

NUCLEOS EFX QC USER GUIDE



Version 1.2.1

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1 TABLE OF CONTENTS

1	Login	1
1.1	Desktop	2
1.2	App Launcher	2
1.3	Navigation bar	3
1.4	Instrument Connection	4
1.5	Settings	4
1.6	general app workflow	5
1.7	Help Menu	7
2	Object Browser	7
4	Data Access Tool	8
4.1	Import	8
4.2	Export	9
5	Property Editor	9
5.1	Properties	9
5.2	Property Library	11
6	Tolerance Editor	13
7	Standard Editor	15
7.1	Standards	15
7.1.1	Spectral	16
7.1.2	Texture	16
7.1.3	Properties	16
7.2	Tolerances	17
7.3	Standard Libraries	18
7.4	colorimetric standards	18
8	QC Job Template Editor	20
8.1	Measurement Configuration	20
8.2	Standards	22
8.3	Properties	22
8.4	Default Tolerance	22
8.5	Schematic Area	22
8.6	Checkpoints	23

9	EFX QC	26
9.1	View	26
9.2	Sending/Receiving to/from the instrument.....	27
9.3	Jobs	27
9.4	Import/Export.....	35
9.5	Job List	36
9.6	Workspace.....	36
9.6.1	Job View.....	37
9.6.2	Job Detail View	41
9.6.3	Single Trial View	43
9.6.4	Adding Properties to a Trial	44
9.6.5	Controls	44
9.6.6	Pop Out/Snapshot	45
10	EFX QA.....	46
10.1	Search	46
10.2	Workspace Differences to EFX QC.....	47
10.2.1	List View	47
10.2.2	Detail View.....	48
	Further help can be found at EFX product support page:	48

1 LOGIN

After installation of Nucleos Server/Desktop the application can be started using the Nucleos Desktop shortcut.

The first screen that welcomes you is the login dialog.



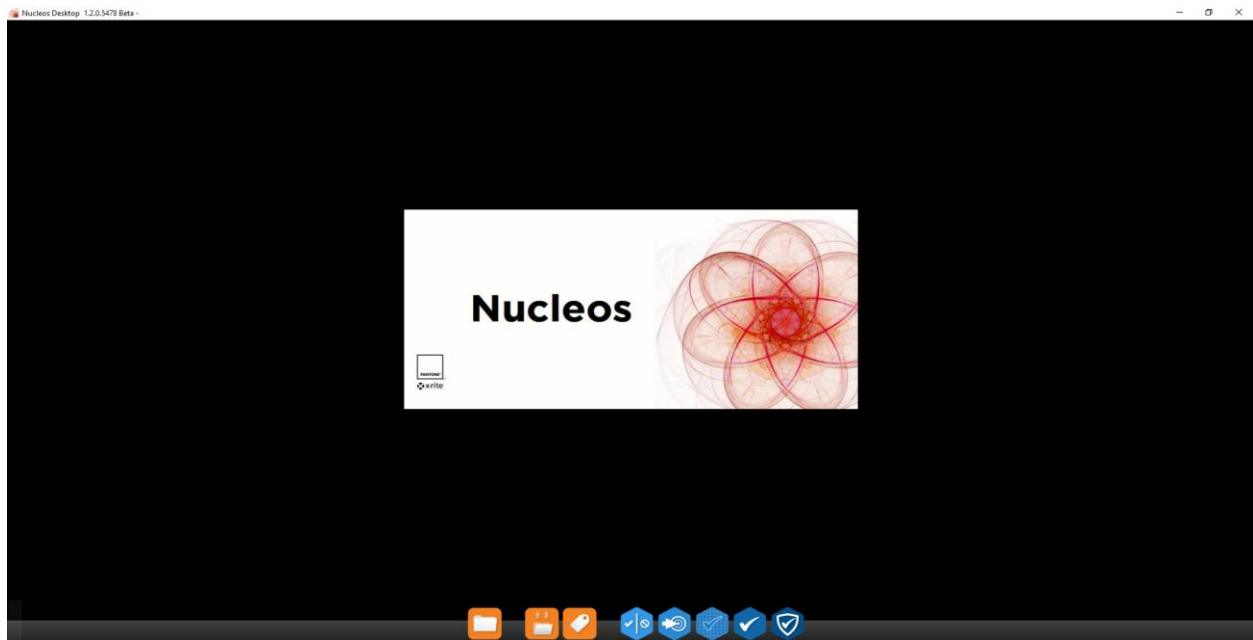
Here the Nucleos databases can be selected. The defaults are SQLite-Nucleos and SQLite-Demo database which are created after installation. Pressing on "ALT" on the keyboard while on this screen will activate the advanced login dialog. This allows alternate Nucleos server connections. Databases can then be selected on these Nucleos servers. User name is reserved for future use. Acknowledgements provide information about the technology used while developing Nucleos.



Nucleos Desktop

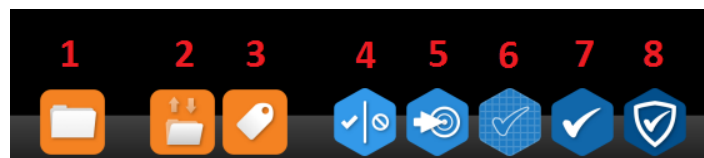
1.1 DESKTOP

The first-time logging into Nucleos will present the Nucleos logo in the background and an application bar with the different available Nucleos applications at the bottom. This only occurs if no applications are selected. Subsequent launches of the Nucleos Desktop will automatically open the last application used.



1.2 APP LAUNCHER

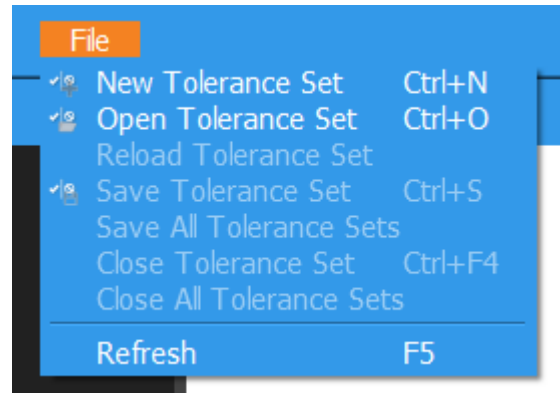
Nucleos EFX QC includes the following apps in the app launcher:



1. Object Browser
2. Data Access Tool (DAT)
3. Property Editor
4. Tolerance Editor
5. Standard Editor
6. QC Job Template Editor
7. EFX QC
8. EFX QA

1.3 NAVIGATION BAR

A navigation bar is available on all the Nucleos applications. The most commonly used functions from the navigation bar are presented below (in this example New/Open/Save).



The navigation bars have a common area that is detailed here – if an app has additional options those will be highlighted in the specific app area of this guide.

- **New** Property/Tolerance Set/Standard/QC Job Template
 - Creates a new entry of the object that is used in the currently active app. In the case of above screenshot, it will create a new tolerance set.
- **Open** Property/Tolerance Set/Standard/QC Job Template/QC Job
 - Opens the Object Browser to navigate to existing objects that can then be loaded into the current app.
- **Reload** Property/Tolerance Set/Standard/QC Job Template/QC Job
 - Refreshes the currently loaded object. This is used if changes were made in another app to any object that is used in the current app. For example: Changes made to a standard that is used in the QC Job Template builder should be refreshed so these changes are apparent in the QC Job Template builder.
- **Save** Property/Tolerance Set/Standard/QC Job Template/QC Job
 - If a new object has been created, an object browser will pop up requesting the location where the object should be saved. Object that have already been saved will be saved to the same location.
- **Save All** Property/Tolerance Set/Standard/QC Job Template/QC Job
 - Performs the save function for all unsaved objects.
- **Close** Property/Tolerance Set/Standard/QC Job Template/QC Job
 - Closes the currently selected object and removes it from the list of open objects.
 - **Note:** Closing an object does not delete it. It can be re-opened as explained in the open section above.
- **Close All** Property/Tolerance Set/Standard/QC Job Template/QC Job
 - Closes all currently open objects in the app and removes them from the object list.

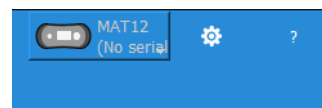
1.4 INSTRUMENT CONNECTION

In applications that use an instrument for measurements, the instrument button will appear on the upper right area of the app. Clicking on the instrument button will show two options if no instrument is connected: An available instruments option and a rescan for new instruments option.

To connect an instrument to the PC in Nucleos, first click first on “rescan for new instrument” and then select the desired instrument from the list of available instruments. If the instrument was already connected to the PC it should immediately appear in the available instrument area.



No Instrument



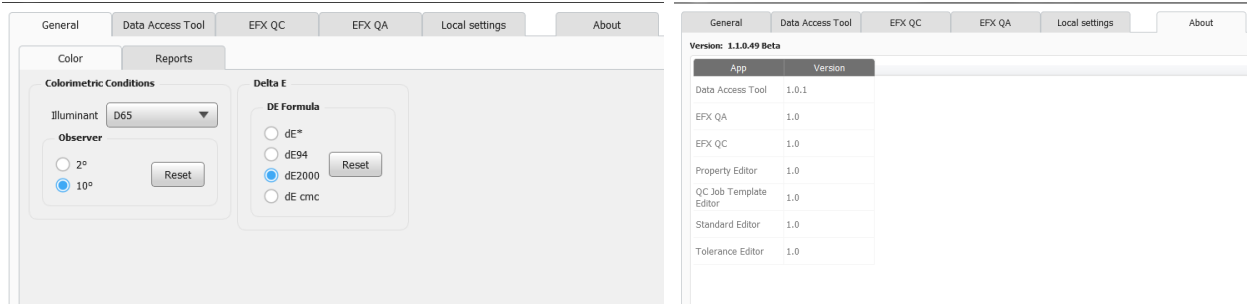
Instrument Connected

To find the correct instrument, it needs to be selected in settings. These settings can be found under the Local settings tab.

1.5 SETTINGS

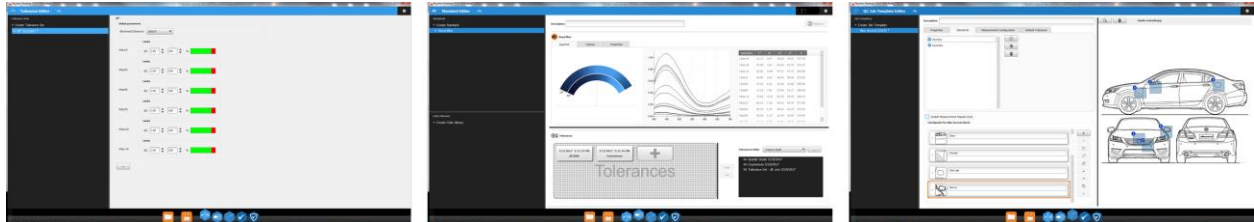
The gear icon next to the instrument connection opens the Nucleos Settings menu.

The settings for all installed Nucleos apps are available on each of the apps settings tabs.



1.6 GENERAL APP WORKFLOW

There are two basic types of apps within the Nucleos desktop. The first are “editor” apps – Tolerances, Standards, and Job Templates. The other two apps are for quality control and quality assurance. The editor apps are used to construct that data assets used by the two quality apps.

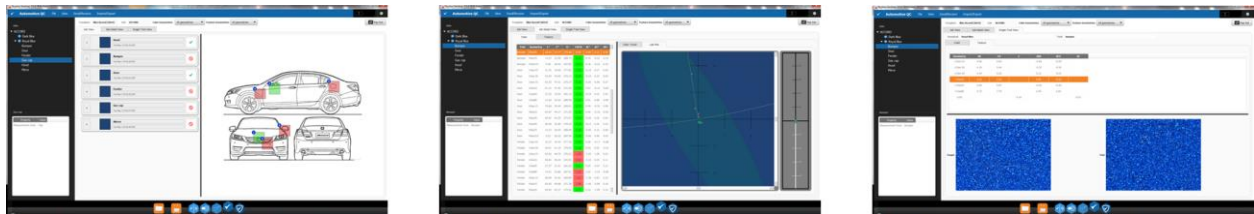


The Tolerance Editor is used to construct tolerances. Tolerances can then be associated to both Standards and Job Templates. Tolerances can be colorimetric or based on texture attributes.

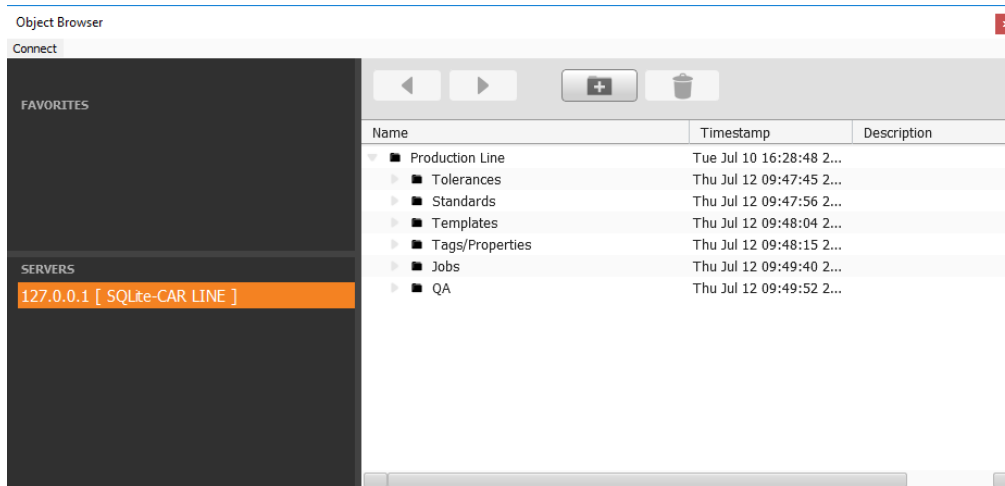
The Standard Editor is used to create Standards. Once created, tolerances and properties can be associated to the Standard and used throughout the other Nucleos Apps.

The QC Job Template Editor is used to create job templates that create a controlled measurement process either remotely, on the instrument, or within the software. Standards and tolerances can be associated to a job template. Templates can also include check zone measurement procedures.

The quality apps are used for data capture, quality checks, harmonization audits, and process and data analysis.

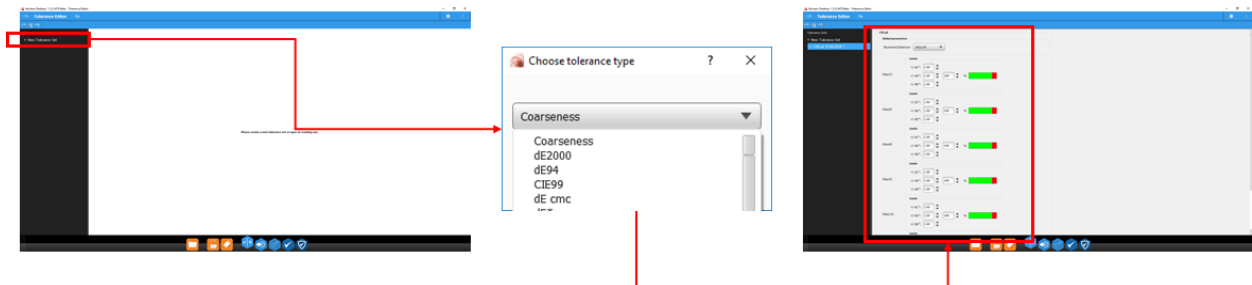


If you have a more procedural workflow, the suggested progression is create tolerances, create standards, and create job templates. These assets are stored and organized in the database and can be managed within the Object Browser.



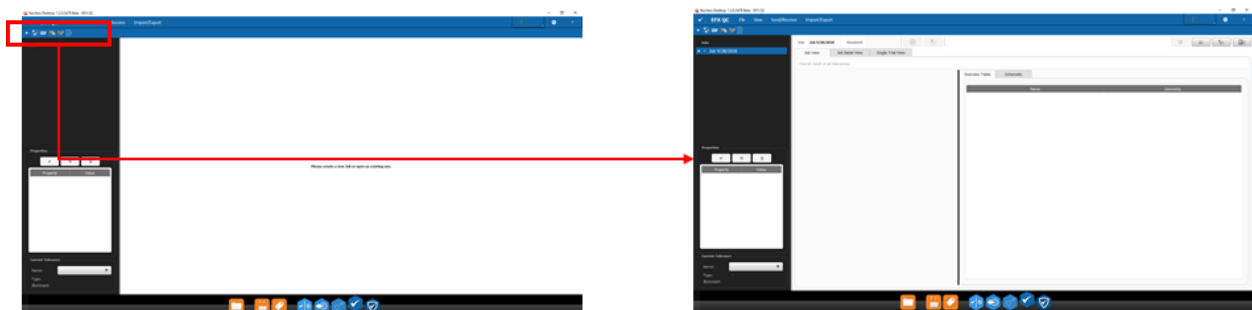
The object browser is accessible from the Nucleos desktop and within the various Nucleos apps when the Open option is selected.

For editor apps, the creation process starts by selecting the '+' symbol. This will display the asset creation form:



The creation form prompts the user to create or enter the elements required to the specific data asset. Data assets must be explicitly saved to the database. Unsaved data assets are indicated by the '*' character next to their name.

Quality apps have a more freeform workflow but start with the same initial step, create or open a job. To create a job, select the '+' character.



More detailed operation of the individual apps is included in the following sections. In addition, most sections include a link to a training video.

1.7 HELP MENU

Clicking on the question marks in the navigation bar will open the Nucleos EFX QC User Guide (this document).

Link to training video: EFX QC Desktop



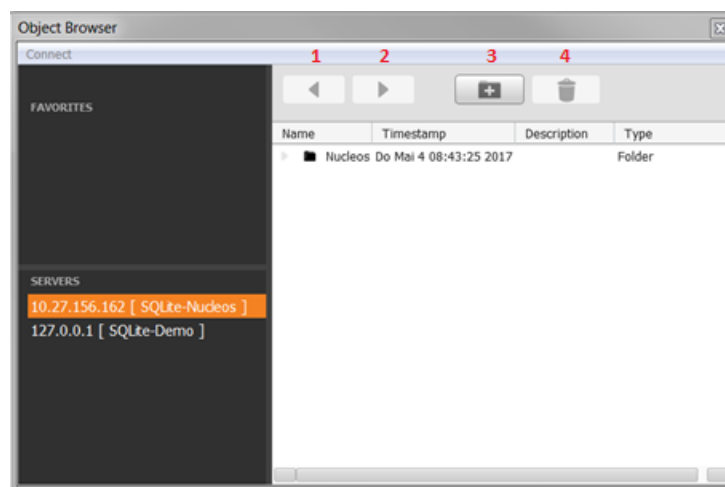
<https://youtu.be/1JMFZs-6NxU>

2 OBJECT BROWSER



The object browser is used to navigate databases and folders, much like directory browsers on popular operating systems.

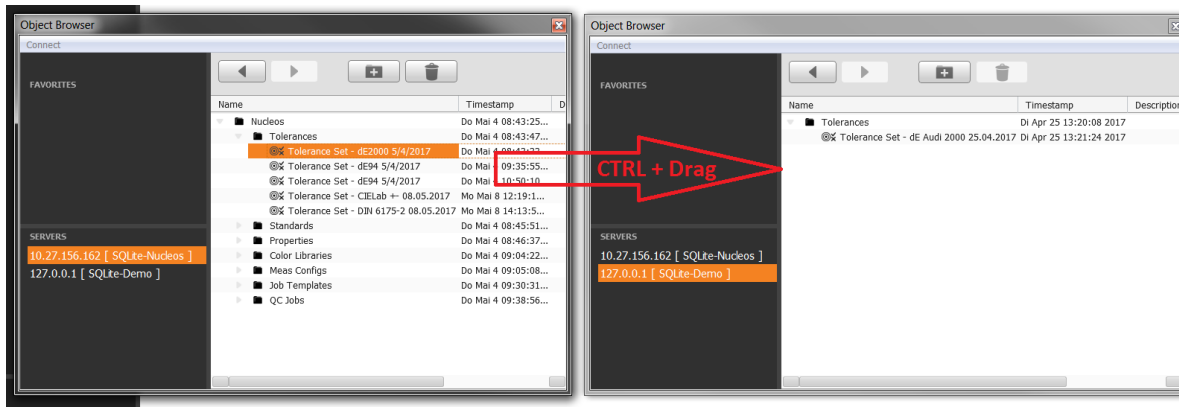
Clicking on the object browser opens a floating window showing favorite folders and the databases(s) which are currently connected to on the left-hand side, and the content of those folders on the right-hand side. Multiple object browsers may be opened at the same time to simultaneously see the content of these folders.



The arrow buttons (1/2) are used to navigate back and forth between already selected folders. The folder with a '+' on it (3) is used to create new folders. The trashcan (4) is used to delete folders or objects. To add a folder to the favorites just drag and drop it into that area.

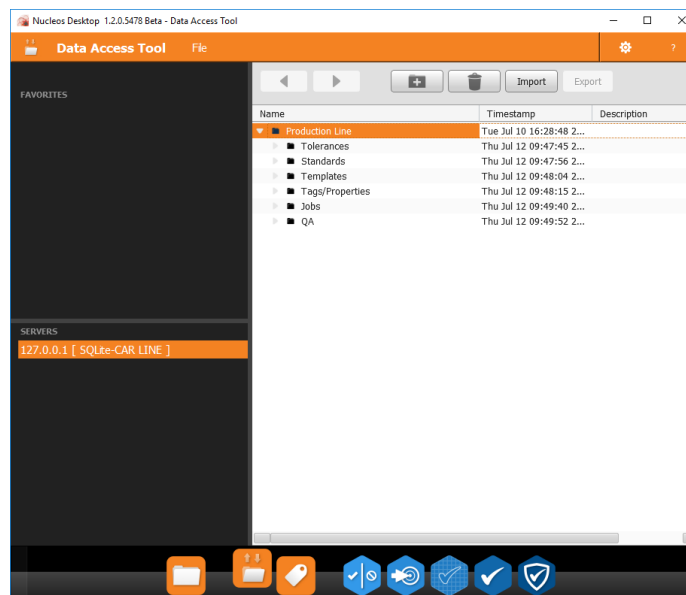
On the upper left-side, a connect button is available to open a pop-up dialog in which another server can be connected. This allows objects to be moved from one database to another.

For example: To move objects from database A to database B two object browsers will need to be open. One showing the content of database A the other the content of database B. Hold CTRL, click and drag the object from database A and then drop to database B.



4 DATA ACCESS TOOL

The Data Access Tool (DAT) is like the object browser in that you can browse and see all your objects in the database. The additional functionality this tool offers for the user is the ability to import and export data in different formats.



4.1 IMPORT

To import data, select a folder in which to import and then click on the import icon. Select the files to be imported. Additional information may be needed depending on the type of import selected.

Supported import file types are:

- Nucleos (.nux)
- Comma Separated (.csv)
- X-Color QC (.cxf)
- Matlab assortment file (.mat)
- X-Rite Colormaster (.xtf)

4.2 EXPORT

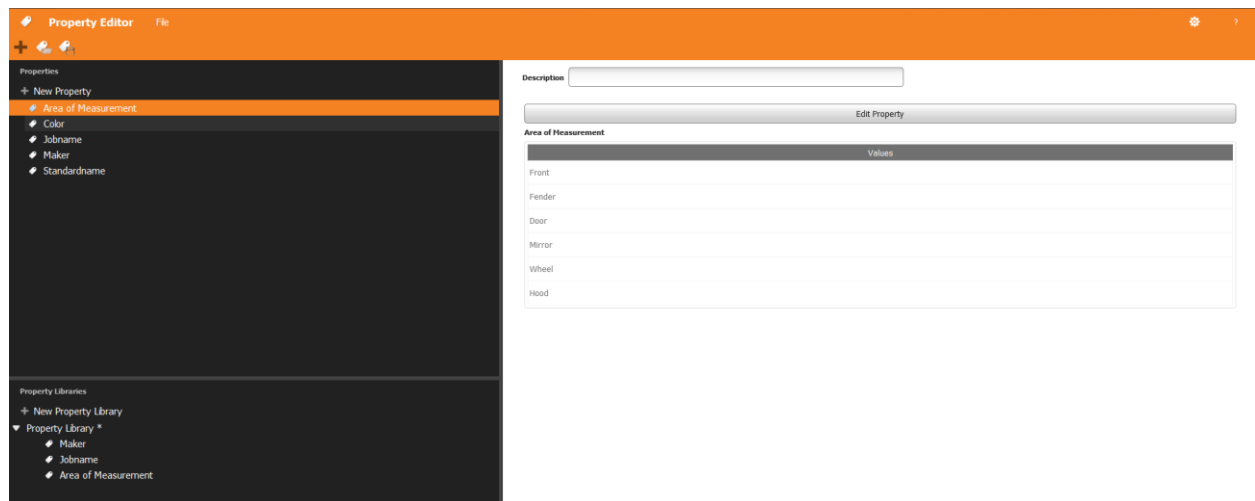
Additionally, one or more data objects may be exported out of Nucleos. Data objects may be exported as either Nucleos (.nux) or comma separated (.csv) format. The .nux format is used share data objects and assets between locations or supply chain partners who are using Nucleos applications.

5 PROPERTY EDITOR

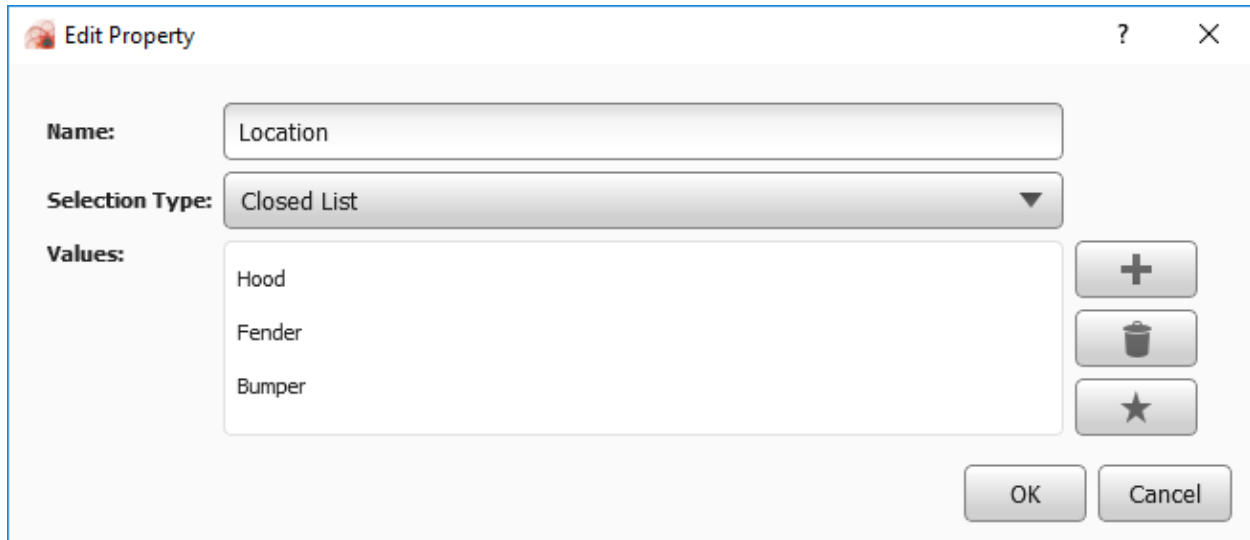


The properties editor is used to create properties and property libraries. These objects can later be used as identifying criteria and is especially useful for filtering in the EFX QA app.

5.1 PROPERTIES



Creating a new property adds a new entry to the navigation bar on the left-hand side. The "Edit Property" button can be used to change the property type and edit its values.

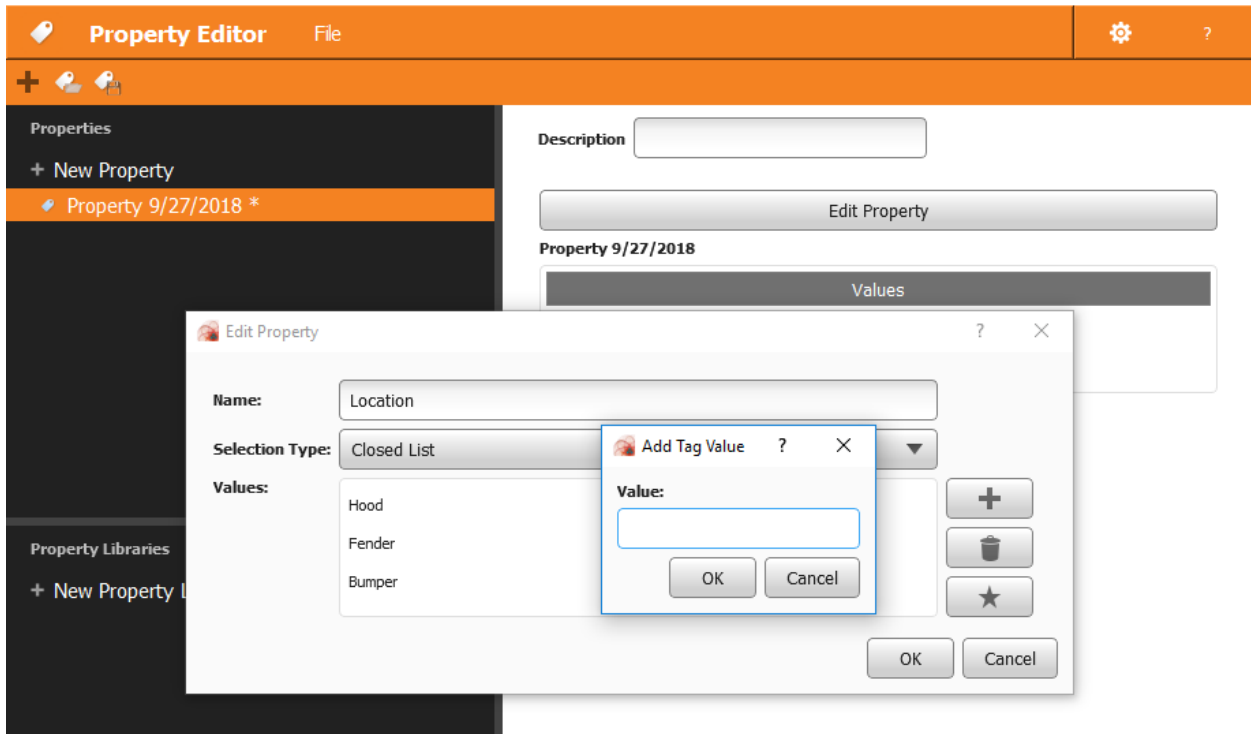


This dialog is used to select the name of the property, its type and values of the types.

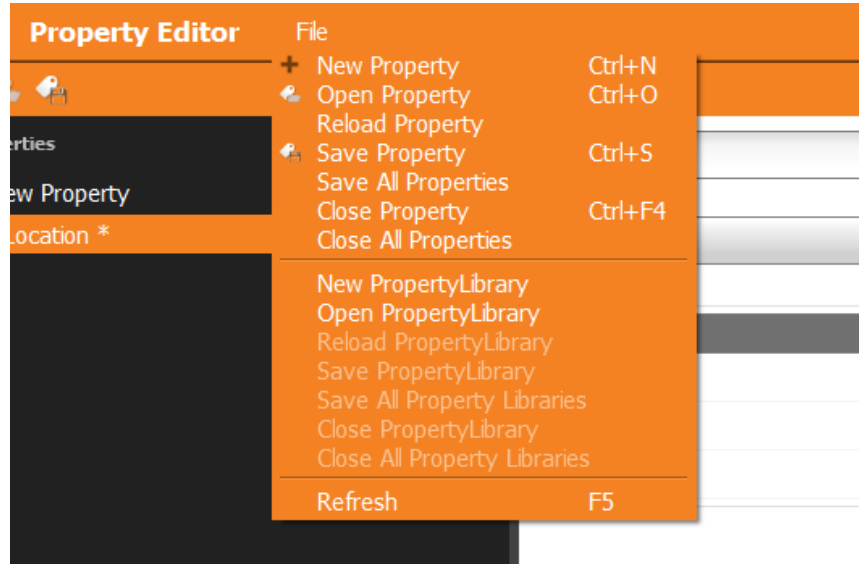
Available Types:

- **Single Entry:** This is just a name value pair. An example of a single-entry tag could be <Operator Name> and the user would enter just a single value containing the name of the operator: Operator Name = <Name>
- **Closed List:** This is where the user wants to create a property that has a fixed set of values that can be selected. An example here could be <Car Model> with a set of value like VW, Ford, Toyota, etc. The user would select a model from the previously entered list of model types.
- **Open List:** This is like a closed list in that you can pick and item from a previously defined set of entries or type in a new value that is not currently in the list.

In a closed/open list values are added and removed by clicking on the + and Trashcan icon.

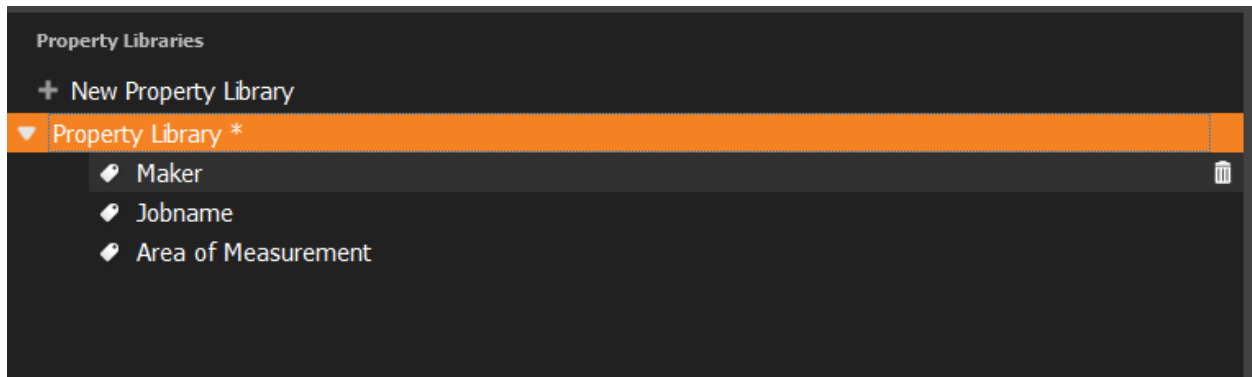


Also, each property needs to be saved to the database. The '*' character next to a property is an indicator that the property item has not been saved.




5.2 PROPERTY LIBRARY

A property library is used to create collections or groups of properties. Similar sets of properties that belong together and to an object can be grouped in a property library. To add a property to a property library, click and drag a displayed property to a property library area.

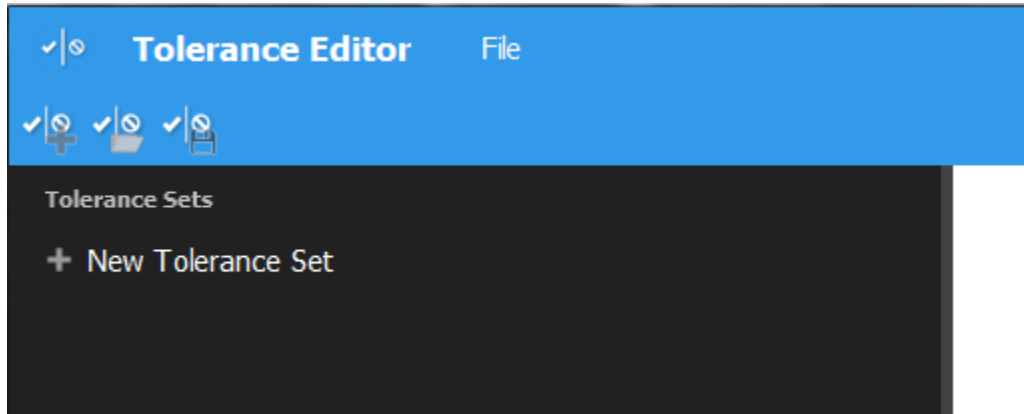


Link to training video: EFX QC Desktop: Property Editor

 <https://youtu.be/qVGnTkrrLTw>



The tolerance editor is used to create and edit tolerances that can then be added to standards or QC Job Templates. Tolerances may also be applied to measurements in EFX QC to test for pass/fail.

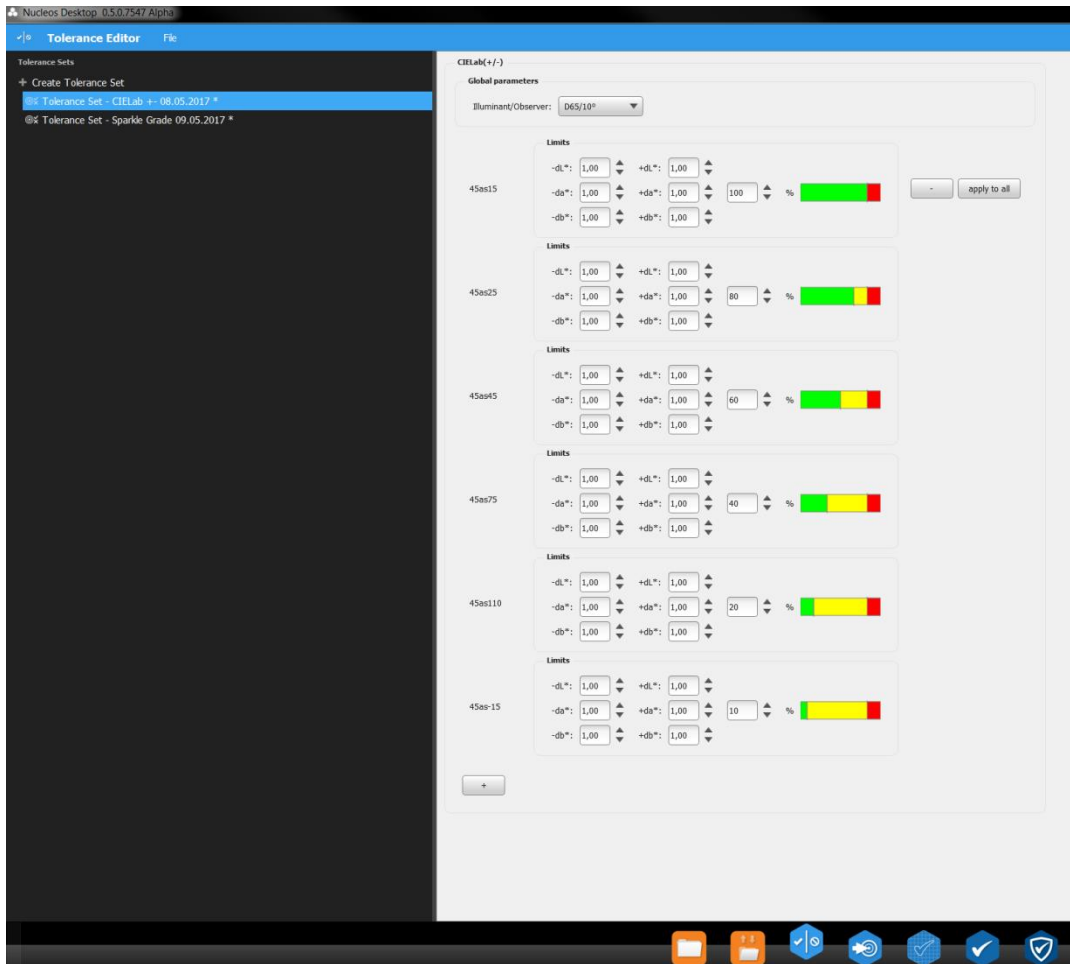


To create a new tolerance set, click on "+ New Tolerance Set" or select the "File->New Tolerance Set" menu in the navigation bar. The File menu can also be used to open an existing tolerance set.

When creating a tolerance set a tolerance type must first be selected. This is a list of currently supported tolerance types:

- Coarseness
- dE2000
- dE94
- CIE99
- dE cmc
- dE*
- CIELab
- CIELab(+/-)
- CIELCH
- Sparkle Grade

The selected tolerance type will determine the available parameters. These parameters are settable on the right window pane. This example is for tolerance type CIELab (+/-):



Different Illuminant/Observers may also be selected. Angles may be added or removed depending on the chosen tolerance type.

The fail limits by discrete values and the check limit by percentage may be set regardless of tolerance type. The above example all delta values are set to 1.00 and percentage are 100, 80, 60, 30, 20 and 10. These values are also shown visually by the pass/check/fail bar in green/yellow/red.

Also, hovering over angle will enable "-" and "apply to all" buttons to remove the angle or apply the settings to all angles.

The asterisk (*) next to the tolerance name shows that it is edited and needs to be saved.

Link to training video: EFX QC Desktop: Tolerance Editor

 <https://youtu.be/NPHESuqrp8A>

7 STANDARD EDITOR

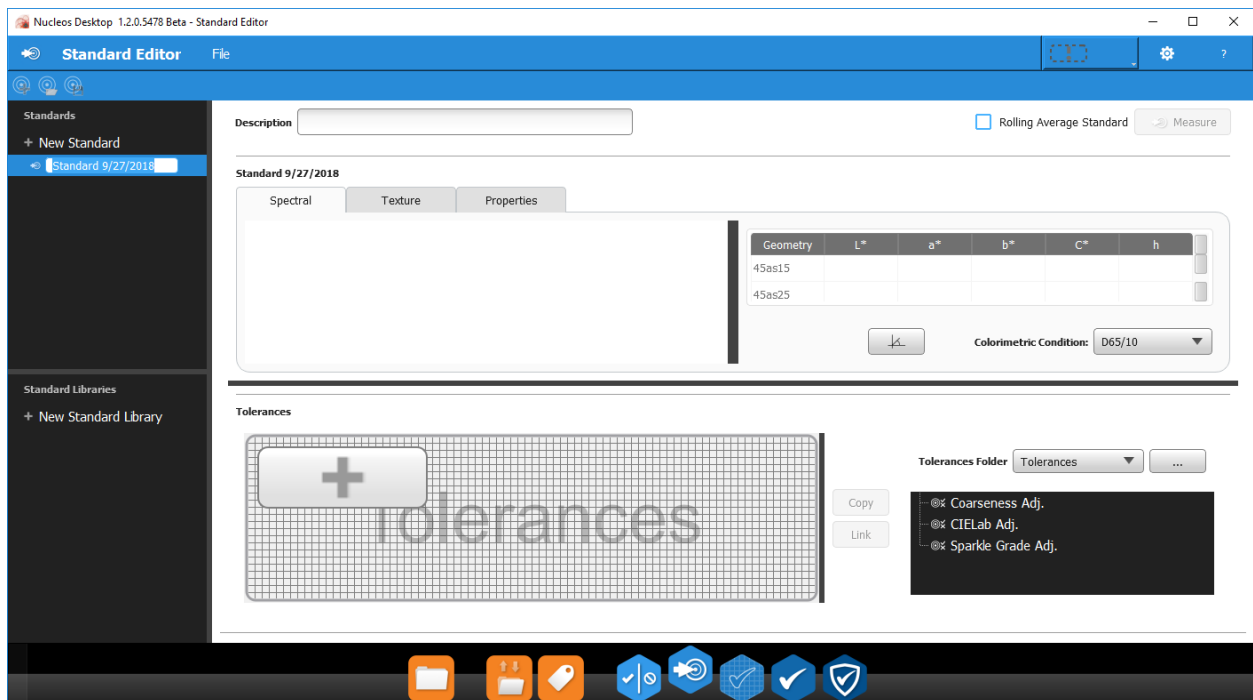


The standard editor is used to create and edit standards that can then be used by the QC Job Template app or in the EFX QC App. There is also the option to search by standards in the EFX QA app.

The standard editor consists of two areas:

- Standard definition
- Color libraries

7.1 STANDARDS



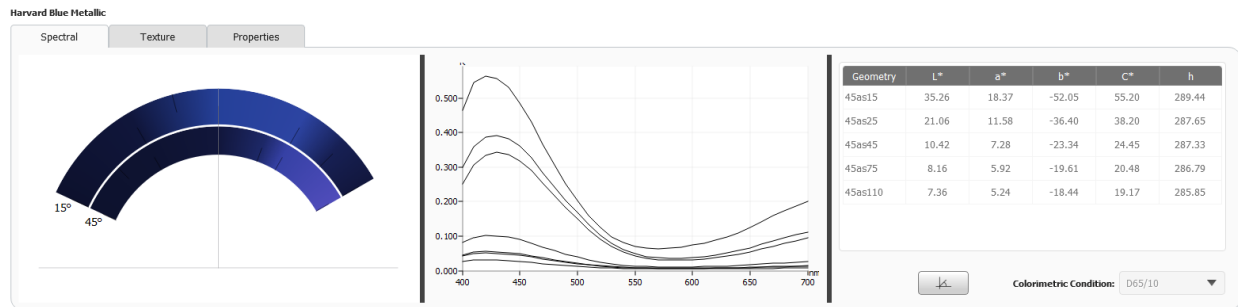
To begin, click on the '+' character to create a new Standard. A measurement with an attached instrument is typically required to create a standard. This can be done by clicking on the Measure button on the upper right side of the standard definition area. After a successful measurement several areas will become available in the standard editor:

- Tolerances selection area
- Spectral tab
- Texture tab
- Properties tab

Selecting the option "**Rolling Average Standard**" next to the measure button will mark this standard as a special one that when used in a job automatically recalculates its color values from the average of the current active trials. Every time the job using this special standard is opened, a recalculation of the average is performed.


7.1.1 SPECTRAL

The spectral tab shows an instrument view depicting how the device sees the sample with the different geometries it supports. This tab also displays the spectral graph and the measurement value table from the instrument. Values may be exported from the spectral table by right clicking anywhere on the table and selecting "Export to CSV".



Hovering over the instrument view shows tooltips with the exact geometries at that specific location.

Selecting single or multiple rows in the table automatically update the spectral graph to only show the spectral curves currently selected. Clicking on the header will return the views to show all geometries.

Selecting the angle icon  will display only the selected geometries.

7.1.2 TEXTURE

In the texture tab the texture values like sparkle grade and coarseness as well as an angle specific image are displayed. Selecting another angle in the table will change the displayed image. This image will be a snapshot of the measurement at the selected angle. Right click on the table to export these values into csv format.



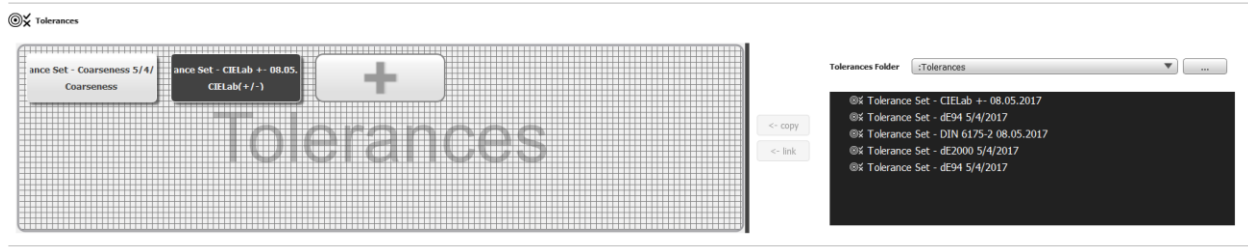
7.1.3 PROPERTIES

In the properties tab one or more properties may be added to the standard. This standard can later be searched in the EFX QA app. Clicking on the upper icon lets you select specific properties, clicking on the middle icon lets you select a property library.

Spectral		Texture	Properties
Property	Value		
Area of Measurement	Hood		
Color	Black		

7.2 TOLERANCES

The lower part of the standard editor screen is used to apply tolerances to the selected standard. The left-hand side of the tolerance area shows all currently assigned tolerances for the selected standard. The right-hand side of the tolerance area shows all existing tolerances that are in the currently selected folder which was selected using the "...” button.



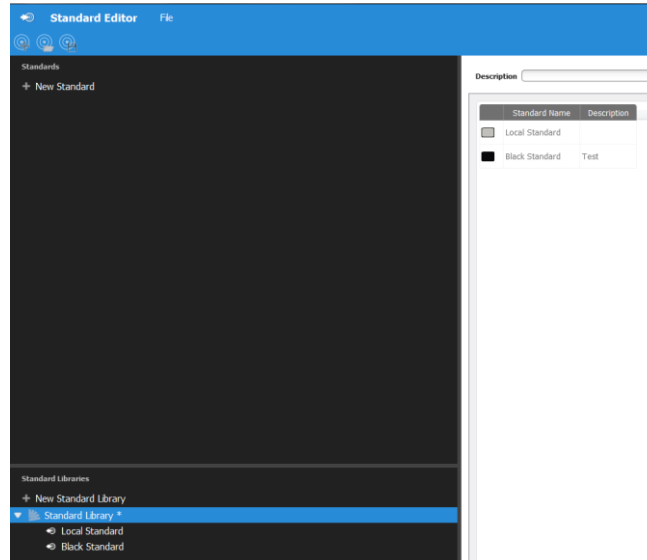
There are several ways to add new tolerances:

- Click on the '+' icon in the left-hand tolerance area to create an "on the fly" tolerance that is not available for any other standard
- Click on a previously created tolerance from the tolerance editor. Doing this gives two options:
 - o Copy the existing tolerance. This creates a duplicate the tolerance that is specific only to the selected standard
 - o Link the tolerance. A linked standard is indicated by a black background and means that the standard is linked to the original tolerance. If the tolerance is modified in the tolerance editor at a later point, the standard would automatically assume the updated tolerance values.

A black background on a tolerance means that this tolerance cannot be edited from this menu. Copied tolerances can be edited by clicking on them to activate a floating tolerance editor window.

7.3 STANDARD LIBRARIES

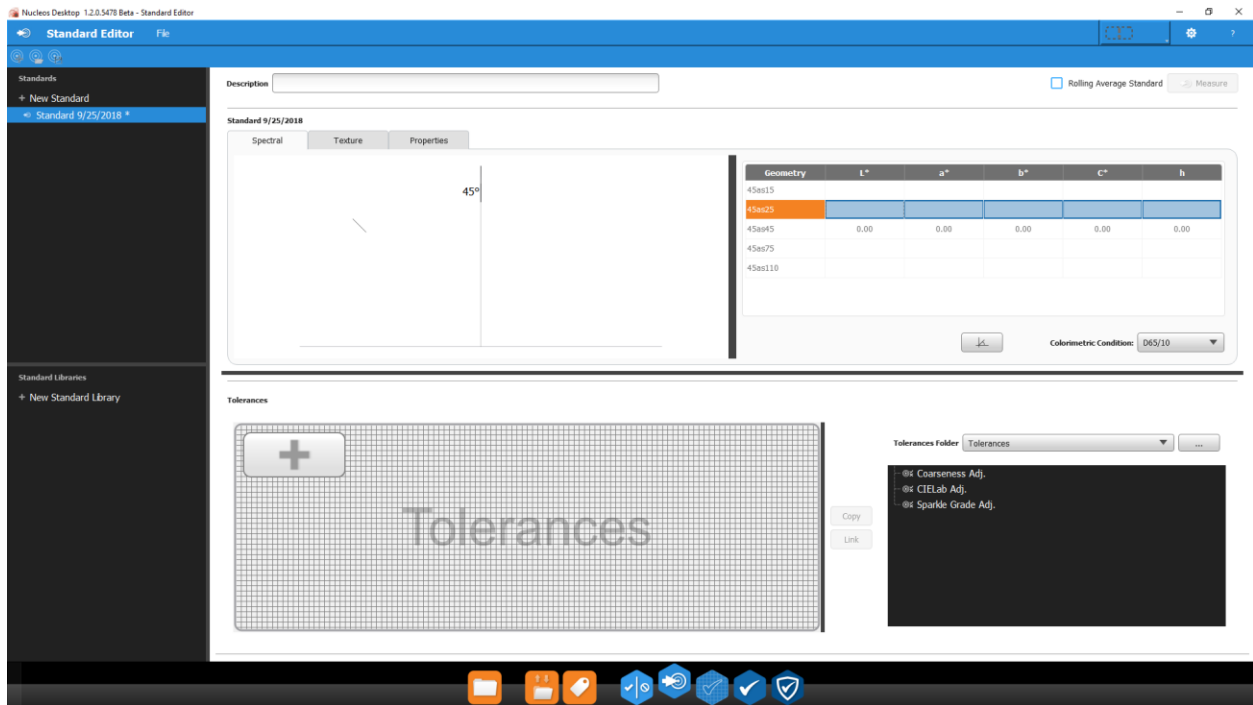
Standard libraries are basically just groups of standards. Drag and drop standards currently open in standards list into the color libraries area to group them together add them to a color library.



Clicking on a standard library will show a short preview of the color of the standards as well as its name and description in the content area. A standard can be removed from a specific color library by clicking on the trashcan icon that appears after you hover over a standard.

7.4 COLORIMETRIC STANDARDS

Colorimetric only standards can also be created within the Standard Editor. Once you create a new Standard, if you click on a row within the colorimetric data display area the ability to manually enter color data is enabled. Click on the row for each geometry and enter the appropriate color values. If you enter L^* , a^* , and b^* the correspond C^* and h values will be automatically calculated. The same is true in reverse, enter C^* and h and the software will automatically calculate a^* and b^* .

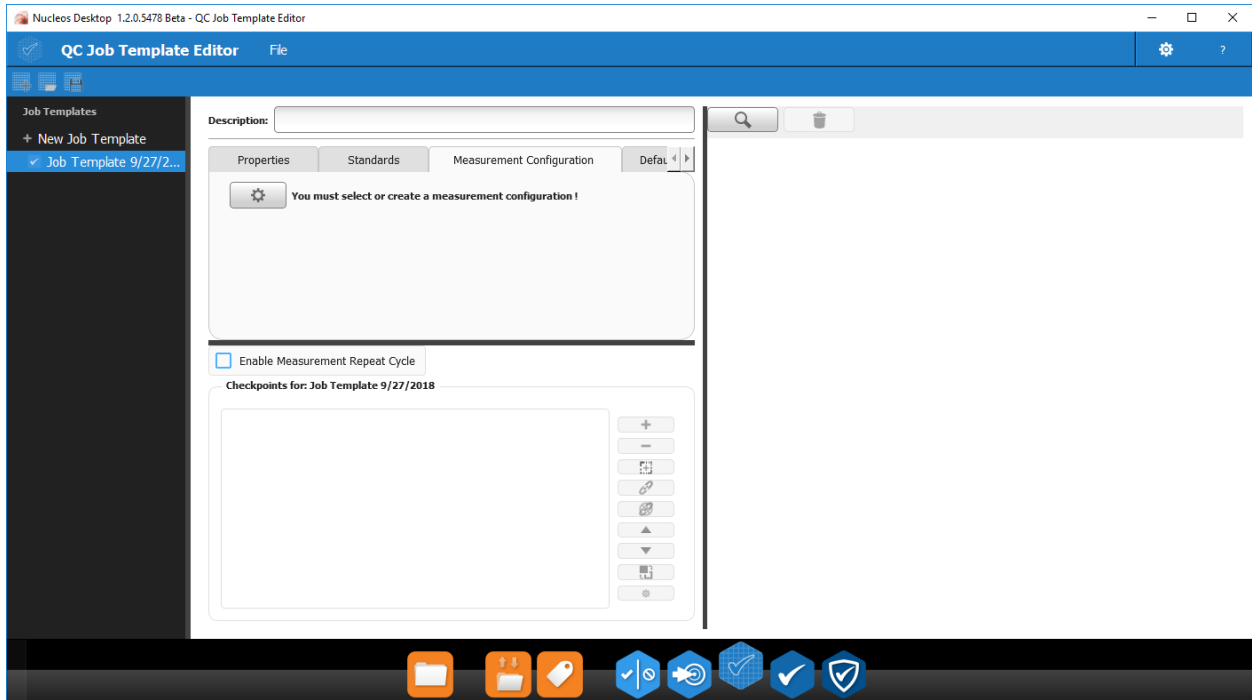


Link to training video: EFX QC Desktop: Standards Editor

 <https://youtu.be/ytFN2jk5AXU>

8 QC JOB TEMPLATE EDITOR

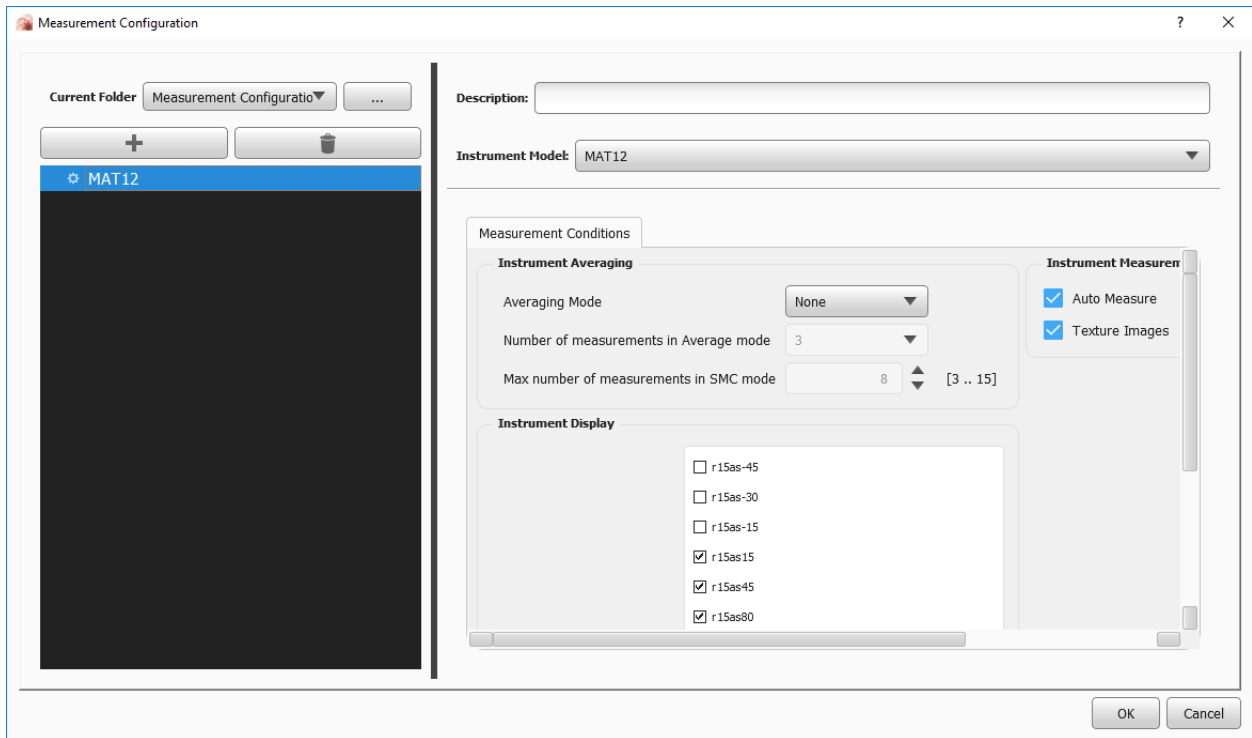
The QC Job Template Editor is used to create or modify QC Job Templates. QC Job templates show the standards, properties, measurement configurations and default tolerances that are used to create jobs on the instrument. Templates also allow the creation of measurement checkpoints used to provide a basic job workflow. This workflow is then used when creating a job on the instrument.



To begin, click on the '+' character to create a new Job Template.

8.1 MEASUREMENT CONFIGURATION

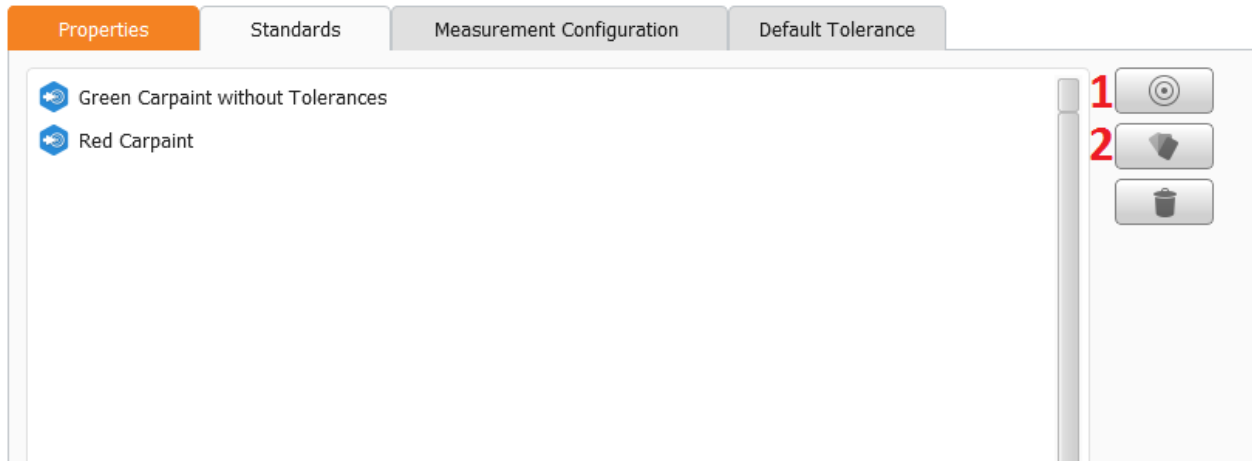
Before a QC Job Template can be created, a measurement configuration must be created or selected. To create a measurement configuration, click on the gear icon in the Measurement Configuration tab. This will activate the Measurement Configuration dialog.



Select a folder that in which to retrieve/save measurement configurations. Then click on the '+' button to create a new configuration. Different instrument models can be selected on the right-hand side of this dialog. Selecting a different instrument model will show specific settings for the selected instrument. Click OK to assign the measurement configuration to the current QC job template.

8.2 STANDARDS

The Standards tab is used to select existing standards (1) or color libraries (2) to attach to the QC Job Template. The measured trials using this QC job template will be compared to these selected standards.



If a standard has no tolerance attached to it a default will need to be assigned. This can be done from the Default Tolerance tab and will be used for all standards/jobs that do not have a tolerance. The standards with tolerances will still use the tolerances which have been assigned.

Note: A tolerance set in the MAT12 instrument contains multiple tolerances to cover both color and texture calculations – so it is possible to include just a color tolerance with a standard and a texture tolerance with the job template.

8.3 PROPERTIES

Like in the standard editor, the properties area is used to assign the required properties to the selected QC job template. These are useful for searching/filtering later in the EFX QA app. Properties in the Template will be applied to the job and will be applied to every trial that is measured in that job. In addition, each individual checkpoint may also have additional properties, and these properties will be applied to the specific trial(s) created from that checkpoint.

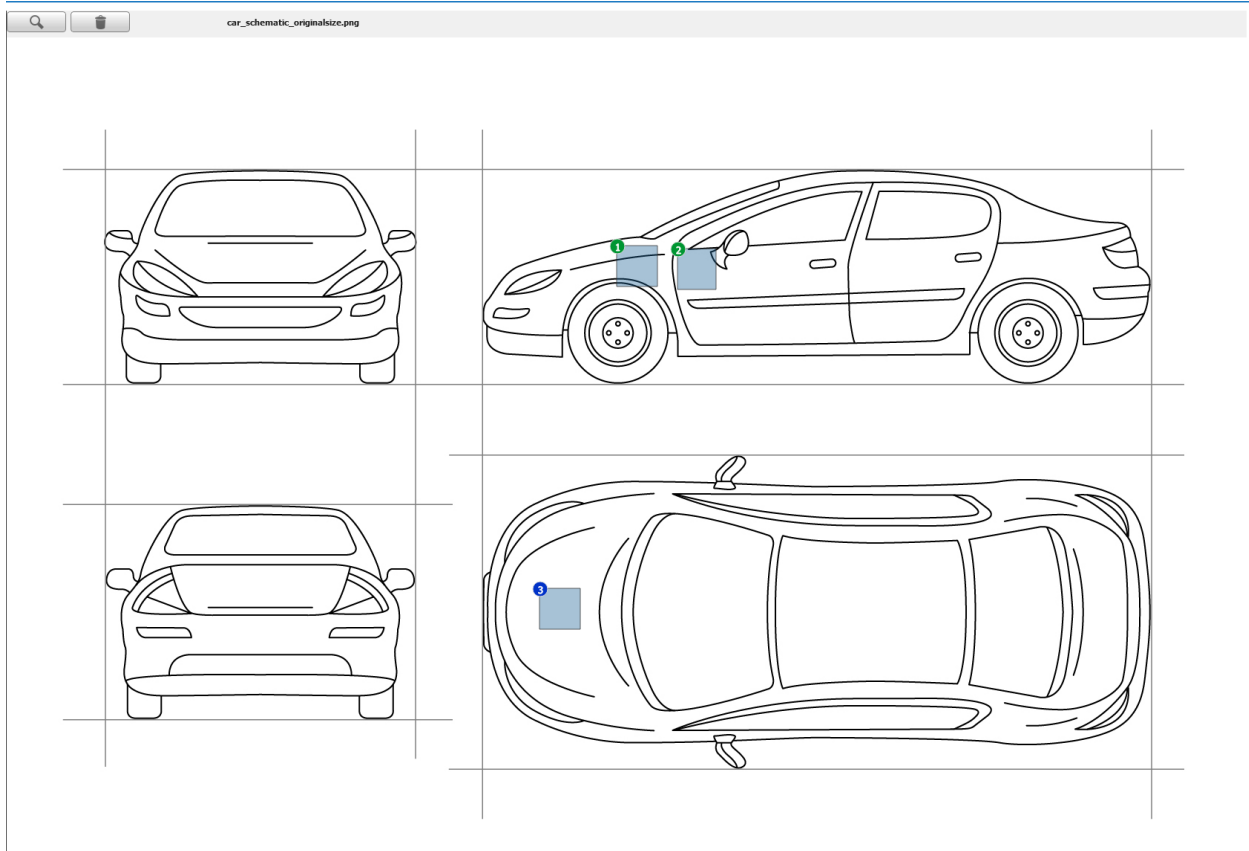
8.4 DEFAULT TOLERANCE

A default tolerance can be assigned to all standards for the QC job template that do not use a specific tolerance. If the standard already has a tolerance, the default will be ignored.

8.5 SCHEMATIC AREA

On the right-hand part of the QC Job Template and magnifying glass icon is available that can be used to load schematic/image that can be used in the definition of a QC job.

This image will be displayed on the right-hand part of the QC Job Template app.



8.6 CHECKPOINTS

Checkpoints can be added to the job template in the lower middle of the app. Clicking on the “+” icon opens the checkpoint properties dialog.

New Checkpoint properties

Name:

Skippable

Selected Standard

Checkpoint properties

Property	Value
STD NAME	<STANDARDNAME>
job name	<JOBNAME>

A name is required to identify a checkpoint. If multiple checkpoints have the same name, they will behave like a single checkpoint, meaning it can only be measured once in the device. All checkpoints with the same name will automatically use this measurement.

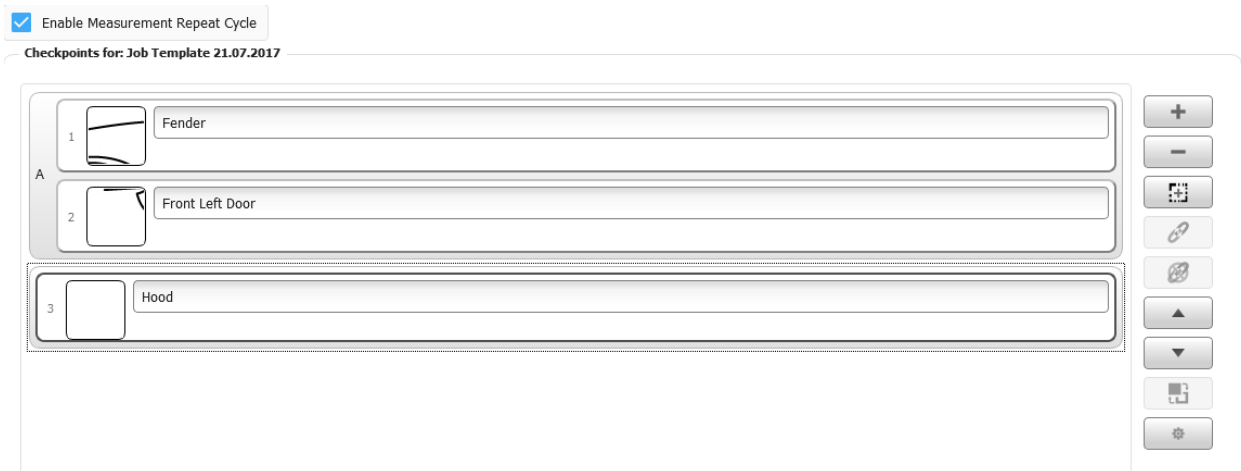
A checkpoint also has the following attributes:

- Skippable
- Standard it should compare against (can be automatic, which uses the standard nearest to what is measured for the first checkpoint)
- Relevant properties that help identify this checkpoint in later searches

It is recommended that a closed list property like "area of measurement" is created and added to the checkpoint. This will allow the search routines to filter the trials across multiple jobs and provide the ability to view measurement areas (like "Bumpers" compared to "Body").


This can be accomplished by doing the following:


- 1) Add choices for the diverse types or areas of measurement (like Bumper, Hood, Door, Mirror, etc.)
- 2) Assign the property and specific value to each checkpoint.





"Enable Measurement Repeat Cycle" can be selected for the whole job template. This is used in Tethered Jobs (not directly supported on the instrument) and allows the entire QC job template to be repeated any number of times. This allows jobs to be reopened in the EFX QC app and additional cycles of measurements to be made.

 Adds a checkpoint

 Removes the checkpoint

 Add a preview image from the image schematic to the selected checkpoint. Drag over an area on the schematic to select a little square that is assigned as a preview image to this checkpoint.


 Couple two selected checkpoints (See above screenshot the indented 1 and 2)

 Removes the coupling of two checkpoints

 Changes the order of the checkpoints - move selected checkpoint up

 Changes the order of the checkpoints - move selected checkpoint down

 Changes the order of the checkpoints inside a checkpoint couple

 Opens the property menu of the checkpoint

9 EFX QC ✓

The EFX QC app is the core of the workflow of Nucleos EFX QC. This app uses all objects created in editor apps including standards, tolerances and QC job templates. Jobs, standards and trials can be analyzed and compared using this app. This app is also used to perform jobs, either remote, tethered or template-less, and interface to the instrument. As with all Nucleos apps, begin by clicking on the '+' character to create a new Job.

The screenshot shows the EFX QC application interface. The top menu bar includes 'File', 'View', 'Send/Receive', and 'Import/Export'. The main window is divided into several sections:

- Jobs Panel (Left):** Lists jobs such as 'CAR ID', 'CAR ID 1', and 'CAR ID2'. Below this is a 'Property Value' table for 'Left Front Bumper' with fields like 'STD NAME', 'Job name', 'Paint Line', 'Operator', and 'Car Model'.
- Job View (Middle):** Shows a list of components for 'Overall result of all tolerances':
 - Left Front Bumper
 - Left Front Fender
 - Left Door
 - Left Quarter
 - Left Back Bumper
- Overview Table (Right):** A table with columns: Name, Geometry, dSG, dC, dt* (D65/10), ds* (D65/10), and db* (D65/10). The table contains data for various car parts like 'Left Front Bumper', 'Left Front Fender', 'Left Front Door', 'Left Front Quarter', and 'Left Front Back Bumper' across different geometry types (e.g., 15sa15, 15sa95, 15sa80, 15d, 45sa15, 45sa25, 45sa45, 45sa75, 45sa110).

9.1 VIEW

Property grouping of the trials in the color plot can be selected in the view menu.

The screenshot shows a dialog box titled 'Select a Property to use for grouping trials'. It features a tree view on the left with 'FAVORITES' and 'SERVERS' sections. The 'SERVERS' section is expanded to show a list of properties. The 'Plant' property is selected and highlighted in orange.

Name	Timestamp	Description
Production Line	Tue Jul 10 16:28:48 2...	
Tolerances	Thu Jul 12 09:47:45 2...	
Standards	Thu Jul 12 09:47:56 2...	
Templates	Thu Jul 12 09:48:04 2...	
Tags/Properties	Thu Jul 12 09:48:15 2...	
Car Model	Thu Jul 12 09:53:58 2...	Car Model
Plant	Thu Jul 12 10:00:43 2...	Plant/Location
Operator	Thu Jul 12 10:04:01 2...	ID fillable by the opera...
Paint Line	Thu Jul 12 10:06:40 2...	Assembly lines
STD NAME	Thu Jul 12 11:40:22 2...	
job name	Thu Jul 12 11:40:09 2...	
Jobs	Thu Jul 12 09:49:40 2...	
QA	Thu Jul 12 09:49:52 2...	

Buttons for 'OK' and 'Cancel' are located at the bottom right of the dialog.

9.2 SENDING/RECEIVING TO/FROM THE INSTRUMENT

To send an existing QC job template or tolerance to the instrument go to the navigation bar and select Send/Receive. From here there are three options:



Sending Job Template to Instrument - Select the QC job template to send to the instrument. After selecting this, the job template can be selected from the menu on the instrument. New job instances can then be created which are used to measure trials according to the settings made in the QC job template.

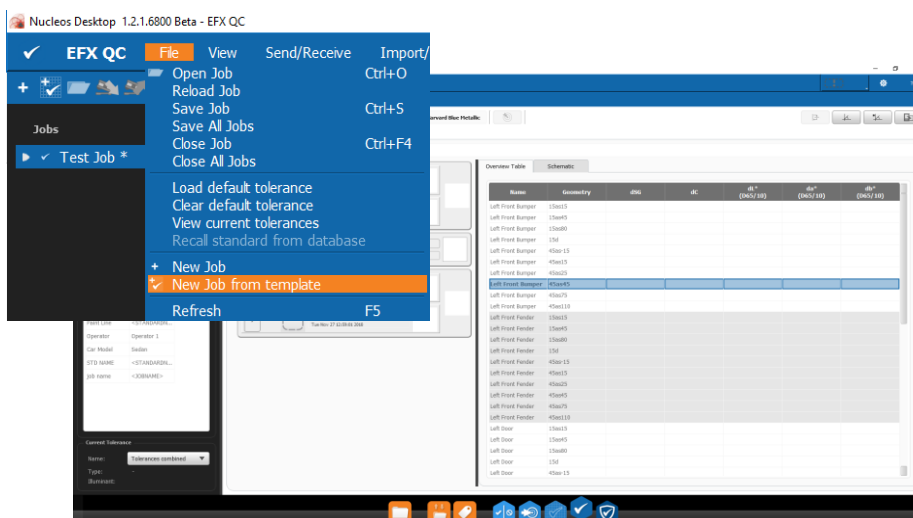
Send Default Tolerance – Select a tolerance to send to the instrument. Both color tolerance and one or more texture tolerances should be selected as these are combined in the device into a single tolerance set.

Receive Jobs from the Instrument (with Job Template) – Retrieve jobs of the selected QC job template into the EFX QC app.

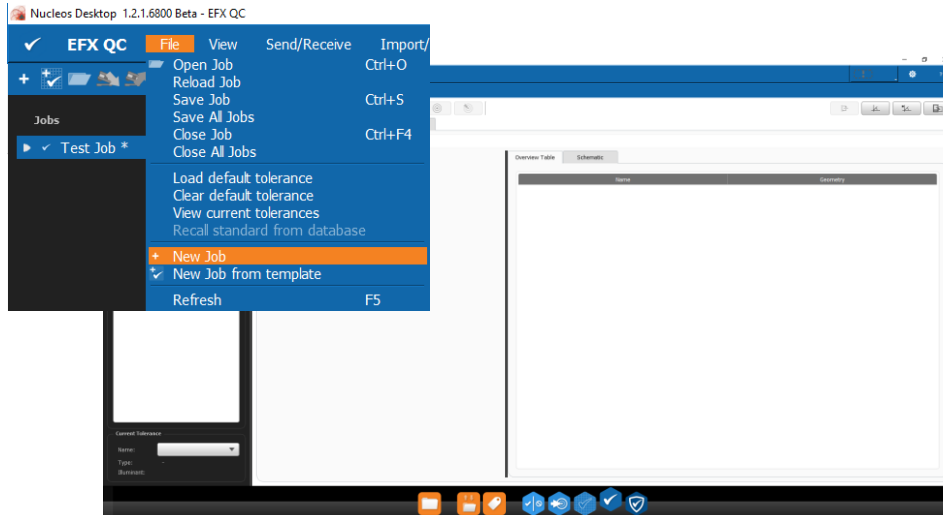
Receive Jobs from the Instrument (without Job Template) – Retrieve measurements created on the instrument without requiring a job template.

9.3 JOBS

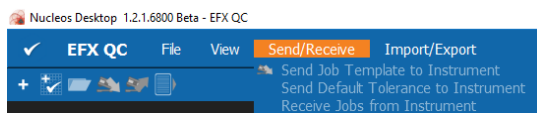
The QC App supports multiple types of jobs:



- **New Job from Template** allows you to create a job from a QCJobTemplate and recall a standard from the database into it. New trials are measured from the attached current instrument. If the job contains a template and/or standard, then you are restricted from performing certain actions such as measuring or recalling additional standards into it or deleting/reassigning trials after measuring them (since those are controlled by the template). If the template allows “recycling”, then the job may be recalled from the database and a new SET of trials added to the job (SET as defined by the template).



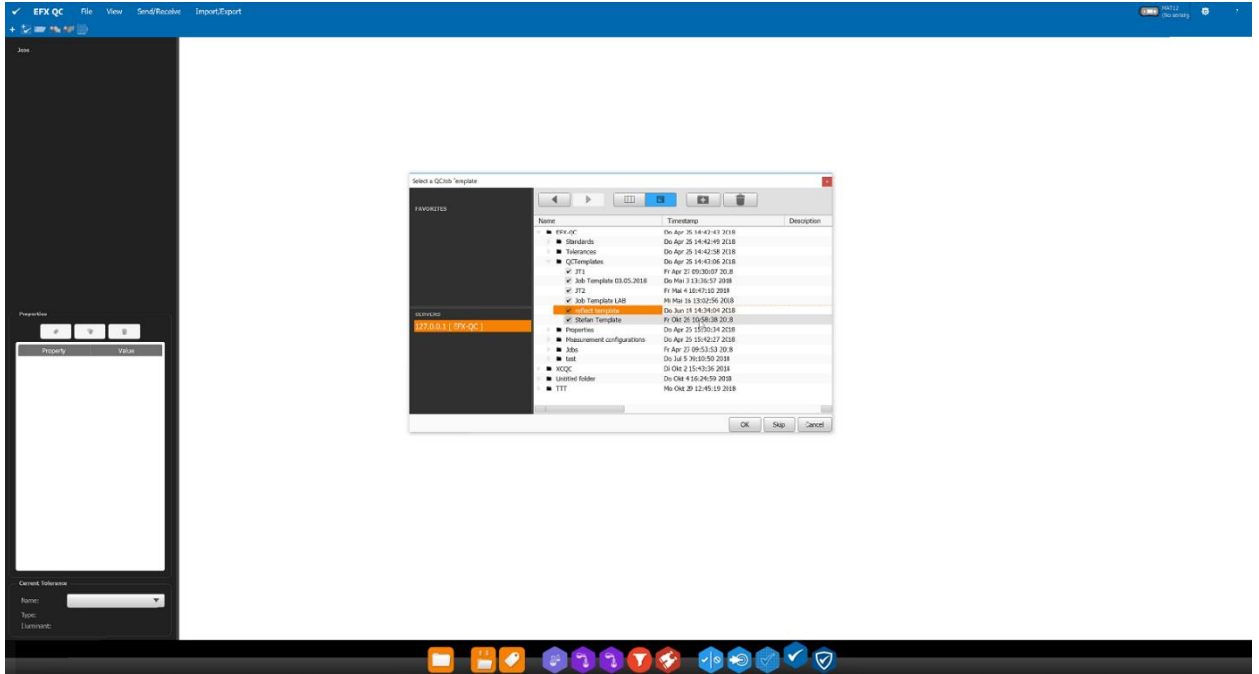
- **New Job** has no workflow restrictions, does not contain a template, and you can measure and/or recall standards and tolerances into the job at any time. The job is created immediately, with no dialogs or additional input required. The name defaults to “Job datetime” but can be modified by double clicking on the job in the tree view. To recall tolerances and standards into the job, select the menu item under “File”. New trials are automatically associated with the closest matching standard, but can be deleted, remeasured, or re-associated with a different standard at any time. Basic Jobs can be recalled from the database and additional trials added to them. Measuring a new standard will prompt for a name and a location to save the standard to in the database. If you do not intend to save the standard, trials, or job to the database on completion, you can cancel the storage dialog. Jobs with standards that do not exist in the database cannot currently be stored to the database.



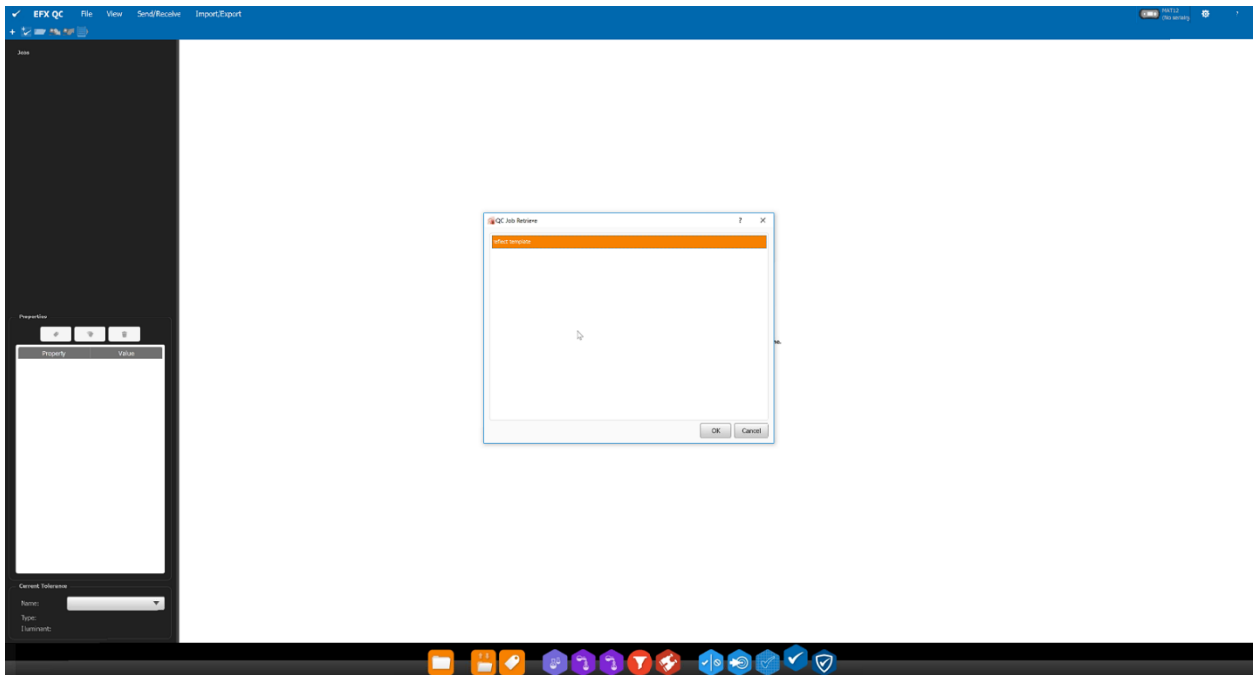
- **Remote Jobs** are jobs that are executed on the instrument. Remote Jobs can be of several types.
 - **Template Based Job Retrieval:** The first are jobs where a **template has been sent to the instrument**, measurements are taken, and the job is then uploaded from the instrument. This requires a matching job template to create and import remotely measured trials into the software. A remote job is restricted, and you are not allowed to remeasure, delete, add to, or modify trials in a remote job. This type of Job is sent to

the instrument using the Send Job Template to Instrument option. The data import steps are shown below:

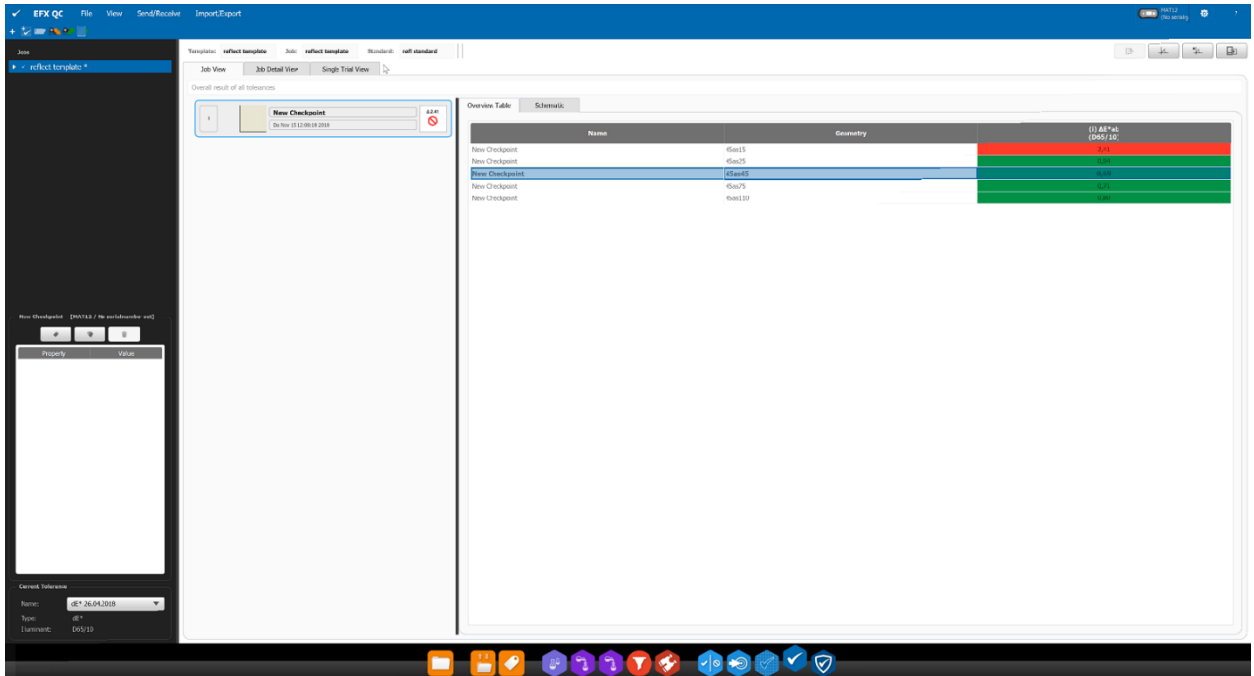
1. Select Template



2. Confirm Template

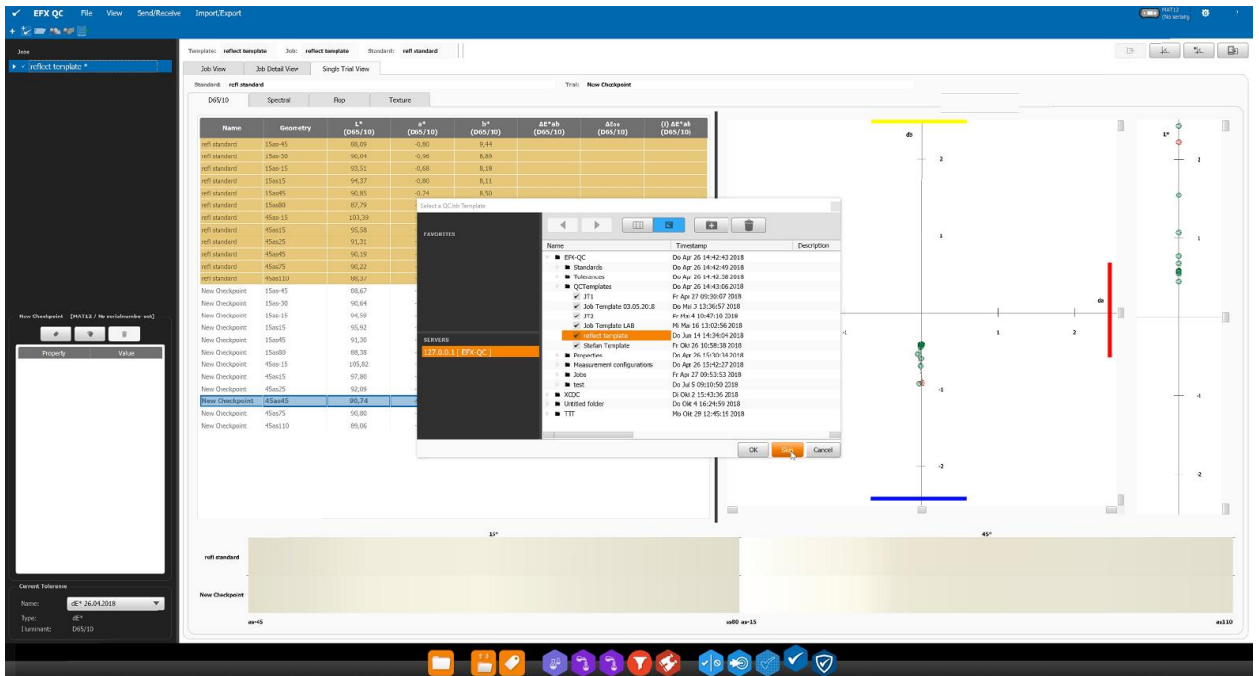


3. Data Imported from Device

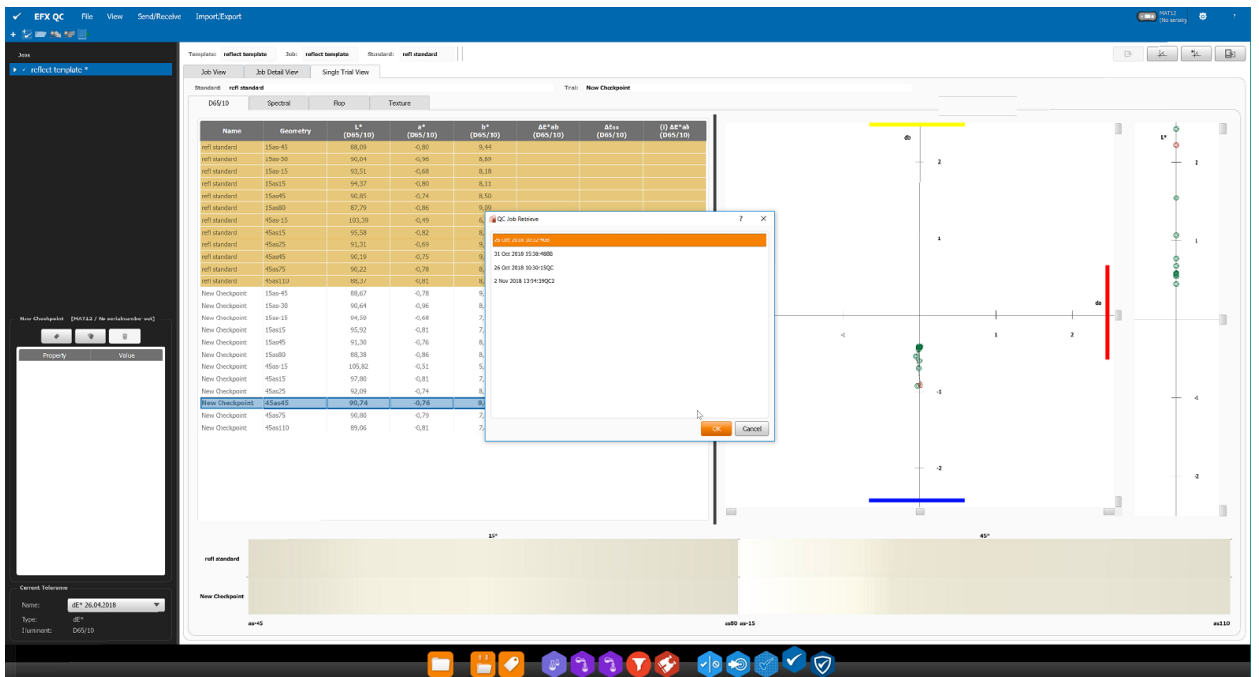


- The next type is where we can import jobs on the instrument that were not created by a template. When Receive Jobs from Instrument is selected, click on SKIP when promoted for a job template. The software will then display the list of template-less jobs on the device. Jobs that end with a 'b' are **Basic Measurements**, so single measurements without an associated Standard. During import, you will be prompted to select a Standard from the database. If you select a single Standard the sample will be associated to your selection. If you select multiple Standards the software will automatically find the closest Standard. The data import steps are shown below:

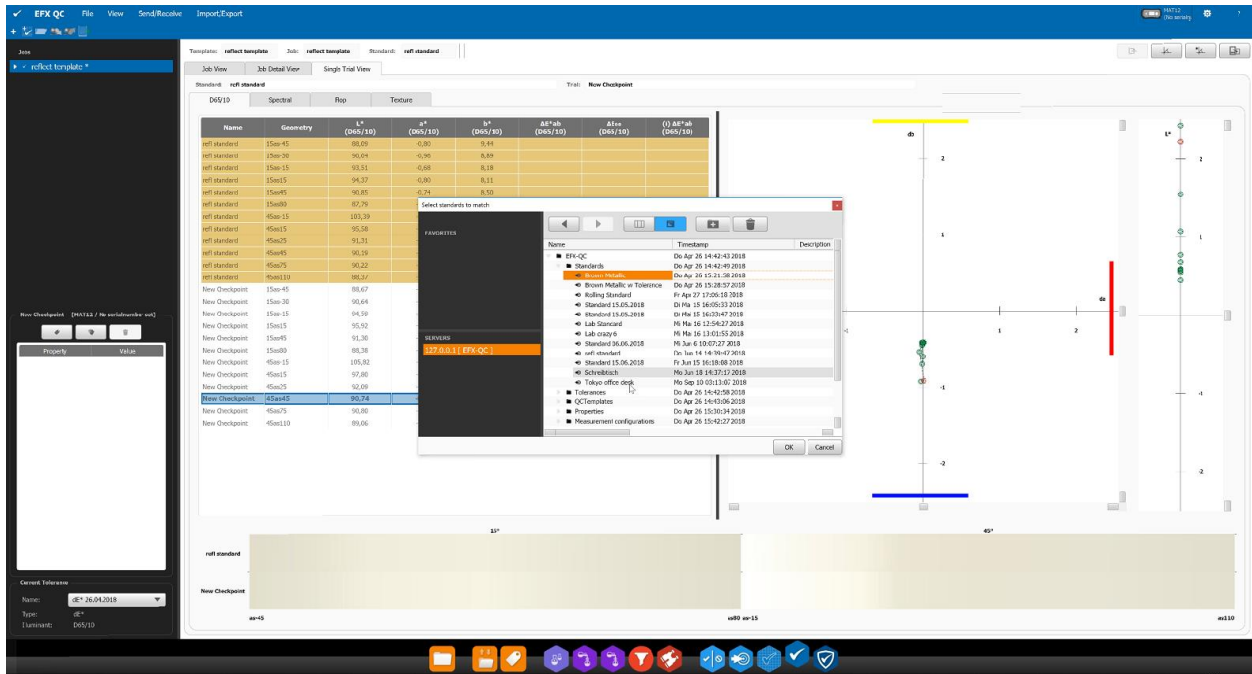
1. Select Skip



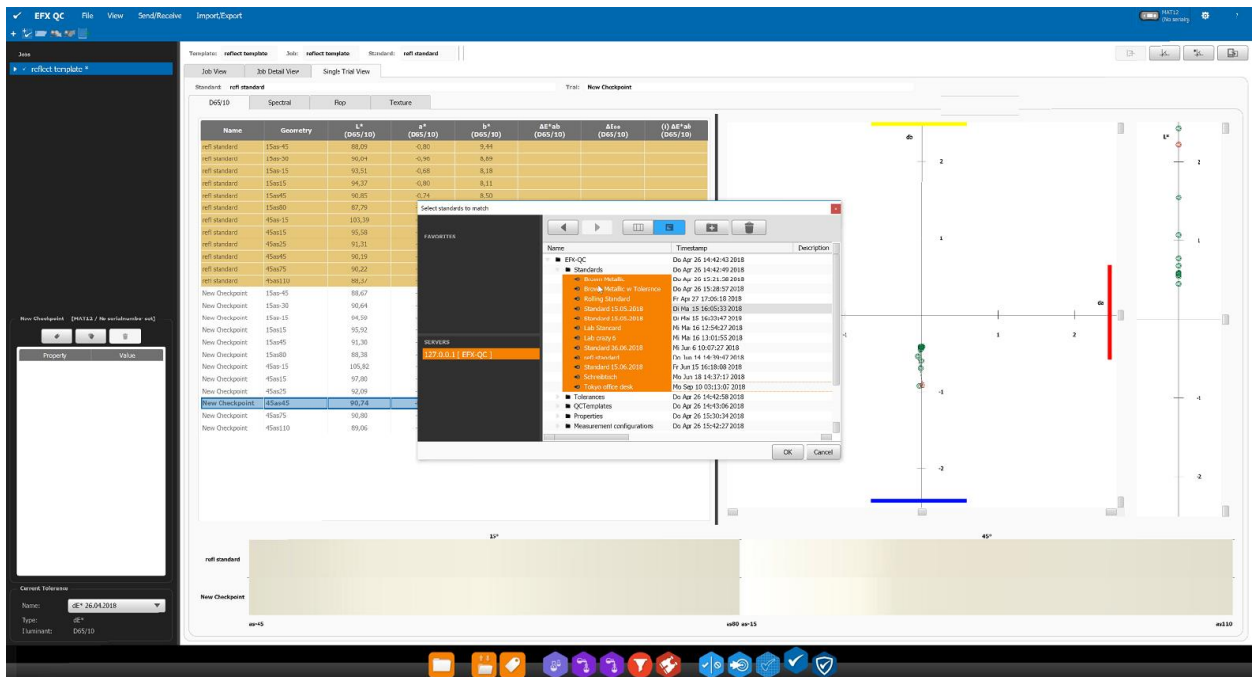
2. Select Job



3. Select single Standard...



4. Or select multiple Standards



Jobs that end in "QC" are **Quick Compare** jobs and contain a Standard and samples. There are two types of Quick Compare jobs, one where the Standard came from the software and the other where the Standard was measured on the instrument. If the Standard does not already exist within the software it is created with a GUID. The data import steps are shown below:

1. Select Skip

The screenshot shows the EPX QC software interface. A dialog box titled "Select a QC Job Template" is open, displaying a list of templates. The "REWORK" section is expanded, and "127 D 0 1 | EPX-QC" is selected. The background shows a data table with columns for Name, Geometry, L*, S*, U*, D57*H, D55*H, and D55*H. A 3D model of a structure is visible on the right side of the interface.

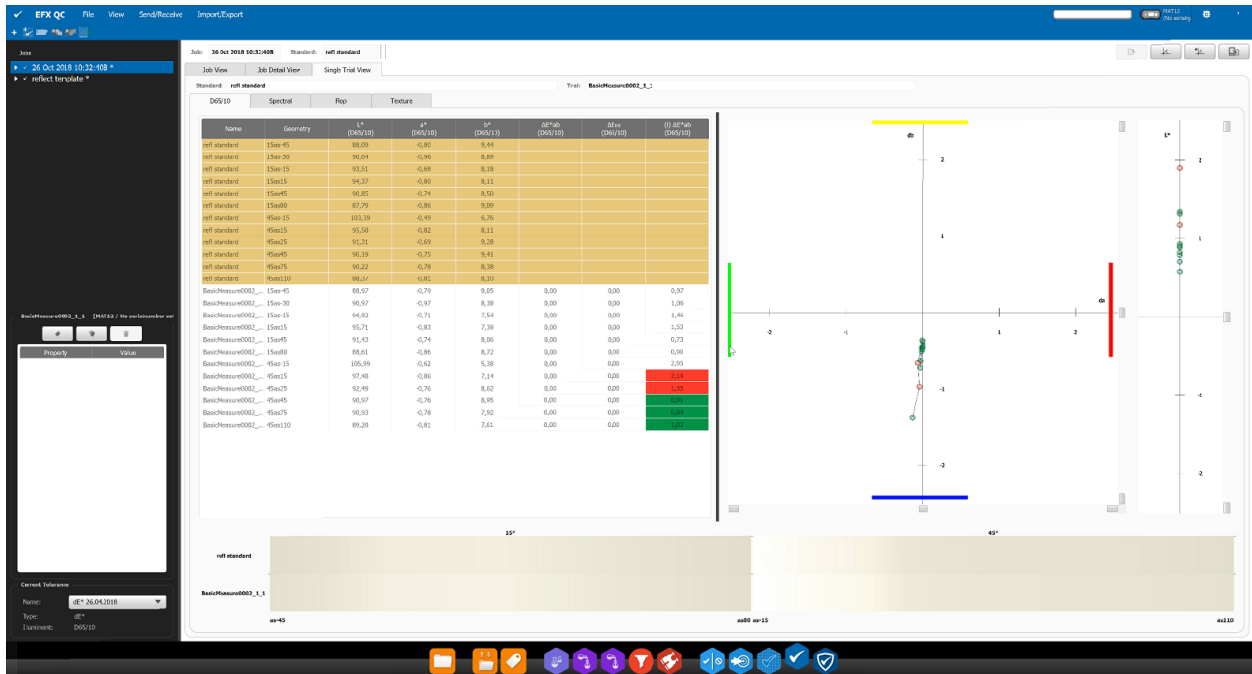
Name	Geometry	L* (D65/10)	S* (D65/10)	U* (D65/13)	D57*H (D65/10)	D55*H (D65/10)	D55*H (D65/10)
ref standard	15sw-45	88.97	-0.80	9.14			
ref standard	15sw-30	90.04	-0.95	8.89			
ref standard	15sw-15	93.51	-0.68	8.18			
ref standard	15sw15	94.37	-0.80	8.11			
ref standard	15sw45	96.85	-0.74	8.50			
ref standard	15sw80	87.79	-0.86	9.09			
ref standard	45sw-15	103.39	-0.49				
ref standard	45sw15	95.58	-0.82				
ref standard	45sw25	93.71	-0.69				
ref standard	45sw45	96.19	-0.75				
ref standard	45sw75	90.22	-0.79				
ref standard	45sw110	88.37	-0.81				
BasicResour002_...	15sw-45	88.97	-0.79				
BasicResour002_...	15sw-30	90.07	-0.97				
BasicResour002_...	15sw-15	94.82	-0.71				
BasicResour002_...	15sw15	95.71	-0.83				
BasicResour002_...	15sw45	93.43	-0.74				
BasicResour002_...	15sw80	88.61	-0.86				
BasicResour002_...	45sw-15	105.99	-0.62				
BasicResour002_...	45sw15	97.48	-0.86				
BasicResour002_...	45sw25	92.49	-0.76				
BasicResour002_...	45sw45	96.97	-0.76				
BasicResour002_...	45sw75	90.93	-0.78				
BasicResour002_...	45sw110	89.28	-0.81				

2. Select Job

The screenshot shows the EPX QC software interface. A dialog box titled "QC Job Review" is open, displaying a list of jobs. The job "26 Oct 2018 10:32:408" is selected. The background shows the same data table as in the previous screenshot. A 3D model of a structure is visible on the right side of the interface.

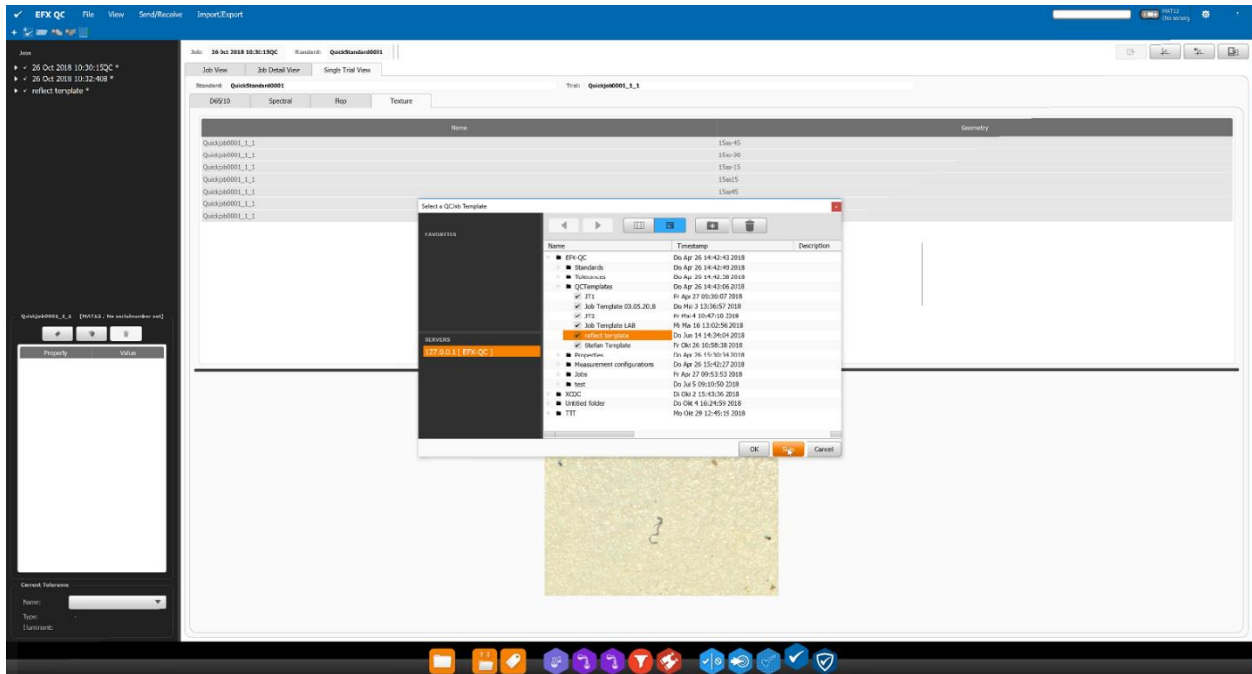
Name	Geometry	L* (D65/10)	S* (D65/10)	U* (D65/13)	D57*H (D65/10)	D55*H (D65/10)	D55*H (D65/10)
ref standard	15sw-45	88.97	-0.80	9.14			
ref standard	15sw-30	90.04	-0.95	8.89			
ref standard	15sw-15	93.51	-0.68	8.18			
ref standard	15sw15	94.37	-0.80	8.11			
ref standard	15sw45	96.85	-0.74	8.50			
ref standard	15sw80	87.79	-0.86	9.09			
ref standard	45sw-15	103.39	-0.49				
ref standard	45sw15	95.58	-0.82				
ref standard	45sw25	93.71	-0.69				
ref standard	45sw45	96.19	-0.75				
ref standard	45sw75	90.22	-0.79				
ref standard	45sw110	88.37	-0.81				
BasicResour002_...	15sw-45	88.97	-0.79				
BasicResour002_...	15sw-30	90.07	-0.97				
BasicResour002_...	15sw-15	94.82	-0.71				
BasicResour002_...	15sw15	95.71	-0.83				
BasicResour002_...	15sw45	93.43	-0.74				
BasicResour002_...	15sw80	88.61	-0.86				
BasicResour002_...	45sw-15	105.99	-0.62				
BasicResour002_...	45sw15	97.48	-0.86				
BasicResour002_...	45sw25	92.49	-0.76				
BasicResour002_...	45sw45	96.97	-0.76				
BasicResour002_...	45sw75	90.93	-0.78				
BasicResour002_...	45sw110	89.28	-0.81				

3. Import Job and create Standard

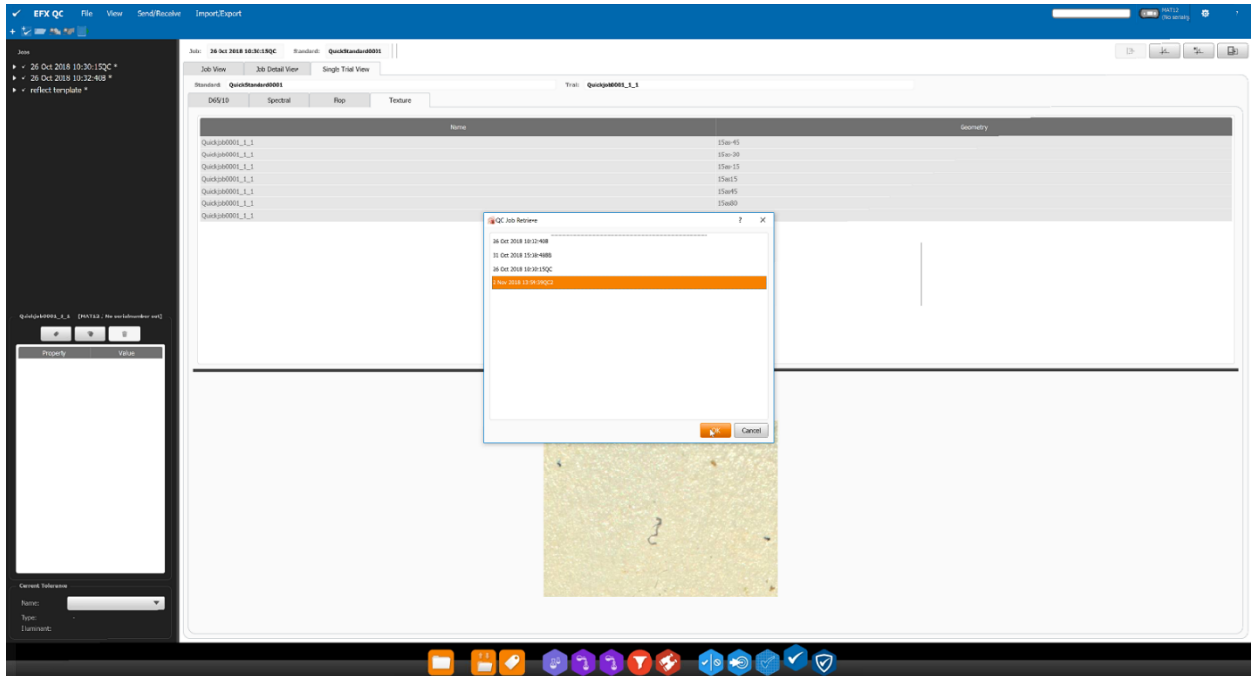


If the Standard was originally sent from the instrument, the original Standard is identified by its GUID and retrieved. The data import steps are shown below:

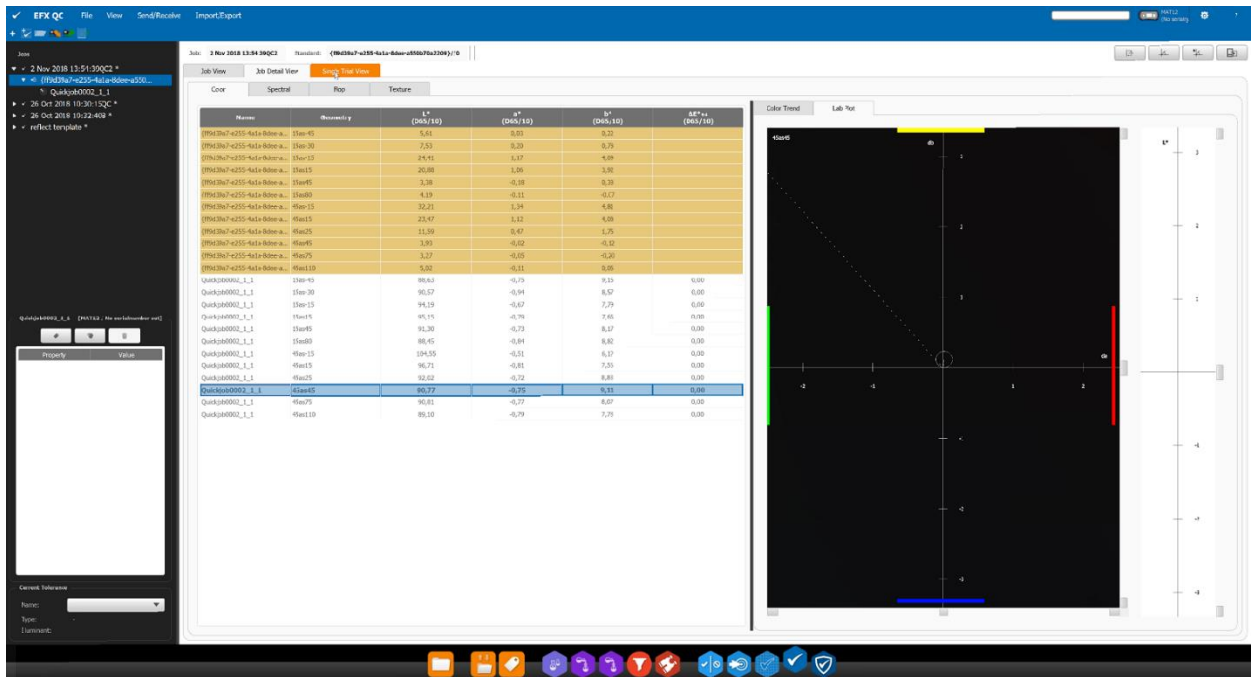
1. Select Skip



2. Select Job



3. Import Job and retrieve Standard

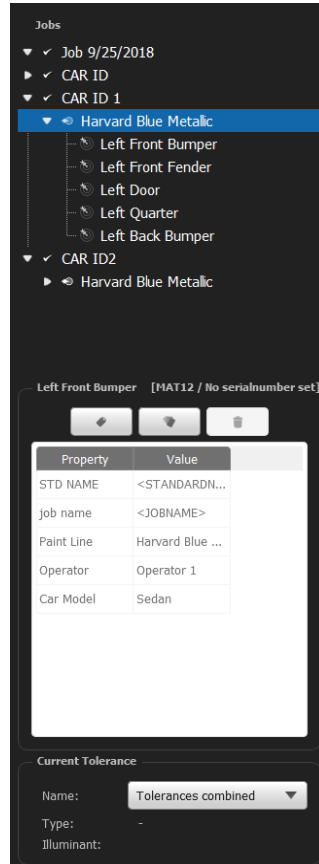


9.4 IMPORT/EXPORT

Use the **Import/Export** button in the navigation bar to export the whole job in a csv format.

9.5 JOB LIST

On the left side of the EFX QC app all open jobs are listed. The job can be enhanced to show the standards as well as the trials that were measured.



Beneath the list of trials are buttons to add/remove/edit properties for that job and which ones are already assigned.

Under the properties the currently used tolerances for this job is displayed. The drop down lets you select between using all associated tolerances or any individual tolerance for pass / fail determination.

Clicking on one or more trials in this list will select change the tabbed display to show information relative to the selected trials.

9.6 WORKSPACE

The workspace displays the name of the current selected open job and is associated QC job template.

The workspace consists of three areas – Job View, Job Detail View and Single Trial View. The single job detail/single trial view each contain an area for the color and the texture values of the trials.

9.6.1 JOB VIEW

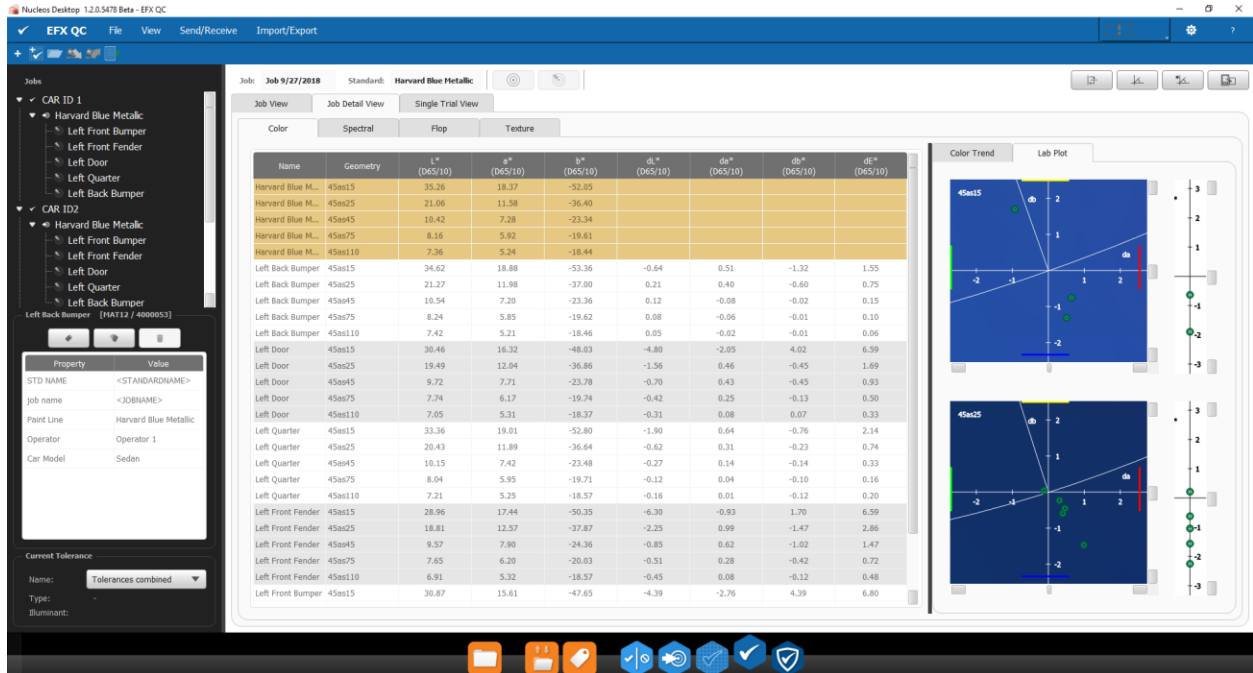
Job View tab allows the display of either the schematic view or the Color Table view. If no schematic is present, then the color table will be selected by default. The checkzone items in the job list support 3 *right-click* menu actions:

- **Remeasure** (or Measure) – allows you to remeasure or measure the trial. Any current trial parameters (associated standard, tags, date/time of creation, etc.) are not changed.
- **Associate** – allows you to manually re-associate the trial with a different standard in the job. Not available if the trial is part of a couplet or is controlled by a template.
- **Delete** – allows you to delete the trial from the job. Not available if the trial is part of a couplet or is controlled by a template.

The screenshot shows the EFX QC software interface. The main window is titled 'Job 9/27/2018' and 'Standard: Harvard Blue Metallic'. The 'Job View' tab is active, showing a list of trials for 'Left Back Bumper', 'Left Door', and 'Left Quarter'. The 'Overview Table' is displayed on the right, showing color difference data for various parts. The table has columns for Name, Geometry, d5c, dC, d5* (D65/10), d5* (D65/10), and d5* (D65/10). The data is color-coded based on the difference values.

Name	Geometry	d5c	dC	d5* (D65/10)	d5* (D65/10)	d5* (D65/10)
Left Back Bumper	15a115	0.40		-0.44	0.28	-0.96
Left Back Bumper	15a945	-0.27		0.11	-0.05	-0.01
Left Back Bumper	15a80	1.18		0.03	0.01	-0.05
Left Back Bumper	15d		0.33			
Left Back Bumper	45a115			-1.47	1.38	-1.69
Left Back Bumper	45a115			-0.64	0.01	-1.32
Left Back Bumper	45a125	0.21		0.40	0.40	-0.06
Left Back Bumper	45a445			0.12	0.00	-0.02
Left Back Bumper	45a175			0.38	0.00	-0.01
Left Back Bumper	45a1110			0.05	-0.02	-0.01
Left Door	15a115	0.75		-3.71	-0.64	2.35
Left Door	15a945	0.71		-0.64	0.40	-0.48
Left Door	15a80	2.92		-0.39	0.07	0.12
Left Door	15d		0.26			
Left Door	45a115			0.70	-0.81	0.02
Left Door	45a115			-4.80	-2.05	-4.00
Left Door	45a125			1.06	0.00	0.00
Left Door	45a445			0.70	0.43	-0.40
Left Door	45a175			0.00	0.00	-0.10
Left Door	45a1110			0.01	0.00	0.01
Left Quarter	15a115	0.05		-1.45	0.57	-0.74
Left Quarter	15a945	-0.97		-0.24	0.12	-0.10
Left Quarter	15a80	0.00		-0.15	0.00	-0.07
Left Quarter	15d		0.01			
Left Quarter	45a115			0.47	0.00	-0.43

Note: The color difference calculations displayed in the color tables are always calculated against each trial's associated Standard, regardless of what the "current" selected Standard is or is shown in the top row. Selecting a *specific* Standard in the tree view will *ONLY* display the trials associated with that standard.



Showing Standard Values in Color Tables. The numeric color value tables shown in Job View, Job Detail View, and Single Trial View support multiple choices for displaying the Standard's Color Coordinates ($L^*a^*b^*$) in the table. These can be displayed as columns or as rows. For situations where the job contains multiple standards and trials measured against multiple standards, it is more appropriate to display each trials current Standards $L^*a^*b^*$ values as columns (in same row as trial). For cases where only one standard (or current standard) is shown, then displaying the standard values as a header section is more useful. The choices for Job Detail view and Single Trial view are set in the respective settings tab. Job View shares the same settings as job detail view. Note that display of Standard values as a row is ONLY possible if you have also selected to show Trial Color Coordinates (otherwise the columns for L^* , a^* , b^* will not be available).

Job View Job Detail View **Single Trial View**

Color Spectral Flop Texture

Name	Geometry	Std. L* (D65/10)	Std. a* (D65/10)	Std. b* (D65/10)	L* (D65/10)	a* (D65/10)	b* (D65/10)	dl* (D65/10)	da* (D65/10)	db* (D65/10)	dE* (D65/10)
Left Fro...	45as15	35.26	18.37	-52.05	31.18	15.00	-46.15	-4.07	-3.37	5.90	7.92
Left Fro...	45as25	21.06	11.58	-36.40	19.66	11.70	-35.96	-1.40	0.12	0.44	1.47
Left Fro...	45as45	10.42	7.28	-23.34	9.76	7.90	-24.06	-0.66	0.62	-0.73	1.16
Left Fro...	45as75	8.16	5.92	-19.61	7.57	6.26	-19.91	-0.59	0.34	-0.30	0.74
Left Fro...	45as110	7.36	5.24	-18.44	6.86	5.32	-18.50	-0.50	0.08	-0.05	0.51
Left Fro...	45as15	35.26	18.37	-52.05	28.78	16.86	-48.53	-6.48	-1.51	3.51	7.52
Left Fro...	45as25	21.06	11.58	-36.40	18.83	12.18	-36.62	-2.22	0.60	-0.22	2.31
Left Fro...	45as45	10.42	7.28	-23.34	9.67	7.89	-23.91	-0.75	0.61	-0.57	1.12
Left Fro...	45as75	8.16	5.92	-19.61	7.73	6.20	-19.74	-0.43	0.28	-0.13	0.53
Left Fro...	45as110	7.36	5.24	-18.44	7.04	5.30	-18.30	-0.33	0.06	0.14	0.36
Left Door	45as15	35.26	18.37	-52.05	28.31	17.37	-48.92	-6.95	-1.00	3.13	7.69
Left Door	45as25	21.06	11.58	-36.40	18.77	12.15	-36.76	-2.29	0.57	-0.36	2.38
Left Door	45as45	10.42	7.28	-23.34	9.80	7.86	-24.02	-0.62	0.58	-0.68	1.09
Left Door	45as75	8.16	5.92	-19.61	7.78	6.17	-19.69	-0.38	0.25	-0.08	0.47
Left Door	45as110	7.36	5.24	-18.44	7.13	5.31	-18.28	-0.24	0.08	0.17	0.30
Left Qua...	45as15	35.26	18.37	-52.05	28.62	17.38	-49.31	-6.64	-0.99	2.74	7.25
Left Qua...	45as25	21.06	11.58	-36.40	18.80	12.53	-37.30	-2.26	0.95	-0.90	2.61
Left Qua...	45as45	10.42	7.28	-23.34	9.66	7.85	-24.09	-0.76	0.57	-0.75	1.21
Left Qua...	45as75	8.16	5.92	-19.61	7.72	6.25	-19.79	-0.44	0.34	-0.18	0.59
Left Qua...	45as110	7.36	5.24	-18.44	7.08	5.29	-18.29	-0.29	0.05	0.16	0.33
Left Bac...	45as15	35.26	18.37	-52.05	28.91	17.18	-49.23	-6.35	-1.19	2.82	7.05
Left Bac...	45as25	21.06	11.58	-36.40	18.88	12.44	-37.21	-2.17	0.86	-0.81	2.47
Left Bac...	45as45	10.42	7.28	-23.34	9.65	7.95	-24.16	-0.76	0.66	-0.82	1.30
Left Bac...	45as75	8.16	5.92	-19.61	7.66	6.23	-19.78	-0.50	0.32	-0.17	0.61
Left Bac...	45as110	7.36	5.24	-18.44	6.96	5.28	-18.37	-0.40	0.05	0.08	0.41

Color Trend Lab Plot

General Data Access Tool EFX Formulation Search & Correct Automotive QC Automotive QA Local settings

Job View Job Detail View **Single Trial View**

Color Data

Displayed Color Coordinates

CIELab
 CIELCh
 CIELabCh
 None

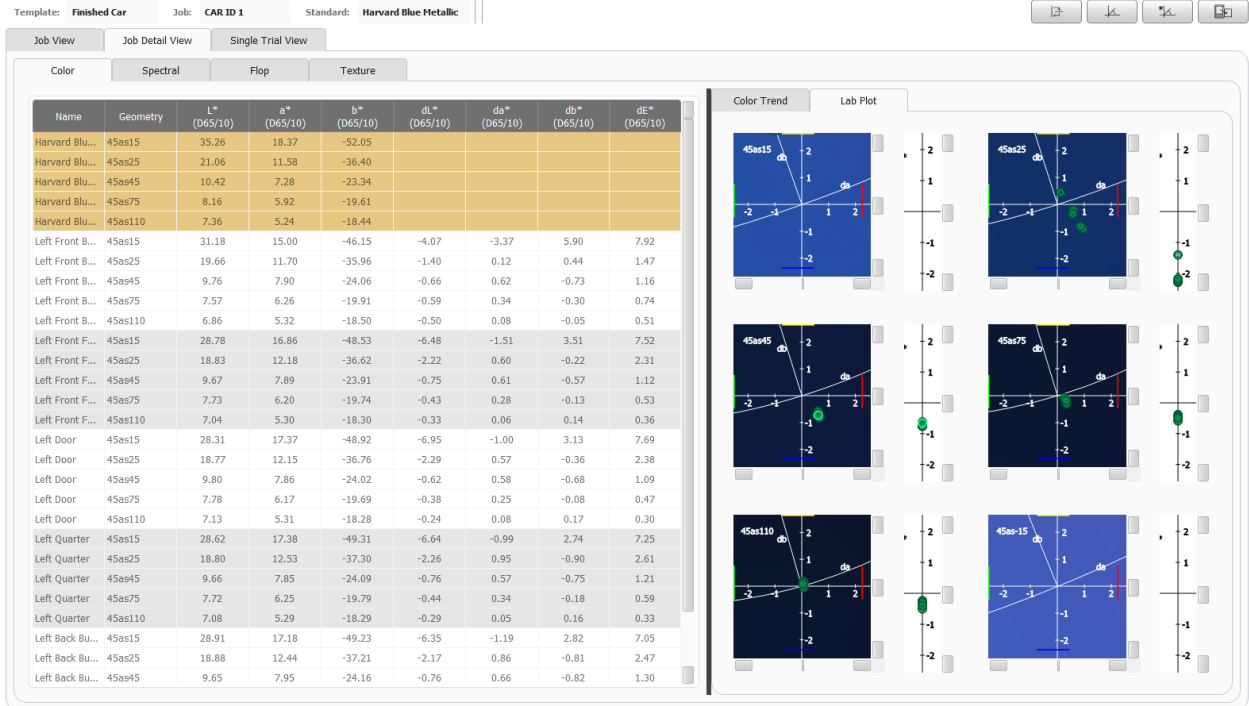
Reset

Standard Color Data

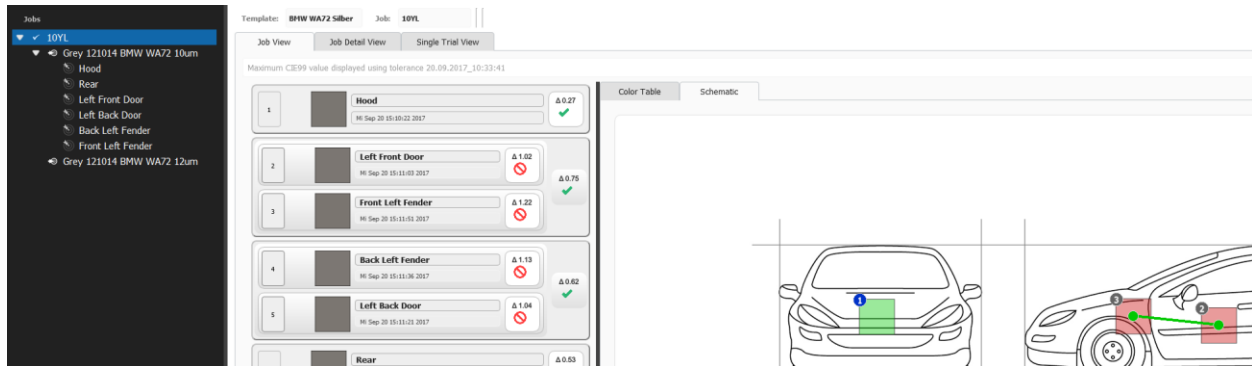
Display as columns

CIELab
 CIELCh
 CIELabCh
 None (Show as top rows)

Reset



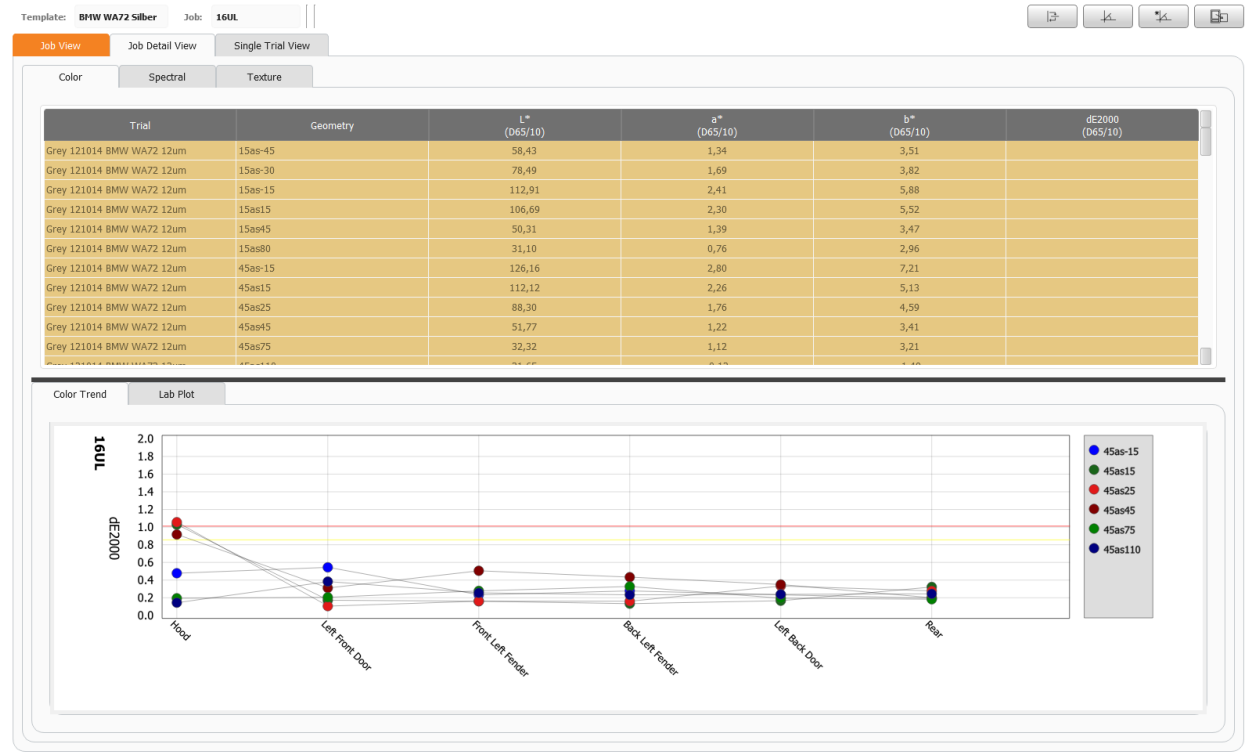
If the job is based on a QC job template the schematic with the corresponding checkpoint is available on the right-hand side (if a schematic is included in the QC Job Template). This view will show colors for fail/check/pass and a lines connecting couples. The color of the line will show the fail/check/pass state of the couple itself.



A tab "Color Table" can be selected to display the pass/check/fail of each checkpoint in tabular view.

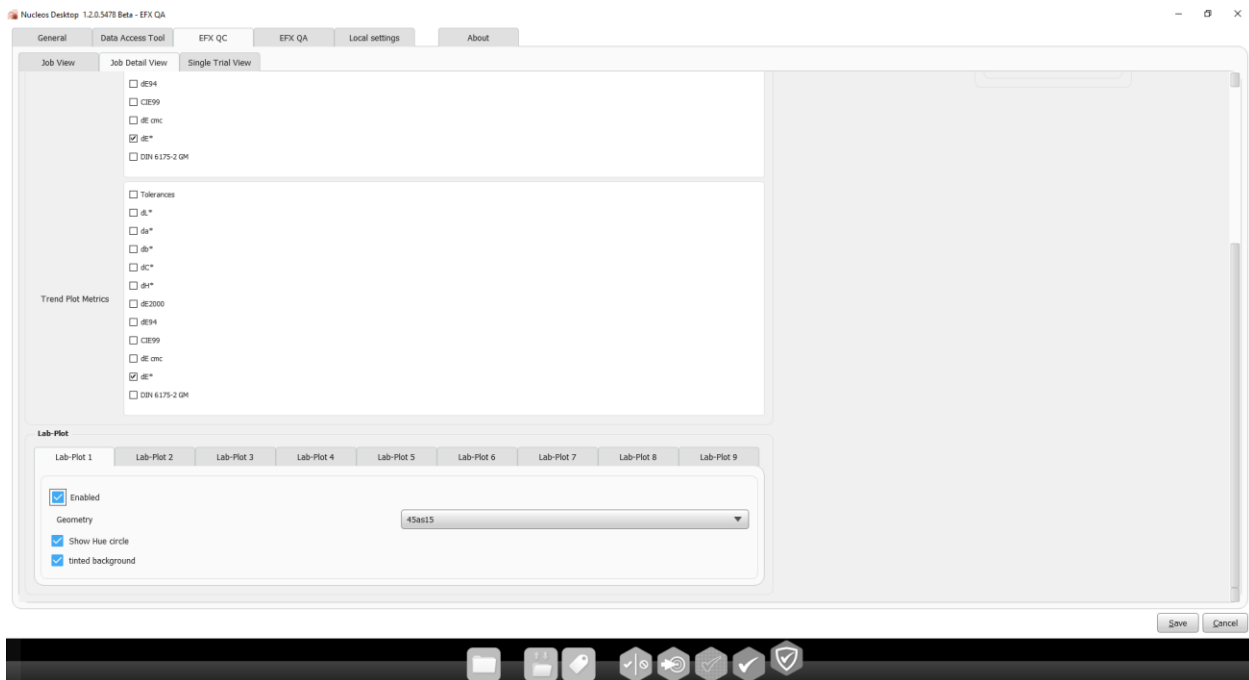
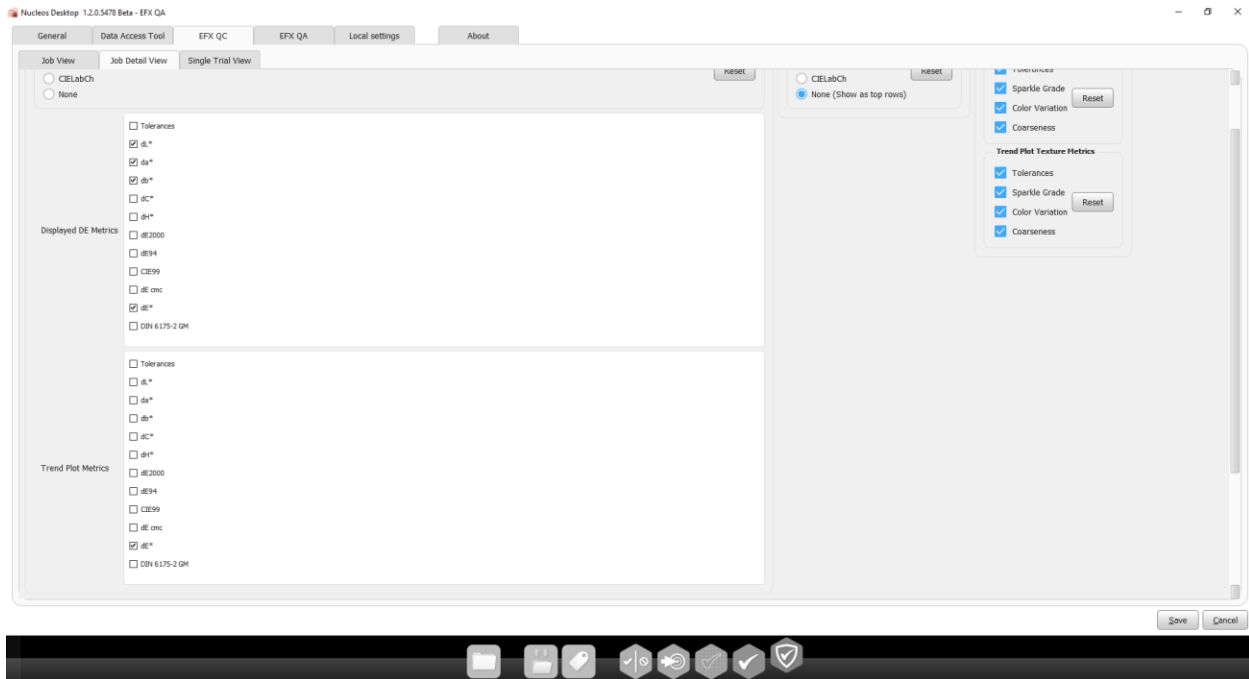
9.6.2 JOB DETAIL VIEW

The job detail view can be used to view more detail about the job and measured trials. Right clicking on any of the tables gives the option to print a snapshot or export to CSV. Right clicking on any graph gives the option to print it.



The view can be switched between color, spectral and texture values. On the upper side a table containing the geometries, LAB values and the delta to the standard is displayed. These values are grouped by trial name. At the top of the table is color highlighted the standard that is used to compare the trials against. If one geometry shows a pass/check/fail area the trial in the job view will display it as pass/check/fail. If everything passes it will be green. These values can be exported in CSV format by right clicking on the table.

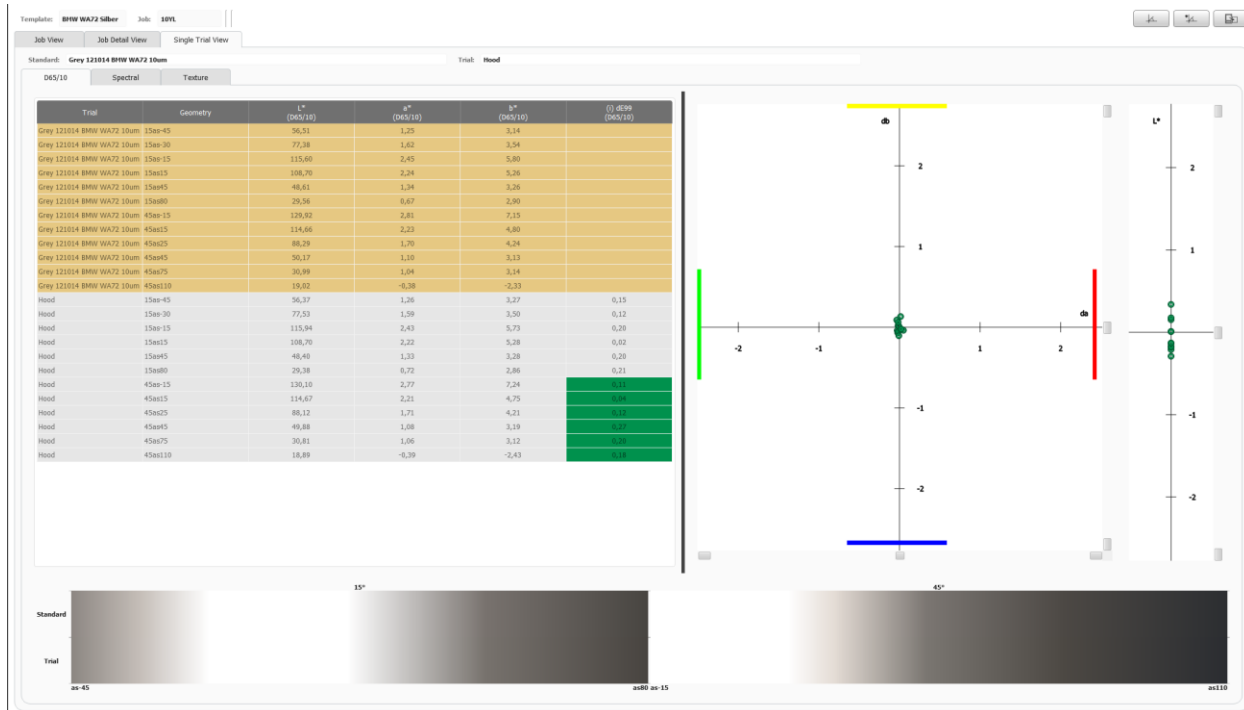
On the lower side the trend (for both texture and color), spectral table or LAB plot (only color) are visible depending on what is selected. The trend for all trials is displayed if the job/standard in the job list is selected or click on single trials to display it in the trend. The trend itself as well the dE metrics displayed in the tables can further be configured in the settings menu.



9.6.3 SINGLE TRIAL VIEW

For further analysis about a single trial the single trial view can be used. The view here can also be switched between color, spectral and texture values.

The currently selected trial from the job list compared against the standard is displayed.



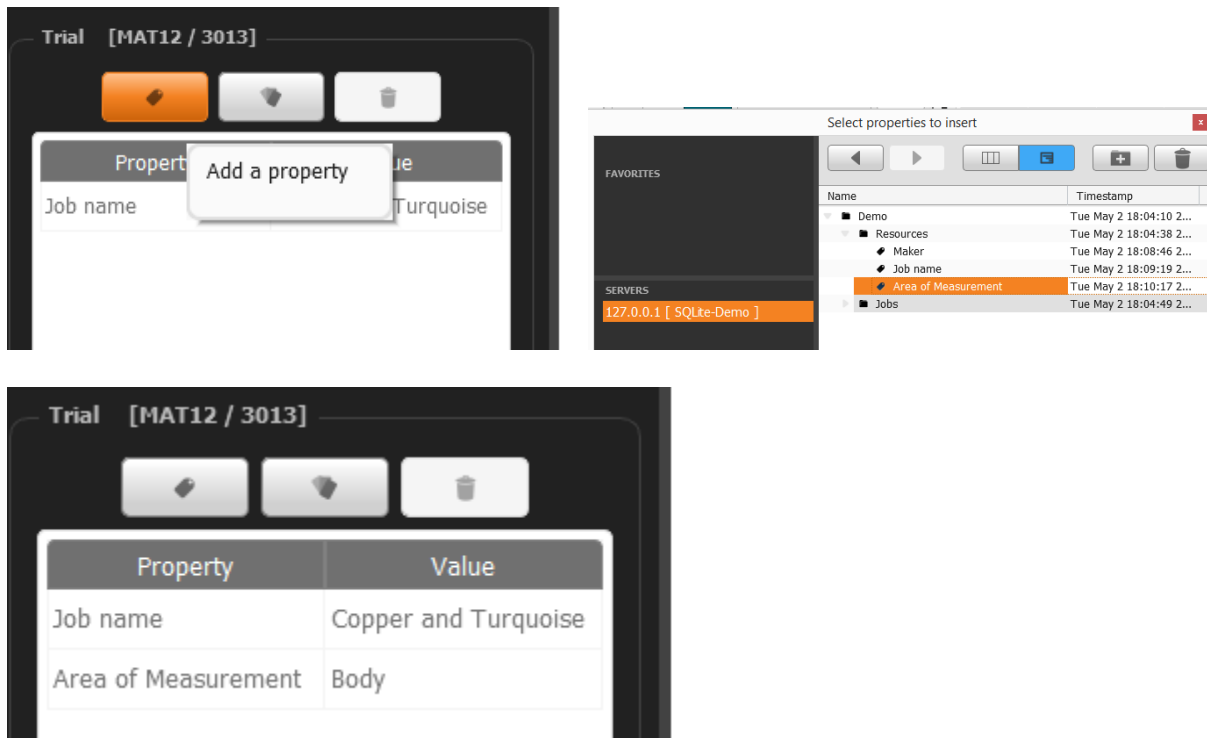
The table displays the LAB values of the standard as well as the dL, da, db of the trial as compared to the standard. This shows how far away the trial measured as compared to the standard. Only the geometries defined in the used tolerance are color coded – even though delta values are displayed for all geometries. As with other tables, right click to export in csv format.

To further understand the differences below the table a graphical comparison of the target/standard to the trial is shown. The left-hand side depicts 15° angles and the right side the 45° angles.

On the right of the table the color plot displaying all trials is displayed. The currently selected trial is displayed as green/yellow/red according to where in the tolerance it belongs. All other trials are shown as gray dots. Zoom in and out of the color plot to get a better overview using the mouse scroll wheel. The L value is displayed to the right of the color plot. The lab plot updates depending on what geometries are selected in the color geometry combo box at the top of the view. Multiple color plots depicting different angles can be configured in the settings for up to four color plots.

9.6.4 ADDING PROPERTIES TO A TRIAL

The Properties section has three buttons for working with the properties of the current selected trial. Add Property adds a specific property to the trial. Add PropertyLibrary adds all the properties in the selected property library to the trial. Delete Property deletes the currently selected property. If the property added is an "autofill" type of property (example <JOBNAME>), it will be auto filled as it is added to the trial. As before, you may click on a property in the list and modify it within the current restrictions set by the property type.



9.6.5 CONTROLS

Splitter Bar Orientation. Is used for switching splitter bar orientation (vertical/horizontal) in the Job

Detail tab.




Geometry Selectors. Are used for selecting color and texture geometries using a pop-up dialog

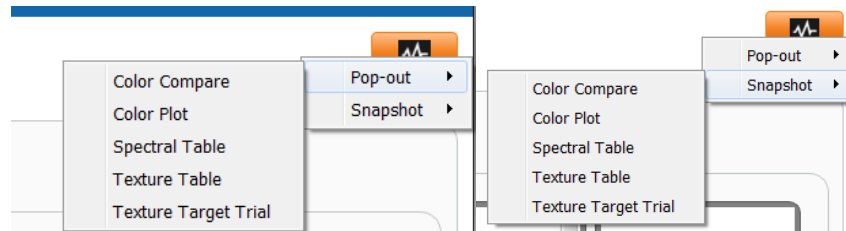
selector.



9.6.6 POP OUT/SNAPSHOT

To pop out any graph/table to view and compare them simultaneously, click on the icon on the upper right-hand side of the workspace  .

Here are the two options:



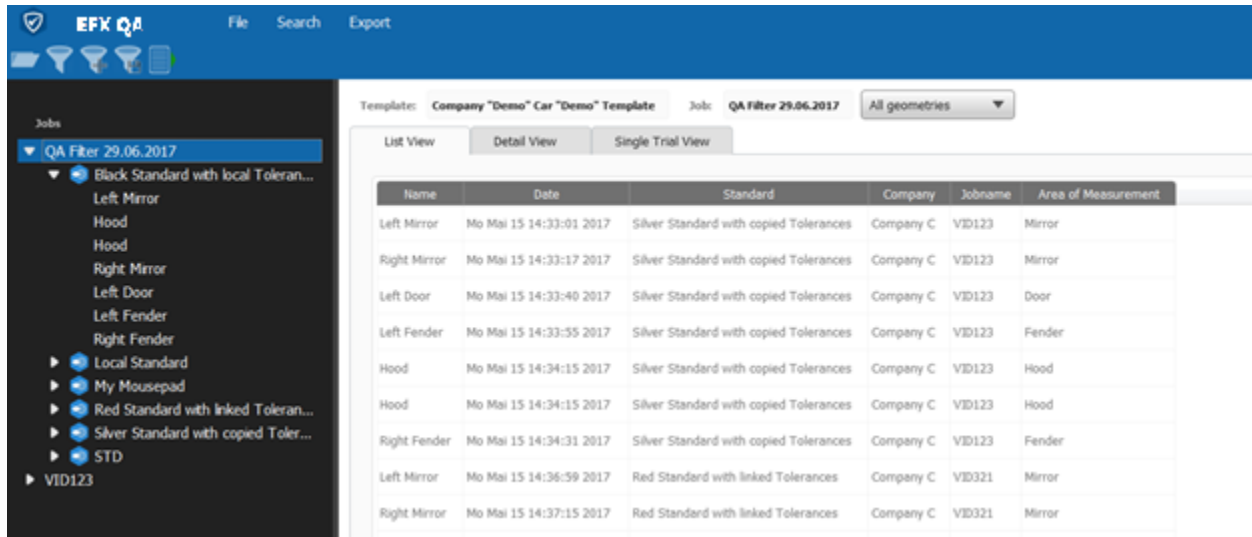
- 1) Pop-out - Opens a small extra window of the selected view type. This window will automatically update to reflect the current data selected.
- 2) Snapshot – Similar to Pop-out but does not update as data is changed in the application. Selecting another job/trial will not affect the contents of a snapshot window.

Link to training video: EFX QC Desktop: EFX QC



<https://youtu.be/asDPGG7dso>

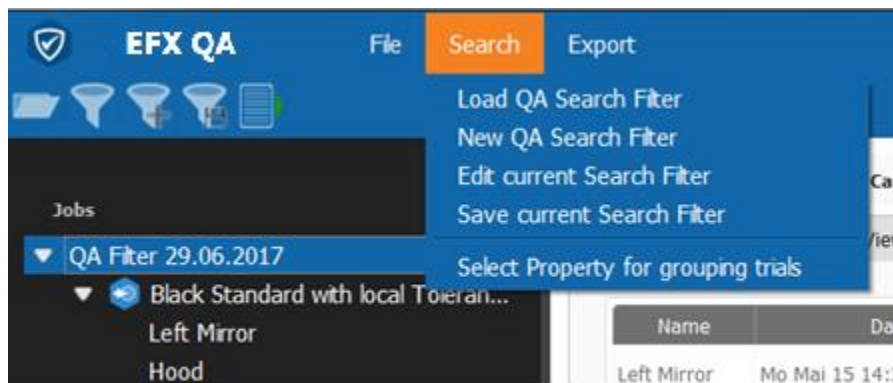
The EFX QA app is used to quickly filter and compare and analyze multiple jobs, trials, and standards.



The view is like the EFX QC app. For a description of these shared views and functionality, please reference the EFX QC section.

10.1 SEARCH

The differencing part of the EFX QA app is the search and filter functionality.



QA search filters can be created with the criteria that was setup in the application editors. It allows the search and filter on jobs, trials, standards, etc. from the database into the views for comparison.

In the “New QA Filter” the following may be specified:

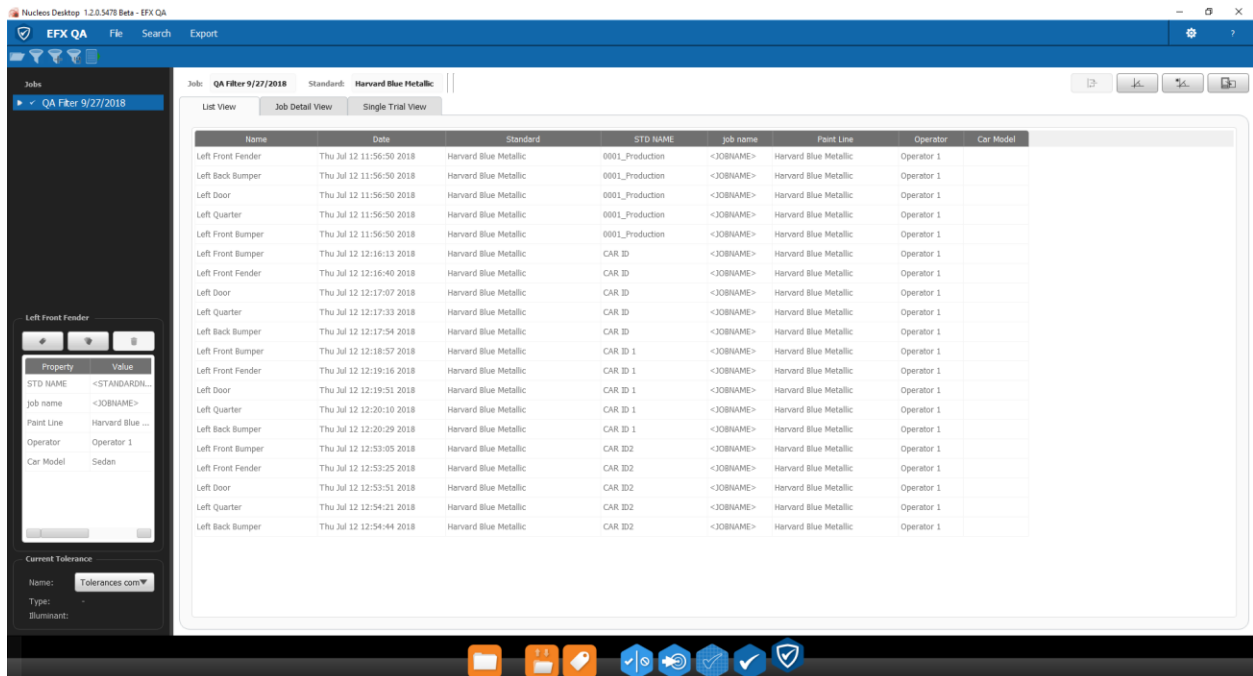
- Standard – Returns all trials measured against this standard
- Job Template – Returns all trials measured using this job template
- Properties – Up to three properties can be specified – Returns all trials measured which have included the selected property (i.e. Area of Measurement: Hood and Color: Black)
- Date range - Returns trials only contained within the specified date range.
- Instrument type – Return trials only if they were measured with the selected instrument
- Add trials to current workspace – Adds the next filter results to the existing set of filtered results. For example, in the above case only black hoods would be included. To add black fenders to the same result the filter can be edited to add trials to the current workspace.

10.2 WORKSPACE DIFFERENCES TO EFX QC

The filter itself behaves like a job in the EFX QC app. Clicking on the filter name will display a general overview or click on a single trial to view more details.

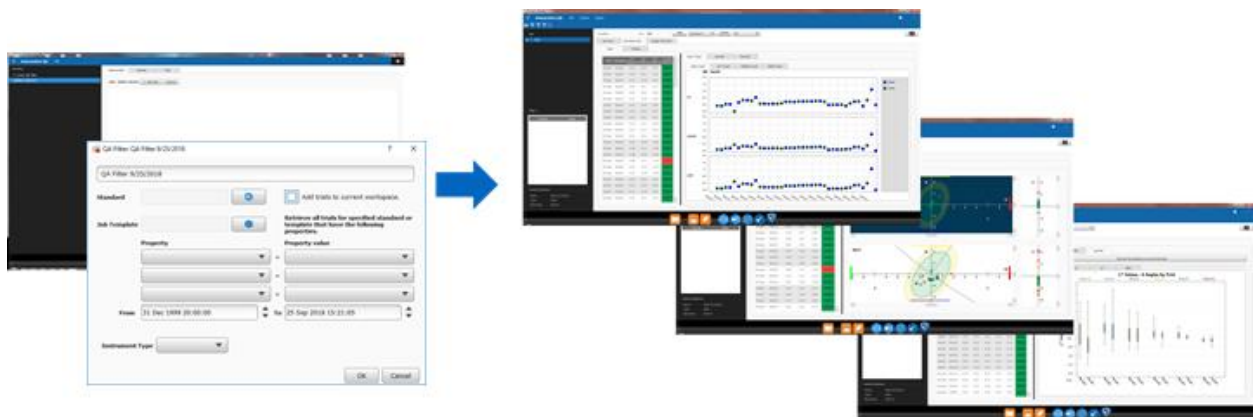
10.2.1 LIST VIEW

The list view in EFX QA shows an overview of the names and properties of all trials that are found using this filter.



10.2.2 DETAIL VIEW

In addition to the views contained in EFX QC, the detail view now also contains a box plot comparing all samples in groups against each other. Due to the statistical analysis required by a box plot, multiple trials per grouping are required.



FURTHER HELP CAN BE FOUND AT EFX PRODUCT SUPPORT PAGE:

<https://www.xrite.com/service-support/product-support/formulation-and-qc-software/efx-qc>

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