dies at the time of installation. Every individual light reading taken and evaluated while the probe is in each “Lane” will be averaged together to yield a single lane average. Each change of direction the traverse head makes will reset the ‘current traverse’ calculation as the probe moves across



the web. If the probe is stopped in a lane, the data will be recorded as a single value regardless of how long the probe is motionless.

Light Tower

With an SA Traversing System, a light tower is provided to give users a quick visual reference to their measurement range. Starting from the top, the colors are Amber, Blue, Green, and Red.





Green Only – Measurement is within range.

Blue/Amber (PLC Only*) – Measurement has moved slightly high of the range.

Blue Only – Measurement has moved far high of the range.

Red/Amber (PLC Only*) - Measurement has moved slightly low of range.

Red Only - Measurement has moved far low of range.

* - Amber light used in PLC Traversing only. In SA Traversing only Blue or Red lights are used whenever measurement falls out of acceptable range.

In-line Wave Analysis Tool

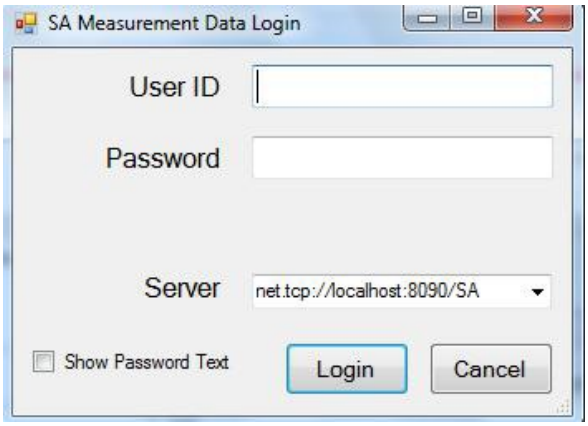


SA Analysis Tool – used to analyze collected debug files during a measurement cycle by using optimized algorithms for faster analysis and validation of your In-line coatings & films. Collect debug files by clicking the "debug" check-box in the In-line UI. Export files to a location on C:\ to load them in the tool for analysis.

Getting Started

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 seven 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 before the data being purged. Because of database size restrictions, Sensory Analytics® cannot guarantee data to remain in the system for longer than seven days.

Logging Inline Graph



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 the 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 the Analysis Tool.

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

Loading Files

There are three 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 one 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.

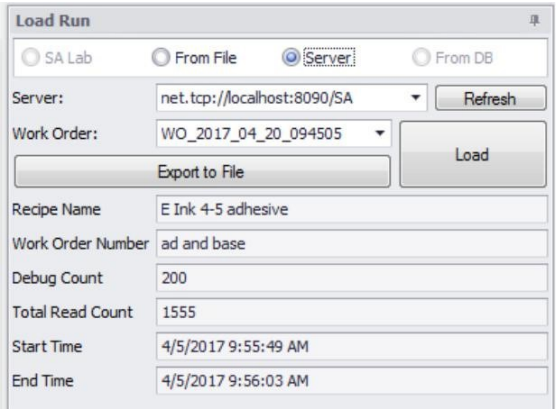
    b. Click “Change DB” if you have an archived database you wish to work with. Navigate to the folder and select the SA database (*.mdf) to work with.

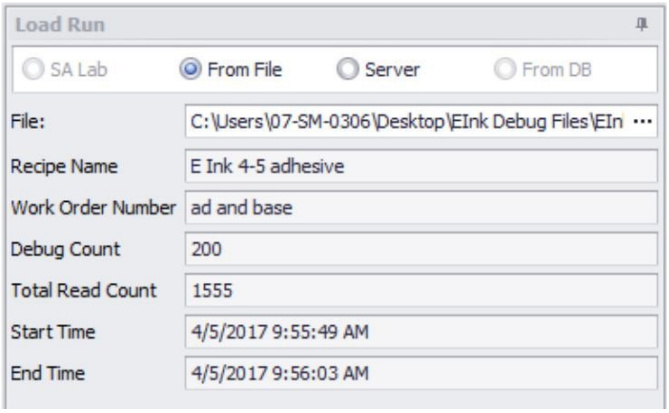
    c. The drop-down window will display the list of Work Order numbers for each run

    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.

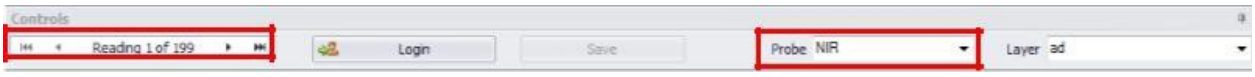
4. SA Lab will be explained in the SA Lab Manual.





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 backward and forwards or enter the number of the reading directly.

Language: Displays a selection window to change the language without having to exit

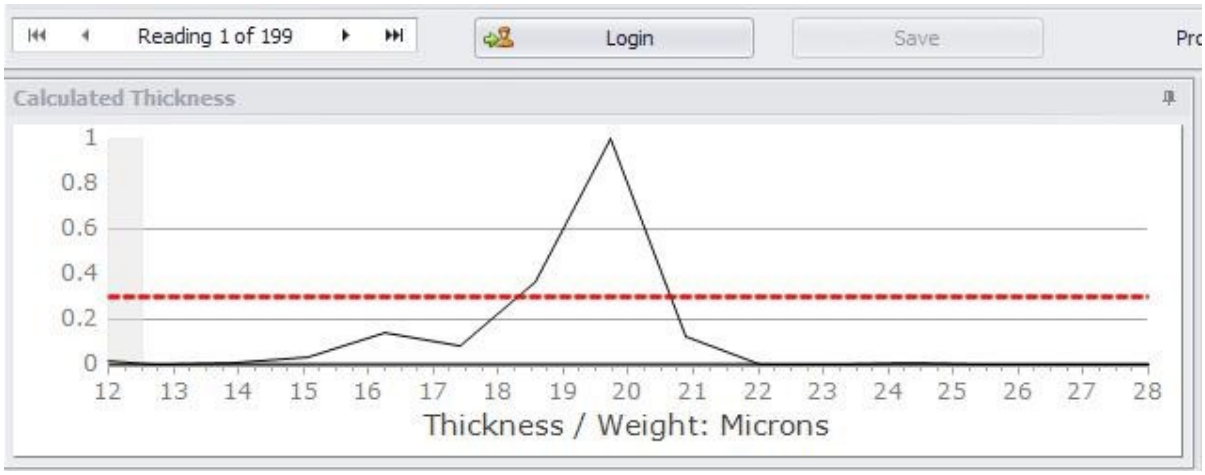
Probe Drop-down menu: Selector used to choose between probes.

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 one probe that has had analysis (Debug) readings taken, you can select which probe analysis data you wish to review.

Calculated Thickness



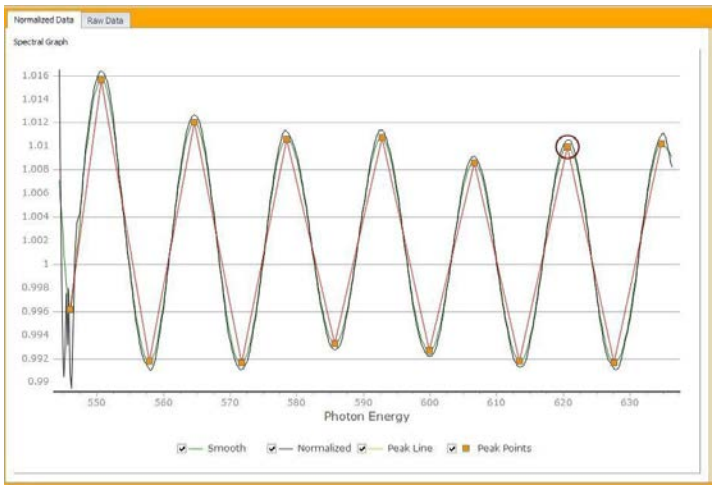
A Peak graph that shows the thickness or film-weight peaks within the Min/Max evaluation range.

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

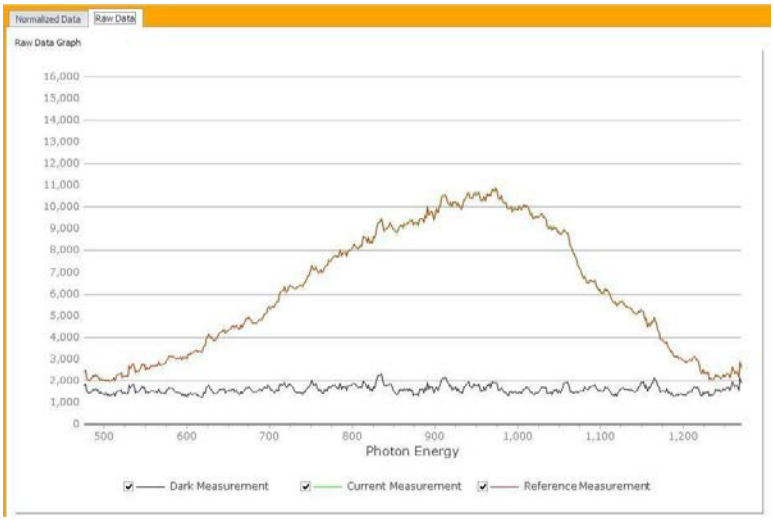
The Spectral graph displays the normalized reflectance used to calculate the thickness of a coating/film across a wavelength range.



Raw Data

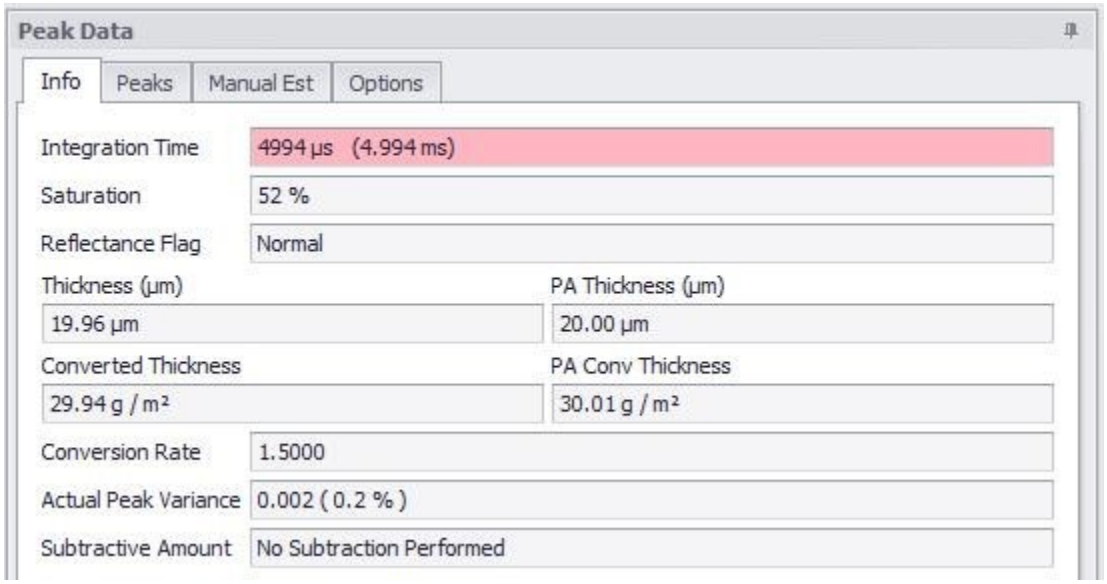
The y-axis shows the reflectance energy entering the probe at the respective integration time. The x-axis is the wavelength of light in nanometers (nm).

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.



Info

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 (µm): 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.

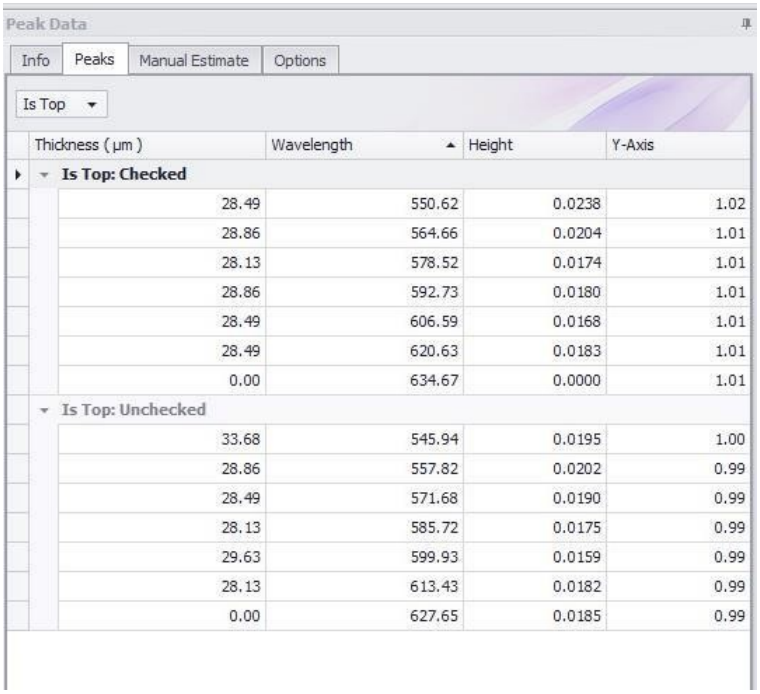
Conversion Rate: From measurement thickness in microns, converted to desired units of measure

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.

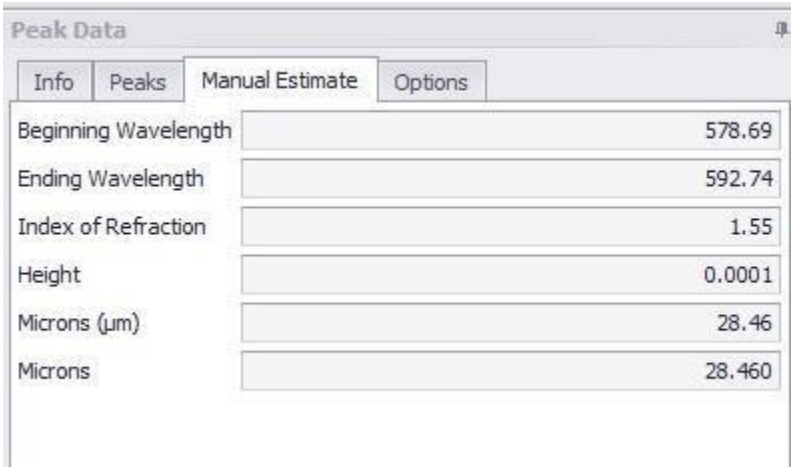
Peaks

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)	Wavelength	Height	Y-Axis
Is Top: Checked			
28.49	550.62	0.0238	1.02
28.86	564.66	0.0204	1.01
28.13	578.52	0.0174	1.01
28.86	592.73	0.0180	1.01
28.49	606.59	0.0168	1.01
28.49	620.63	0.0183	1.01
0.00	634.67	0.0000	1.01
Is Top: Unchecked			
33.68	545.94	0.0195	1.00
28.86	557.82	0.0202	0.99
28.49	571.68	0.0190	0.99
28.13	585.72	0.0175	0.99
29.63	599.93	0.0159	0.99
28.13	613.43	0.0182	0.99
0.00	627.65	0.0185	0.99

Manual Est.



Allows users to adjust the following values:

Beginning/Ending Wavelength/Energy: The wavelength/Energy range is the range of light spectrum that is being measured to produce a reading. SpecMetrix® software currently measures in 3 different spectral ranges:

- 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).
- Near-Infrared (NIR) which is from 900 nm – 1700 nm.
- Extended Range (ER) which operates in the 485-1300 photon energy range.

When you adjust, the wavelength or Energy 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.

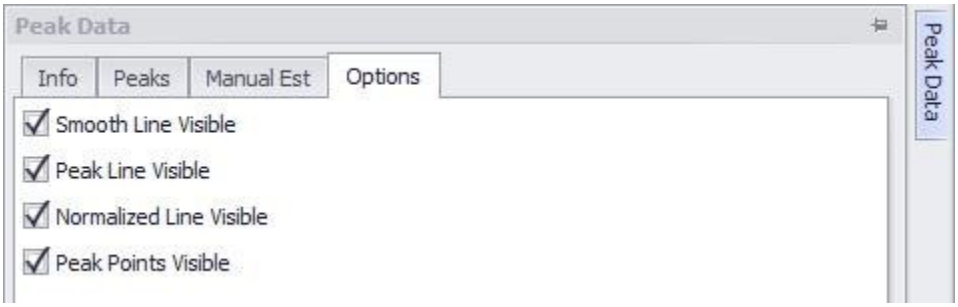
Height (Height Threshold): This is the minimum amount of height (distance from the bottom point to the top point for a given interference cycle) required to consider the interference wave as valid. If the peak to valley distance is less than the height threshold value, then that is not considered as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

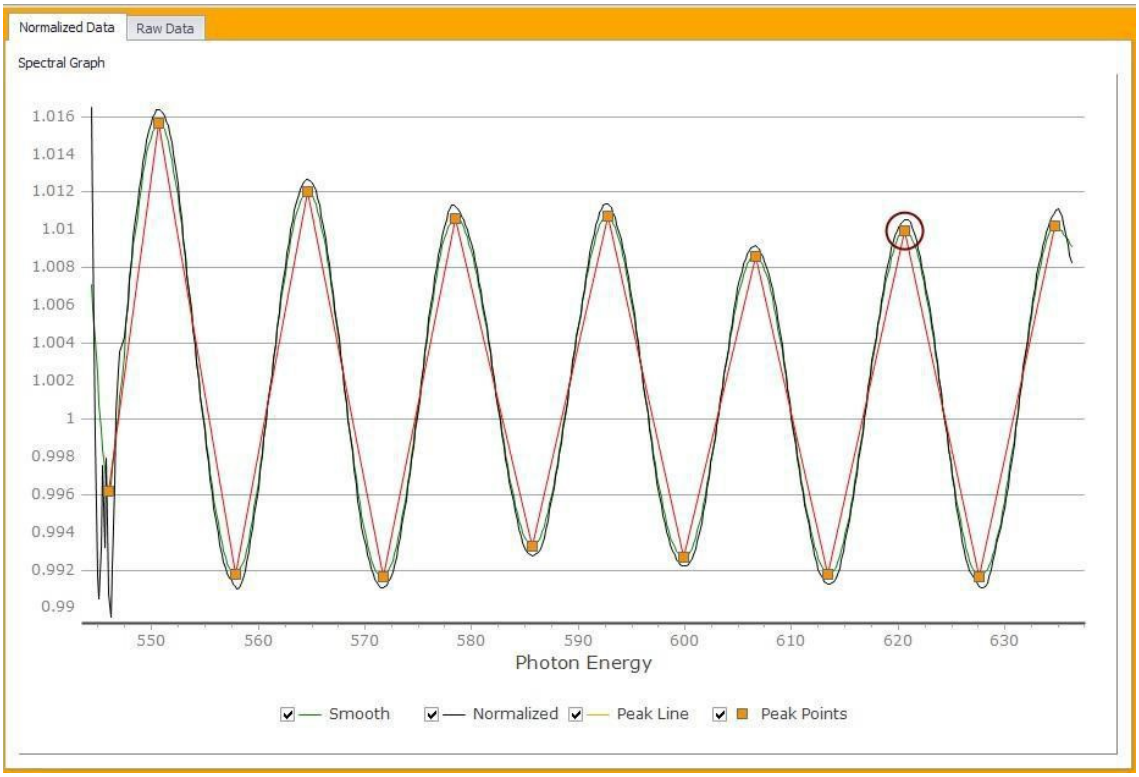
Options

Controls the visibility of the Normalized graph lines:

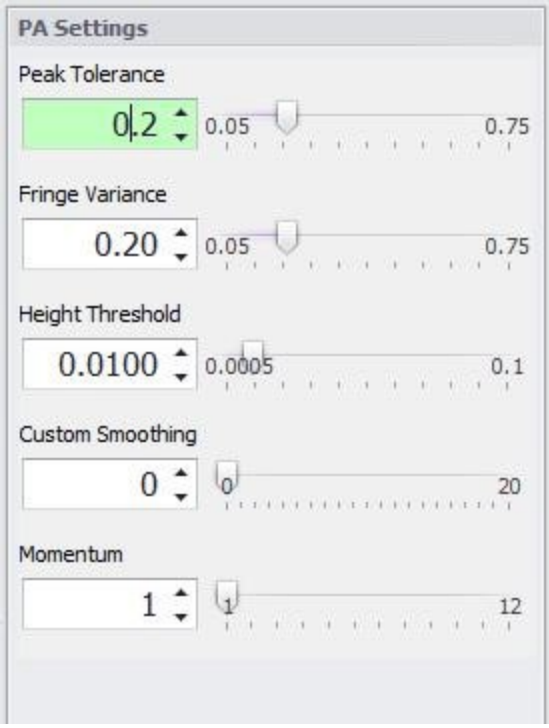


Checking or unchecking the line display boxes will hide or unhide the respective lines in the Wave Graph.

- **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:

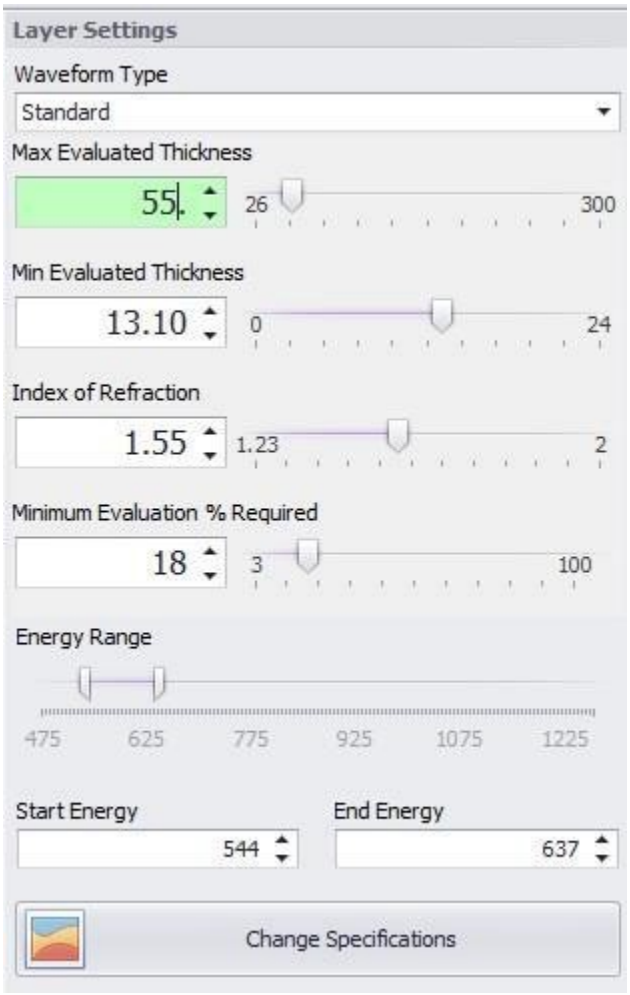
Peak Tolerance: This is the amount of acceptable variation in percentage between the final estimated thickness by the peak analysis algorithm and the thickness displayed by the software. If a value of 0.2 is used in this field, then a 20% variation is acceptable between the calculated thickness by the 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." The 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 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.

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.

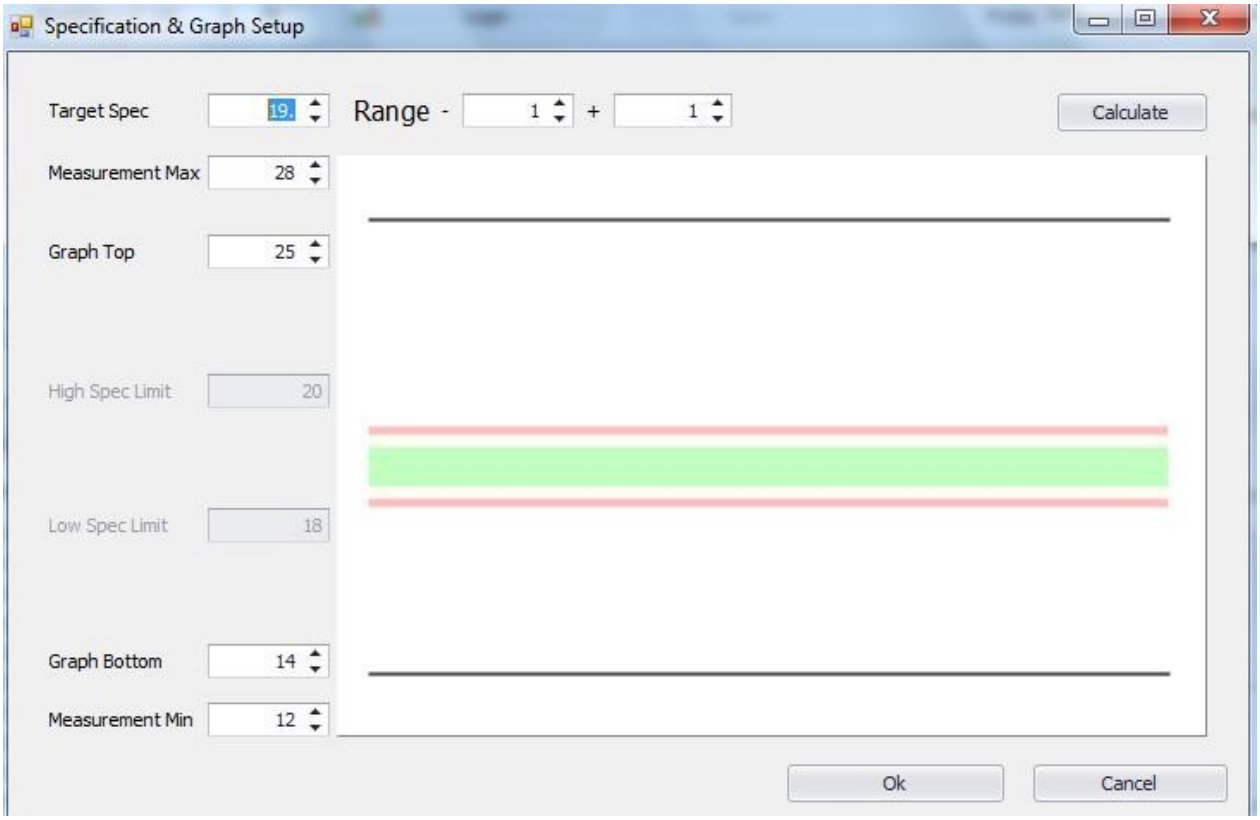
Minimum Evaluated Percent: The required minimum percentage of readings that are successfully evaluated for a reading to be displayed.

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.

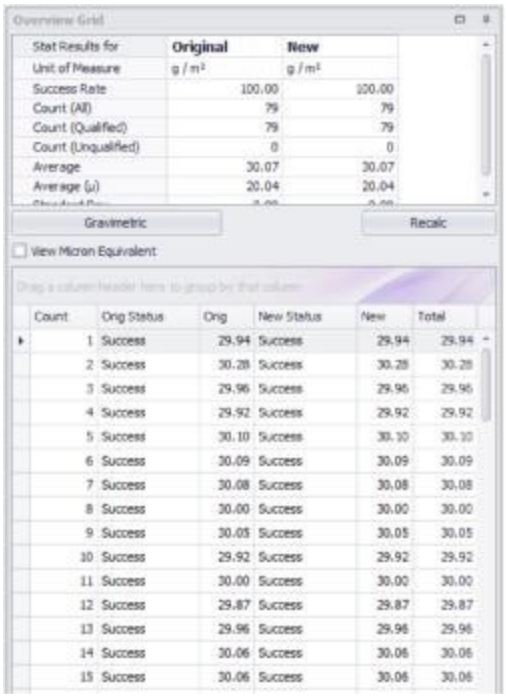
Specification & Graph Setup



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.

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



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.

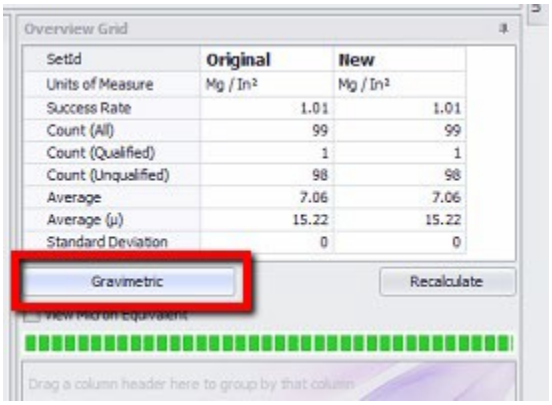
You can also click and drag column headers to group by those columns as indicated in the figure above.

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 the 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”).

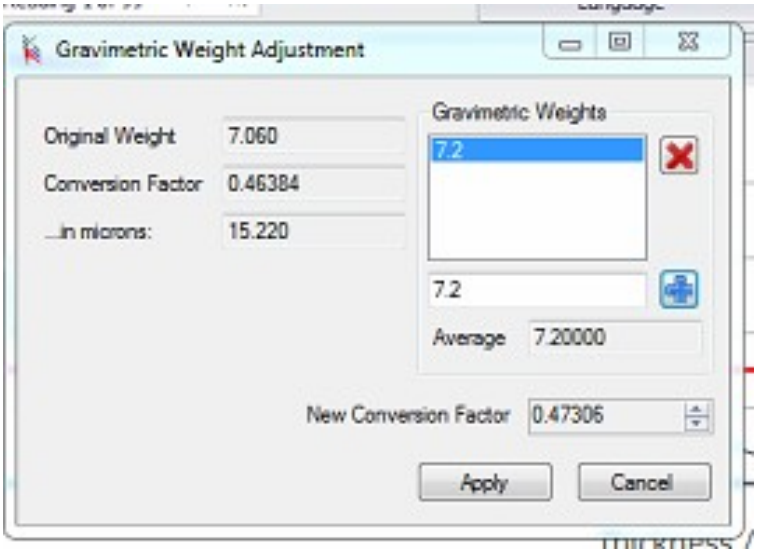
Gravimetric



When the Gravimetric Assistant is invoked from the Analysis tool, the values for measuring are already added in providing the “Debug” checkbox was checked during the run. Otherwise, you will need to use the Gravimetric tool from within the Recipe Editor and enter the Average Microns measured by the SpecMetrix® system for the Gravimetric 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 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 three 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.

Making changes with Analysis Tool

WHAT TO CHANGE AND HOW IT AFFECTS YOUR READING

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." The 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. The 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. A typical value for this field is from 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 a change in the 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

The Index of Refraction is the dimensionless number which describes how fast light propagates through the material. 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

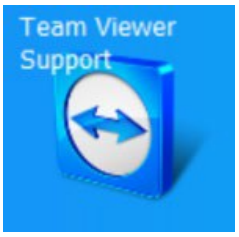
This is the defined target from the recipe. If Target is changed, the Min/Max Thickness values will automatically change

+/- 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.

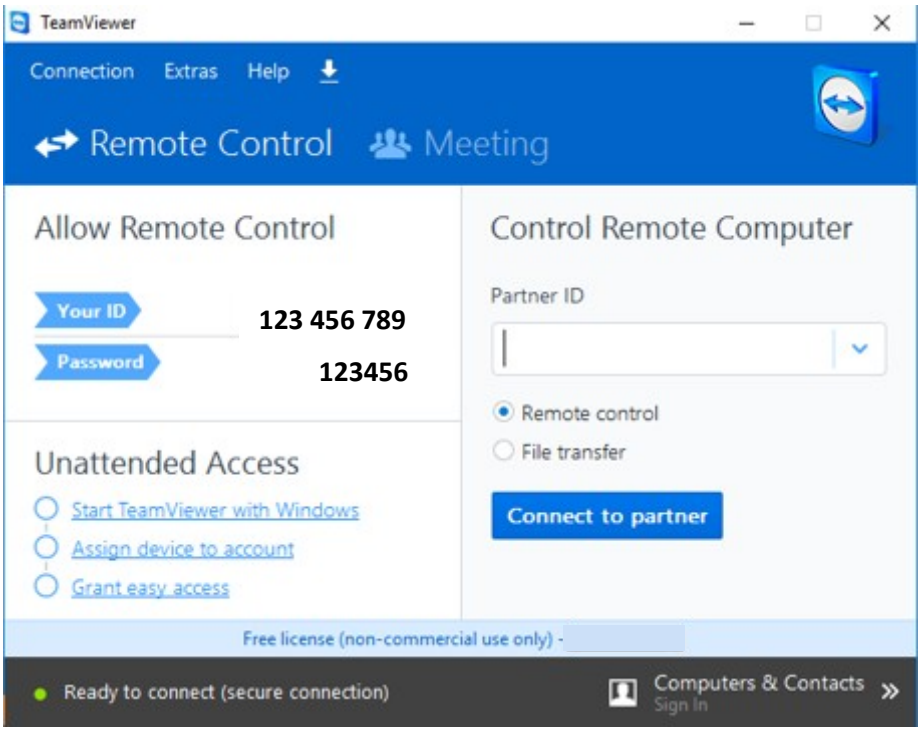
SpecMetrix® On-Line Support



Team Viewer Support – Team Viewer is a secure third-party 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 more information about Team Viewer visit them online at (www.teamviewer.com).

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:



For Sensory Analytics to provide the remote support, you will need to provide the **9-digit Team Viewer ID** as well as the **Team Viewer password**. There is no way to access your SpecMetrix® unit without the plant providing this information. This will allow the technical staff to access the unit to assist with any operational needs remotely.

Other SA Menu Buttons



The image to below will allow users to minimize the SA Menu window and return to the Windows desktop environment without shutting down the SA software.

Windows Shutdown – used to close the *SpecMetrix*® Server in a 'Friendly' way (so that all hardware is properly closed), you must first Stop the In-line 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 set up with the sensory technician, the system will either shut down or restart.





SA Config Tool – Troubleshooting Tool to be used by authorized *SpecMetrix*® Representatives only

Change Language – Changes Language used throughout the SA Display. All major languages are supported.



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.

Environment	Maintenance Interval *
Clean Room / Office / Lab environment	Quarterly
Factory Environment	Monthly
Harsh Factory Environment	Weekly

* - These are recommended minimum intervals. You may choose to do more frequently based on your environment.

Maintenance Procedures for Lab and In-line systems

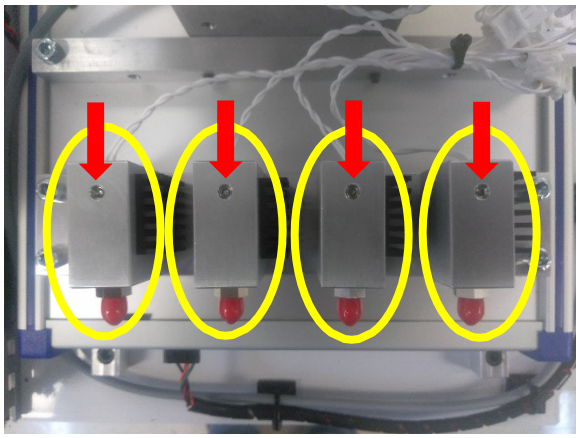
We suggest using compressed canned air for dust/particle removal. Never use water or liquids to clean electronic components.

***** 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 for In-line Systems

There is one illumination lamp in the system for each optical probe. These lamps can be found in the aluminum blocks identified by the yellow circles in the following picture (Figure 62).



Optical switch with light sources



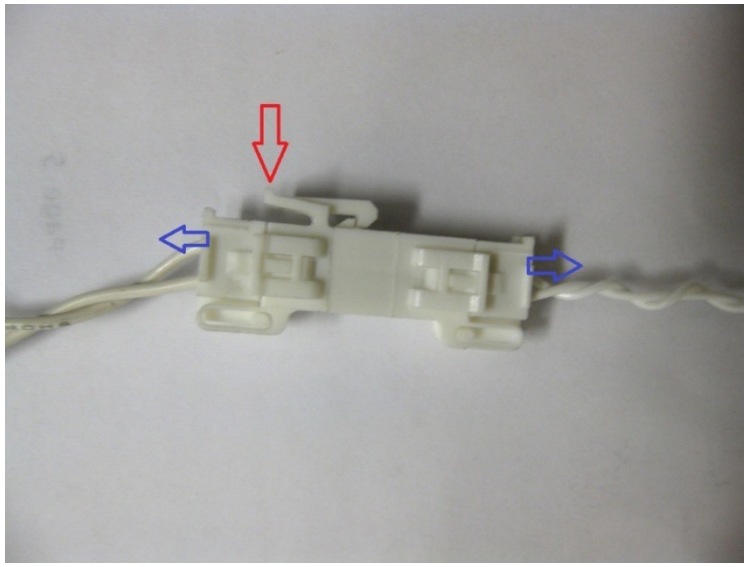
Halogen Lamp

To remove a lamp:

1. Use a 3/32 Allen key to loosen the set screw identified with the red arrows.

2. After pulling the lamp out of the aluminum housing, it should look like Figure 63 Above.

3. To disconnect the lamp from the system, press the tab indicated by the red arrow while pulling the two ends of the quick-connect away from each other in Figure 64 above.
4. To install a new lamp, reverse the last three steps, **being careful not to tighten the set screw in the aluminum housing so hard that it damages the lamp**. The set screw should be snug with very little torque.



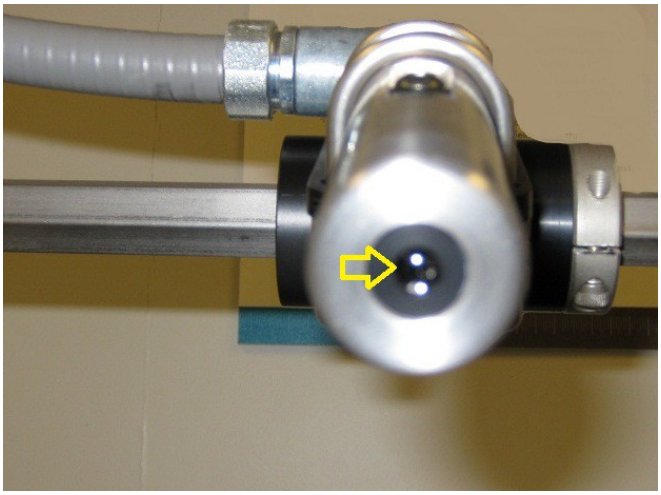
Lamp extender connection

Probe Cleaning

The probe lens needs to be cleaned from time to time, as it will collect coating and other particulates. Best to use standard lens wipes (the same thing used to clean eye glasses).

This should be done on a regular cleaning schedule based on schedule chart shown at the start of this section.

The more often you clean, the better.



Probe Lens

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 touchscreen is operational
5. Verify the Window operating system starts correctly
6. Start each software package and verify correct functionality of lamps and measurements
7. Visually inspect the system for damage
8. Check all probes, Lab 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

There is no requirement for calibration on individual coating standards on a 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 six 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 Thickness Verification Unit (TVU) (*See Image at Right*) and place the probe head inside the TVU until it stops. Insert a battery into the location as shown in the image – this will turn on a rotating piece of film inside the TVU.



2. Turn on the *SpecMetrix®* software.
3. Select the appropriate NIST Recipe for the TVU.

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 TVU.

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

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