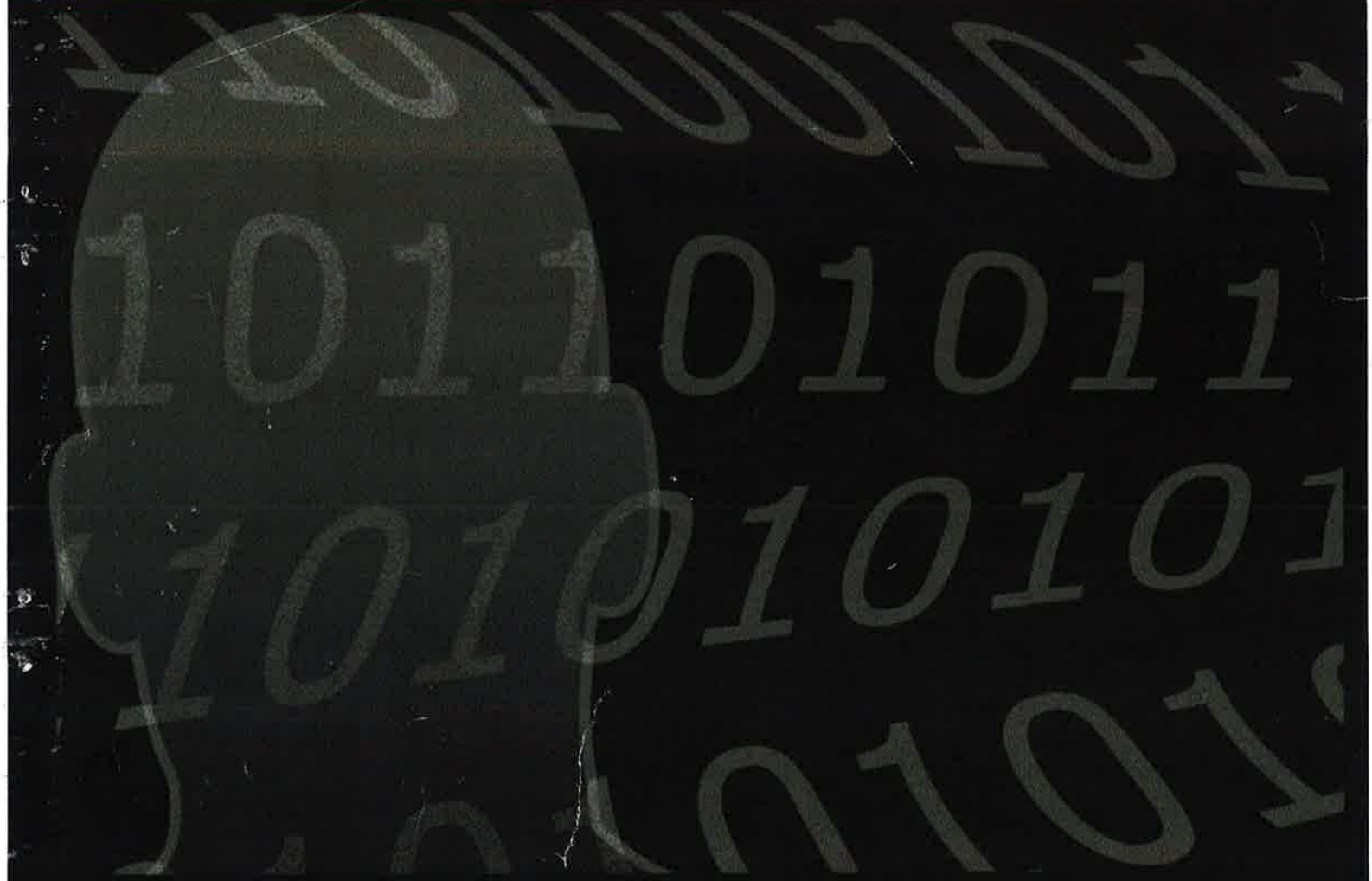
FACE Plus Case Management

User Guide



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A Leader in Law Enforcement & Criminal Justice Technology

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Getting Started

Welcome to FACE Plus Case Management

Welcome to FACE Plus Case Management by DataWorks Plus. FACE Plus provides accurate, reliable identification with the latest and greatest in facial recognition matching accuracy and tools to manipulate images and compare images.

Case Management

Track and store multiple search scenarios in a case. You can input and manage multiple views of probe images taken from JPEG single image files as well as AVI and MPEG video files. Then you will be able to create a variety of searches with different probe images and data field selections for filtering. Each search will be saved. Select a combination of searches to review a blended result based on match scores.

Image Enhancement

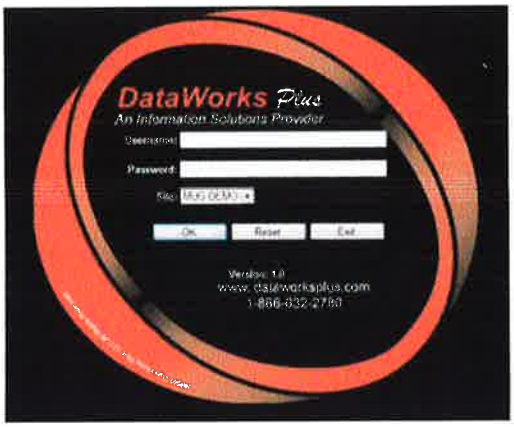
Images can be edited to provide even more accurate results by marking the eye locations, cropping the images to be similar, correcting image brightness, and other basic editing functions. Pose correction and lighting normalization is also available, allowing you to search facial images that were once unsearchable.

Facial Comparison

Compare images side-by-side or edit copies of images for easier viewing or to clarify certain details. You can overlay two images to view distinct images, or view a "curtain" image, which displays the left portion of one image and the right portion of the other image.

Log In To the System

Double-click the Facial Recognition icon to launch the application. The logon screen will be displayed.



The logon screen will prompt you for a user name, password, and site selection. The site can be selected by clicking on the drop down list. If there multiple sites are available, click the site you want to work with to select it. Your system's administrator will provide your logon information. Note that you may have access to one or more sites and you may have different logons per site.

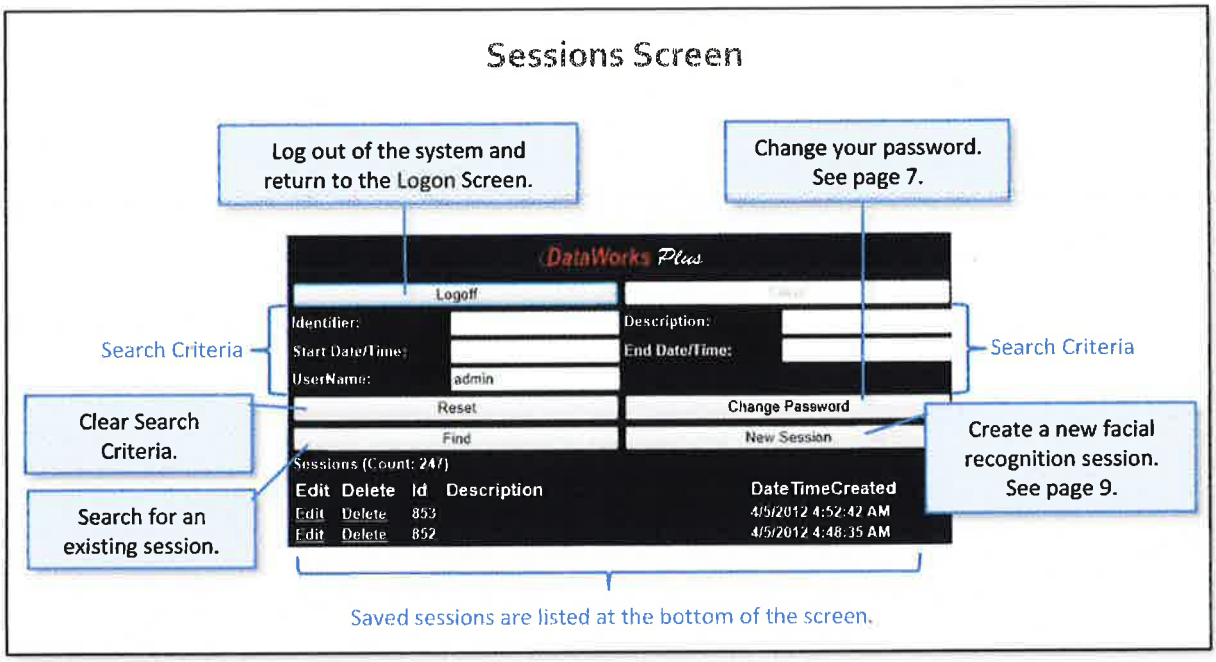
The additional options available on this screen are:

- **OK** will log into the system once the user name and password have been entered.
- **Reset** will clear anything entered in the user name and password fields.
- **Exit** will close the system.

After entering the logon information, click **OK** to access the program. The Sessions screen will be displayed.

Sessions Screen Overview

After you enter a valid user name and password, the Sessions screen will appear.



There are several buttons located on the Sessions screen.

- **Logoff** logs you out of the system and returns you to the Logon screen.
- **Reset** clears information entered in the Identifier, Description, Start Date/Time, or End Date/Time fields.
- **Find** is used to search and view existing sessions. You may enter criteria in the Identifier, Description, Start Date/Time, or End Date/Time fields to search on. If you leave all fields before clicking **Find**, all sessions will be displayed.
- **Change Password** allows you to change your password.
- **New Session** allows you to create a new facial recognition session.

Change Password

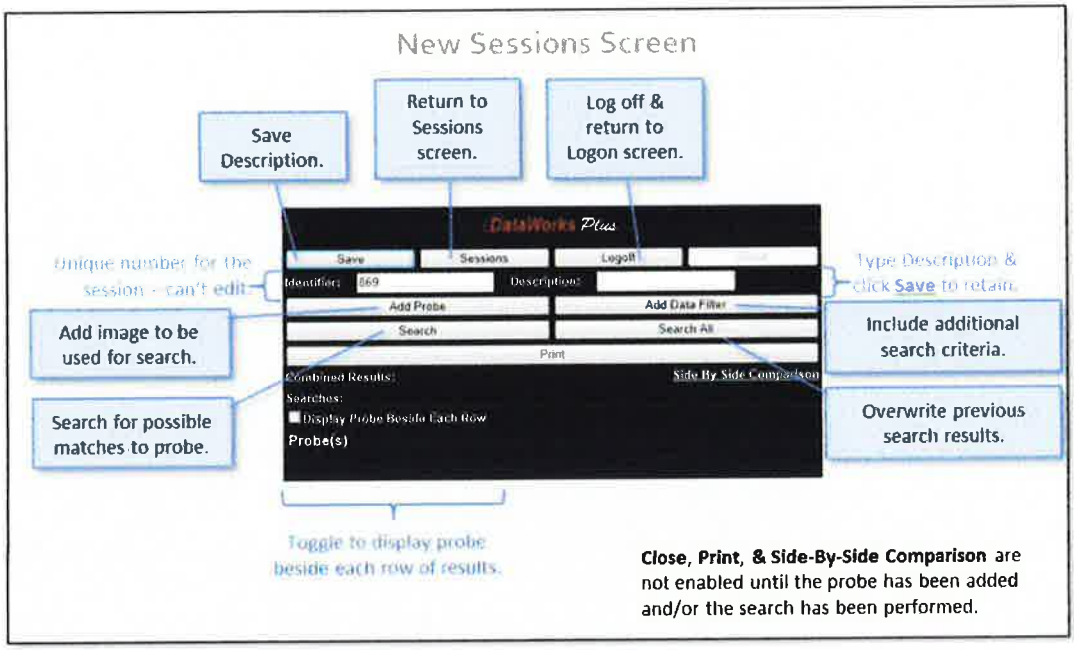
The **Change Password** button allows you to update your current password. Note that this does not allow you to update a password that has been forgotten. To change your password, click **Change Password** from the Sessions screen.

Enter your old password. Then enter and confirm your new password. Select **Cancel** if you would NOT like to change your password. Otherwise, select **OK** to proceed to accept the changes to your password.

Starting a New Session

Face Plus allows you to store multiple search scenarios. You may upload and manage multiple views of probe images taken from single image files as well as video files. You will be able to create a variety of searches with different probe images and data field selections for filtering. The system supports over 40 different fields for data filtering. Each of the searches will be saved as a separate session.

New Session Screen Overview



- **Save:** All sessions are automatically assigned an **Identifier** and saved. However, if you wish to add a description, be sure to click **Save** to save the description you entered for the session.
- **Sessions** returns you to the Sessions screen.
- **Logoff** logs you out of the system and returns you to the Logon screen.
- **Identifier** displays the unique number that has been automatically assigned to this session. You may not edit this field.
- **Description** allows you to enter a description for the session. Click **Save** to save your information.
- **Add Probe** allows you to locate the desired probe image to be used for the facial recognition search. Please see "*2. Load Probe Image(s) from Single Images or Video*" on page 9 for more information.
- **Search** searches the database for possible matches to the probe image(s). If you have added another probe to a saved session, clicking "Search" will retain the results of the original search and only add the matches from the new probe.
- **Add Data Filter** allows you to include additional search criteria, such as name or gender in order to narrow your results.
- **Search All** searches the database for possible matches to the probe image(s). It differs from "Search" in that it will perform a new search on all probes, overwriting the original search results. Generally, you will not perform a "Search All" unless you have added many new records to the database and want to overwrite the previous search results.

Steps for Creating a New Session

Following are the steps for creating a new facial recognition session. More details about each step are included in the following sections. In addition, you may add data filters to narrow your search results.

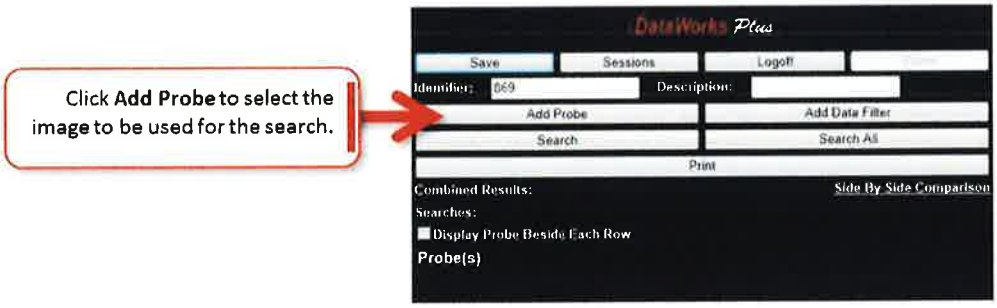
1. Click **New Session** from "Sessions" screen – see page 9
2. Load Probe Image(s) from single images or video – see page 9
3. Edit probe image(s) if needed – see page 11
4. Search databases and view results – see page 19

Optional: Add data filter(s) if needed – see page 20

1. Click New Session from "Sessions" screen.

2. Load Probe Image(s) from Single Images or Video

Next you need to select the image to be used for the facial recognition search. Click **Add Probe.**



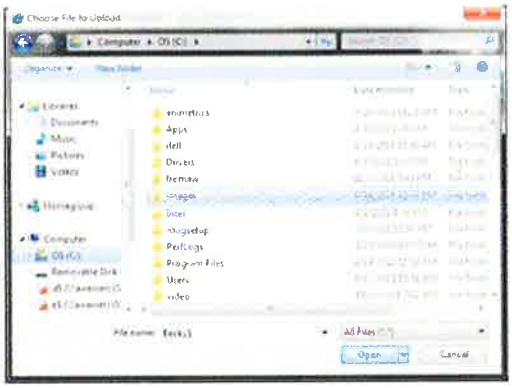
The "Image Upload" screen will be displayed.

You may upload a single JPEG image file or you may extract a frame from a video file to search on.

Note: Only JPEG images are supported for facial recognition searches. If you are using a non-JPEG image type that is natively supported by Windows, such as a bitmap image, then the system will automatically attempt to convert the image into JPEG format before searching.

Upload Single Image File

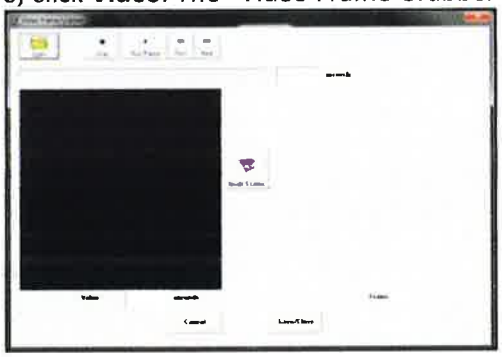
To upload a single JPEG image file, click **Browse** to locate the image. You will be prompted to select the image.



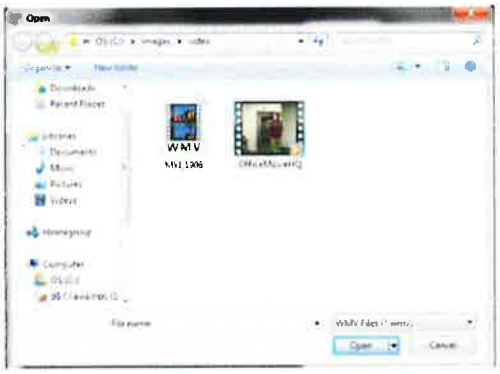
Browse to the appropriate location, select the desired file and click **Open.** The probe image you selected will be displayed.

Upload Image from Video

To upload an image from a video, click **Video**. The "Video Frame Grabber" screen will be displayed.

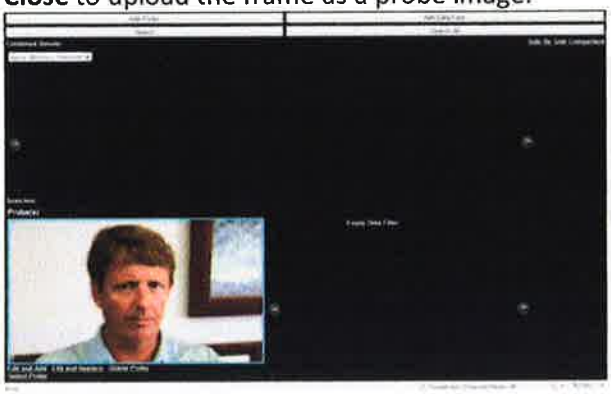


Click **Open**.



Browse to the desired file and click **Open.** The video will automatically play. Click the **Grab Frame** button to extract a particular frame. The frame you have captured will be displayed on the right side of the screen. You may use the playback buttons to replay or pause the video until you get the frame you wish to use.

When satisfied, click **Save/Close** to upload the frame as a probe image.



3. Edit Probe Image(s) if Needed

The Probe images can be edited to provide even more accurate results by marking the eye locations, cropping the images to be similar, correcting image brightness, and other basic editing functions. Pose correction and lighting normalization is also available, allowing you to search facial images that were once unsearchable. If the probe image is satisfactory, proceed to ***4.*** Search Databases & View Results on page 19.

Editing or Enhancing Probe Images

If needed, images can be edited to provide even more accurate results by marking the eye locations, cropping the images to be similar, correcting image brightness, and other basic image editing functions. Pose correction and lighting normalization is also available. Two options allow you to access the editing tools:

- **Edit and Add:** Allows you to edit a copy of the probe image. The edited image will be an additional probe image. The original will remain.
- **Edit and Replace:** Allows you to edit the probe image. The edited image will replace the original.

Click either **Edit and Add** or **Edit and Replace**. A screen similar to the following will be displayed.

There are several menu options available at the top of the screen, as well as several toolbar buttons.

File

The **File Menu** allows you to either **Save/Close** the changes you have made to the image or **Cancel** out of the Image Manipulate window. These options are available as buttons on the bottom of the screen as well.

Edit

The **Edit Menu** provides the following tools:

Undo: will undo that last change that was made.

Undo Current Changes: will undo all changes made since you last saved the image.

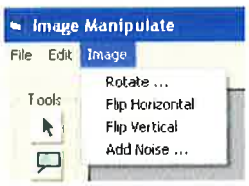
Restore to Original Image: will undo all changes that you have made to the image.

View History Menu: this tool will open a menu at the right side of the image manipulate window that will display all of the changes that have been done to the image. From this menu you can choose to undo specific actions that were done to the image.

Deselect: will deselect the portion of the image that you have selected.

Color Picker: turns your mouse arrow into a color picker that allows you to choose a color within the image. The selected color will be displayed in the Color box at the bottom of the screen.

Image



The Image Menu provides the following tools:

Rotate: opens the Rotate window. For more information, please see ***"Rotating Images"*** on page 54.

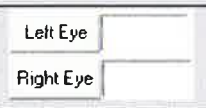
Flip Horizontal: this reverses the image horizontally.

Flip Vertical: this reverses the image vertically.

Add Noise: this opens the noise window. For more information, please see ***"Adding Noise to Images"*** on page 54.

Toolbar

Image Manipulate Screen - Toolbar	
	**Selection Arrow** allows you to select different portions of the screen or to click on items and move them.
	**Magnifying Glass** will magnify the portion of the image that you are hovering over when you right click.
	**Crop Tool** allows you to make a selection and discard that area around it. For more information, please see ***"Cropping Images"*** on page 51.
	**Color Picker** allows you to pick a color from the image that you are working with.
	**Paint Brush** allows you to paint onto the image.
	**Lasso Tool** allows you to make a free-hand selection.
	**Magic Wand Tool** automatically selects an area that you click.
	**Paint Bucket** allows you to dump paint over a selected area. If no area is selected it will paint over the entire image.
	**Sharpen Image:** This allows you to sharpen the image. Sharpening seems to bring out image detail that wasn't there before by emphasizing the edges of an image. It increases the contrast between each pixel and its neighbors. You will be prompted to enter a sharpening value. Move the slider on the bar to the left or right or type in a percentage to sharpen the image by. Select **OK** to apply to adjust the image. For more information, please see ***"Sharpening Images"*** on page 52.
	**Contrast:** This allows you to adjust the contrast of the image. Contrast is the difference in brightness between light and dark areas in an image. You will be prompted to enter a contrast setting. Move the slider on the bar to the left or right or type in a percentage. Positive values increase the contrast of the image; negative values decrease the contrast. Select **OK** to adjust the image. For more information, please see ***"Adjusting Image Contrast"*** on page 53.
	**Brightness:** This allows you to adjust the brightness of the image. Brightness adjusts how light or dark and image appears. You will be prompted to enter a brightness setting. Move the slider on the bar to the left or right or type in a percentage. Positive values will lighten the image; negative values will darken the image. Select **OK** to adjust the image. For more information, please see ***"Adjusting Image Brightness"*** on page 53.
	**Saturation:** This allows you to adjust the saturation of the image. Saturation is the "purity" of the color. Fully saturated colors are very rich and bright. Less saturated colors are more gray. You will be prompted to enter a saturation value. Move the slider on the bar to the left or right or type in a percentage to change the saturation of the image. Click **OK** to apply the adjustment. For more information, please see ***"Adjusting the Saturation of an Image"*** on page 53.
	**Hue:** This allows you to adjust the hue, or color, of the image. You will be prompted to enter a hue angle. Depending on what number you enter, the color will be adjusted across the hue circle by that many degrees. Click **OK** to apply the adjustment. For more information, please see ***"Adjusting the Hue of an Image"*** on page 54.
	**RGB Balance** allows you to adjust the individual RGB values of an image.
	**Grayscale** allows you to adjust the RGB values for the grayscaled image.
	**Auto-correct Image** will automatically correct the image as needed.

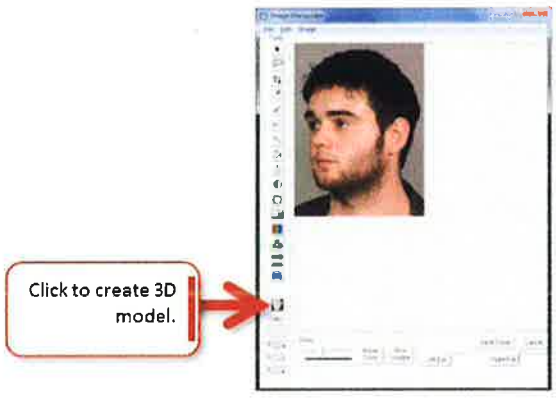
Image Manipulate Screen - Toolbar	
	**Pose Correction** allows you to create a 3D model of the face. From the 3D model, you may adjust the 3D model to optimize the pose and lighting of the image, which can then be used to find matching records. For more information, please see ***"Pose Correction"*** on page 14.
	**Color Swatch:** This is the default color for paint brush, paint bucket, background and foreground colors. You can adjust the color using the RGB values or you can double click on the swatch to change it.
	**Zoom** allows you to zoom in and out of the image as necessary by adjusting the slider position. **Reset Zoom** will return the image to the original size. **Fit in Window** will make the entire image visible from the view window.
	**Left Eye** and Right Eye can be used to mark the eye locations. The Cognitec search engine will use these locations to find matching records; however, it is not necessary to mark the eye locations.

Saving

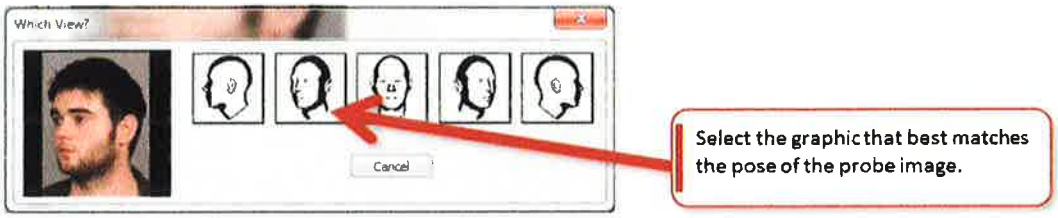
When you are finished working with the image click **Save/Close** and the changes that you have made to the image will appear in the lineup. Note that the changes are done to a copy of the original image; you cannot alter the original image. If you want to discard that changes that you have made to the image click **Cancel**.

Pose Correction and Light Normalization

The Pose Correction tool allows you to create a 3D model, which will allow you to search facial images that were once unsearchable. The following example shows how you can create the model and manipulate it to create a searchable image. First, click  from the edit screen.



You will be prompted to select the view of the original image. Click the graphic that best matches the pose of the original image.

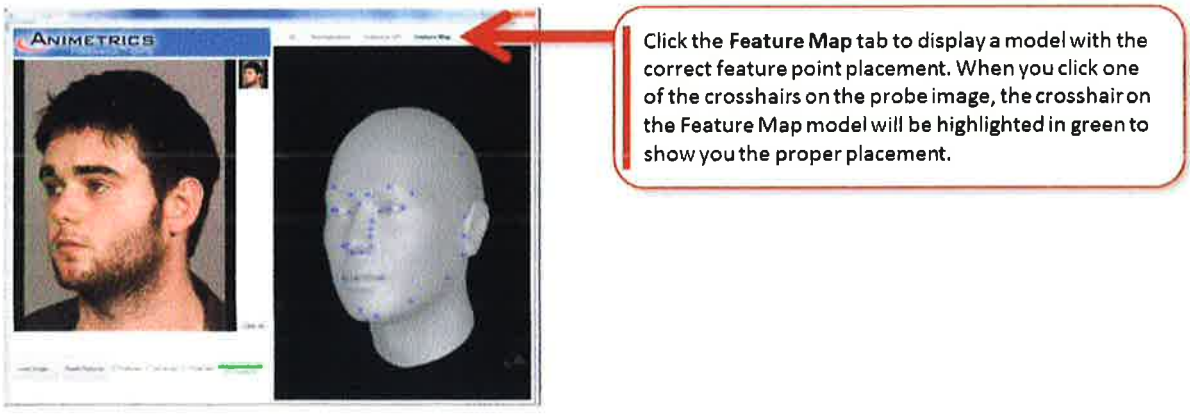


The image will be loaded into the pose correction/light normalization screen.

The accuracy of the 3D models generated is dependent upon the accuracy of the 2D feature points that overlay the original images. The feature points are displayed on the image as red, green, and gray crosshairs. Verify that the red crosshairs are in the correct place (eyes, chin and ear). The green and gray crosshairs may be moved if you wish to fine-tune the image. If you wish to move the feature points, refer to the following section: *"Adjusting Features (Optional)"* on page 15; otherwise, proceed to *"Generating the 3D Model"* on page 17.

Adjusting Features (Optional)

Select the **Feature Map** tab to display a model with correct feature point placement.



The Feature Map displays the proper anatomical locations for each point. You may refer to it while adjusting the location of the selected crosshair. When you click one of the crosshairs on the probe image, the crosshair on the Feature Map model will be highlighted in green to show you the proper

placement. The green and gray crosshairs may be moved if you wish to fine-tune the image. To reset the feature points to their original locations, click **Reset Features** below the original image.

Primary (Red) Points

Click and drag any of the red feature points to their proper location. When the mouse is released, the green and gray "secondary" features are recalculated in real time based on the "primary" red features. This method of feature point adjustment will be sufficient to generate an accurate 3D model in most cases.

Feature Fine Tuning

The green and gray secondary features can also be moved if desired. To enable the secondary features, check the **Advanced** checkbox. The secondary features may now be adjusted by clicking and dragging with the mouse. The red primary features may also be moved, but if you adjust them when the **"Advanced"** box is checked, they system will not automatically recalculate the green and gray feature points. The green features indicate the subset that have either been detected or manually adjusted by the user. The blue/gray set is projected from the generated 3D model. To view the entire set of 3D projected features, check the **Projected** checkbox.

Resetting Features

To reset the feature points on an image to the original detected locations, click the **Reset Features** button below the image viewport.

Hiding/Showing Features

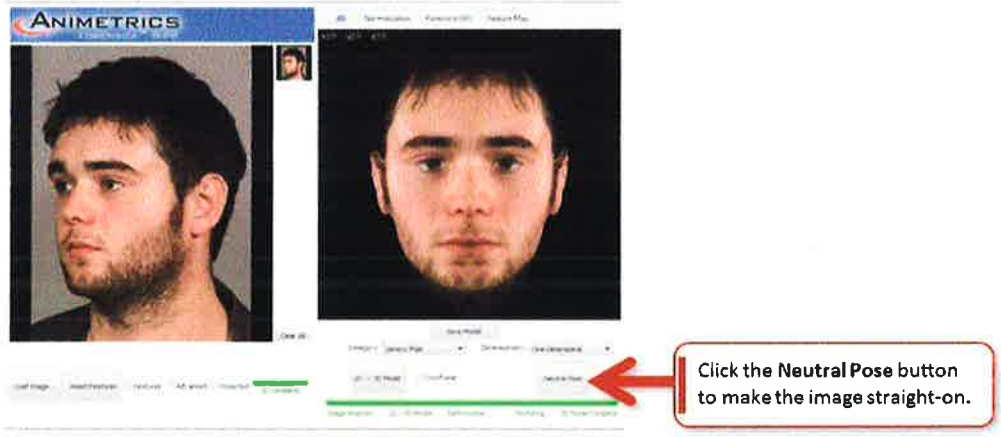
To toggle hiding/showing of the feature points on an image, click on the **Features** checkbox below the image viewport.

When you have finished adjusting the feature points, click the **3D** tab. Proceed to *"Generating the 3D Model"*.

Generating the 3D Model

Once the feature points have been adjusted (if necessary), make sure the **3D** tab has been selected and click the **2D->3D Model** button to generate the 3D model. The progress bar at the bottom of the screen shows the status of the generation process.

If necessary, click the **Neutral Pose** button to make the image a straight-on image.

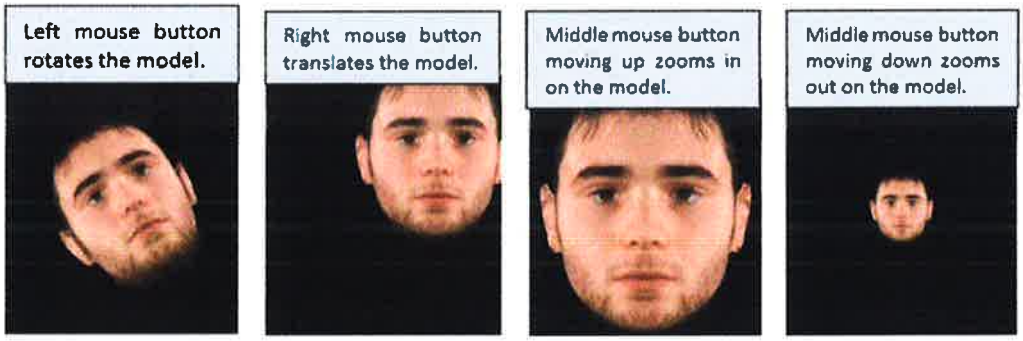


When finished, click **OK** on the **Pose** screen to the right of the 3D model.

The revised image will be displayed in the Image Manipulate screen. Click **Save/Close** to load the edited probe image.

Optional – Rotating or Translating the Model

You may rotate and translate the 3D model with your mouse. Click the left mouse button, hold and drag to rotate the model. Click and drag the right button to translate the model. Click and drag with the middle button to move the model towards or away from you (zooming in and out).



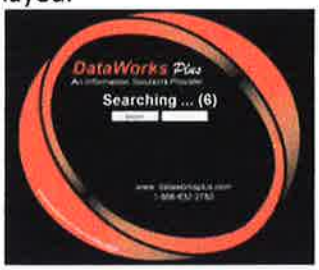
Optional: To save the model, click **Save Model**. You will be prompted to enter the file name. Browse to the location where you'd like to save the file, enter a file name, and click **Save**.

Note: More options are available from the 3D model screen. For more information, please refer to Appendix B for more information.

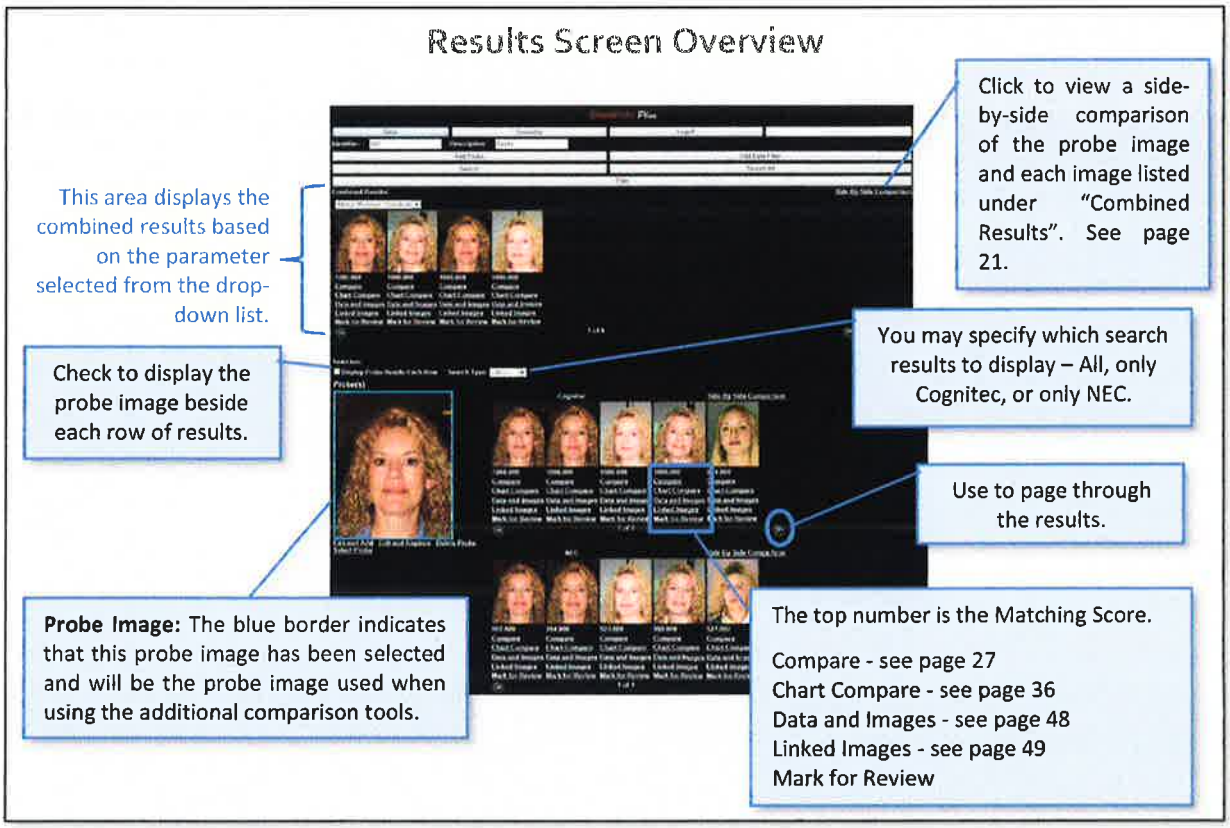
4. Search Databases & View Results

After you have uploaded and edited the probe image(s), click **Search** to find potential matches.

The Search Progress screen will be displayed.



FACE Plus provides a multiple engine approach, which uses both Cognitec and NEC search engines to deliver optimal facial recognition accuracy. When the search has completed, the potential matches from each engine will be displayed.

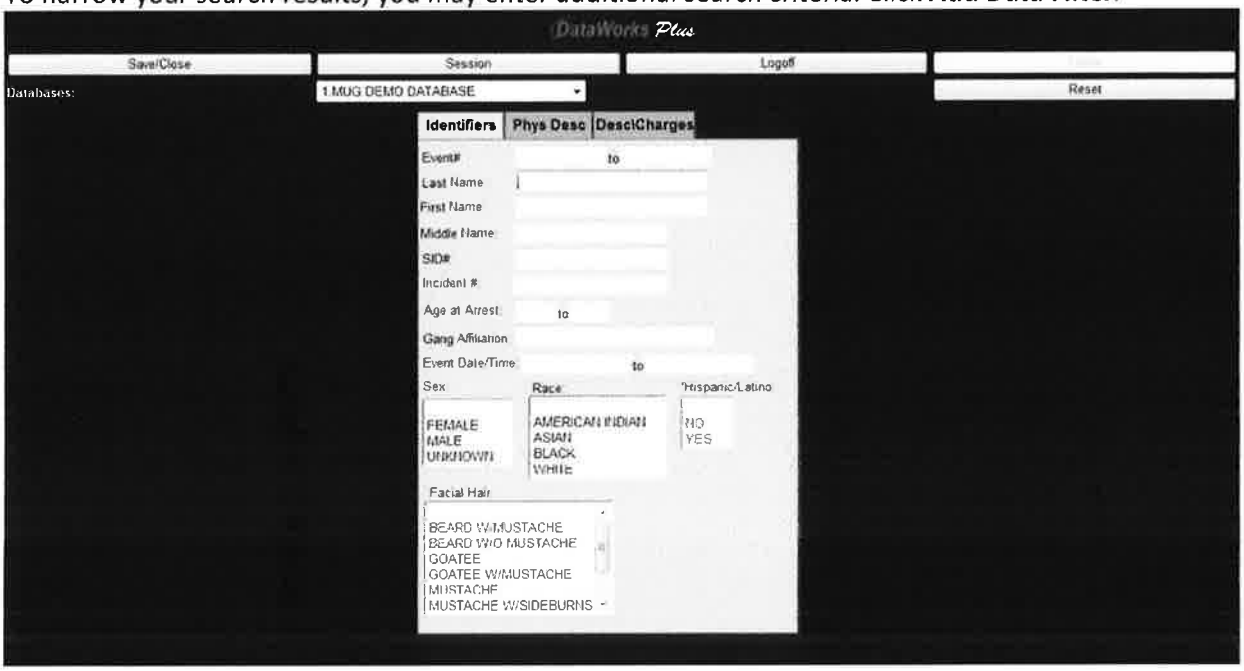


Combined Results are displayed at the top left of the screen. You may specify the parameter that will be used for determining the combined results from the drop-down list. Choices are Above Minimum

Threshold, In All Results, In All But One, In All But Two, and Marked for Review. The images that are included in Combined Results will change depending on which option you select. You may view a side-by-side comparison of the selected probe image and each "Combined Results" image by clicking **Side By Side Comparison**, which is located in the upper right corner. Beneath each search result image is a matching score and several tools that you can use for more detailed comparisons to the selected probe image.

Optional: Add Data Filter(s) If Needed

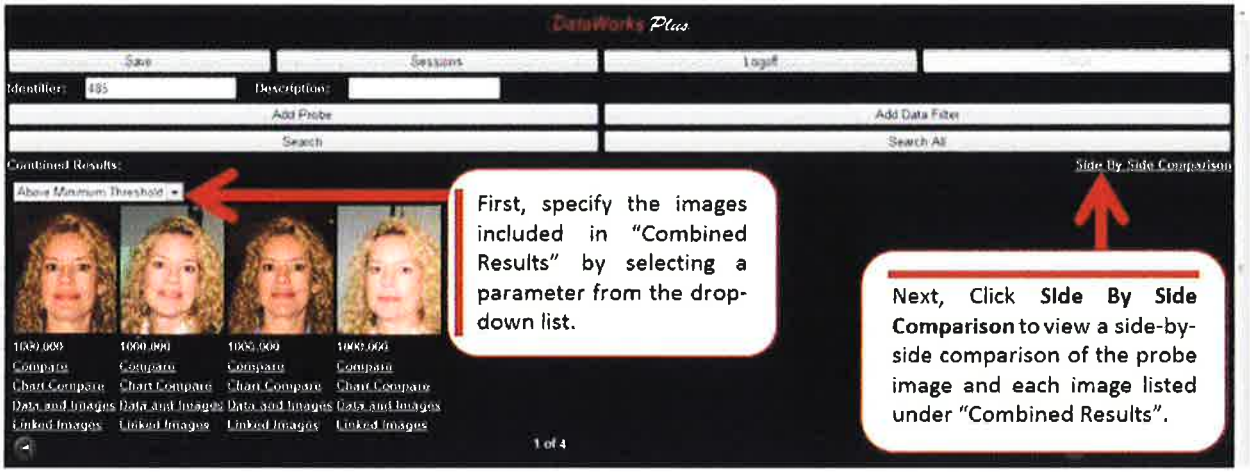
To narrow your search results, you may enter additional search criteria. Click **Add Data Filter**.



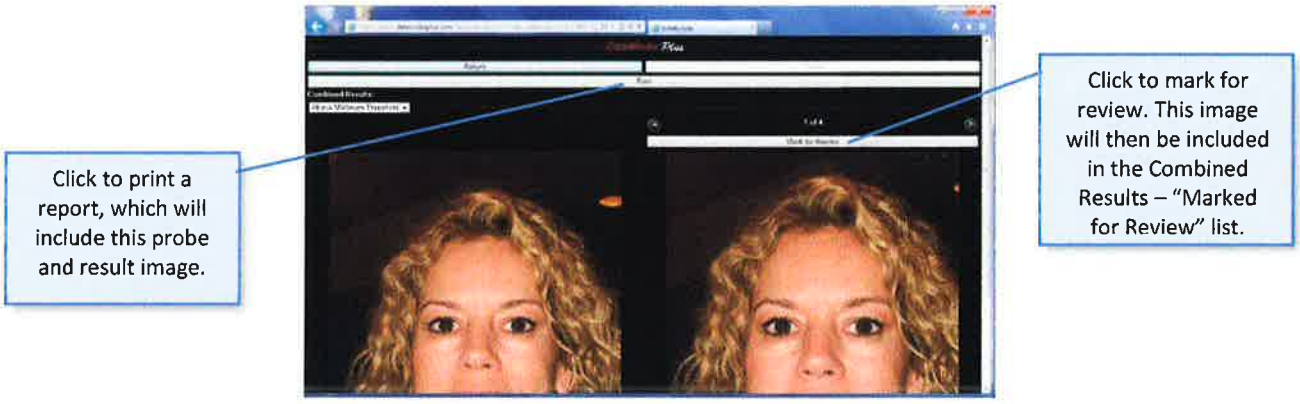
Enter specific search criteria such as sex, race, height, and other physical characteristics to narrow the search results. Click **Save/Close**. The filtered results will be added to the bottom of the screen.

Side by Side Comparisons

Combined Results are displayed at the top left of the screen. You may specify the parameter that will be used for determining the combined results from the drop-down menu. Depending on your system's configuration, the choices may vary. The images that are included in Combined Results will change depending on which option you select.



After you click **Side By Side Comparison**, which is located in the upper right corner, you will be able to view a side-by-side comparison of the selected probe image and each "Combined Results" image. You may mark result image(s) for review.



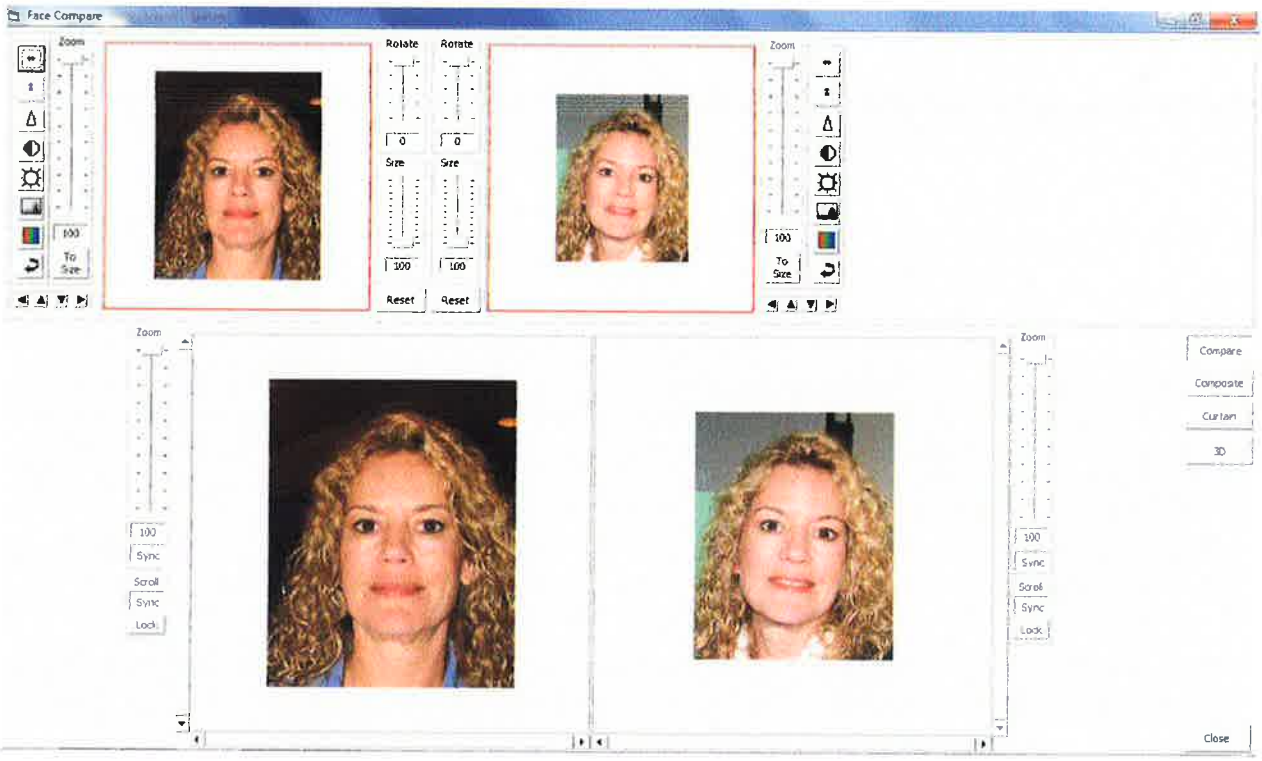
Click the right arrow to view the next "combined result" image beside the probe image.

Printing Side-by-Side Comparisons

You may print a report that displays the side-by-side comparison of the probe image and the result image. While viewing the side by side comparison, click the **Print** button.

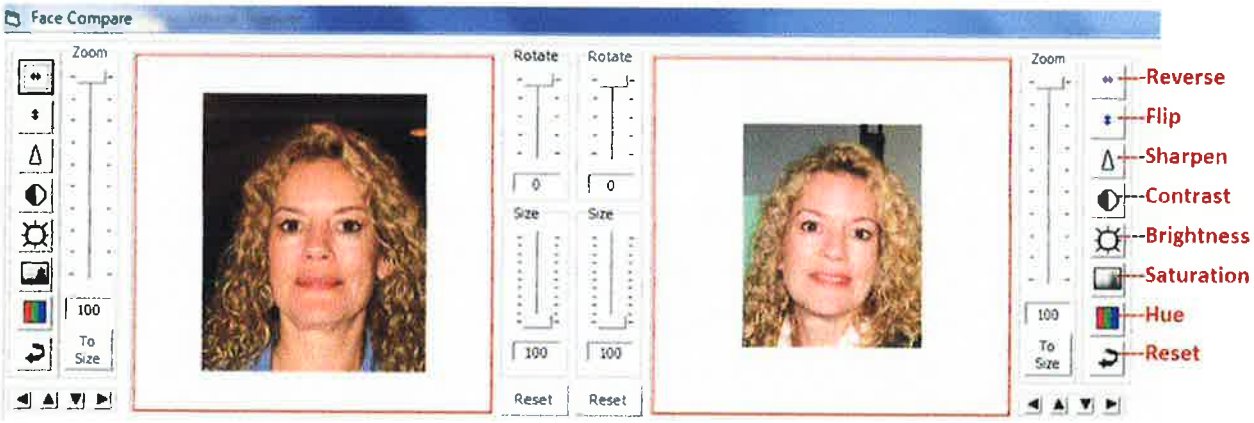
Compare

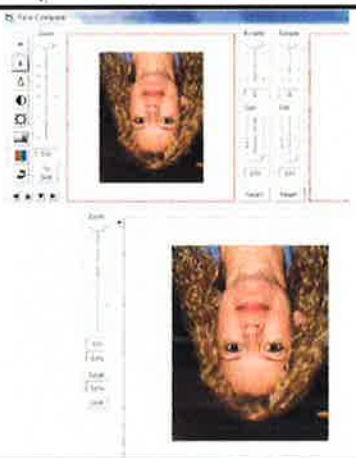
FACE Plus allows you to compare the probe image to one of the search result images. Select the desired probe image to compare (designated by a blue box), then click **Compare** under the search result image that you wish to compare to the probe image. A screen similar to the following will be displayed.



Top Panel Options

Several options are available at the top of the Face Compare screen. Unless otherwise noted, all of the actions available in the top portion of the screen will affect the larger corresponding image at the bottom of the screen.



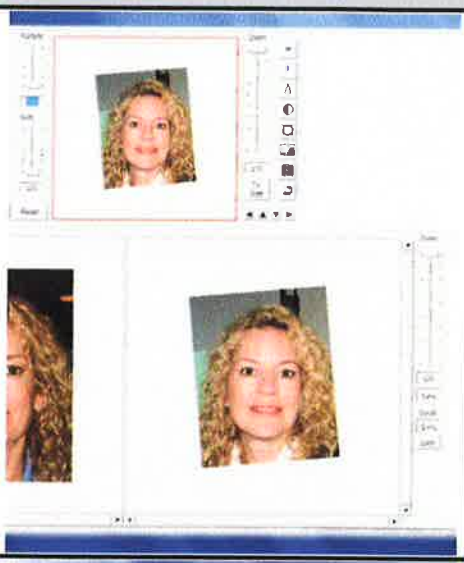
Face Compare Screen – Top Panel Options	
	Original Image 
	**Reverse Image:** This will reverse the image, flip the image horizontally. Note that reversing the image also reversed the image's display at the bottom of the screen. 
	**Flip Image:** This will Flip the image vertically/turn it upside down. Note that flipping the image also turned the image's display upside down at the bottom of the screen. 
	**Sharpen Image:** This allows you to sharpen the image. Sharpening seems to bring out image detail that wasn't there before by emphasizing the edges of an image. It increases the contrast between each pixel and its neighbors. You will be prompted to enter a sharpening value. Move the slider on the bar to the left or right or type in a percentage to sharpen the image by. Select **OK** to apply to adjust the image. For more information, please see *Sharpening Images* on page 52.
	**Contrast:** This allows you to adjust the contrast of the image. Contrast is the difference in brightness between light and dark areas in an image. You will be prompted to enter a

Face Compare Screen – Top Panel Options	
	contrast setting. Move the slider on the bar to the left or right or type in a percentage. Positive values increase the contrast of the image; negative values decrease the contrast. Select **OK** to adjust the image. For more information, please see *Adjusting Image Contrast* on page 53.
	**Brightness:** This allows you to adjust the brightness of the image. Brightness adjusts how light or dark and image appears. You will be prompted to enter a brightness setting. Move the slider on the bar to the left or right or type in a percentage. Positive values will lighten the image; negative values will darken the image. Select **OK** to adjust the image. For more information, please see *Adjusting Image Brightness* on page 53.
	**Saturation:** This allows you to adjust the saturation of the image. Saturation is the "purity" of the color. Fully saturated colors are very rich and bright. Less saturated colors are more gray. You will be prompted to enter a saturation value. Move the slider on the bar to the left or right or type in a percentage to change the saturation of the image. Click **OK** to apply the adjustment. For more information, please see *Adjusting the Saturation of an Image* on page 53 .
	**Hue:** This allows you to adjust the hue, or color, of the image. You will be prompted to enter a hue angle. Depending on what number you enter, the color will be adjusted across the hue circle by that many degrees. Click **OK** to apply the adjustment. For more information, please see *Adjusting the Hue of an Image* on page 54.
	**Reset Image:** This button will reset the image to its original size and rotation.
	**Zoom:** These sliders allow you to zoom in or out on the image. This zooming affects only the image at top of the screen, not the image preview below. The percentage that you are zoomed in will be displayed in the box below the slider. You can also type in the percentage that you want to zoom in the box.
	**To Size**: This button displays the image so that it fits in the preview window. Essentially this acts as a reset button if you have zoomed in on the image.

Face Compare Screen – Top Panel Options

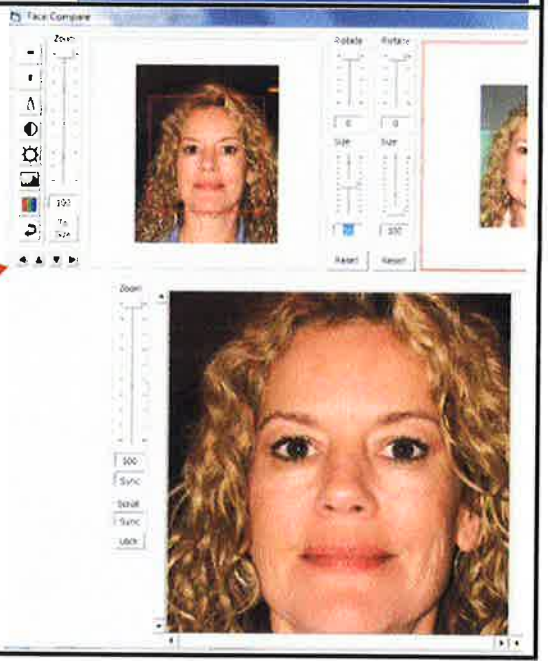
Rotate: These sliders allow you to rotate the image. The degree that you have rotated the image will be displayed in the box below the slider. You can also enter the degree that you would like to rotate the image in the box.

In this example, the result image was rotated 355 degrees to correct the slight tilt of the head, so that it more resembles the angle of the probe image.



Size: The "Size" slider will adjust the size of the red box around the image. For example, if you move the slider to 50 (or type 50 in the box below the slider) the red box will be reduced to outline 50% of the image as shown in this example. The preview image at the bottom of the screen will display the portion of the image in the red box.

You may drag the box to change the view or use the arrow buttons to make more precise box movements.



Bottom Panel Options

The bottom of the screen provides several tools that you can use to further compare the images. They include:

- Compare
- Composite
- Curtain
- 3D

The following sections describe these tools in more detail.

Compare

When the **Compare** button is selected, the images will be displayed side-by-side and you may compare the images by zooming and scrolling them.

Compare: Zoom

These sliders allow you to zoom in and out of the image. You can also enter the percentage that you would like to zoom in the box underneath the zoom slider. Click **Sync** to zoom the images simultaneously.

Note in the top screen, **Sync** was not clicked (pressed) before zooming to 217%, so only the left image was zoomed.

In the second screen, **Sync** was clicked (pressed) before zooming, so both images were zoomed simultaneously to 211%.

Scrolling

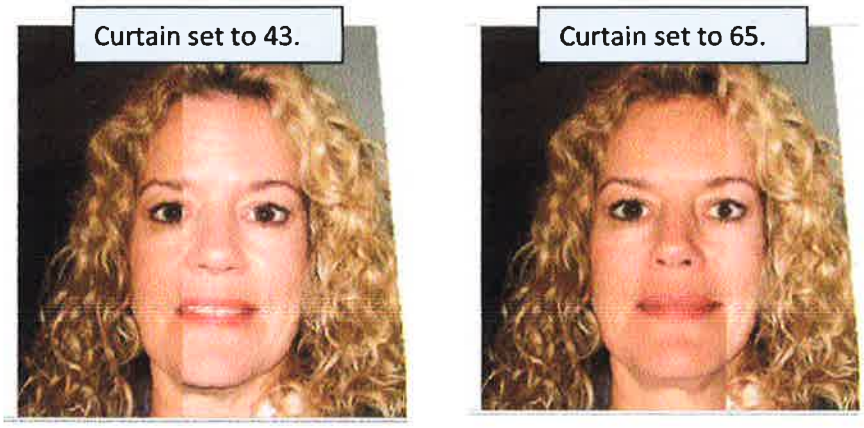
You may move the image around by clicking on the image and holding down the left mouse button while you move the mouse. The two Scroll buttons, **Sync** and **Lock** affect how the images move in relation to one another. When **Sync** is pressed, the images will be brought in line with each other and moved simultaneously. When neither button is pressed, you may move each image individually. When **Lock** is pressed, the images will be locked at their current positions and you can then scroll them simultaneously.

Composite

When **Composite** is selected, the images will be overlaid on each other. You may zoom in on the composite image by using the zoom slider bar. You may adjust the opacity of the images by using the **Opacity** slider bar on the right.

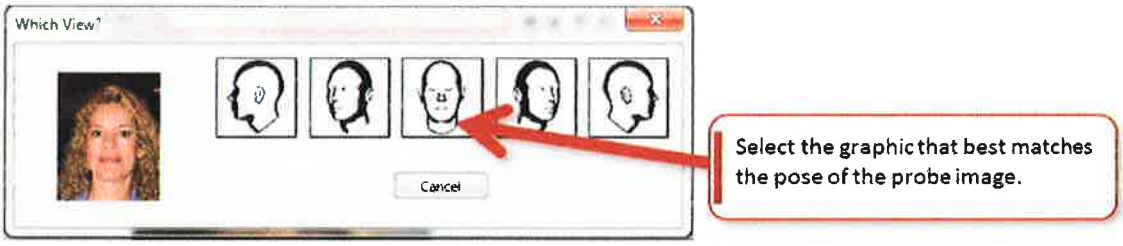
Curtain

When Curtain is selected, the left portion of the probe image and the right portion of the result image will be displayed. You may adjust how much of each image is shown by changing the "Curtain" slider located to the right of the image. Increasing the curtain number will display more of the left image.

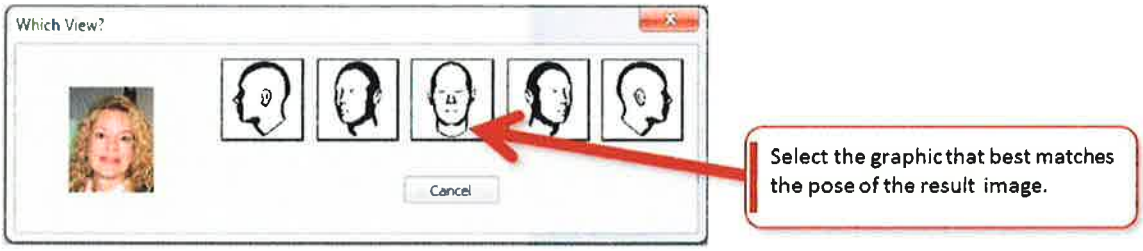


3D

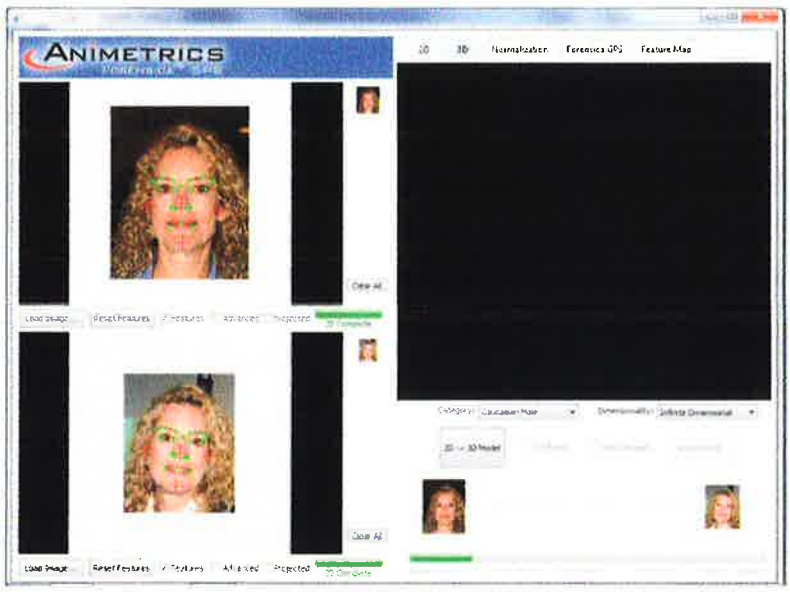
The **3D** option allows you to generate a 3D model, which is comprised of both the probe image and the result image. When you click the 3D button, you will be prompted to select the view that best matches the probe image's pose.



Click the graphic that best matches the pose of the probe image. You will then be prompted to select the view that best matches the result image's pose.



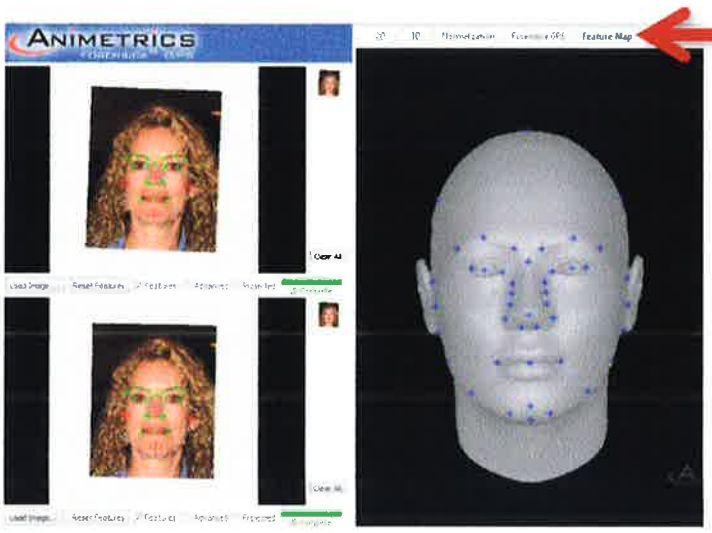
Click the graphic that best matches the pose of the result image. Both images will be displayed as shown on the following screen.



The accuracy of the 3D models generated is dependent upon the accuracy of the 2D feature points that overlay the original images. The features points are displayed on the image as red, green, and gray crosshairs. Verify that the red cross-hairs are in the correct place (eyes, chin and ear). The green and gray crosshairs may be moved if you wish to fine-tune the image. If you wish to move the feature points, refer to the following section: "*Adjusting Features*" on page 30; otherwise, proceed to "*Generating the 3D Model*" on page 31.

Adjusting Features

To move the feature points (crosshairs), first click the **Feature Map** tab.



Click the **Feature Map** tab to display a model with the correct feature point placement. When you click one of the crosshairs on the probe image, the crosshair on the Feature Map model will be highlighted in green to show you the proper placement.

The Feature Map displays the proper anatomical locations for each point. You may refer to it while adjusting the location of the selected crosshair. When you click one of the crosshairs on the probe image, the crosshair on the Feature Map model will be highlighted in green to show you the proper placement. The green and gray crosshairs may be moved if you wish to fine-tune the image. To reset the feature points to their original locations, click **Reset Features** below the original image.

Primary (Red) Points

Click and drag any of red feature points to their proper location. When the mouse is released, the green and gray "secondary" features are recalculated in real time based on the "primary" red features. This method of feature point adjustment will be sufficient to generate an accurate 3D model in most cases.

Feature Fine Tuning

The green and gray secondary features can also be moved if desired. To enable the secondary features, check the **Advanced** checkbox. The secondary features may now be adjusted by clicking and dragging with the mouse. The red primary features may also be moved, but if you adjust them when the **"Advanced"** box is checked, they system will not automatically recalculate the green and gray feature points. The green features indicate the subset that have either been detected or manually adjusted by the user. The blue/gray set is projected from the generated 3D model. To view the entire set of 3D projected features, check the **Projected** checkbox.

Resetting Features

To reset the feature points on an image to the original detected locations, click the **Reset Features** button below the image viewport.

Hiding/Showing Features

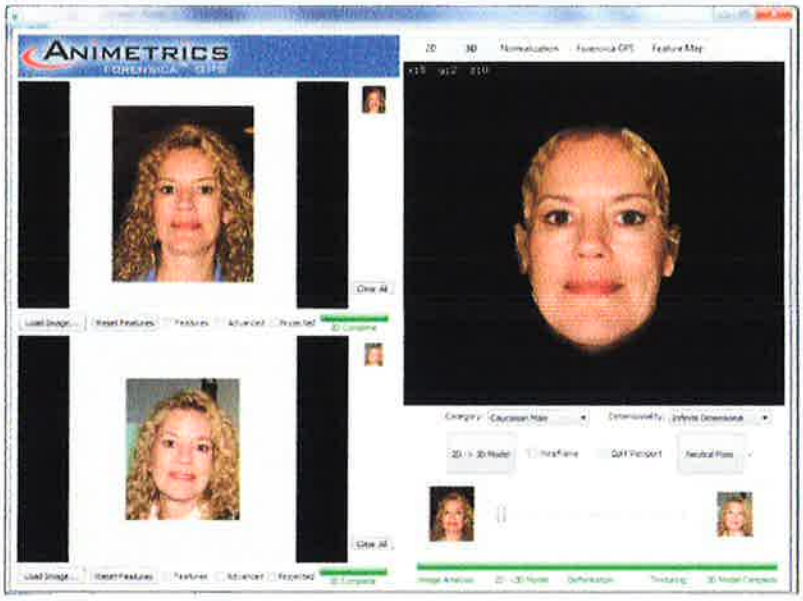
To toggle hiding/showing of the feature points on an image, click on the **Features** checkbox below the image viewport.

When you have finished adjusting the feature points, click the **3D** tab. Proceed to *"Generating the 3D Model"*.

Generating the 3D Model

Once the feature points have been adjusted (if necessary), it is time to generate the 3D model representing each subject.

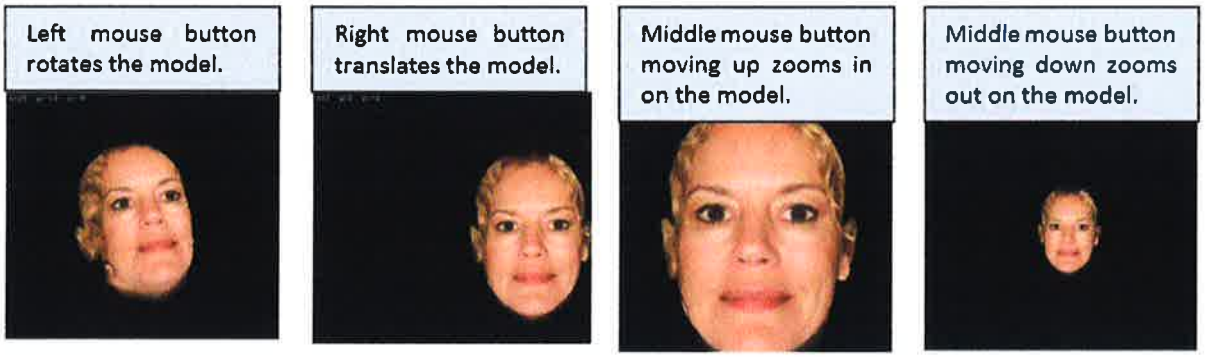
- **Category:** Select the category from the drop-down list that best represents the subject in the photograph.
- **Dimensionality:** This parameter affects the variability and statistics used in generating the 3D geometries. Choose "One Dimensional" for a smooth, generic geometry, "Infinite Dimensional" for a more variable geometric structure. "Hundred Dimensional" is a compromise between the generic and specific choices. Note: all dimensionality choices may not be available for the selected metadata category.
- **2D ->3D Model:** Once the metadata category and dimensionality selections have been chosen, click on the **2D -> 3D** button to proceed with the 3D geometry generation. The progress bar below the Primary View thumbnails shows the status of the 3D generation process. A 3D model comprised of both images will be generated.



The 3D model is comprised of both the probe and result images. You may use the slider bar to adjust the view to show more of the probe or result image.

Rotating and Translating the 3D Model

You may rotate and translate the 3D model with your mouse. Click the left mouse button, hold and drag to rotate the model. Click and drag the right button to translate the model. Click and drag with the middle button to move the model towards or away from you (zooming in and out).



Creating a Splitview of the 3D Model

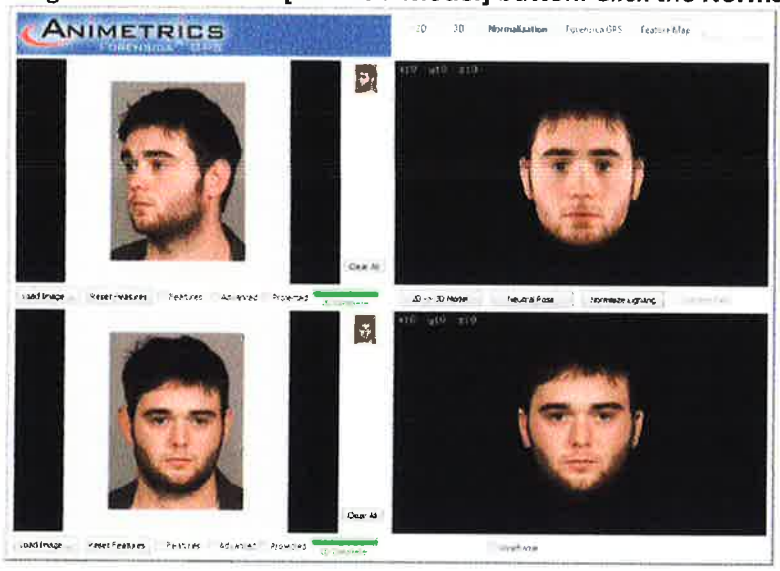
You may also create a splitview of the 3D model. Check the **Split Viewport** box.

The red line may be rotated. Place your mouse pointer near the top or bottom portion of the line. When the pointer changes to a circular arrow, hold down the left mouse button and drag.

Click **Close** when you have finished comparing the 3D models. You will be returned to the Compare screen.

Normalizing the 3D Model – Poses and Lighting

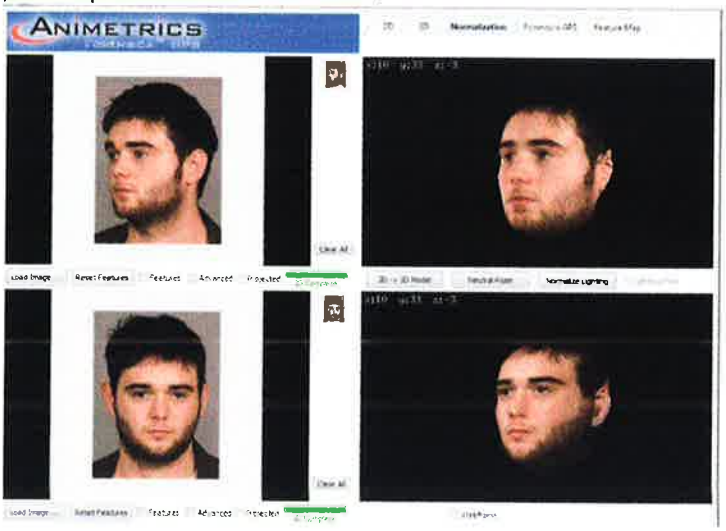
The **Normalization** tab contains tools for visualizing the 3D geometries of both subjects simultaneously as well as normalizing the lighting in the primary photographs. The Normalization tools are not active until a model has been generated with the **[2D -> 3D Model]** button. Click the **Normalization** tab.



From this screen, you may change the pose of the 3D model and normalize the lighting of the images.

Choosing a reference image/pose

Clicking on the image thumbnails directly to the right of the subject viewports will change the reference pose to match that of the selected image. Both 3D models will be rotated to match the selected pose. In the following example, the top thumbnail was clicked.



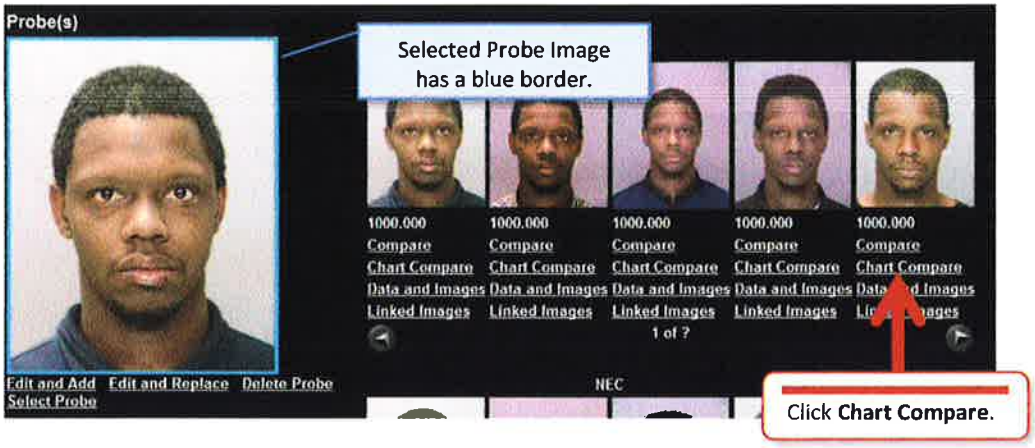
Notice that the pose of the bottom 3D model was changed to match the pose of the thumbnail that you clicked. Clicking **Neutral Pose** will return both 3D models to a neutral pose.

Normalize Lighting
Clicking on the [Normalize Lighting] button will compute the lighting field on each primary view and attempt to normalize the lighting effects on the 3D texture. Once computed, the button can now be used to toggle between the normalized and original lighted textures.

Lighting Field
After the lighting field is computed using the [Normalize Lighting] button, the [Lighting Field] checkbox can be used to toggle a visualization of the lighting field in the primary photograph for each subject.

Chart Compare

Chart Compare allows you to make annotations and measurements on the probe image and the result image. First, verify that the correct probe image you wish to compare is selected. (The selected probe image will be surrounded by a blue border.)



Click **Chart Compare** beneath the image you wish to compare. The Facial Markup screen will be displayed.

Set Eye Locations

First set the eye locations for both the probe and result images.

Set Eye Locations for Probe Image

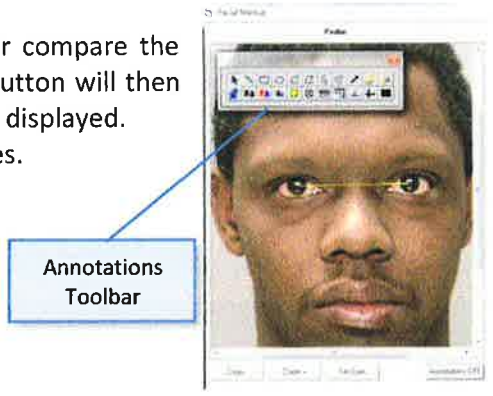
Click **Set Eyes**. If you'd like to zoom on the image, click **Zoom**. You should draw a line between the pupils on the image. On the probe image, go to the left pupil, click and hold the left mouse button, and drag to the right pupil's location. Release the mouse button. The line you drew will be displayed.

Set Eye Locations for Result Image

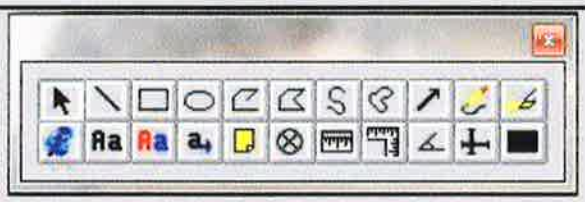
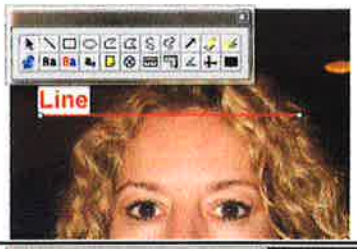
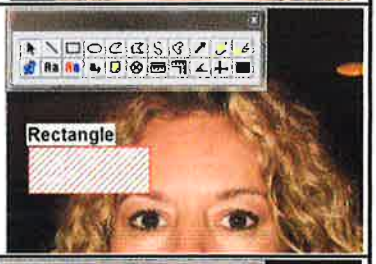
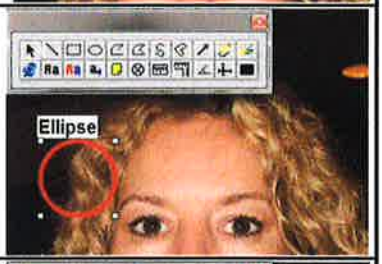
Set the eye locations for the result image on the right side of the screen. Click **Set Eyes**. If you'd like to zoom on the image, click **Zoom**. Go to the left pupil, click and hold the left mouse button, and drag to the right pupil's location. Release the mouse button. The line you drew will be displayed.

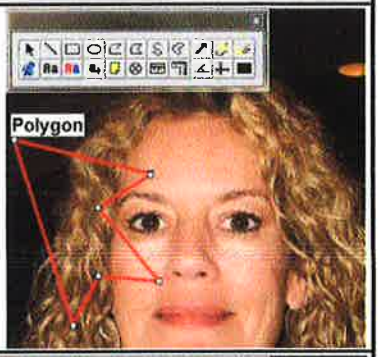
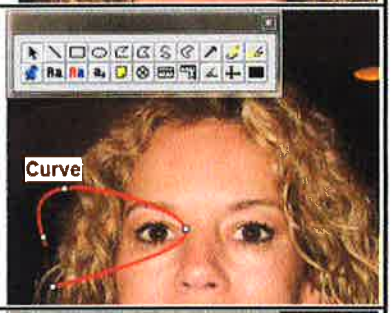
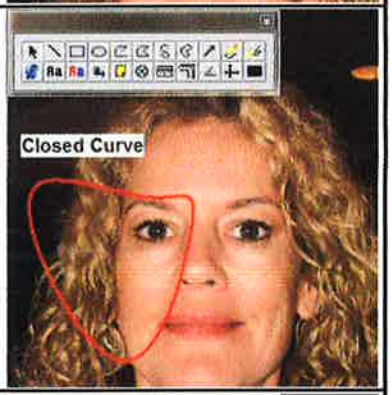
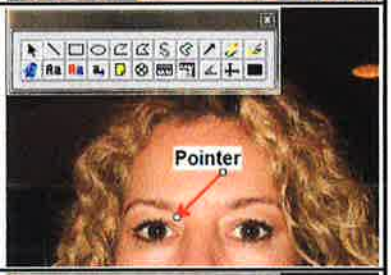
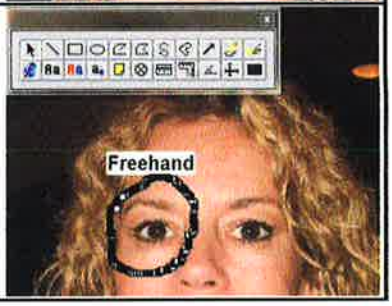
Adding Annotations

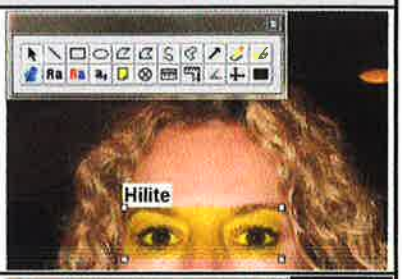
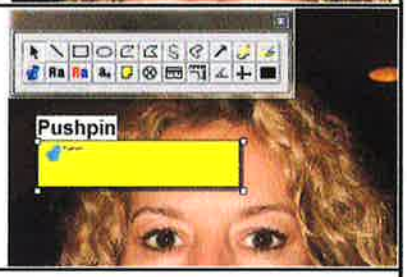
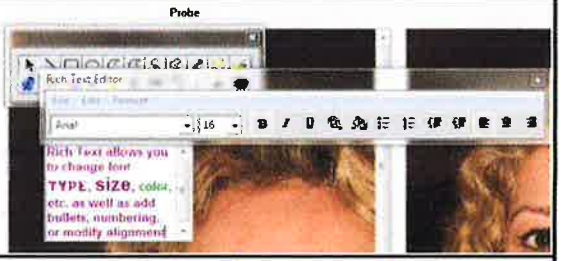
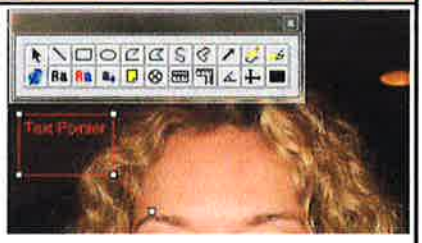
You may add annotations or make measurements to further compare the two images. Click **Annotations ON** beneath the image. The button will then display **"Annotations OFF"** and the Annotation Toolbar will be displayed. Several tools are available for adding annotations to the images.

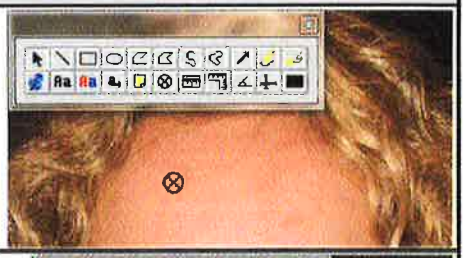
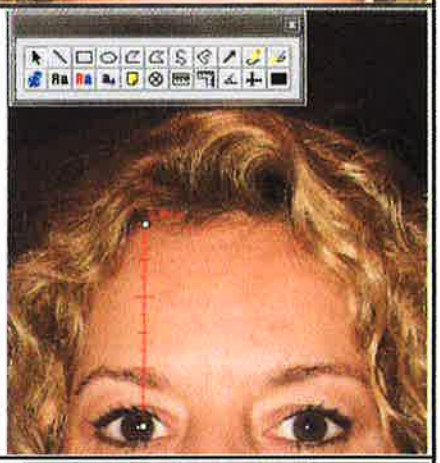
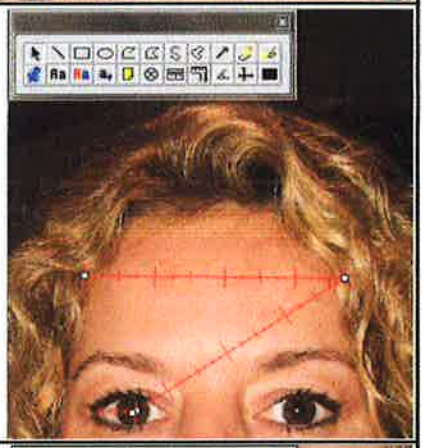
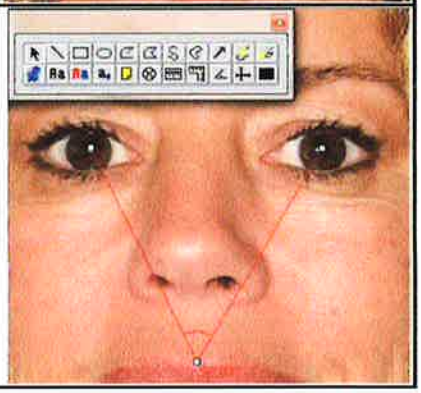


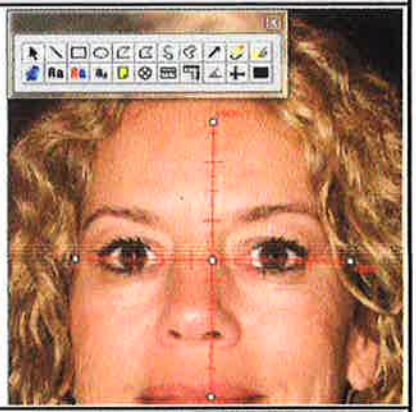
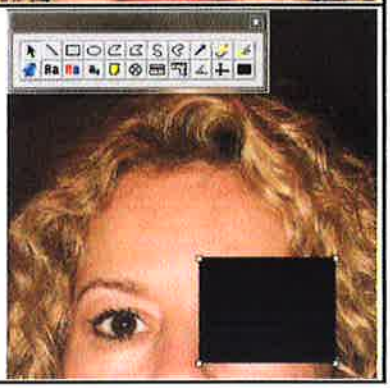
Annotation Toolbar

Annotation Toolbar	
	
	**Select** allows you to select drawn objects or selected areas on the image.
	**Line** allows you to draws a line. After the line is drawn, you may right-click the line and modify the properties of the line, including its color and width. You may also name the line. Available property options are Name, Line, ROP2, Fill, Foreground Color, Background Color, and Font. 
	**Rectangle** allows you to draw a rectangle. After the rectangle is drawn, you may right-click the rectangle and modify the properties, including its color and width. You may also name it. Available property options are Name, Line, ROP2, Fill, Foreground Color, Background Color, and Font. 
	**Ellipse** allows you to draw an ellipse. After the ellipse is drawn, you may right-click the ellipse and modify the properties, including its color and width. You may also name it. Available property options are Name, Line, ROP2, Fill, Foreground Color, Background Color, and Font. 
	**Polyline** allows you to draw connecting lines. Click on the image to start the first line, and then click where you want to change direction. Do this until you have drawn the shape you need. Double click to see the completed drawing. Right click for polyline properties: Name, Line, ROP2, Fill, Foreground Color, Background Color, Font, and Nodes. 

Annotation Toolbar		
	**Polygon** allows you to draw lines, and then closes the image by connecting the first and last points. Click on the image to start the first line, and then click where you want to change direction. Do this until you have drawn the shape you need. Double click to see the completed drawing. Right click for polygon properties: Name, Line, ROP2, Fill, Foreground Color, Background Color, Font, and Nodes.	
	**Curve** allows you to draw a curve. Click on the image to start the first line, and then click where you want the curve to be. Move the mouse and click again to create another curve. Do this until you have drawn the shape you need. Double click to see the completed drawing. Right click for curve properties: Name, Line, RPO2, Foreground Color, Nodes, Fixed.	
	**Closed Curve** allows you to draw a closed curve. Click on the image to start the first line, and then click where you want the curve to be. Move the mouse and click again to create another curve. Do this until you have drawn the shape you need. Double click to see the completed drawing – the curve will automatically be closed for you. Right click for closed curve properties: Name, Line, ROP2, Fill, Foreground Color, Background Color, Nodes, Fixed.	
	**Pointer** allows you to draw an arrow. Right click for pointer properties: Name, Line, ROP2, Fill, Foreground Color, Background Color, and Font.	
	**Freehand** allows you to draw a freehand shape. Right click the shape for freehand properties: Name, Line, ROP2, Fill, Foreground Color, Background Color, Font, and Nodes.	

Annotation Toolbar	
	**Highlighter** allows you to highlight the selected area. Right click highlight properties: Name, Foreground Color, Background Color, and Font. 
	**Pushpin** allows you to add a note with a push pin graphic. Right click for pushpin properties: Name, Foreground Color, Background Color, Font, Bitmap, Text, and Secondary Bitmap. 
	**Text** allows you to add text to the image. Click and hold down the mouse button to create the text box. Type the desired text.
	**Rich Text** allows you to add text to the image, and provides additional options for modifying the text, such as changing the font, size, and/or attributes of the text. 
	**Text Pointer** allows you to add a note field that you can type text in and then extend a pointer line. Click on the image and hold the mouse button and drag to create the text box. Release the mouse button. Move the mouse to create the pointer line. Click the left mouse button to set the ending point of the pointer line. Right click the text box for text pointer properties: Name, Line, ROP2, Fill, Foreground Color, Background Color, Font, Text, and Fixed. 
	**Note** allows you to add a note field that you can type text in. Click on the image and hold the mouse button and drag to create the note box. Type the desired text in the box. Right click for note properties: Name, Fill, Foreground Color, Background Color, Font and Text (this option lets you change the text that is shown in the note). 

Annotation Toolbar		
	**Point** allows you to draw a crosshair point. Right click for point properties: Name, Transparent, Transparent Color, Fill, Foreground Color, Background Color, Font, and Bitmap.	
	**Ruler** allows you to draw a ruler with a measurement. Click and hold the mouse button and drag to create the ruler. Right click the ruler for properties: Name, Line, ROP2, Fill, Foreground Color, Background Color, Font, Ruler, and Fixed.	
	**Polyruler** allows you to draw connecting ruler lines with a measurement. Click on the image to start the first line, and then click where you want to change direction. Do this until you have drawn the shape you need. Double click to see the completed ruler. Right click for properties: Name, Line, ROP2, Fill, Foreground Color, Background Color, Font, Ruler, Nodes, and Fixed.	
	**Protractor** allows you to find the angle degree between two points. Click where you want the vortex to be and then move the mouse to the first location and click. Then move the mouse to the second location and click again to create the angle. Right click for protractor properties: Name, Line, ROP2, Fill, Foreground Color, Background Color, Font, Ruler, Protractor, and Fixed.	

Annotation Toolbar		
	**Crossproduct** allows you to draw perpendicular rulers with measurements. Click and hold the mouse button and drag to create the rulers. Right click for properties: Name, Line, ROP2, Fill, Foreground Color, Background Color, Font, Ruler, and Fixed.	
	**Redact** allows you to draw a rectangle that is filled with a color. Right click for Redact properties: Name and Background Color.	

The "Text Pointer"  and "Point"  tools will be described in more detail in the following section because they are used to assign points on the image(s), which are then used with the assigned points measuring tool.

Making Measurements

Before making a measurement, be sure that the eye locations have been set. See Set Eye Locations for Probe Image on page 37 for more information. You may either measure between two assigned points on the image or measure the length of a line you draw on the image (no assigned points).

Assigned Point Measurements

In order to measure between assigned points on an image, you must first designate the point(s). You will need two or more points for measurements.

Assigning Points

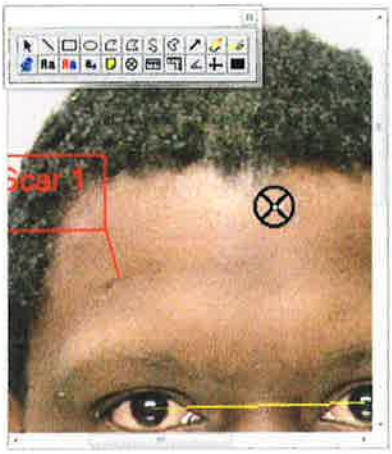
Two tools allow you to assign points on the image:

- Text Pointer
- Point

To access the annotations toolbar, first click **Annotations ON.** The toolbar will be displayed. Click to access the Text Pointer tool. Click near the point you'd like to reference, hold the left mouse button and drag to draw the text box. When you release the left mouse button, drag the mouse to the location of the point on the image that you wish to reference. When you reach the desired location, click the left mouse button. A line from the bottom right corner of the text box will be drawn. Type the text you wish to use to describe this point and press **[Enter]**.

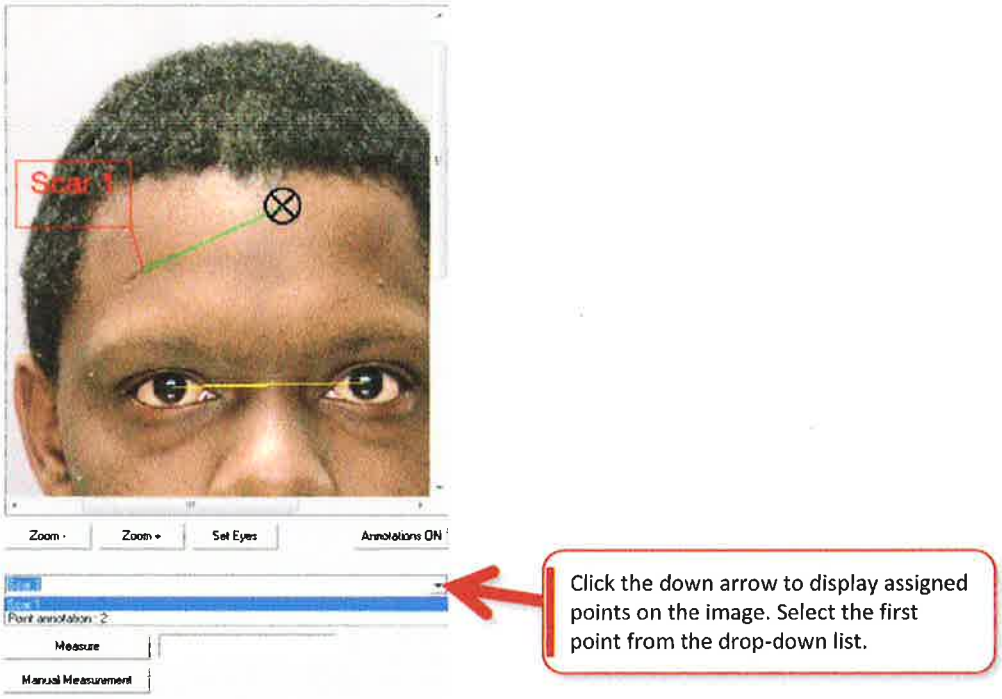
In the previous example, we typed "Scar 1" to designate the right end mark of the scar. Set at least one other point on the probe image. You may use the Text Pointer tool again or the Point tool. In the following example, we'll use the Point tool. Make sure Annotations are active. Click to access the Point tool. Click on the point you'd like to reference.

Assign similar points on the results image.

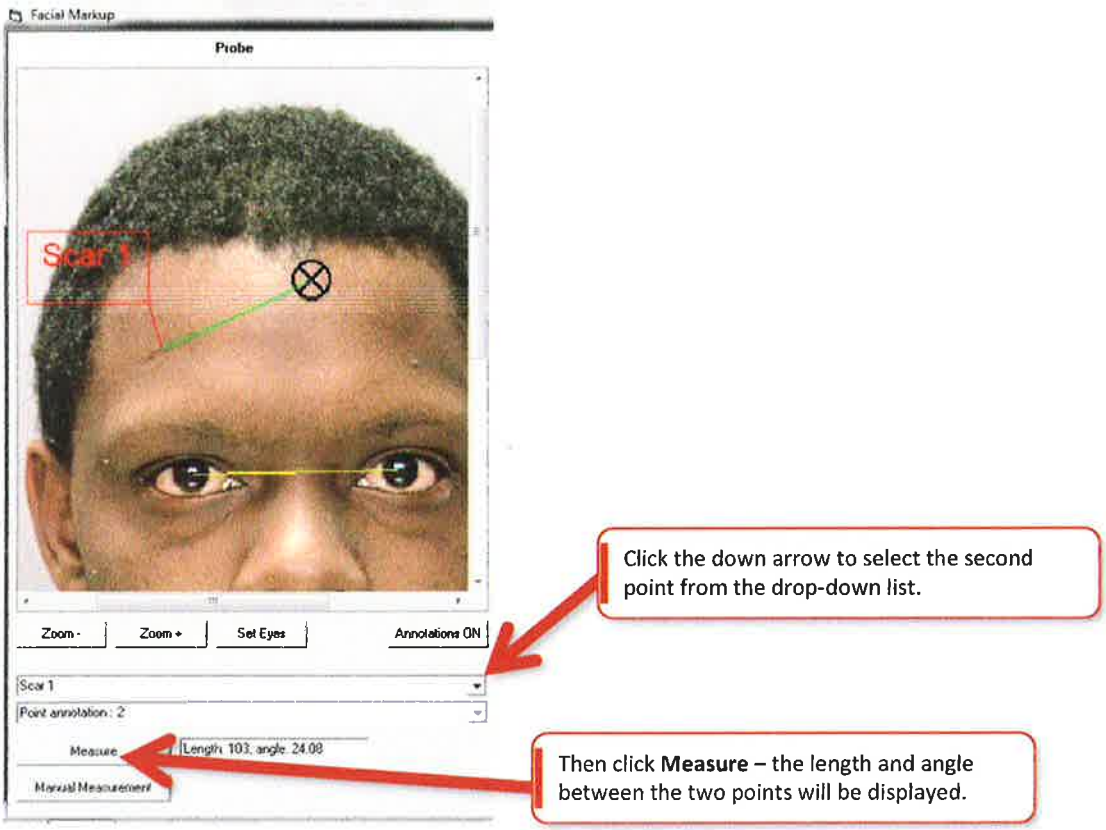


Measuring the Distance Between the Points

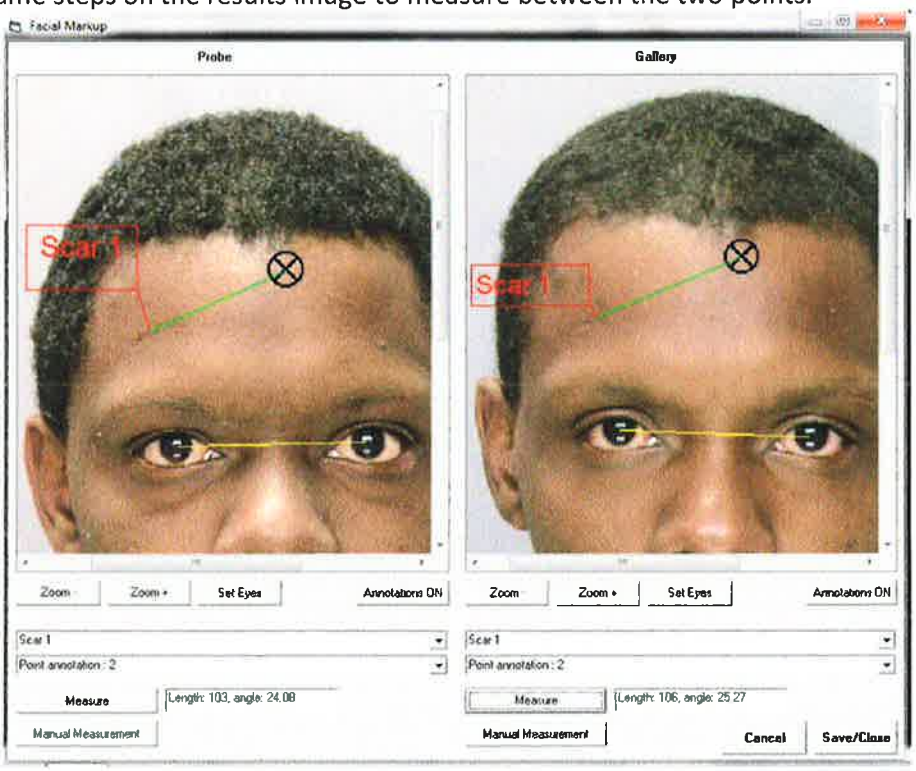
You may then measure the distance between the points. Below the "Zoom", "Set Eyes" and "Annotations" buttons are two fields that have a down-arrow button signifying a drop-down list. Click the drop-down arrow in the top field and select the starting point of the measurement (all assigned points will be listed).



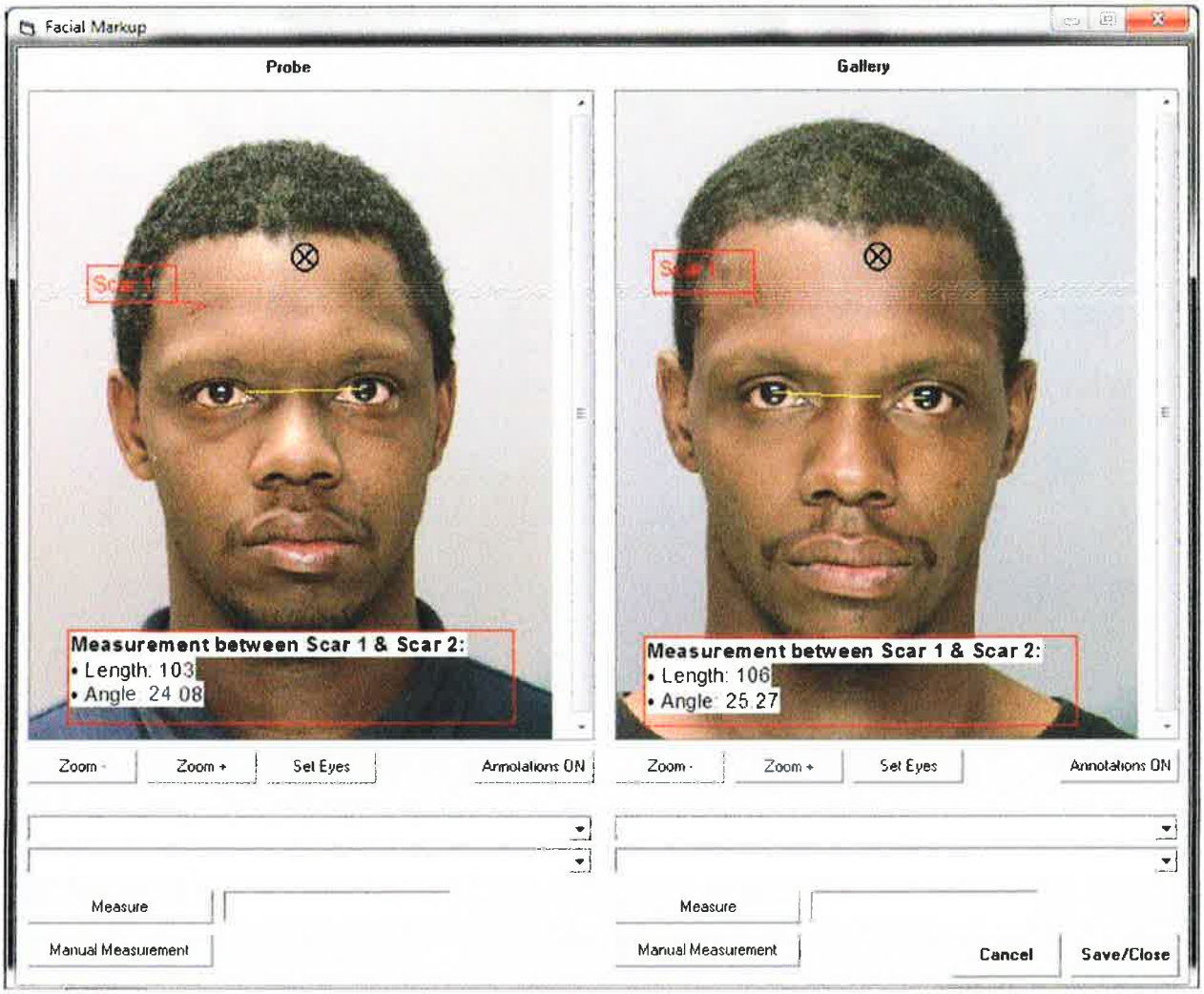
Click the bottom drop-down arrow and select the ending point of the measurement. Click the **Measure** button. The length and angle between the two points will be displayed.



Perform the same steps on the results image to measure between the two points.

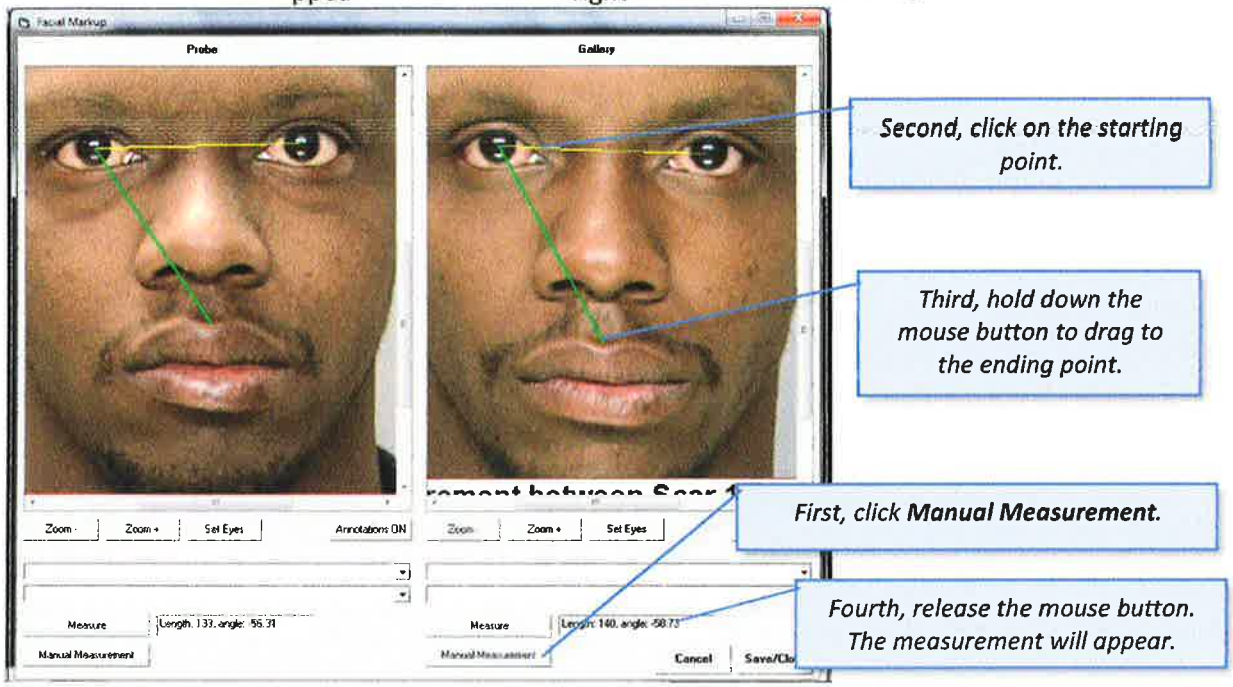


The measurements are not saved, so you may want to create a text box to make notes of the measurements, as shown in the following screen.


Facial Markup
Probe
Gallery
Measurement between Scar 1 & Scar 2:
• Length: 103
• Angle: 24.08
Measurement between Scar 1 & Scar 2:
• Length: 106
• Angle: 25.27
Zoom -
Zoom +
Set Eyes
Annotations ON
Zoom -
Zoom +
Set Eyes
Annotations ON
Measure
Manual Measurement
Measure
Manual Measurement
Cancel
Save/Close

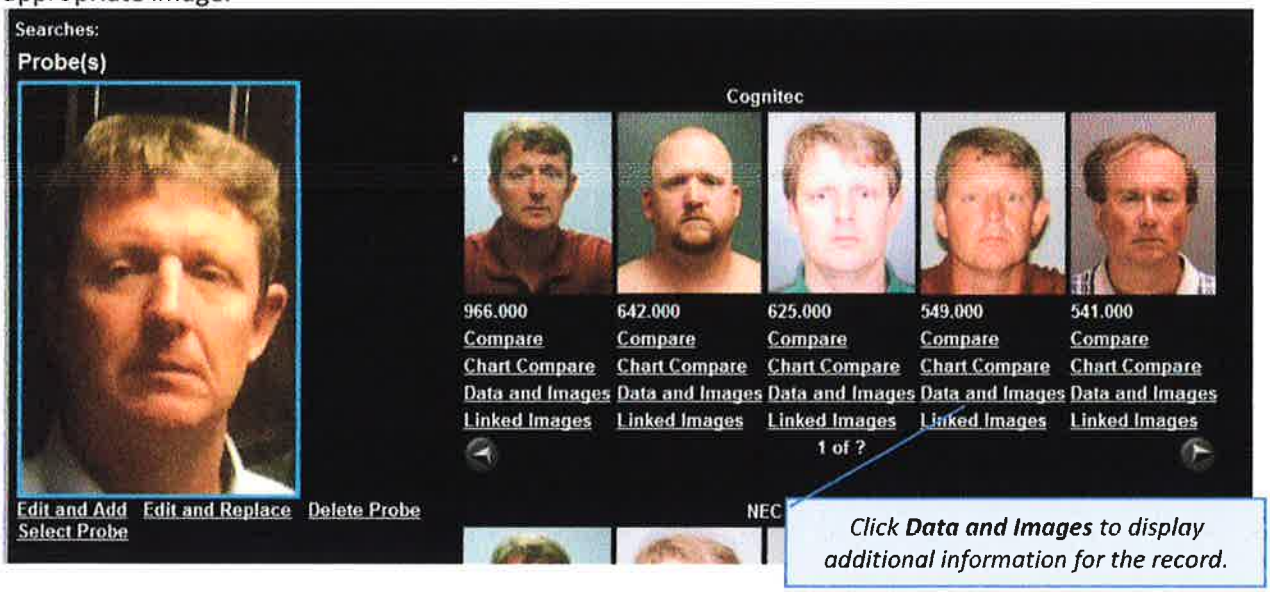
Manual Measurements/No Assigned Points

You may still make measurements even if you haven't assigned particular points, by using the **Manual Measurement** tool. Click the **Manual Measurement** button, then click on the image at the starting point and hold down the mouse button to drag to the ending point. A green line will appear on the image and the measurement will appear in the box to the right of the **Measure** button.

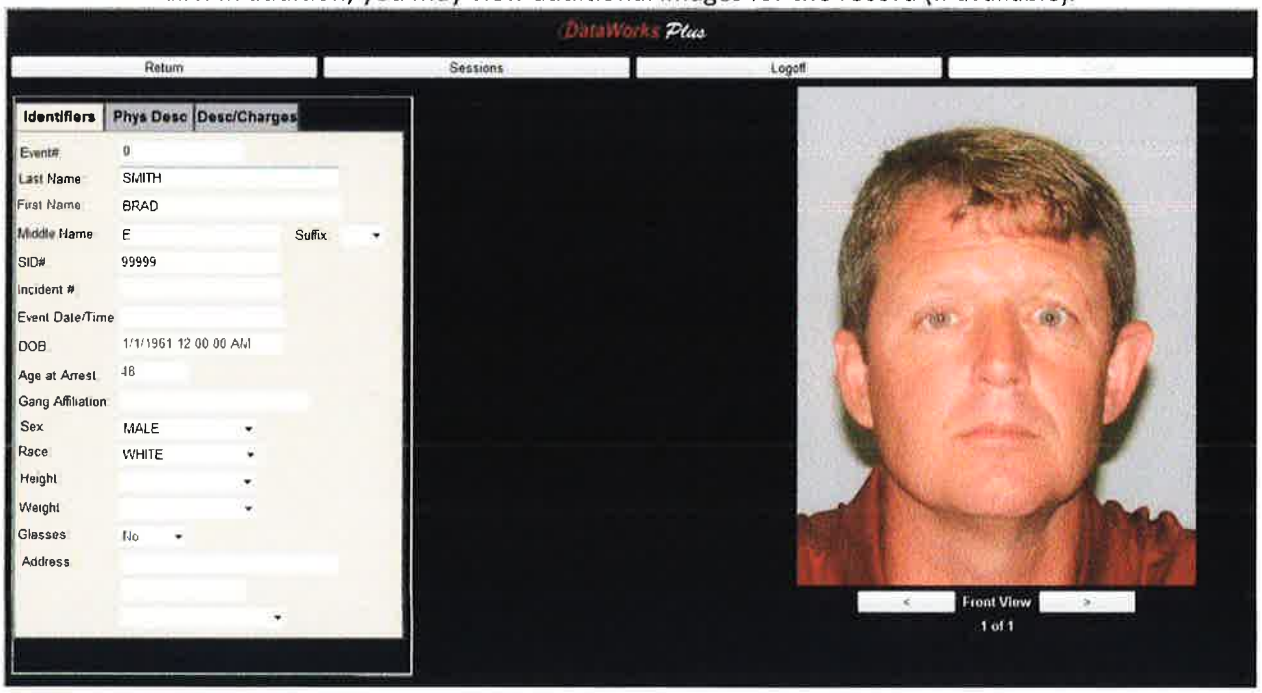


Data and Images

You may view data and images that are associated to an image by clicking **Data and Images** below the appropriate image.



A screen similar to the following will be displayed. Additional information about the individual will be included on tabs. In addition, you may view additional images for the record (if available).



Linked Images

Click **Linked Images**.

Appendix A: Working With Images

Image Manipulate Tools

Cropping Images

Select the **Crop Tool** ( ). Click on the image where you would like to start the crop box and then drag it to the desired size. The area to be deleted from the image will be shown as darker than the area that will be kept. This is shown in the following image.

If you would like to change the crop area, then click on the darker area of the image and redraw the crop box. If you are satisfied with the area to be cropped, then select **Apply Crop**. The portion of the image that was not shaded will be displayed and the rest of the image will be discarded.

Sharpening Images

Sharpening seems to bring out image detail that wasn't there before by emphasizing the edges of an image. It increases the contrast between each pixel and its neighbors. You will be prompted to enter a sharpening value. Move the slider on the bar to the left or right or type in a percentage to sharpen the image by. Select **OK** to apply to adjust the image.

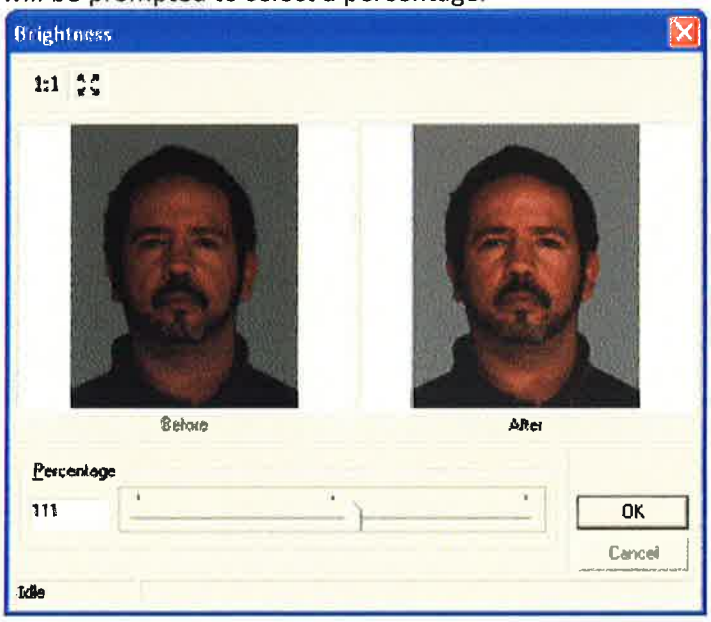
Adjusting Image Contrast

Contrast is the difference in brightness between light and dark areas in an image. You will be prompted to enter a contrast setting. Move the slider on the bar to the left or right or type in a percentage. Positive values increase the contrast of the image; negative values decrease the contrast. Select **OK** to adjust the image.

Adjusting Image Brightness

Brightness adjusts how light or dark and image appears. You will be prompted to enter a brightness setting. Move the slider on the bar to the left or right or type in a percentage. Positive values will lighten the image; negative values will darken the image. Select **OK** to adjust the image.

To change the brightness of an image, click the **Brightness** ( ) button from the toolbar menu. You will be prompted to select a percentage.



Choose a positive number to brighten the image. The higher the number, the brighter the image will be. A negative number will darken the image if it is too bright. Select **OK** to view the changes. If you are not satisfied with the changes, then select **Edit** from the top toolbar and **Undo** and try a different number to change the brightness.

The image below has been brightened and the contrast has been increased to maintain the correct color balance. Once you are satisfied with you changes click on **Save/Close** to return to the lineup screen. The edited image will be placed into the lineup.

If your image is brightened correctly, but looks like it has lost vivid color, then you may have to increase the contrast as well. This is located under Image of the top toolbar or via the side toolbar using the contrast button ( ).

Adjusting the Saturation of an Image

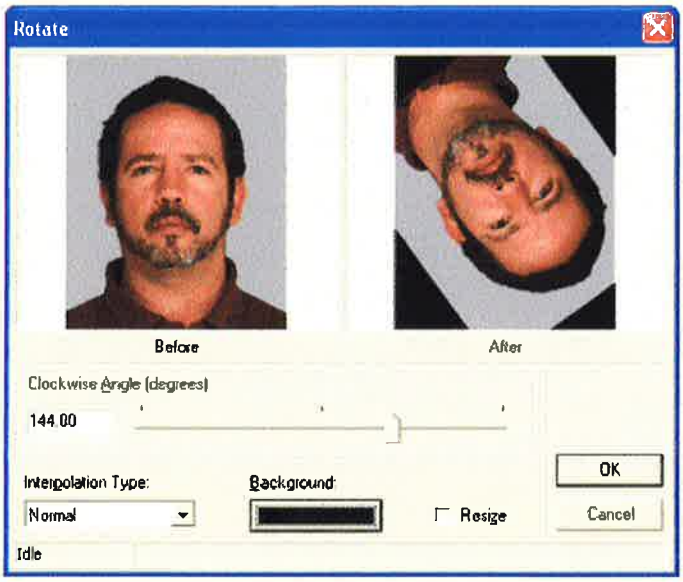
Saturation is the "purity" of the color. Fully saturated colors are very rich and bright. Less saturated colors are more gray. You will be prompted to enter a saturation value. Move the slider on the bar to the left or right or type in a percentage to change the saturation of the image. Click **OK** to apply the adjustment.

Adjusting the Hue of an Image

This allows you to adjust the hue, or color, of the image. You will be prompted to enter a hue angle. Depending on what number you enter, the color will be adjusted across the hue circle by that many degrees. Click **OK** to apply the adjustment.

Rotating Images

This option will open the Rotate Window. The original image before the change is shown on the left and labeled as 'Before'. The changes that will be made to the image can be previewed in the 'After' image on the right. You can rotate your image to any degree desired by using the slider in the middle of the image or by typing the number of degrees that you would like to rotate the image by in the box next to the slider.



Below the rotation angle slider there are additional options available.

- **Interpolation Type**: the options from the drop down menu here are: Normal, Resample, and Bicubic.
- **Background**: This allows you to change the background color for the empty space left after you rotate the image.
- **Resize**: If you check this box, then the image will be resized to fit the entire image in the window.

When you are done making changes select **OK** to save changes and return to the Image Manipulate window or select **Cancel** to discard changes and return to the Image Manipulate window.

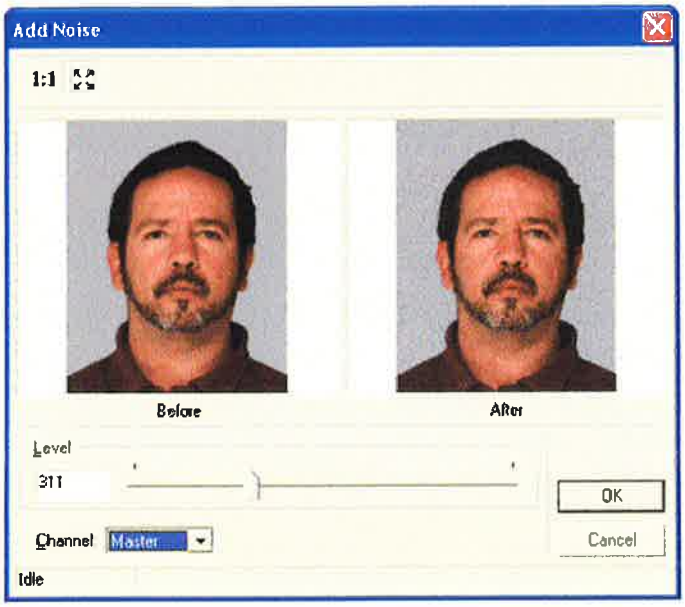
Adding Noise to Images

When you select to **Add Noise** from the Image Menu, the Add Noise window will be displayed. Noise will add flecks of random color in the image which will give an appearance of an image taken in low light or appear similar to film grain seen with older photos. Generally, this function will not be used. However, if you would like to make a digital image match an older photo, or a photo with a 'grainy' appearance, such as from a newspaper, then this function may be useful.

The original image prior to the Noise changes is shown on the left side and labeled as 'Before'. Any changes made can be previewed in the 'After' image shown on the right.

You can use the Noise Level slider to add the amount of noise that you desire or type level in the box to the left of the slider.

You can also select the color channel to which you would like the noise to be added. This is selected from the **Channel** drop down menu at the bottom left of the screen. Your options here are **Master, Red, Green**, and **Blue**. When you are done making your changes select **OK** to save your changes and return to the Image Manipulate window or select **Cancel** to discard changes and return to the Image Manipulate window.



Appendix B: Forensica

Loading Images

To load an image into Forensica GPS, click on the [Load Image...] button below the top or bottom viewport. You can load up to 5 images of the same person in each viewport.

Supported file formats
Supported image files include *.jpg, *.png, *.gif, and *.bmp

Pose types
After selecting an image file from disk, the [Which View] dialog prompts you for the pose. Click on the icon that best matches the input photograph.

Image thumbnails
After loading one or more images, the thumbnails shown directly to the right of the viewports show the active images for that subject. You can click on the thumbnails to enlarge the chosen image in the subject's viewport.

Primary view
In order to proceed with 3D model generation, a frontal "primary view" must be loaded for each subject. If none is specifically selected, the first frontal image to be loaded for that subject is chosen by default. The primary view forms the basis of the texture map on the 3D model, so it is important to choose the best quality frontal photograph available. You can change the primary view by right-clicking on the thumbnail and selecting [Set As Primary View]. The primary view for each subject is shown on either side of the slider control in the lower right.

Removing images
To remove an individual image from a subject's dossier, right-click on the thumbnail to remove and choose [Remove Image]. To remove all images from a subject, click the [Clear All] button next to the subject's viewport.

Adjusting Features

The accuracy of the 3D models generated by Forensica GPS is dependent on the accuracy of the 2D feature points that overlay ecah photograph. Forensica GPS includes automatic feature-finding algorithms that are invoked each time a new image is loaded. The feature points are displayed on the image as a series of red, green, and gray crosshairs. These feature points may be adjusted by the user as descibed in the following sections. Refer to the Feature Map for the proper anatomical locations for each point. As a feature point is moved, the Feature Map is displayed in the right side viewport illustrating the correct location of the selected feature.

Semi-automatic adjustment
The primary method of feature point adjustment is through semi-automatic refinement. Click and drag any of red feature points to their proper location. When the mouse is released, the green and gray "secondary" features are recalculated in real time based on the "primary" red features. This method of feature point adjustment will be sufficient to generate an accurate 3D model in most cases.

Feature fine tuning
The green and gray secondary features can also be moved if desired. To enable the secondary features, check the [Advanced Features] checkbox. The secondary features may now be adjusted by clicking and dragging with the mouse. The red primary features may also be moved, but the semi-automatic refinement is disabled when the [Advanced Features] box is checked. The green features indicate the subset that have either been detected or manually adjusted by the user. The blue/gray set are projected from the generated 3D model. To view the entire set of 3D projected features, check the [Projected] checkbox.

Resetting features
To reset the feature points on an image to the original detected locations, press the [Reset Features] below the image viewport.

Hiding/Showing features
To toggle hiding/showing of the feature points on an image, click on the [Features] checkbox below the image viewport.

Generating a Model

Once all of the images are loaded for each subject and the feature points have been adjusted (if necessary), it is time to generate the 3D geometry representing each subject. In order to generate 3D models, at least one frontal photograph for each subject must be loaded (top and bottom viewports).

Metadata category
Choose the category from the drop-down list that best represents the subject in the photographs.

Dimensionality
This parameter affects the variability and statistics used in generating the 3D geometries. Choose "One Dimensional" for a smooth, generic geometry, "Infinite Dimensional" for a more variable geometric structure. "Hundred Dimensional" is a compromise between the generic and specific choices. Note, all dimensionality choices may not be available for the selected metadata category.

2D -> 3D
Once the metadata category and dimensionality selections have been chosen, click on the [2D -> 3D] button to proceed with the 3D geometry generation. The progress bar below the Primary View thumbnails shows the status of the 3D generation process.

Manipulating the 3D Model

The 3D model may be manipulated inside the 3D viewport using the mouse controls. To rotate the model, click and drag the left mouse button within the viewport. To translate the model, click and drag the right mouse button within the viewport. To zoom the view, click and drag the middle mouse button.

Splitting the 3D viewport
To split the 3D viewport, rendering the 3D model from one subject on one side of the divider and the other subject on the other side, click the [Split Viewport] checkbox. This is a useful tool to help visually determine if the two subjects are the same person. The splitter may be manipulated also with the mouse. As the mouse is moved closer to the splitter, the cursor will change to indicate the active splitter

control. If the mouse is placed far away from the center of rotation (indicated by a white dot), the splitter can be rotated by clicking and dragging the left mouse button. If the mouse is placed close to the center of rotation (indicated by a white dot), the splitter can be translated by clicking and dragging the left mouse button. The center of rotation (white dot) can be repositioned while translating by holding the shift key. NOTE: the 3D model can also be manipulated while the viewport is split.

Saving a screenshot
Click the [Save Snapshot] button to export the 3D rendering as an image file. Supported file formats for snapshots are *.png and *.jpg.

2D Comparison

The [2D] tab contains tools for comparing the two subjects by aligning and transforming their photographs in register with one another. Transparency blending is used as a visual aid to identify corresponding or mismatched facial features, tattoos, or scars. As with the 3D geometry, the accuracy of the image registration is affected by the quality of the feature points placed on the images prior to model generation. The 2D Comparison tools are not active until a model has been generated with the [2D -> 3D] button.

Choosing a reference image/pose
Clicking on the image thumbnails directly to the right of the subject viewports will change the reference pose to match that of the selected image. It also selects the representative photo from that subject to use in 2D comparison. It is best to select matching poses for the top and bottom subjects when possible. (e.g., compare a frontal to a frontal, or a left profile to a left profile)

Using the transition slider
The slider control situated between the two primary view thumbnails at the lower-right is used to interactively blend the transparency between the two subjects. The primary view thumbnails can also be clicked to instantly move the slider to the two extremes.

3D Comparison

The [3D] tab contains tools for comparing the two subjects by simultaneously visualizing the correlation or mismatch in their 3D face structure and texture. The 3D Comparison tools are not active until a model has been generated with the [2D -> 3D] button.

Choosing a reference image/pose
Clicking on the image thumbnails directly to the right of the subject viewports will change the reference pose to match that of the selected image. It also will set the 3D geometry and texture of the 3D model to match that of the selected subject.

Manipulating the 3D model
The 3D Model can be rotated and translated by using the mouse. Click and drag with the left button to rotate the model. Click and drag with the right button to translate the model. Click and drag with the middle button to move the model towards or away from the camera.

Neutral pose
Clicking on the [Neutral Pose] button will reset the model to a front pose, centered in the viewport.

Wireframe
Clicking on the [Wireframe] check box will toggle between displaying the 3D wireframe mesh. The wireframe mesh is shown both in the 3D viewport, and projected over the images in the left viewports.

Using the transition slider
The slider control situated between the two primary view thumbnails at the lower-right is used to interactively blend the geometry and texture simultaneously between the two subjects. The primary view thumbnails can also be clicked to instantly move the slider to the two extremes.

Normalization

The [Normalization] tab contains tools for visualizing the 3D geometries of both subjects simultaneously as well as normalizing the lighting in the primary photographs. The Normalization tools are not active until a model has been generated with the [2D -> 3D] button.

Choosing a reference image/pose
Clicking on the image thumbnails directly to the right of the subject viewports will change the reference pose to match that of the selected image. Both 3D models will be rotated to match the selected pose.

Normalize lighting
Clicking on the [Normalize Lighting] button will compute the lighting field on each primary view and attempt to normalize the lighting effects on the 3D texture. Once computed, the button can now be used to toggle between the normalized and original lighted textures.

Lighting field
After the lighting field is computed using the [Normalize Lighting] button, the [Lighting Field] checkbox can be used to toggle a visualization of the lighting field in the primary photograph for each subject.

Global Positioning System

The [GPS] tab contains tools for checking the correlation or mismatch of selected locations or distances between the two subjects. The GPS tools are not active until a model has been generated with the [2D -> 3D] button.

GPS Mode
The [GPS Mode] is enabled by selecting its checkbox, moving the mouse over the 3D model or photographs will simultaneously compute the corresponding locations in all viewports. The point in registration is displayed as a blue X in the image viewports and a small blue sphere in the surface viewport. This tool can be useful in comparing the locations of tattoos or scars, for example.

Measuring tool
To measure and compare distances on the face, select the [Measure] checkbox. The cursor now turns into a tape measure. To measure a distance on the face, click on the 3D model or one of the images to place the first point in the segment. Release the mouse button and drag the cursor to a second endpoint. Click the mouse a second time to lock in the measurement. The distance in millimeters

between the two endpoints is displayed in the field below the [Measure] checkbox. The displayed measurements are calibrated based on an assumed 63mm pupillary distance. The distance is defined as the length of the direct line between the two locations in 3D, not around the contour of the face. Once a measurement is locked in place, the slider can be used to interpolate the 3D geometry and the distance may change. This can be a useful tool to help identify a correlation or mimatch between the two subjects.

Feature Map

The [Feature Map] tab displays the proper locations of the facial feature points on a generic face model. This tab is automatically displayed when moving a feature point on one of the photographs. The selected feature is highlighted in green and the name is displayed in the upper-left corner of the map.

Choosing a reference image/pose
Each pose type has its own associated feature map. By clicking on the image thumbnails to the right of the subject viewports, the pose of the feature map will change to match the selected image.

Selecting a feature
A feature can be selected using the left mouse button. The corresponding feature will be highlighted in green in all of the photos.