

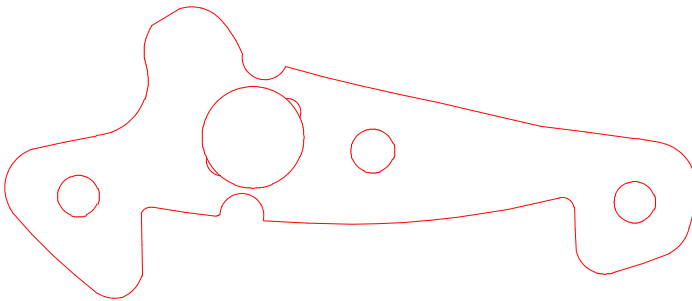
Using CAD File Overlays in Premier Software

Premier Software offers the option to import 2D CAD drawing files (in .dxf or .dwg formats) as an overlay on the live image. The CAD files are automatically scaled to exactly match the magnification of the live image.

Important Information About CAD Files

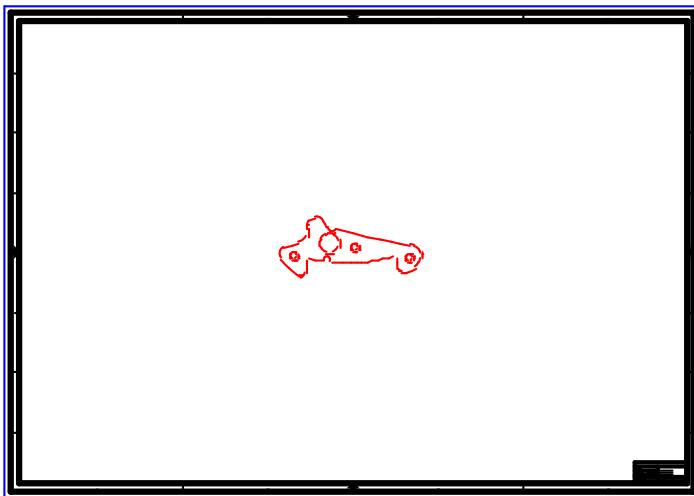
Premier Software automatically imports and scales the CAD file to match the size of the live image. It is very important that the CAD file is similar in size to the field of view in the microscope or camera system. Here are some rules for creating a CAD file for an overlay:

- 1) The CAD file should be approximately the size of the viewing area of the microscope or smaller. The CAD file should never be greater than 3 times the size of the viewing area of the microscope or camera. For example, if the viewing area under the microscope is 10 mm across, then the CAD file should be 10 mm across or smaller. It cannot be larger than 30 mm across. You may need to edit the CAD file to eliminate notes, framing, border callouts and other extra notes.



Good

CAD File sized to the field of view of the microscope



No good

Full drawing is much larger than part and contains extraneous elements

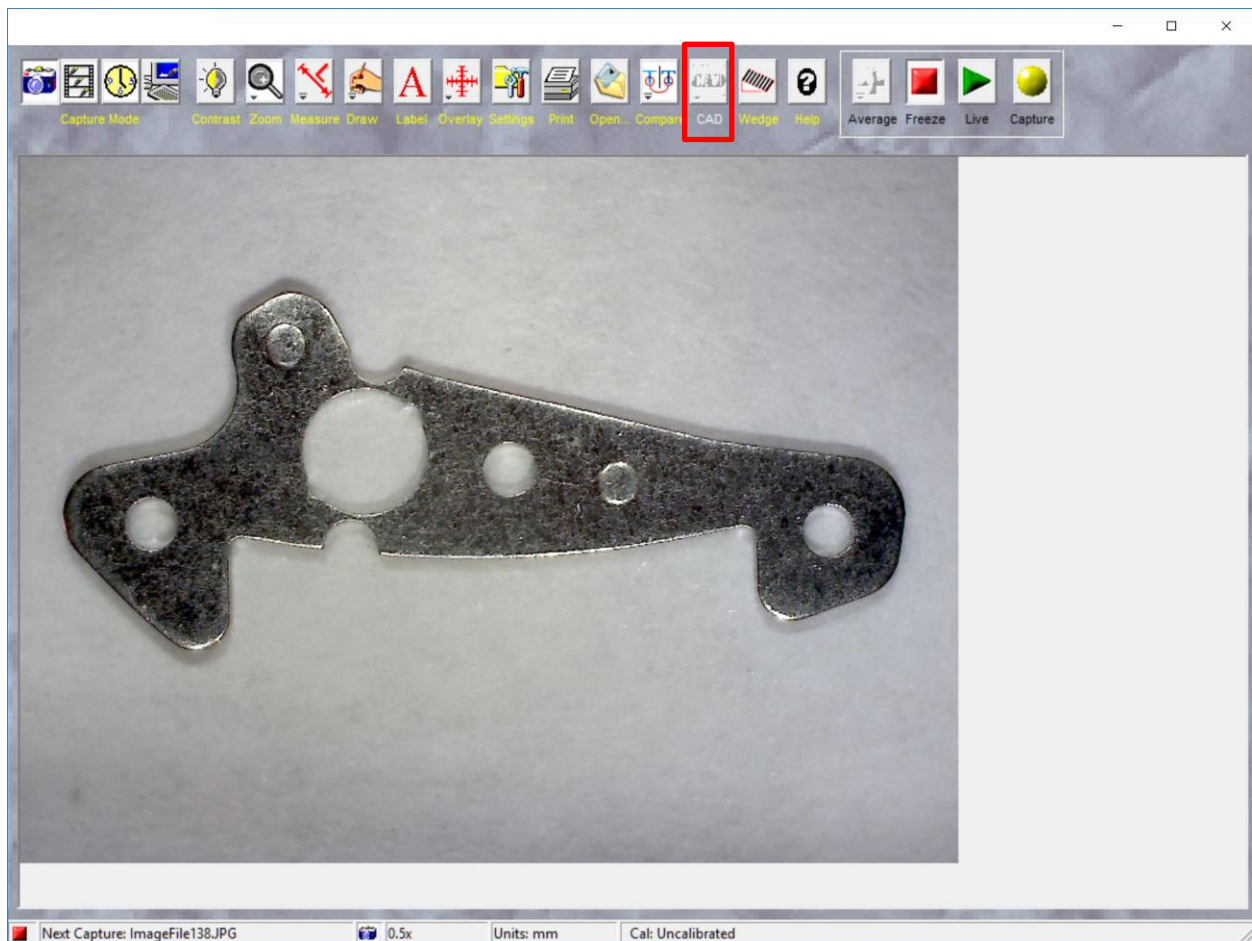
- 2) Text size and positions sometimes shift during translation. You may need to adjust the text position in the CAD file to get it properly located in the overlay.

Getting Started with CAD File Overlays – Software Installation

To start importing CAD files into Premier Software, make sure that the Premier Software software is installed. You will also need to install the Delta CAD import/export libraries – this is a separate step.

Your Premier Software installer should include instructions on how to add the CAD libraries if you purchased this option. If you have downloaded the demo version of Premier Software, the last step of the installation will include additional instructions to download temporary import/export libraries.

Once you have all the software installed, start the Premier Software program. If the files have been correctly installed, then you will see the main window with the CAD File button displayed.



Don't worry if the CAD button is disabled, the software will need to be calibrated before you can import a CAD file overlay. Without calibration the software would not know how to size the CAD file to exactly match the image.

Image Calibration – The Key to Accurate Measurement

Your Premier Software must be accurately calibrated to provide for precise measurement and overlay display. Premier Software supports manual calibration and offers an optional instant calibration feature.

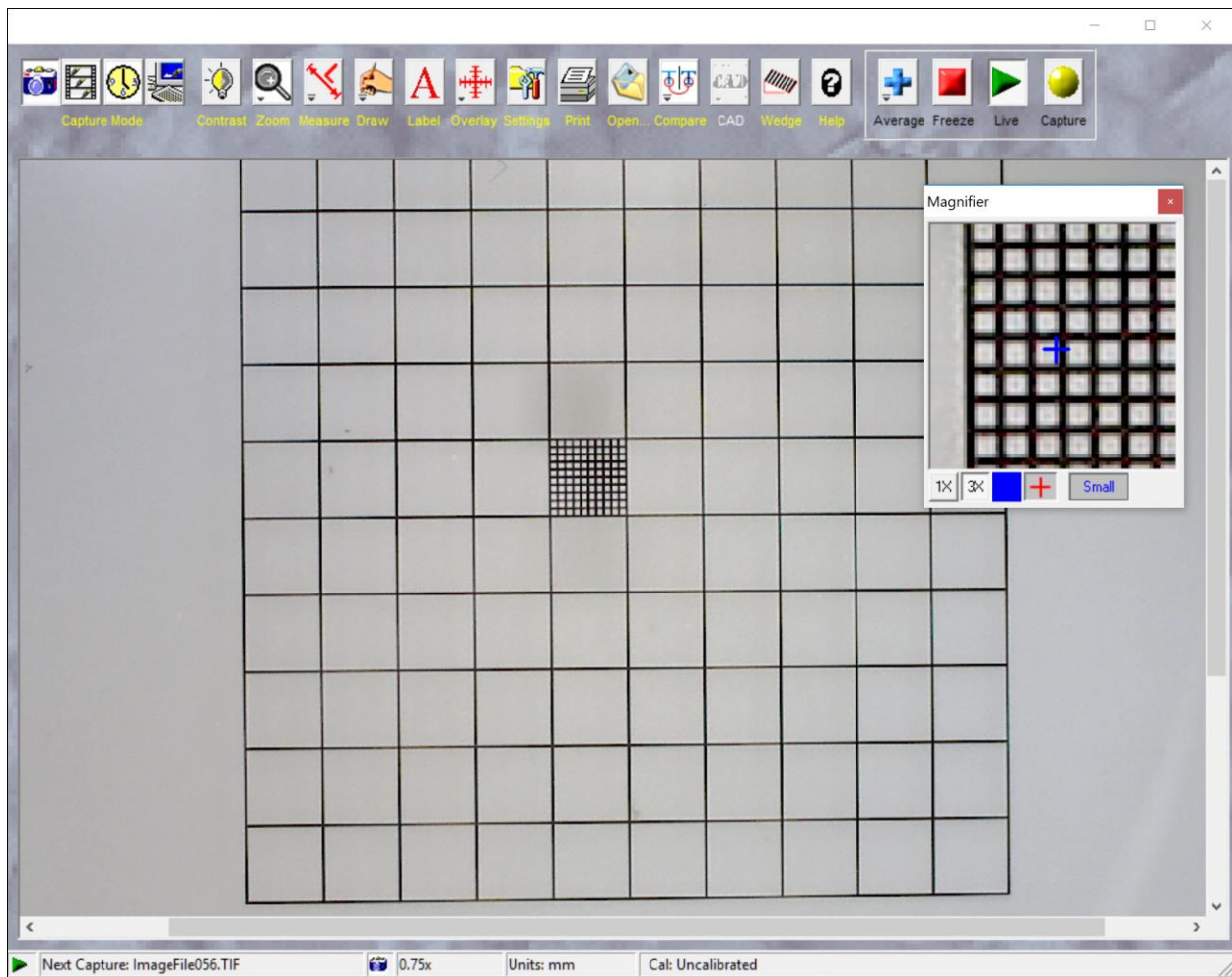
Manual Calibration

To perform a manual calibration, adjust the magnification of the microscope to the desired setting. If the microscope has separate objective lenses, or if the zoom (variable magnification) lens has repeatable detents (click stops) then the calibration can be stored within the software for use later.

Next, place a reference object of known size under the microscope. The reference object can be a calibration slide, gage block, pin gage or any other precisely calibrated object. If a precise calibration reference is not available, use a precision metal ruler or an object that has been measured using precision calipers.

For this example, the reference object is a precision grid with 0.7 mm x 0.7 mm boxes (see for example <http://www.zarbeco.com/products-miscope-accessories-mgrid.shtml>).

Without changing the magnification of the microscope, adjust the focus until the image of the calibration target in Premier Software is sharp.



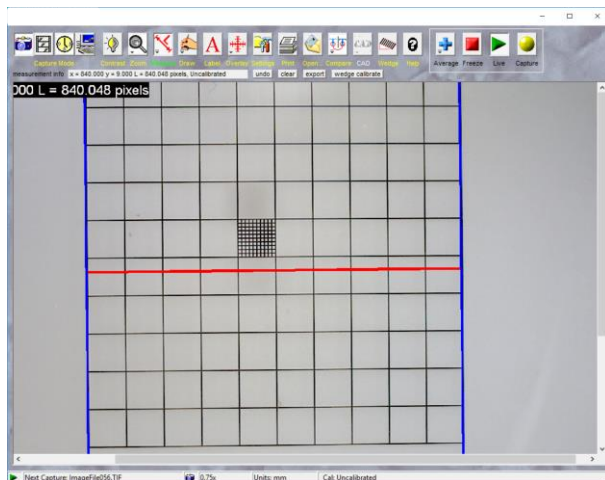
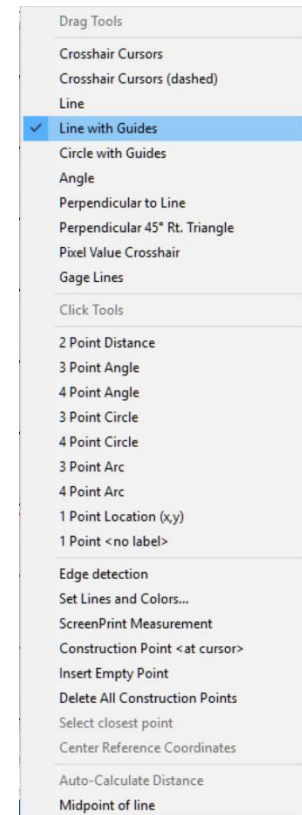
The magnifier window is an excellent aid for fine focusing. To enable the magnifier window, press the ZOOM button and select Magnifier Window. Within the magnifier window, the image below the mouse cursor will appear magnified, regardless of the ZOOM magnification of the main window.

Once the calibration target is sharply in focus, press the MEASURE button to enable the measurement tools. Right-click the mouse anywhere over the live image to display the list of available measurement tools (see right). When performing manual calibration the “Line with guides” tool is recommended for calibrating a linear distance such as the length along a calibration reticle, grid or gage block. The “Crosshair Cursors” tool is recommended when using circular reference objects such as a pin gage.

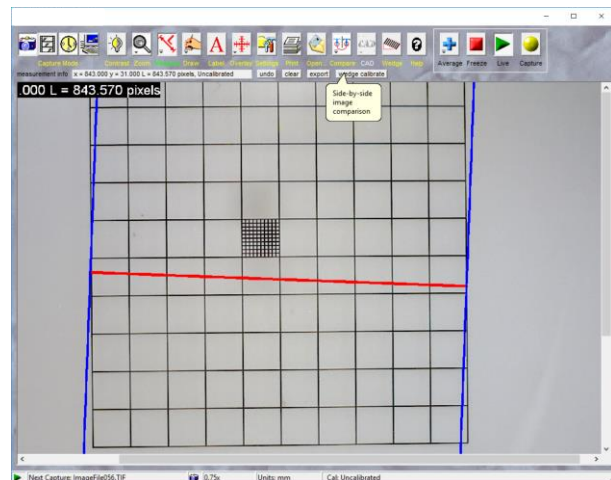
This example uses a grid so the “Line with Guides” tool is selected.

Next, click and hold the left mouse button at one side of the grid to start the distance line. While holding the mouse button, drag to extend the distance line. Release the mouse button to end the line. The distance line is displayed with perpendicular guide lines at each end. The guide lines are used to verify that the measurement is a true perpendicular distance and is not skewed.


The following shows a properly aligned and incorrectly aligned distance line.



Properly aligned – guide lines match the grid angle



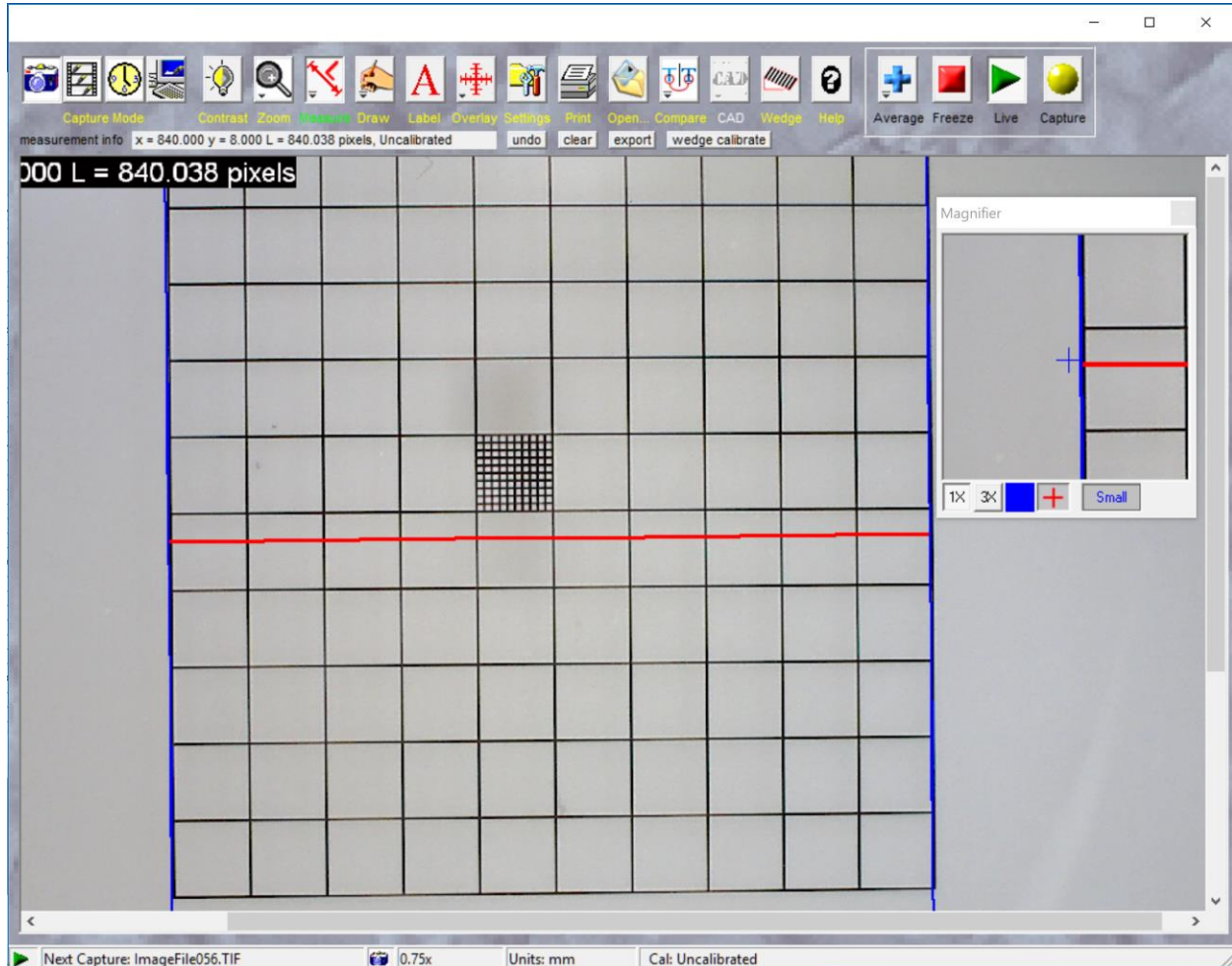
Incorrectly aligned – guide lines skew to the grid lines

To reposition the distance line, move the cursor to the intersection of the distance and guide lines. The cursor will change from a standard arrow to a diagonal resize icon  to indicate that you can now resize the line. While the cursor is the diagonal resize icon, click and hold the left mouse button; drag the mouse to move that end of the line.

For more precise movements, the keyboard arrow keys and the mouse scroll wheel can be used. Move the mouse next to the end of the distance line that will be moved; press the keyboard arrow keys to move that end of the line. Or turn the scroll wheel to move the end of the distance line in the corresponding direction.

Note: Premier Software also offers computer-aided edge detection for enhanced measurement tool positioning. See the software manual for more information.

Once the distance lines are precisely positioned to the same side of the grid lines (in this example the distance lines just touch the left side of the two extreme grid lines) and the guide lines are squared to the grid,



press the OVERLAY button and select Calibrate... to open the calibration window.

Calibrate

Present Cursor Positions In Pixels

x = 840 (width)
y = 11 (height)
L = 840.072021 (length)

Image Size (pixels)
Camera: 1600 x 1200 (1.333:1)
Calibration: <undetermined>

Cal number:

Menu label:

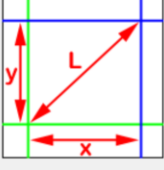
Set units (example mm, inches):

Decimals places:

Cal bar length: ☒ Default ☐ Custom length:

☐ Calibrate by X and Y ☒ Calibrate by L (length)

x =
y =
L =



Fill out the following information:

Cal number: pull down the menu and select from 1 to 16 to set a location to store the calibration data.

Menu label: enter text that can be used to remember the microscope settings in case you will reuse this calibration.

Set units: enter the units of distance used for this calibration.

Decimal places: select the number of decimal places to be displayed for each measurement.

L = : enter the calibrated known length of the distance line.

Here is the information filled out for this example:

Calibrate

Present Cursor Positions In Pixels

x = 840 (width)
y = 11 (height)
L = 840.072021 (length)

Image Size (pixels)
Camera: 1600 x 1200 (1.333:1)
Calibration: <undetermined>

Cal number:

Menu label:

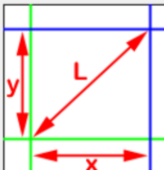
Set units (example mm, inches):

Decimals places:

Cal bar length: ☒ Default ☐ Custom length:

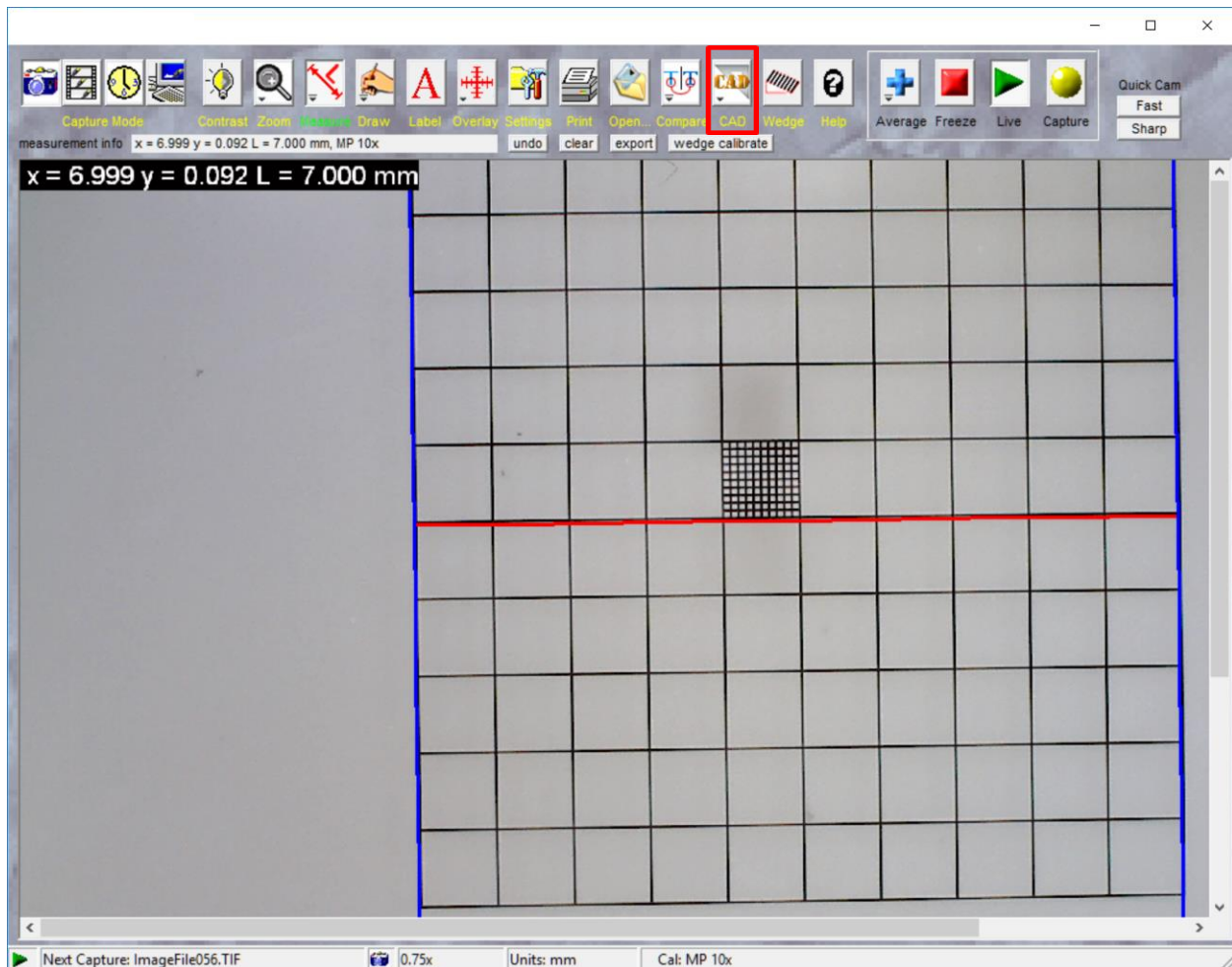
☐ Calibrate by X and Y ☒ Calibrate by L (length)

x = mm
y = mm
L = mm



The calibration grid has 0.7 mm boxes and the distance line runs across 10 boxes → 7 mm length. The menu label indicates that the microscope is set at the 10x value on the lens, and the calibration will be stored in location #1. Press OK to complete the calibration.

Here is the Premier Software main window.

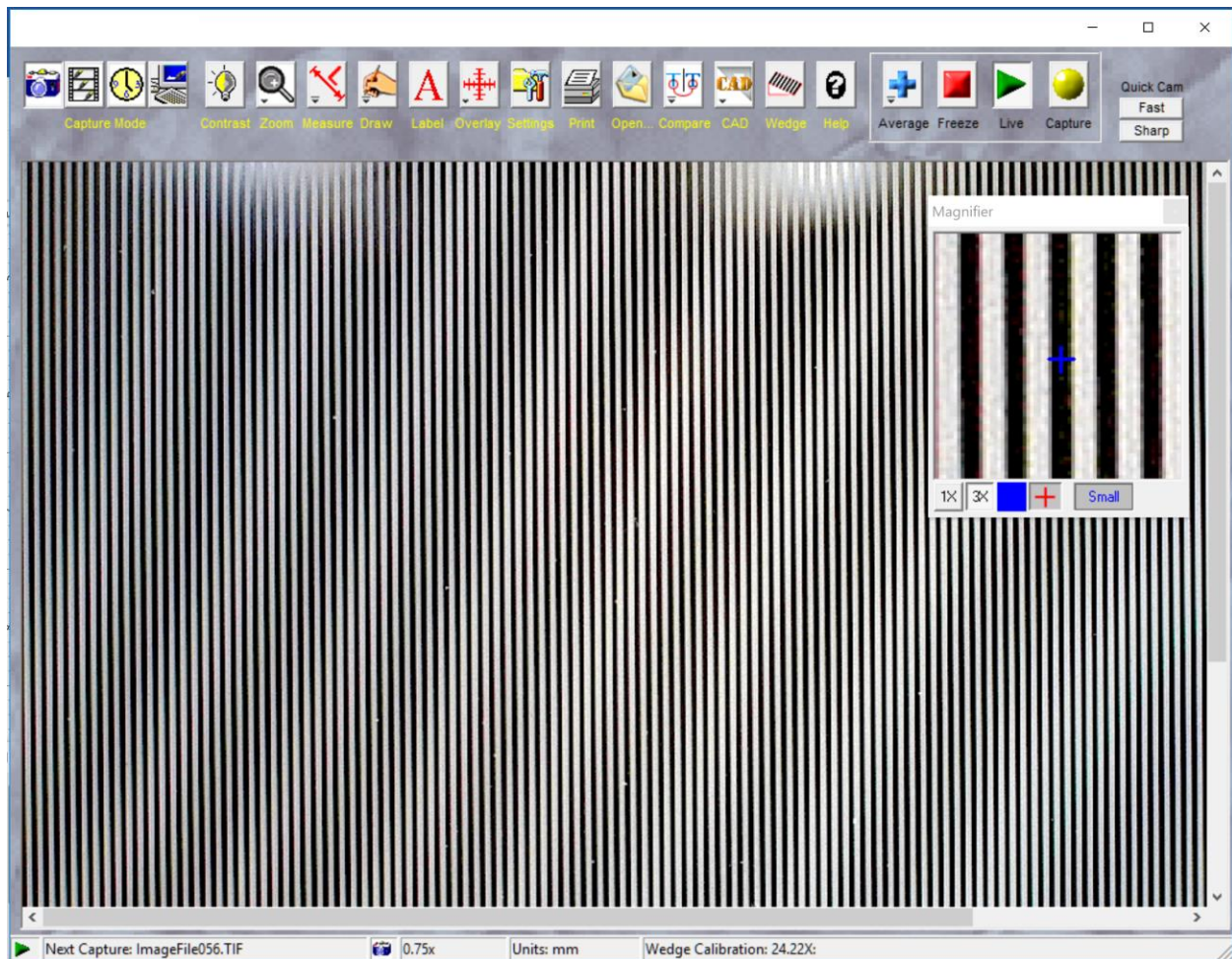


Note a few changes in the window. The measurement info status display (just below the buttons) and the measurement display on the top-left corner of the live image now show the calibrated distance. The CAD button is now enabled, indicating that it is now possible to import a CAD file overlay.

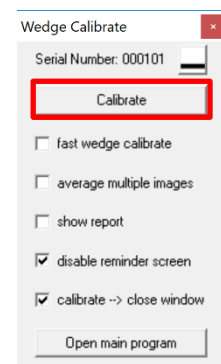
Automatic Calibration

Premier Software supports automatic calibration and optical measurement with an optional calibration target and software plugin tool (see . The optical measurement target quantifies optical properties of the lens system including distortion, field curvature and defocused measurement error (also sometimes called tele-centricity) – all of which are important to know when trying to make precision measurements. The calibration tool produces an instant calibration and displays the exact magnification, without performing the steps shown above.

To perform an automatic calibration, place the special target under the microscope. The target is a glass plate that contains of an array of parallel lines. Position the target with the lines approximately vertical.

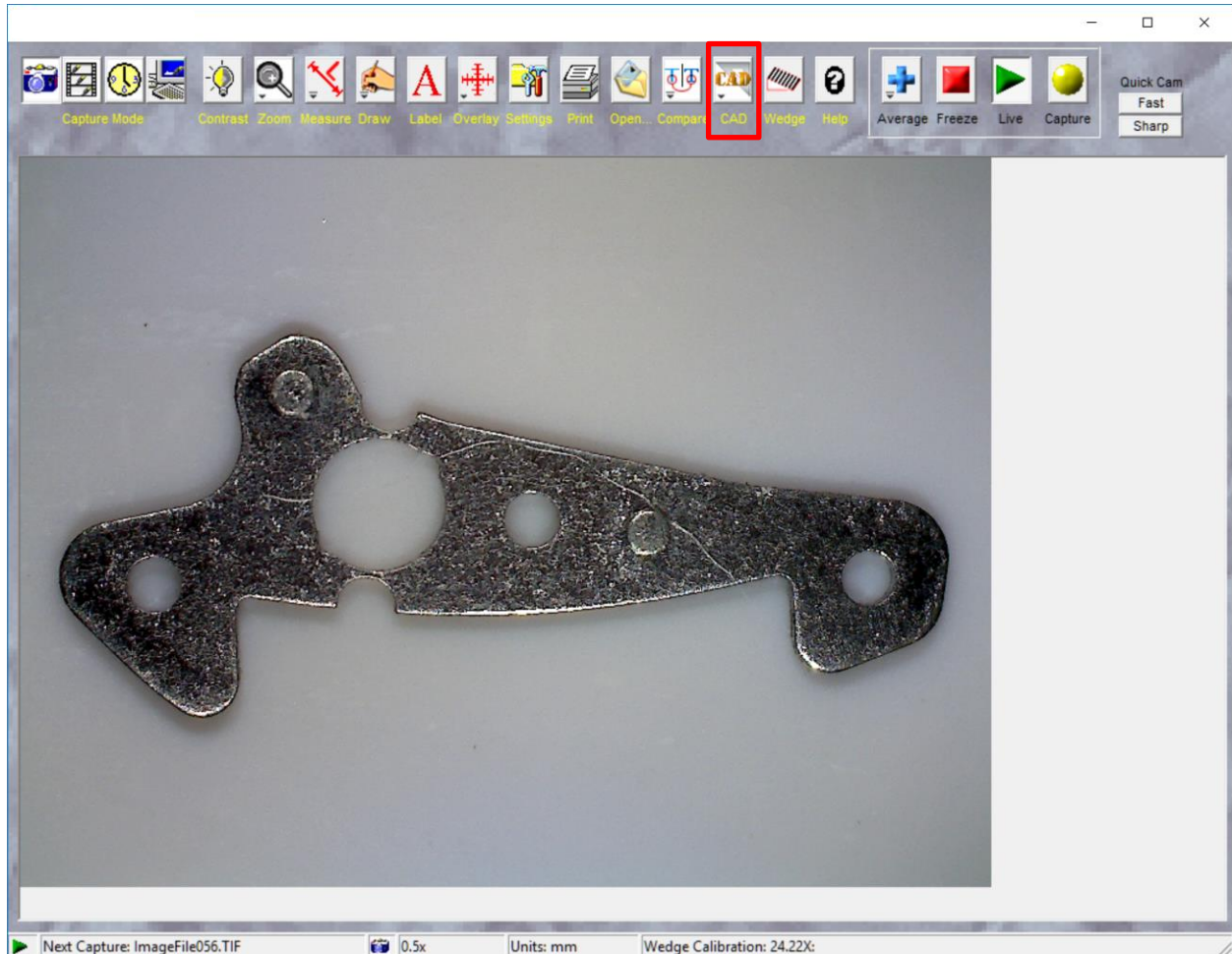


Focus the microscope on the target until the lines are sharply in focus. Next press the WEDGE button to open the calibration menu (see right) and press the CALIBRATE button. The software is now calibrated. Note that the exact magnification is now displayed on the bottom right of the main window (see above "Wedge Calibration 24.22X").

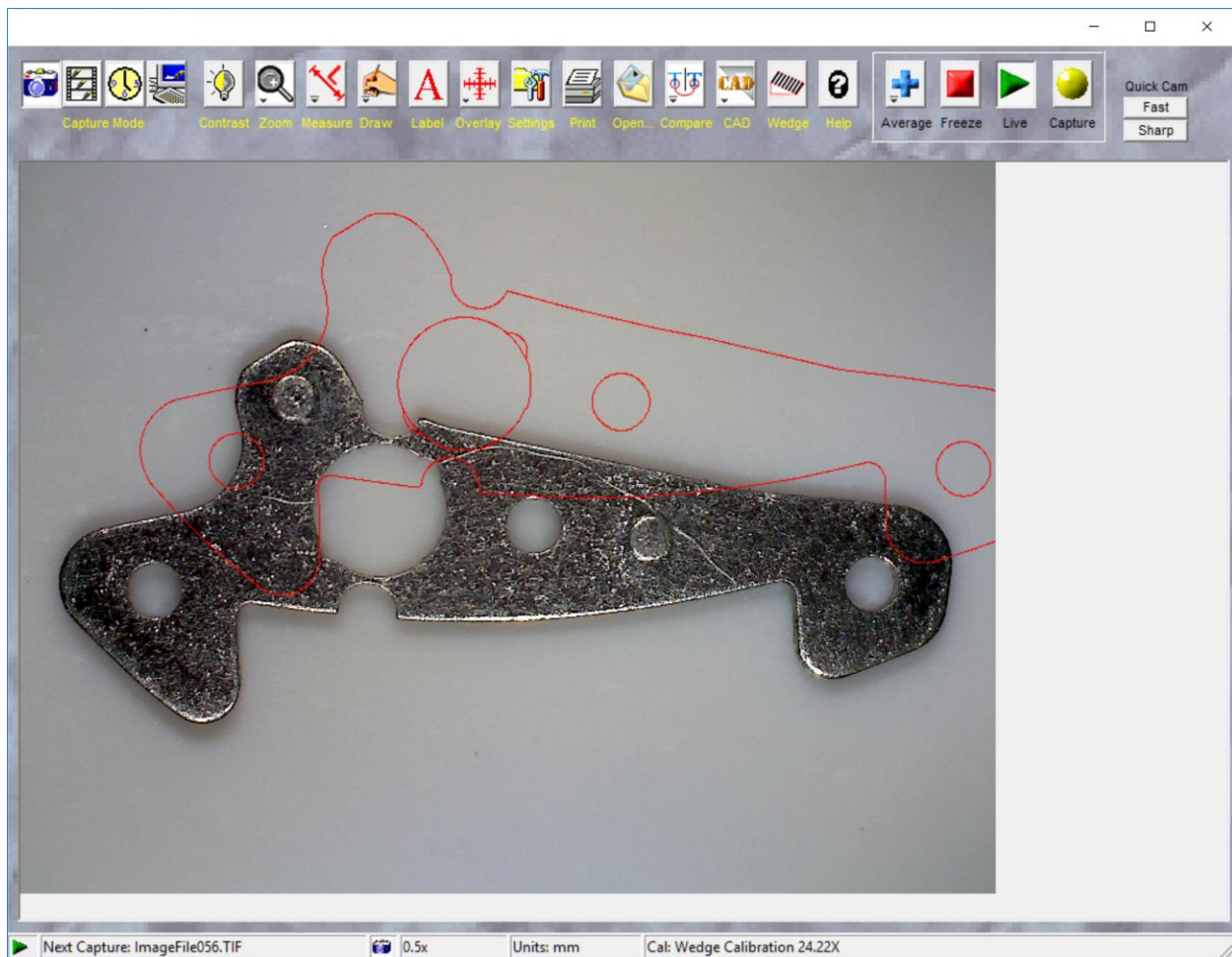


How to Import a CAD file

Once the software is calibrated remove the calibration reference object and refocus on the sample without altering the magnification (or zoom) setting. The CAD button should now be enabled.



To import a CAD file, press the CAD button and select “Import CAD file → Overlay” from the menu. Select a CAD file (.dxf or .dwg format). The CAD import tool will read the CAD file and convert it into a properly scaled overlay file which should appear on the screen.



Once the overlay file is displayed, you can either move the sample to align it with the overlay, or you can move the overlay to align it with the sample.

How to Move the CAD Overlay

Manually Moving the CAD Overlay

Shift X and Y: Hold down the SHIFT key then click and hold the left mouse button and drag with the mouse to move the overlay on the image.

Precise shift: Hold down the SHIFT key and press the arrow keys on the keyboard, or rotate the scroll wheel on the mouse to move the overlay one pixel at a time in any direction.

Undo shift: Hold down the SHIFT key and double-click the left mouse button to undo any shift in the position of the overlay.

Rotate: Hold down the R key (for rotate) then click and hold the left mouse button while dragging left or right to rotate the overlay around a center point.

Precise rotate: Hold down the R key and simultaneously press the arrow keys on the keyboard, or rotate the scroll wheel on the mouse to rotate the overlay one degree at a time in either the clockwise or counter-clockwise direction.

Undo rotate: Hold down the R key, then double-click the left mouse button to undo any rotation of the overlay.

Set the center of rotation: The overlay rotates about the center of rotation (which by default is the center of the overlay). To change the center of rotation, hold down the C key (for center of rotation) and left click the mouse on the new center of rotation. The overlay will now rotate about this new point.

Undo center of rotation change: To restore the center of rotation to the center of the overlay, hold down the C key and double-click the left mouse button.

Manually Aligning a CAD Overlay

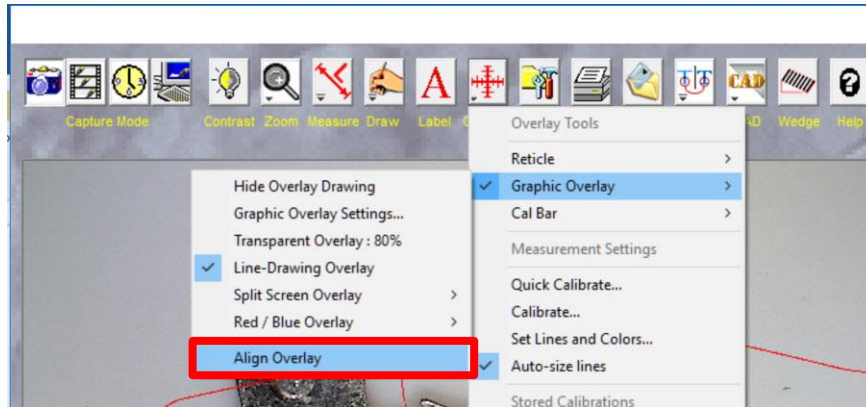
An overlay can be quickly aligned by using the shift and rotation options. First, shift the overlay until a feature of the overlay is aligned to the corresponding point on the sample (SHIFT-click and drag on the image). Next set that location to be the center of rotation (C key and left click on the feature).

Now rotate the overlay (R key and arrow keys or muse scroll wheel) until the overlay aligns with the part.

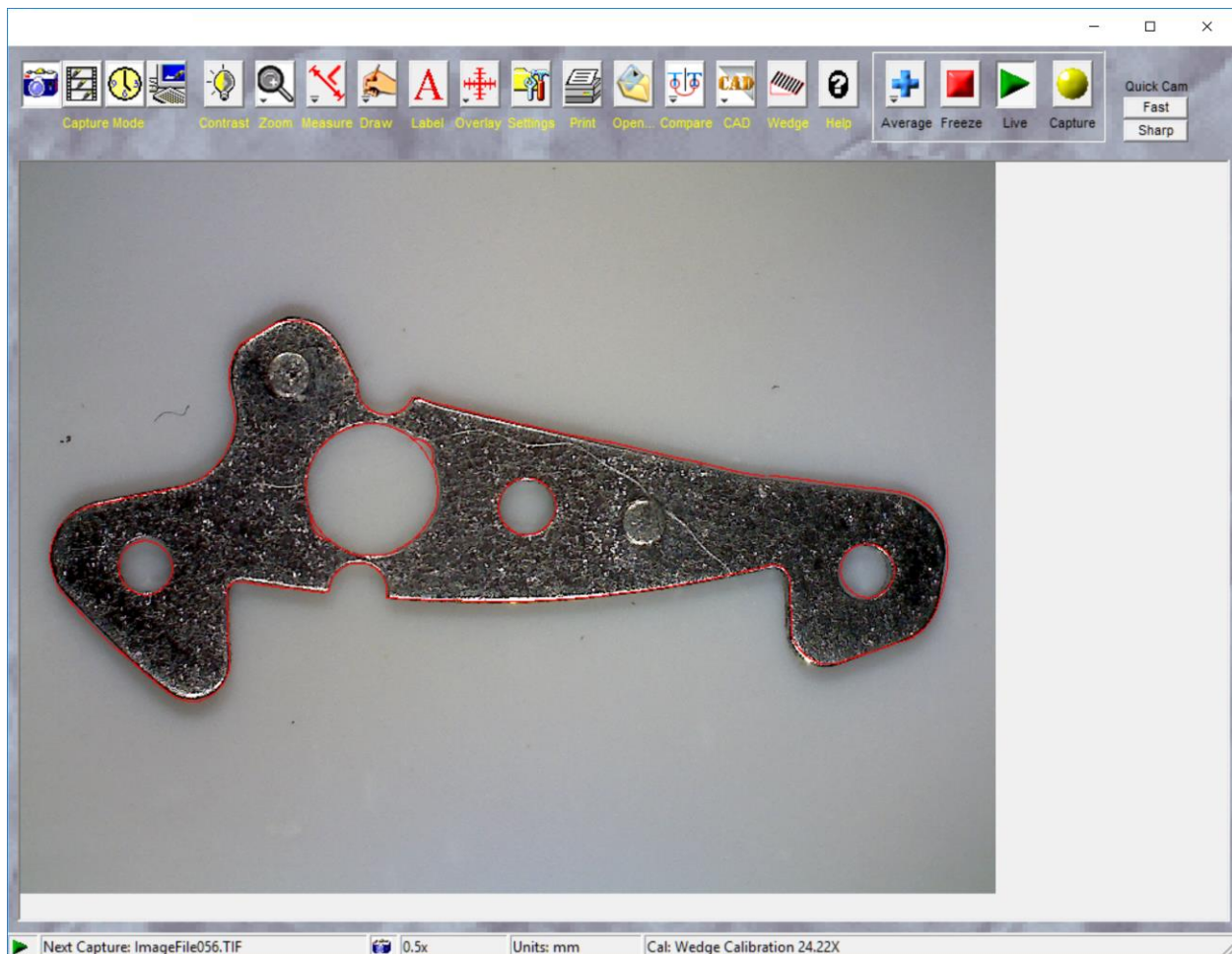


Computer-assisted Alignment of a CAD Overlay

Premier Software offer computer-assisted alignment of overlays. To perform a simplified alignment press the OVERLAY button, select the menu Graphic Overlay → Align Overlay.

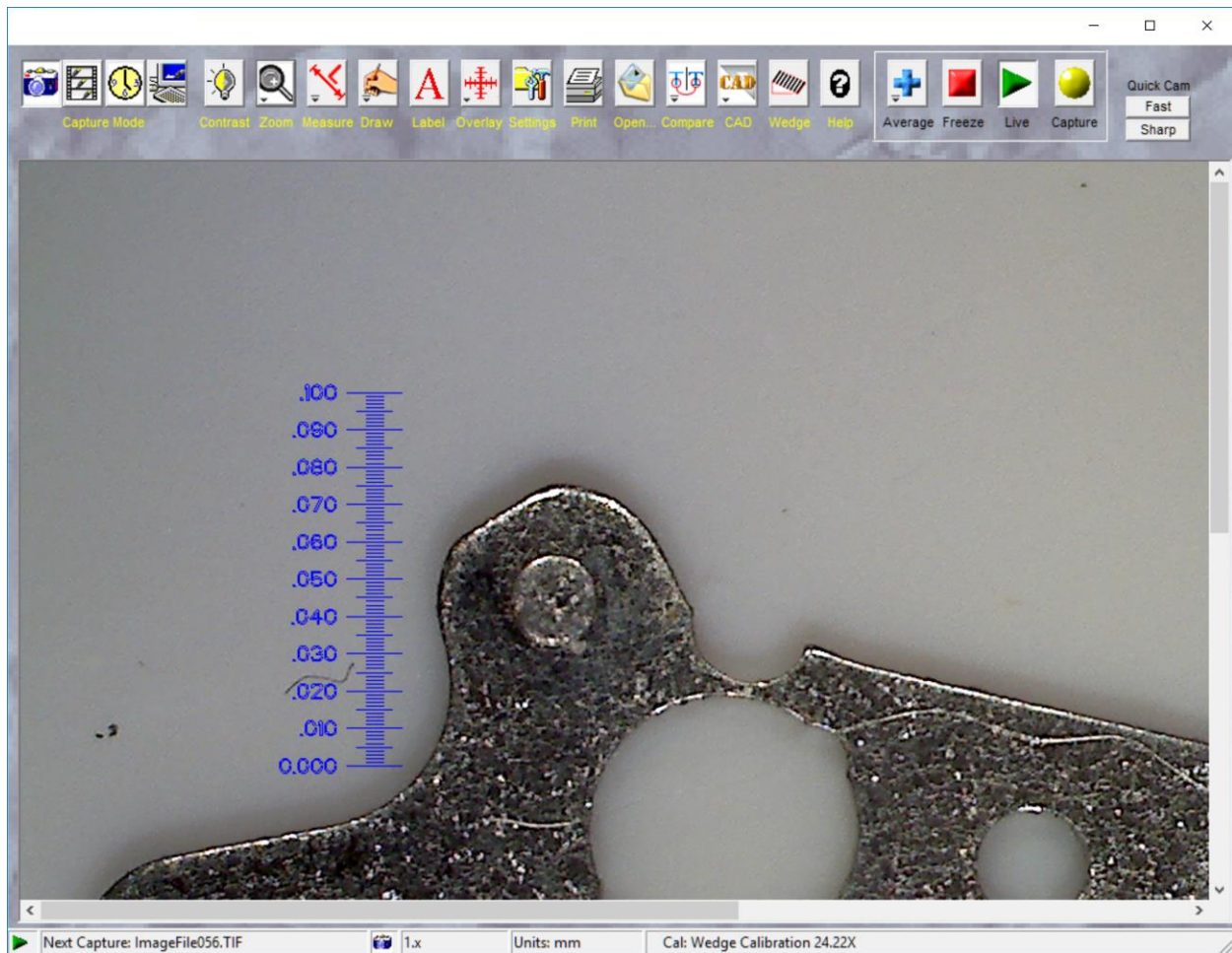


The program will ask you to mark three reference points on the sample. Next the program will ask you to mark the corresponding points on the overlay. The program will then automatically shift and rotate the overlay to best match the sample. You can further adjust the overlay manually.



CAD Reticles and Alignment Tools

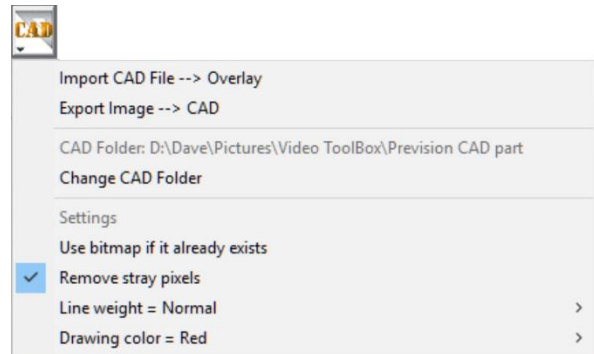
In addition to part-specific CAD files, general purpose measurement and alignment tools can be created for use as overlays. Premier Software will automatically scale the CAD file to precisely the correct size to match the size of the image.



CAD Overlay Settings

The CAD Overlay tool offers a set of advanced features to adjust how the overlay is drawn, and also allows images to be exported back to the CAD conversion program. Sending an image to the CAD conversion program offer the option to create CAD overlays drawn directly over the image.

Press the CAD button to display the following options:



Import CAD File → Overlay: Import a CAD File (.dxf or .dwg format) as an overlay onto the live image.

Export Image → CAD: Send the live image back into Delta CAD. The image is correctly scaled so the CAD drawing tools draw at the correct size.

CAD Folder: Displays the folder in which the converted overlay image files are stored.

Change CAD Folder: Change the folder that holds the converted overlay image files.

Settings

Use bitmap if it already exists: Checks if the CAD file has already been converted to a overlay file. If the overlay file already exists, the software will not try to convert it again. Use this option if overlays are frequently changed – it eliminates the conversion process and significantly reduces the time needed to switch overlays.

Remove stray pixels (*recommended*): Rasterizing the CAD drawing sometimes results in stray dark or light pixels scattered throughout the overlay. This option will detect and remove those stray pixels.

Line weight = <option>: Use this option to override the file settings to change the weight (thickness) of the lines in the CAD drawing. After changing this setting, the CAD file must be imported again for the new setting to take effect.

Drawing color = <option>: Use this option to override the file settings to change the color of the lines in the CAD drawing. Best used to make the lines stand out against the sample. After changing this setting, the CAD file must be imported again for the new setting to take effect.