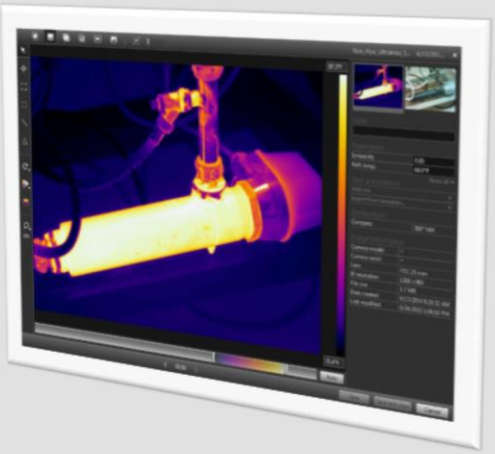
INFRARED TRAINING CENTER

FLIR Tools

PC software for importing and analyzing images, creating inspection reports, and viewing live IR camera video



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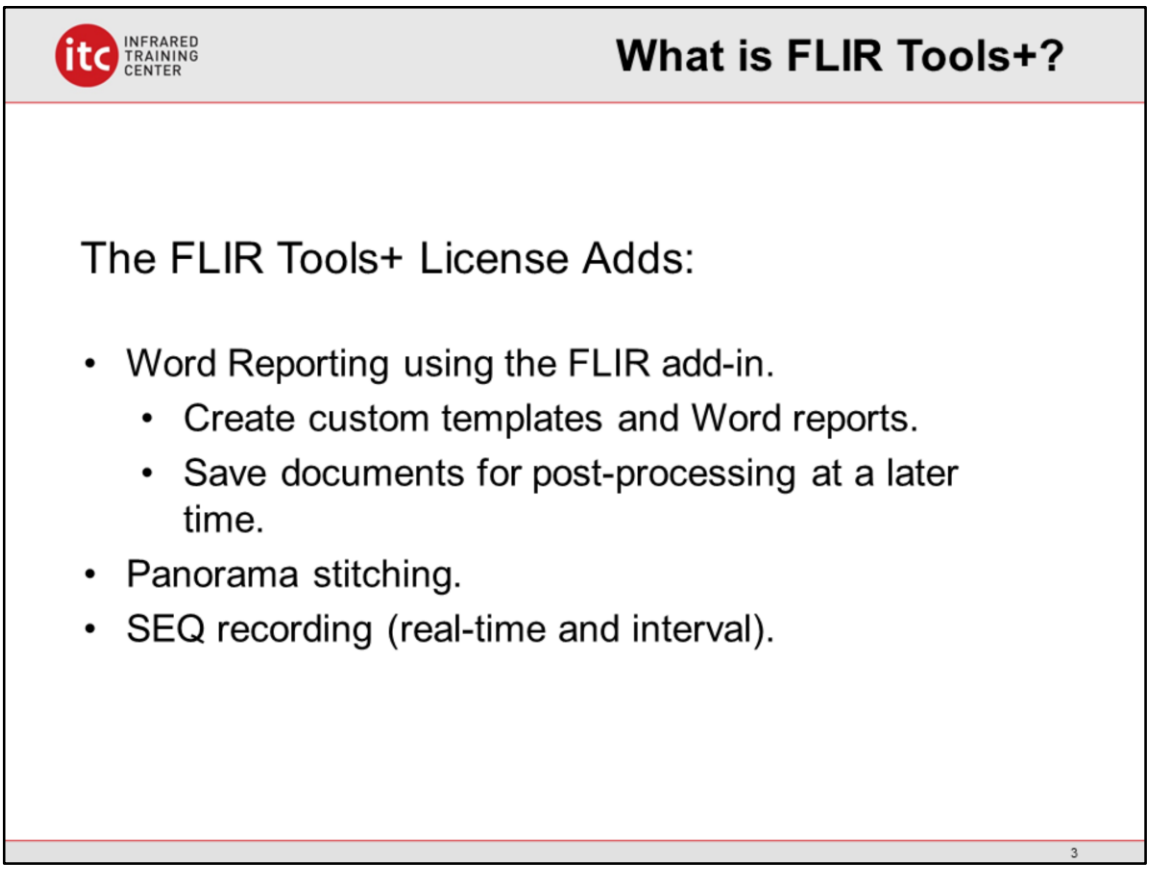
What is FLIR Tools?

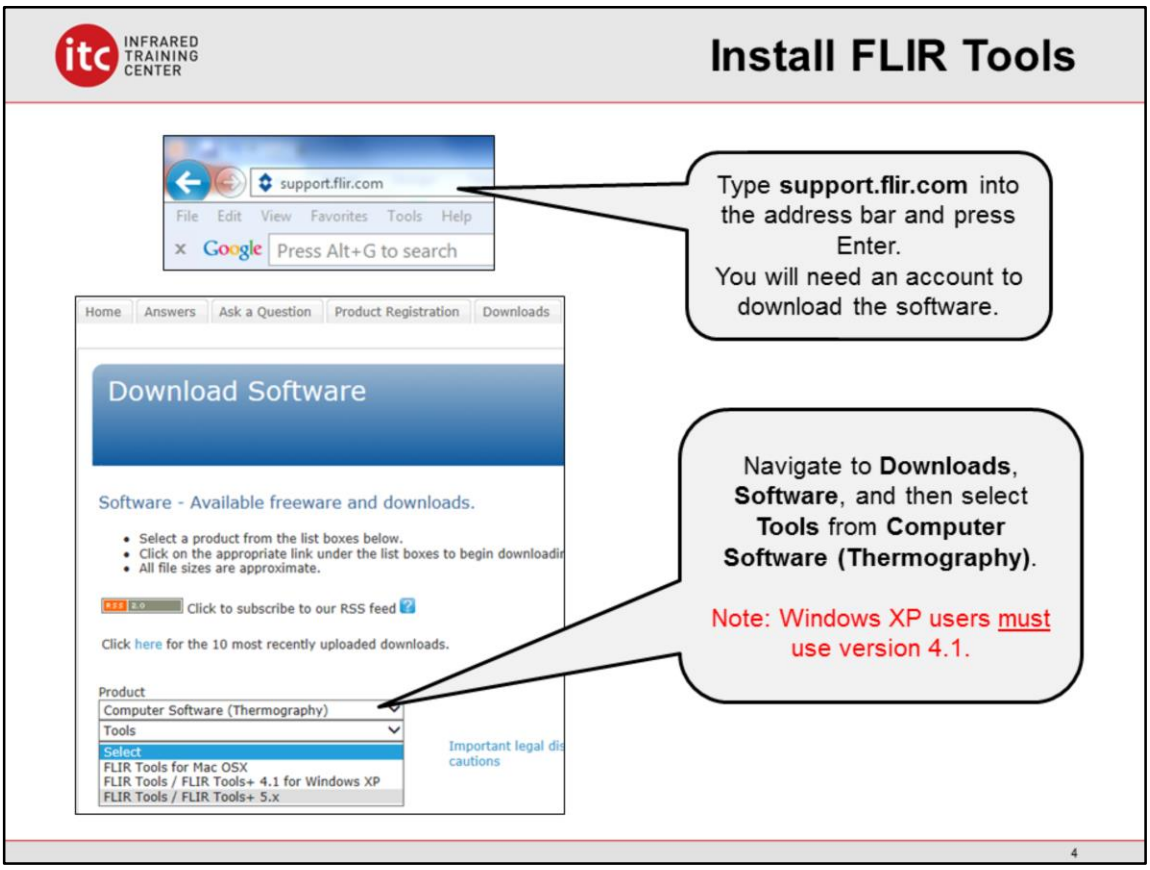
FLIR Tools is a versatile software suite for importing and analyzing images and creating inspection reports.

- Import images, videos, and CSQ files from FLIR cameras.
- Analyze IR images and save changes.
- Adjust object parameters globally and locally.
- Create text annotation templates.
- Create and save inspection reports and export to PDF.
- View live radiometric video and save JPEGs.
- Play and analyze SEQ and CSQ files.
- Create temporal plots from measurement results.

2



Tools+ is an upgrade that adds the ability to create Microsoft Word templates and reports, create radiometric panorama images, and record sequences from compatible USB and Ethernet cameras.



FLIR Tools can be downloaded from the FLIR Support Center website. A user account is needed to download software and manuals.

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Objectives

- Import images from a camera.
- Manage the image library.
  - Add and delete folders, group images, etc.
- Analyze images.
  - Adjust scale, palette, image modes.
  - Add and remove measurement tools.
  - Apply global and local object parameters.
  - Add text notes and save changes.
- Create a text annotation template and send to a camera.
- Create and save a new report, and export to PDF format.
- View live video and save JPEGs.
- Play and analyze SEQ and CSQ recordings.
- Update camera firmware and configure K-Series.

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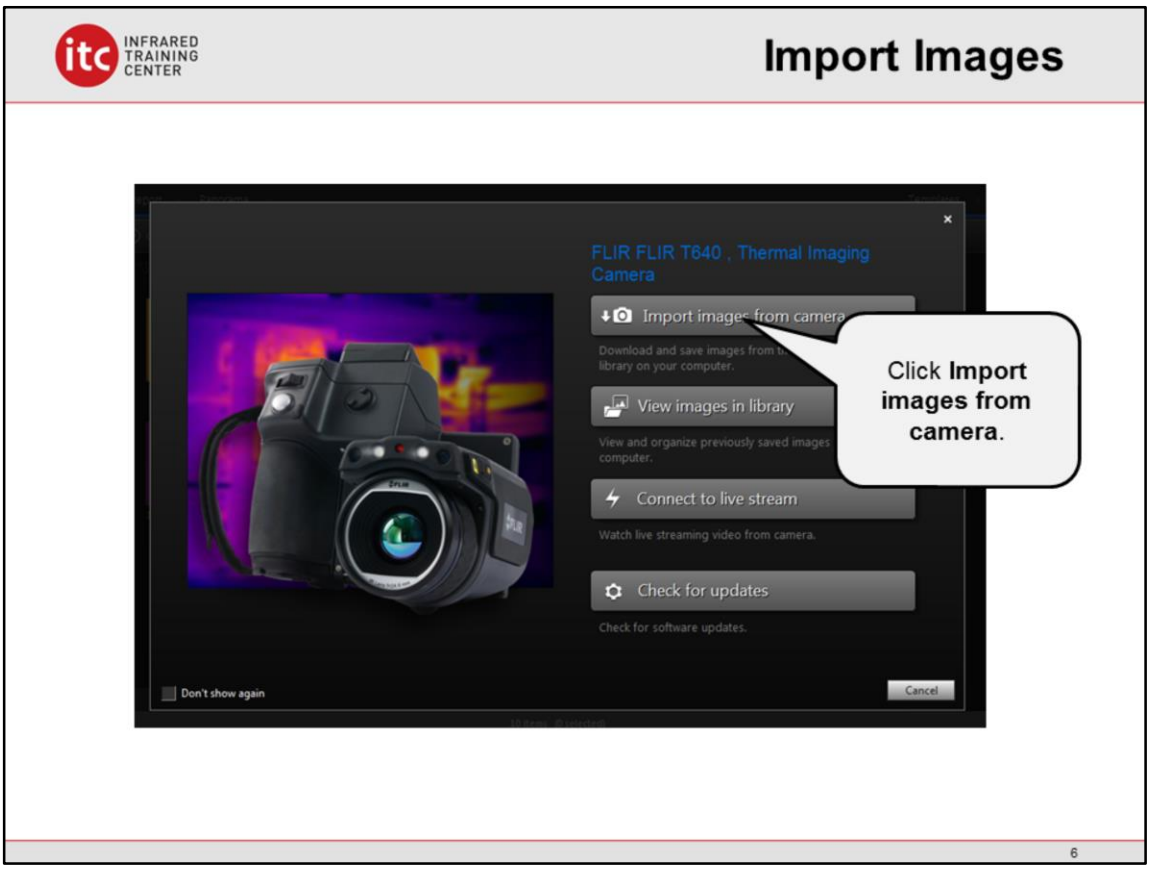
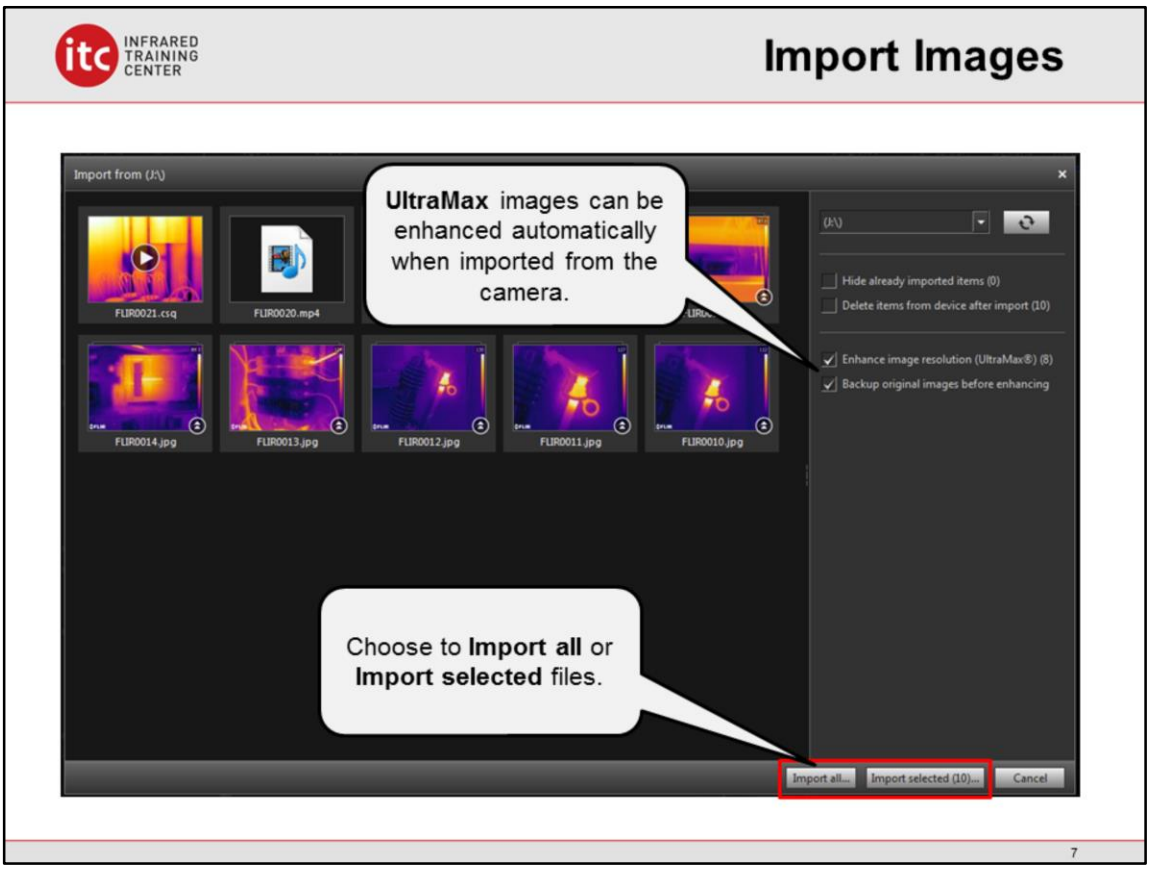


If you connect a camera via USB while FLIR Tools is running a startup screen will appear with links to common functions. Click the button to **Import images from camera**.

View images in library will close the startup screen and show the image library. **Connect to live stream** will display a live image from compatible FLIR cameras. **Check for updates** will check for FLIR Tools updates. It can also check for updates for certain FLIR USB cameras.

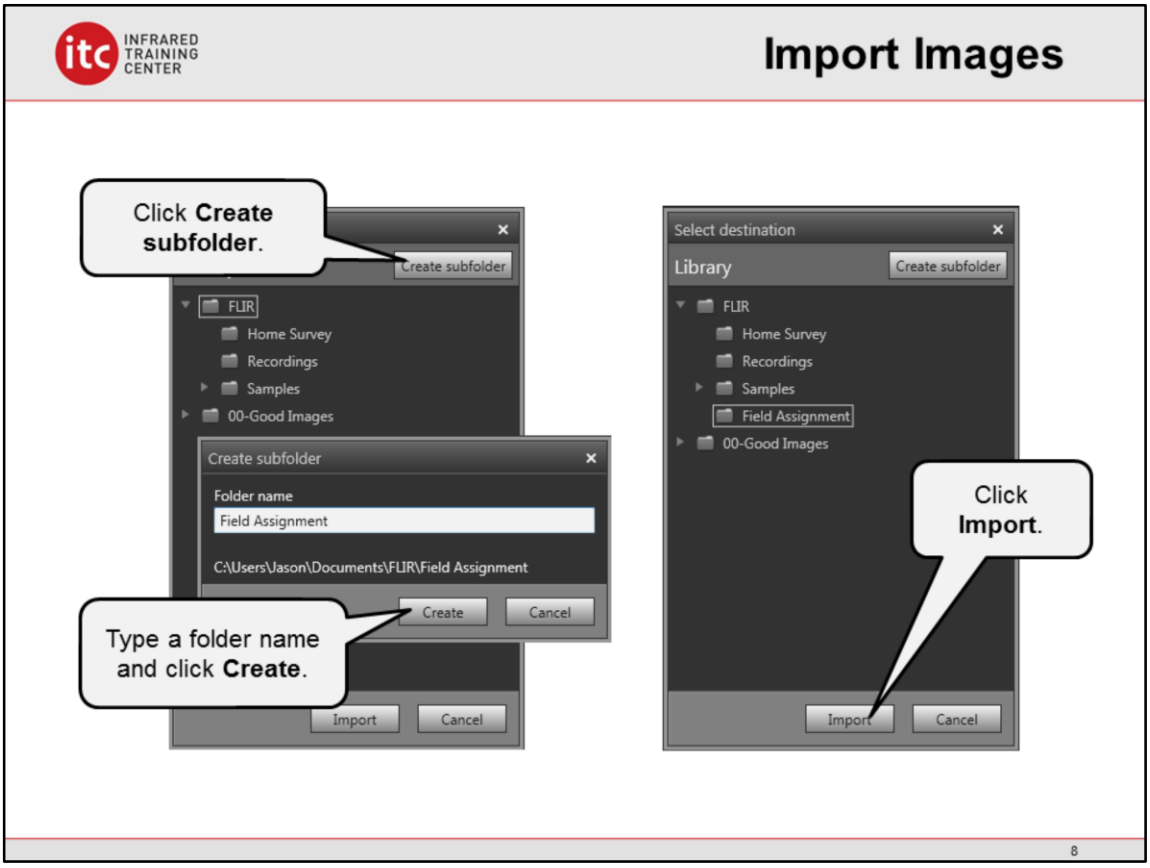
You can also import images using the **Import button** in the image library.



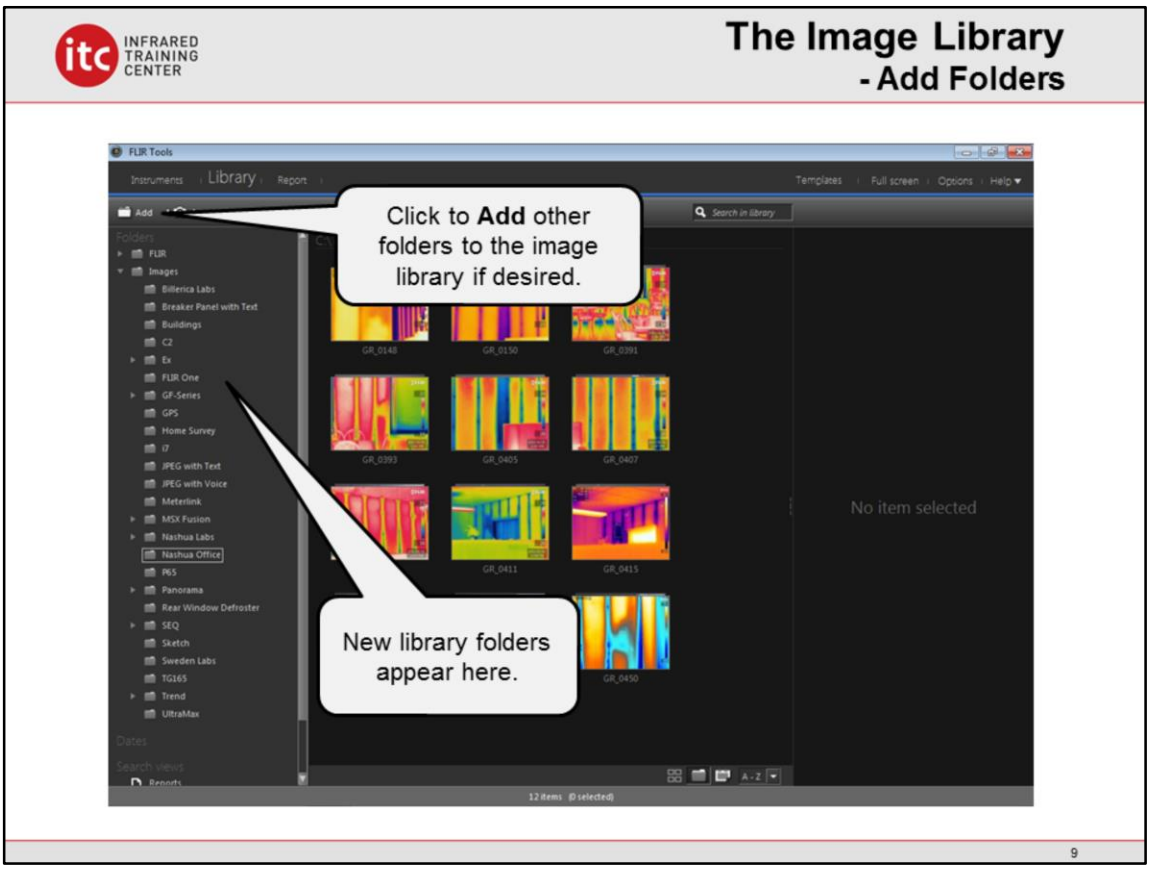
FLIR Tools will read all the images and videos on the FLIR camera and display them in the import window. IR and photo groups, MSX, and Fusion images will appear "stacked" in the import window and in the library.

You can use the **CTRL** or **SHIFT** key on the keyboard to select specific groups to import, or you can choose to import all the files from the camera.

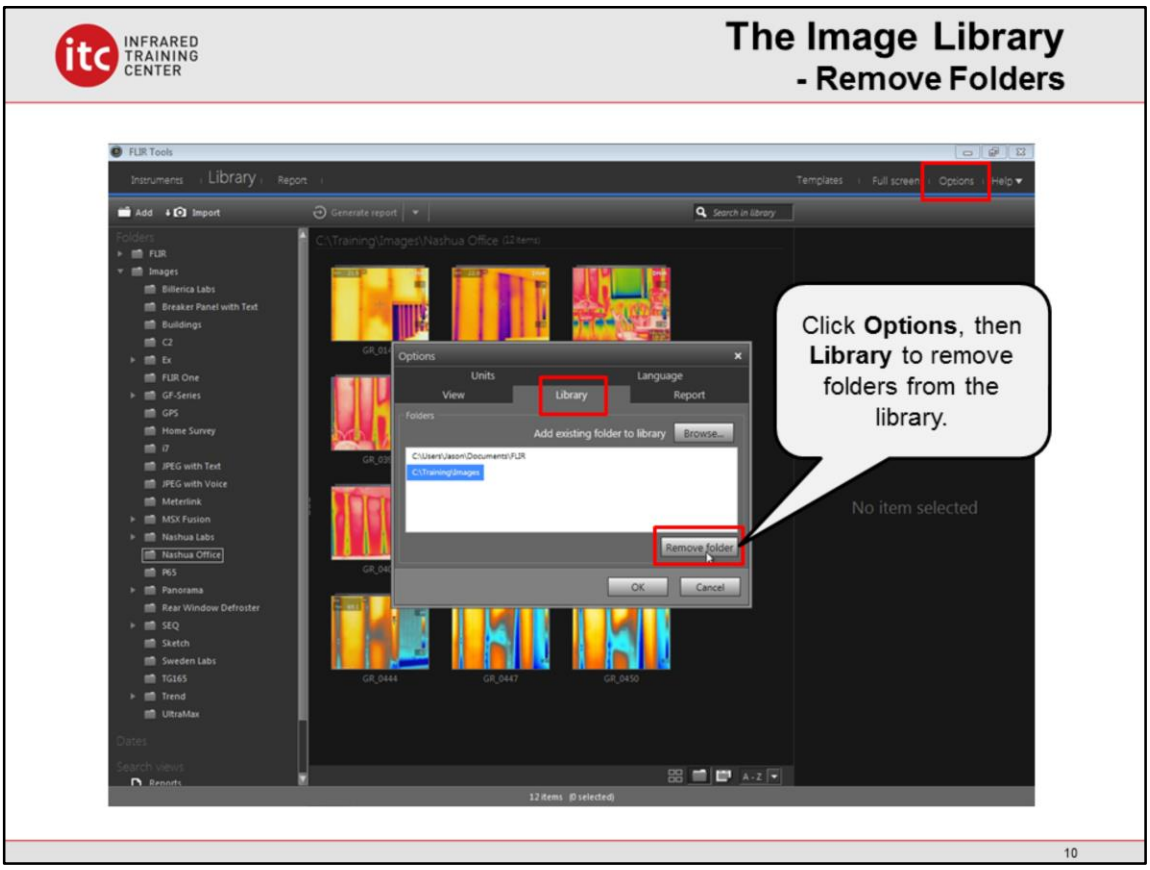
UltraMax images can be automatically enhanced while being imported.



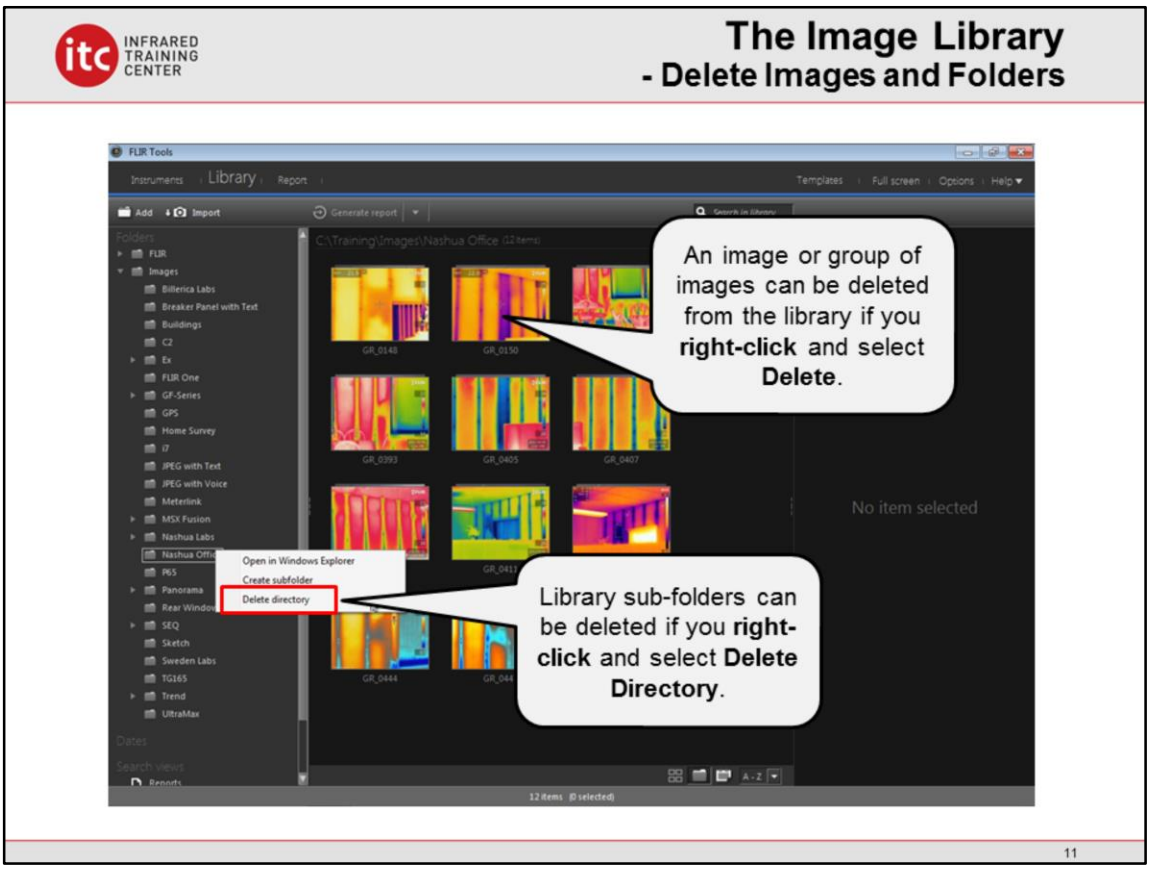
The next step is to select a destination folder, or create a new folder, and then click **Import** to complete the file transfer.



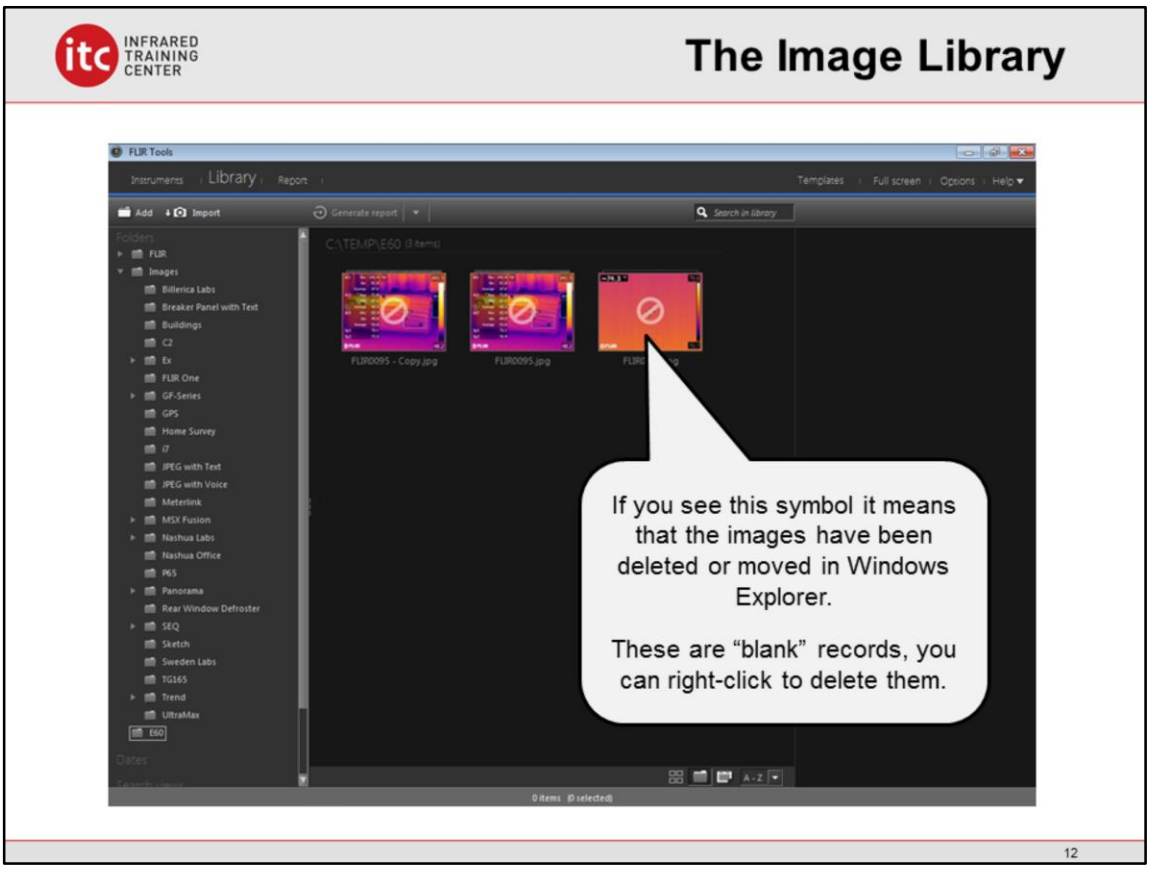
All library folders appear on the panel to the left. The default folder is \My Documents\FLIR. The **Add button** allows you add more folders to the library.



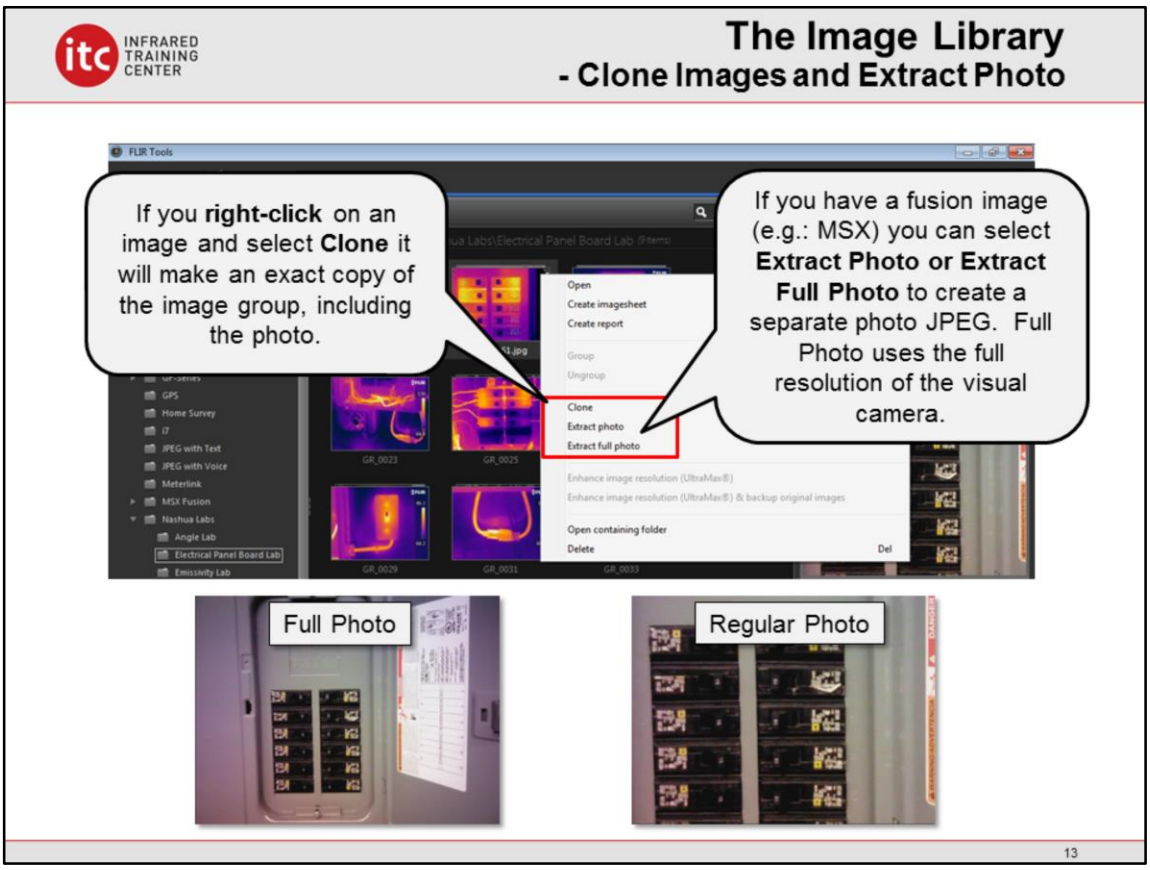
Folders can be removed from the library by selecting the **Options** menu, then the **Library** tab. Removing folders does not delete them from the PC, it just takes them out of the FLIR Tools library.



Images and sub-folders can be deleted if you **right-click** and select **Delete**.

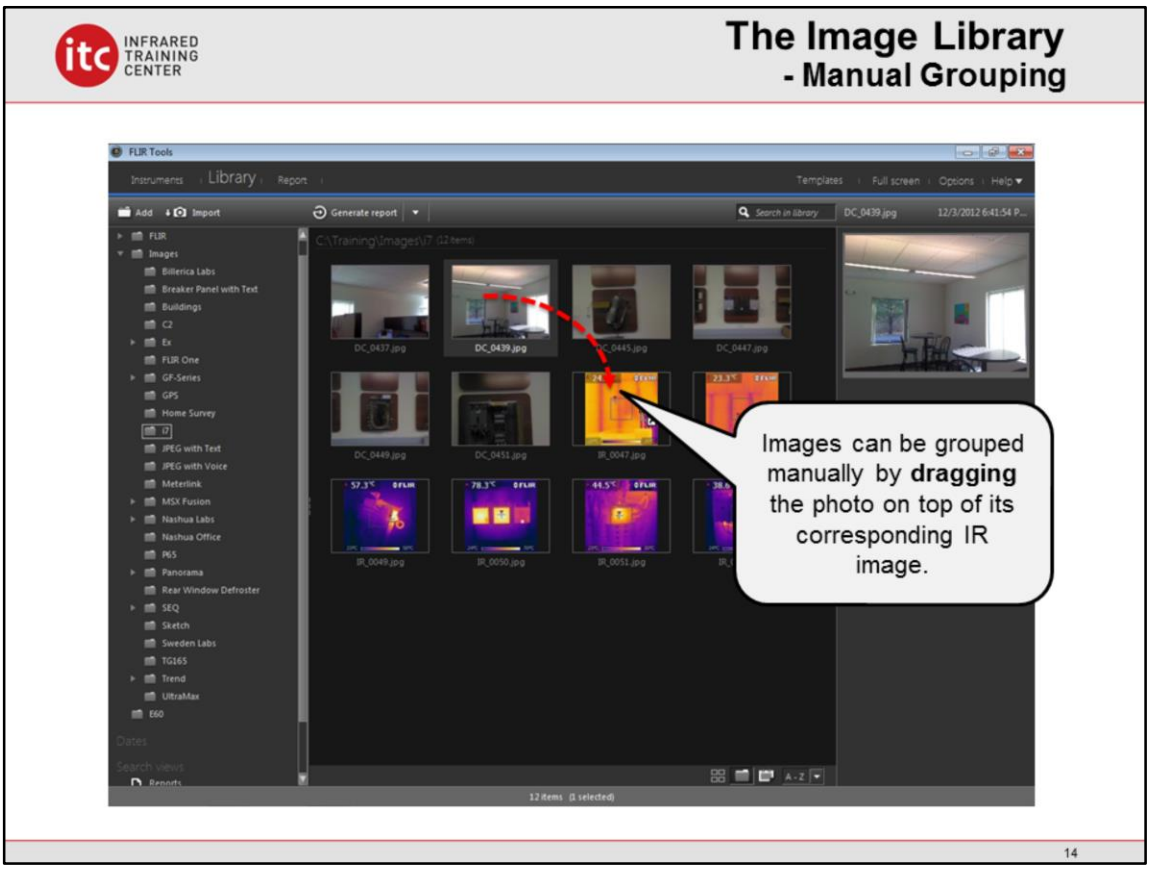


It is important to delete images from within the FLIR Tools library. If you delete them from Windows Explorer the Tools database will show a blank record because it can no longer find the images. You can right-click on these to delete them.



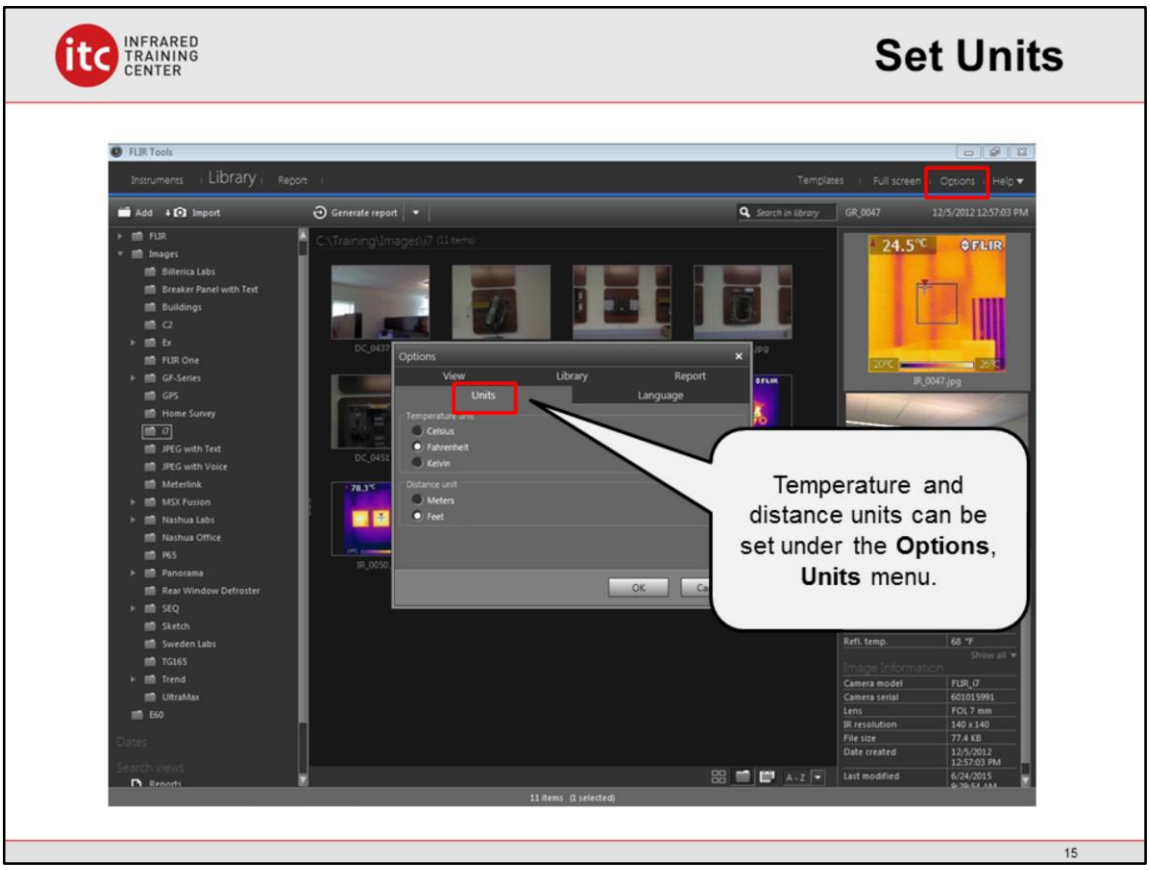
The **Clone** option on the right-click menu will make an exact copy of an image group or sequence (SEQ or CSQ) in your library.

The **Extract Photo** option will extract the visual photo from a fusion image and create a separate JPEG file. **Extract Full Photo** will extract the photo using the full visual camera resolution.
Extracting the photo is not necessary if you create reports using FLIR Tools or Tools+. The FLIR software will automatically extract the photo for use in the report.

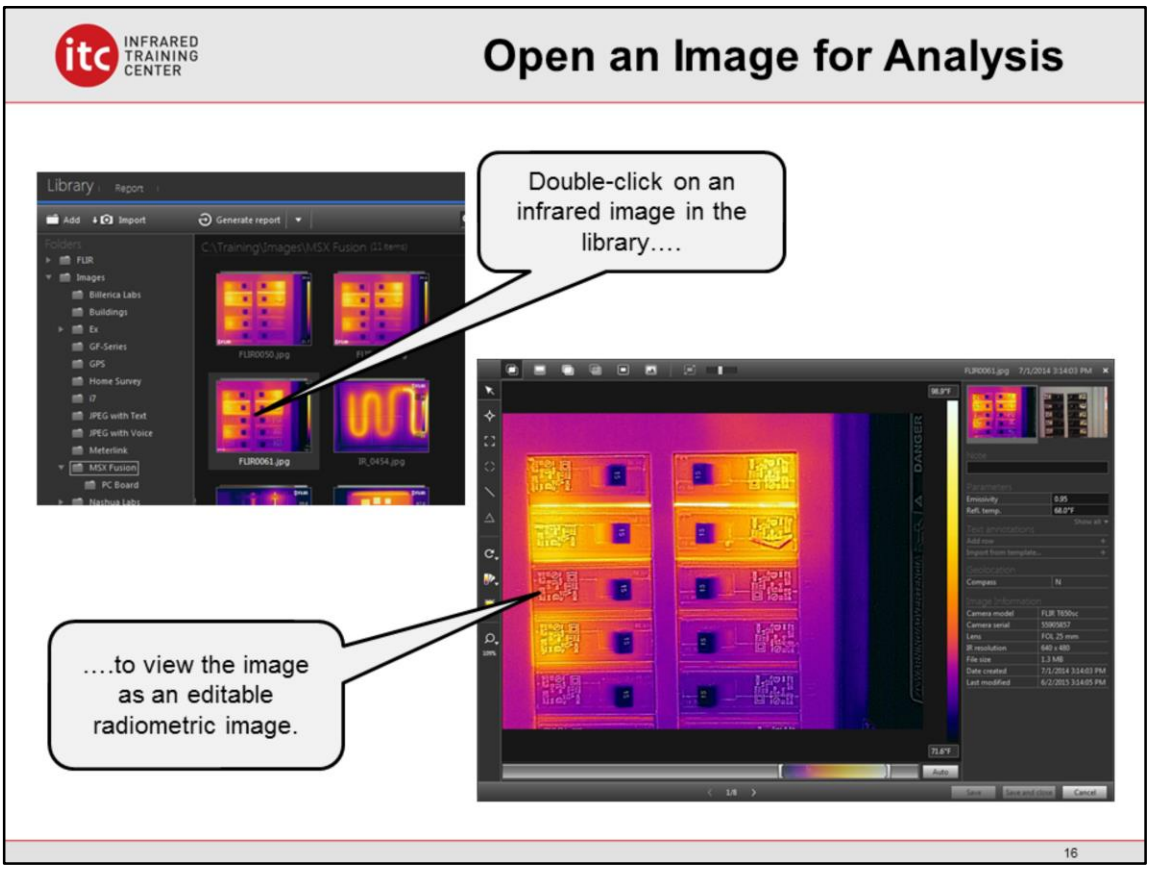


Some camera models do not have a built-in visual camera. In this case, you can create an image group manually by dragging a photo on top of its corresponding IR image. The resulting image group will be the same as if the images were taken on the same camera. You would need to copy and paste the photos into the image folder using Windows Explorer.

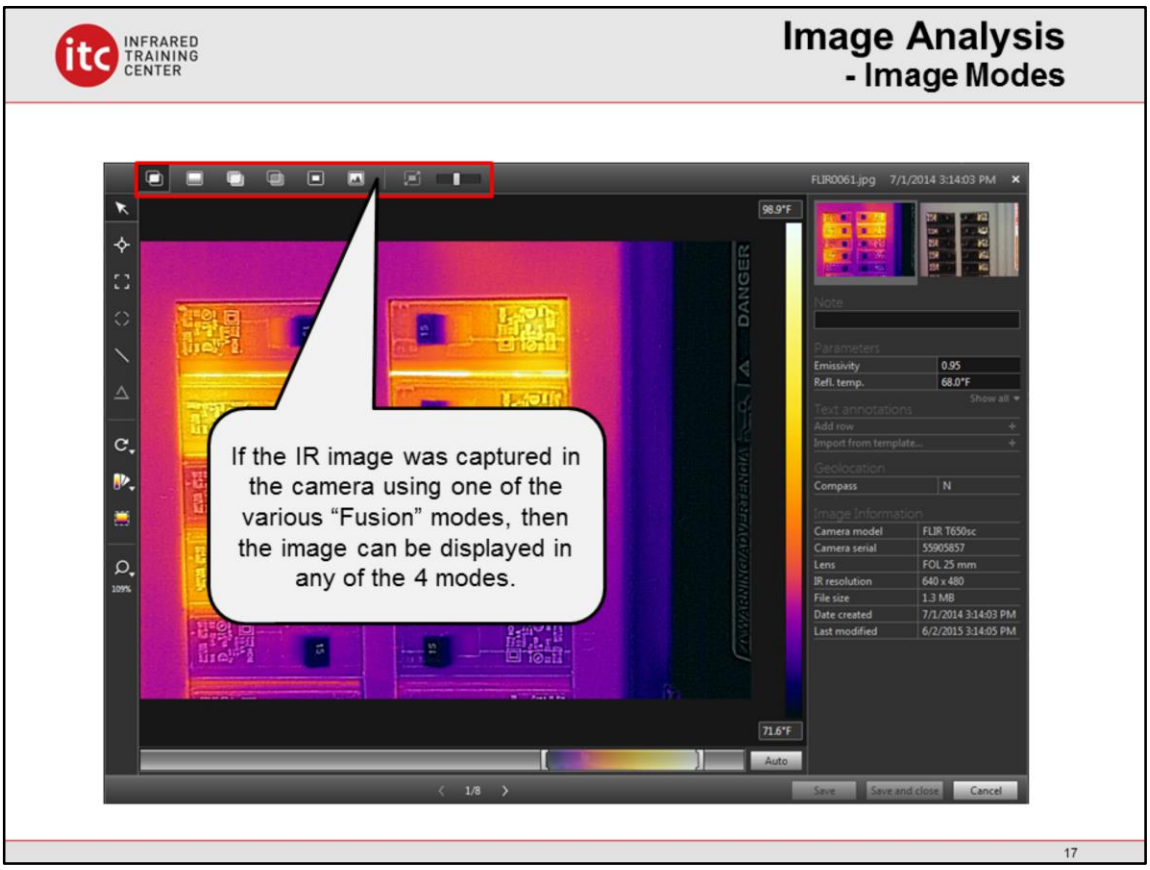
You can right-click on a previously grouped set of images and click Ungroup to separate them.



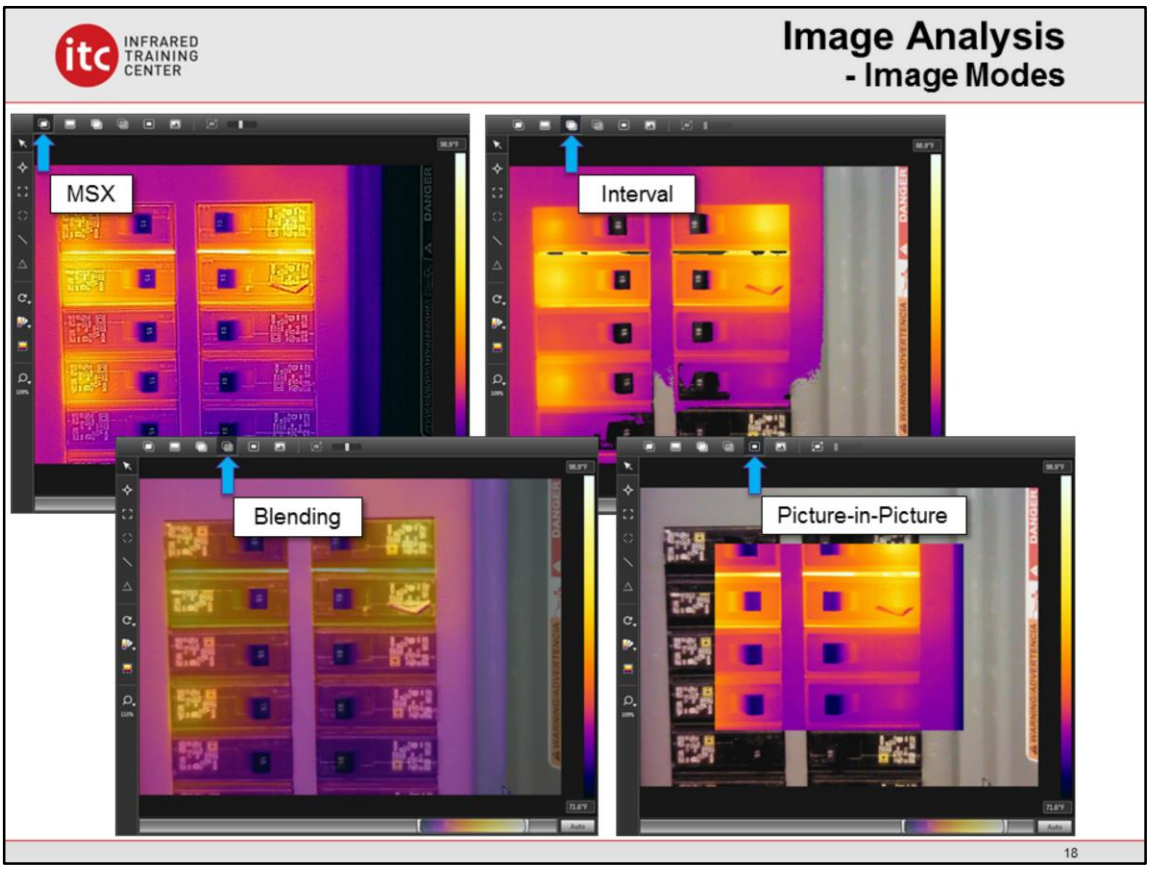
To set the units in FLIR Tools, click the **Options** menu and click **Units**.



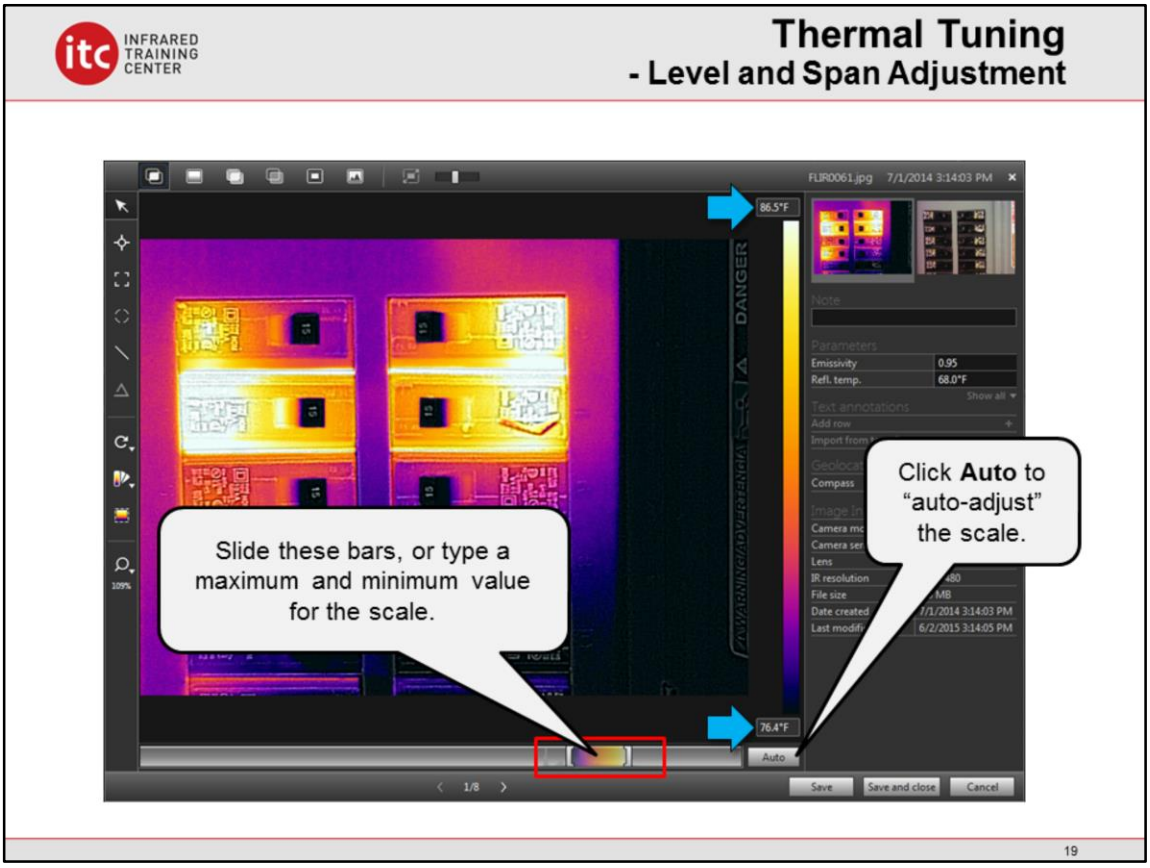
You can double-click on any of the images in the library to view a full-size radiometric image. This allows you to perform detailed measurements, adjust the temperature scale, palette, object parameters and other settings, and save changes.



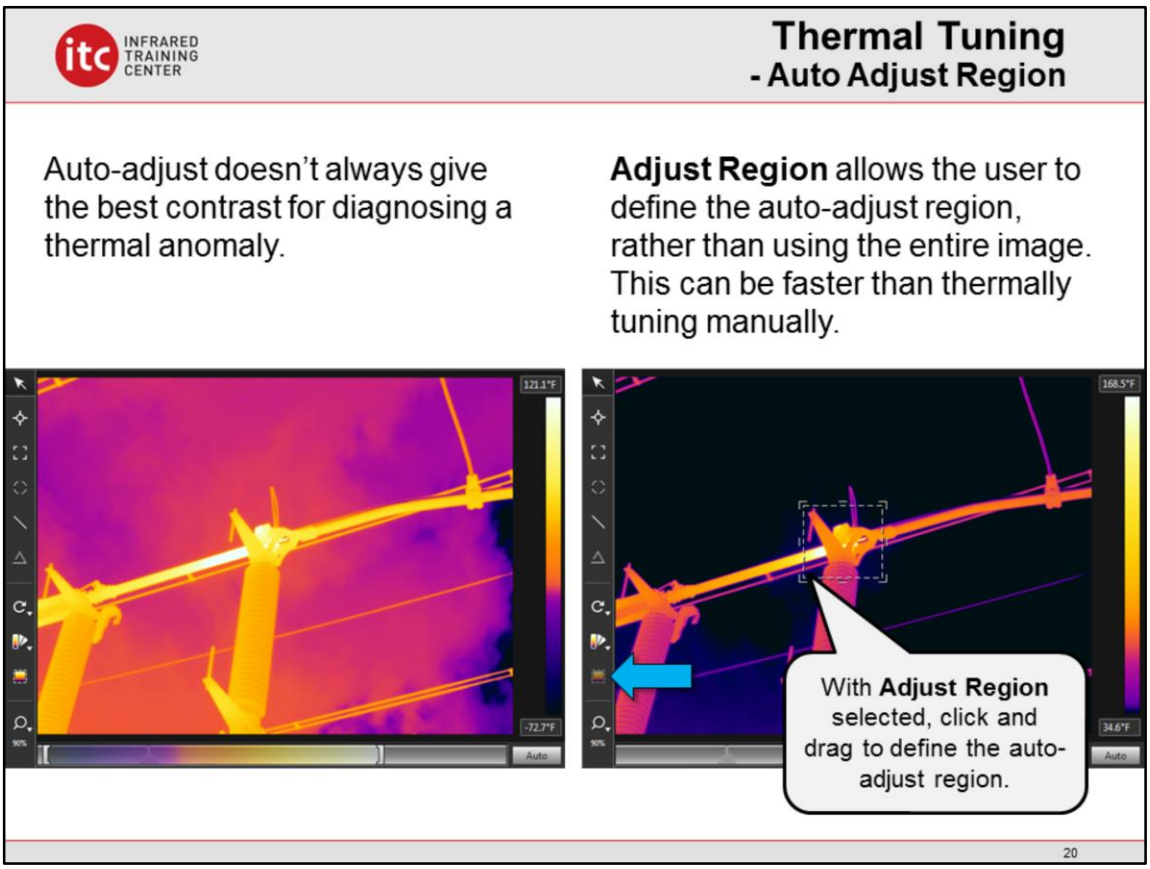
Many modern cameras can save images using one of the various Fusion modes, such as MSX or Picture-in-Picture. Regardless of which mode was used, FLIR Tools allows you to switch between MSX, Interval, Blending, and Picture-in-Picture modes. You can also view the standard thermal image and visual photo.



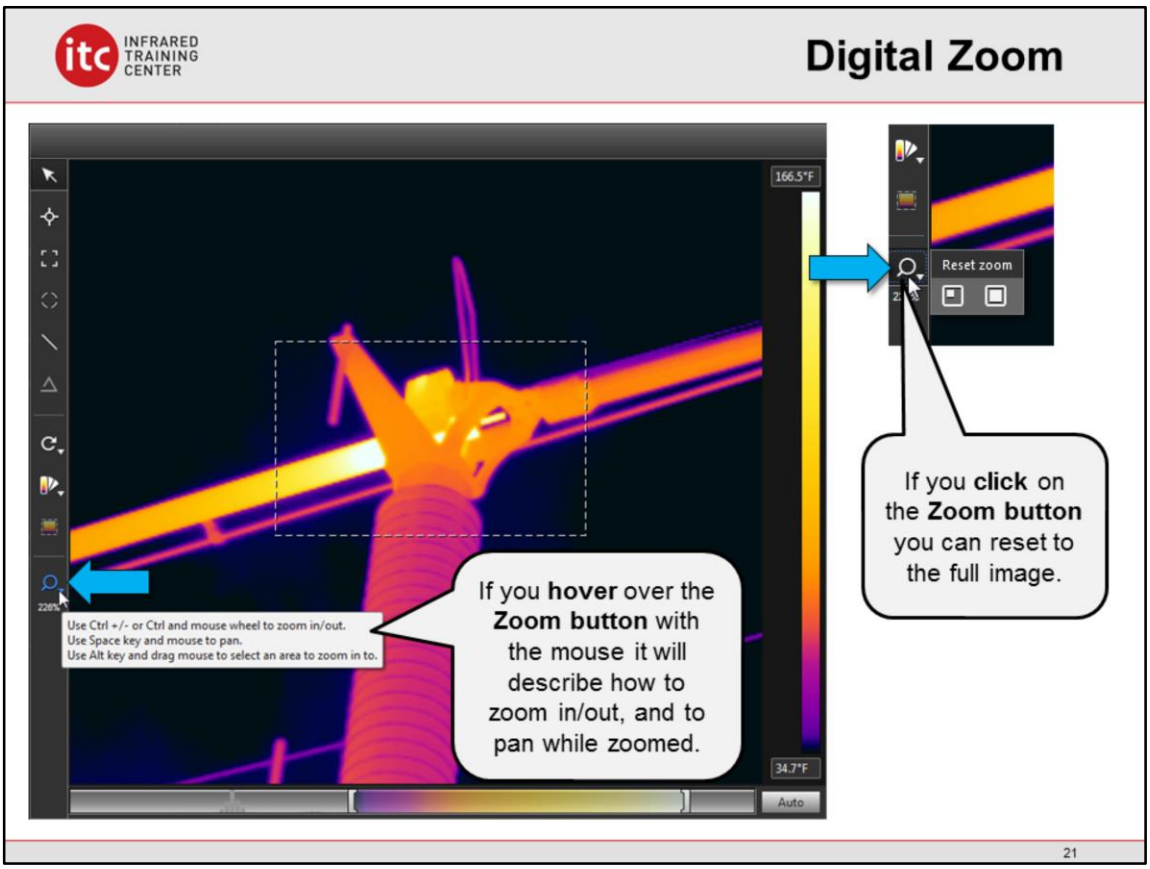
This shows the same image in the four different fusion modes. The second button from the left will show the plain thermal image with no fusion.



The level and span can be adjusted using the brackets under the image. You can also automatically adjust the scale, and you can type specific numbers for the maximum and minimum temperature if desired.



The **Adjust Region** option allows the user to define a region of interest for the auto-adjust, rather than using the entire image. This can be helpful, particularly for outdoor electrical work, where the background is often a cold sky. When using this mode the auto-adjust algorithm is applied to a small area of interest, excluding much of the background. The result is better thermal contrast, which can help to identify potential problems.

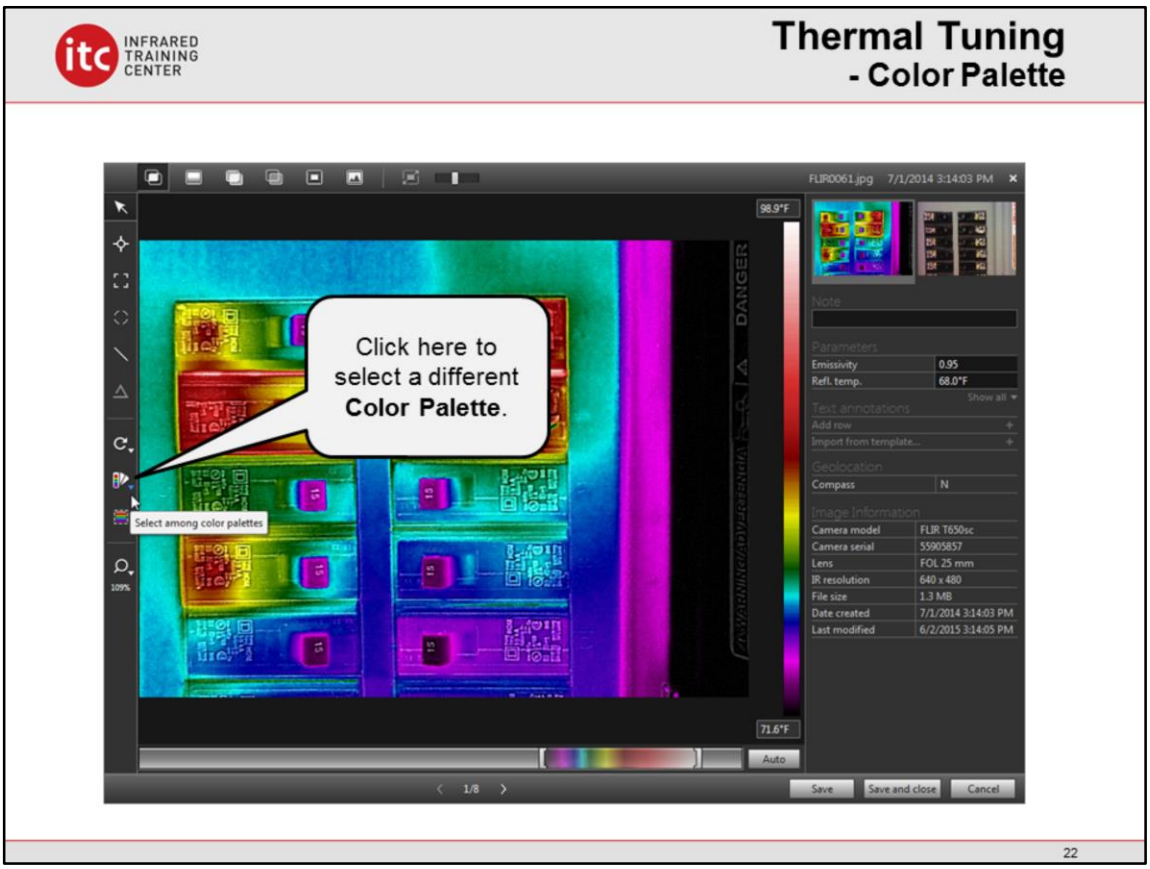


The Digital Zoom allows the user to digitally magnify the image. If you hover over the Zoom button some instructions will appear for zooming and panning. If you click on the Zoom button you can reset to the full image.

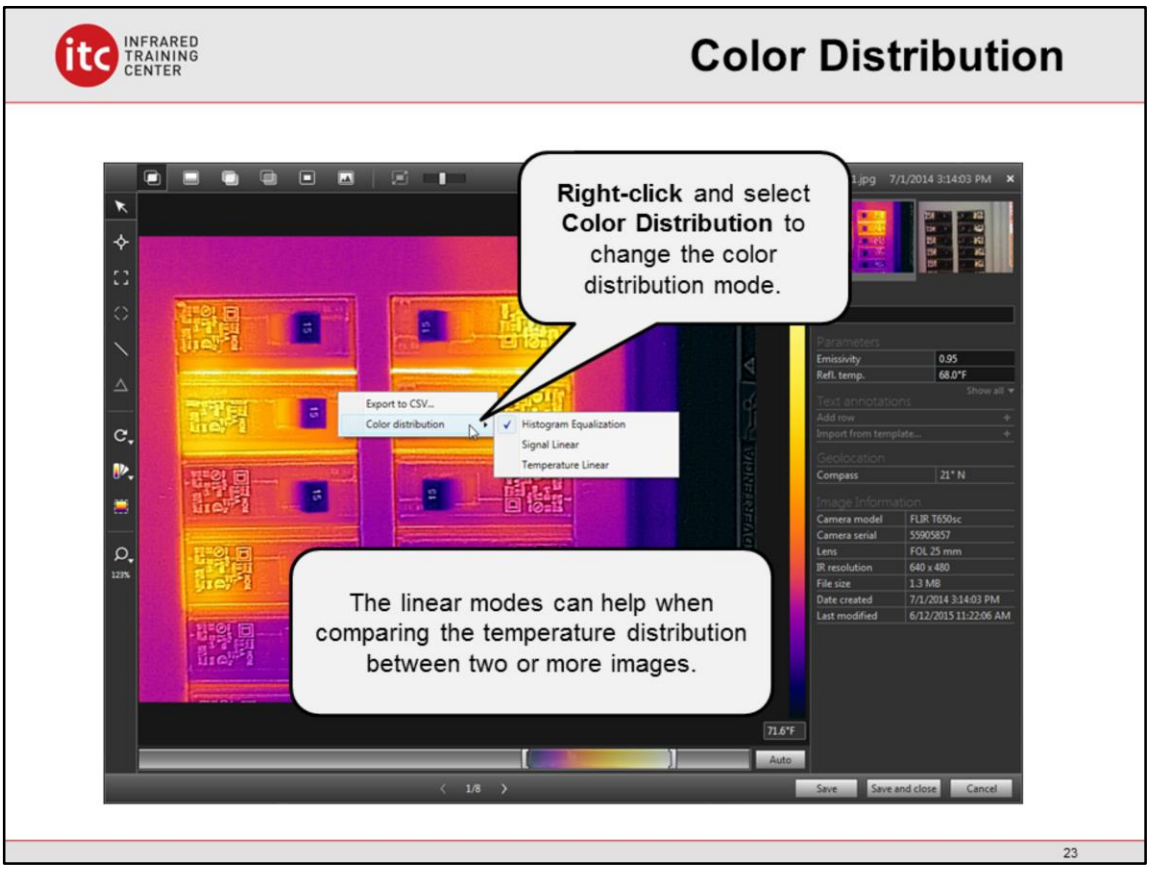
<u>To Zoom In and Out</u>
Use CTRL + and – .
Use CTRL and mouse wheel.

<u>To Pan</u>
Hold down Space and move mouse.

<u>To Select Zoom Window</u>
Use Alt and drag mouse to select zoom window.

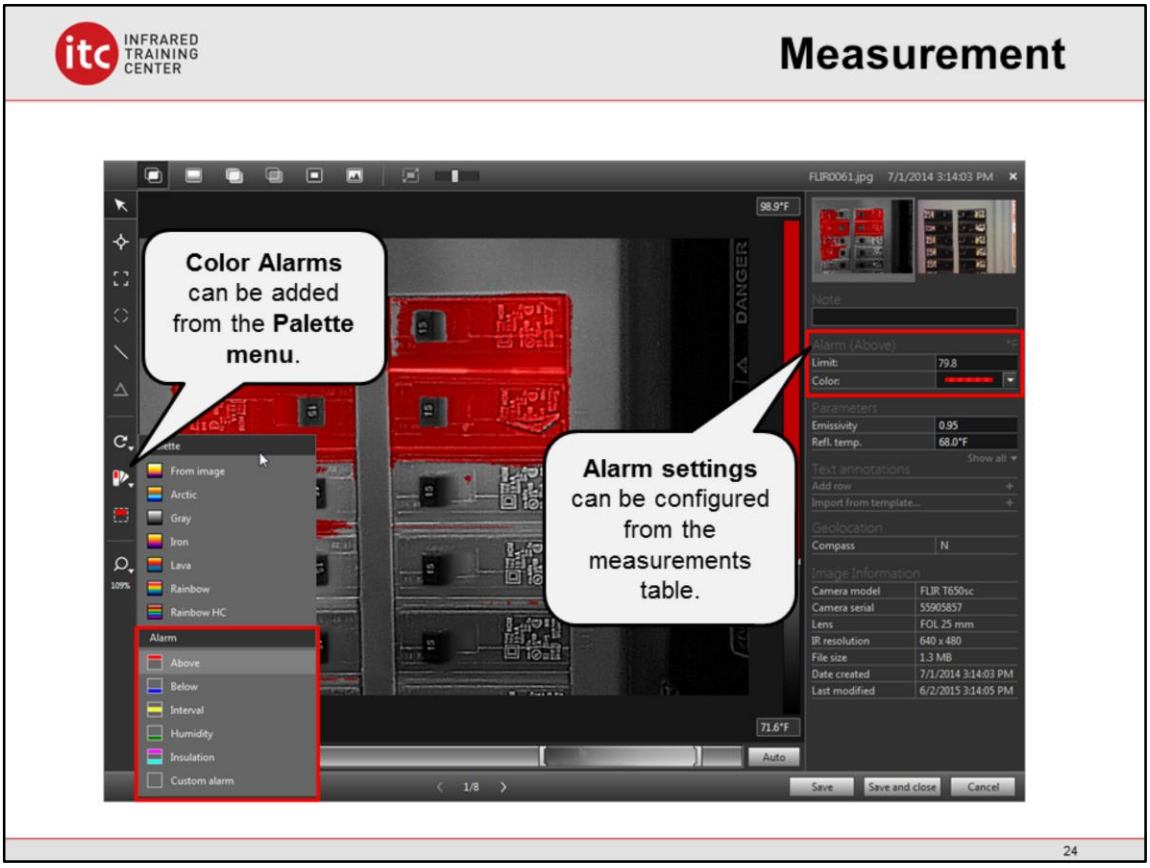


FLIR Tools offers a number of color palettes that can be applied to the image. Color palettes can help with image interpretation in certain cases.



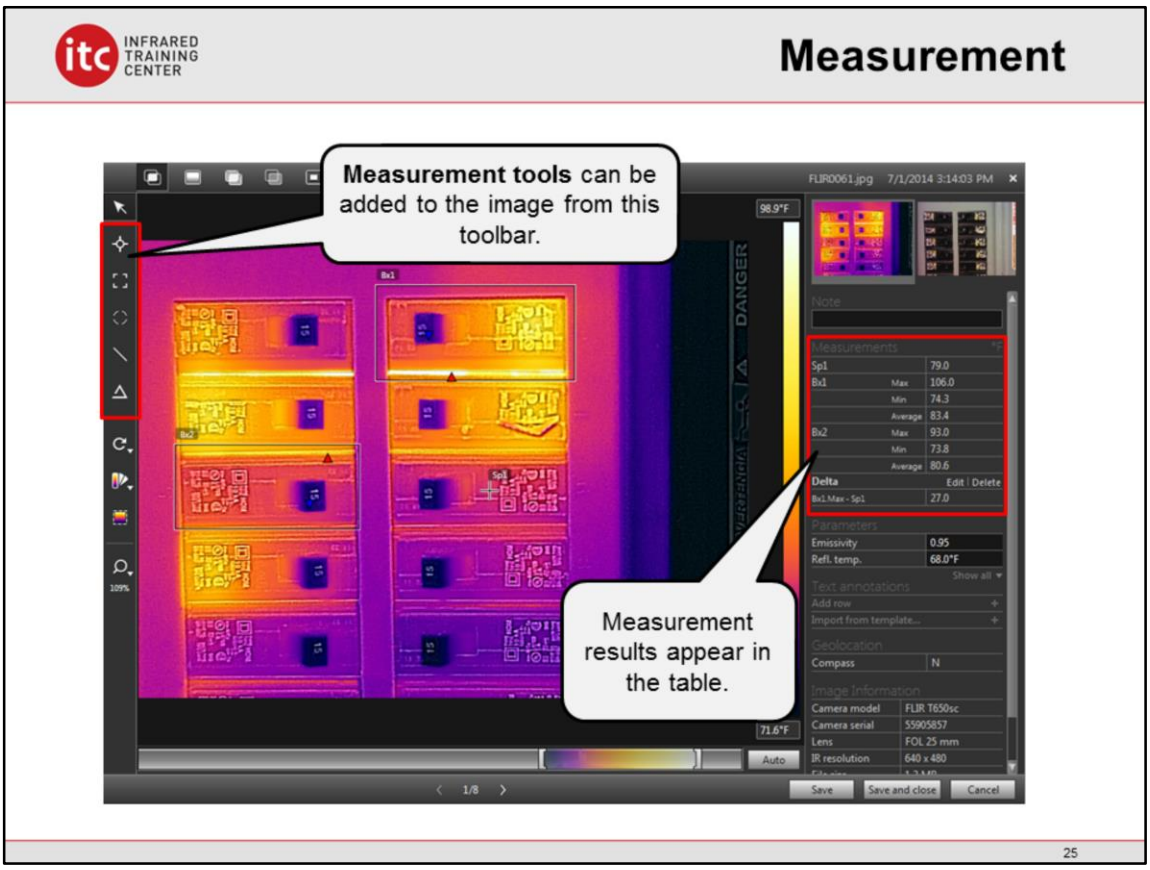
The **Color Distribution** menu allows you to change how the colors are being spread across the image.

Histogram Equalization is the most common mode used by most handheld cameras. This can help to optimize thermal contrast, particularly when you have small areas of relatively high temperatures compared to a cooler background. **Signal and Temperature Linear** will linearize the color scale based on pixel values or temperatures, respectively.

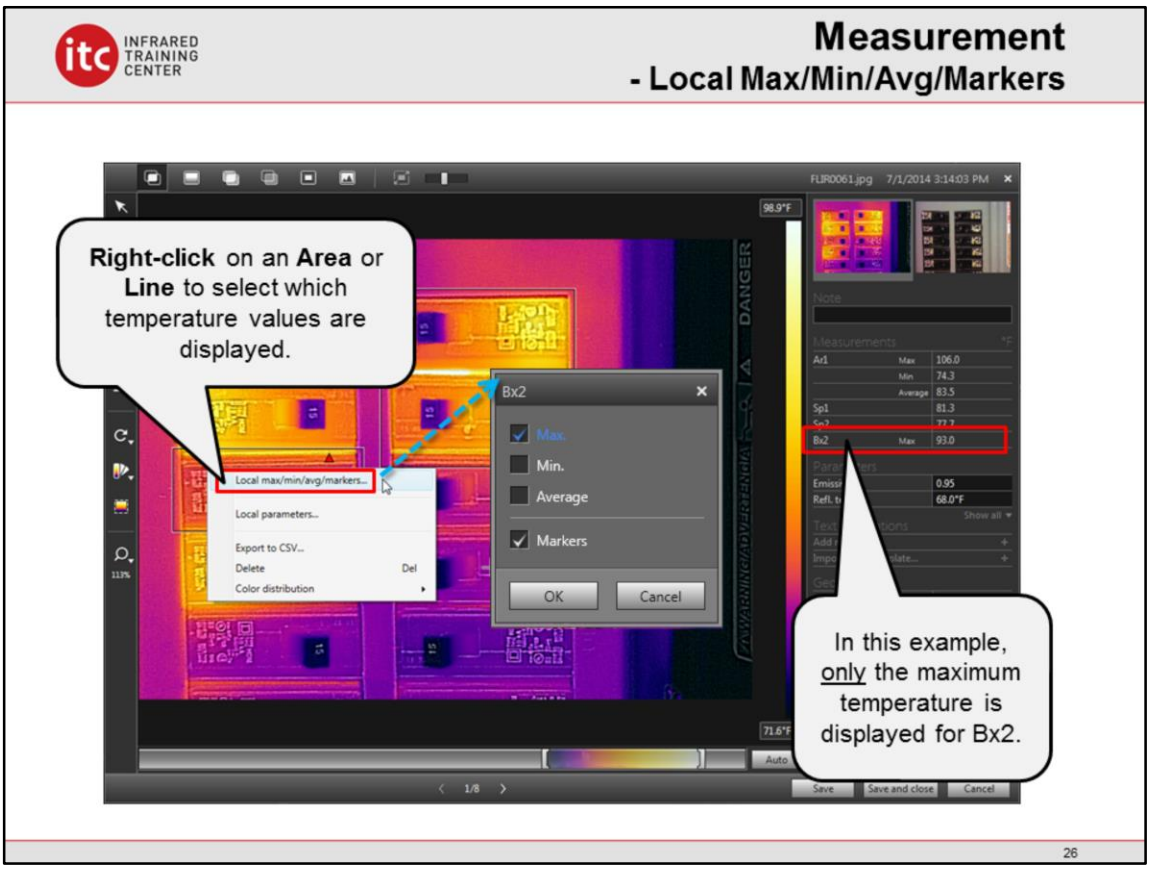


Color alarms, also known as isotherms, can be added to the image from the Palette menu. Alarm settings can be adjusted from the measurements table to the right of the image.

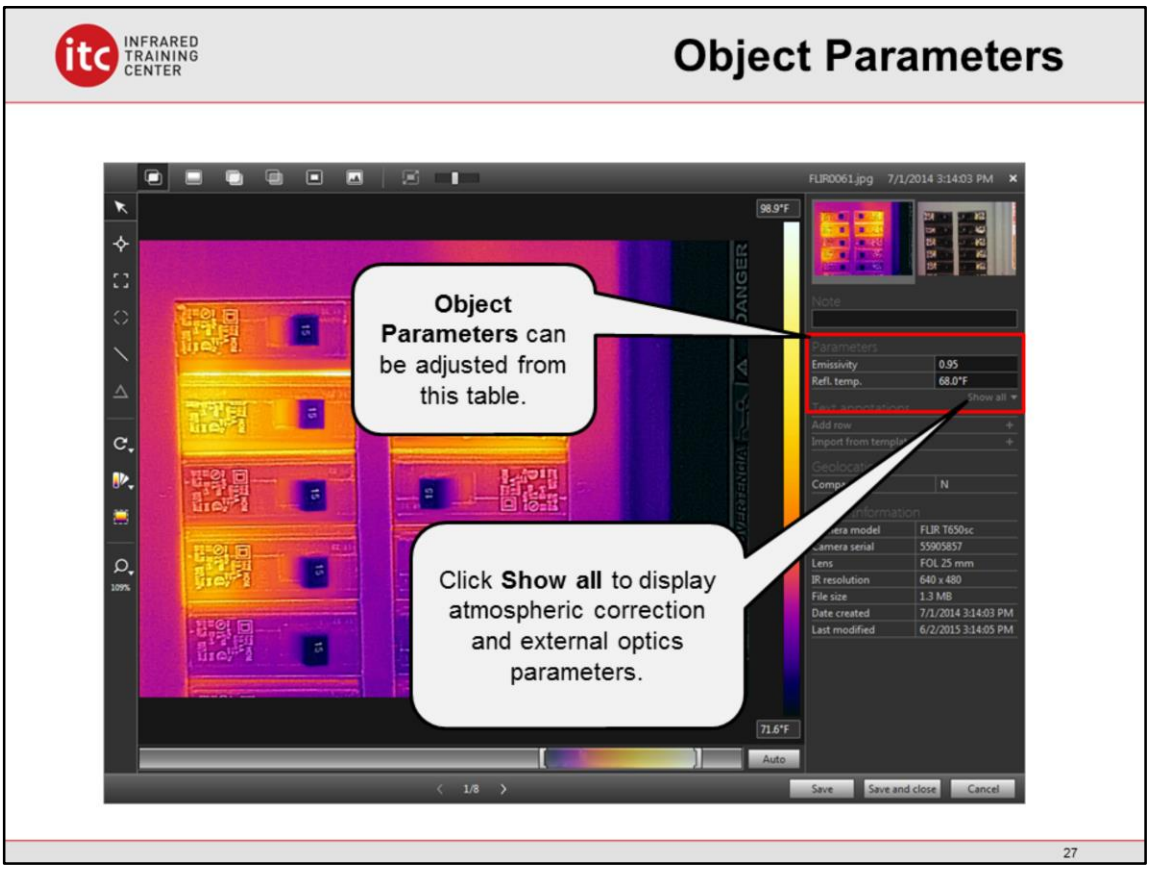
There are also building alarms for detecting areas of potential moisture and insulation problems.



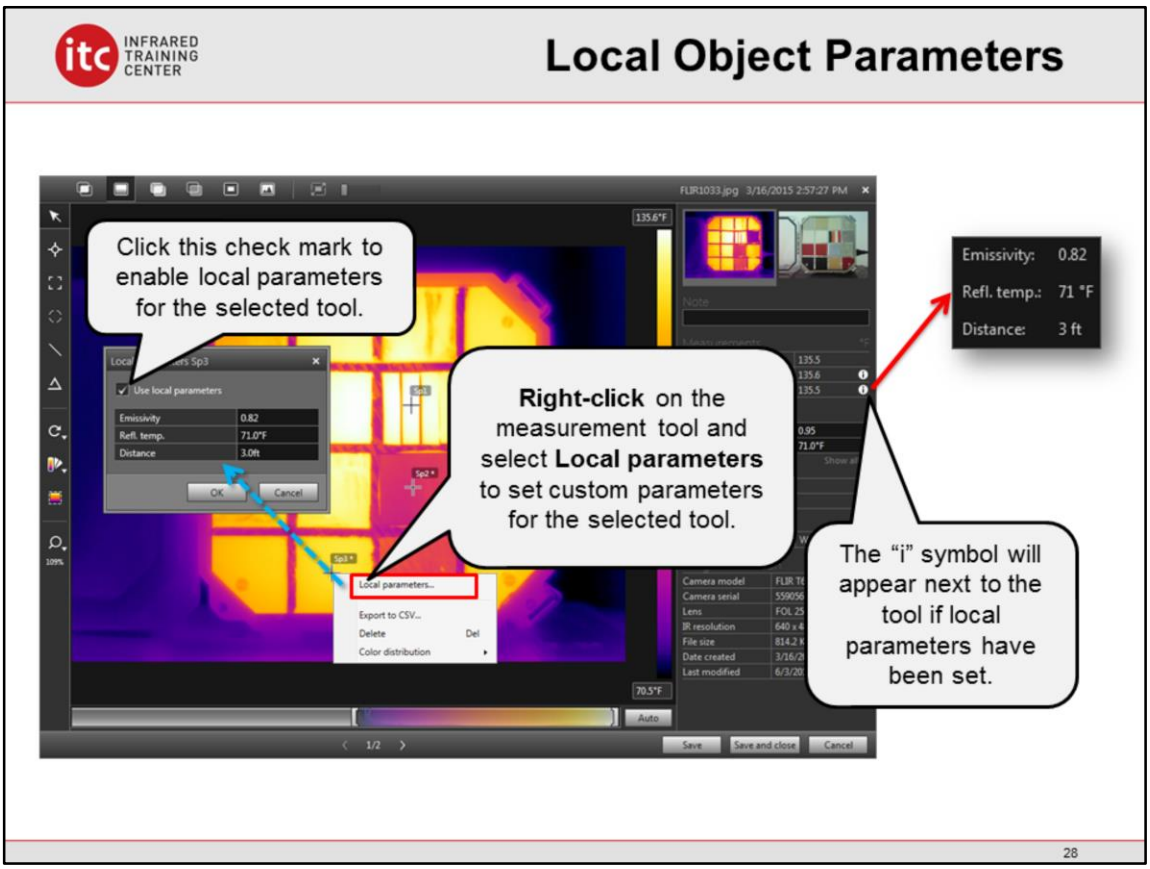
Spot meters, areas, lines, and difference functions can be added to the image. Measurement results can be viewed in the table to the right of the image.



Temperature information displayed about areas and lines can be customized if you **right-click** and select the **Local max/min/avg/markers** menu. You can choose any combination of parameters to display in the Measurements table. You can also show or hide the min/max markers on the image.

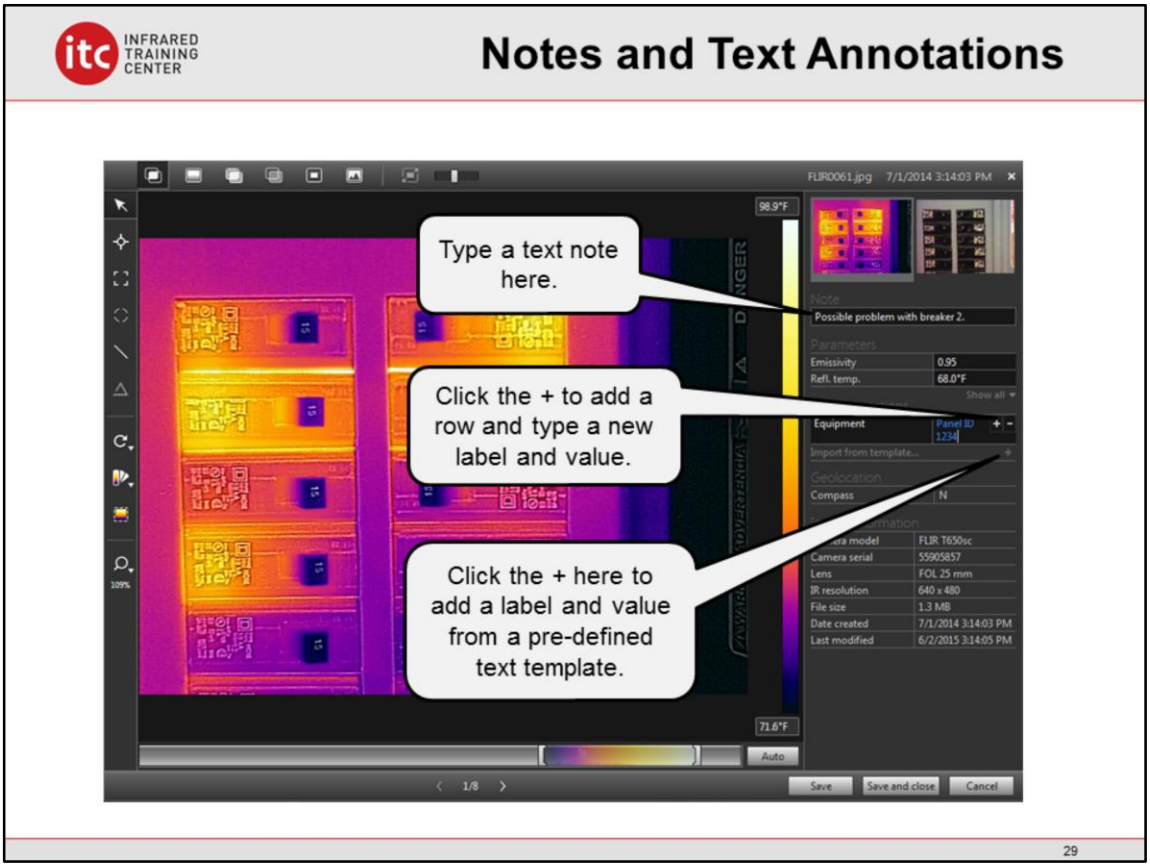


Emissivity, reflected temperature, and other object parameters can be easily adjusted from the table to the right of the image. These parameters have an impact on the accuracy of temperature measurements. Click **Show All** to display the atmospheric temperature, humidity, distance, and external optics parameters.



Local object parameters can help in cases where you have a variety of different materials in the same image. You can set the emissivity for each measurement tool to reflect the material being measured. Right-click on the measurement tool and click **Local Parameters**. You can use local settings for emissivity, reflected temperature, and distance.

If local parameters have been set an "i" symbol will appear next to the measurement tool. If you hover over the "i" symbol with the mouse a small window will appear showing the local parameter settings.

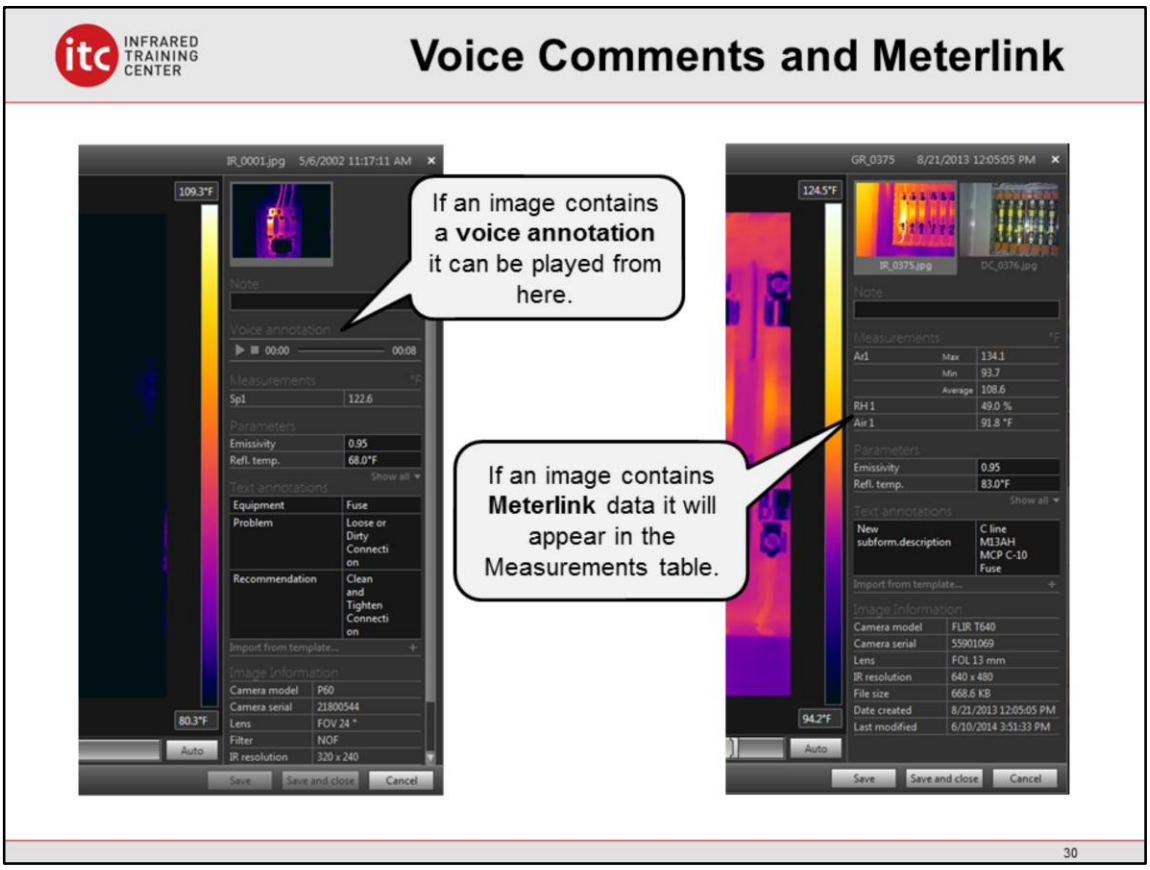


Notes and text annotations can be added and saved with the image. The **Note** field is meant for a brief note, perhaps describing your findings.

If you click the + symbol in the **Text Annotations** section you can add a row with a label and value field.

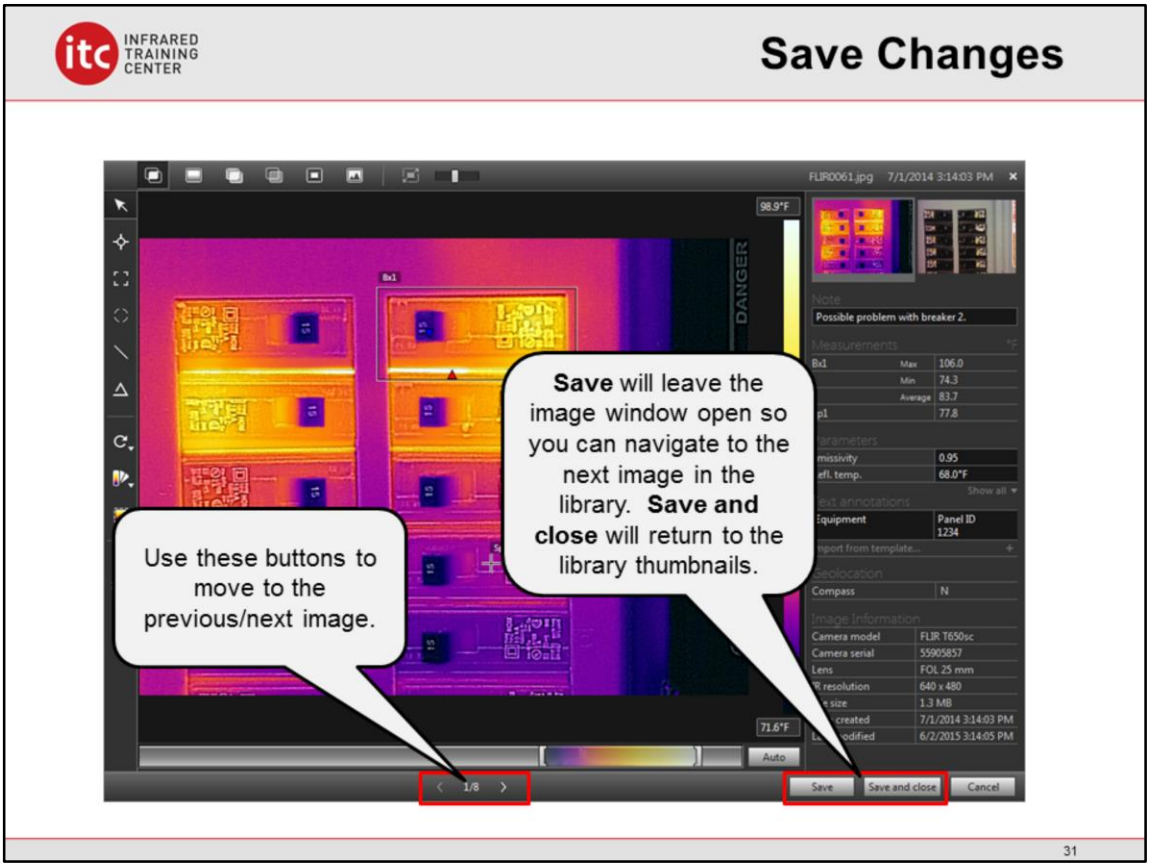
If you click the + next to **Import from template** you can import text labels and values from pre-defined text annotation templates. See the section on “Text Annotation Templates” for more details.

If an image contains text from a camera then it will appear automatically.



If an image was saved with a voice annotation in the camera, a playback bar will appear in the table to the right of the image. Click the Play button to listen to the voice annotation with your PC speakers.

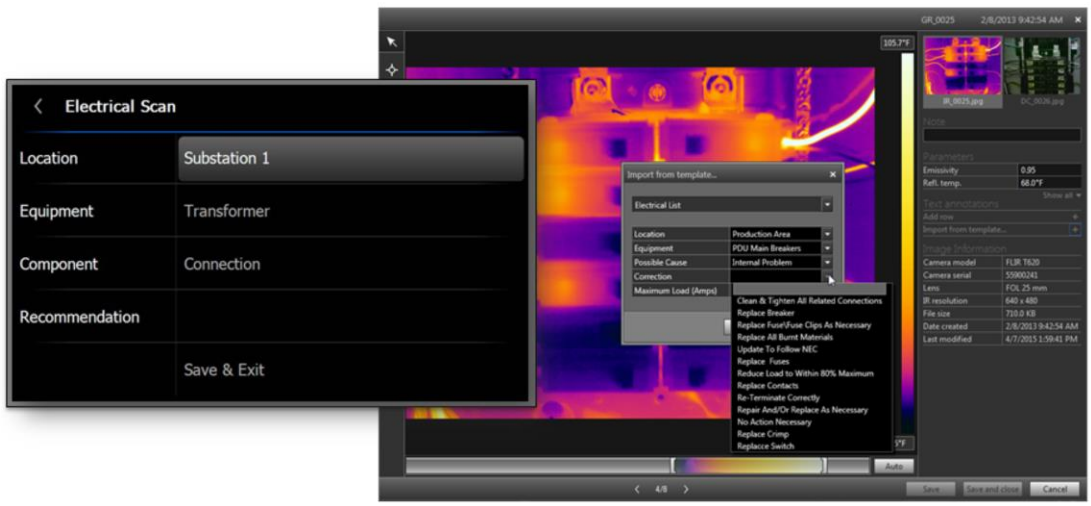
If an image is saved with Meterlink data this will appear in the measurements table to the right of the image.



Click the **Save** button to save changes to the image. The image window will remain open so you can navigate through the library images. Click **Save and close** to return to the image library.

Text Annotation Templates

Text Annotation Templates can be used by some FLIR cameras to annotate images while they are being saved in the camera. These templates are also accessible while editing the image in FLIR Tools. The selected text is saved with the JPEG file and will appear in the reports automatically.



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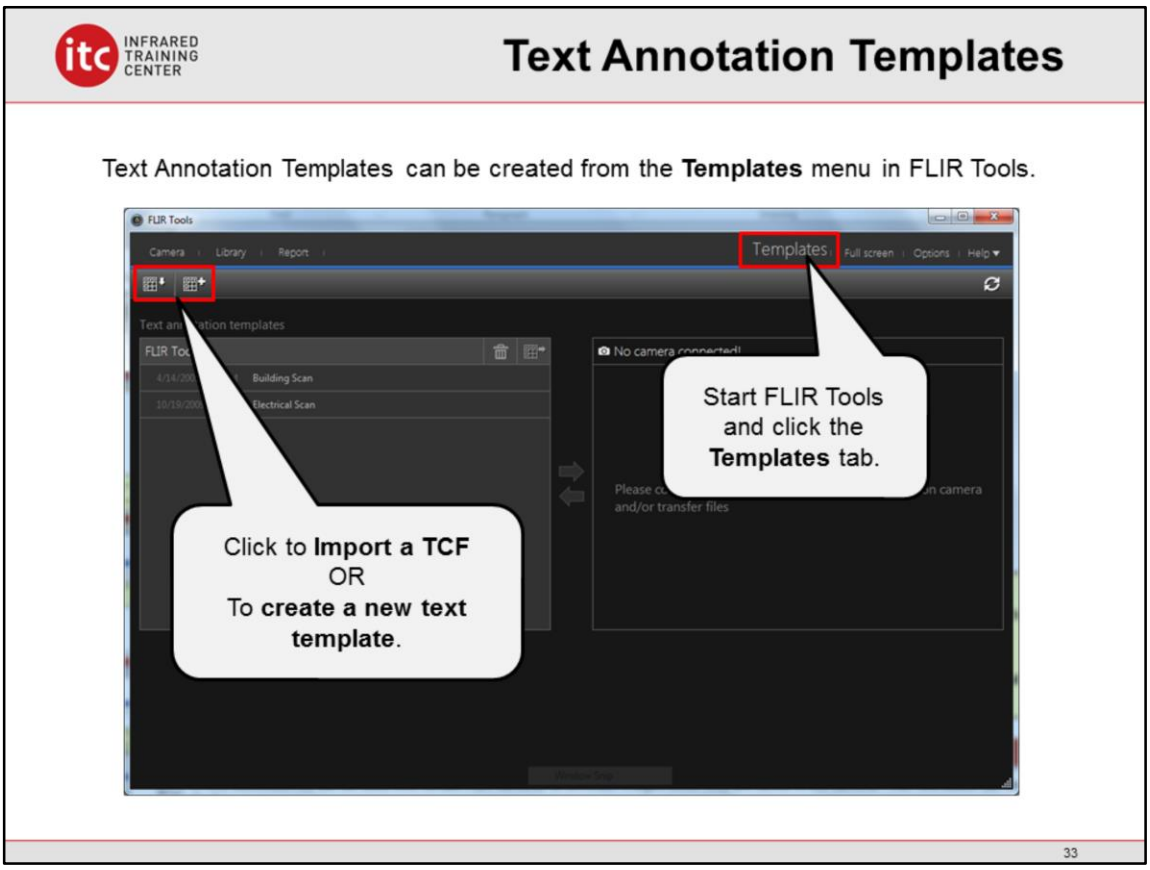
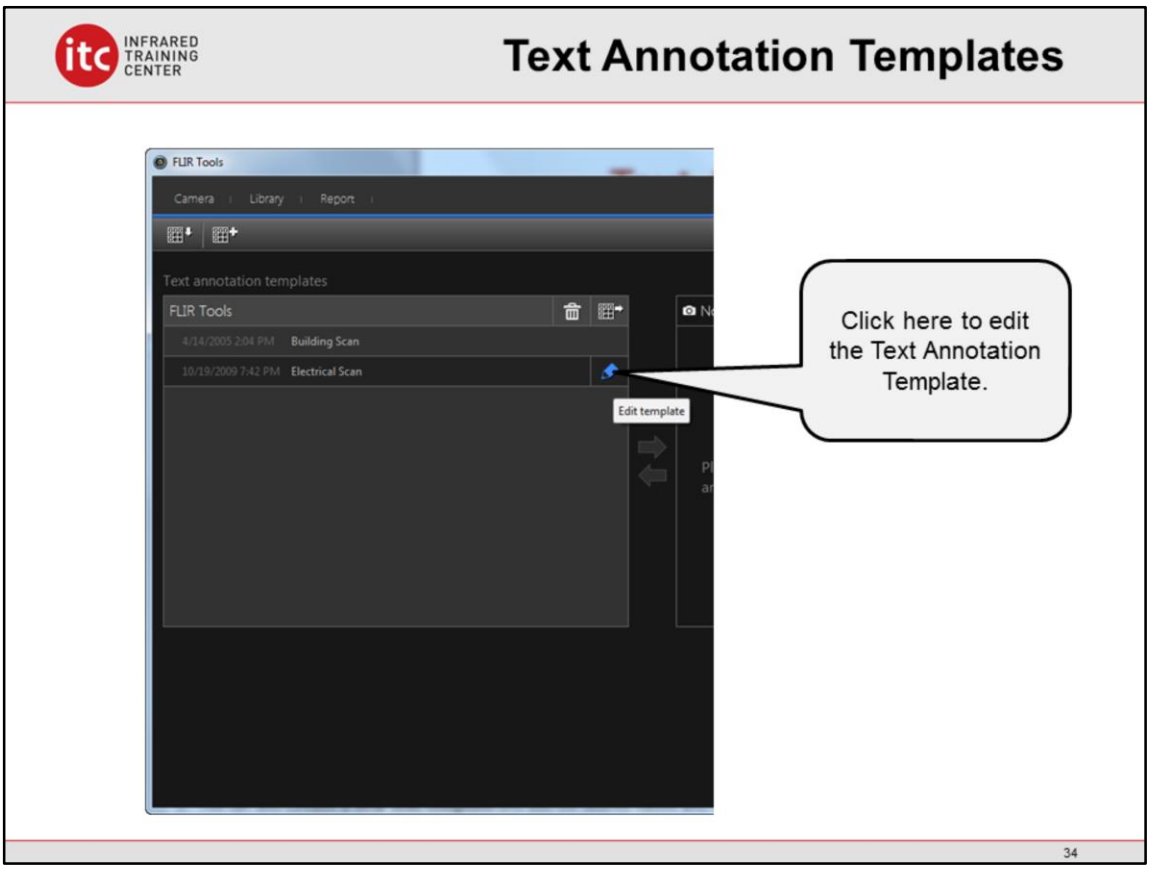
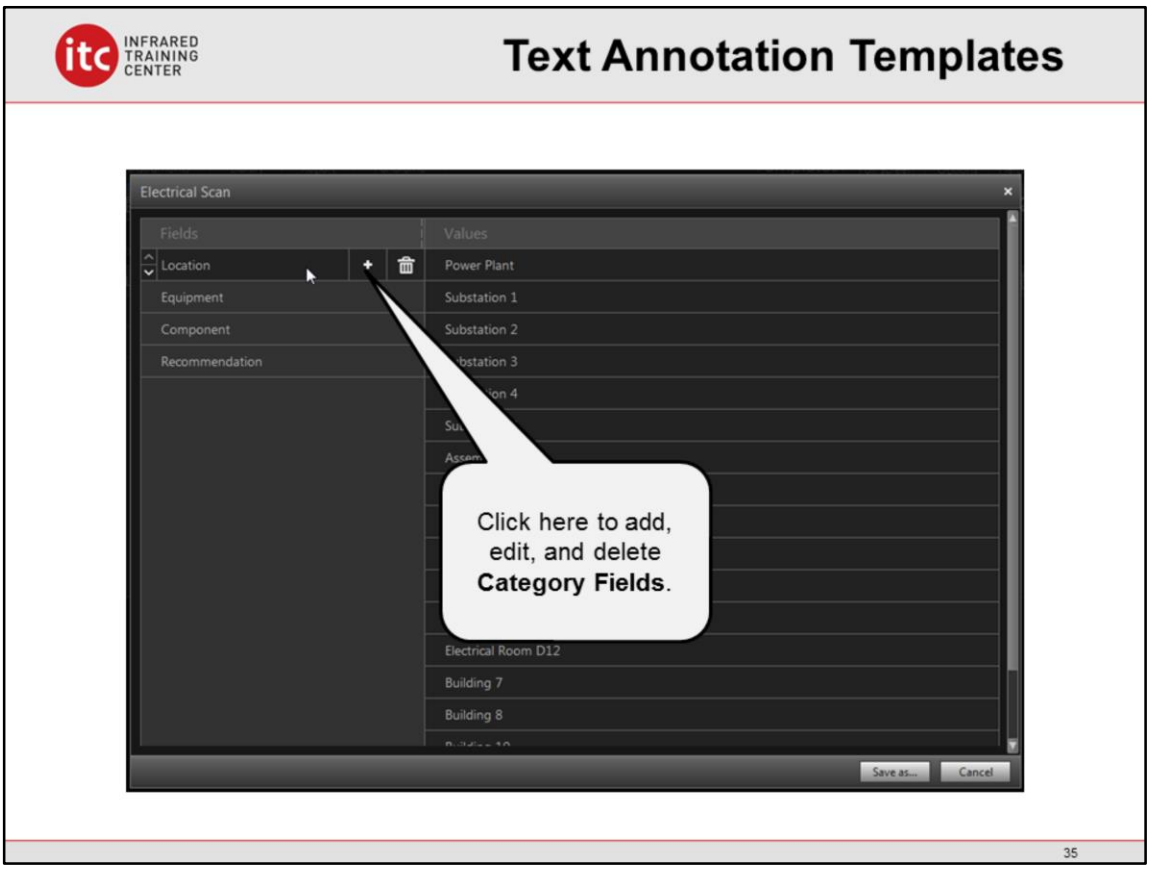


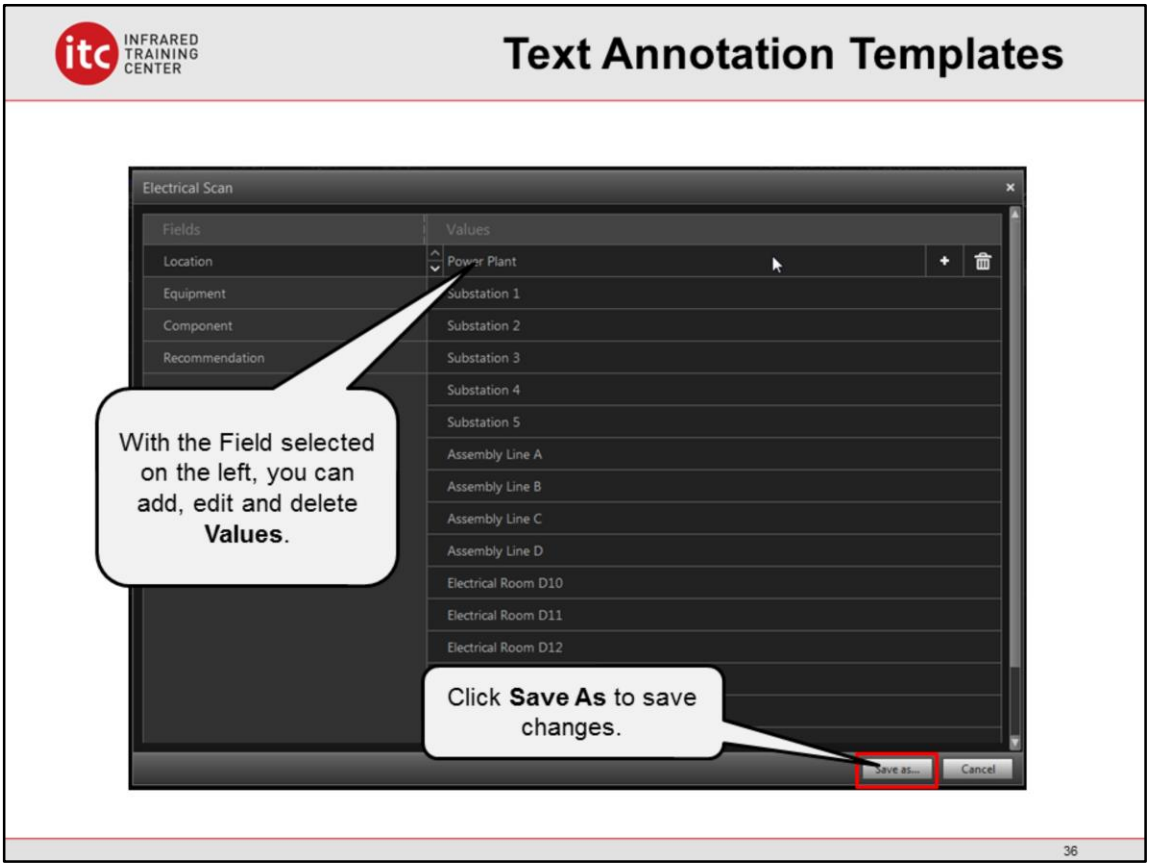
From the Templates tab:
Click to **Import a TCF** file. This can be a file created from an older version of Reporter, or a file that has been exported from FLIR Tools.
You can also **Create a new text template** and add the desired values and fields.



If you have an existing text template you can click the small “pencil” icon to edit the template.

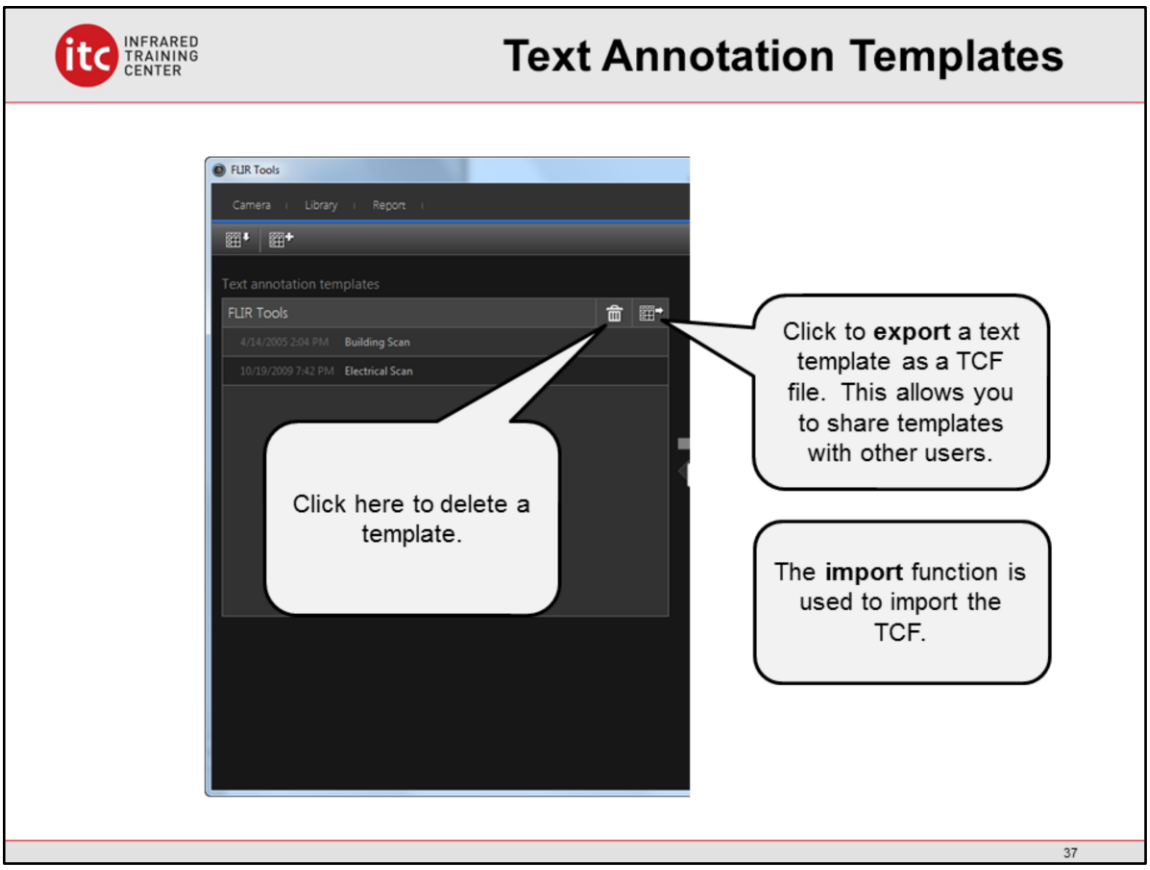


A text template contains a list of Fields (or categories) and Values (related to each Field). You typically will have several values for each field. If you click on a field you can type new text. If you hover over the field with the mouse you will see an option to add a new row and to delete an item from the Template.

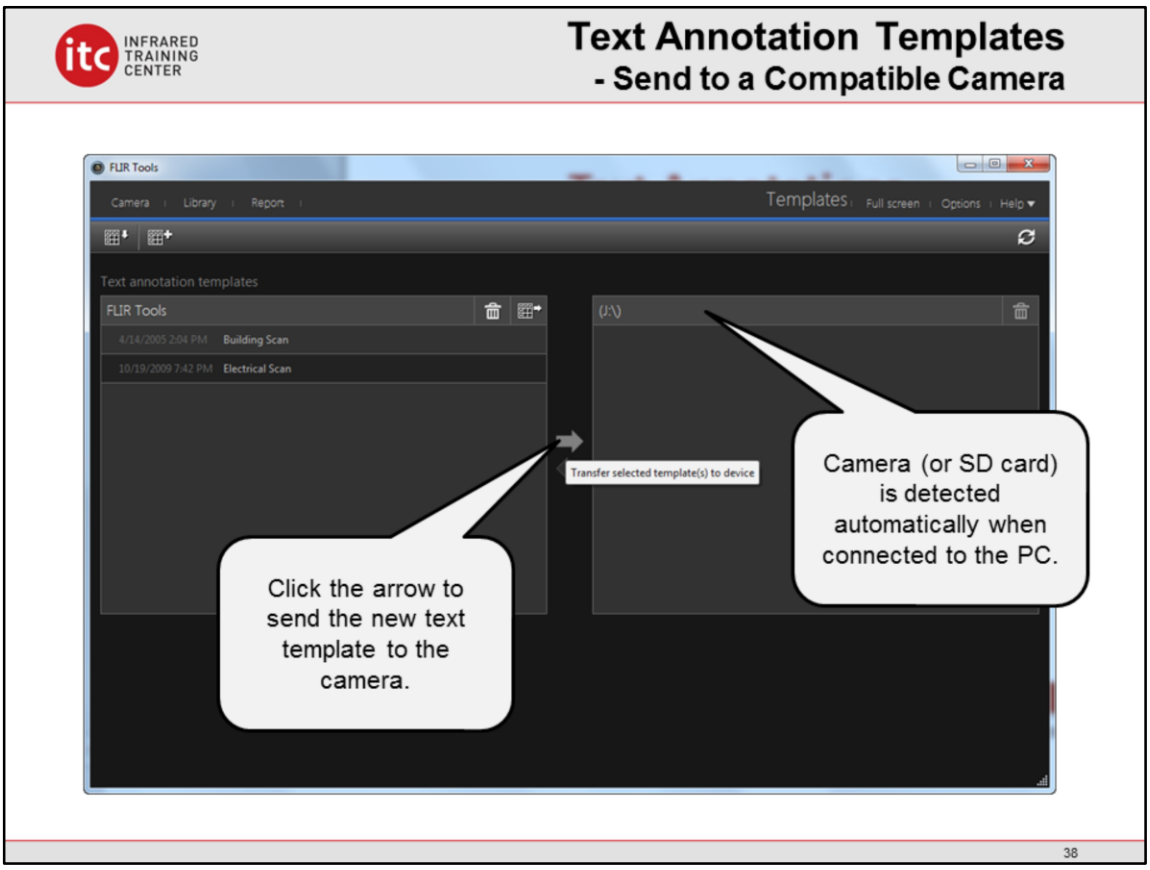


If you select a Field from the left column you can begin to add/edit related Values. These values are the choices that will appear when you select the field.

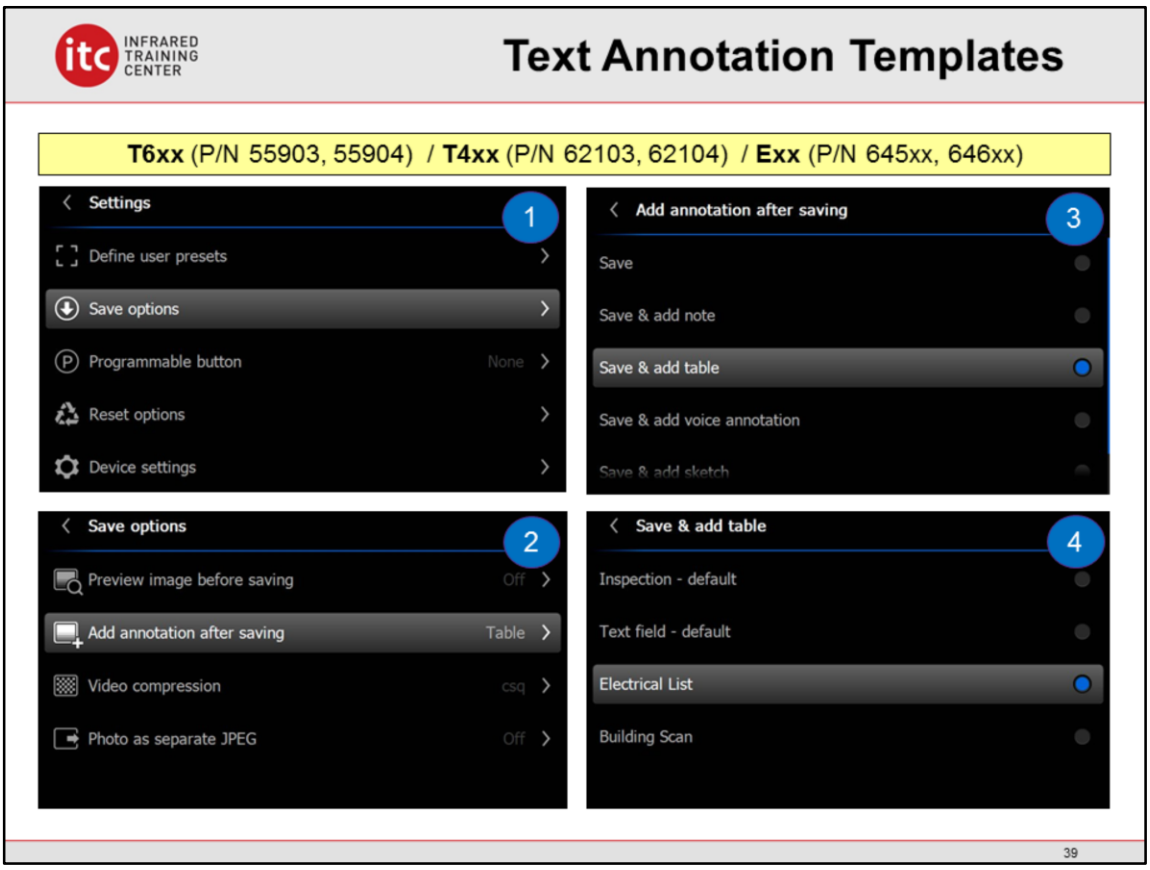
When you are done editing the template click **Save As** to save changes.



The **Export button** allows you to export the text template as a TCF file. This provides a way to share the template with other Thermographers, and can also help if you move to a new PC.

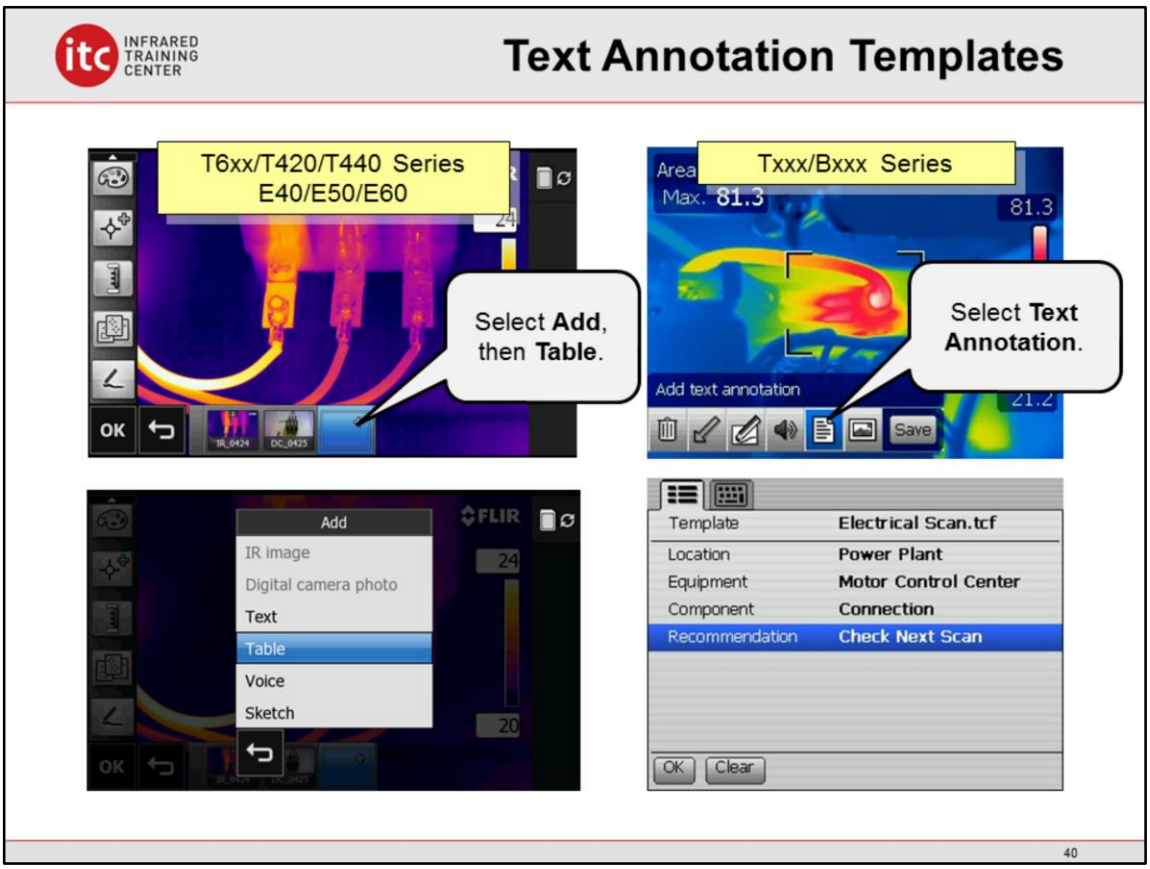


If you connect a compatible camera via the USB cable, or plug the SD card into the PC, FLIR Tools will recognize the device and show a drive letter. When you are ready to send the template to the camera simply click on the desired template file, click the arrow button, and that will place the template in the camera memory. Now you can disconnect and begin storing images with text!



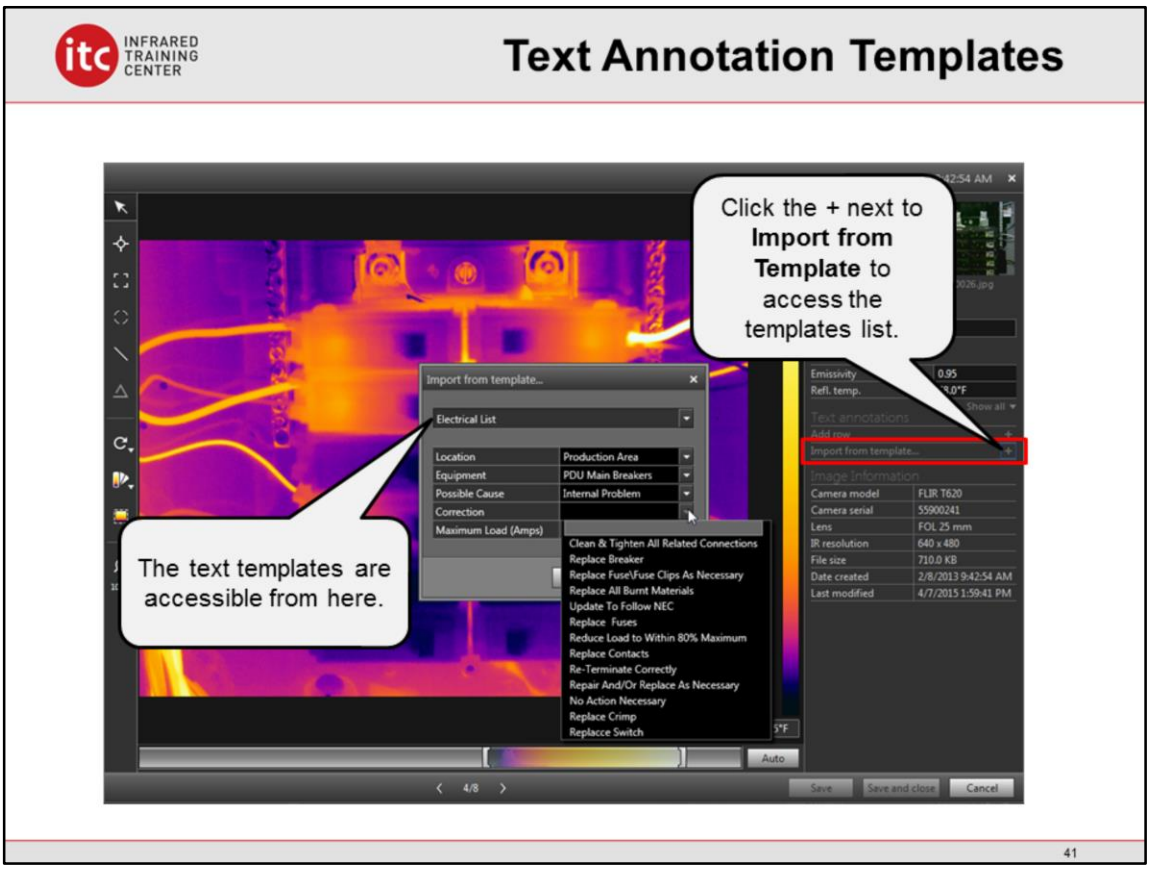
If you have the T6xx (P/N 55903, 55904) or T4xx (P/N 62103, 62104) or Exx (P/N 645xx, 646xx):

1. From the Settings menu choose **Save Options**.
2. Choose **Add annotation after saving**.
3. Choose **Save and Add Table** or **Save and add any annotation**.
4. Select the text template you wish to use when saving images.



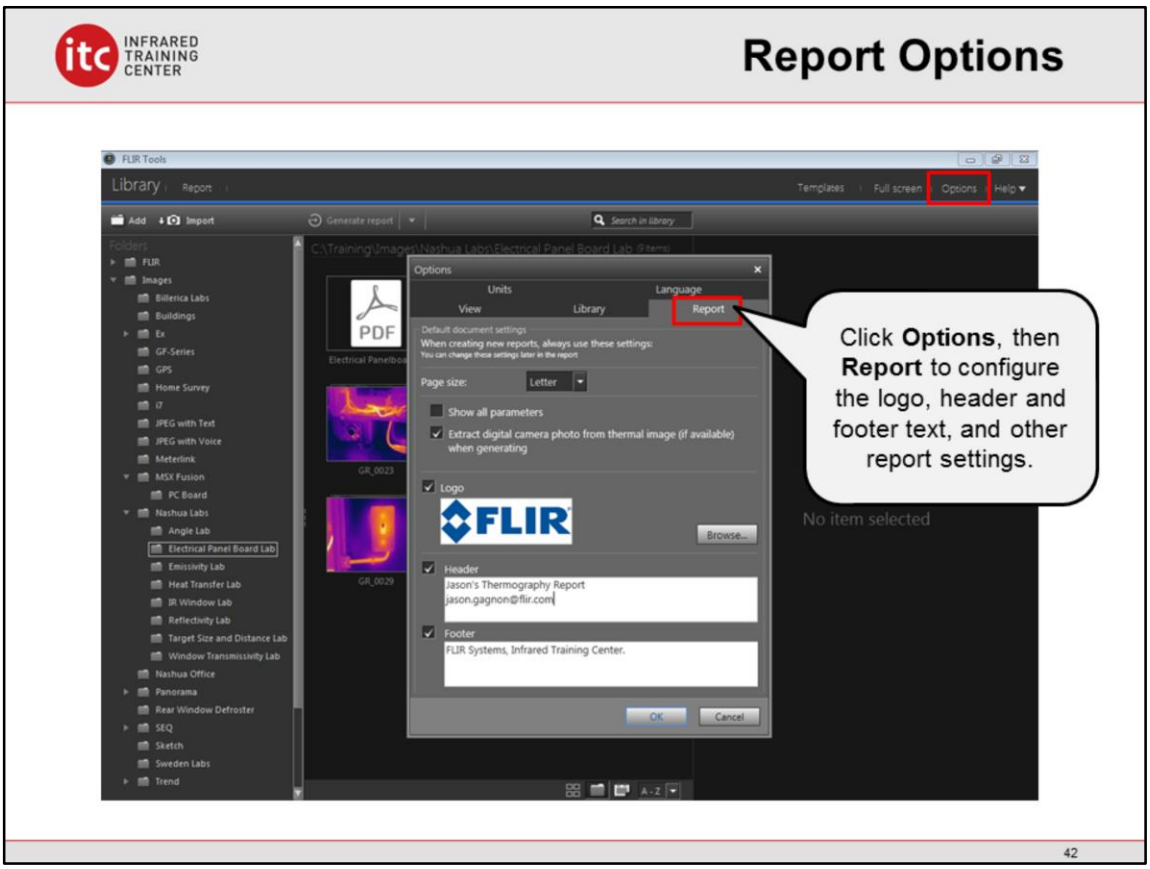
If you have the T6xx, T420, T440, or Exx camera:
Preview the image.
Select **Add** (the + button).
Select **Table**.
Chose the desired fields and values.

If you have a Txxx, Bxxx (or similar):
Preview the image so the toolbar appears at the bottom.
Select the **Notepad** button.
Choose the first tab and select the desired values for each field.



The same text annotation templates are available when editing the image in FLIR Tools, regardless of whether the text is used in the camera.

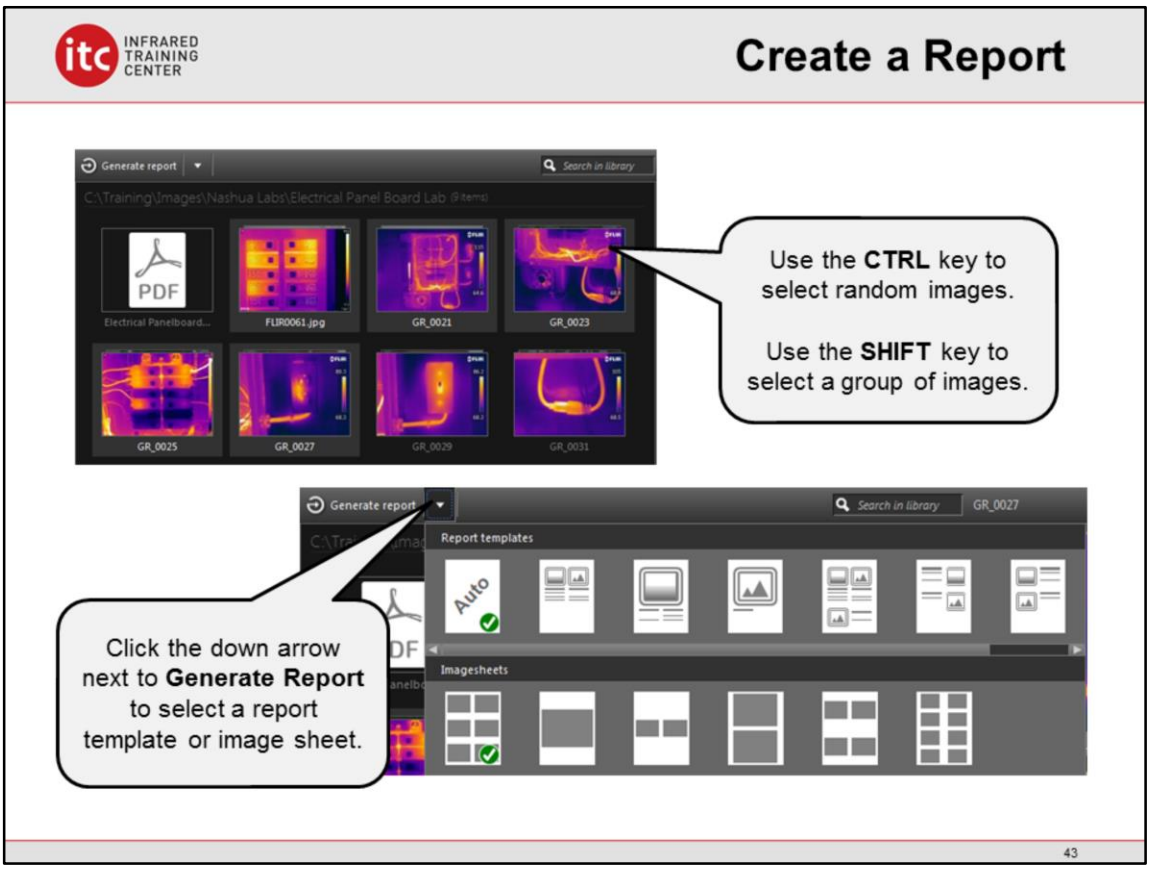
Click the + next to **Import from Template** to display a list of text annotation templates. From the pull-down menu choose the desired template. Then, choose the appropriate values for each label. The image will be saved with the selected text fields, and the text will appear in the report.



If you click **Options**, then **Report**, you can configure the report logo and add header and footer text for the report page. You can also select the page size.

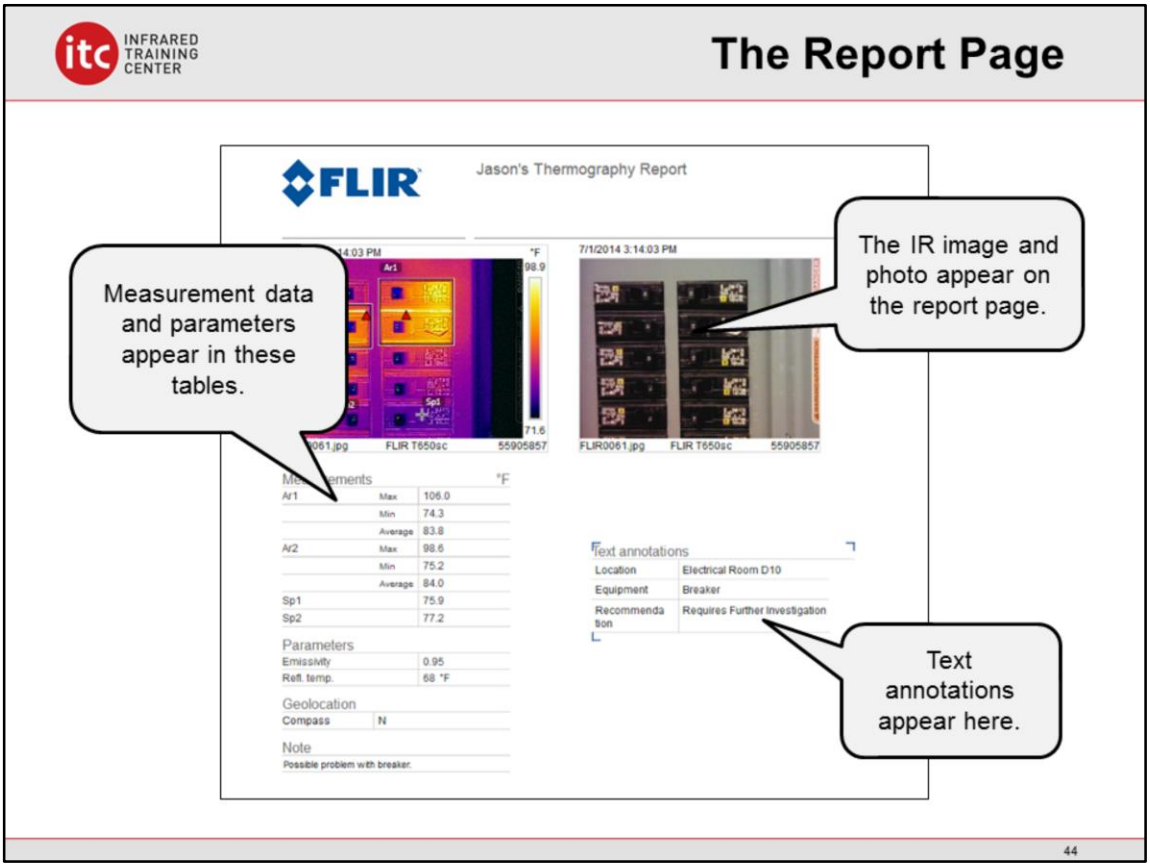
The **Show all parameters** checkbox will display all object parameters on the report, rather than just emissivity and reflected temperature.

The **Extract digital camera photo….** checkbox will extract the visual photo from fusion images and place it on the report page next to the infrared image.

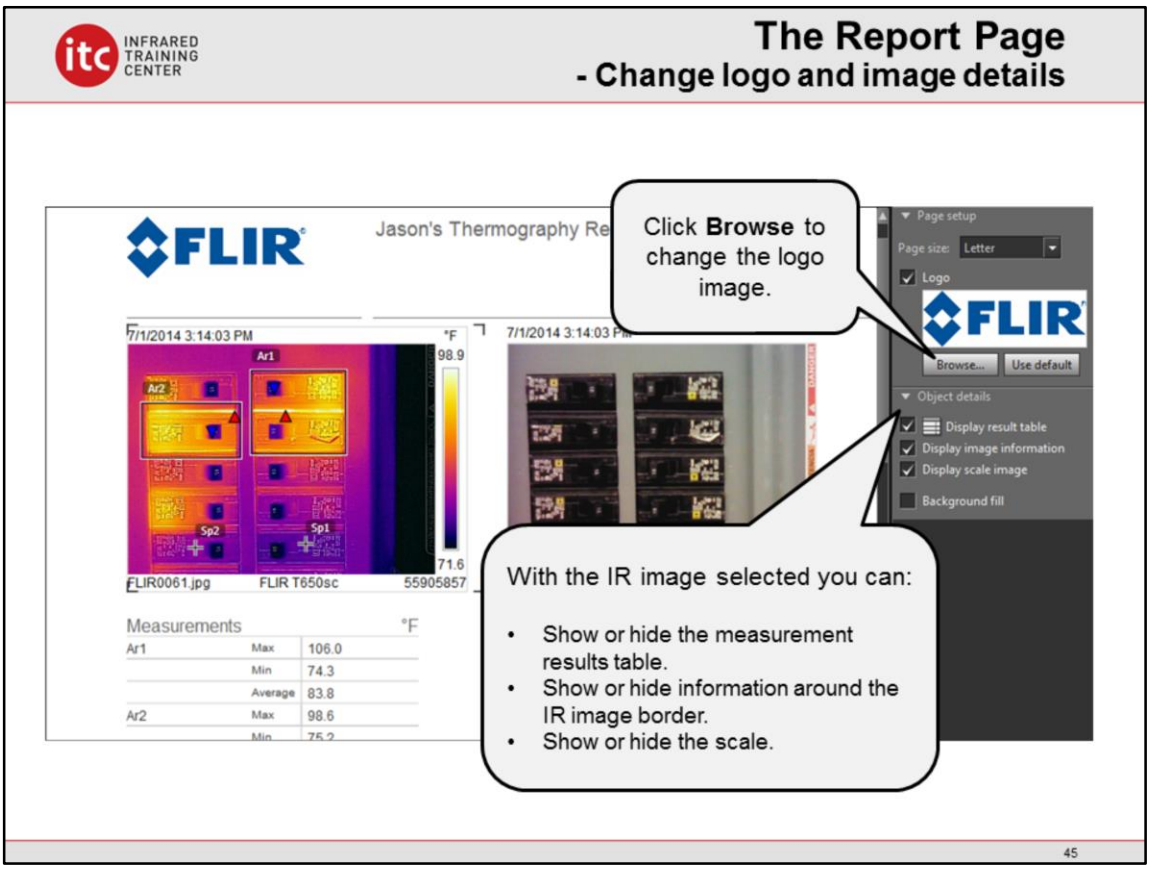


The first step of the report creation process is to select the images. If you hold down the **CTRL** key you can select multiple, random images in the library. The **SHIFT** key can be used to select a group of images; click the first image, hold down **SHIFT**, and then click the last image in the group.

With the desired images selected, click the down arrow next to **Generate Report** and click on the template or image sheet you wish to use.



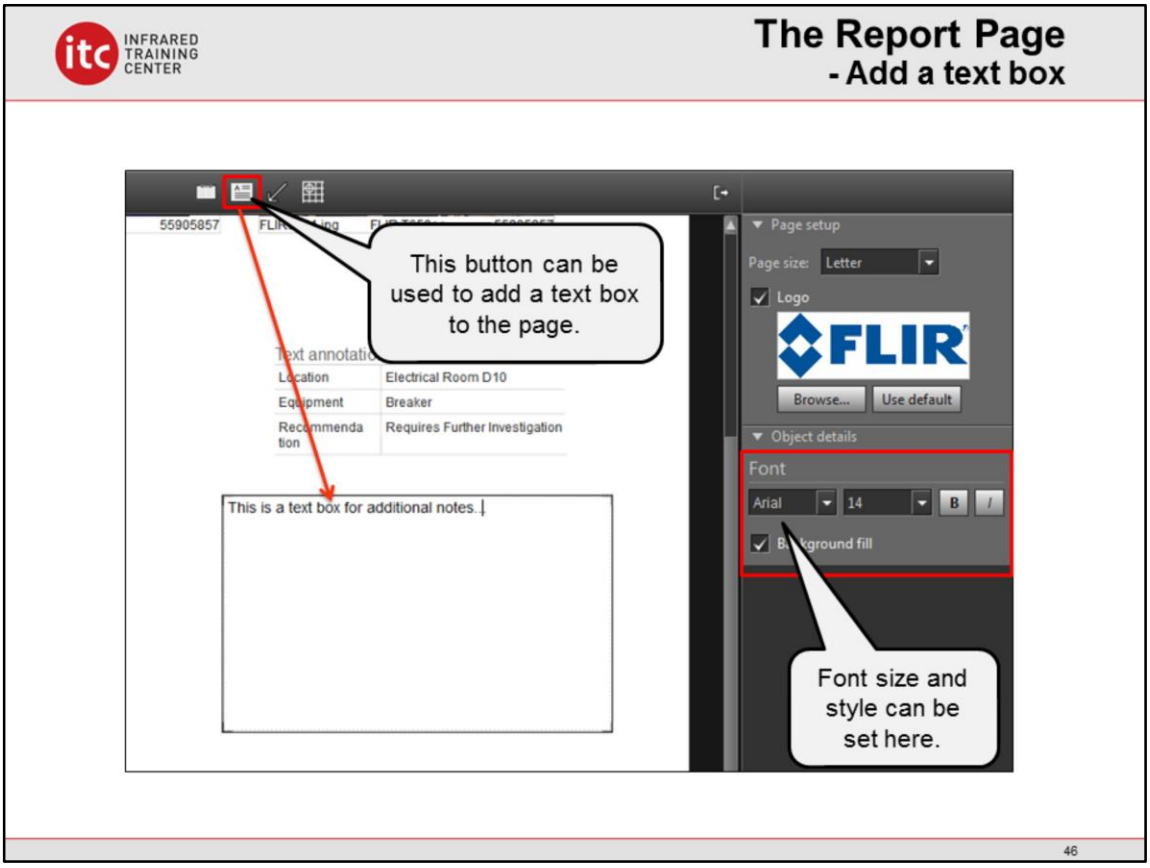
Each template has a different page layout, however most templates show the IR image and photo, the measurements table, and any notes and text annotations that have been added to the image.



If you click on the IR image some additional options will appear to the right of the page that control what is displayed:

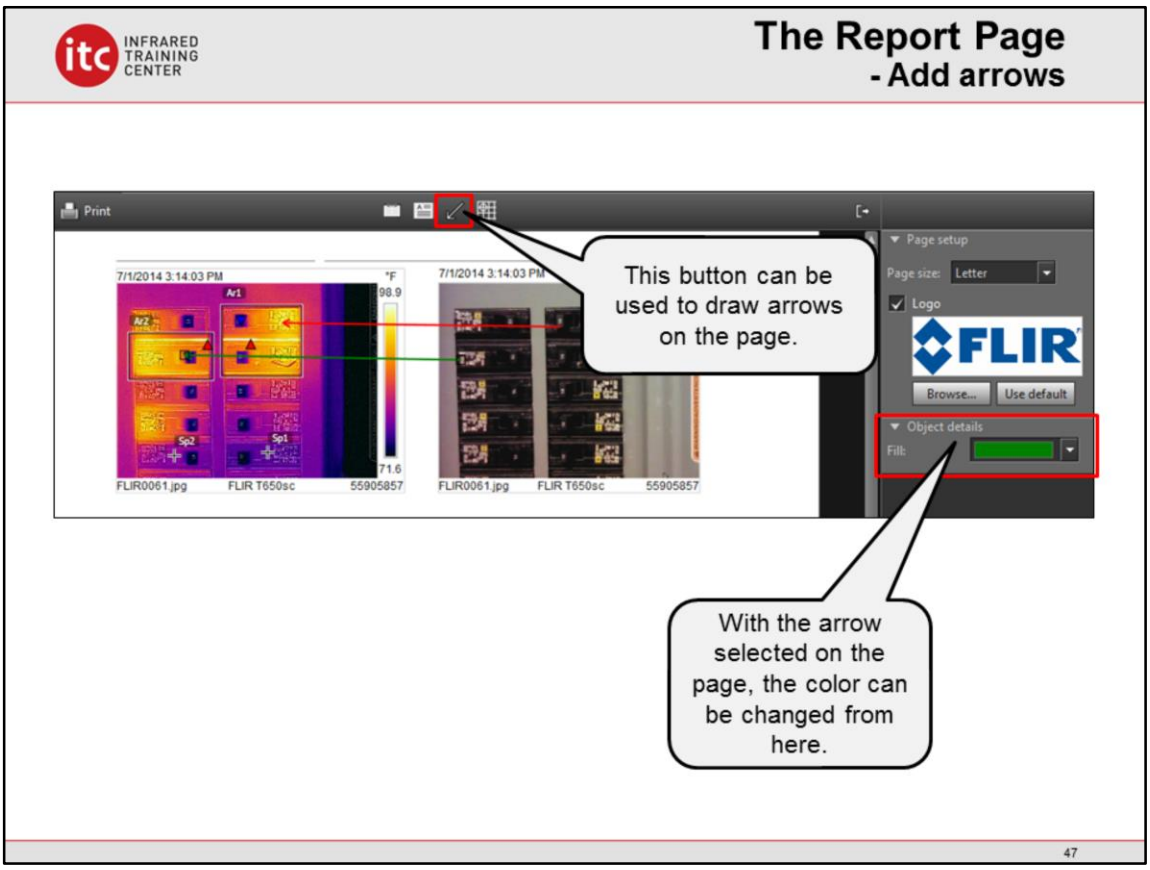
1. The first check mark under object details allows you to show or hide the measurement results table.
2. The second checkmark will show or hide the information around the IR image border (date, time, serial number, etc.).
3. The third checkmark will show or hide the scale.

You can also change the logo that is shown on the page, or uncheck the logo box to hide it.



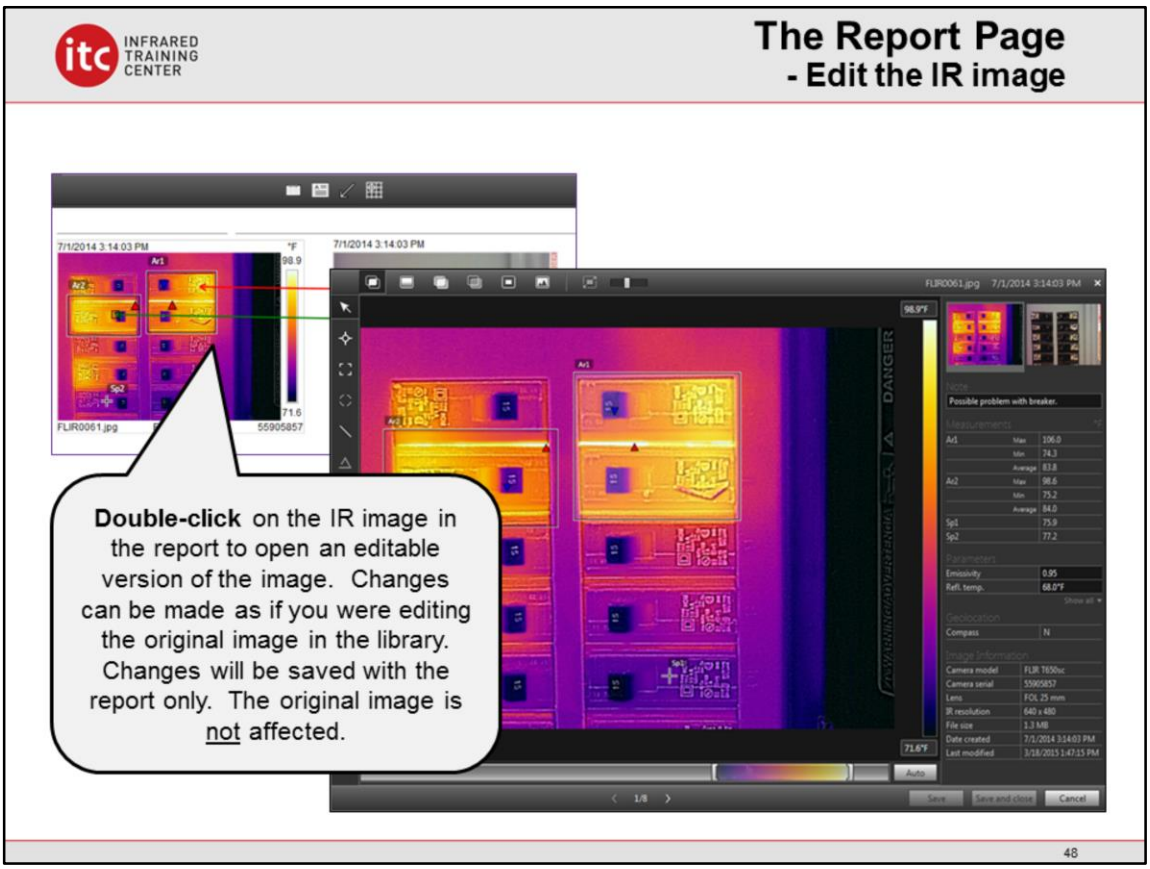
The **insert new textbox** button can be used to add a text box to the report page, for additional notes about your findings. Just click the button to select it, then click and drag anywhere on the page.

With the text box selected, the font options will appear in the panel to the right of the page.

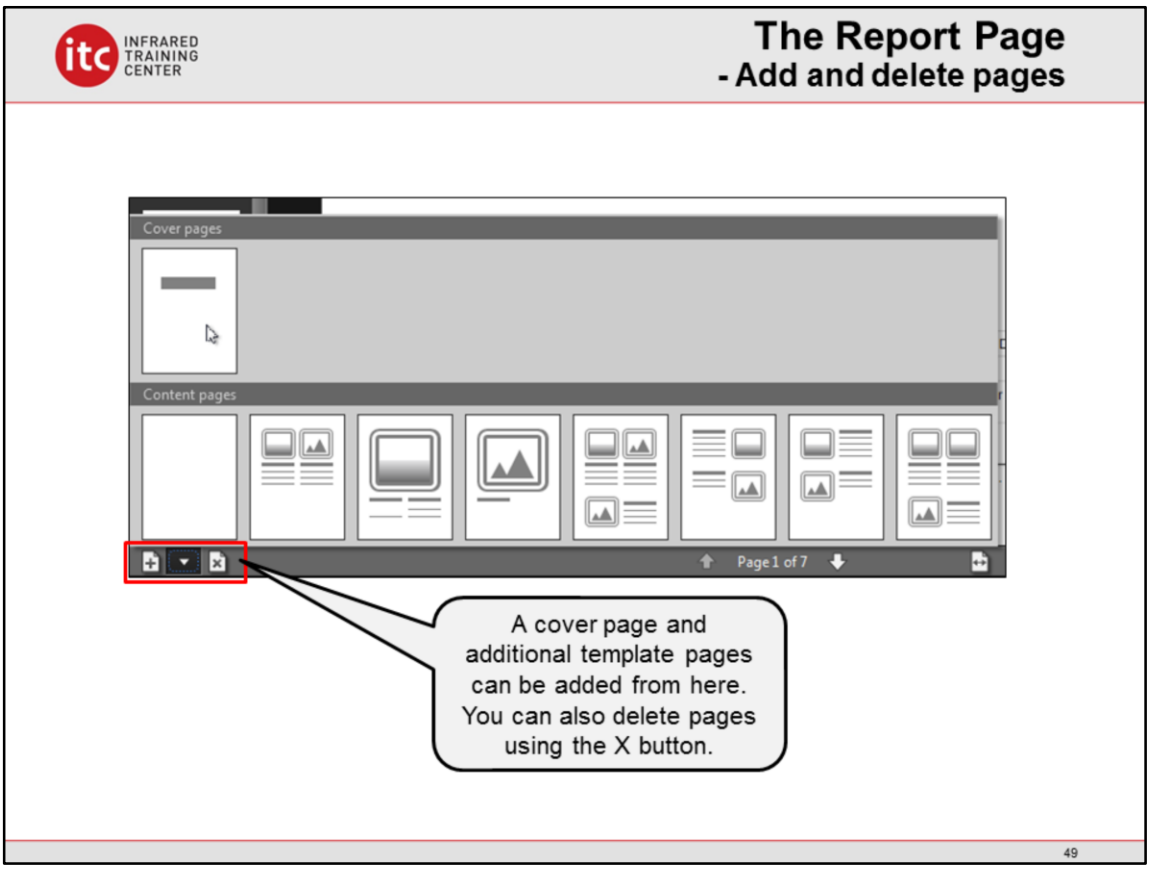


The **insert new marker** button can be used to draw arrows on the page. This is often used to correlate a problem on the IR image with the visual photo, to make it easier for the person reading the report to identify the location of the fault. Just click the marker button to select it, and then click and drag to draw it on the page.

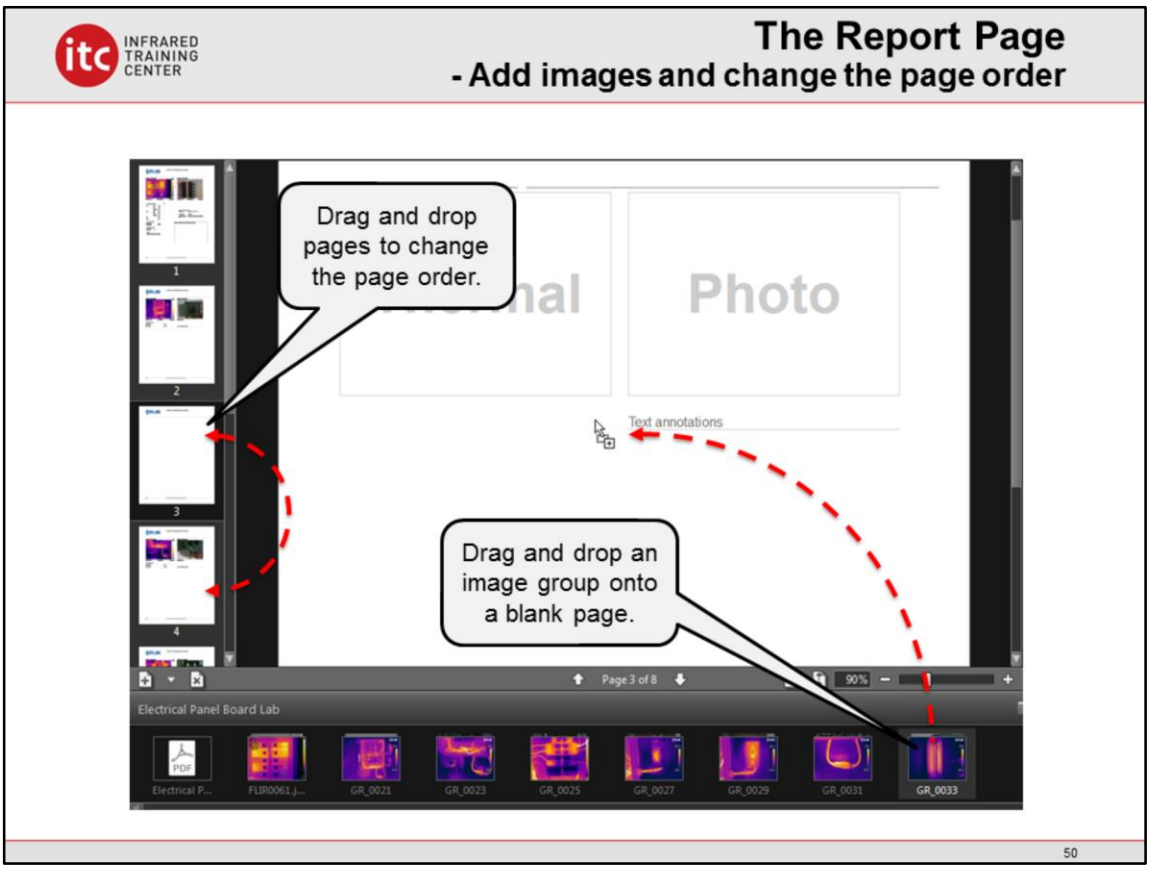
With the arrow selected on the page the color can be changed in the panel to the right of the page.



Even though the report is made, you can still edit the thermal image to make changes to the scale, parameters, and measurement functions. Simply double-click on the IR image on the report page. The image editor window is identical to what you see when editing the image in the library. Any changes made in the report, however, will not affect the original image in the library.

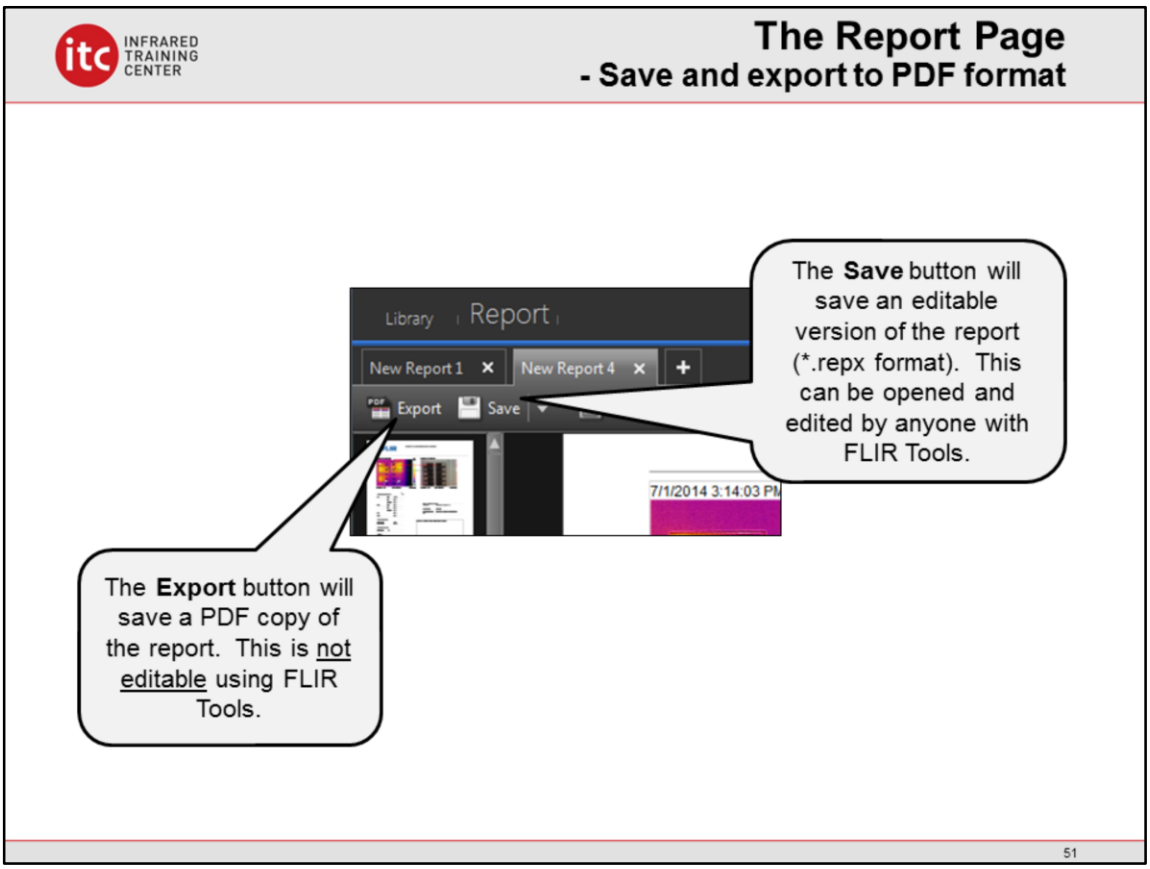


If you click the arrow button in the lower-left corner it will show a list of cover and content pages that can be added to the report. Click on the desired page to add it to the report. You can also click the X button to delete a page.



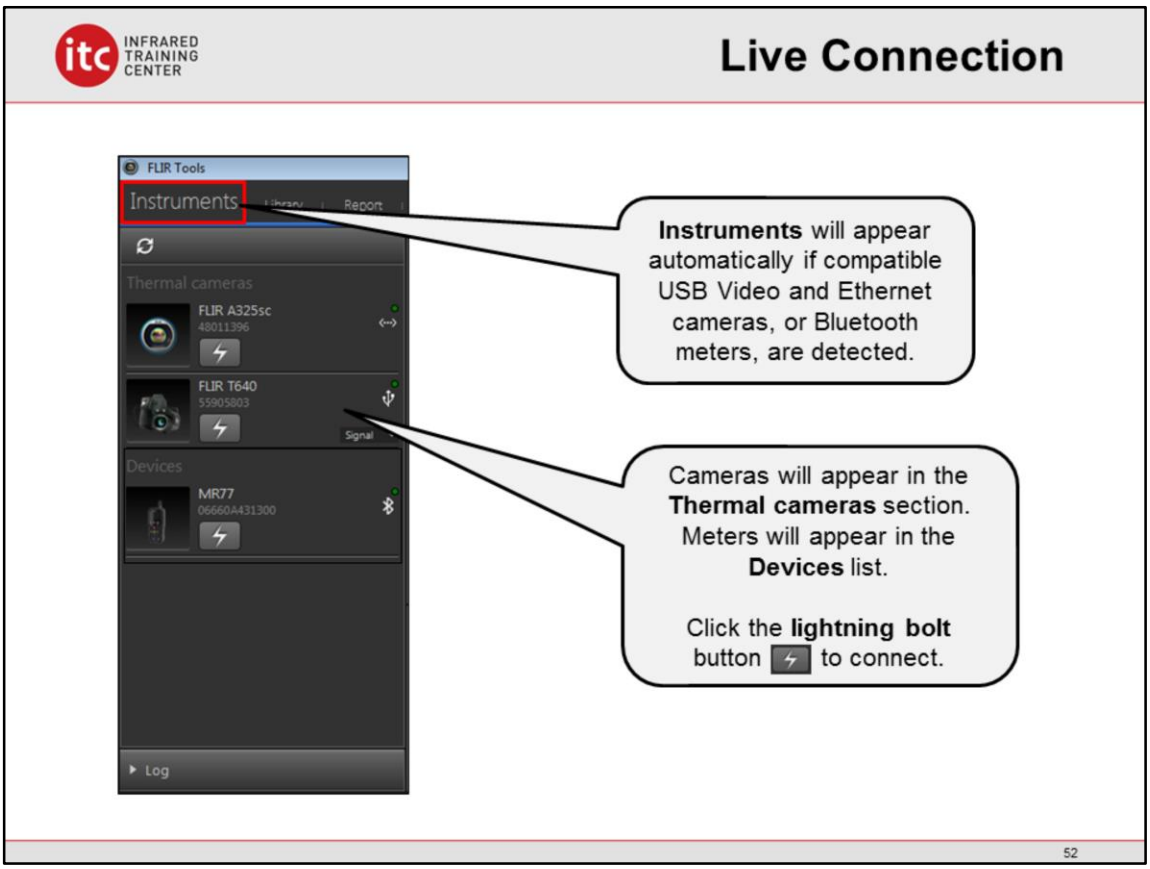
After a blank template page is added, you can drag and drop the desired image group onto the page to add it, along with the measurement results and any text annotations that were added to the image.

The order of the pages can be changed by dragging and dropping them in the column to the left of the report page.



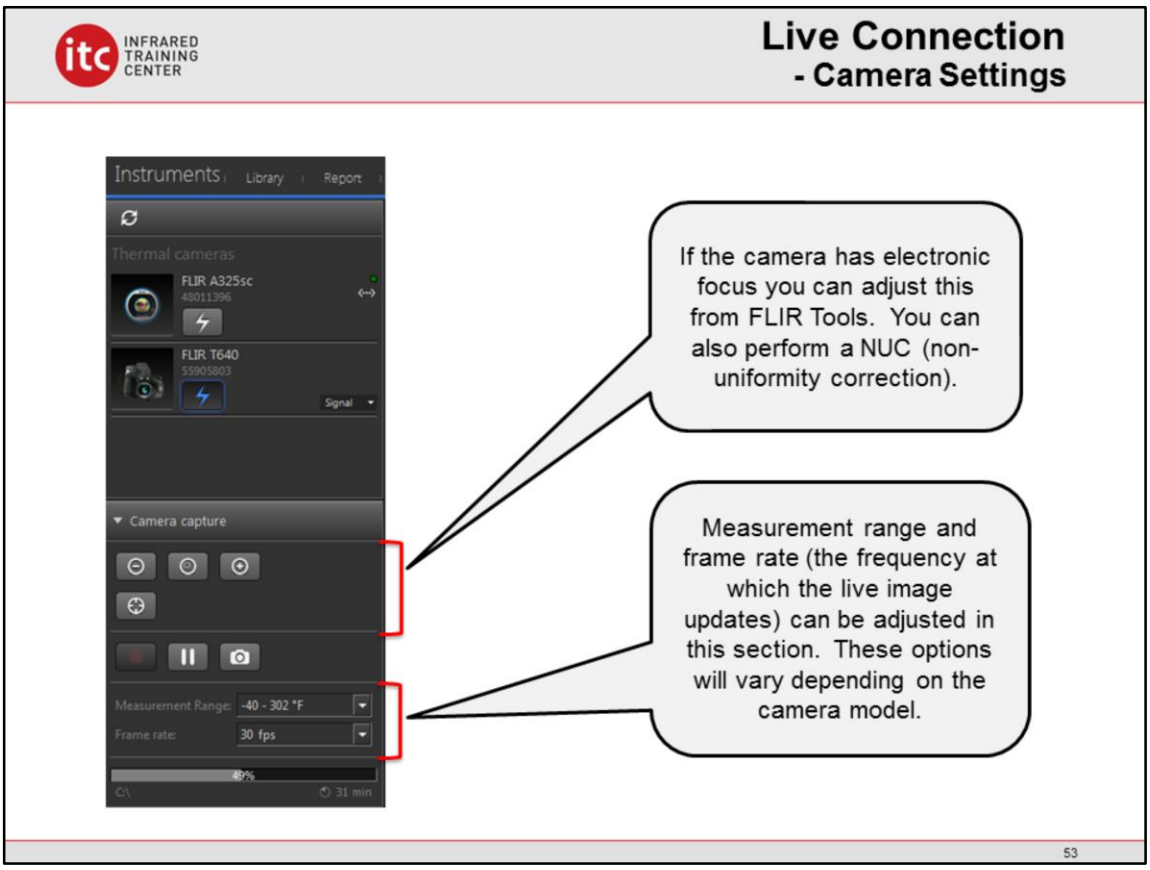
If you click the **Save** button you can save the report in an editable format. You can open this report at a later time and add pages, edit text, and edit the IR images inside the report. We recommend always saving in this format.

The **Export** button allows you to save a PDF copy of the report. This is not editable with FLIR Tools. We recommend using this option when distributing reports to clients.



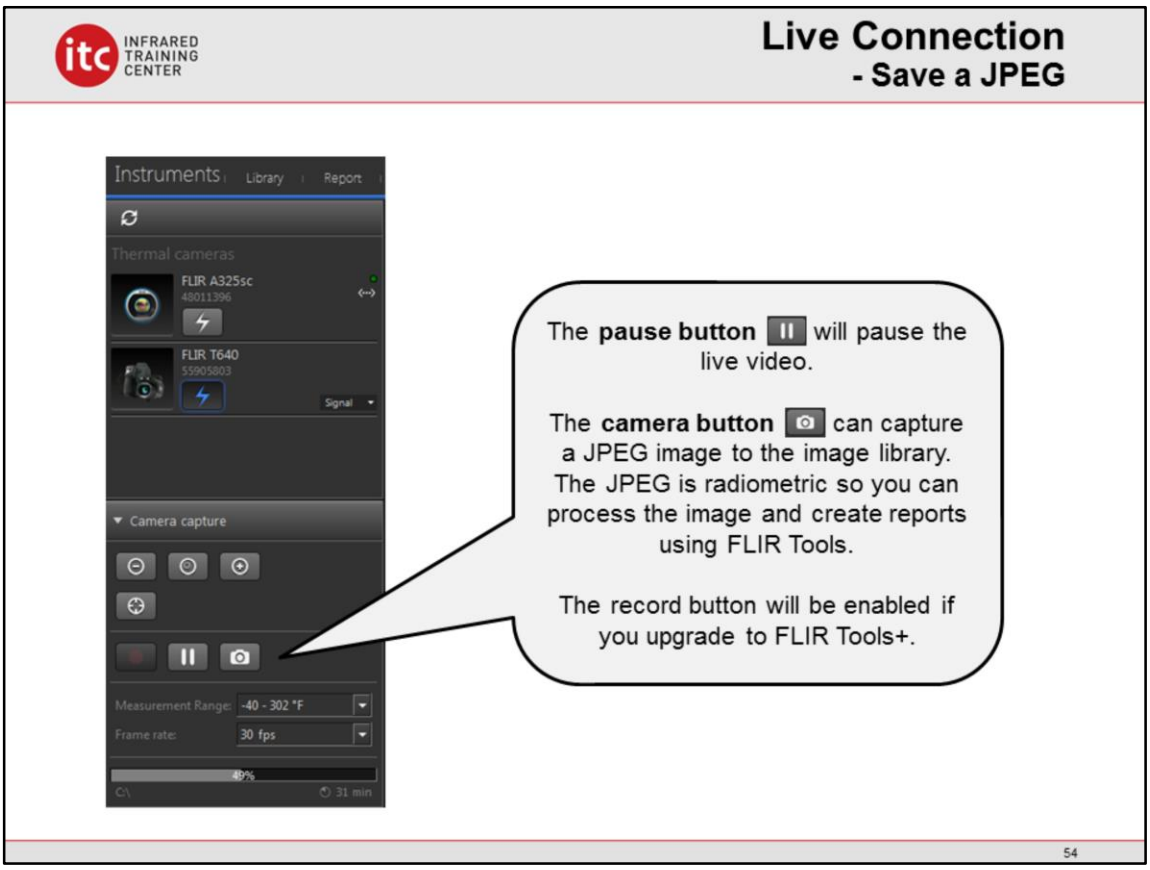
FLIR Tools has the ability to connect to a variety of FLIR USB Video and Ethernet cameras. An E60, T440, T640, A310, A35, and many other similar models can connect. These cameras can stream radiometric video, allowing you to measure temperatures on the live image, adjust parameters, and capture JPEGs that can be post-processed and used for inspection reports. FLIR Bluetooth meters can also be connected.

If a camera or meter is detected the **Instruments** section will appear automatically. All thermal cameras and meters that are detected will appear in this list. If you click on the lightning bolt button a live connection will be established.

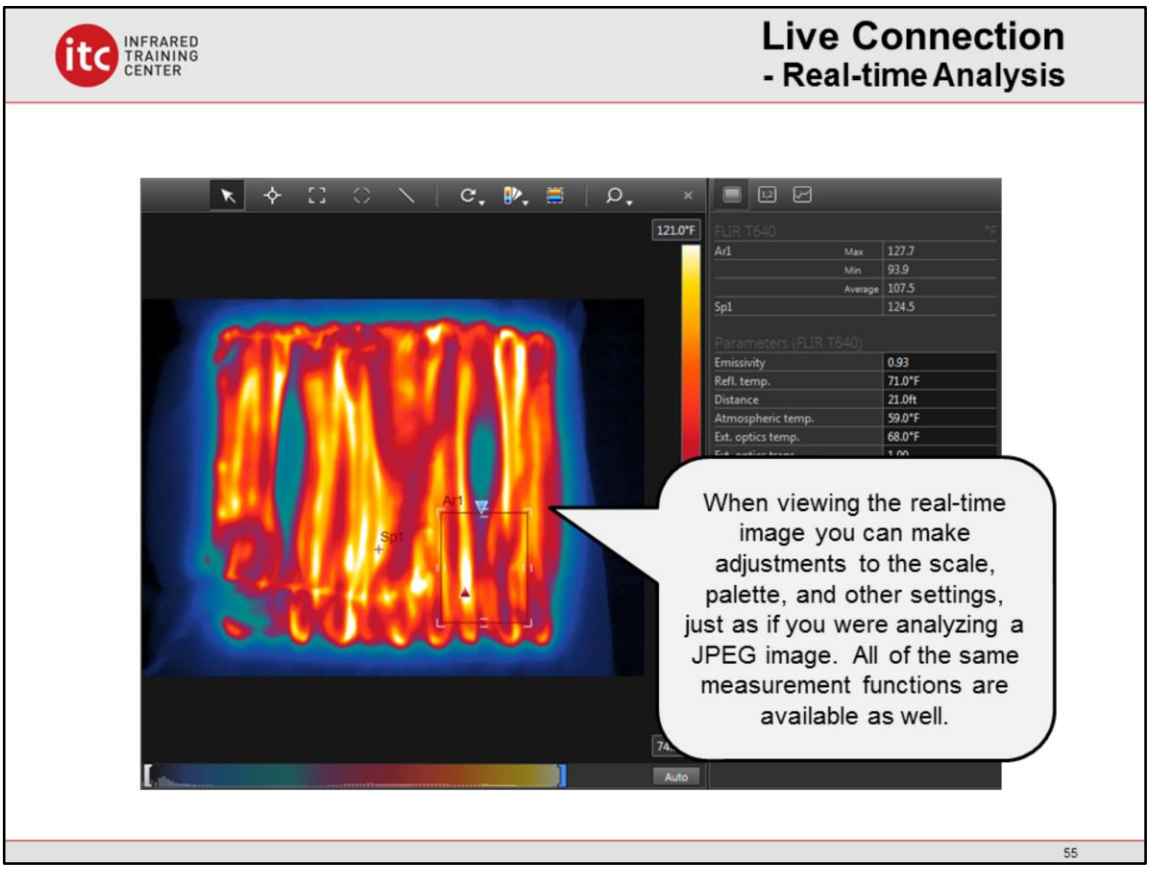


Once connected you can control most camera functions from FLIR Tools. If the camera has electronic focus you can adjust the near/far focus, and you can auto-focus. You can also perform a NUC, which will engage the internal shutter and perform a non-uniformity correction.

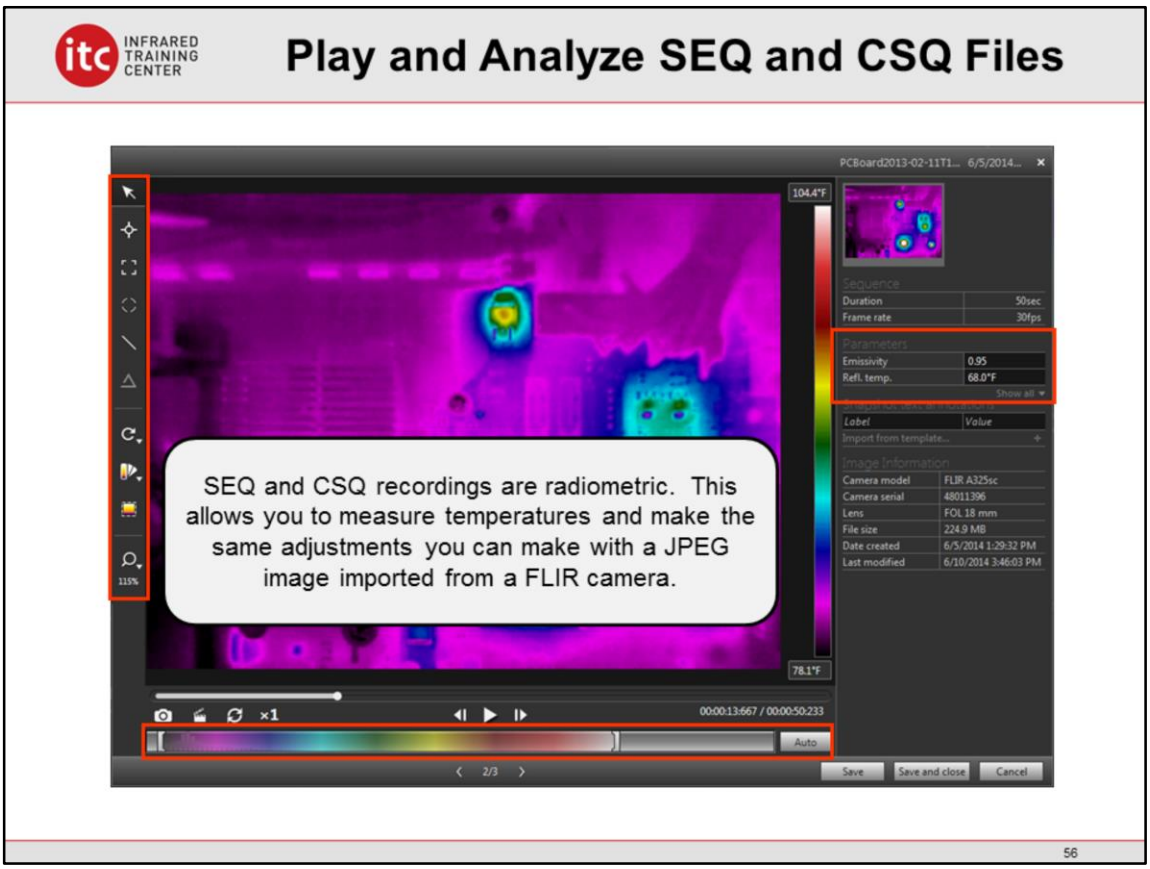
The measurement range can be changed, and you can adjust the frame rate. These options will vary depending on the camera model.



The pause button allows you to pause the live video stream. The camera button will capture a radiometric JPEG to your image library. Since it is radiometric you can process it using FLIR Tools, allowing you to measure temperatures, adjust parameters, and create inspection reports.

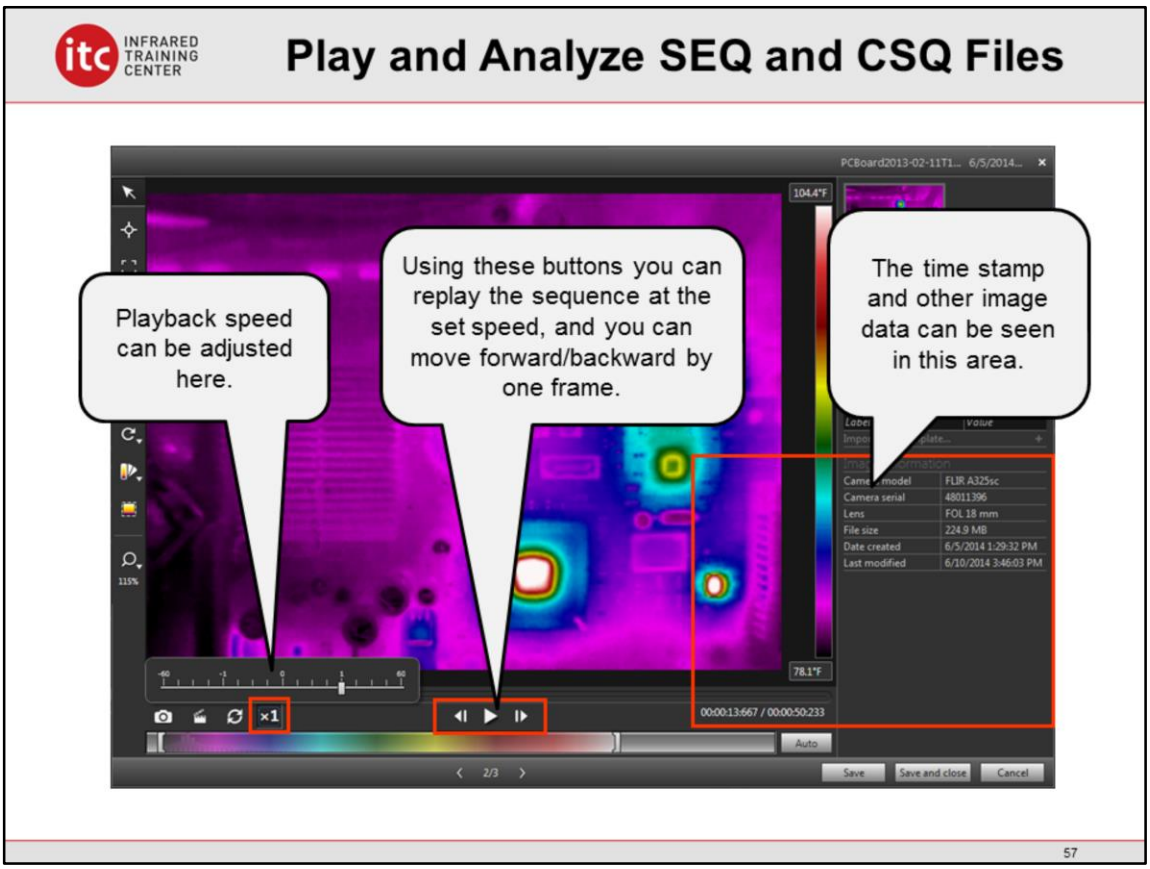


The real-time image is fully radiometric, so you can make scale adjustments, change the palette, measure temperatures, and adjust object parameters. If a JPEG is captured it will save all of the settings and measurement tools that are present on the image.

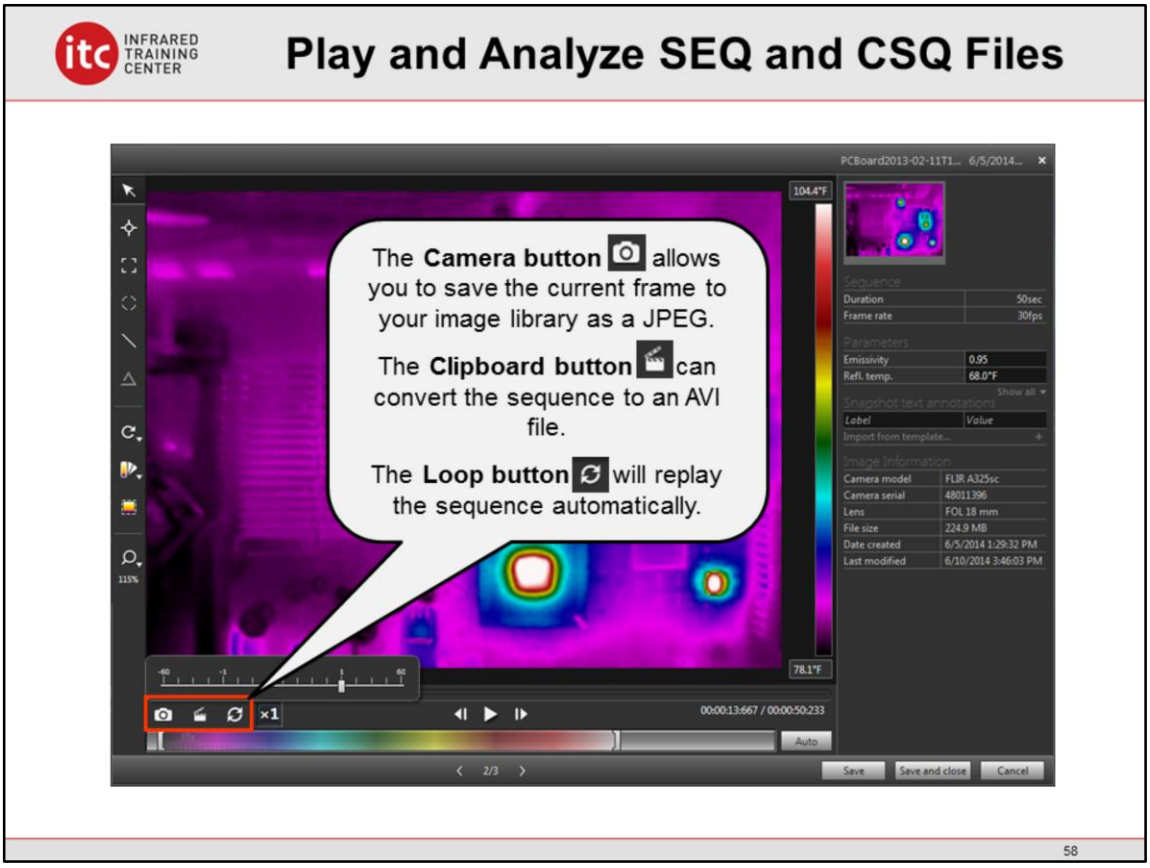


FLIR Tools can playback and analyze previously recorded SEQ and CSQ files.

As with any standard radiometric JPEG, you can easily measure temperatures, adjust the thermal tuning, change emissivity and other parameters, and add text annotations to the sequence. All of these changes can be saved with the recording.



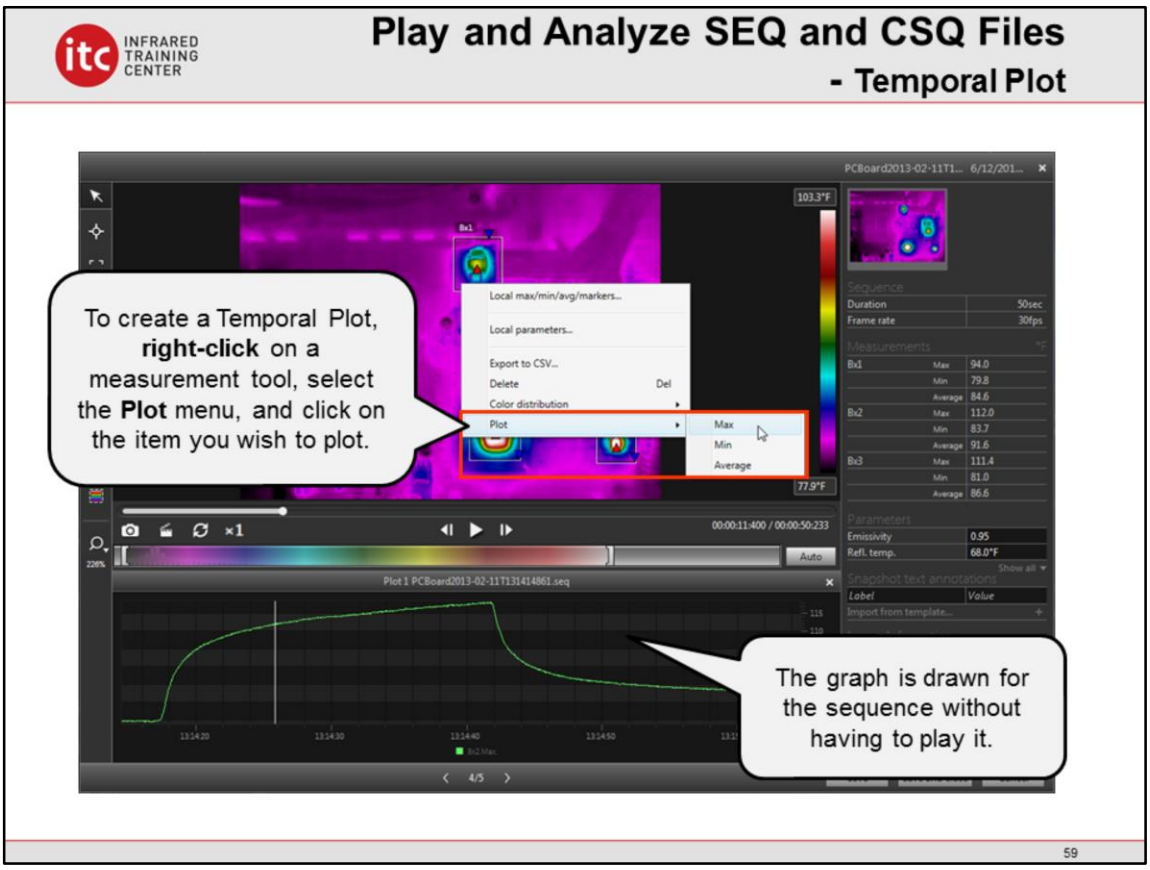
If you click the **x1 button** the playback speed can be adjusted to play forward or backward up to 60x times the original speed. The play buttons in the center of the toolbar will play the recording, and you can step forward/backward by one frame. The camera type, date, time, and other data shows in the panel to the right of the image.



The camera button below the image allows you to extract any frame from the recording to your image library as a radiometric JPEG. This can be analyzed using FLIR Tools and can be used in a report.

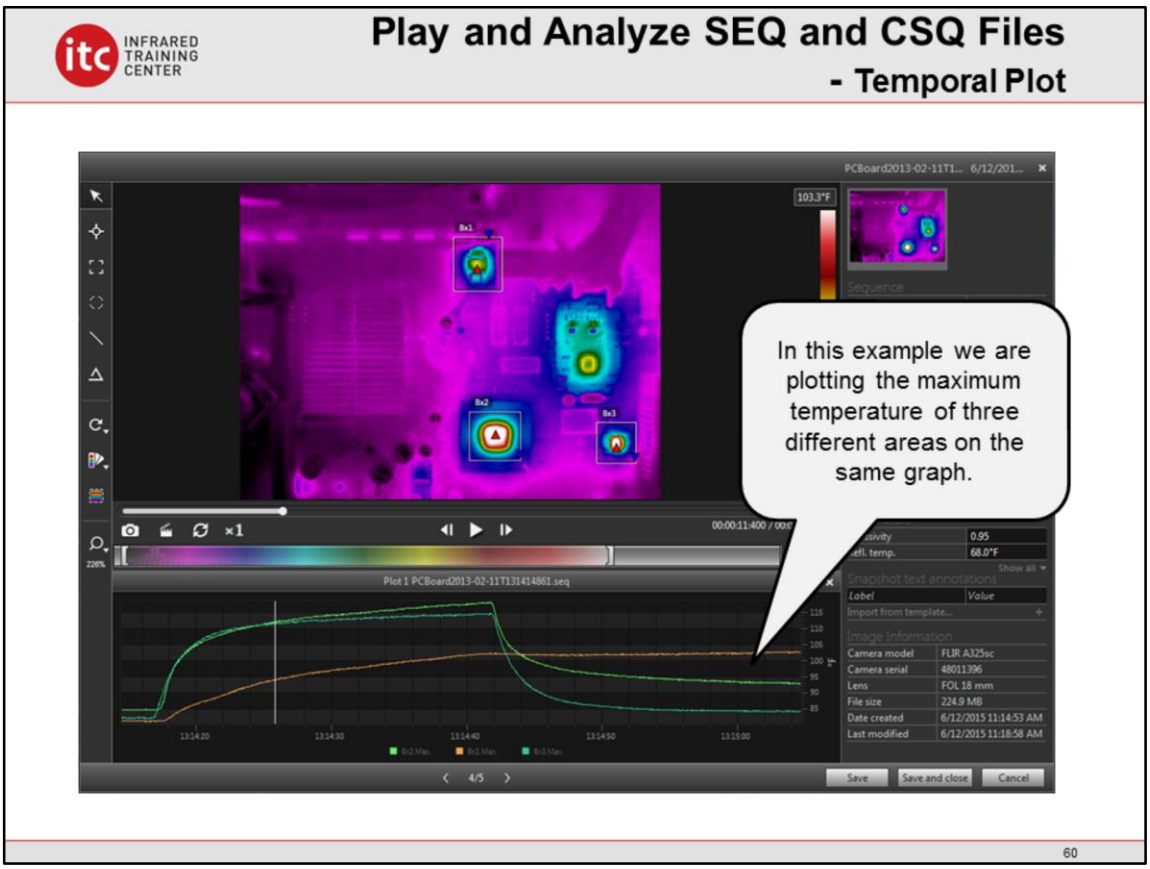
You can also convert the sequence to an AVI file, which is handy for sharing with others who do not have the FLIR software.

The loop button will automatically replay the sequence.



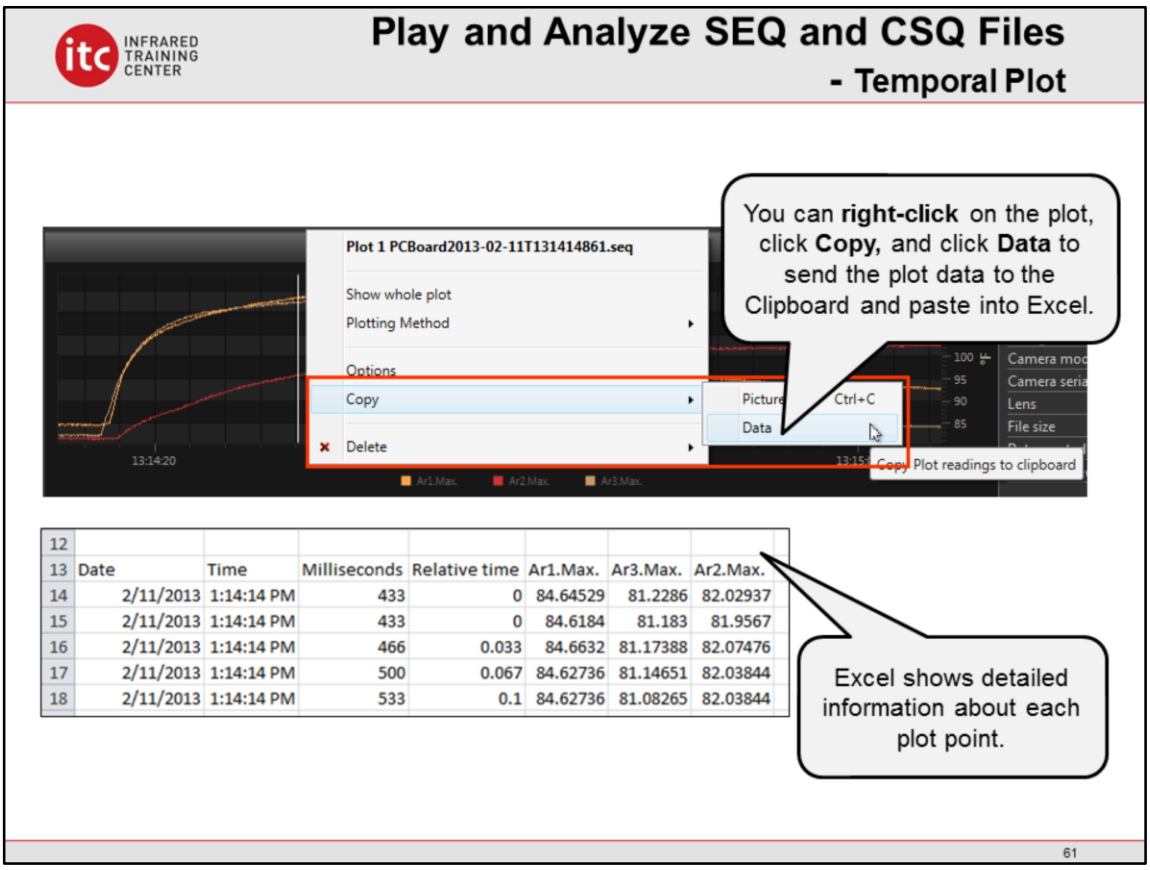
Temporal Plots can be a convenient way to analyze transient events.

Plots can be created using any measurement tool. Just **right-click** on the tool, click **Plot**, and then click the item you wish to plot. In this case we are plotting the maximum temperature of Area 1. The graph is drawn automatically without having to replay the entire sequence.



More than one tool can be plotted on the same graph. To add more tools simply right-click on the next tool and choose the Plot menu again. Repeat this process for each tool you wish to plot.

This graph is plotting the maximum temperature of three different areas.



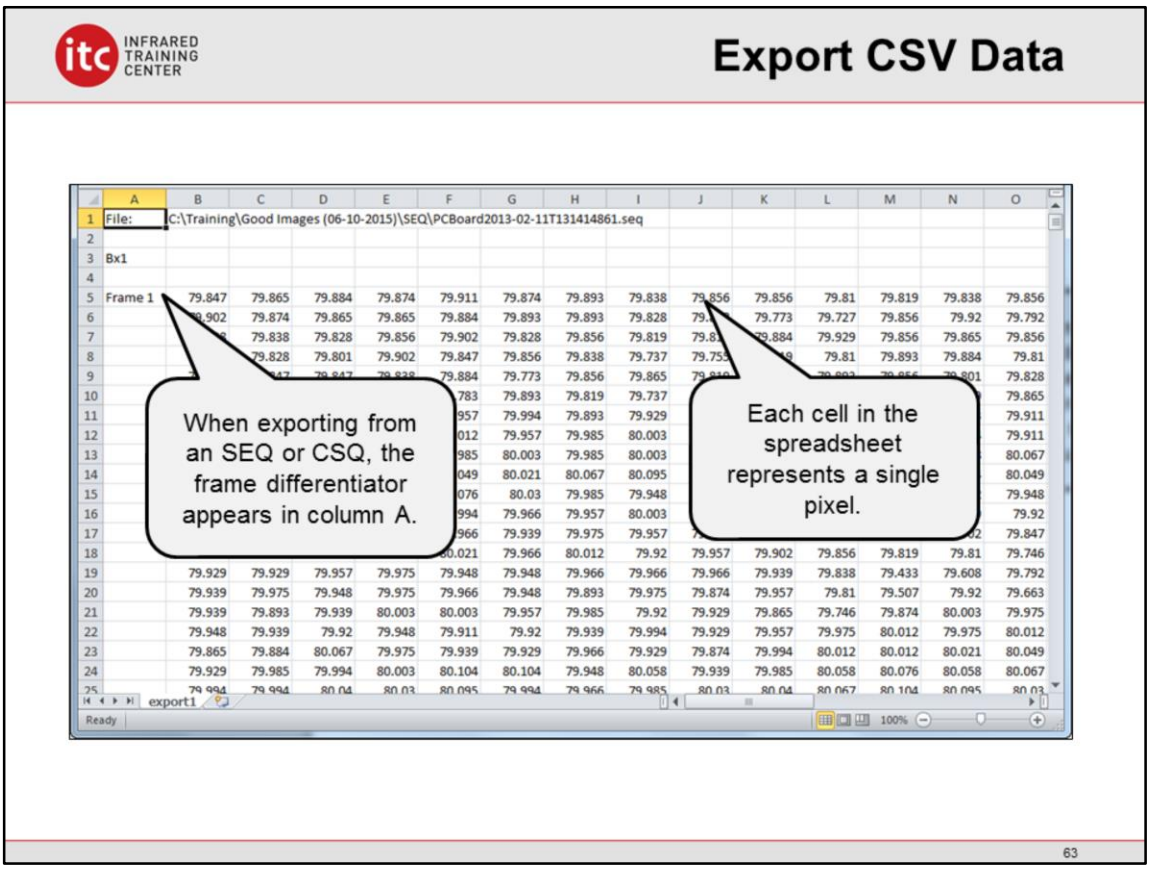
	Date	Time	Milliseconds	Relative time	Ar1.Max.	Ar3.Max.	Ar2.Max.
12							
13	Date	Time	Milliseconds	Relative time	Ar1.Max.	Ar3.Max.	Ar2.Max.
14	2/11/2013	1:14:14 PM	433	0	84.64529	81.2286	82.02937
15	2/11/2013	1:14:14 PM	433	0	84.6184	81.183	81.9567
16	2/11/2013	1:14:14 PM	466	0.033	84.6632	81.17388	82.07476
17	2/11/2013	1:14:14 PM	500	0.067	84.62736	81.14651	82.03844
18	2/11/2013	1:14:14 PM	533	0.1	84.62736	81.08265	82.03844

Plot data can be easily copied from FLIR Tools as text and pasted into other programs like Microsoft Excel for more detailed analysis.

Just **right-click** anywhere on the graph, click **Copy**, and click **Data** to copy the plot data to the Windows Clipboard. Now you can start Excel and paste the data into a new spreadsheet.

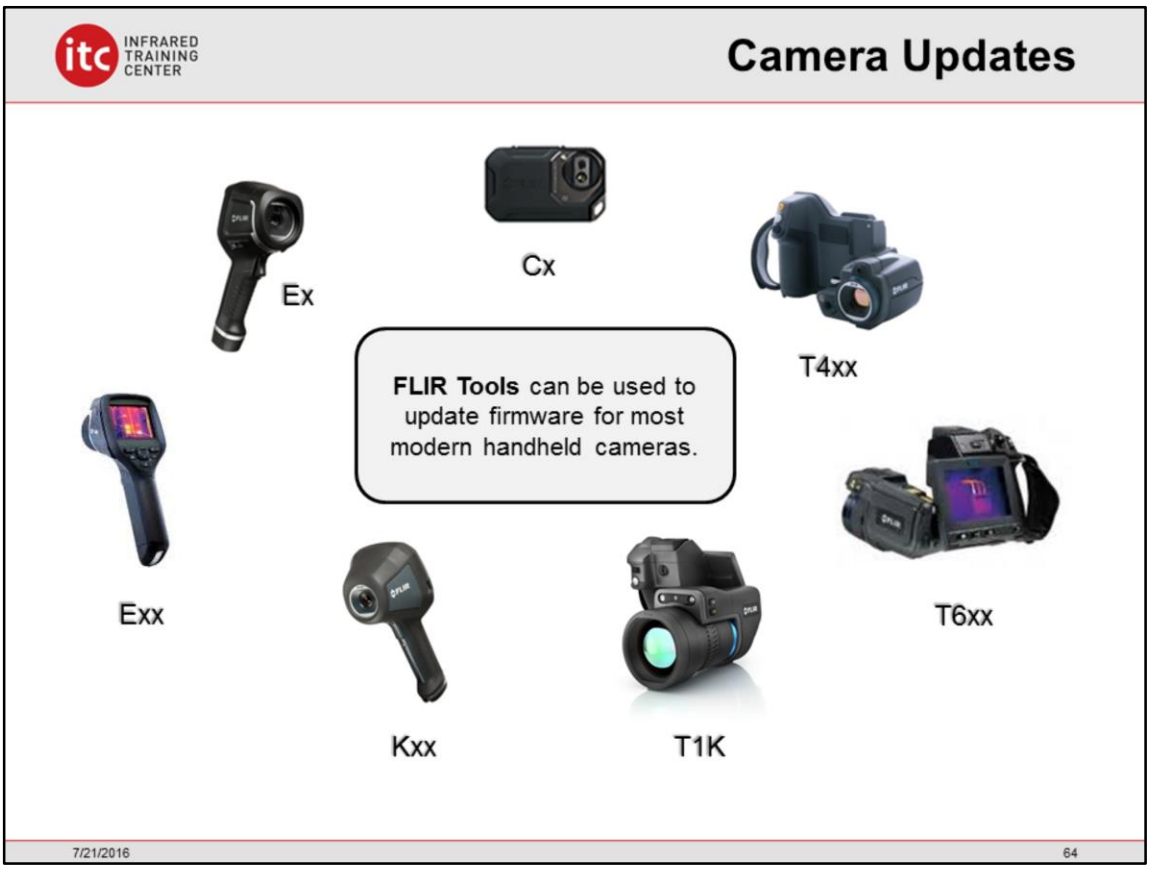
Each row represents a plot point in the graph. The data is broken up into columns showing the date, time, and temperature for each measurement tool.

Temperature data for an image, or for any measurement tool, can be exported to **CSV format**. This is a comma-separated text file that can be read using Excel.



When exporting an image, area, or line, the text file will contain an array of temperatures for each pixel.

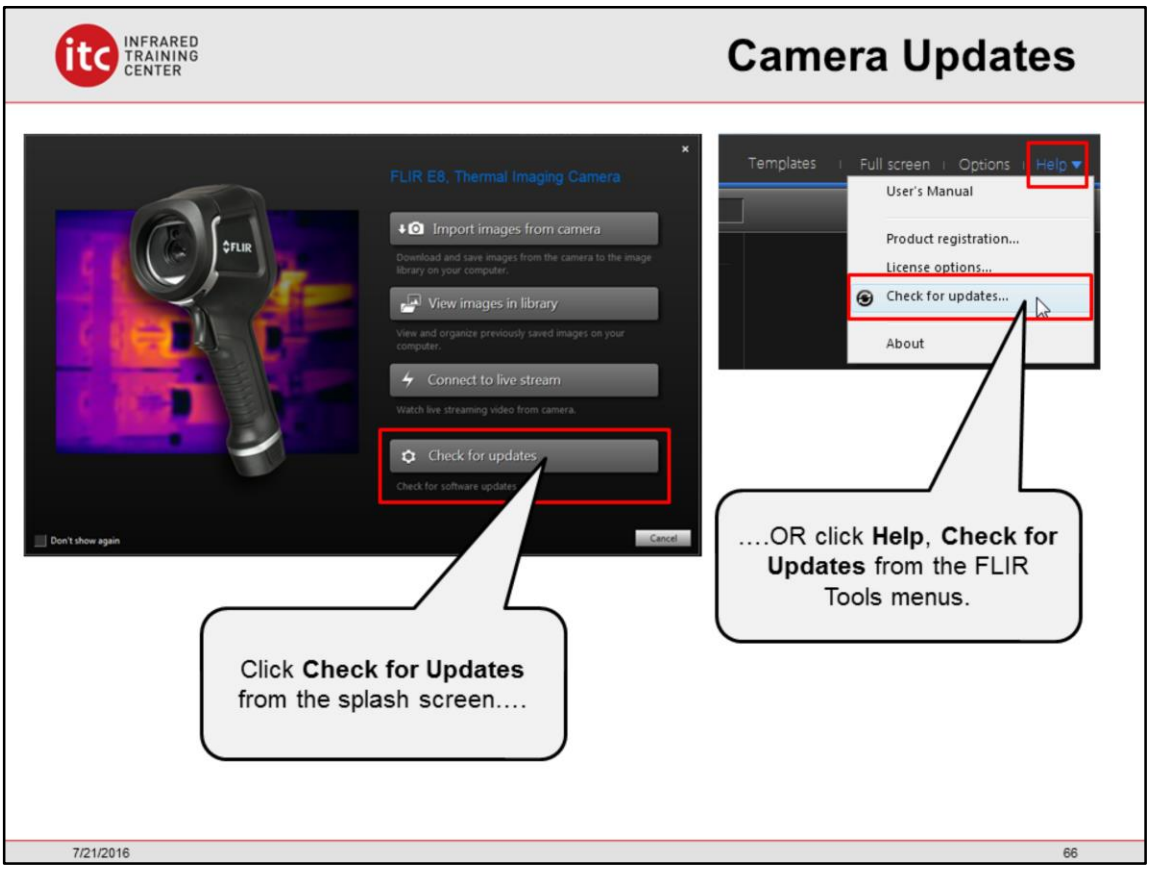
When exporting from an SEQ or CSQ, each frame from the recording is exported to a single CSV file. Column A contains the frame differentiator.



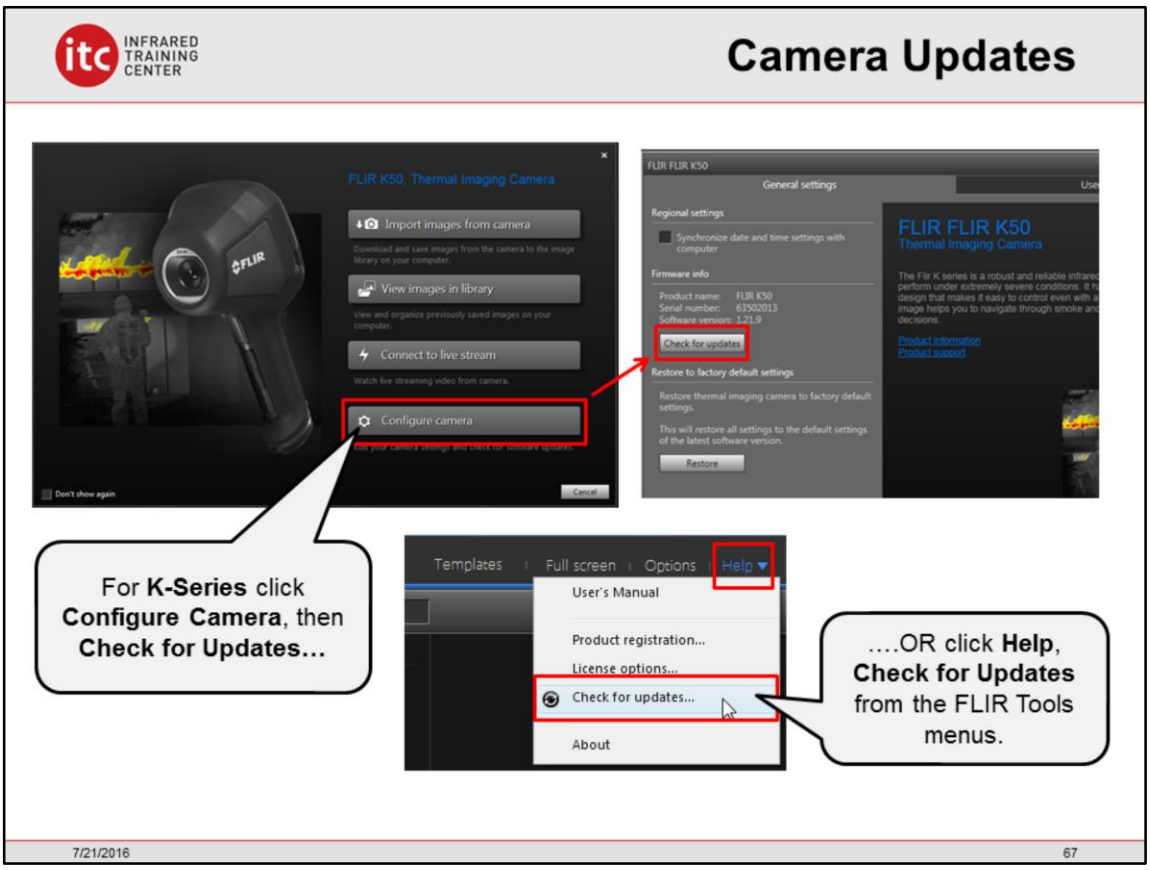
The FLIR Tools PC software can be used to update firmware for a variety of handheld Thermography cameras.

Firmware updates can be done via the USB connection. Once FLIR Tools is installed, power on the camera and connect it to the USB port.

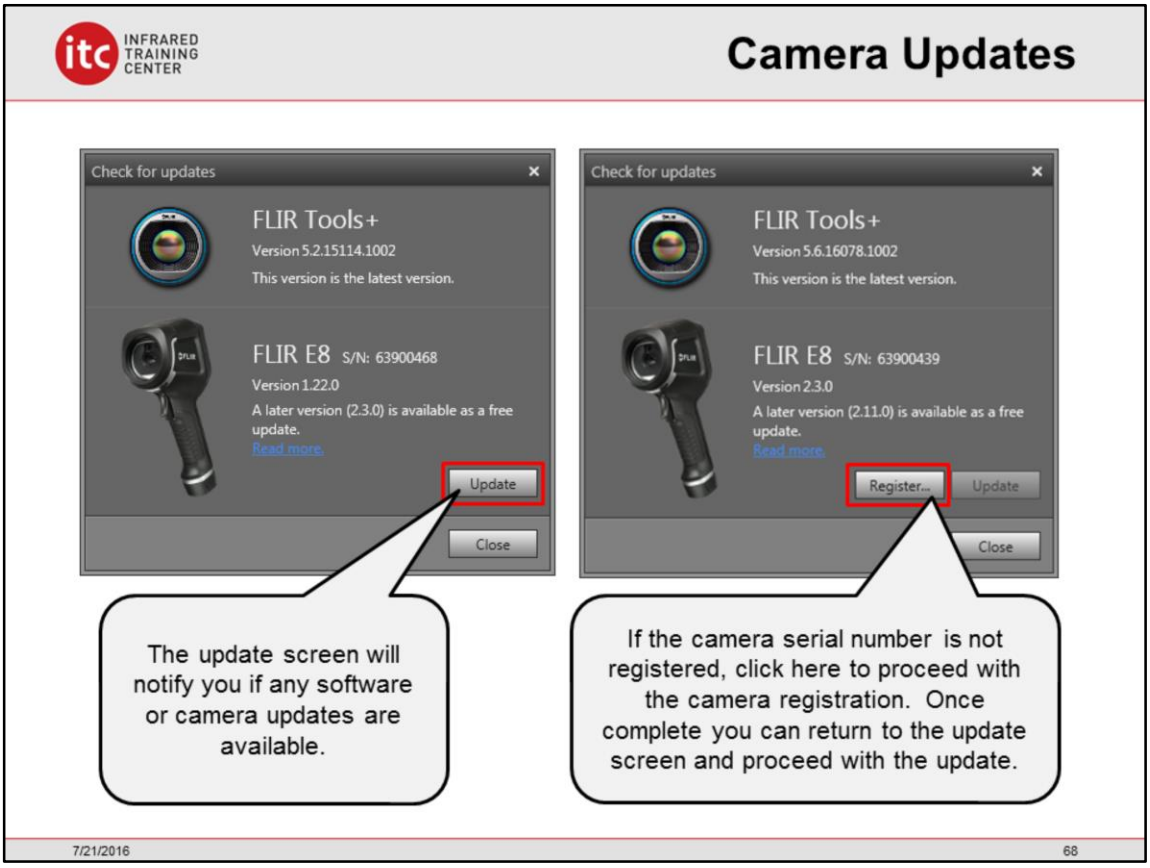
When possible use the camera power supply, or ensure that the battery is fully charged before performing a firmware update. Updates can take up to 20 minutes depending on the camera model.



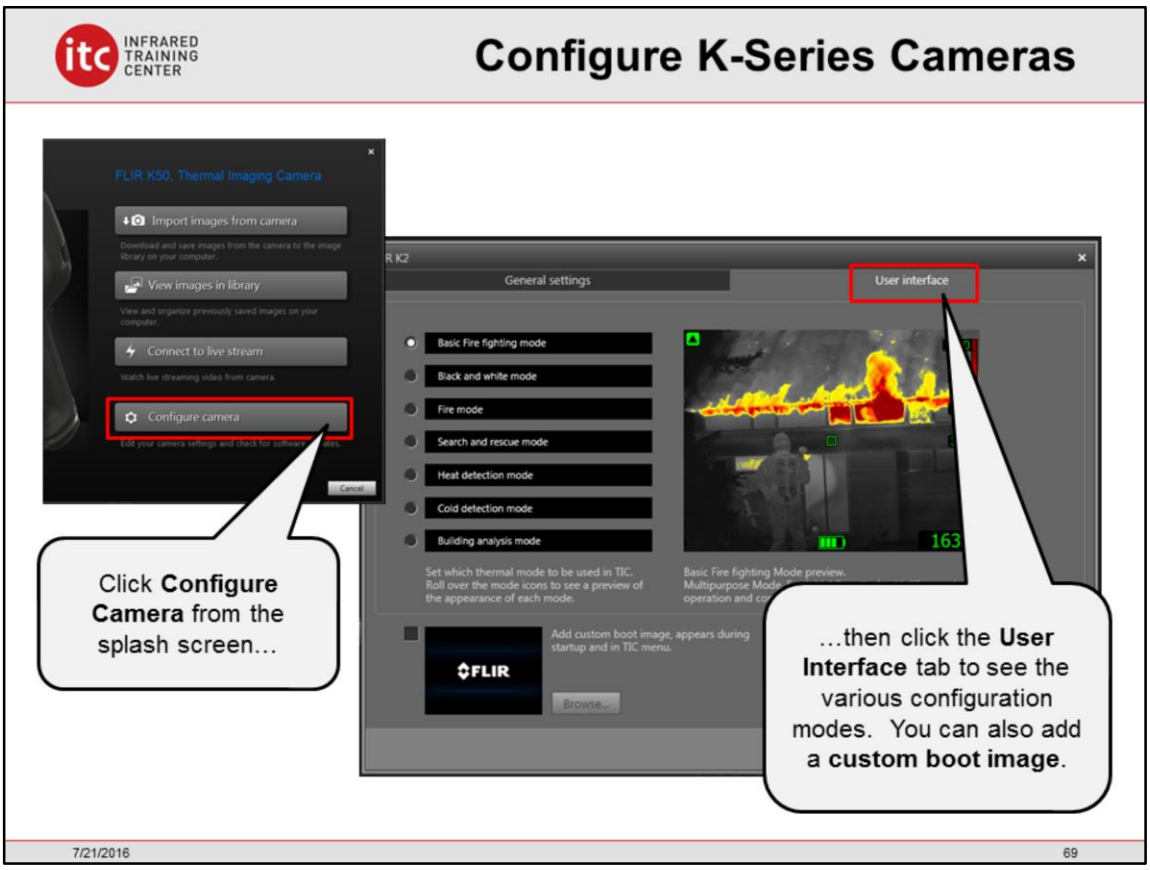
If FLIR Tools is running when the camera is connected a splash-screen will appear with several links to common functions. Click “Check for Updates” from here, or click “Help, Check for Updates” in FLIR Tools.



The splash-screen for the K-Series is slightly different, you must click “Configure camera” and then “Check for updates”. You can also click “Help, Check for Updates” in FLIR Tools.



FLIR Tools will notify you if any updates are available for the software and the camera. If the camera is already registered simply click “Update” and follow the steps. If not, a button will appear prompting you to register the serial number first.



The K-Series firefighting cameras can be configured using FLIR Tools. When connected via USB click the Configure Camera button from the splash screen. The configuration window has two tabs. Click the User Interface tab to select the desired configuration mode. You can also choose to add a custom boot logo to the camera.

Support and Training

- For FLIR technical support, downloads and other resources please visit http://support.flir.com
- For more information about training please visit http://www.infraredtraining.com. Here you can find a complete list of certification courses, on-demand courses, webinars, and community forums.

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