VECTRA H1®

User Guide

software version 5.7

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IMAGING EXCELLENCE FROM

CANFIELD

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3D SOLUTIONS • FACIAL IMAGING & ANALYSIS • IMAGING SOFTWARE • PHOTOGRAPHY • RESEARCH SYSTEMS & SERVICES • TRAINING

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VECTRA H1 USER GUIDE

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VECTRA LIMITED ONE-YEAR WARRANTY

Coverage:
A one-year warranty is provided by Canfield Scientific, Inc. ("Canfield") on VECTRA 3D capture systems. (For warranty information on the VECTRA software, please refer to the End User License Agreement in the VECTRA User Guide.) During the one year period beginning on the date of delivery, Canfield warrants that the VECTRA 3D capture system will be free from defects in material and workmanship. If the customer discovers a defect, Canfield will, at its option, repair or replace the defective component(s) at no charge to the customer, provided it is returned during the warranty period. The cost of shipping the replacement parts both ways (less any applicable custom duties, taxes and any other costs associated with exporting or importing goods) will be paid by Canfield for all warrantable repairs.

Canfield owns all parts removed from repaired products. If Canfield repairs or replaces a product, its warranty term is not extended.

After the first year, VECTRA's Warranty Service and Support can be extended by fee-based yearly service agreements covering product hardware, technical support, and software upgrades.

State Law Rights:
Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the above exclusions or limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Exclusions:
This Warranty does not cover customer training, instruction, installation, set up adjustments, or LAN-network-related problems. (For warranty information on the VECTRA software, please refer to the End User License Agreement in the VECTRA User Guide.)

This Warranty does not cover damage due to external causes, including accident, abuse, misuse, problems with electrical power, servicing not authorized by Canfield, usage not in accordance with product instructions, failure to perform required preventive maintenance, and problems caused by use of parts and components not supplied by Canfield.

This warranty does not cover computer systems, computer peripherals, or other equipment not manufactured by Canfield. All such third-party equipment is covered by separate manufacturers' warranties where applicable.

This warranty is expressly made in lieu of all other warranties, expressed or implied, including without limitation, warranties of merchantability and fitness for a particular purpose.

Our liability is limited to the repair or replacement, at our option, of any defective product and shall in no event include incidental or consequential commercial or property damages of any kind.

To request warranty service:
Customers located in the United States, Canada or Mexico, please phone Canfield technical support at 1-800-815-4330. Other international customers please call 1-973-276-0336.

The e-mail support address is techsupport@canfieldsci.com.

Should it be determined by Canfield technical support that a unit must be returned for service, a Return Merchandise Authorization (RMA) number will be provided. This RMA number must be clearly marked on the outside of all packaging. Information on packing and shipping will be included.

Shipping address: RMA # _____ (to be provided by Canfield prior to shipment)
Canfield Scientific, Inc.
253 Passaic Avenue
Fairfield, NJ 07004-2524 USA

EXTENDED CANFIELD CARE SERVICE AGREEMENT FOR VECTRA

One year of Canfield Care is included with your new VECTRA purchase. The initial Canfield Care agreement provides a warranty on the VECTRA 3D capture system, phone access to technical support[1], and free software upgrades for one year from date of delivery.

The most effective and efficient way to identify issues and upgrade software on your system is via an internet connection. It is assumed that your VECTRA computer will be connected to a land-based internet connection with the ability to connect to Canfield Scientific, Inc. ("Canfield") via the www. Should this not be the case, additional costs may apply when providing support for your system.

Beyond this first year, Canfield Scientific, Inc. offers an extended Canfield Care service agreement for an annual fee. This extended service agreement extends the warranty for all VECTRA 3D capture system parts. All coverage and exclusion details for this extended warranty are the same as those described in the VECTRA Limited One-Year Warranty. In addition, the user continues to receive software upgrades and have phone access to technical support[1] for the term of the Canfield Care Agreement.

All renewal fees must be remitted to Canfield (or an authorized distributor where applicable) at least 30 days prior to the expiration date of the current VECTRA 3D Capture Service Agreement (initial or extended). Once a Canfield Care Agreement has expired, the hardware warranty may not be renewed; although system repair, technical support, and upgrades may still be obtained with individual service charges as noted below[2–4].

To enter into an Extended Canfield Care Service Agreement, please contact Canfield by e-mail at support@canfieldsci.com or by phoning 1-800-815-4330 toll-free in the US, Canada or Mexico (other international customers phone 1-973-276-0336).

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[1]Note that for international customers (outside of the U.S. and Canada), technical support is provided locally through an authorized distributor where available.

[2]Out-of-warranty repairs to the VECTRA 3D capture system: The customer will be charged a fixed diagnostic fee of $350, plus any parts and labor required for repairs. The customer is responsible for prepaying all transportation charges including insurance and any associated fees and any applicable custom duties and/or export taxes. *IMPORTANT:* A Return Merchandise Authorization (RMA) number must be obtained from Canfield prior to shipping any equipment.

[3]For customers without a current Agreement, technical support may be obtained at the rate in effect at the time of service.

[4]All pricing subject to change without notice.

SAFETY AND TECHNICAL INFORMATION

DESCRIPTION OF MARKS

CAUTION and/or WARNING — Please consult ACCOMPANYING DOCUMENTS and read carefully to ensure safe use of this equipment.

DANGER/HIGH VOLTAGE — This symbol indicates "dangerous voltage" inside the product that presents a risk of electric shock or personal injury.

ENVIRONMENTAL RESTRICTIONS

- Not suitable for use in WET LOCATIONS.
- Not suitable for use in the presence of a FLAMMABLE ANAESTHETIC MIXTURE WITH OXYGEN or NITROUS OXIDE.

AUTHORIZED STANDARDS

This device complies with the following Standards:

3107557

Safety of Information Technology Equipment

Federal Communications Commission (FCC)

Safety

European Union

This device complies with the requirements of the Low Voltage Directive 2006/95/EC.

- EN 60065:2002 (or IEC 60065:2001 + Am.1:2005) for Safety for Audio, Video and Similar Electronic Apparatus

United States of America

- UL 60065 Seventh Edition, Dated June 30, 2003 with revised on March 20, 2006; for Safety for Audio, Video and Similar Electronic Apparatus

Canada

- CAN/CSA-C22.2 No. 60065:03 with Amendment 1:2006 for Safety for Audio, Video and Similar Electronic Apparatus

EMC Standard

European Union: EMC Directive 2004/108/EEC

- Radiated Emissions IEC 61000-6-3:2011 Ed 2, Am.1
- Radiated Immunity IEC 61000-6-1:2005 Ed. 2

Safety and Technical Information

United States of America:

Federal Communications Commission (FCC): FCC 47CFR Part 15:2012 Subpart B Class B. This device complies with FCC CFR 47 Part 15 sub part B. Operation is subject to the following two conditions: 1) This device may not cause harmful interference, and 2) this device must accept any interference received, including interference that may cause undesired operation.

WARNING: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Canada This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Compliance with other EU directives Vectra H1 complies with the following European Union Directives aimed at environmental protection as well as consumer health and safety.

- Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE Directive)
- Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances (RoHS Directive)
- Directive on Packaging and Packaging Waste 94/62/EC

RECYCLING AND DISPOSAL INFORMATION

In accordance with these directives, all non-electronic components removed for replacement, and any related packaging material should be disposed of following your country's or local area's legislation for recycling.

Any electronic components or modules removed for replacement should be returned to Canfield or its local agent, using the packaging material supplied with the replacement component or module received.

Shipping address: Canfield Scientific, Inc., 253 Passaic Avenue, Fairfield, NJ 07004-2524 USA

SAFETY PRECAUTIONS

Do not make conversions and/or changes to the equipment without express authorization from the manufacturer. Unauthorized conversions and/or changes could jeopardize the safety of the system and will void the warranty.

Operate the system only with original and/or manufacturer authorized parts.

Always ensure that this device and any relevant accessory equipment are placed on a dry, stable surface.

Keep cables free and clear from traffic areas to prevent trip hazards.

Do not place food or liquid on the VECTRA imaging system. If the VECTRA system gets wet, contact Canfield Technical Support.

Using flammable substances near the unit's high-voltage areas may result in a fire or electrical shock.

If smoke or excessive heat is detected, turn the equipment off, unplug the power cord and contact Technical Support. Do not resume use unless authorized by Canfield Technical Support to do so.

CHAPTER 1

Overview of the VECTRA 3D Imaging System

1.1 VECTRA SYSTEM OVERVIEW

The VECTRA H1 system enables high quality 3D image capture of small- to medium-field subjects. The 3D images appear in the designated VECTRA® patient chart and may be viewed and analyzed using the included VECTRA Analysis Module (VAM) software and optional Sculptor® software.

The H1 camera is shipped completely configured and ready to use. If you purchased a computer from Canfield, the Mirror and VECTRA software is pre-installed. Otherwise, install Mirror, VECTRA and Calibration software according to the instructions in Appendix A.

Chapter 3 (tethered capture) or Chapter 4 (capture to SD card) takes you through the image capture process, and you can begin using the system within a few minutes. If you should encounter any problems, please contact our Technical Support Department.

1.2 VECTRA H1 TECHNICAL SPECIFICATIONS & REQUIREMENTS

System components

- Soft carrying case containing
  - VECTRA H1 3D camera with stereo optics, ranging lights for easy patient positioning, and on-board modular, intelligent flash unit
  - USB cable for connecting camera to computer
  - 4 rechargeable batteries (2 are in the camera)
  - 2 battery chargers & cables
  - SD memory card
  - camera strap
- *Getting Started* kit, including
  - Software installation disks for Mirror®, VECTRA, and Calibration files
  - USB hardware key (contains your VECTRA and Mirror software licenses)
  - VECTRA Marketing Kit DVD

Options

- Face Sculptor® 3D aesthetic simulation software with RBX® image processing
- laptop computer with pre-installed software

Specifications

- 0.8 mm geometry resolution (triangle edge length)
- 2.0 milliseconds capture time
- Stereophotogrammetry technology
- 165mm × 270mm × 100mm (x, y, z) capture volume

Power requirements

- voltage: 100 to 240 Volts AC
- frequency: 50/60 Hz
- current 4.0A (rms), 100-240VAC

CHAPTER 2

The VECTRA Patient Chart

2.1 FINDING A PATIENT CHART

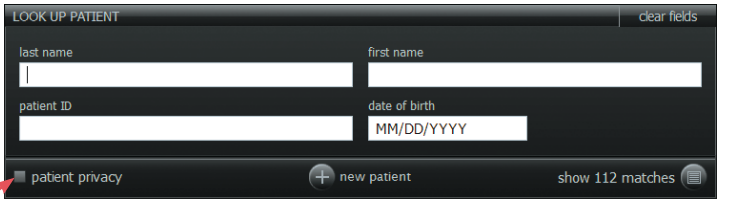
1 Double-click the VECTRA icon on the Windows desktop to open the software.

If VECTRA software is already open, click the **home** button in the upper left corner of the screen to return to the patient chart, then click the VECTRA logo from a patient chart to return to the home screen.

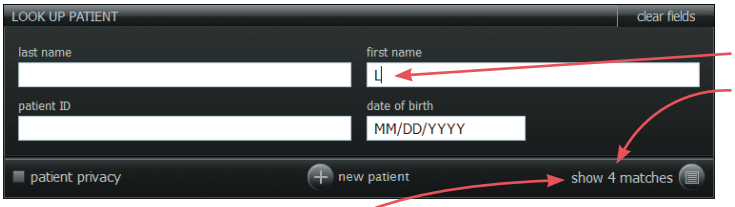
2 Click the **look up patient** button in the upper right corner of the VECTRA home screen.

If you are certain that this is a new patient, see *2.2 Creating a New Patient Chart*. Otherwise, start by looking up the patient.

3 Enter search criteria such as the patient's name, date of birth, and/or ID number. Press the "Tab" key to move among fields, or click in a field and type.



To hide names, select the **patient privacy** checkbox.

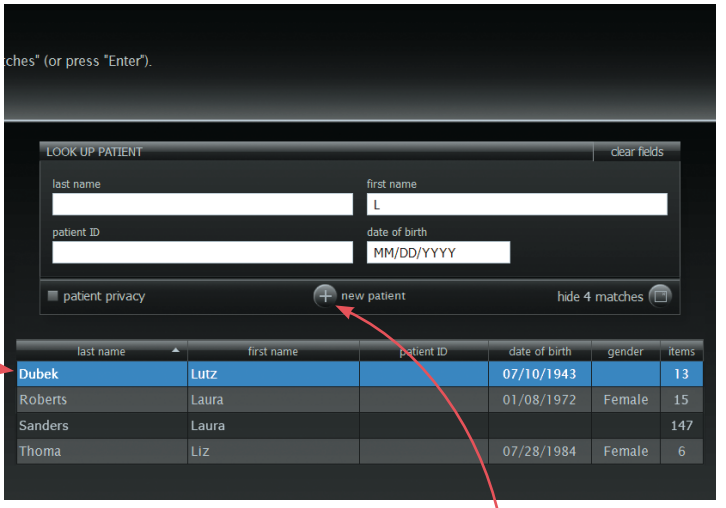


As you enter more information, **show matches** updates to display the number of records found that match the search criteria.

- Continue adding criteria if you wish to show fewer matches.
- Leave the fields blank to view all records.

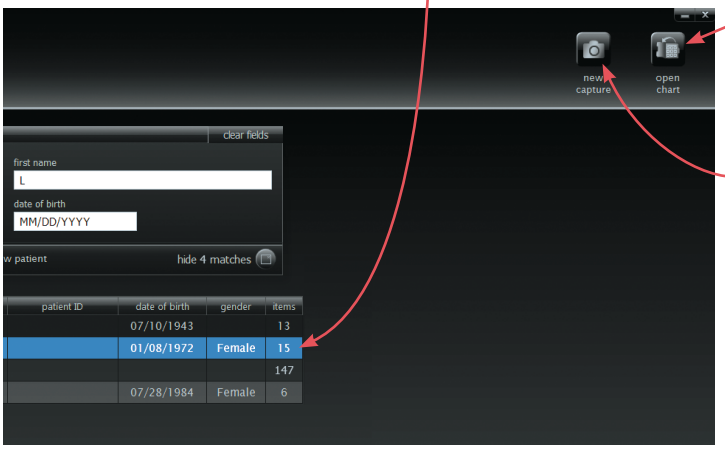
4 Click **show matches** (or press the "Enter" key) to display matching records.

In this example, 4 records with a first name starting with the letter "L" were located. The first record is automatically selected (indicated by white type on a blue background).



If the correct chart is not found, click **new patient** to create a new patient chart (see *2.2 Creating a New Patient Chart*).

5 Click once on a row to select it.

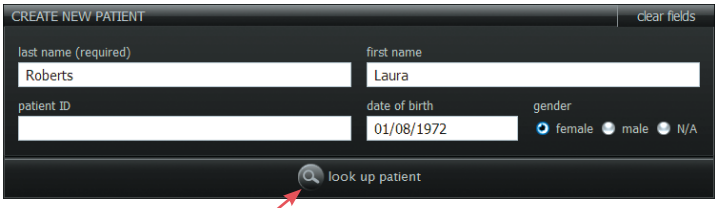


- Click **open chart** (or double-click a row or press the "Enter" key) to open the selected chart.
- Click **new capture** to take a picture of the selected patient (see Chapter 3).

2.2 CREATING A NEW PATIENT CHART

1 Click the **new patient** button in the upper right corner of the VECTRA home screen, or click **new patient** on the Look Up Patient screen.

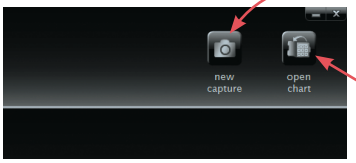
NOTE: To avoid creating a duplicate chart, start by looking up the patient (see *2.1 Finding a Patient Chart*). Click **new patient** if the chart is not found.



Clicking **look up patient** opens the Look Up Patient screen.

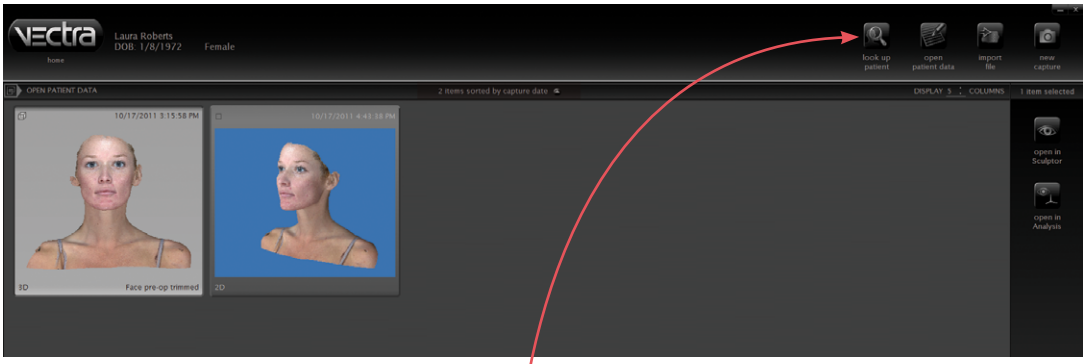
2 Click in a field to enter patient information. Press the "Tab" key to move among fields. The more information you enter, the easier it will be to find the patient next time.

Once you click in the date of birth field, the field will remain pink until a valid date is entered.



3 Click **new capture** to create the patient chart and take a picture (see Chapter 3 or Chapter 4), or click **open chart** to view the new patient chart.

2.3 USING THE PATIENT CHART



Top bar buttons

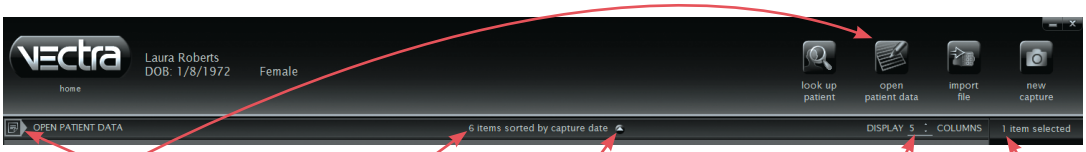
The buttons in the top bar are always available when a patient chart is open:

look up patient to find a different patient chart

open patient data to edit patient information

import file to add an existing file (CR2, avi, bmp, doc, docx, gif, jpg, jpeg, pdf, png, ppt, pptx, tif, tiff, tom, txt, or wmv) to the patient chart

new capture to take a picture that will be automatically added to the current chart



open patient data

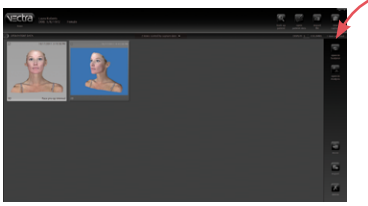
quantity of items in the chart

click to toggle ascending or descending order

specify number of columns displayed (fewer columns = larger thumbnails)

quantity of items selected

Side bar buttons



The buttons in the side bar on the right of the patient chart vary according to the type of item(s) selected. If no thumbnail is selected, there are no buttons in the side bar.

open in Sculptor to open a 3D image in the appropriate Sculptor software

open in VAM to open a 3D image in the VECTRA Analysis Module (VAM)

open to view a 2D image, movie, PowerPoint, PDF, or other type of document

process to finish processing a 3D capture

stitch images to automatically stitch multiple captures into one image

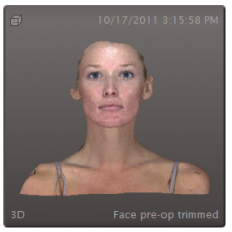
move to move a file to a different patient chart

export to make a file available outside of VECTRA

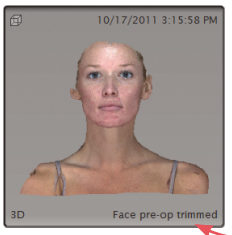
extract 2D originals to extract 2-dimensional images from the original 3D capture

delete to delete selected file(s)

Thumbnails



unselected



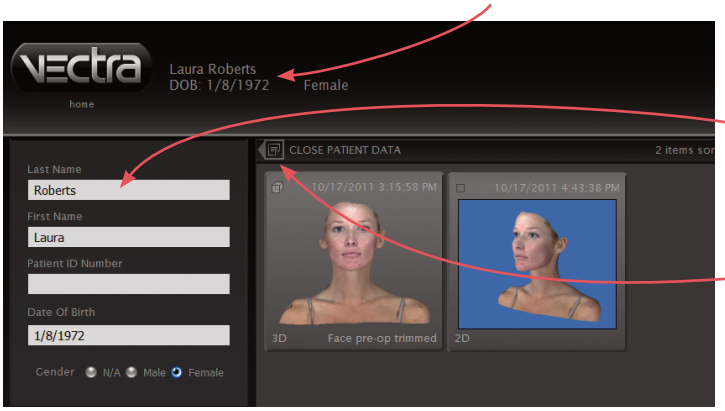
selected

- Click on a thumbnail to select it.
- Click on a selected thumbnail to deselect it.
- Shift-click to select multiple thumbnails.
- If a thumbnail is selected, its frame reverses to light gray with dark type.

- Image type is noted in the corners of the thumbnail. For example, ☐ in the upper left and **2D** in the lower left denotes a 2D image.

Viewing and editing patient data

Patient information that was entered in the New Patient fields is displayed in the top bar.



Click **open patient data** to view.

Click in a field to add or change information.

Click **close patient data** (top bar) or **CLOSE PATIENT DATA** to close the patient data drawer and apply changes.

CHAPTER 3

Capturing Images with H1 Tethered to Computer

(VECTRA H1 camera connected to the computer)

3.1 START THE VECTRA SYSTEM & SOFTWARE

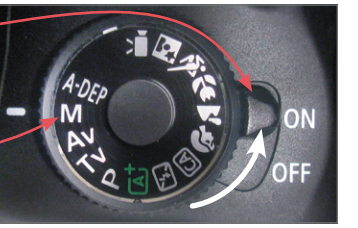
1 Turn on the computer.

2 Double-click the VECTRA icon on the Windows desktop to open the software.

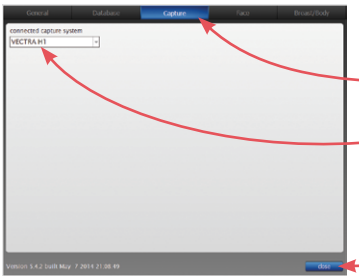
3 Connect the VECTRA H1 camera to the computer with the supplied USB cable.

4 Rotate the power switch (top of the camera) to **ON**.

5 The mode dial should be set to **M** when the camera is on.



The first time you use the VECTRA software, check to make sure H1 is selected as the capture system:



1 Click the **set up** button in the lower right corner of the VECTRA home screen.

2 Select the **Capture** tab and make sure **VECTRA H1** is displayed.

3 Click **close**.

3.2 FIND OR CREATE A PATIENT CHART *(see Chapter 2 for more details)*

First determine whether a VECTRA chart exists for this patient.

1 Click the **look up patient** button in the upper right corner of the VECTRA home screen.

2 Enter search criteria such as the patient's name, date of birth, and/or ID number.

3 Click **show matches** (or press the "Enter" key) to display matching records.

4 Click **new capture**. (If more than one matching record is displayed, first click to select the correct patient, then click **new capture**.)

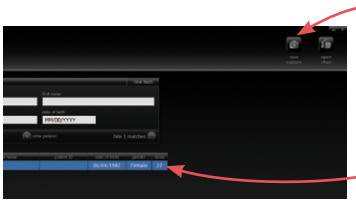
✔ If the correct chart is not found, click **new patient** to create a new patient chart.

Creating a new VECTRA patient chart

1 Click the **new patient** button in the upper right corner of the VECTRA home screen.

2 Enter patient information.

3 Click **new capture**.



If the new capture button is not available (upper right corner of the screen), make sure

- the H1 camera is turned on
- a patient chart has been selected (or opened)
- the USB cable is firmly connected to both the computer and the H1 camera
- VECTRA H1 is selected as the capture system in **setup** (see previous page).

Turn the H1 camera off, then on.

If **new capture** is still unavailable, restart the VECTRA software and try again.

3.3 CAPTURE 3D IMAGES FOR STITCHING

General guidelines for capturing 3D facial images

- ☑ **Consistent patient positioning** is the most important aspect of capturing medical images. Follow consistent methods to ensure consistent patient positioning.
- ☑ **Capture the images in the specified order:** right side, front, left side.
- ☑ **The patient's eyes should be open**, gaze fixed straight ahead, not looking up or down, mouth closed, relaxed facial expression.
- ☑ For the right and left views of the face, the camera should be angled upward toward the patient's head to optimize chin and neck detail.
- ☑ **The patient should remain completely still throughout the 3 image captures.**
- ☑ **For follow-up images:** Review the baseline image before initiating image capture, to assist in positioning the patient correctly.

Before positioning the patient in front of the VECTRA

- Make sure the 3D FACE CAPTURE tab is selected.
- Remove all jewelry near the area of interest.
- Remove sweat, oils, or anything shiny from the skin.
- Remove all make-up for facial imaging.
- Make sure the patient's hair and clothing is secured away from the face, ears and neck.

Using the H1 camera

1 Turn on the ranging lights by pressing the button on the right of the lens housing (**ON** glows green).

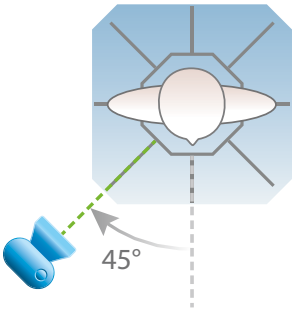
The ranging lights will automatically turn off after 1 minute of inactivity. Press the button again to restart.

2 When the ranging lights are converged and the target area is centered in the left side of the split screen preview, press the shutter release to capture the image.

The display on the camera is off during tethered capture. Refer to the live split screen preview on the computer screen.

✔ The flashes should recharge as you move into place for the next capture.

THE PATIENT SHOULD REMAIN COMPLETELY STILL THROUGHOUT THE 3 IMAGE CAPTURES.

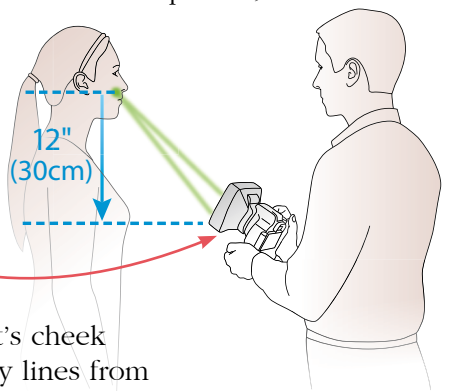


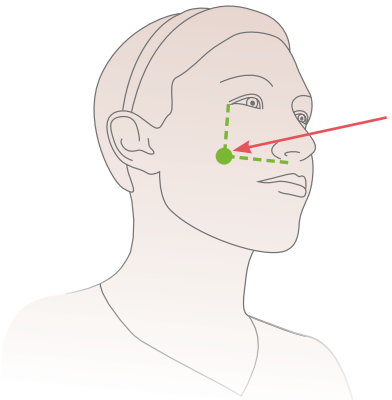
Capture 1: RIGHT side

Position camera at a 45° angle from the front toward the RIGHT side of the face.

1 Stand at 45 degrees from the direction the patient is facing (photographer moves left of patient).

2 Hold the camera at patient's chest level, about 12 inches (30cm) below mid-face, and angled upward.





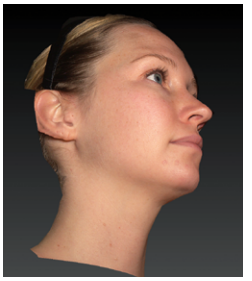
3 Aim the green dots at the middle of the patient's cheek (intersection of imaginary lines from the lateral canthus and the upper lip).

4 Converge the green dots to a single point by adjusting camera distance from the patient.

5 Capture image.

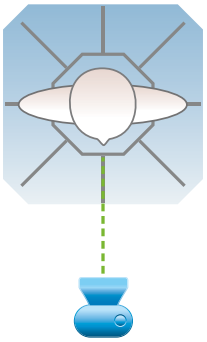
ranging lights at mid face

live preview during right view capture



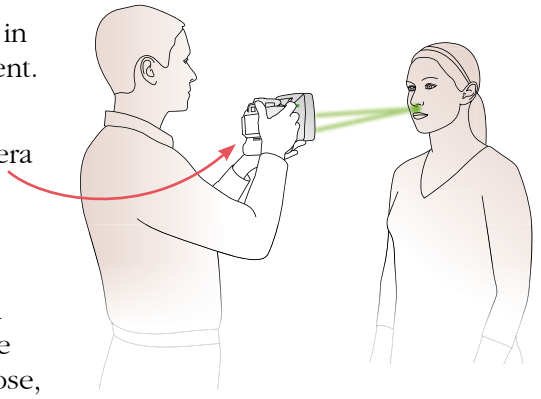
captured 3D image

THE PATIENT SHOULD REMAIN COMPLETELY STILL THROUGHOUT THE 3 IMAGE CAPTURES.



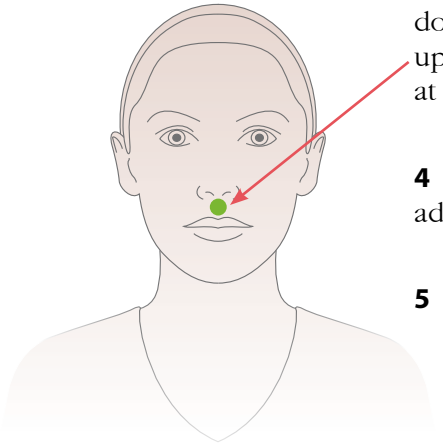
Capture 2: FRONT

Position camera directly in FRONT of the face.



1 Stand directly in front of the patient.

2 Hold the camera level with the patient's nose.



3 Aim the green dots between the upper lip and nose, at the mid-line of the patient's face.

4 Converge the green dots to a single point by adjusting camera distance from the patient.

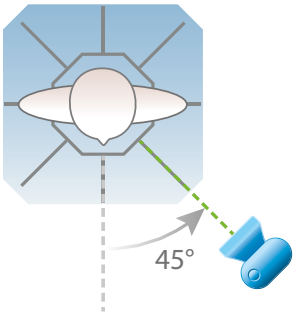
5 Capture image.

ranging lights at center of upper lip, just below nose

live preview during front view capture

captured 3D image

THE PATIENT SHOULD REMAIN COMPLETELY STILL THROUGHOUT THE 3 IMAGE CAPTURES.

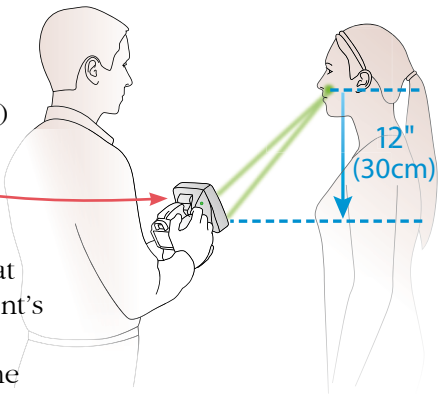


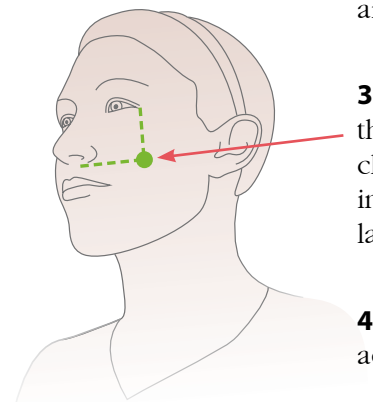
Capture 3: LEFT side

Position camera at a 45° angle from the front toward the LEFT side of the face.

1 Stand at 45 degrees from the direction the patient is facing (photographer moves right of patient).

2 Hold the camera at patient's chest level, about 12 inches (30cm) below mid-face, and angled upward.





3 Aim the green dots at the middle of the patient's cheek (intersection of imaginary lines from the lateral canthus and the upper lip).

4 Converge the green dots to a single point by adjusting camera distance from the patient.

5 Capture image.

ranging lights at mid face

live preview during left view capture

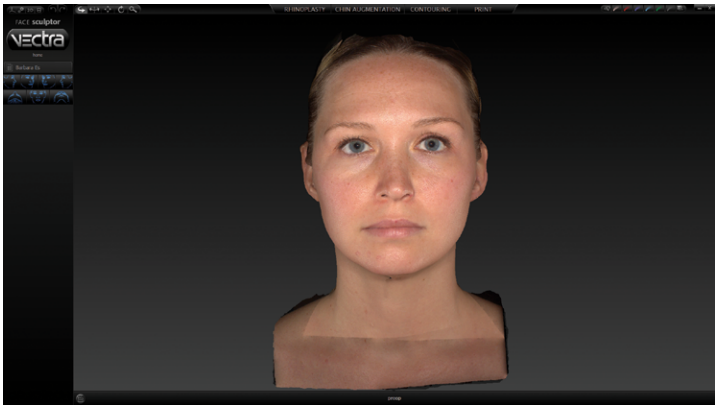
captured 3D image

3.4 STITCHING

After the third image is captured, VECTRA software automatically processes the images and stitches them together into a single 3D image. The individual captures are displayed while they are being processed.

If you wish to interrupt the processing and retake the images (if, for example, the subject blinked or was in the wrong position) click **discard & retake**.

The completed image is displayed in Face Sculptor.



If auto-stitch fails

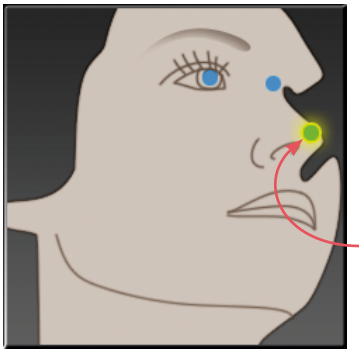
If VECTRA software is unable to locate the required facial features, it will display an error message over the captured images.

First check to see whether all three images were taken in the specified order: right, front, left. If not, click **discard & retake** and capture the images in the correct order.

If the order is correct, check to see whether the poses are correct, eyes are open and mouth is closed for all three images. If not, click **discard & retake** and recapture the images.

Placing manual landmarks

If images appear to be properly captured, click **OK** in the error message to manually identify the landmarks.



1 The location for the first landmark is displayed in the icon below the first image. Position the tip of the cursor arrow over the appropriate anatomical location in the first image as shown, and click once to place the landmark.

- As each location is clicked, the icon updates to highlight the next landmark to be placed.
- Each of the 3 captures requires its own set of landmarks.

2 Repeat until each of the requested landmarks has been placed.

If you wish to change the position of a landmark, position the tip of the cursor arrow over it. The cursor changes to an open hand when it's close enough to the landmark. Click and drag (the cursor changes to a grabbing hand). Release the mouse button when the landmark is in the correct position.

3 When you are satisfied with the manual landmarks, click **retry stitch**. VECTRA software completes the automatic stitching process and displays the completed image in Face Sculptor.

CHAPTER 4

Capturing Images to an SD Card

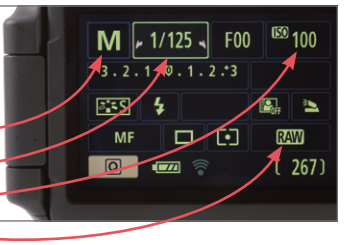
(Capture to the VECTRA H1 camera's SD card and then transfer the images to the VECTRA patient chart.)

4.1 USING THE H1 CAMERA

1 Make sure the SD card is properly inserted into its slot on the VECTRA H1 camera.

2 Rotate the power switch (top of the camera) to **ON**.

3 Make sure the settings displayed on the back of the camera are as follows:



M (manual mode)
1/125 (shutter speed)
ISO 100
RAW (image file format)

(For more on camera settings, see Appendix B.)

4 Press the **live view** button to the right of the viewfinder.

The camera will automatically suspend operation after 4 minutes of inactivity. Press again to resume.

5 Turn on the ranging lights by pressing the button on the right of the lens housing (**ON** glows green). *The ranging lights will automatically turn off after 1 minute of inactivity. Press the ranging lights button again to restart.*

6 When the ranging lights are converged and the target area is centered in the left side of the split screen preview, press the shutter release to capture the image.

✔ The flashes should recharge as you move into place for the next capture.

4.2 CAPTURE 3D IMAGES FOR STITCHING

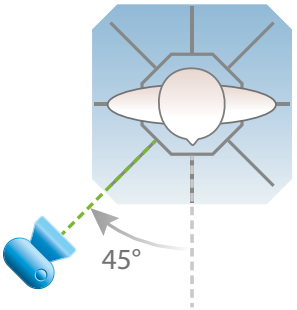
General guidelines for capturing 3D facial images

- ☑ **Consistent patient positioning** is the most important aspect of capturing medical images. Follow consistent methods to ensure consistent patient positioning.
- ☑ **Capture the images in the specified order:** right side, front, left side.
- ☑ **The patient's eyes should be open**, gaze fixed straight ahead, not looking up or down, mouth closed, relaxed facial expression.
- ☑ For the right and left views of the face, the camera should be angled upward toward the patient's head to optimize chin and neck detail.
- ☑ **The patient should remain completely still throughout the 3 image captures.**
- ☑ **For follow-up images:** Review the baseline image before initiating image capture, to assist in positioning the patient correctly.

Patient preparation

- Remove all jewelry near the area of interest.
- Remove sweat, oils, or anything shiny from the skin.
- Remove all make-up for facial imaging.
- Make sure the patient's hair and clothing is secured away from the face, ears and neck.

THE PATIENT SHOULD REMAIN COMPLETELY STILL THROUGHOUT THE 3 IMAGE CAPTURES.

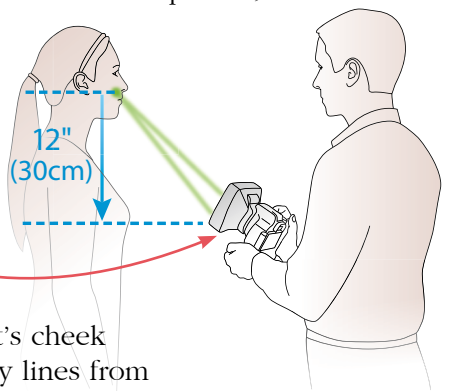


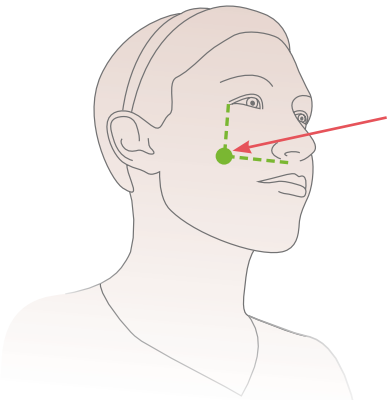
Capture 1: RIGHT side

Position camera at a 45° angle from the front toward the RIGHT side of the face.

1 Stand at 45 degrees from the direction the patient is facing (photographer moves left of patient).

2 Hold the camera at patient's chest level, about 12 inches (30cm) below mid-face, and angled upward.





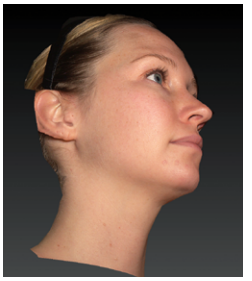
3 Aim the green dots at the middle of the patient's cheek (intersection of imaginary lines from the lateral canthus and the upper lip).

4 Converge the green dots to a single point by adjusting camera distance from the patient.

5 Capture image.

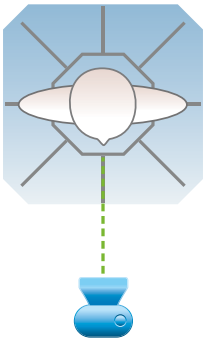
ranging lights at mid face

live preview during right view capture



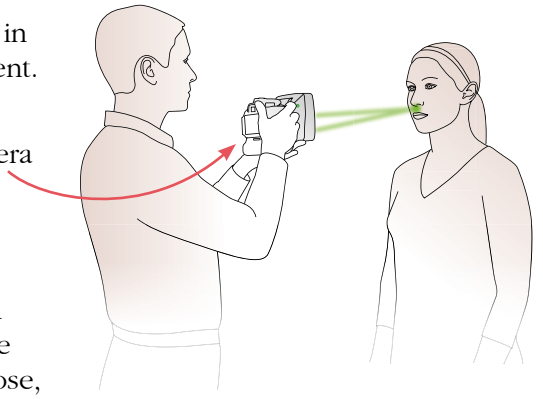
captured 3D image

THE PATIENT SHOULD REMAIN COMPLETELY STILL THROUGHOUT THE 3 IMAGE CAPTURES.



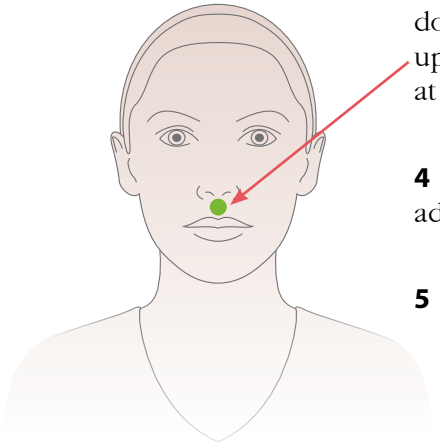
Capture 2: FRONT

Position camera directly in FRONT of the face.



1 Stand directly in front of the patient.

2 Hold the camera level with the patient's nose.



3 Aim the green dots between the upper lip and nose, at the mid-line of the patient's face.

4 Converge the green dots to a single point by adjusting camera distance from the patient.

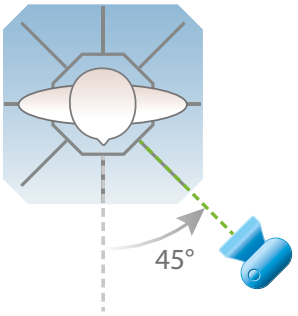
5 Capture image.

ranging lights at center of upper lip, just below nose

live preview during front view capture

captured 3D image

THE PATIENT SHOULD REMAIN COMPLETELY STILL THROUGHOUT THE 3 IMAGE CAPTURES.

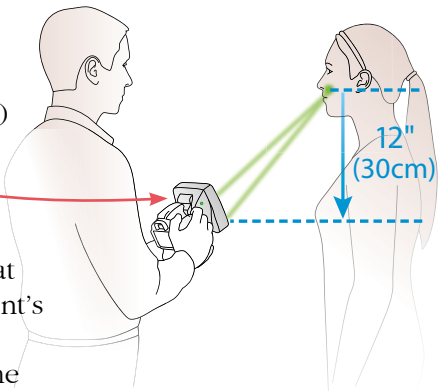


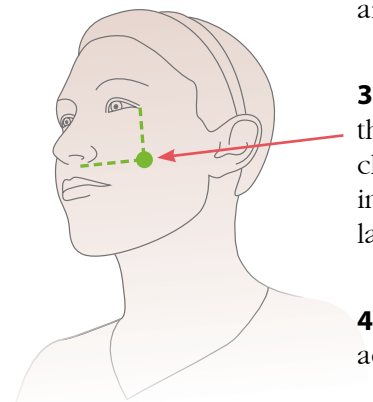
Capture 3: LEFT side

Position camera at a 45° angle from the front toward the LEFT side of the face.

1 Stand at 45 degrees from the direction the patient is facing (photographer moves right of patient).

2 Hold the camera at patient's chest level, about 12 inches (30cm) below mid-face, and angled upward.





3 Aim the green dots at the middle of the patient's cheek (intersection of imaginary lines from the lateral canthus and the upper lip).

4 Converge the green dots to a single point by adjusting camera distance from the patient.

5 Capture image.

ranging lights at mid face

live preview during left view capture

captured 3D image

4.3 TRANSFER IMAGES TO THE VECTRA PATIENT CHART

Retrieve images

1 After the desired H1 images have been captured and the camera has returned to live preview mode, rotate the power switch (top of the camera) to **OFF**.

2 Remove the SD card from the camera: Open the cover and press on the edge of the SD card until it pops up.

3 Insert the SD card into the appropriate slot on the VECTRA computer or connected card reader.

Open a patient chart (*see Chapter 2 for more details*)

1 Turn on the computer.

2 Double-click the VECTRA icon on the Windows desktop to open the software.

First determine whether a VECTRA chart exists for this patient:

1 Click the **look up patient** button in the upper right corner of the VECTRA home screen.

2 Enter search criteria such as the patient's name, date of birth, and/or ID number.

3 Click **show matches** (or press the "Enter" key) to display matching records.

4 Click **open chart** (or double-click a row or press the "Enter" key) to open the selected chart.

If the correct chart is not found, click **new patient** to create a new patient chart.

Creating a new VECTRA patient chart:

1 Click the **new patient** button in the upper right corner of the VECTRA home screen.

2 Enter patient information.

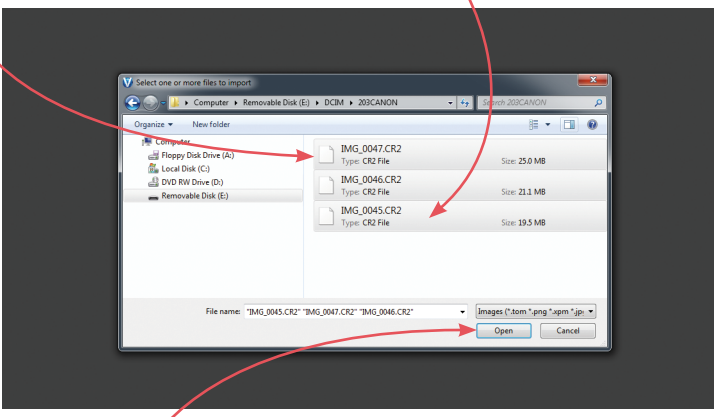
3 Click **open chart**.

Import images

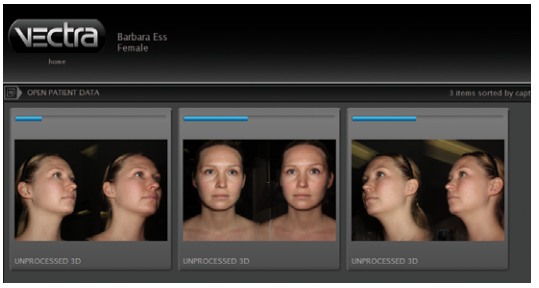
1 Click **import file**.

2 Navigate to the CR2 files on the SD card (Removable Disk).

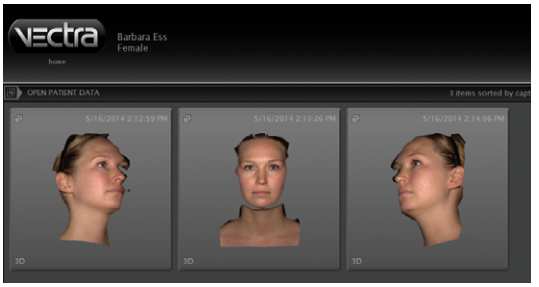
3 Click on the first file to select, then hold down the **shift** key and click on the third file so that all three are selected.



4 Click **Open**. The CR2 files are imported into the open VECTRA patient chart and the software processes the images.



processing in progress

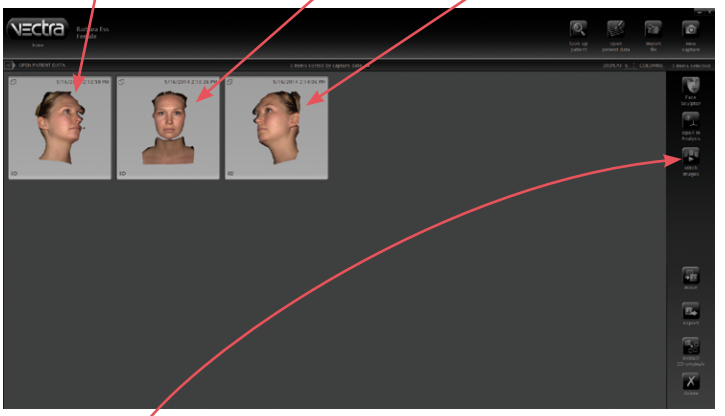


processing complete

4.4 STITCHING

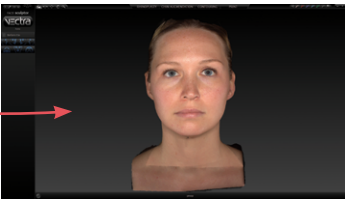
1 Select the 3 captures for stitching: Click on the first thumbnail (right view) to select it, then shift-click to select the other thumbnails in order. (*See* Chapter 2 *for more about using the VECTRA patient chart.*)

The thumbnails must be selected in the correct order: first **RIGHT** view, then **FRONT**, and **LEFT** view last.

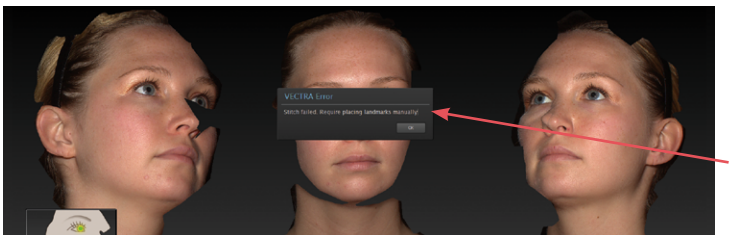


2 Click **stitch images**. VECTRA software automatically stitches the three captures into a single 3D image. The individual captures are displayed while they are being processed.

The completed image is displayed in Face Sculptor.



If auto-stitch fails



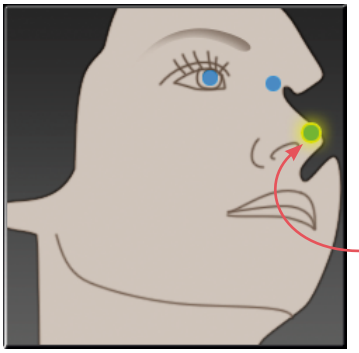
If VECTRA software is unable to locate the required facial features, it will display an error message over the captured images.

First check to see whether all three images are in the specified order: right, front, left. If not, click **OK** in the error message and then click **cancel stitch** to open the patient chart. Select the images in the correct order.

If the order is correct, check to see whether the poses are correct, eyes are open and mouth is closed for all three images. If not, click **cancel stitch** and recapture the images.

Placing manual landmarks

If images appear to be properly captured, click **OK** in the error message to manually identify the landmarks.



1 The location for the first landmark is displayed in the icon below the first image. Position the tip of the cursor arrow over the appropriate anatomical location in the first image as shown, and click once to place the landmark.

- As each location is clicked, the icon updates to highlight the next landmark to be placed.
- Each of the 3 captures requires its own set of landmarks.

2 Repeat until each of the requested landmarks has been placed.

If you wish to change the position of a landmark, position the tip of the cursor arrow over it. The cursor changes to an open hand when it's close enough to the landmark. Click and drag (the cursor changes to a grabbing hand). Release the mouse button when the landmark is in the correct position.

3 When you are satisfied with the manual landmarks, click **retry stitch**. VECTRA software completes the automatic stitching process and displays the completed image in Face Sculptor.

CHAPTER 5

Face Sculptor®

5.1 GETTING STARTED

Face Sculptor 3D aesthetic simulation software assists the surgeon during consultations enabling prospective patients to visualize the possibilities of their anticipated facial aesthetic procedures. This software module provides tools to assess the patient's face and enables the user to quickly make realistic surface and three-dimensional changes to the facial features of the patient's own 3D image. The results can then be reviewed with the patient to ensure mutually understood expectations between the surgeon and the patient. The pre-op and post-simulated images can also be used as references during surgery.

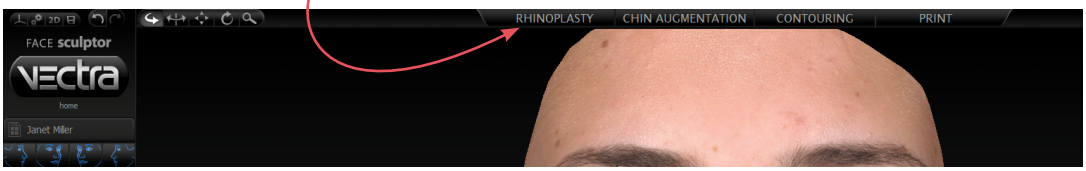
Open a 3D image in Face Sculptor

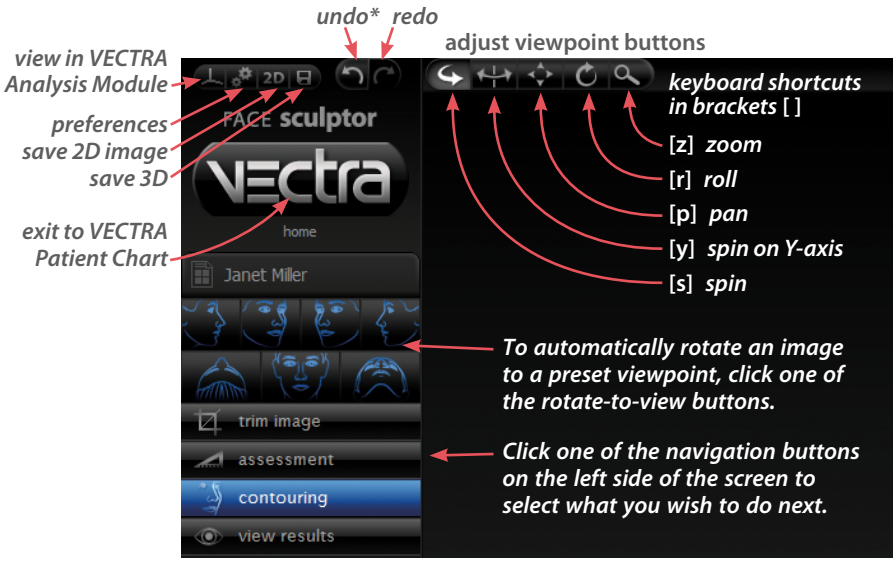
A newly captured 3D image of your patient's face is automatically displayed in Face Sculptor software after processing is complete (see *Chapter 3: Capturing Images with H1 Tethered to Computer* or *Chapter 4: Capturing Images to an SD Card*).

To open a previously captured image, open the patient chart and double-click a 3D face image (see *Chapter 2: The VECTRA Patient Chart)*. If three captures have been stitched into one, all three captures as well as the final stitched image are available. Use the stitched image.

Face Sculptor overview

To get started, select the Rhinoplasty, Chin Augmentation, or Contouring module by clicking the corresponding tab at the top of the screen. You may select a different module or Print by clicking its tab at any time.



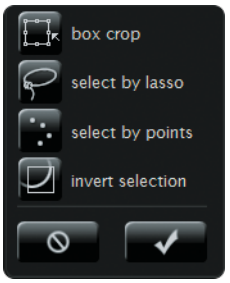


To see the image(s) from any viewpoint at any magnification, select one of the adjust viewpoint buttons  , then click within the image and drag. You can also change the magnification by rotating the scroll wheel on your mouse.

or press* **Ctrl-Z *on your keyboard to undo the most recent action*

5.2 trim image TRIM IMAGE

If you wish to remove unwanted parts of the image, click the **trim image** navigation button on the left side of the screen.



- The **box crop** tool enables you to draw a rectangular boundary box, adjust it, and delete everything outside of the box.
- The **select by lasso** tool enables you to circle unwanted parts of the image and delete them.
- The **select by points** tool enables you to define the area you wish to keep by clicking multiple points on the image, then delete the unwanted areas leaving a clean, smooth perimeter.
- Click **invert selection** to reverse what is and is not selected.
- Click to clear your selection without applying or to undo crop.
- Click to apply the cropping or delete the selected area.
- To remove all cropping/trimming, click **reset**.

Using the Select By Points tool

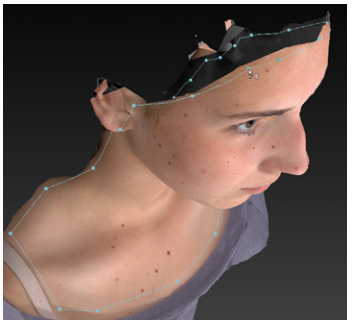
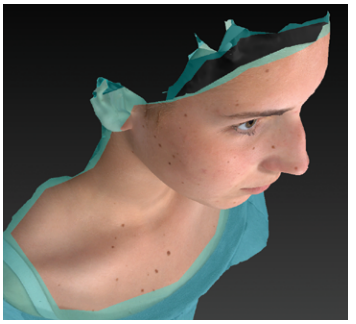
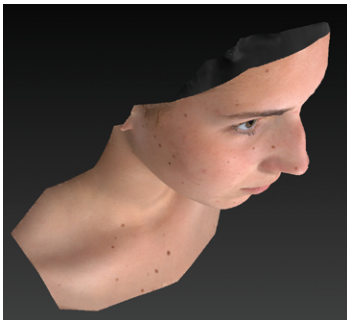
1 Click **select by points**.

2 Place the cursor over the edge of the area you wish to preserve, then click to place a point.

3 Continue to place points in a **clockwise** order around the perimeter of the area you wish to preserve.

To temporarily enable the Spin tool, hold down the **Alt** key on the keyboard while you rotate the image.

4 Right-click the mouse after placing the last point. The area outside of the perimeter is painted green.

5 Click **delete** to remove the highlighted area.

Using the Box Crop tool

1 Click **box crop**.

2 Click and drag out a rectangle to define the area you wish to keep. The boundary box you have drawn is projected onto the three-dimensional surface.

To adjust the size or position of the boundary box, click an edge or corner of the box and drag to the desired location.

3 Click **crop** (or right-click the mouse) to delete everything outside of the box. If you wish to cancel this operation, you may click **cancel**.

Using the Select By Lasso tool

1 Click **select by lasso**.

2 Place the cursor over the edge of an area you wish to define, then click and drag around its perimeter.

3 Click **delete** (or right-click) to remove the highlighted area.

To delete everything outside of the highlighted area, first click **invert selection**, then click **delete**.

You may click **deselect** if you wish to start over.

5.3 assessment ASSESSMENT

Click the **assessment** navigation button on the left side of the screen to access the Face Sculptor assessments that are relevant for the current module (Rhinoplasty [**Rh**], Chin Augmentation [**Ch**], or Contouring [**Co**]).

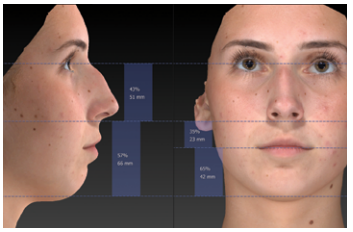
- To display another assessment, click its name on the left side of the screen.
- To view assessments for a different module, click its tab at the top of the screen, then click the **assessment** navigation button.

Symmetry [**Rh**, **Ch**, **Co**] helps to visualize asymmetries in the face.

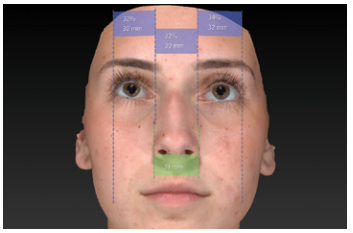
- The first viewport shows two right sides: The right side of the face is flipped and joined to the normal right side.
- The center viewport shows the normal face.
- The third viewport shows two left sides: The left side of the face is flipped and joined to the normal left side.

Reflection [**Rh**, **Ch**, **Co**] displays the view one sees in the mirror: The image is flipped (reflected) to further help visualize asymmetry.

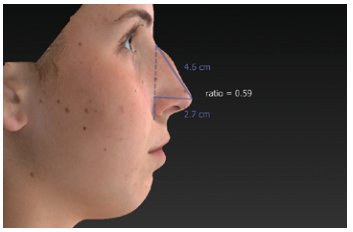
Oblique [**Co**] displays three viewing perspectives of the same image: right oblique, front, and left oblique.



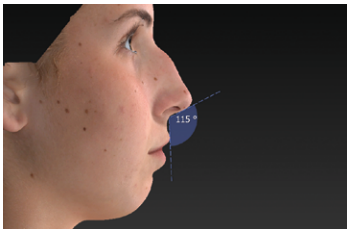
Horizontal proportions [**Rh**, **Ch**] displays both straight-line distance measurements and proportions (%) for the lower segment of the face (menton to subnasale) and the middle segment of the face (subnasale to radix).



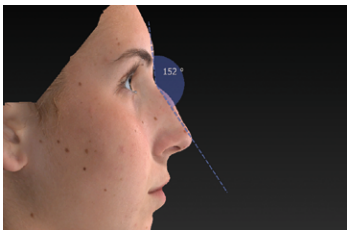
Vertical proportions [**Rh**] displays both straight-line distance measurements and proportions (%) for the right and left segments of the face (lateral to medial canthi) and the middle segment of the face (right to left medial canthi). The alar width (right alar rim to left alar rim) is also measured and compared.



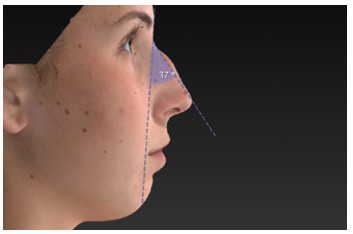
Tip projection [**Rh**] displays the ratio of the tip projection divided by the dorsal length. Tip projection is measured by drawing a perpendicular line to the nasal tip from a second line drawn from the radix to the alar rim. The dorsal length is measured from the nasal tip to the radix.



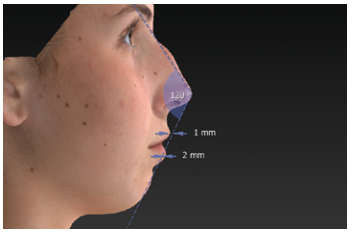
Columella-labial angle [**Rh**] displays the angle formed by lines drawn from the labrale superius to the subnasale and the subnasale to the columellar point.



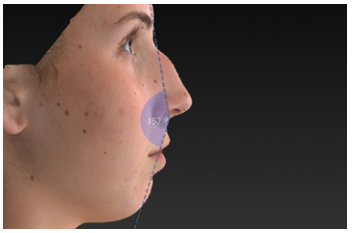
Nasofrontal angle [**Rh**] displays the angle formed by lines drawn from the nasal tip to the radix and the radix to the glabella.



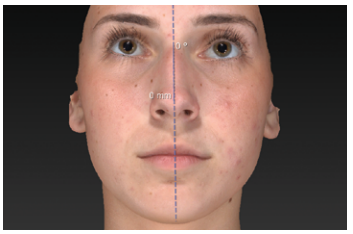
Nasofacial angle [**Rh**, **Ch**] displays the angle formed by lines drawn from the pogonion to the glabella and the nasal tip to the radix.



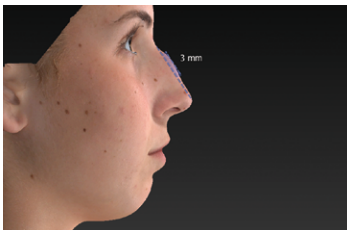
Nasomental angle [**Rh**, **Ch**] displays the angle formed by lines drawn from the pogonion to the nasal tip and the nasal tip to the radix. The horizontal distances from the labrale superius and inferius to the line drawn from the pogonion to the nasal tip is also provided.



Facial angle [**Rh**, **Ch**] displays the angle formed by lines drawn from the glabella to the subnasale and the subnasale to the pogonion.

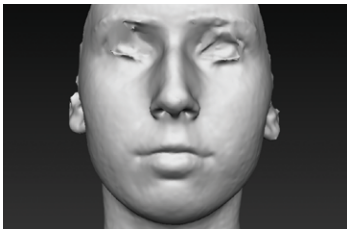


Tip deviation [**Rh**] displays the angle formed by the facial midline to the line drawn from the radix to the nasal tip. The horizontal distance from the nasal tip to the midline is also provided.



Dorsal height [**Rh**] displays the maximum point of projection from the line drawn from the nasal tip to the radix.

Color [**Rh**, **Ch**, **Co**] displays normal skin tone and texture.



Gray [**Co**] removes the distraction of complexion details for superior visualization of facial contours.

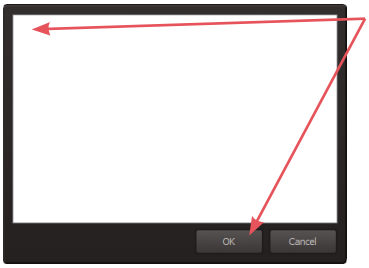
Click **Brown Spots** [**Co**] for enhanced visualization of pigmentation.

Click **Red Areas** [**Co**] for enhanced visualization of vascularity.

Red | Brown [**Co**] shows Red Areas and Brown Spots side by side. To view the image(s) in an alternative lighting mode click . Click again to toggle off.

Notes

To record your notes and recommendations, click in the marker palette (upper right corner of screen).



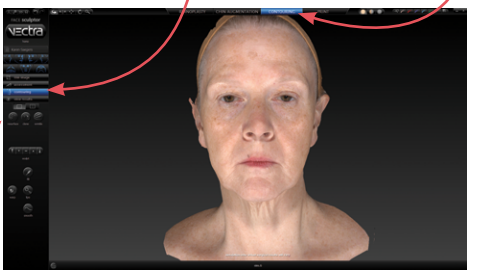
Type in the box, then click **OK**. Content that you enter in the notes box will appear on notes-enabled versions of the printed report (see *5.10 Printing Reports*).

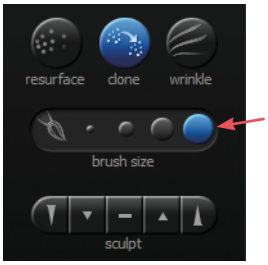
Notes are not saved to the patient chart. If you wish to save your notes, save a notes-enabled report as a PDF: Click the **Print** tab at the top of the screen, select desired template(s), and click **save PDF**. The PDF with notes is saved to the patient chart.

5.4 contouring MODELING FACIAL CONTOURING OUTCOMES

Click the **Contouring** tab at the top of the screen, then make sure the **contouring** navigation button on the left side of the screen is selected (blue).

Sculptor's facial contouring module opens with its array of tools displayed on the left side of the screen.

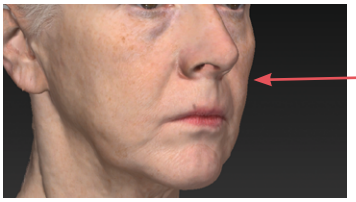




Tool-specific options appear only when the relevant tool is selected:

- The brush size selector is displayed when **resurface**, **clone**, **wrinkle** or **sculpt** is selected.
- When **fill**, **lipo**, or **smooth** is selected (blue) and a region of the face has been circled, the slider bar is displayed.
- Help text for the current tool appears at the bottom of the screen.

Alternate view modes



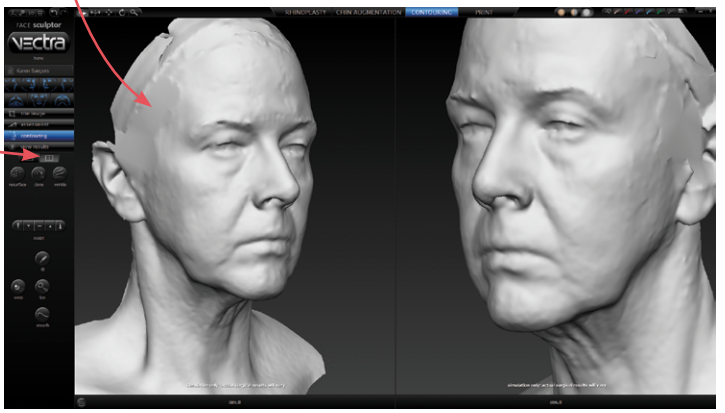
- Click one of the shading mode buttons  (located at the top of the screen) to view the image with alternate shading modes.

Natural photo mode (the default view). The image retains all of its photographic detail for a pleasing visual representation. Use to show skin resurfacing procedures.

Dynamic photo mode. The image is skin colored, but with reduced detail. This helps to show shape and anatomical features under raked lighting.

Shape (gray) mode. This solid colored image helps to visualize shape and volume changes without the distraction of skin tones.

- Click the 2-viewports button in the navigation sidebar to see two independent views of the same image.



- To automatically rotate the image on the left to a preset viewpoint, click on the left side of one of the rotate-to-view buttons.

  Click on the right side of one of the rotate-to-view buttons to automatically rotate the image on the right to a preset viewpoint.

About the brush tools

- The cursor changes to when you mouse over the viewport and is surrounded by a translucent round shape when it's over the image. The translucent shape indicates the area affected by the tool.
- Brushing over a region twice doubles the effect.
- Selecting a different brush size does not affect the changes you have already made.
- It's okay to stop and start again.

Using the Resurface tool

The Resurface tool smooths the skin's texture and is ideal for showing the effects of skin resurfacing procedures such as fractional laser and IPL treatments.

1 Click **resurface**.

2 *Optional:* Select a **brush size**.

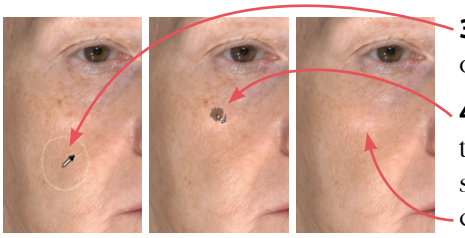
3 Click and drag over the region to be treated.

Using the Clone tool

With the Clone tool, you can select the desired skin appearance and apply it to areas that you wish to change, such as brown spots, blemishes and tattoos.

1 Click **Clone**.

2 *Optional:* Select a **brush size**.



3 Click the eyedropper cursor in the section of skin you wish to replicate.

4 Click and drag where you wish to apply the selected sample. The characteristics of the sampled skin are copied to the brushed area in a context-sensitive manner.

✔ To select a different source, click **Clone** again and then click the eyedropper cursor in the desired area.

Using the Wrinkle tool

The Wrinkle tool is used for removing or softening wrinkles and demonstrating the results of procedures such as toxin and dermafiller injections.

1 Click **wrinkle**.

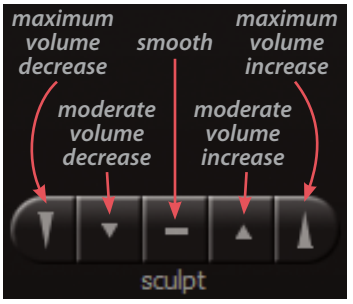
2 *Optional:* Select a **brush size**.

3 Click the eyedropper cursor in the section of skin you wish to replicate.

4 Click and drag over the region to be treated. The texture of the sampled skin is copied to the brushed area.

Using the Sculpt tool

The Sculpt tool is ideal for changing the shape of small, irregular-shaped regions of the face, such as pre-jowls and nasolabial folds.



1 Click a section of the **sculpt** button to select volume increase, decrease, or smooth and degree of change.

2 *Optional:* Select a **brush size**.

3 Click and drag or use a series of clicks over the region to be treated. The color of the translucent round shape indicates your tool selection: red for decrease, green for increase, and yellow for smoothing.

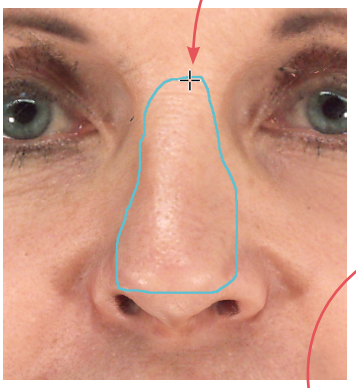
Using the Warp tool

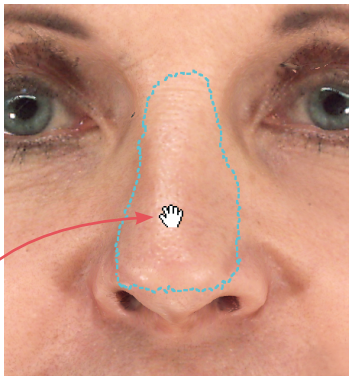
The versatile free hand Warp tool can be used for shape adjustments to almost any part of the face.

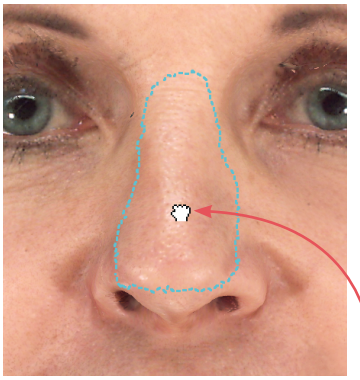
1 Orient the image(s) so that the area you wish to warp is visible. Usually frontal view is best, but lateral view is better for defining some warp areas, such as the bridge of the nose.

2 Click **Warp**.

3 Place the cursor (+) over the image, then click and drag to define the region to be adjusted. Release the mouse button when you are satisfied with the boundary.







4 Position the cursor near the part that you wish to warp (the cursor changes to an open hand), then click and drag in the desired direction (the cursor changes to a grabbing hand). Release the mouse button when you are satisfied with the adjustment.

For a stronger effect, click inside the defined area and drag. For a more subtle effect, click outside the defined area and drag.

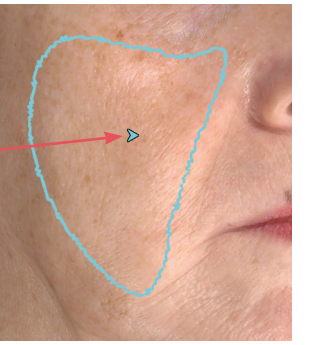
Using the Fill, Lipo, and Smooth tools

The Fill, Lipo, and Smooth tools are ideal for reshaping larger regions of the face, such as cheeks, or regions that are not easy to correct using the Warp tool, such as nasolabial folds.

1 Orient the image(s) so that the area you wish to treat is visible for circling (for example, oblique view for the cheeks).

2 Click **Fill** to add volume, **Lipo** to remove volume, or **Smooth** to flatten unwanted contours.

3 Place the cursor (+) over the image, then click and drag to define the region to be adjusted. Release the mouse button when you are satisfied with the boundary.



4 Position the cursor within the circled region; the cursor changes to an arrow (▷). Click once to automatically apply a calculated adjustment. The change in volume added/removed is displayed below the slider bar.

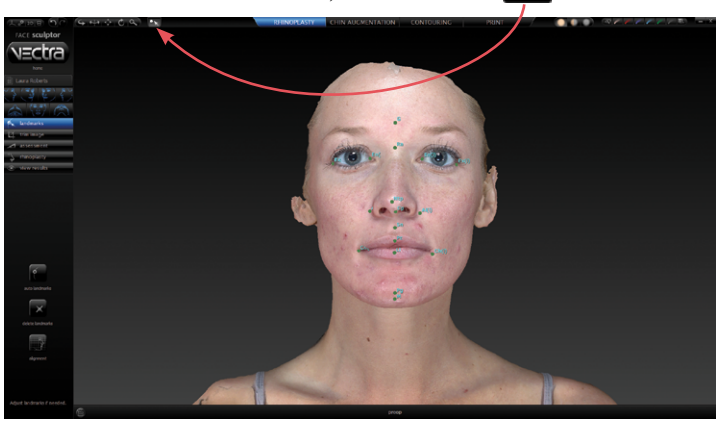
✔ If you wish to change the amount of adjustment, click and drag the bubble in the slider bar. To reset, click the triangle near the base of the slider bar.

5.5 MODELING RHINOPLASTY OR CHIN AUGMENTATION OUTCOMES

With the patient's image open in Face Sculptor, click the **Rhinoplasty** or **Chin Augmentation** tab at the top of the screen.

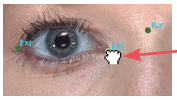
Auto landmarking

Face Sculptor software automatically identifies and places the landmarks needed for modeling outcomes in the selected module. The identified landmarks are displayed as green dots for review and adjustment, if needed. The landmark adjustment tool is selected.



Adjusting landmarks *(optional)*

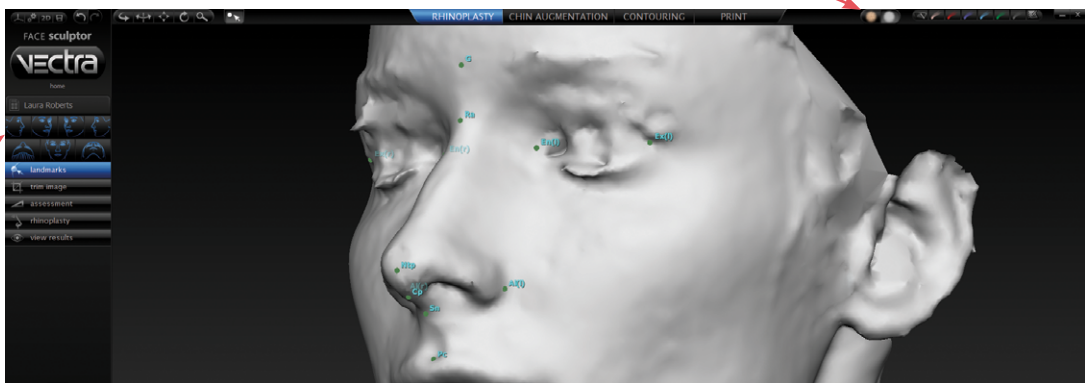
1 Position the tip of the cursor arrow over a landmark. The cursor changes to an open hand when it's close enough to the landmark.



2 Click and drag (the cursor changes to a grabbing hand). Release the mouse button when the landmark is in the correct position.

If you make a mistake, click **undo** to move the landmark to its previous position.

In some cases the anatomy may be more distinct in Shape (gray) mode. To see the image in Shape mode, click (located at the top of the screen). To see the image in Natural photo mode (with normal skin color), click .



Rotating the image to inspect landmarks

- To automatically rotate an image to a preset viewpoint, click one of the rotate-to-view buttons on the left side of the screen.
- To see the image from any viewpoint at any magnification, select one of the adjust viewpoint buttons at the top of the screen, then click within the image and drag. Click the landmark adjustment button to resume moving landmarks.
- With the adjustment tool selected, press and hold the **Alt** key (on your keyboard) to temporarily switch to **Spin**, then click within the image and drag to rotate. Release the **Alt** key to resume using the adjustment tool.

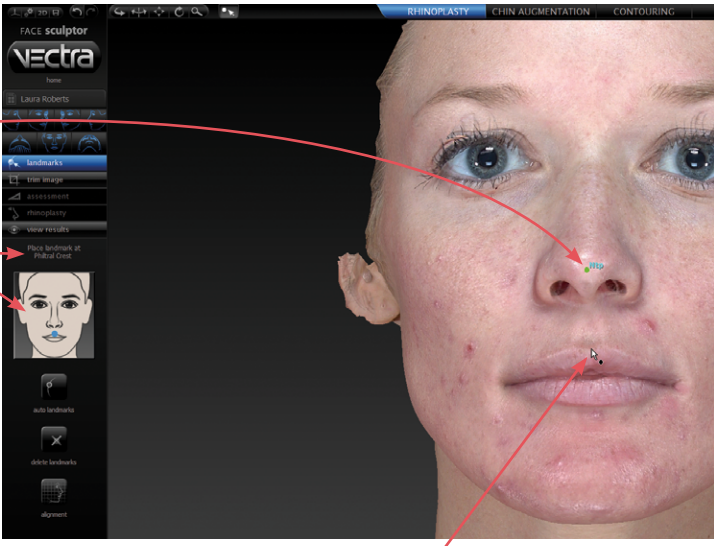
Resetting auto landmarks

To delete all of the previously set landmarks and have Face Sculptor software automatically identify and place landmarks, click **auto landmarks** on the left side of the screen.

Placing user-identified landmarks *(optional)*

1 Click **delete landmarks** (on the left side of the screen) if you wish to delete all of the previously set landmarks and have the software guide you through each landmark location with instructions (words and picture) on the left side of the screen.

- A green dot shows that the landmark is placed.
- Updated instructions show the next location to place a landmark.



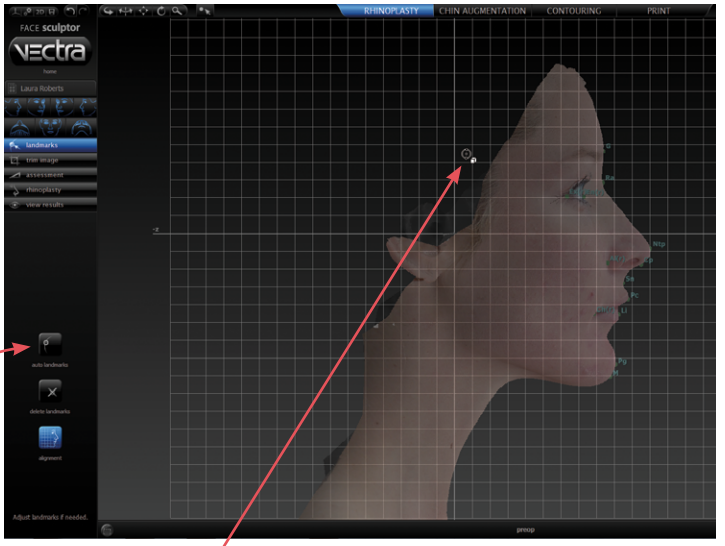
2 Position the tip of the cursor arrow over the appropriate anatomical location as described on the left side of the screen. Click once to place the landmark. As each location is clicked, the image rotates automatically to facilitate placement of the next landmark.

3 Repeat until each of the requested landmarks has been placed. When the final landmark has been placed, the image automatically rotates to frontal view.

4 Review landmark placement. If you wish to change the position of a landmark, see *Adjusting Landmarks* (previous pages).

Adjusting the horizontal plane

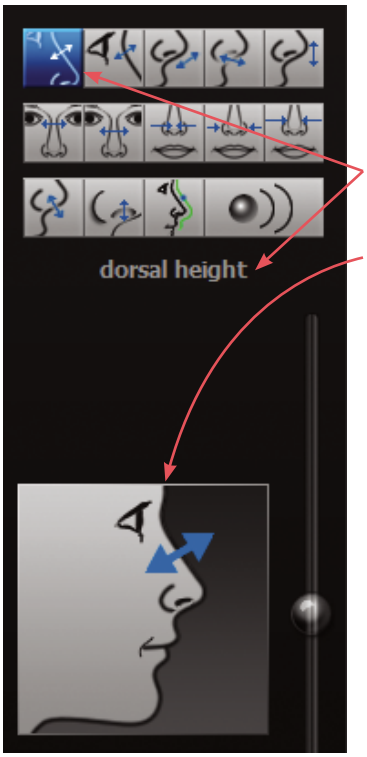
1 Click **alignment** (on the left side of the screen) if you wish to adjust a face image to the horizontal plane. A grid is displayed to guide the adjustment.



2 Position the cursor over the image, then click and drag clockwise or counter-clockwise to align the image to the horizontal or vertical grid lines.

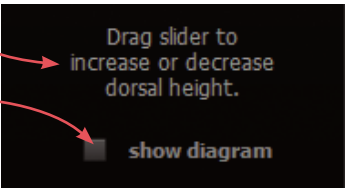
3 Once set, click **auto landmarks** to reset the landmarks to the corrected alignment.

Adjustment tools for rhinoplasty and chin augmentation



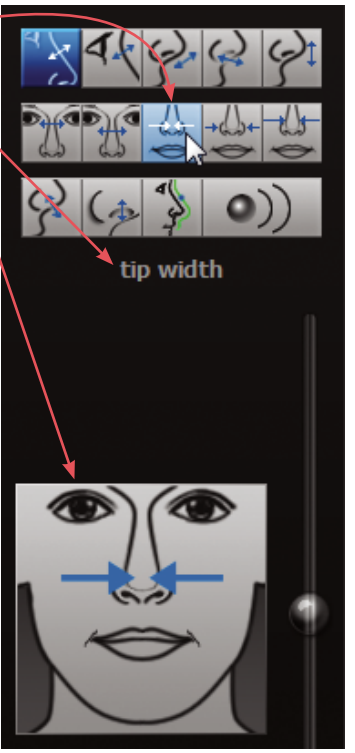
Click the rhinoplasty or chin augmentation navigation button on the left side of the screen to access the appropriate actions (tools) for the selected procedure.

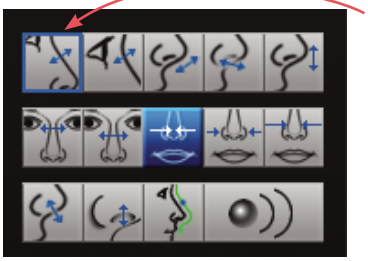
- The caption below the tool palette identifies the currently selected tool.
- The diagram next to the slider bar illustrates the function of the currently selected tool.
- Help text for the current tool appears at the bottom of the screen.
- Click the **show diagram** check box to display the assessment diagram.



When you hover over an unselected button in the palette, the caption and diagram update to show the function of that tool.

- Click on a button to select the action described.





Tools that have been applied are highlighted with a blue box.

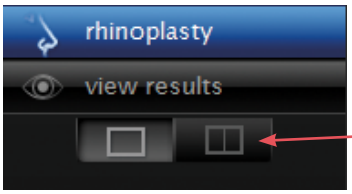
Overview of constrained adjustment tools for rhinoplasty

Move the slider ***up*** to add or increase; move the slider ***down*** to subtract or decrease.

Overview of constrained adjustment tools for chin augmentation

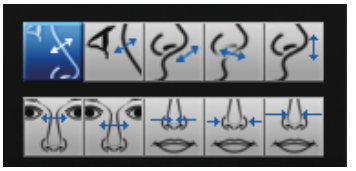
Move the slider ***up*** to add or increase; move the slider ***down*** to subtract or decrease.

Using constrained adjusting tools



Constrained, single adjusting tools are for bidirectional adjustment to a single aspect of the face, such as the bridge of the nose or the tip of the chin.

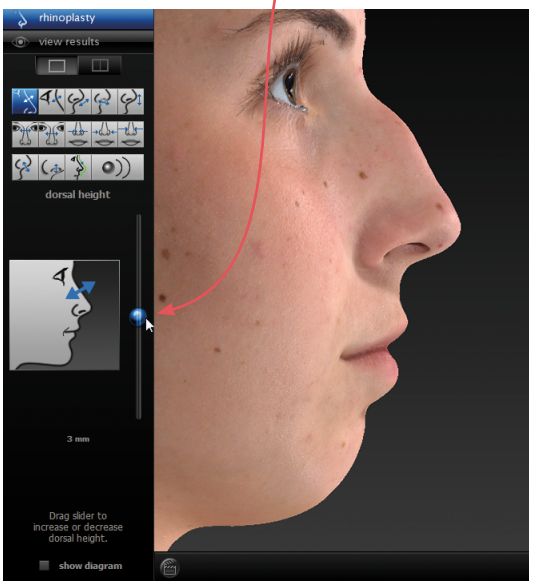
1 *(Optional)* Click the two viewports button to see two views of the 3D image as you're working on it.

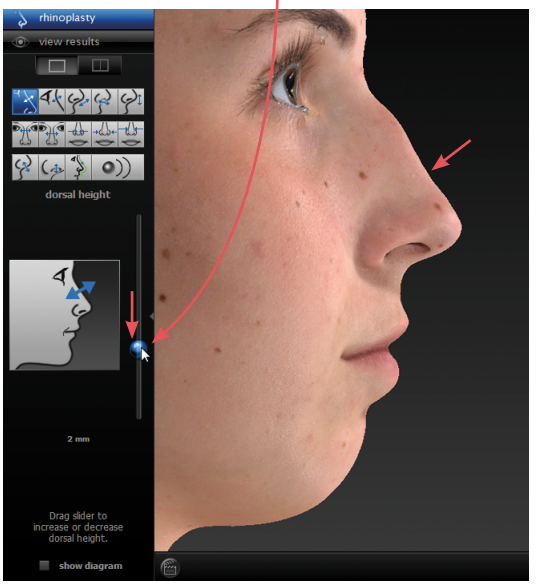


2 Click an adjusting tool in the palette, for example, “dorsal height”. The caption, diagram and help text update to reflect the currently selected tool. The image in the left viewport automatically rotates to the optimal orientation for monitoring the selected adjustment.

✔ If you wish, you may change the orientation and/or magnification in one or both viewports (see *Face Sculptor overview*).

3 Position the cursor on the bubble at the center of the slider bar. Click and drag the slider up or down to make the adjustment.





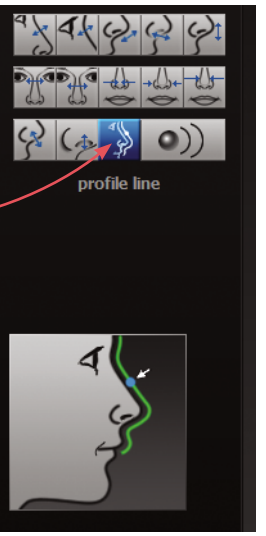
✔ Move the slider up to add or increase; move the slider down to subtract or decrease.

✔ If you wish to reset a particular adjustment, click the small triangle to the right of the slider bar.

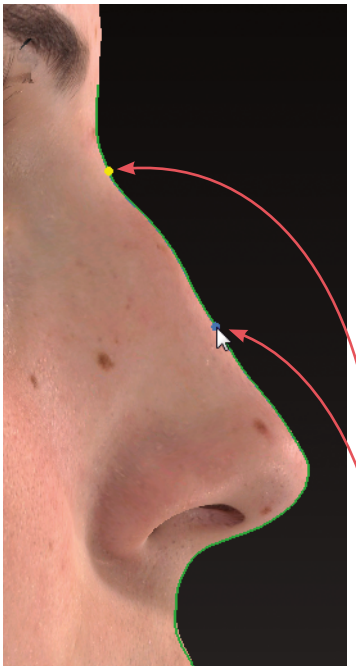
4 Click to select additional tools as needed.

Using unconstrained adjusting tools

The profile warp tool is for fine tuning, or non-standard adjustment.



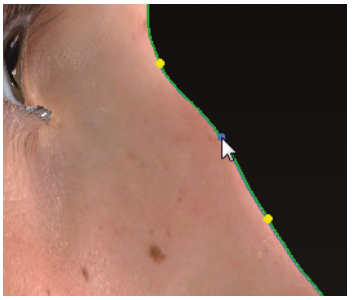
Recommended: Use the constrained tools *first*.

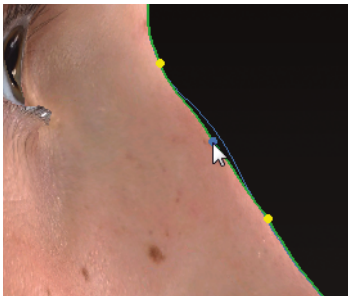


1 Click the profile line tool. The image in the left viewport automatically rotates to profile view and a green line outlines the nose and upper lip (rhinoplasty) or the chin and neck (chin augmentation).

2 Mark the outermost boundaries of the area you wish to warp:

- Position the cursor over the green line at the uppermost point of the area to be warped. (The green line brightens when the cursor is over it.)
- Click once to place a marker (a blue dot which turns yellow when you release the mouse button).
- Position the cursor over the green line at the lowermost point of the area to be warped. Click once to place a marker.



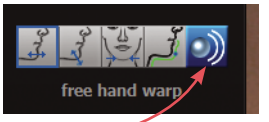


3 Position the cursor at roughly the midpoint between the two edge markers. Click and drag the green line to move the edge of the face to the desired point.

Repeat steps 2 and 3 to make additional adjustments, if necessary.

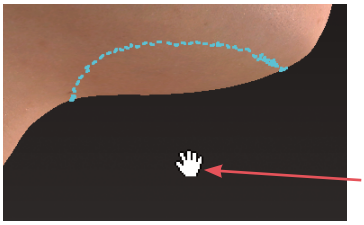
To remove a marker, right-click on it.

The free hand warp tool can be used for shape adjustments to almost any part of the face. Unlike the profile warp tool, a profile view is not required for free hand warp.

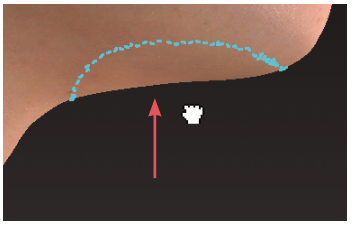


1 Orient the image(s) so that the area you wish to warp is visible.

2 Click the free hand warp tool.



3 Place the cursor (-┼-) over the image, then click and drag to define the region to be adjusted. Release the mouse button when you are satisfied with the boundary.

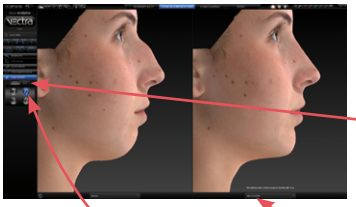


4 Position the cursor near the part that you wish to warp (the cursor changes to an open hand), then click and drag in the desired direction (the cursor changes to a grabbing hand). Release the mouse button when you are satisfied with the adjustment.

✔ For a stronger effect, click inside the defined area and drag. For a more subtle effect, click outside the defined area and drag.

5.6 view results VIEWING THE SIMULATED OUTCOME

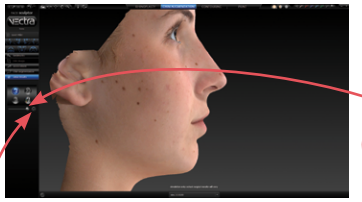
Click the **view results** navigation button on the left side of the screen to review the simulated outcome in various view modes.



- The initial viewing option displays a side-by-side comparison of the pre-op image (on the left) and the simulated outcome (on the right.) To view in 3 viewports click . Click to return to two.

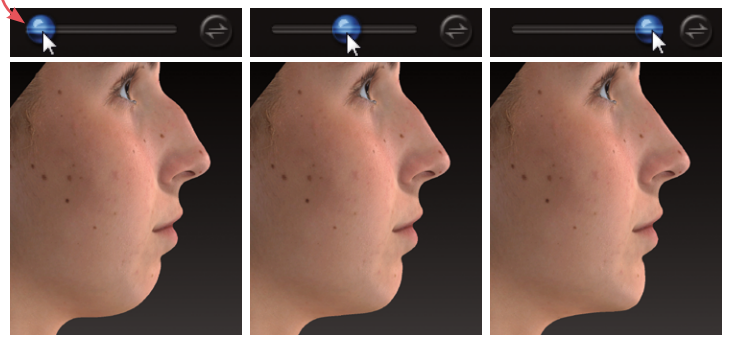
  To change the image in one of the viewports, click its name in the bottom bar and select the desired image from the pop-up menu.

  To return to this side-by-side view at any time, click .

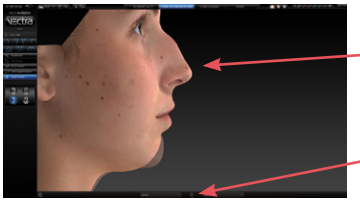


- To display a single image with a slider for morphing between pre-op and simulated outcome, click .

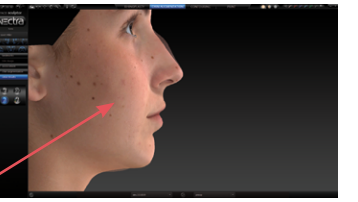
Drag the slider bubble to display the original image, the simulated outcome, or any point in between:

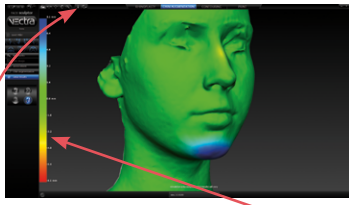


✔ To quickly toggle between the original image and the simulated outcome, click the toggle button to the right of the slider.



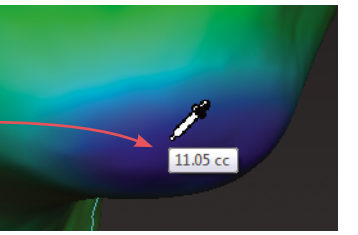
- Click to view the pre-op image overlaid with a semi-transparent simulated outcome. Click to toggle between showing the pre-op or simulated image opaque.





- Click to generate a color-coded view of the volume differences between the original image and the simulated image. Green represents unchanged areas, blue represents the greatest increased volume, and red represents the greatest decreased volume in the simulated image. Intermediate values are represented by corresponding intermediate colors. A scale along the left edge of the viewport shows the amount of change associated with each color.

Click and hover the cursor over modified areas to display the volume difference between the pre-op image and the simulated outcome.



- To automatically rotate an image to a preset viewpoint, click one of the rotate-to-view buttons on the left side of the screen.
- To see the image from any viewpoint at any magnification, select one of the adjust viewpoint buttons at the top of the screen, then click within the image and drag.
- To toggle automatic rotation on or off click at the top of the screen.

5.7 USING MARKERS AND ADDING NOTES

Sculptor's color markers enable you draw colored lines on the 3D image, useful for communicating with your patient or adding treatment planning notes for future reference. The marker palette is displayed in the upper right corner of the screen.

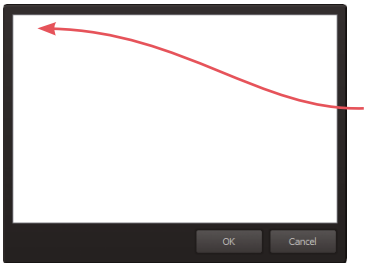
1 Click a marker button ( ) to select its color (pink, red, purple, blue, green, or black). The button becomes highlighted ( ) and the cursor changes to the selected color marker ( ).

2 Position the cursor over the desired start point for the line, click and drag to draw a line on the surface of the 3D image, then release the mouse button.

- To draw with a different color, select one of the other marker buttons.
- To erase the most recent stroke, click **undo** or press **Ctrl-Z** on your keyboard.
- To clear all recently drawn marker lines at once, click . (To toggle visibility, click , then .)

Erase all mark-ups before applying Sculptor's texture tools (resurface, clone or wrinkle).

The marked up image may be saved as a 3D or 2D image and/or printed or saved in a Sculptor report.



To record your notes and recommendations, click in the marker palette (upper right corner of screen).

Type in the box, then click **OK**. Content that you enter in the notes box will appear on notes-enabled versions of the printed report (see *5.10 Printing Reports*).

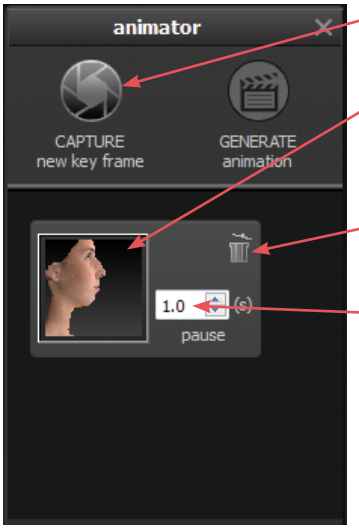
Notes are only saved to the patient chart if you save a notes-enabled report as a PDF.

5.8 CREATING A 3D ANIMATION

1 Click (bottom of the screen) to open Animator.

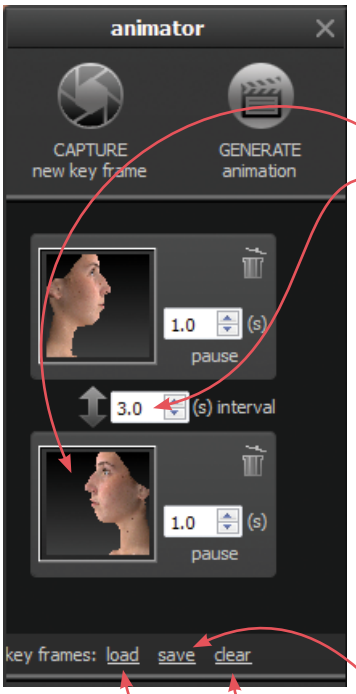
Click the Animator title bar and drag to reposition the floating dialog box as needed.

2 Use adjust viewpoint buttons to orient the image to the rotation and zoom desired for the first frame of the animation.



3 Click **CAPTURE New Key Frame** to save this view as Key Frame 1.

- A thumbnail of the key frame appears in the Animator dialog. If you wish to return the image to this orientation and zoom, click the thumbnail.
- Click the trash icon if you wish to delete this key frame.
- *Optional:* Adjust the amount of time the animation should pause at this key frame.



4 Rotate and/or zoom the image to the next position, and then click **CAPTURE New Key Frame** to save this view as Key Frame 2.

- A second thumbnail appears in the Animator dialog.
- *Optional:* Adjust the interval between key frames.
- Notice that the **GENERATE animation** button is no longer disabled. A minimum of two key frames must be specified to generate an animation.

Repeat step 4 until you have specified all the key frames you wish to include in your animation. Animator will automatically insert the in between frames ("tweens") to make smooth transitions between the key frames.

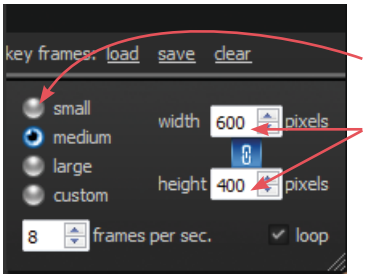
If you would like the animation to loop back to Key Frame 1 at the end, click the first thumbnail, then click **CAPTURE New Key Frame**.

Saving key frames *(optional)*

If you plan to reuse a particular sequence, click **save** after you have specified all the key frames you wish to include in the template. Click **clear** if you wish to delete all of the key frames and start over. Click **load** to automatically generate the saved sequence.

Changing the pixel dimensions *(optional)*

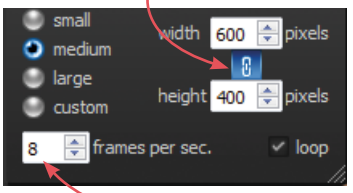
Pixel dimensions determine how large the animation appears on screen during playback. Increasing the pixel dimensions also increases the size of the file. Smaller file sizes are recommended for web or e-mail.



To change the pixel dimensions, select a preset size by clicking the radio button next to **small**, **medium** or **large**, or modify the values in the **width** and/or **height** fields.

preset	1 viewport	2 viewports*
small	**180 x 240 pixels**	**360 x 240 pixels**
medium	**360 x 480 pixels**	**720 x 480 pixels**
large	**720 x 960 pixels**	**1440 x 960 pixels**

**The preset pixel width is doubled for 2 viewports.*

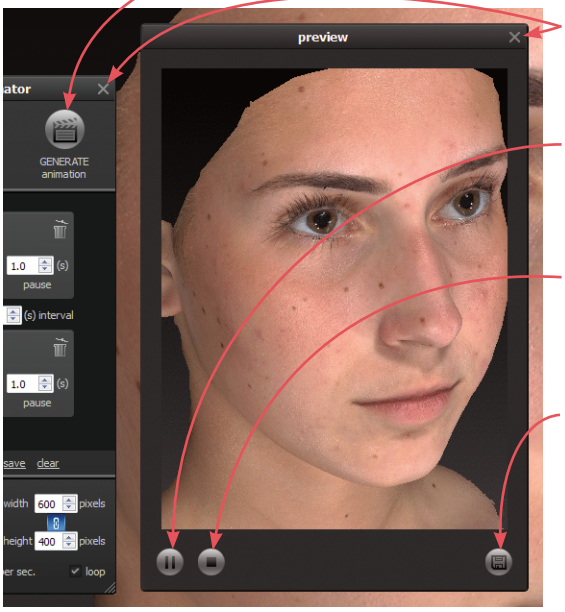


When **link** is selected, changing one dimension will automatically change the other dimension to maintain the aspect ratio. When **link** is unselected, the aspect ratio may be modified.

Changing the number of frames per second *(optional)*
To define the number of frames Animator will insert for each second of playback, modify the value in the **frames per sec.** field. More frames per second will result in smoother transitions, but increase the file size. 8 FPS is the default, recommended value.

Changing the looping option *(optional)*
If the **loop** check box is selected (☑), the animation will loop continuously. If the **loop** check box is unselected, the animation will play once and then stop.

5 Click **GENERATE animation** to view the animation in a floating Preview dialog box.



Clicking the × in the upper right corner of the Preview or Animator dialog closes the box.

Click ⏸ to pause playback. The icon changes to ▶.

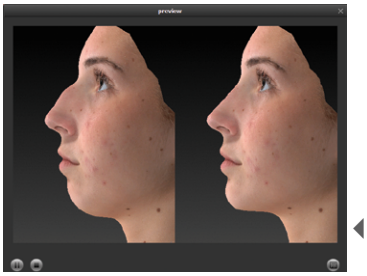
Click ▶ to resume playback.

Click ■ to stop playback. The animation starts at the first frame when resumed.

6 Click 💾 to save the animation into the patient chart as an Animated GIF Image with the file extension, ".gif".

The generated animation is not retained if you close the Preview dialog box without saving the animation.

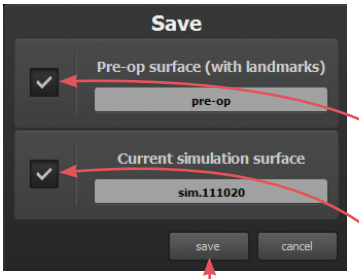
The Animator dialog box retains your specified key frames and settings until you close the image. You may change, for example, the number of open viewports or the view mode from color (textured) to gray (untextured), then generate a new animation.



Pre-op and simulated images in synchronized 2-viewport animation.

5.9 SAVING THE SIMULATED OUTCOME

1 Click **save** (top left corner of the screen) or press **Ctrl-S** on your keyboard.



2 The **Save** dialog opens with automatically generated names for the pre-op image with trimming and/or landmarks and the simulated outcome image.

- To preserve trimming and/or landmarks that have been applied to the pre-op image, make sure the first checkbox is checked.
- To preserve the simulated outcome as a 3D image (.tom file), make sure the second checkbox is checked.
- If you wish to change a file name, highlight the name and type a new name in the field.

3 Click **save** to save the pre-op (if checked) and simulated 3D images into the patient chart.

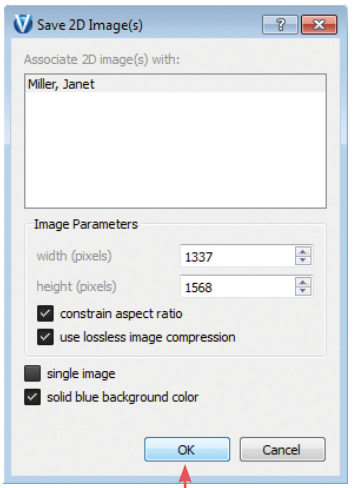
You will be prompted to save the simulated outcome before you exit Face Sculptor.

Saving 2D images

Sculptor enables you to save a 2D version of any image that appears on the screen into the patient chart. When the patient chart is opened in Mirror software, 2D images may be exported into PowerPoint presentations or be printed for use during surgery. (For more on printing and exporting 2D images, see your *Mirror User Guide*.)

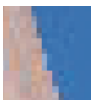
1 Make sure the orientation, zoom, and framing of the images(s) on screen reflect the desired 2D image(s).

2 Click **2D** (top left corner of the screen).



3 Select desired image parameters:

- **Constrain aspect ratio** is recommended to avoid image distortion.
- **Lossless image compression:**

  Unchecked will produce a compressed JPEG image with smaller file size and loss of quality.

  Checked will produce a PNG with larger file size and sharper edges.

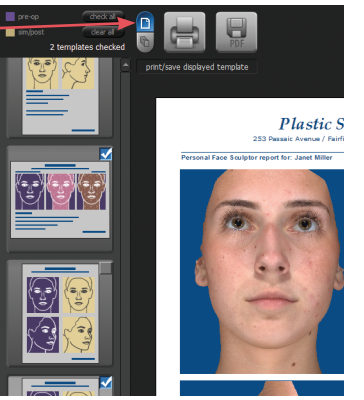
- **Single image:** If two or three views are displayed on screen, and **single image** is unchecked, a 2D image of each view will be saved. If checked, a single image of all views will be saved.
- **Solid blue background color:** Check to save 2D image with blue background; uncheck to save with the viewport background color selected in Settings (dark gray/light gray/gradient/solid).

4 Click **OK**.

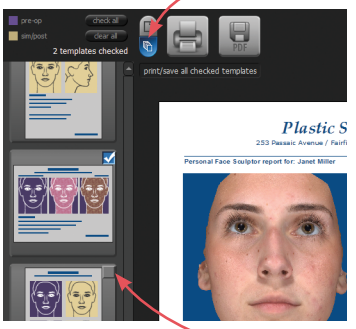
5.10 PRINT PRINTING REPORTS

1 Click the **print** tab at the top of the screen to open Sculptor's print dialog.

- Thumbnail representations of Face Sculptor's report templates are displayed in the left column. Click on a thumbnail to view a full size preview of that report.



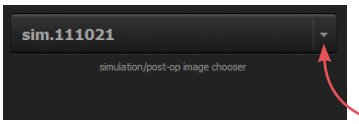
- If the single print button is selected when **print** or **save PDF** is clicked, only the "current" report template—the one that is shown in the full size preview—is printed/saved. It doesn't matter whether the thumbnail is checked or not.



- If the multiple print button is selected when **print** or **save PDF** is clicked, only the checked thumbnails are printed/saved. It doesn't matter which report is being currently previewed.

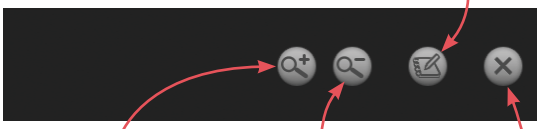
  ✔ The single/multiple selectors enable you to identify certain report templates as your standard set for Face Sculptor consultations while keeping the standard set intact if a different template, or only one of the templates, is occasionally used.

- Click the checkbox (☐) in the upper right corner of a thumbnail to add that template to the report set. Click a selected checkbox (☑) to remove that template from the report set.



- The most recently viewed simulated outcome is represented in the print reports by default. To print/save a different simulation or post-op image, click the arrow next to the image name at the top of the screen and select the desired image from the drop down menu.

- If you wish your notes and recommendations to appear on the printed report, select a notes-enabled report template (e.g., *2 images, preop & sim, oblique, notes*). Click **notes** to add or edit your notes and personalized recommendations for treatment.



click **zoom in** *to see a magnified view of the preview*

click **zoom out** *to reduce the magnification of the preview*

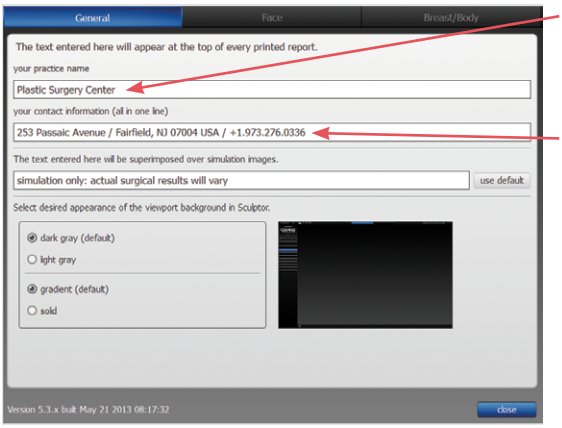
2 Click **print** to open the OS Print dialog and print a paper report, or click **save PDF** to save an electronic version of the selected report(s).

3 To exit Sculptor's print dialog and return to the review screen, click **close** (top right of screen).

5.11 CUSTOMIZING FACE SCULPTOR

Click **preferences** (top left corner of the screen) to open the preferences dialog box or click **setup** from the VECTRA home screen.

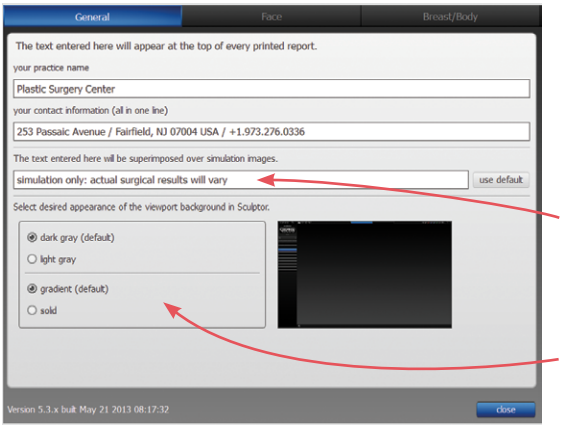
1 GENERAL tab



Enter your name or the name of your practice as you wish for it to appear at the top of every printed report.

Enter your contact information, such as address, phone number, website. This will appear at the top of every printed report, below your practice name.

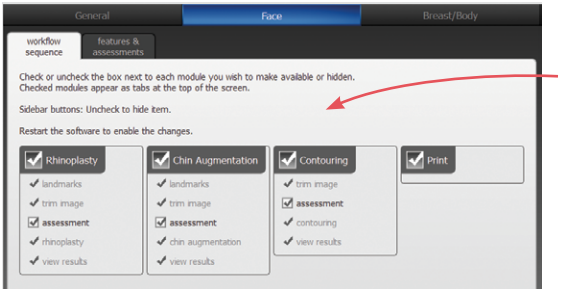
✔ Each of the two customizable fields can contain one line of text. Print a test to make sure your information fits the template.



If desired, modify or delete the disclaimer that is displayed over simulations.

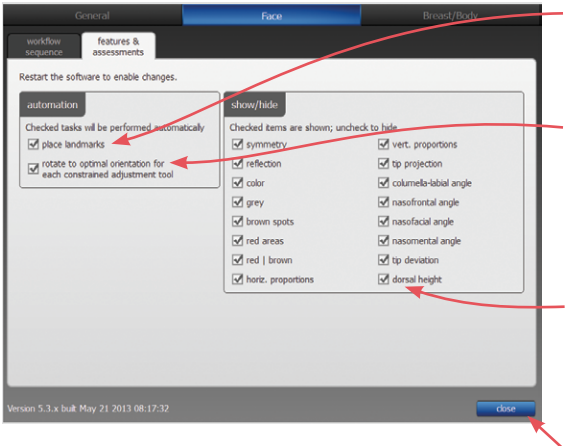
If desired, change the viewport background.

2 FACE tab—workflow sequence



Select or deselect the modules you wish to be displayed. *These changes take effect after you close and reopen Sculptor.*

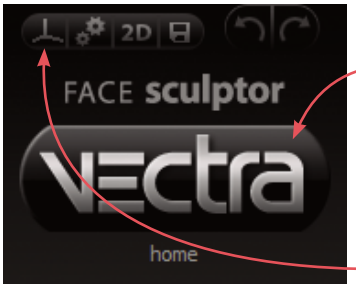
2 FACE tab—features & assessments



- Uncheck “place landmarks” if you wish to turn off automatic placement of landmarks.
- Uncheck “rotate to optimal . . .” to disable automatic rotation to optimal orientation when you select a constrained rhinoplasty or chin augmentation adjustment tool.
- **show/hide** Uncheck to disable some or all of Face Sculptor’s assessment diagrams and modes (see *5.3 Assessment*).

After you have made your selections, click the **close** button to apply.

5.12 EXITING FACE SCULPTOR



- To close Face Sculptor and display the VECTRA patient chart, click the VECTRA logo in the upper left corner of the screen or click the X in the upper right corner of the screen.

- To close Face Sculptor and display the current image in VECTRA Analysis Module, click in the upper left corner of the screen.

- To exit VECTRA software completely, click the VECTRA logo from a patient chart to return to the home screen, then click **exit** in the lower right corner of the screen.

CHAPTER 6

VECTRA Analysis Module (VAM) Overview

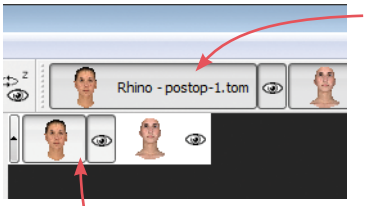
The VECTRA Analysis Module may be accessed from the VECTRA Patient Chart (see *Chapter 2: The VECTRA Patient Chart*) or it may run as a module within Mirror® imaging software (see *7.1 The Mirror Patient Chart*).

NOTE: The term "surface" refers to any 3D object, image, or part of an image displayed in a viewport.

6.1 THE VECTRA ANALYSIS MODULE SCREEN

Surface View Selector

The Surface View Selector controls the selection (whether the image is active) and visibility of the open image. Each open image is controlled by its own Surface View Selector.



A *master* Surface View Selector for each open image is located at the top of the screen on the toolbar. Changes in a master Surface View Selector will affect its image in *all viewports*.

The visibility of the master Surface View Selector(s) is controlled by checking or unchecking **Preferences ▸ Show ▸ ✓ Surface View Selector**.

The master Surface View Selector(s) may display the name of the image ("surface") next to or below the image icon (see *6.11 The Preferences Menu, Surface View Selector* for more on hiding/displaying Surface View Selector features).

A *viewport* Surface View Selector for each open image is located in the upper left corner of each viewport if ✓ **show selector in each viewport** is checked (**Preferences ▸ Surface View Selector ▸ show selector in each viewport**). Changes in a viewport Surface View Selector will affect only its image in *that viewport*. When "show selector in each viewport" is checked, the viewport selector(s) may be retracted or extended by clicking the arrow next to the selector(s).

active image

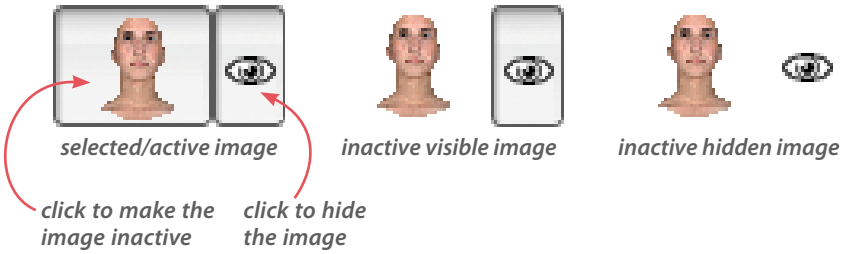
inactive image

The left side of the Surface View Selector contains an iconic representation of the image that it controls. When it appears selected (pressed), the image is active. When it appears deselected, the image is inactive and appears translucent in the viewport (if it is visible).

visible image

hidden image

The right side of the Surface View Selector controls the visibility of its image. When the eye appears selected (pressed), the image is visible. When the eye appears deselected, the image is hidden.



(**Note:** *An image cannot be active if it is hidden.*)

6.2 TOOLBARS

Horizontal toolbar buttons

import	import 3D object from directory location
snap view	snap grid to nearest 90° alignment
rock view	rotate viewport 1 back and forth continuously
smooth shading	view image with smooth shading
flat shading	view image with flat shading
wireframe	view image in wireframe
outline view	view image outline only
textured	view image with texture (looks like skin)
textured + lit	view image with texture + artificial light
untextured	view image only—no texture (looks like clay)
color by distance	view false color map (if created)
perspective	perspective (with depth) view
orthographic	orthographic (flat) view
1 viewport	show 1 viewport
2 viewports (vertical split)	show 2 viewports with vertical split
2 viewports (horizontal split)	show 2 viewports with horizontal split
4 viewports	show 4 viewports
6 standard views	generate 6 standard + 2 custom views
show axis grid	turn on all axis grids (x, y, z)

	highlight selected views	outline selected images
	brush size selector	choose size of Area Selection brush
	Face Sculptor®	switch to Face Sculptor 3D aesthetic simulation
	Body Sculptor®	switch to Body Sculptor 3D aesthetic simulation
	Breast Sculptor®	switch to Breast Sculptor 3D aesthetic simulation

Viewport Extras toolbar buttons This set of buttons becomes available by selecting **Preferences** ▸ **Show** ▸ ✓ **Viewport Extras**.

	side-by-side	show one image in each of two viewports
	synchronize viewports	lock/unlock synchronization between viewports
	spin X	spin point-of-view around X axis only
	spin Y	spin point-of-view around Y axis only
	spin Z	spin point-of-view around Z axis only

Vertical toolbar buttons

	select views	select image in viewport
	spin	spin point-of-view
	pan	pan point-of-view right, left, up, or down
	zoom	zoom point-of-view (increase/decrease magnification)
	roll	roll point-of-view
	dolly zoom	move closer to image
	contra zoom	zoom with perspective distortion
	paint area selection	select area by painting over the image
	erase area selection	subtract from selection by painting over selected area
	select area by points	select area by clicking points around its perimeter
	erase area by points	click points around area to subtract from selection
	select area by lasso	select area by drawing a line around its perimeter
	erase area by lasso	draw over selected area to subtract from selection
	box crop	draw a box and delete everything outside of it

	spin active surfaces	spin image spatial orientation
	pan active surfaces	pan image spatial orientation
	roll active surfaces	roll image spatial orientation
	place landmarks	place landmarks on image
	select landmarks	select placed landmarks (hold **shift** key for multiple)

Point-of-view

The direction from which the image is viewed. The image retains its spatial orientation relative to the axis grid as the point of view moves (see *6.9 The Surface Menu*). Tools of this type move the axis grid *and* the image, and are identified by an eye:

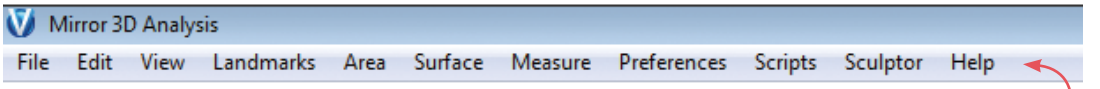
 .

Spatial orientation

The viewing direction remains the same and the image moves relative to the axis grid (see *6.9 The Surface Menu*). ***This action changes the spatial orientation of the image and will nullify registration of images if the change is saved.*** Use only as directed and in the manner described. Tools of this type are identified with a cube:

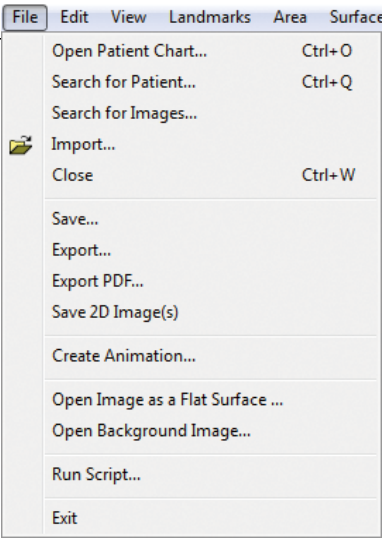
 .

6.3 ABOUT THE MENUS



The following sections briefly describe all of the commands that may appear in the main menus. Many of the functions provided in the menus are also available in the toolbars. Available keyboard shortcuts are noted [**in brackets**].

6.4 THE FILE MENU



Open Patient Chart...
[Ctrl + O]
(only if opened from Mirror)

View the current patient's chart in Mirror (see *Mirror User Guide,* Chapter 7). Click ➔ arrow in upper right corner of the screen to return to VAM.

Search for Patient...
[Ctrl + Q]
(only if opened from Mirror)

Locate a patient record in Mirror's **Patient Search** tab (see *Mirror User Guide,* Chapter 7). Click ➔ arrow in upper right corner of the screen to return to VAM.

Search for Images...
(only if opened from Mirror)

Locate an image in Mirror's **Image Search** tab (see *Mirror User Guide,* Chapter 7). Click ➔ arrow in upper right corner of the screen to return to VAM.

Import...

Import 3D files (with suffixes .obj, .stl, .tsb, or .tom): Browse to the desired file, select it, and click **Open**. The image opens in VAM.

Close [Ctrl + W]

Close active image(s).

Save...

Opens a dialog box that enables the user to enter a new name for an image that has been captured, imported, or altered. A thumbnail with the new name will be added to the open **Patient Chart**.

Export...

Exports the active image as a .tom file to the selected directory location.

Export PDF...

Exports the active image(s) as a 3D PDF file to the selected directory location.

Save 2D Image(s) The current view in each viewport is saved as a two-dimensional image in the currently open Patient Chart.

Create Animation... Opens the Animator dialog for creating an Animated GIF Image with the file extension, ".gif".

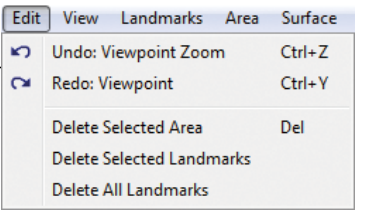
Open Image as a Flat Surface... Opens a two-dimensional image (.png, .jpg, or .jpeg) as a flat surface in the plane selected.

Open Background Image... Opens a two-dimensional image (.png, .jpg, or .jpeg) as the background/wallpaper for the viewport.

Run Script... Enables the user to run pre-configured scripts.

Exit Closes VECTRA Analysis Module and returns the user to the patient chart.

6.5 THE EDIT MENU



Undo [Ctrl + Z] Undoes the last action (in this example, undo **Viewpoint Zoom**).

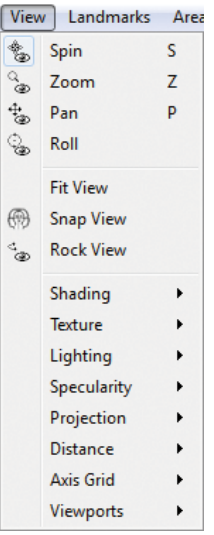
Redo [Ctrl + Y] Enables the user to redo the last action that was undone (in this example, redo **Viewpoint**).

Delete Selected Area Deletes the area of the image that has been selected.

Delete Selected Landmarks Deletes landmarks that have been selected.

Delete All Landmarks Deletes all landmarks, regardless of whether they are selected or not selected.

6.6 THE VIEW MENU



Spin, **Pan**, and **Roll** enable the user to change the point of view without moving the image in relation to the axis grid.

These tools move the image *and* the grid; the image is locked in its spatial orientation relative to the axis grid.

This operation is different from the Spin (Pan or Roll) Active Surfaces operation which moves the spatial orientation of the image in relation to the axis grid (see *6.9 The Surface Menu*).

Spin [S] — Rotates the image freely in any plane. [**Alt + left mouse button** *temporarily enables the Spin tool.*]

Zoom [Z] — Increases or decreases the magnification of the image: Click in the image and drag up (to decrease) or down (to increase), or rotate the scroll wheel on the mouse (if your mouse has this feature).

Pan [P] — Moves the image left, right, up, or down within the viewport—x and y axes only. [**Alt + right mouse button** *temporarily enables the Pan tool.*]

Roll — Rotates the image in the XY plane.

Fit View — Changes the magnification of the image to the maximum size that will fit within the Viewport.

Snap View — Automatically moves/rotates the image to the nearest 90-degree alignment.

Rock View — The image(s) in viewport 1 continuously rotate back and forth (side to side) by approximately 45 degrees in each direction. Click **Rock View** (in the toolbar or menu selection) to stop the rotation.

Shading ▸

Smooth Shading—This is the default view. When viewed in this mode, the image geometry is smoothed to create a more aesthetically pleasing appearance.

Flat Shading—Displays the image as flat-sided polygons representative of raw capture data.

Wire Frame—Displays the image as the geometric triangles that comprise the image. This view may be used to understand the image in greater detail.

Show Outline Only—Only the outline of the image is displayed (to demonstrate contour lines).

Texture ▸

Textured—This is the normal view, the image as originally captured or imported. Skin color and texture are visible.

Textured + Lit—Adds artificial lighting, such as shadows or highlights, for a clearer view of targeted areas. To *change* the lighting, use the **Lighting** options explained in the next section.

Untextured—Removes color texture detail leaving an image that visually represents the geometric data.

Color by Distance—Displays the results of the Color Surface by Distance tool (see *Using "Color Surface by Distance"* in section 8.1) if it has been previously executed for the selected image(s).

Lighting ▸

This feature works in conjunction with **Textured + Lit** *(see above)*. Four Lighting options are available.*

classic—Adds artificial lighting as if one light is shining on the image from the front, top, left side.

front 2 top light—Adds artificial lighting as if two lights are shining on the image from the top. This is the default light setting.

front light—Adds artificial lighting as if one light is shining on the image from the front.

**Additional Lighting sources and/or Specularity options may be defined as needed—contact Canfield Scientific, Inc..*

front top light—Adds artificial lighting as if one light is shining on the image from the top.

vectra3face—Lighting used in Face Sculptor.

vectra3torso—Lighting used in Body/Breast Sculptor.

capture lighting—Lighting used when image was captured.

Specularity ▸

This feature works in conjunction with **Untextured** and **Lighting** *(see above)*. Four Specularity options are available.*

Matt—Displays the image in a matte finish. This is the default specularity setting.

Slightly Shiny—Displays the image in a slightly shiny finish.

Medium Shiny—Displays the image in a moderately shiny finish.

Shiny—Displays the image in the maximum shiny finish.

Projection ▸

The image may be viewed with or without depth.

Perspective—Provides depth to the image.

Orthographic—Displays the image as if it were flat.

Distance ▸

Two ways to zoom the user's point of view in relation to the image.

Dolly Zoom—Gives the effect of the viewer moving closer to or farther from the image. To dolly zoom, click in the image and drag up to move farther from the image or drag down to move closer to the image.

Contra Zoom—Zooms the point-of-view with perspective distortion (the rear of the image remains in place while the front of the image moves toward the viewer).

**Additional Lighting sources and/or Specularity options may be defined as needed—contact Canfield Scientific, Inc..*

Axis Grid ▸

Show Axis Grids [G]—Display (or hide) the three-dimensional axis grids for all planes.

Show XY Plane—Show/hide the grid in the XY plane.

Show YZ Plane—Show/hide the grid in the YZ plane.

Show ZX Plane—Show/hide the grid in the ZX plane.

Viewports ▸

Five presets enable simultaneous display of different images, or different views of the same image.

1 Viewport—A single viewport is displayed.

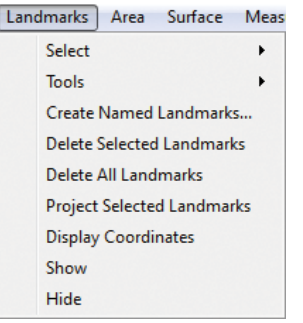
2 Viewports—Two viewports are displayed side-by-side vertically.

2 Viewports—Two viewports are displayed side-by-side horizontally.

4 Viewports—Four viewports within a 2 x 2 grid.

6 Standard Views—Eight viewports within a 2 x 4 grid (six standard views and two custom views).

6.7 THE LANDMARKS MENU



Measurements are based on landmarks: significant user-defined points on the image.

Select ▸

All—Select all landmarks.

None—Deselect all landmarks.

Tools ▸

Place Landmarks—Create auto-numbered landmarks.

Select Landmarks—Select previously created landmarks. To select multiple landmarks, press and hold the **Shift** key after the first landmark selection.

[**Ctrl**] toggles between selection and deselection of landmarks, as well as between the placement of landmarks and the deselection of landmarks. For example, press the **Ctrl** key while using Place Landmarks to deselect a previously placed landmark.

Create Named Landmarks... Opens the Named Landmarks window for placing landmarks that are assigned and named according to a preset list and are then used to generate a pre-defined set of calculations.

Delete Selected Landmarks Deletes landmarks that have been selected. (The same command is available from the **Edit** menu.)

Delete All Landmarks Deletes all landmarks, regardless of whether they are selected or not selected.

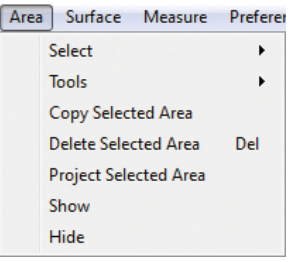
Project Selected Landmarks Project selected landmarks onto a different image. Landmarks can be properly projected only onto an image that has already been registered to the image on which the landmarks were created.

Display Coordinates The values for the X, Y, and Z coordinates for all selected landmarks are displayed in the **Log** window.

Show Show all previously hidden landmarks.

Hide Hide all landmarks.

6.8 THE AREA MENU



Select ▸

All—Select all active image areas.

Clear—Deselect all image areas.

Inverse—Inverse the selected areas: The areas of the image that were not selected become selected and vice versa.

Extend Using Landmarks—A selection method: Click **place landmarks** and then click at several points around the perimeter of the area you wish to select. Select **Area ▸ Select ▸ Extend Using Landmarks**. The landmark dots are connected and filled in as a selection.

Reduce Using Landmarks—Subtract from the selected area by defining a series of landmarks to create the shape that should be deselected.

✔ If the landmarks are placed in a clockwise order, the area outside of the shape will be selected/deselected. If the landmarks are placed in a counter-clockwise order, the area inside of the shape will be selected/deselected.

Tools ▸

Paint Area Selection—Select area by painting over the image.

Erase Area Selection—Subtract from selection by painting over selected area.

Select Area By Boundary—Select area by drawing its boundary. Drawing in a counter-clockwise direction selects the area inside of the shape. Drawing in a clockwise direction selects the area outside of the shape.

Erase Area By Boundary—Draw boundary of an area to subtract from selection. Drawing in a counter-clockwise direction subtracts the area inside of the shape. Drawing in a clockwise direction subtracts the area outside of the shape.

✔ [**Ctrl**] toggles between the Paint and Erase functions of Area Selection, as well as between the Select and Erase functions of Area By Boundary. For example, press the **Ctrl** key while using Paint Area Selection to temporarily switch to Erase Area Selection.

Copy Selected Area Create a new image from the selected area.

Delete Selected Area Remove the image within the selected area.

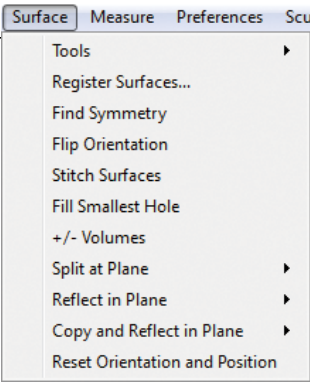
Project Selected Area Project a selected area onto a different image.

✔ An area can be properly projected only onto an image that has already been registered to the image on which the area was created.

Show Show all previously hidden image area selections.

Hide Hide all image area selections.

6.9 THE SURFACE MENU



Tools ▸

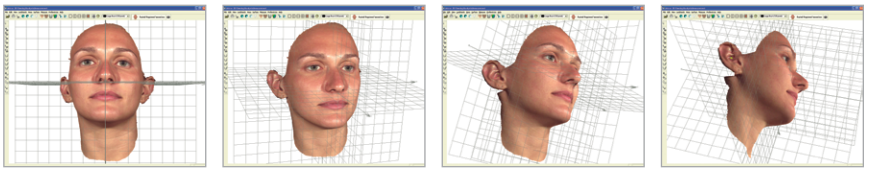
Select Views of Surfaces—Click within an inactive image to make it active; all other open images become inactive.

The next three tools (Spin Active Surfaces, Pan Active Surfaces, and Roll Active Surfaces) move the image relative to the axis grid while the point of view remains the same.

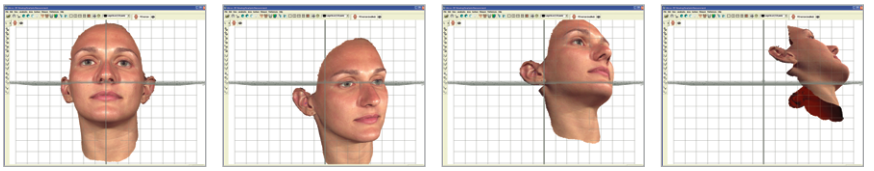
This action changes the spatial orientation of the image and will nullify registration of images if the change is saved. (See section *6.6 The View Menu* for tools that move the point of view and not the image.)

The difference between **View** menu tools and **Surface** menu tools becomes more apparent when the Axis Grid is visible (**View ▸ Axis Grid ▸ Show Axis Grid**):

View / Spin:
The point of view moves while the image retains its spatial orientation relative to the grid.



Spin Active Surfaces:
The image moves relative to the axis grid while the point of view is fixed.



Spin Active Surfaces—Rotates the image freely in any plane, independent of the axis grid.

Pan Active Surfaces—Moves the image left, right, up, or down within the viewport—x and y axes only—independent of the axis grid.

Roll Active Surfaces—Rotates the image in the XY plane, independent of the axis grid.

Register Surfaces...

Enables the user to register two or more images so that they are aligned as closely as possible. This is useful for visual image comparison and necessary for some analytical processes.

Find Symmetry

Enables the user to establish midline symmetry—useful for evaluation and for registering two images.

Flip Orientation

Enables the user to change the orientation of a surface view from outside to inside, or from inside to outside. The result is discernible only if **Show Reverse in Different Color** is selected from the **Preferences** menu.

Stitch Surfaces

Enables the user to create a volumetric shape by joining (stitching) two surfaces together. This is useful for measuring difference in volume between two registered images, such as pre- and post-op.

Fill Smallest Hole

Enables the user to fill gaps in the surface. The software will identify the smallest hole in the surface and fill it. Selecting this option a second time will cause the second smallest hole to be filled. This process can be repeated as many times as necessary to fill the holes in a surface. **NOTE:** The filled surface will be untextured.

+/– Volumes

Allows the positive and negative volume components to be separated from any closed, or solid model, surface that has been generated using the Volume Between Two Surfaces (difference model) tool, created using advanced stitching techniques, or imported from a directory location. This will result in the creation of two surface models, one representing positive volumes and one representing negative volumes.

Split at Plane ▸

Divides the image based on the selected plane and reports the volume for each half in the **Log** window.

3 Landmarks—The plane is based on three user-placed landmarks.

✔ The order in which landmarks are placed determines the values of the measurements.

X = 0—The plane is based on the zero-point of the X-axis of the grid.

Y = 0—The plane is based on the zero-point of the Y-axis of the grid.

Z = 0—The plane is based on the zero-point of the Z-axis of the grid.

✔ The term "In front of split" refers to positive values in relation to the axis grid, and the term "Behind split" refers to negative values in relation to the axis grid.

Reflect in Plane ▸

Reflects the image around the X, Y, or Z axis. The result is a mirror image of the original.

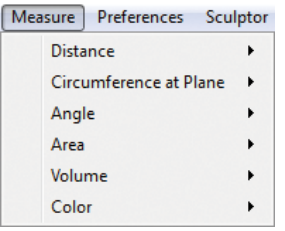
Copy and Reflect in Plane ▸

A copy of the image is created and reflected around the X, Y, or Z axis or a user-defined plane. The result is a mirrored copy of the original image. The user may then overlay the original with its reflection, or display the two views side by side.

Reset Orientation and Position

Restores the original orientation and position of the image as it was captured or last saved. If **Spin**, **Pan**, and/or **Roll Active Surfaces** has been applied to change the spatial orientation of the image, the image will be reset to its original captured orientation and position. (Selecting this menu item will have no effect on **Viewpoint Spin**, **Pan**, or **Roll**.)

6.10 THE MEASURE MENU



Distance ▸

Straight Line Between Landmarks—Measures the straight-line distance between two landmarks regardless of the surface topography.

Across Surface Between Landmarks—Measures the shortest surface distance along a path defined by landmarks.

Landmark to Surface—Measures the distance between selected landmark(s) on one image and the nearest point on a second active image.

Perimeter of Selected Area—Measures the perimeter of a selected area, such as the perimeter of a lesion on a patient's skin.

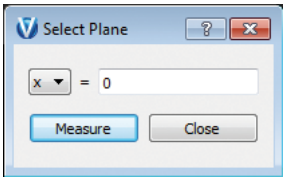
Color Surface by Distance...—Calculates the distances between two images and colors the images according to the measurement data for visual feedback. Numerical data for min., max., RMS, mean, and standard deviation is also displayed. Useful for measuring accuracy of registration and identifying regions of dimensional difference. These regions can be selected and then separated and further analyzed.

Circumference at Plane ▸

Circumference is measured at the cross-section of a user-selected plane and selected image. Each measurement is displayed in the **Log** window.

3 Landmarks—The plane is defined by three user-selected landmarks.

x, y, or z = n—The plane is defined by a user-selected point (n) along the selected axis (x, y, or z).



✔ The orientation of the image to the grid will determine where the cross-section will be created.

Angle ▸

from 3 Landmarks—Measures the angle formed at landmark 2 by landmarks 1 and 3 on the selected image.

Area ▸

of selection—Measures the area of the selected region.

of surface—Measures the area of active image(s).

Values are displayed in the **Log** window.

Volume ▸

to Interpolating Surface—Uses a mathematical algorithm to generate an independent interpolating surface based on the selected area. The volume between the interpolating surface and the original surface is then calculated and reported in the **Log** window.

of Closed Surface—Measures the volume of an object that is completely enclosed.

Between Two Surfaces (difference object)—Measures the volume between two registered images by calculating the volume between a selected area on one image and the corresponding area on the other (registered) image. A closed model of the difference volume is created as a new image. The volume difference (or closed model) volume is reported in the **Log** window.

Between Two Surfaces (parallel projection)—Measures the difference in volume between similar areas on two different images, the second image being projected parallel to a plane on the first.

Color ▸

Measures and displays color for the **Textured** (normal skin-tone) view of the image.

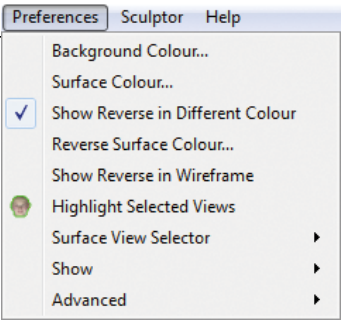
Display RGB Values for Landmarks—Displays the RGB (Red, Green, Blue) values at each landmark (dot).

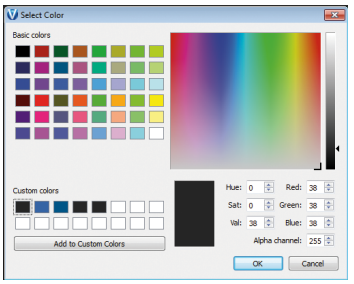
Display Average RGB Values for Selected Area—Displays the average of the values for each color (Red, Green, Blue) for the selected area, as well as the size of the selection (in pixels) and the standard deviation within the sample.

Set White Point for CIE Measurements—Enables the user to set the white point for CIE measurements .

Display Average CIE L*a*b* Value for Selected Area—Displays the average of the values for each aspect of the Lab color space for the selected area, as well as the size of the selection (in pixels) and the standard deviation within the sample.

6.11 THE PREFERENCES MENU





Background Color...—Opens the **Select color** dialog box for changing the background color of the Viewport.

Surface Color...—Opens the **Select color** dialog box for changing the image color.

The image color is visible only when **Untextured** view is selected.

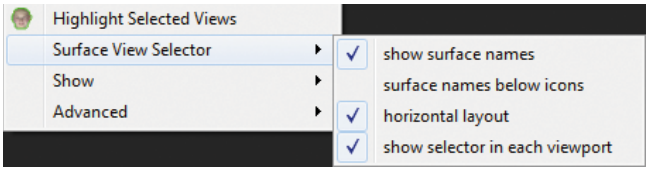
Show Reverse in Different Color—Displays the reverse (inside or rear) of a surface in a different color from the outside (front).

Reverse Surface Color—Opens the **Select color** dialog box for changing the color of the reverse (inside) surface.

Show Reverse in Wireframe—Displays the reverse (inside) of a surface in **Wireframe** view.

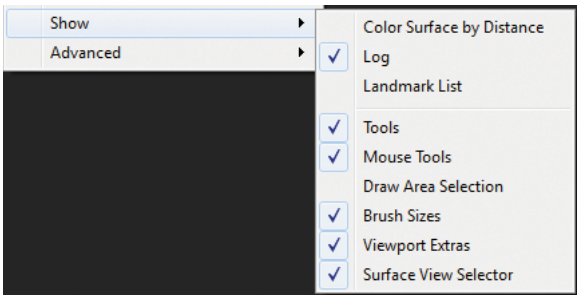
Highlight Selected Views—Displays an outline around the edge of the image.

Surface View Selector ▸ Enables the user to customize the display of surface view indicators on screen.



- ✓ **show surface names** displays the image name to the right of the icon (rather than the icon only).
- ✓ **surface names below icons** displays the image name centered below its icon (rather than next to it).
- ✓ **horizontal layout** displays the surface view information horizontally across the top of the screen (rather than stacked vertically). This option makes a difference only if more than one image is open.
- ✓ **show selector in each viewport** displays a separate Surface View Selector in the upper left corner of each viewport, enabling the user to show or hide images separately for each viewport. This option makes a difference only if more than one viewport is displayed.

Show ▸ Enables the user to customize availability of tools and information on screen.



- ✓ **Color Surface by Distance** makes the Color Surface by Distance dialog box visible.
- ✓ **Log** makes the list of measurements and data visible.
- ✓ **Landmark List** makes the Landmark List dialog box visible.

- ✓ **Tools** makes the toolbar at the top of the screen visible.
- ✓ **Mouse Tools** makes the vertical toolbar visible.
- ✓ **Draw Area Selection** makes additional selection tools available in the vertical toolbar: **select area by boundary** and **erase area by boundary**.
- ✓ **Brush Sizes** makes the brush sizes drop down menu visible at the top of the screen.
- ✓ **Viewport Extras** makes additional toolbar buttons available at the top of the screen: .
- ✓ **Surface View Selector** makes the Surface View Selector visible.

6.12 NAVIGATING THE SOFTWARE

Software features are accessed by selecting commands from the main menus or by clicking buttons on the toolbars. Which commands are available depends upon the current state of the program (whether any images are open/selected, etc.).

Dialog boxes

Some commands (**Open Patient Chart**, for example) cause a dialog box to appear. A dialog box allows you to enter information, make selections or choose settings for the current operation.

When settings and data in a dialog box appear as you wish, you can execute the command by clicking a button that is typically marked with a descriptive label (**Save**, **Import**, etc.) or simply **OK**.

Most dialog boxes also contain a **Cancel** button. Clicking **Cancel** closes the dialog box without executing the command. Any data entered prior to clicking **Cancel** is discarded.

Moving

Moving the mouse will cause the cursor (pointer) to move on the screen.

Clicking

To “click”, move the mouse to position the cursor over the desired area, then press and release the left mouse button.

Right-clicking

To “right-click” press and release the right mouse button. A right-click is used to select from a contextual pop-up menu.

6.13 THE FILING SYSTEM

File management occurs within a database that is made up of individual patient records. Each patient record contains data pertaining to that patient (name, ID number, date of birth, etc.) along with images that have been saved for that patient. Each image may have additional data associated with it (image date, procedure, etc.).

A SQL database is used to store the data. The images and associated capture data are stored in individual image directories. The system may be configured to store the database and/or images on the local computer or on a network server. The number of patient records and images you can store in the database is primarily dependent upon the capacity of the hard drive or server.

6.14 CUSTOMIZING VECTRA ANALYSIS MODULE

You can move or close toolbars and sub-windows in VECTRA Analysis Module. For example, you can detach the **Log** window from the bottom of the frame and make it float in front of the viewport anywhere on the screen.

The viewport background color is customizable: Select **Preferences ▸ Background Color...** to open the **Select color** dialog box. Select desired color and click **OK**.

The color of **Untextured** images is also customizable: Select **Preferences ▸ Surface Color...** to open the **Select color** dialog box. Select desired color and click **OK**.

✔ Changes to toolbar or sub-window size or position, background color, or image color will be retained when you restart VECTRA Analysis Module.

CHAPTER 7

Viewing and Manipulating Images in VAM

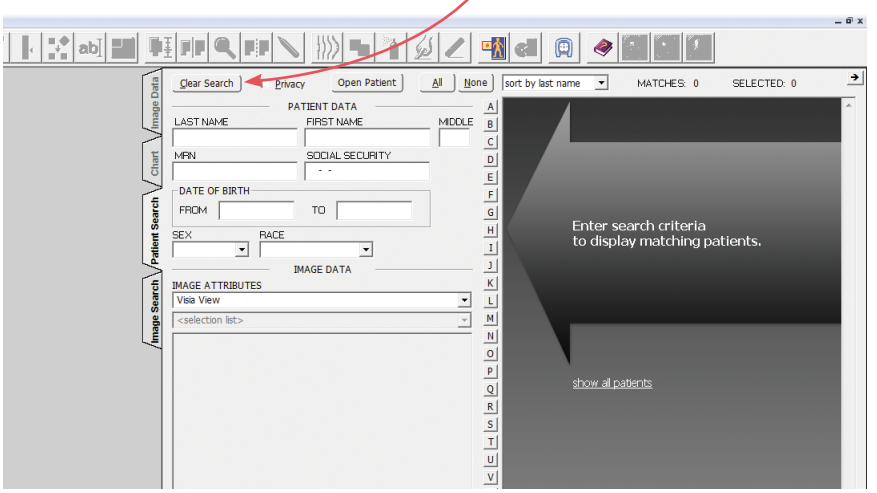
7.1 THE MIRROR PATIENT CHART

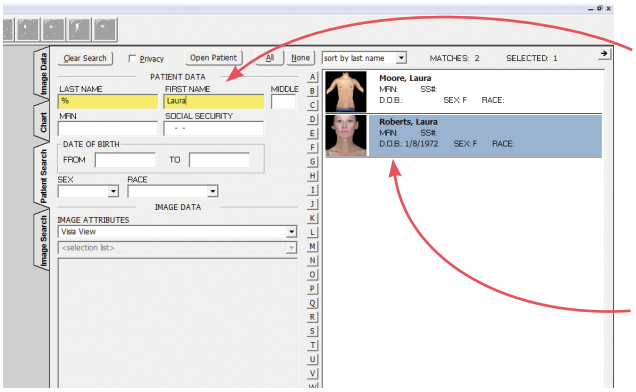
Finding and opening an existing patient record

1 Double-click the Mirror icon on the Windows desktop to open Mirror software.

2 Select **File ▸ Search for Patient**, or click the **Patient Search** tab on the right edge of the screen.

3 If the fields are not empty, click Clear Search **Clear Search**.





4 Enter search criteria such as the patient's name, date of birth, or social security number. Thumbnail images for patient(s) who fit the criteria will be displayed.

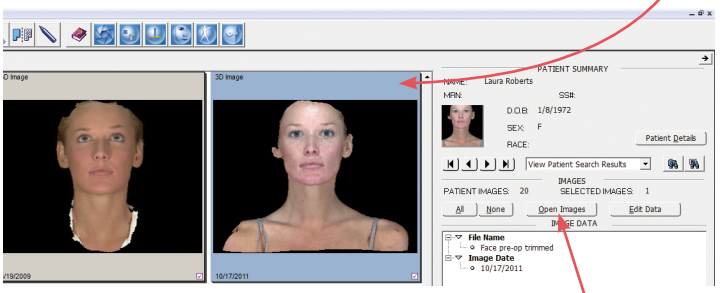
5 Click once on a thumbnail to select the associated patient chart. The background changes to blue, confirming that the chart is selected. To deselect a chart, click on the thumbnail again.

6 To open the selected patient chart, select **File ▸ Open Patient Chart** or click Open Patient, or just double-click on the highlighted thumbnail.

Opening image(s) from within the Mirror chart

1 Click once on a thumbnail to select the associated 3D image. The frame color changes, confirming that the image is selected.

✔ Multiple images may be selected and opened at the same time: To select an additional image, click on its thumbnail. To deselect an image, click on the thumbnail again.



2 To open the selected image(s), click Open Images or double-click on a highlighted thumbnail.

Saving data from VAM's Log window into the Mirror patient chart

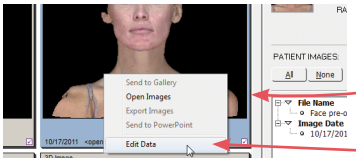
1 Select **File ▸ Save...**, enter a unique file name, and click **OK**.

2 Click once inside the **Log** window (at the bottom of the screen).

3 Right-click and select **Select All** from the pop-up menu (or drag over data to select it).

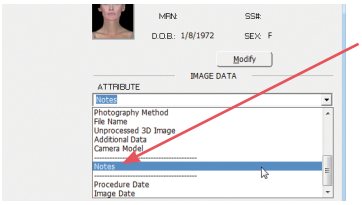
4 Right-click and select **Copy** from the pop-up menu.

5 Select **File ▸ Open Patient Chart...**.



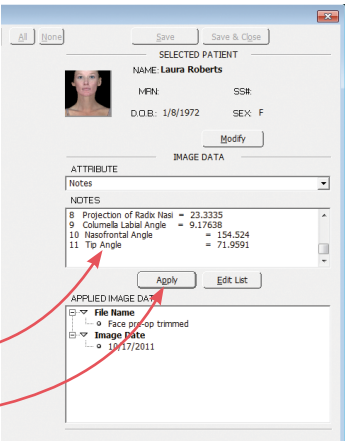
6 Click once on the corresponding thumbnail to select it (the border turns blue to show that it's highlighted.)

7 Right-click on the highlighted thumbnail and select **Edit Data** to open the **Edit Image Data** window.



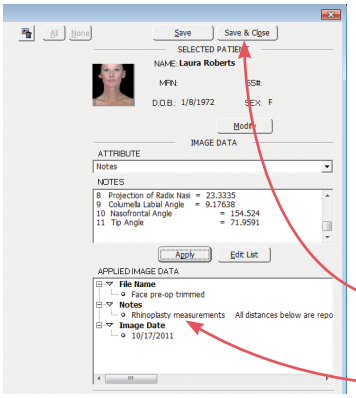
8 Select **Notes** from the **Attribute** drop-down menu.

9 Click in the **Notes** field. Type a descriptor for the data that you are adding, such as "Rhinoplasty measurements" or "Area =". Right-click and select **Paste** from the pop-up menu. The data that was copied from VAM's Log window populates the Notes field.

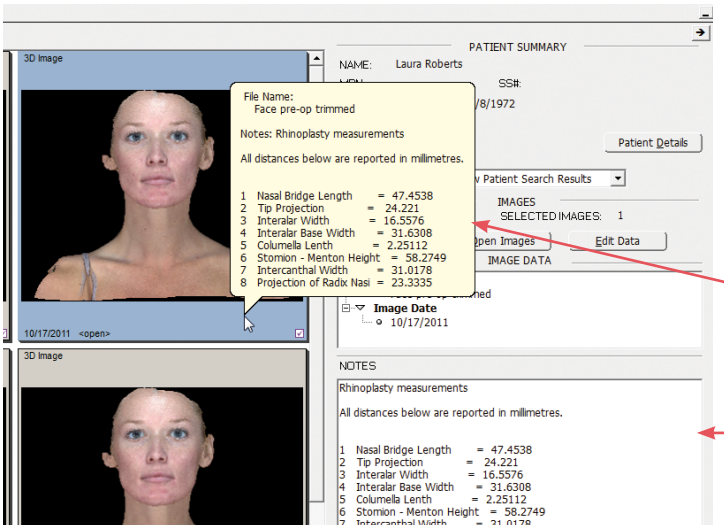


10 Click Apply.

The **Notes** attribute is added to **Applied Image Data**.



11 Click Save & Close.



The data that you pasted into **Notes** appears in the Mirror Patient Chart.

✔ Float cursor over thumbnail to display data.

12 Repeat for each open image.

Saving data from VAM's Log window into a Word or other text file

1 Select **File** ▸ **Save...**, enter a unique file name, and click **OK**.

2 Click once inside the **Log** window (at the bottom of the screen).

3 Right-click and select **Select All** from the pop-up menu (or drag over data to select it).

4 Right-click and select **Copy** from the pop-up menu.

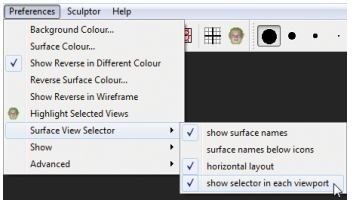
5 Click within the destination document and press the **Ctrl** and **V** keys to paste.

7.2 VIEWING, SAVING AND CLOSING IMAGES IN VAM

Viewing multiple 3D images simultaneously in viewports

Five viewport presets (see *Viewports* in section 6.6) enable simultaneous display of different images, or different views of the same image. Multiple images will initially open in a single viewport (☐), superimposed. To display images in more than one viewport, click a viewport button in the toolbar (◫, ⊟, ⊞, ⊞) or select the desired preset from the **View** menu (**View ▸ Viewports ▸**).

All open images will initially be active, visible, and superimposed in every viewport. Use the viewport-specific **Surface View Selectors** to activate/deactivate and show/hide images as needed (see *Surface View Selector* in section 6.1).



Select "show selector in each viewport" from Preferences

Comparing two 3D images side-by-side

This viewing method allows you to apply the point-of-view tools to two viewports simultaneously to review images side-by-side.

1 Select **Preferences ▸ Show ▸** ✓ **Viewport Extras** to make the Viewport Extras toolbar available.

2 Click the **Side-By-Side** button in the Viewport Extras toolbar. This will open two viewports with one image active in the left viewport and the second image active in the right viewport.

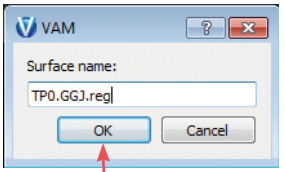
3 Click the **Synchronize** button in the Viewport Extras toolbar to lock synchronization between the two viewports.

4 Use the point-of-view and texture tools to review the images in tandem.

Saving a modified 3D image

IMPORTANT: ***Changes, edits, landmarks will not be retained unless the image is saved***.

1 Select **File ▸ Save...**.



2 Enter a unique and descriptive file name in the **Surface name** dialog box.

The file name should describe the session number, the patient, and the status of the image. For example, in the filename TP0.GGJ.reg, "TP0" identifies the session number (TP0 = time point zero, or baseline; TP1 = time point one, or first follow up; etc.), "GGJ" are the patient's initials, and "reg" indicates that the image is registered to the grid (if baseline) or to the baseline image (follow up visits).

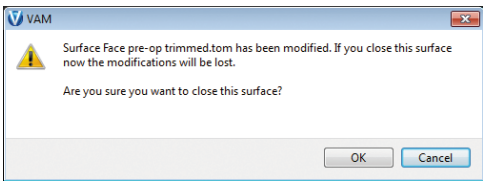
3 Click OK. The modified image is saved as a separate 3D image in the patient's chart and the original 3D image is preserved unchanged.

Closing a 3D image

1 Using the **Surface View Selector** (see *Surface View Selector* in section 6.1), make sure the image you wish to close is active and any other open images are inactive.

2 Select **File ▸ Close [Ctrl + W]**.

If the image has been modified and the changes have not been saved, a prompt appears allowing you to discard the changes and close the image (click **OK**) or keep the image open so that you may save the changes (click **Cancel**).

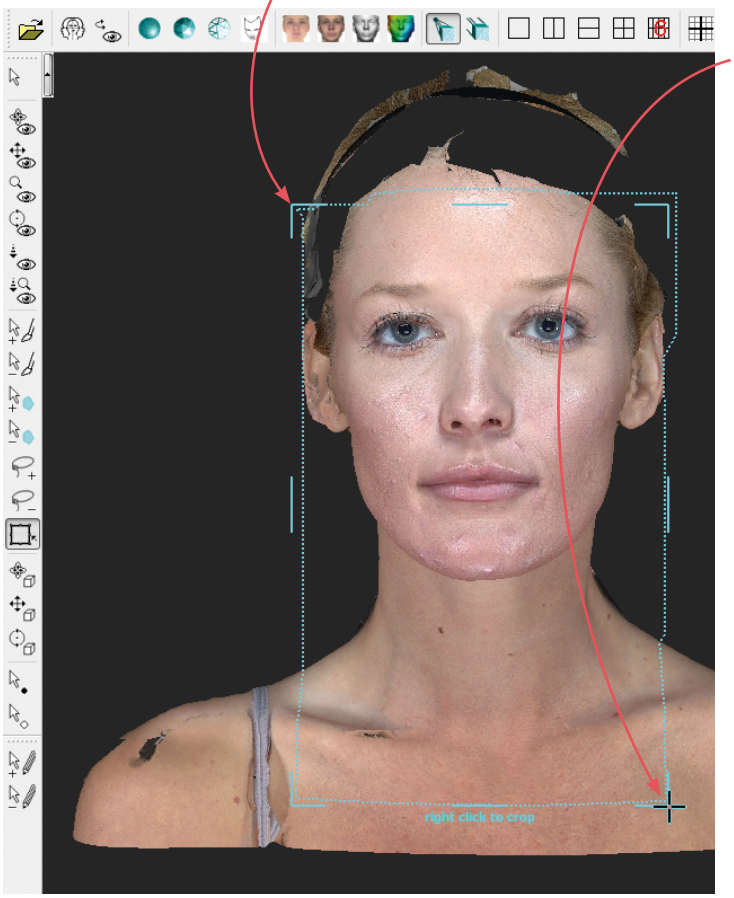


7.3 REMOVING UNNEEDED FEATURES OR ARTIFACTS FROM AN IMAGE

Method 1 *(good for quickly cropping an image)*

1 Click the **box crop** button in the vertical toolbar.

2 Place the + cursor at a corner of the area you wish to keep, then click and continue to hold down the mouse button.



3 Drag out a rectangle to the opposite corner of the area you wish to keep and release the mouse button. The boundary box you have drawn is displayed.

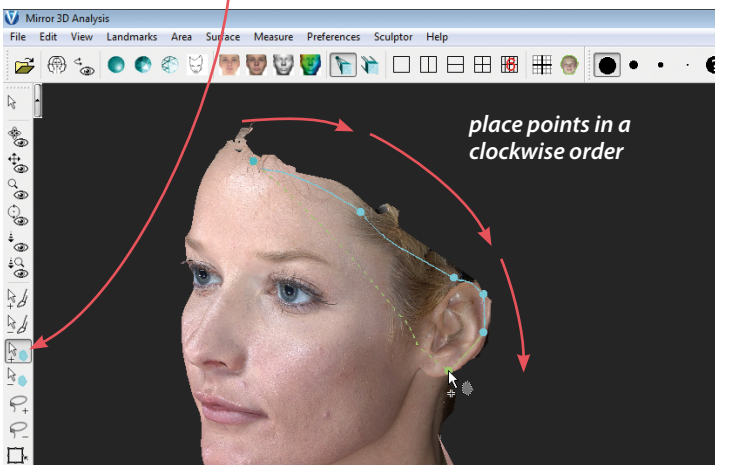
4 If you wish to adjust the size or position of the boundary box, click an edge or corner of the boundary box. The cursor changes to (edge) or (corner). Drag to the desired location.

5 Right-click the mouse to delete everything outside of the box.

6 Save the changes (see *Saving a modified 3D image* in section 7.2).

Method 2 ***(good for creating a smooth perimeter)***

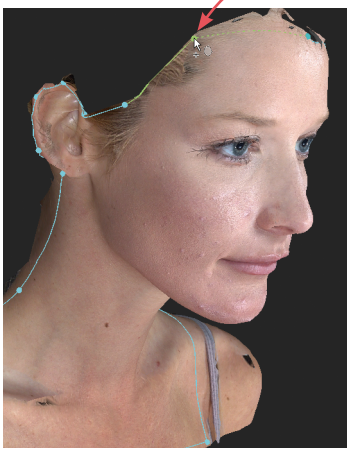
1 Click the **Select Area By Points** button in the vertical toolbar.



2 Click to place a series of points defining the perimeter of the area you wish to preserve.

✔ If the points are placed in a clockwise order, the area outside of the shape will be selected. If the points are placed in a counter-clockwise order, the area inside of the shape will be selected.

3 Right-click the mouse after placing the last point. The selected area is painted green.



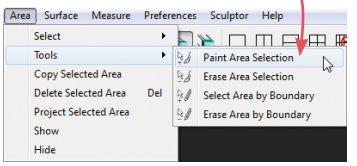
✔ If the area you wish to preserve is selected, select **Area ▸ Select ▸ Inverse.**

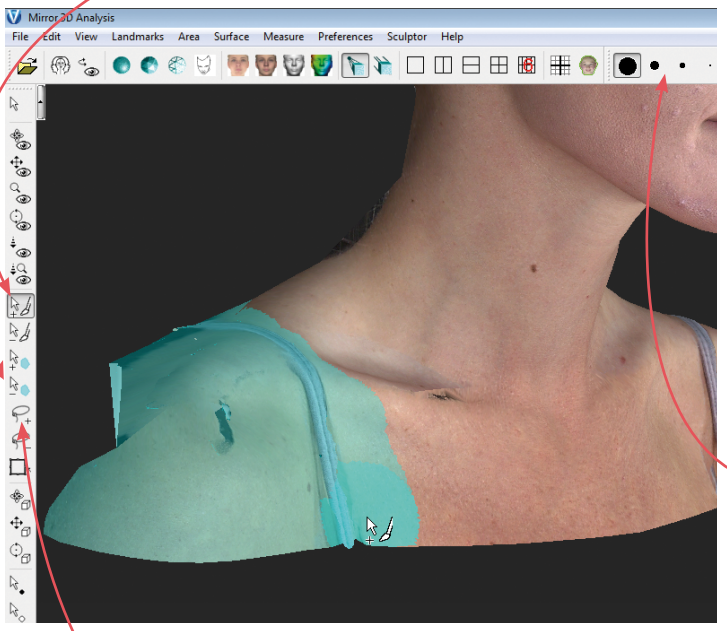
4 Select **Edit ▸ Delete Selected Area** or press **Delete** on your keyboard. The green area is deleted, leaving a smooth perimeter.

5 Save the changes (see *Saving a modified 3D image* in section 7.2).

Method 3 *(good for removing discontinuous areas)*

1 Select **Area ▸ Tools ▸ Paint Area Selection** or click the **Paint Area Selection** button in the vertical toolbar.





2 Drag the brush over the image (hold down the left mouse button while moving the mouse) to select the areas you wish to ***remove***. The selected areas will be painted a contrasting blue-green color.

✔ To change the size of the brush, click on a brush size in the horizontal toolbar.

3 Select **Edit ▸ Delete Selected Area** or press **Delete** on your keyboard.

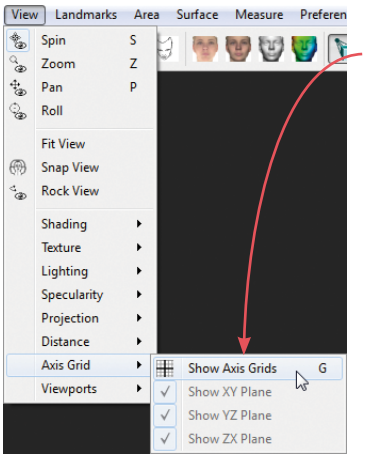
4 Save the changes (see *Saving a modified 3D image* in section 7.2).

✔ **NOTE:** **Select Area by Points** or **Lasso Select** may be used instead of the **Paint Area Selection** tool throughout the examples in this user guide.

7.4 REGISTERING A BASELINE 3D IMAGE TO THE AXIS GRID

It is essential to register a baseline 3D image to the axis grid. This establishes the permanent reference to which all of the patient's future images will be registered.

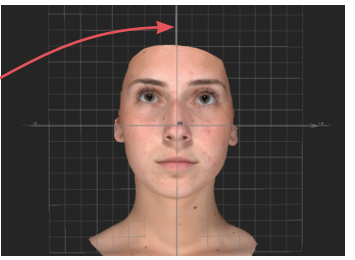
Establishing midline symmetry



1 With a baseline 3D image open in a single viewport, select **View** ▸ **Axis Grids** ▸ **Show Axis Grids** (or type **G**). The X, Y, and Z planes will be displayed in the viewport.

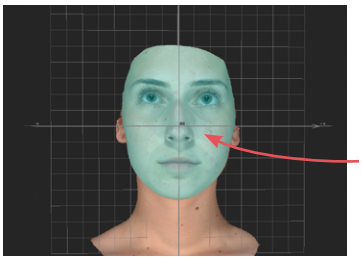
2 Select **View** ▸ **Snap View** or click the **Snap View** button in the horizontal toolbar. This will square the grid to the nearest 90° increment.

3 Select **Surface** ▸ **Tools** ▸ **Spin Active Surfaces** or click the **Spin Active Surfaces** button in the vertical toolbar.



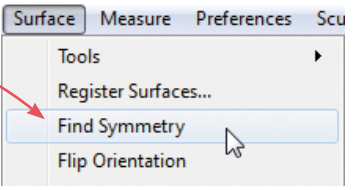
4 Spin the image until it is bisected by the vertical (**Y**) axis.

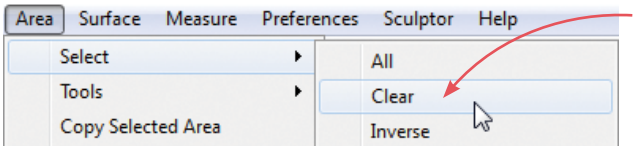
5 Click the **Paint Area Selection** button in the vertical toolbar.



6 Drag the brush over the image (hold down the left mouse button while moving the mouse) to select the entire front of the image.

7 Select **Surface** ▸ **Find Symmetry**. This will cause the image to be automatically oriented to the vertical axis through its center.





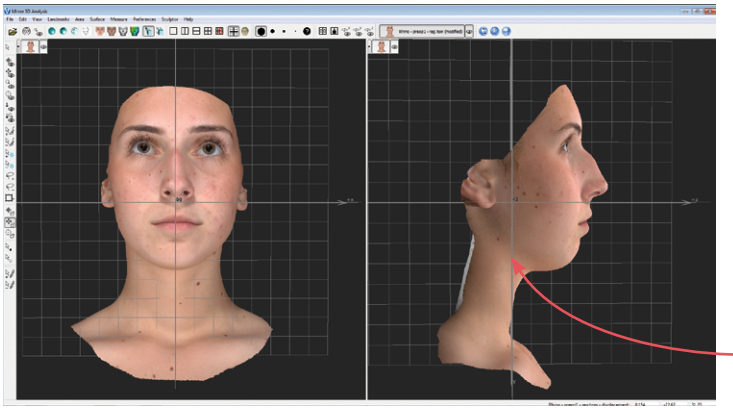
8 Select **Area** ▸ **Select** ▸ **Clear** to deselect the image area.

Correcting image rotation

1 Select **View** ▸ **Viewports** ▸ **2 Viewports** (vertical split) or click the **2 Viewports** button in the horizontal toolbar.

2 Click the **Spin** button in the vertical toolbar (or select **View** ▸ **Spin**, or press the **S** key).

3 In the viewport on the right, rotate the grid and image to obtain a lateral view.



4 Select **View** ▸ **Snap View**.

5 Click the **Roll Active Surfaces** button in the vertical toolbar.

6 Roll the image in the right viewport so that it is oriented to the vertical grid lines.

Establishing front-to-back orientation for registration

1 Click the **Pan Active Surfaces** button in the vertical toolbar.

2 Move the image in the right viewport until it is centered on the main vertical axis line.

Saving the registered baseline image

1 Select **File** ▸ **Save...** to open the **Surface name** dialog box.

2 Enter a filename that includes "reg", indicating that the image has been registered (see *Saving a modified 3D image* in section 7.2).

3 Click **OK**. The registered baseline image is saved as a separate 3D image in the patient's chart.

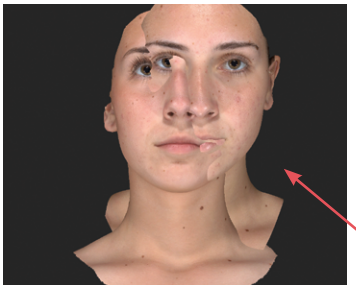
7.5 REGISTERING SUBSEQUENT 3D IMAGES TO THE BASELINE IMAGE

When comparing images (e.g., pre-op and post-op), it is important to ensure that the images are registered to each other. Typically, the original (first) image is aligned to the grid and serves as the baseline image (see *7.4 Registering a Baseline 3D Image to the Axis Grid*). All subsequent images are then registered to the baseline.

There are two methods that may be used to register follow-up images to a baseline image. It is possible, and sometimes even desirable, to employ both registration methods. This will help ensure precise registration.

Method 1: Using anatomical landmarks

1 Open a patient chart and select an image that needs to be registered and the baseline image that has been previously registered to the axis grid.



2 Open the two images in VECTRA Analysis Module:

- VECTRA chart: click **open in VAM**
- Mirror chart: click Open Images (or double-click one of the thumbnails)

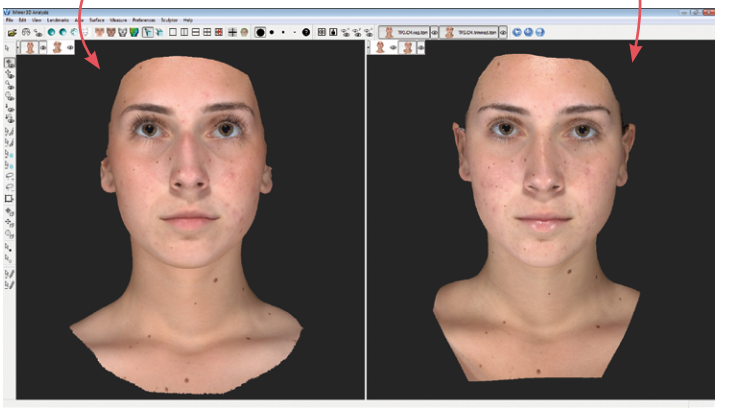
VECTRA Analysis will be launched and both images will open, superimposed in one viewport.

✔ Work with only two images at a time to ensure optimal computer performance and simplify the process.

3 Click the **Side-By-Side** button in the Viewport Extras toolbar to put each image in its own viewport. (If you don't see , select **Preferences** ▸ **Show** ▸ ✓ **Viewport Extras**.)

4 Use the **Synchronize** button in the Viewport Extras toolbar to toggle synchronization *off*.

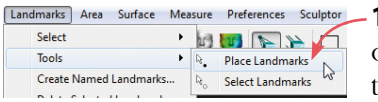
5 Use viewpoint **Spin [S]** to rotate the follow-up image until its orientation is similar to the baseline image.



Place landmarks.

Identify and mark anatomical landmarks outside of the treatment area which are common to both images, such as canthi, moles, or permanent scars.

For more on landmarks see the next section, *7.6 Using Landmarks*.

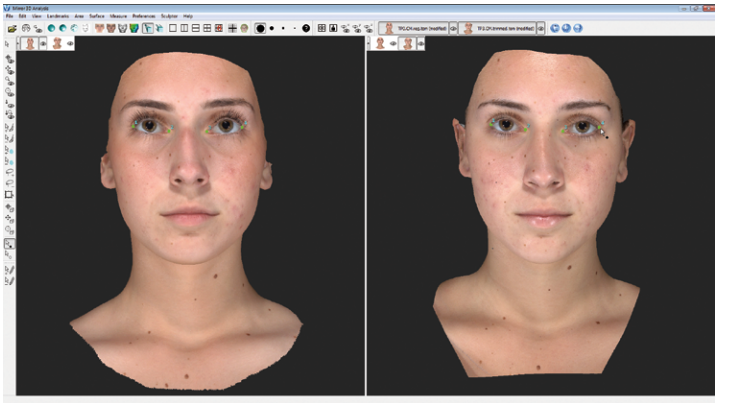


1 Select **Landmarks** ▸ **Tools** ▸ **Place Landmarks**, or click the **Place Landmarks** button in the vertical toolbar.

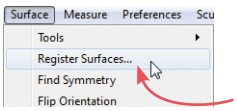
2 Click once at an anatomical landmark on the baseline image in the left viewport, then click at the corresponding point on the follow-up image in the right viewport. A numbered green dot appears at each click, indicating that the landmark has been placed.

- Corresponding landmarks on each image must have the same identifying number. The software will automatically assign "1" for the first click in each viewport, "2" for the second click in each viewport, etc.

Use viewpoint **Spin**, **Pan**, **Roll**, and **Zoom** to help you find and place appropriate landmarks.

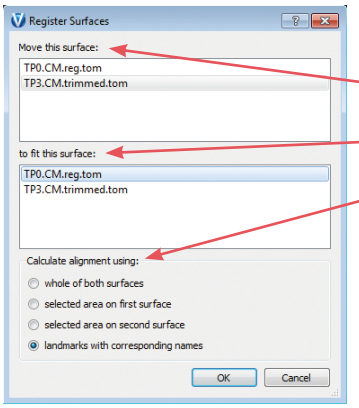


3 Repeat step 2 until four or more landmarks have been identified and placed.



Register the images.

1 Once the landmarks have been placed, select **Surface ▸ Register Surfaces**.



2 In the Register Surfaces dialog box make the following selections:

Move this surface:	[follow-up image]
to fit this surface:	[baseline image]
Calculate alignment using:	landmarks with corresponding names

3 Click OK. The follow-up image is registered to the baseline image.

Save the registered follow-up image.

1 Select **View ▸ Viewports ▸ 1 Viewport** or click the **1 Viewport** button in the horizontal toolbar.

2 Use **Surface View Selector** (see *Surface View Selector* in section 6.1) to hide the baseline image and make sure the follow-up image is active.

3 Select **File ▸ Save...** to open the **Surface name** dialog box.

4 Modify the filename to include "reg", indicating that the image has been registered (see *Saving a modified 3D image* in section 7.2).

5 Click OK. The registered follow-up image is saved as a separate 3D image in the patient's chart.

Verify registration.

Perform **Color Surface by Distance** to verify the registration. See *Using "Color Surface by Distance"* in section 8.1.

Method 2: Using image contour

1 Open a patient chart and select an image that needs to be registered and the baseline image that has been previously registered to the axis grid.

2 Open the two images in VECTRA Analysis Module:

- VECTRA chart: click **open in VAM**
- Mirror chart: click Open Images (or double-click one of the thumbnails)

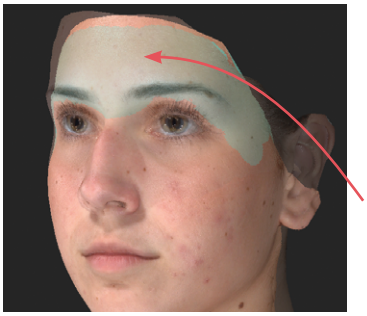
VECTRA Analysis will be launched and both images will open, superimposed in one viewport.

✔ Work with only two images at a time to ensure optimal computer performance and simplify the process.

3 Use **Surface View Selector** (see *Surface View Selector* in section 6.1) to deactivate the baseline image (it remains visible, but is displayed with low opacity) and make sure the follow-up image is active (displayed with full opacity).

4 Select **Surface ▸ Tools ▸ Spin Active Surfaces** or click the **Spin Active Surfaces** button in the vertical toolbar.

5 Rotate the follow-up image so that its orientation is similar to the baseline image.



6 Use **Surface View Selector** to hide the follow-up image and activate the baseline image.

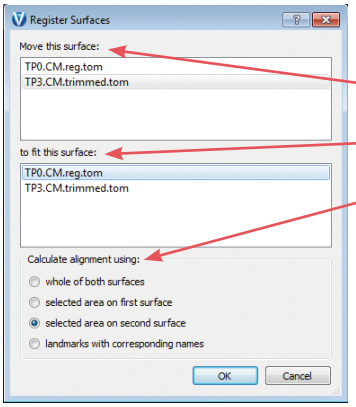
7 Click the **Paint Area Selection** button in the vertical toolbar.

8 Drag the brush over the image (hold down the left mouse button while moving the mouse) to select the desired areas: bony or anatomically consistent areas outside the treatment area.

✔ It is important to avoid areas impacted by treatment.

Register the images.

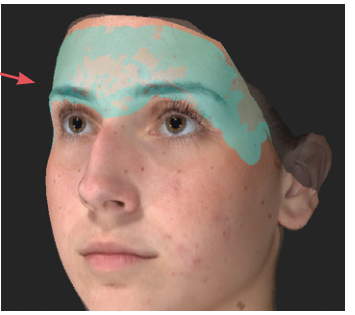
1 Select **Surface ▸ Register Surfaces**.



2 In the Register Surfaces dialog box make the following selections:

Move this surface:	[follow-up image]
to fit this surface:	[baseline image]
Calculate alignment using:	selected area on second surface

3 Click OK.
The follow-up image is registered to the baseline image.



Save the registered follow-up image.

1 Use **Surface View Selector** (see *Surface View Selector* in section 6.1) to hide the baseline image and activate the follow-up image.

2 Select **File ▸ Save...** to open the **Surface name** dialog box.

3 Modify the filename to include "reg", indicating that the image has been registered (see *Saving a modified 3D image* in section 7.2).

4 Click OK. The registered follow-up image is saved as a separate 3D image in the patient's chart.

Verify registration.

Perform **Color Surface by Distance** to verify the registration. See *Using "Color Surface by Distance"* in section 8.1.

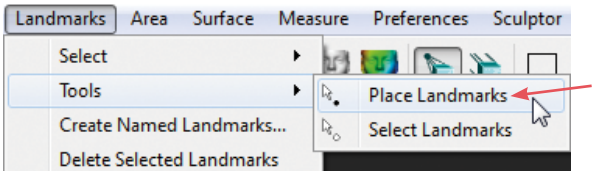
7.6 USING LANDMARKS

Landmarks are used for annotation, registration, and as markers for taking measurements such as the distance between two points over the image.

Moving the image while working with landmarks

As you place landmarks you may need to spin the image to view previously hidden areas. To temporarily access **Viewpoint Spin**, press and hold the **ALT** key. The cursor changes to , allowing you to rotate the image. Release the **ALT** key, and the previous tool (**Place Landmarks** or **Select Landmarks**) becomes active again.

Creating auto-numbered landmarks



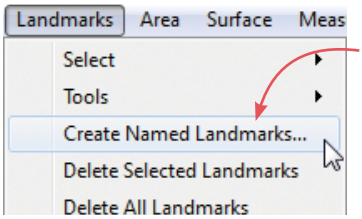
1 With at least one image open and active, select **Landmarks** ▸ **Tools** ▸ **Place Landmarks** (or click the **Place Landmarks** button in the vertical toolbar).

2 Click once on an active image to place a landmark.

- Each new landmark on the image is automatically assigned a numeric label: "1", "2", etc.
- The new landmark is displayed in a bright green color indicating that it is selected. (Deselected landmarks are displayed in a dark green color).

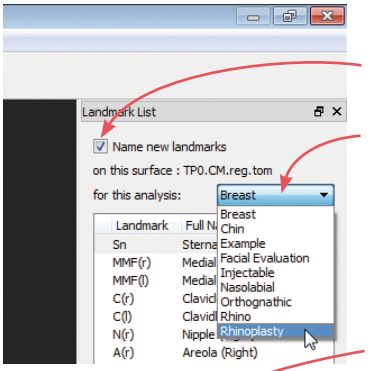
Creating named landmarks

A named landmark is identified by a label that describes it's location on the body. Named landmarks are placed and named according to a preset list and are then used to generate a pre-defined set of calculations.



1 With a 3D image open and active in VAM, select **Landmarks ▸ Create Named Landmarks**. The Named Landmarks window opens on the right side of the screen.

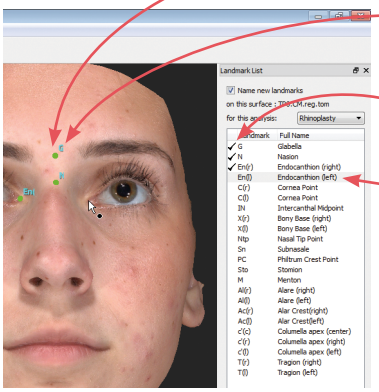
2 Select **Landmarks ▸ Tools ▸ Place Landmarks** or click the **Place Landmarks** button in the vertical toolbar.



3 Click to select the **Name new landmarks** check box.

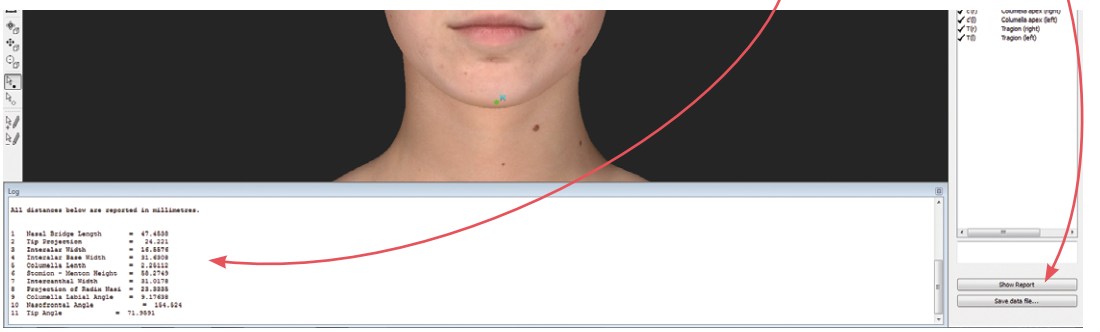
4 Select the desired landmark set from the drop down menu. The abbreviation and full name for each of the landmarks in the set is displayed. The first landmark is highlighted, ready to be placed.

5 Position the tip of the cursor arrow over the appropriate anatomical location and click once to place the landmark.



- The corresponding landmark abbreviation appears next to the placed landmark dot.
- A checkmark appears next to the abbreviation in the landmark list.
- The next landmark in the list becomes highlighted.

6 Once all of the landmarks in the set have been placed, click **Show Report** to display the resulting measurement data (mm) in the **Log** window at the bottom of the screen.



7 See section 7.1, *Saving data from VAM's Log window into the Mirror patient chart*, or *Saving data from VAM's Log window into a Word or other text file* for how to save the data from the Log window.

Selecting landmarks

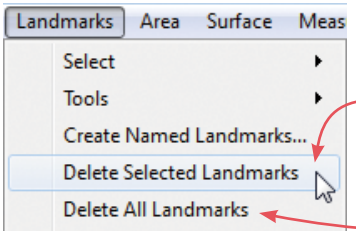
A landmark needs to be selected (bright green) in order to use it for measuring or for any other purpose (deselected landmarks are dark green).

1 Select **Landmarks** ▸ **Tools** ▸ **Select Landmarks** or click the **Select Landmarks** button in the vertical toolbar.

2 Click once on a dark green landmark to select it. The color will change to bright green, indicating that it is selected.

- If you click on a different landmark, it will become selected and all others will become deselected. To select multiple landmarks press and hold the **Shift** key as you click landmarks.
- To deselect a landmark press the **Ctrl** key as you click a selected landmark.

Deleting landmarks



1 Select the landmark(s) you wish to delete (see previous page).

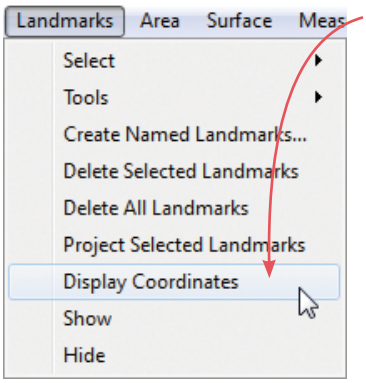
2 Select **Landmarks ▸ Delete Selected Landmarks**.

✔ To remove both selected and unselected landmarks, select **Landmarks ▸ Delete All Landmarks**.

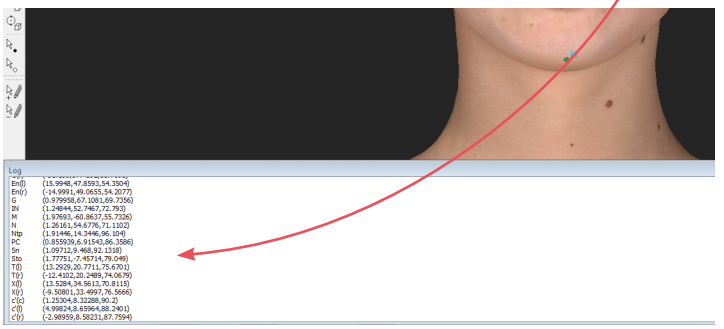
Landmarks on multiple images

- If more than one image is open, landmarks will be placed on whichever image is currently active.
- If more than one image is active, landmarks may be placed on either image.
- If active images overlap, landmarks will be placed on the uppermost active image (the one in the foreground).
- Each image has its own list of landmarks, numbered from **1** onward.

Viewing landmark coordinates



Select **Landmarks ▸ Display Coordinates** to display the **x**, **y** and **z** values for landmarks. The **Log** window at the bottom of the screen displays the label and x, y, z coordinates for each landmark (whether or not it is selected).

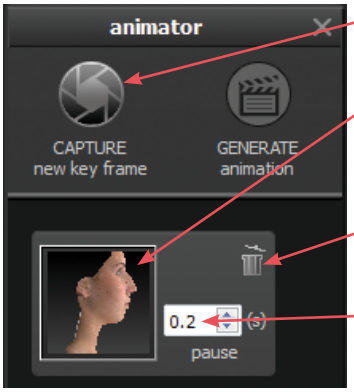


7.7 CREATING A 3D ANIMATION

1 Select **File ▸ Create Animation...** to open Animator.

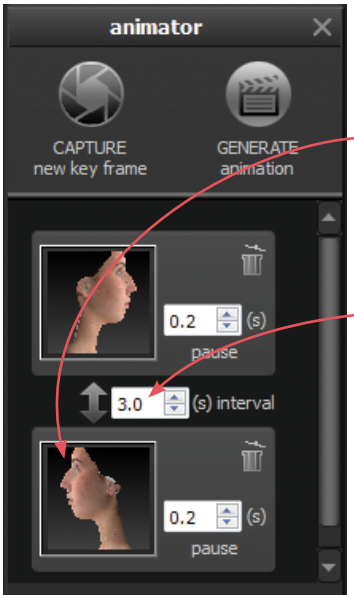
✔ Click the Animator title bar and drag to reposition the floating dialog box as needed.

2 Use viewpoint **Spin**, **Pan**, **Roll**, and/or **Zoom** to orient the image to the rotation and zoom desired for the first frame of the animation.



3 Click **CAPTURE New Key Frame** to save this view as Key Frame 1.

- A thumbnail of the key frame appears in the Animator dialog. If you wish to return the image to this orientation and zoom, click the thumbnail.
- Click the trash icon if you wish to delete this key frame.
- *Optional:* Adjust the amount of time the animation should pause at this key frame.

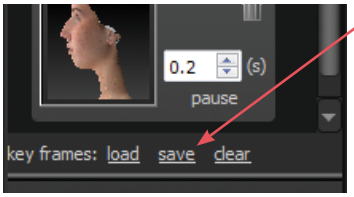


4 Rotate and/or zoom the image to the next position, and then click **CAPTURE New Key Frame** to save this view as Key Frame 2.

- A second thumbnail appears in the Animator dialog.
- Notice that the **GENERATE animation** button is no longer disabled. A minimum of two key frames must be specified to generate an animation.
- *Optional:* Adjust the interval between key frames.

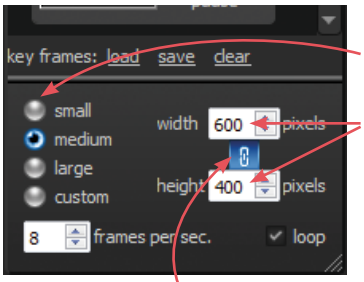
Repeat step 4 until you have specified all the key frames you wish to include in your animation. Animator will automatically insert the in between frames ("tweens") to make smooth transitions between the key frames.

✔ If you would like the animation to loop back to Key Frame 1 at the end, click the first thumbnail, then click **CAPTURE New Key Frame**.



saving key frames *(optional)*
If you plan to reuse a particular sequence, click **save** after you have specified all the key frames you wish to include in the template. Click **load** to automatically generate the saved sequence. Click **clear** if you wish to delete all of the key frames and start over.

changing the pixel dimensions *(optional)*
Pixel dimensions determine how large the animation appears on screen during playback. Increasing the pixel dimensions also increases the size of the file. Smaller file sizes are recommended for web or e-mail.

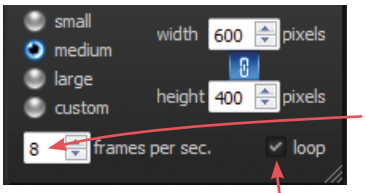


To change the pixel dimensions, select a preset size by clicking the radio button next to **small**, **medium** or **large**, or modify the values in the **width** and/or **height** fields.

preset	1 viewport	2 viewports*
small	**180 x 240 pixels**	**360 x 240 pixels**
medium	**360 x 480 pixels**	**720 x 480 pixels**
large	**720 x 960 pixels**	**1440 x 960 pixels**

**The preset pixel width is doubled for 2 viewports.*

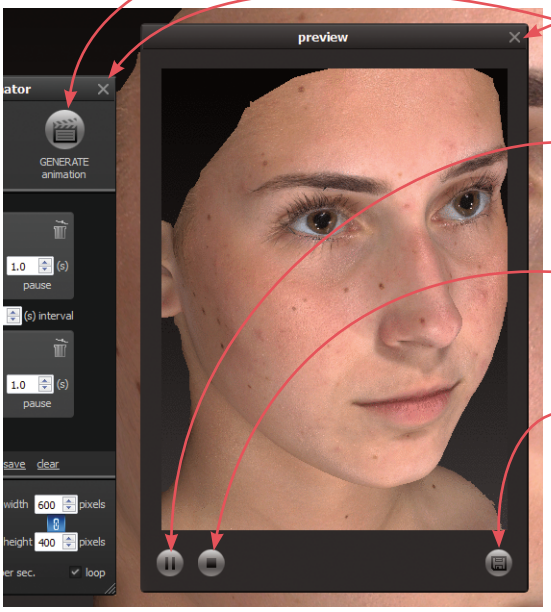
When **link** is selected, changing one dimension will automatically change the other dimension to maintain the aspect ratio. When **link** is unselected, the aspect ratio may be modified.



changing the number of frames per second *(optional)*
To define the number of frames Animator will insert for each second of playback, modify the value in the **frames per sec.** field. More frames per second will result in smoother transitions, but increase the file size. 8 FPS is the default, recommended value.

changing the looping option *(optional)*
If the **loop** check box is selected (☑), the animation will loop continuously. If the **loop** check box is unselected, the animation will play once and then stop.

5 Click **GENERATE animation** to view the animation in a floating Preview dialog box.



Clicking the × in the upper right corner of the Preview or Animator dialog closes the box.

Click to pause playback. The icon changes to .

Click to resume playback.

Click to stop playback. The animation starts at the first frame when resumed.

6 Click to save the animation into the patient chart as an Animated GIF Image with the file extension, ".gif".

The generated animation is not retained if you close the Preview dialog box without saving the animation.

The Animator dialog box retains your specified key frames and settings until you close the image. You may change, for example, the number of open viewports or the view mode from color (textured) to gray (untextured), then generate a new animation.

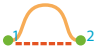
Pre-op and simulated images in synchronized 2-viewport animation.

CHAPTER 8

Image Analysis

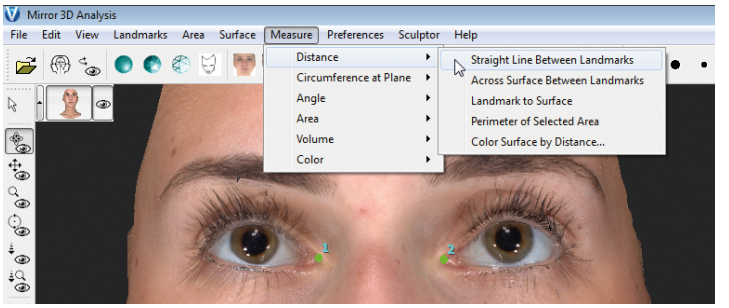
8.1 MEASURE AND COMPARE DISTANCES

Measuring the straight line distance between two landmarks



1 Select two landmarks.

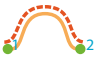
2 Select **Measure** ▸ **Distance** ▸ **Straight Line Between Landmarks**.



The straight line distance between the selected landmarks (in millimeters) is displayed in the **Log** window at the bottom of the screen.

Exactly two landmarks must be selected, but they don't have to be on the same image. You may use **Straight Line Between Landmarks** to measure the straight line distance from a landmark on one image to a landmark on a different image.

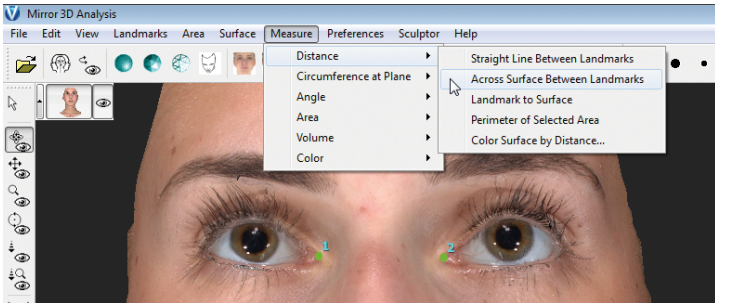
Measuring the distance across a surface



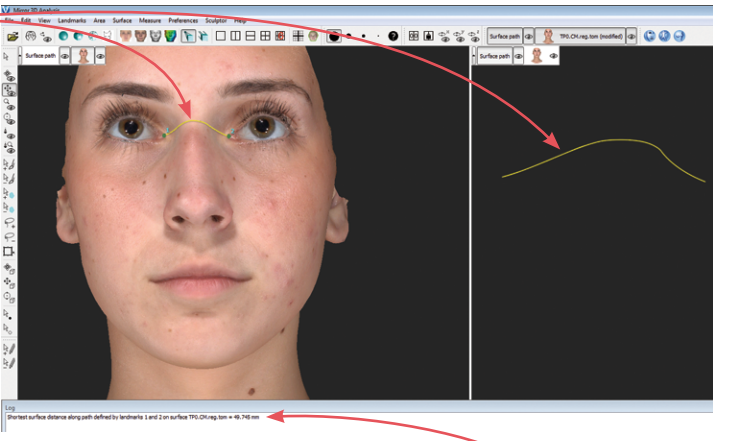
This tool measures the shortest surface distance along a path defined by landmarks.

1 Select two or more landmarks.

2 Select **Measure ▸ Distance ▸ Across Surface Between Landmarks**.



This generates a path along the shortest surface distance between the landmarks (in the order that they were selected).



The path length (mm) is displayed in the **Log** window.

The path may be deleted or saved in the same way as an image.

Measuring from a landmark to the nearest point on another image

1 Place (or select) a landmark on one image.

2 Select another image.

Ensure there is one selected image with one or more selected landmarks, and one selected image with no selected landmarks. Any other open images should be deselected.

3 Select **Measure** ▸ **Distance** ▸ **Landmark to Surface**. The distance between the selected landmark(s) on the first image and the nearest point on the second image is displayed in the **Log** window.

Measuring the perimeter of a selected area

1 Select the area to be measured: Click **paint area selection** or **lasso select** (in the vertical toolbar). Drag over the area you wish to select with , or drag around the perimeter of the desired area with .

[**Ctrl**] toggles between the Paint and Erase functions of Area Selection, as well as between the Select and Erase functions of Area By Boundary. For example, press the **Ctrl** key while using Paint Area Selection to temporarily switch to Erase Area Selection.

Another method to select the area: Click **place landmarks** and then click at several points around the perimeter of the selection area. Select **Area** ▸ **Select** ▸ **Extend Using Landmarks**. The landmark dots are connected and filled in as a selection.

The accuracy of the selection determines the accuracy of the perimeter measurement. To increase selection accuracy, increase magnification: Click **zoom**, click in the image, and then drag downward while holding the left mouse button, or rotate the scroll wheel on your mouse.

2 Select **Measure ▸ Distance ▸ Perimeter of Selected Area**. The length of the perimeter of the selected area is displayed in the **Log** window.

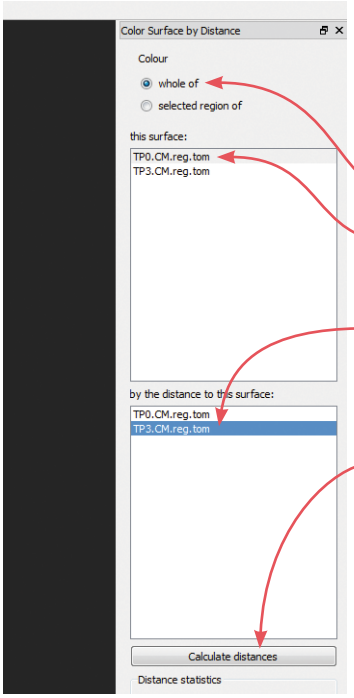
Using "Color Surface by Distance..."

Color Surface by Distance... provides visual feedback and numerical data about the distance between two images, enabling the user to verify image registration and also identify regions of difference/change (e.g., pre- and post-op) for comparison and analysis.

1 Open two registered images.

2 Use **Surface View Selector** (see *Surface View Selector* in section 6.1) to hide the image that will be compared to the baseline image and make sure the baseline is active.

3 Select **Measure ▸ Distance ▸ Color Surface by Distance...**.

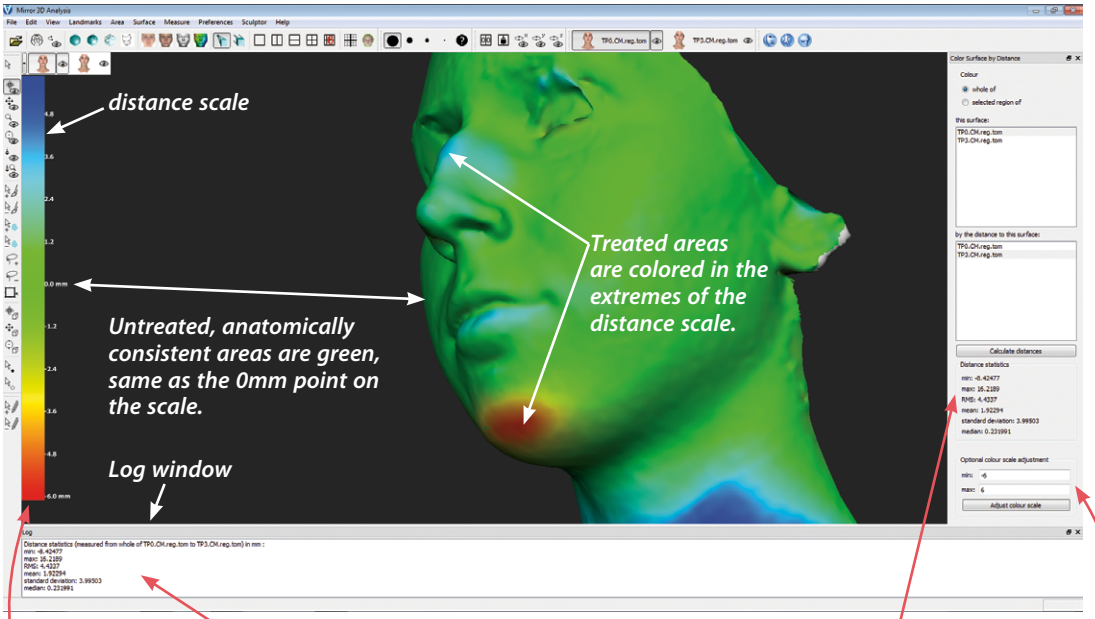


4 Make the following selections in the **Color Surface by Distance** window:

- **Colour:** whole of
- **this surface:** select the .tom for the baseline image
- **by the distance to this surface:** select the .tom for the comparison image

5 Click the **Calculate distances** button.

VECTRA Analysis software calculates the distances between the two images and colors them according to the color scale parameters.



- Numerical data is displayed in the Distance statistics section of the **Color Surface by Distance** window and also in the **Log** window. Review the false color map to determine accuracy of the registration. The distance scale is located on the left side.

- The color in untreated, anatomically consistent areas should reflect the 0mm point on the scale with only slight variation. The color in treated area(s) should indicate a clear +/– change in image projection.

The color scale parameters may be adjusted to demonstrate image differences more clearly:

1 Enter the desired min/max (in mm) in the **Optional Color Scale Adjustment** fields.

2 Click the **Adjust Color Scale** button to apply. Standard recommended values are min = –7, max = 7. Adjust as necessary to demonstrate image differences.

- Untreated, anatomically consistent areas that are not close to the 0mm point on the scale indicate poor registration. This could result from selecting imprecise landmarks, numbering landmarks incorrectly, or a change in physical anatomy due to treatment or patient positioning.

- To return to the standard image view select **View** ▸ **Texture** ▸ **Textured** or click **Textured** in the top toolbar.

- To view the false color map again select **View** ▸ **Texture** ▸ **Colored by Distance** or click **Colored by Distance** in the top toolbar.

✔ To compare two regions of interest, first select the region in the baseline image, then select "selected region of" instead of "whole of".

8.2 MEASURE AND COMPARE CIRCUMFERENCES

1 Open a patient chart and select the images to be analyzed in VECTRA Analysis (including registered baseline):

- VECTRA chart: click **open in VAM**
- Mirror chart: click Open Images (or double-click one of the thumbnails)

VECTRA Analysis will be launched and both images will open, superimposed in one viewport.

2 Use **Surface View Selector** (see *Surface View Selector* in section 6.1) to deactivate the follow-up image and make sure the baseline is active.

3 Select **Landmarks** ▸ **Tools** ▸ **Place Landmarks** (or click the **Place Landmarks** button in the vertical toolbar).

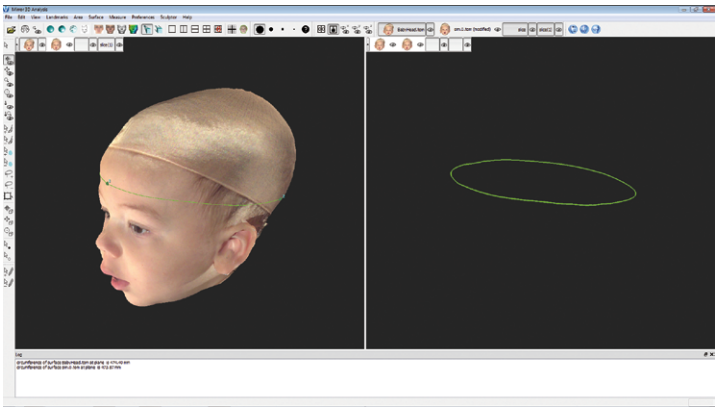
4 Place 3 landmarks (see *7.6 Using Landmarks*) to define the plane or course of the circumferential measurement.

5 Use **Surface View Selector** to activate the follow-up image (keep the baseline active).

6 Select **Landmarks ▸ Project Selected Landmarks**. The landmarks on the baseline image are projected onto the follow-up image.

7 Select **Landmarks ▸ Select ▸ All**.

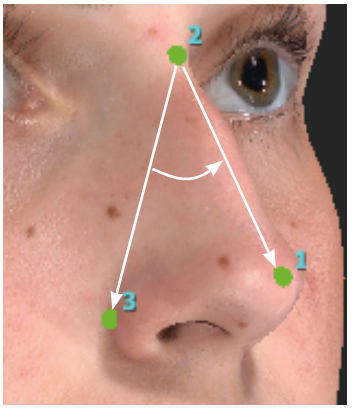
8 Select **Measure ▸ Circumference At Plane ▸ 3 Landmarks**. The circumference of each image is calculated and displayed in the **Log** window (bottom of screen).



9 With the baseline as the only active image, select **File ▸ Save...** and click **OK** to retain the landmarks for analysis of future time-points.

10 See section 7.1, *Saving data from VAM's Log window into the Mirror patient chart*, or *Saving data from VAM's Log window into a Word or other text file* for how to save the data from the Log window.

8.3 MEASURE AND COMPARE ANGLES



1 Place three landmarks on an active image to identify the angle that will be measured, or select three previously placed landmarks.

- The angle formed at landmark 2 by landmarks 1 and 3 will be measured.
- Exactly three landmarks must be selected.
- See *7.6 Using Landmarks* for more on placing and selecting landmarks.

2 Select **Measure ▸ Angle ▸ from 3 Landmarks**.

- The value for the specified angle is calculated and displayed in the **Log** window.

8.4 MEASURE AND COMPARE AREA

1 Open two registered images.

2 Use **Surface View Selector** to deactivate one image (see *Surface View Selector* in section 6.1).

3 Select the area to be measured: Click **lasso select** (in the vertical toolbar) and drag (hold down the left mouse button) around the perimeter(s) of the area(s) to be measured. Alternatively, click **paint area selection** and drag over the area you wish to select.

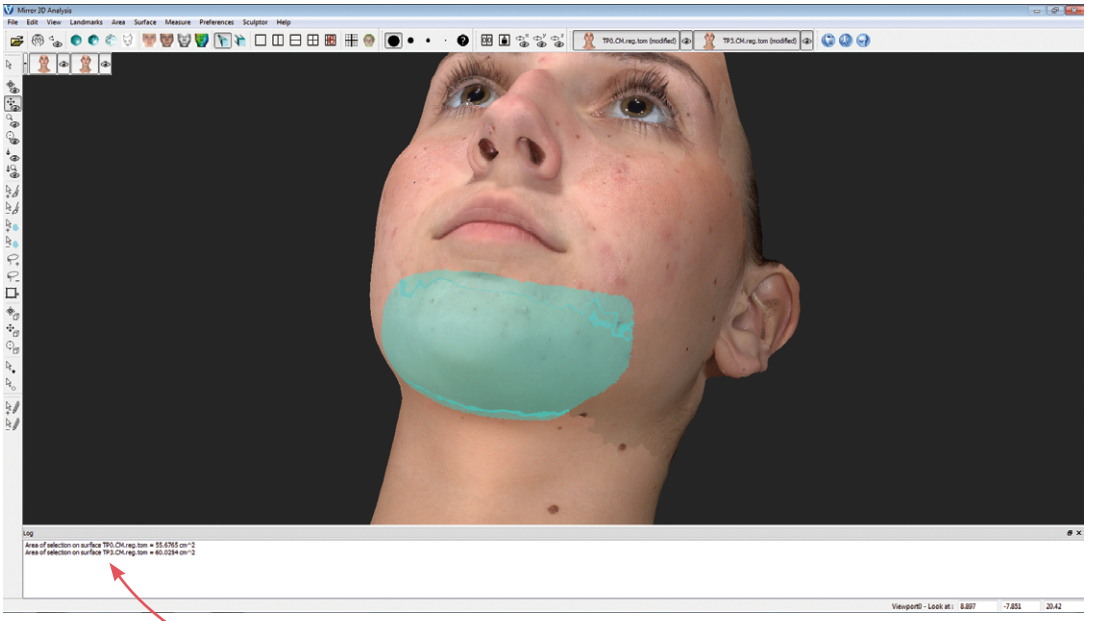
[**Ctrl**] toggles between the Paint and Erase functions of Area Selection, as well as between the Select and Erase functions of Lasso Select. For example, press the **Ctrl** key while using Lasso Select to temporarily switch to Lasso Erase.

Another method to select the area: Click **place landmarks** and then click at several points around the perimeter of the selection area. Select **Area ▸ Select ▸ Extend Using Landmarks**. The landmark dots are connected and filled in as a selection.

4 Use **Surface View Selector** to activate the other image.

5 Select **Area ▸ Project Selected Area**.
The corresponding area on the second image will become selected

6 Select **Measure ▸ Area ▸ of Selection**.



- The value for the specified area is calculated for each of the images and displayed in the **Log** window.

To calculate the area of each entire image, select **Measure ▸ Area ▸ of Surface**—useful for comparing selected area to total area.

7 Select **File ▸ Save...** and click **OK** if you wish to retain the selection(s) for future analysis.

8 See section 7.1, *Saving data from VAM's Log window into the Mirror patient chart*, or *Saving data from VAM's Log window into a Word or other text file* for how to save the data from the Log window.

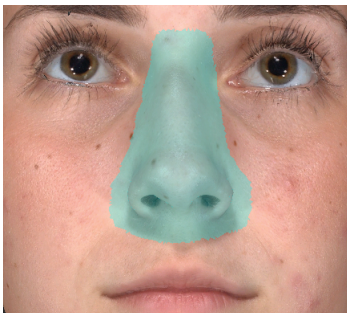
8.5 MEASURE AND COMPARE VOLUME

Using Volume ▸ to Interpolating Surface

Allows the image to be measured against a system-generated reference image. This is useful for obtaining a general reference volume from a single time point (e.g., pre-operative breast patient) when a second image (post-treatment) is not yet available.

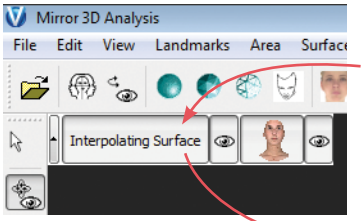
NOTE: The calculated volume does not represent the actual volume as measured against the actual subsurface anatomical structure but may serve as a useful planning tool.

1 Open a single image.

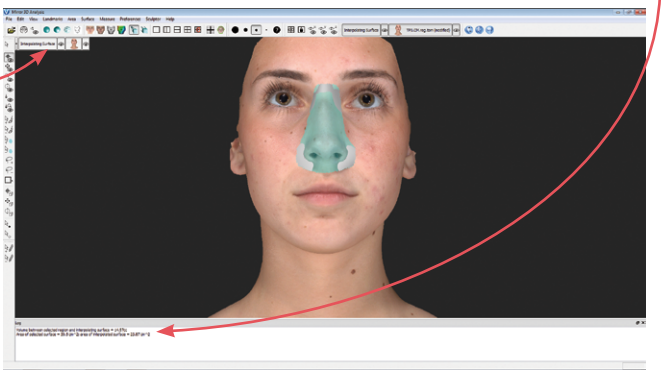


2 Identify the area for which you wish to determine the volume: Click **paint area selection** or **lasso select** (in the vertical toolbar). Drag over the area you wish to select with , or drag around the perimeter of the desired area with .

Include area slightly beyond the boundaries of the target when making the selection.



3 Select **Measure ▸ Volume ▸ to Interpolating Surface**. A new reference image is generated (with its own Surface View Selector and the name, "Interpolating Surface"). The volume difference between the original and interpolating surfaces is reported in the **Log** window.



4 To save the interpolating surface to the patient chart for future analysis deactivate the original image and select **File ▸ Save...** and click **OK**.

5 See section 7.1, *Saving data from VAM's Log window into the Mirror patient chart*, or *Saving data from VAM's Log window into a Word or other text file* for how to save the data from the Log window.

Using Volume ▸ of Closed Surface

Allows the volume measurement of any closed surface (solid model) that has been generated using **Volume ▸ Between Two Surfaces (difference object)**, created using advanced stitching techniques, or imported from a directory location.

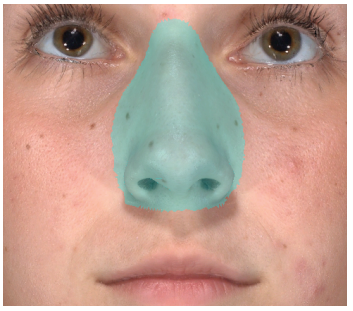
1 Open or import a closed surface.

2 Select **Measure ▸ Volume ▸ of Closed Surface**. The volume of the closed surface is calculated and reported in the **Log** window.

3 See section 7.1, *Saving data from VAM's Log window into the Mirror patient chart*, or *Saving data from VAM's Log window into a Word or other text file* for how to save the data from the Log window.

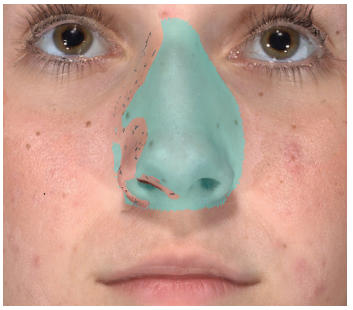
Using Volume ▸ Between Two Surfaces (difference object)

1 Open two registered images.



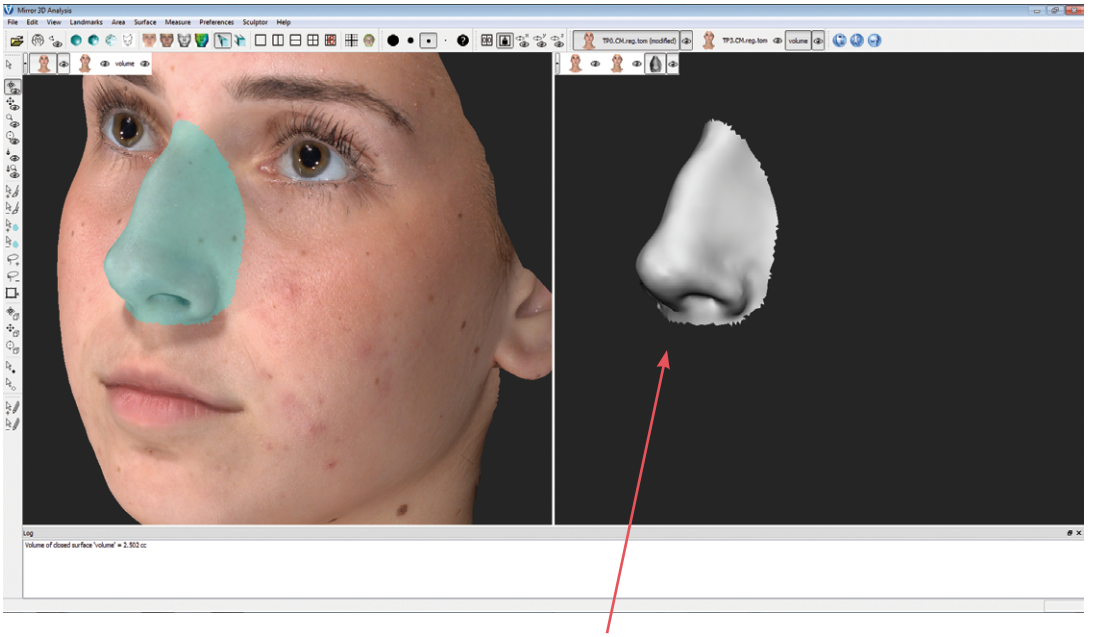
2 Use **Surface View Selector** to make sure the only active image is the baseline (see *Surface View Selector* in section 6.1).

3 Identify the area for which you wish to determine volume difference: Click **paint area selection** or **lasso select** (in the vertical toolbar). Drag over the area you wish to select with , or drag around the perimeter of the desired area with .



4 Use **Surface View Selector** to activate the other image.

5 Select **Measure ▸ Volume ▸ Between Two Surfaces (difference object)**. A new closed surface (with its own Surface View Selector and the name "volume") is created depicting the difference in volume. The volume difference (volume of the difference object) is reported in the **Log** window.



The difference object may be viewed in isolation or in multiple viewports, and manipulated in the same ways as any other image.

6 Deselect the original images and select **File ▸ Save...** and click **OK** if you wish to save the difference object to the patient's chart.

7 Repeat step 6 for the image with the area selection (typically pre-treatment image) if you wish to retain the defined area for analysis against future images.

8 See section 7.1, *Saving data from VAM's Log window into the Mirror patient chart*, or *Saving data from VAM's Log window into a Word or other text file* for how to save the data from the Log window.

Using Volume ▸ Between Two Surfaces (parallel projection)

1 Open two registered images.

2 Use **Surface View Selector** to make sure the only active image is the baseline (see *Surface View Selector* in section 6.1).

3 Select the area to be measured: Click **lasso select** and drag (hold down the left mouse button) around the area to be measured.

4 Use **Surface View Selector** to activate the other image.

5 Select **Area ▸ Project Selected Area**.
The corresponding area on the second image will become selected.

6 Select **Measure ▸ Volume ▸ Between Two Surfaces (parallel projection)**. The volume difference between the areas selected on the two images will be calculated and reported in the **Log** window at the bottom of the screen.

7 Select **File ▸ Save...** and click **OK** if you wish to retain the selection(s) for future analysis.

8 See section 7.1, *Saving data from VAM's Log window into the Mirror patient chart*, or *Saving data from VAM's Log window into a Word or other text file* for how to save the data from the Log window.

APPENDIX A

Installing the Software

NOTE: If you purchased a computer with your VECTRA H1 system, the software is already installed. Follow these software installation instructions if you are using a computer that was *not* supplied by Canfield along with the VECTRA H1 system.

System requirements

Before installing the software on a computer not supplied by Canfield, ensure that it meets the minimum specifications listed below.

minimum

- *operating system:* Microsoft Windows 7 Professional or Ultimate, 64 Bit; Windows 8 Professional, 64 Bit
- *processor:* Dual Core, 2.75 GHz or higher (Quad Core recommended)
- *system memory (RAM):* 8 GB or greater
- *graphics card:*
  - 1 GB or greater
  - nVidia graphics card highly recommended
  - nVidia discrete graphics chips are recommended
  - all other cards and chips come with risk of not performing adequately
  - always use the latest graphics driver available
  - see our website for the latest specs: www.CanfieldSci.com
- *display resolution:* 1920 × 1080 minimum
- 3.0 or later Open GL
- DVD drive

recommended

- Microsoft Security Essentials anti-virus software

Three software installation disks are included with the VECTRA H1 camera system: Mirror, VECTRA and Calibration Files. The Calibration Files are specific to your camera. Expect the software installation process to take approximately 20 minutes.

Installation 1: Mirror software

Follow the steps below to install Mirror software on a single computer or on multiple computers that are not connected by a network. If you wish to run the software on multiple networked computers simultaneously, please refer to Section 1.3 of the *Mirror PhotoFile User Guide*.

1 Run Windows Update to ensure that you are running the most current version of the operating system.

2 Log on to the computer with a user account that has local administrative access privileges.

3 Attach the hardware key to an available USB port.

4 Close any programs that may be running on the computer.

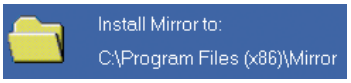
5 Temporarily disable any antivirus software.

6 Insert the installation DVD into the computer's DVD-ROM drive. The Mirror Setup program starts automatically.

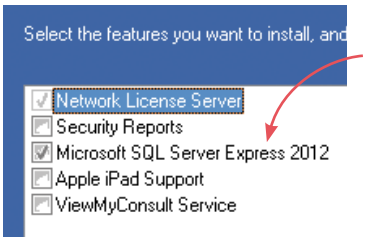
7 When the InstallShield welcome screen appears, click **Next** to proceed with installation.

8 Read the Software License Agreement. If you agree to the terms of the License Agreement, select "I accept the terms of the license agreement" and click **Next** to continue with software installation. If you select "I do not accept the terms of the license agreement," the Setup program will close.

9 Setup Type Click the radio button next to "Custom Installation - Allows installation of optional features and selection of an install folder", then click **Next**.



10 Choose Destination Location Keep default location: C:\Program Files (x86)\Mirror. Click **Next**.



11 Select Features For installation on a standalone PC, make sure "Microsoft SQL Server Express" is checked.

"Apple iPad Support" and "ViewMyConsult Service" should be *unchecked*, as they do not apply to the VECTRA H1.

After confirming that correct items are checked/ unchecked, click **Next**.

12 A summary of installation details appears. If you wish to review or change any settings, click **Back**. If you are satisfied with the settings, click **Next** to begin copying the program files to the computer's hard drive.

13 InstallShield Wizard Complete If prompted, click the radio button next to "Yes, I want to restart my computer now". Remove the disk from the drive. Click **Finish**. Proceed with VECTRA software installation.

Installation 2: VECTRA software

After the Mirror software installation is complete, follow the steps below to install VECTRA software.

1 Insert the installation DVD into the computer's DVD-ROM drive. The VECTRA Setup program starts automatically.

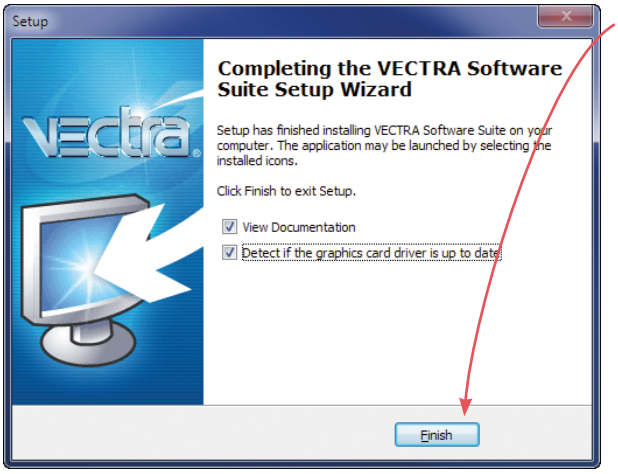
2 When the InstallShield welcome screen appears, click **Next** to proceed with installation.

3 Read the Software License Agreement. If you agree to the terms of the License Agreement, select "I accept

the terms of the license agreement" and click **Next** to continue with software installation. If you select "I do not accept the terms of the license agreement," the Setup program will close.

4 Click **Next** in the "Installation options" window (you do not need to specify an implant library for the H1).

5 Click **Install** to install VAM (VECTRA Analysis Module).

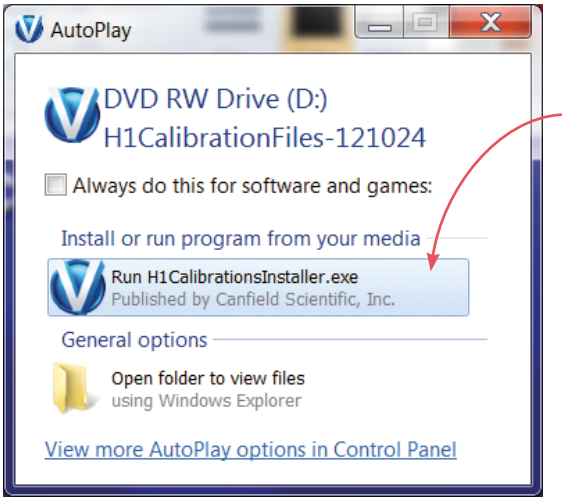


6 Click **Finish** to exit Setup.

7 Remove the disk from the drive and proceed with calibration file installation.

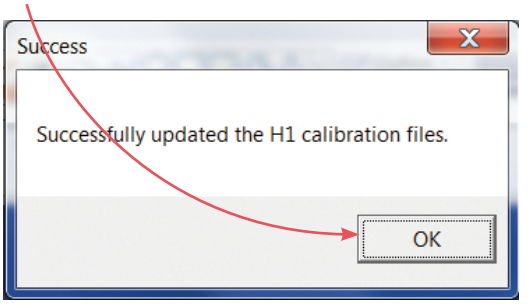
Installation 3: Calibration files

After the Mirror and VECTRA software installations are complete, follow the steps below to install the VECTRA H1 Calibration Files for your camera.



1 Insert the installation DVD into the computer's DVD-ROM drive. When the "AutoPlay" window appears, click **Run H1CalibrationInstaller.exe**.

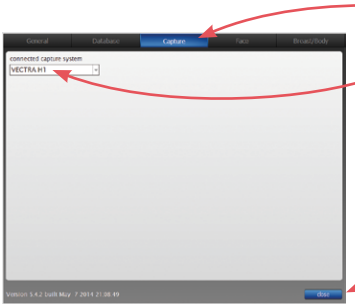
2 After the files are copied over, click **OK** in the "Success" window.



3 Remove the disk from the drive.

Set VECTRA H1 as the capture system

1 Click the **set up** button in the lower right corner of the VECTRA home screen.



2 Select the **Capture** tab and make sure **VECTRA H1** is selected in the drop-down menu.

3 Click **close**.

Once the Mirror, VECTRA and Calibration Files software has been installed, you can start to capture 3D images with the VECTRA H1 (see Chapter 3 or Chapter 4).

APPENDIX B

Camera Settings and Maintenance

B.1 DELETING IMAGES FROM THE SD CARD

1 Rotate the power switch (top of the camera) to **ON**.

2 Press the **MENU** button on the back of the camera to display the menu screen.

Navigate by using the arrow keys around the **SET** button on the back of the camera.

3 Press ▶ or ◀ to select menu 5.

4 Press ▼ or ▲ to select **Erase images**, then press **SET**.

5 Choose **Select and erase images**, **All images in folder**, or **All images on card**, then press **SET**.

Select and erase images

1 Press ▶ or ◀ to view the images on the card. Press ▼ or ▲ to place a checkmark next to 🗑 (on screen) for each image you wish to erase.

2 Press 🗑 (back of camera) to erase selected images.

3 Press ▶ or ◀ to select **OK**, then press **SET**.

All images in folder

1 Press ▼ or ▲ to select the folder you wish to erase, then press **SET**.

2 Press ▶ or ◀ to select **OK**, then press **SET**.

All images on card

Press ▶ or ◀ to select **OK**, then press **SET**.

✔ *Press the* **MENU** *button to exit submenu.*

B.2 CHARGING CAMERA BATTERIES

1 Connect the small end of the charging cable to the charger and the other end to a power outlet.

2 Place a battery in the charger. The CHARGE light glows amber while charging, then the FULL light glows green when fully charged.

3 Locate the latch on the side of the battery compartment. Flip it down, then rotate it 90 degrees counterclockwise.

4 Slide open the compartment and replace the batteries.

5 After replacing the batteries, be sure the compartment is fully closed and the latch is returned to the locked position.

B.3 LCD SCREEN ROTATION

The LCD screen on the camera may be rotated for a better view of the target area, if desired.

B.4 CAMERA SETTINGS

When using the H1 in tethered mode (Chapter 3), VECTRA capture software automatically uses the appropriate settings. But if you are capturing to an SD card (Chapter 4), make sure the settings displayed on the back of the camera are as follows:

M (manual mode)
1/125 (shutter speed)
ISO 100
RAW (image file format)

To reset the VECTRA H1 camera to recommended settings, follow the procedure below.

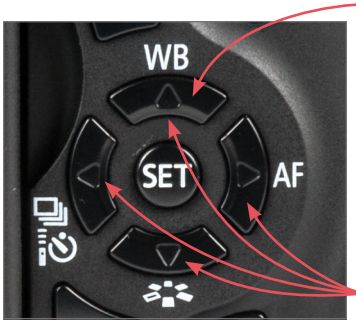
1 Rotate the power switch (top of the camera) to **ON**.

2 The dial on top of the camera controls the mode setting and is glued to the power switch.
I.e., when the camera is **ON**, the white line points to **M** and the camera is in manual mode; when the camera is **OFF**, the white line points to **Av**.

3 While observing the LCD display on the back of the camera, rotate the dial just behind the shutter release button until the shutter speed is set to 1/125.

4 Press the ISO button (top of camera). Use the ▶ or ◀ keys (see following page) to select **100**.

5 Press the AF point section button (back of camera). Press **SET** to toggle between Automatic (all points) and Manual (center point) if needed to make sure Manual is selected. Press ▶, ◀, ▼, or ▲ to select center point only.



6 Press **WB** button/▲ key and use the ▶ or ◀ keys to select **Flash**. Press **SET**.

7 Press the **MENU** button on the back of the camera to display the menu screen.

Set the menus as shown in the following chart. Use the arrow keys around the **SET** button on the back of the camera to navigate through the menus.

- Press ▶ or ◀ to select a menu tab.
- Press ▼ or ▲ to select the desired item, then press **SET**.
- Press ▶, ◀, ▼, or ▲ to select the desired setting. The current setting is indicated in blue. Press **SET** to set it.
- Press the **MENU** button to exit menu editing and return to the shooting settings display.

Menu tab 1	Quality	RAW
	Beep	Enable
	Release shutter without card	Enable
	Image review	4 sec.
	Peripheral illumin. correct.	Disable
	Red-eye reduc.	Disable
	Flash control	
	Flash firing	Enable
	E-TTL II meter.	Evaluative
	Built-in flash func. setting	
	Built-in flash	NormalFiring
	Flash mode	E-TTL II
	Shutter sync.	1st curtain
	exp. comp.	0
	✔ *Press the* **MENU** *button to exit submenu.*	
Menu tab 2	Expo.comp./AEB	0
	Auto Lighting Optimizer	Off
	Metering Mode	Spot
	Custom White Balance	*[no action]*
	WB Shift/BKT	0,0/±0
	Color space	sRGB
	Picture Style	Standard
Menu tab 3	Dust delete data	*[no action]*
	ISO Auto	Max.:6400
Menu tab 4	Live View shoot.	Enable
	AF mode	Live mode
	Grid display	Off
	Aspect ratio	3:2
	Metering timer	16 sec.
Menu tab 5		*[no action]*
Menu tab 6	Histogram	Brightness
	Image jump	1 images
	Slide show	*[no action]*
	Rating	*[no action]*
	Bass Boost	Disable
	Ctrl over HDMI	Disable

Menu tab 7	Auto power off	4 min.
	Auto rotate	On/Camera/PC *[first item]*
	Format	*[no action]*
	File numbering	Continuous
	Select folder	*[no action]*
	Screen color	4
Menu tab 8	LCD brightness	Middle
	LCD off/on btn	Shutter btn.
	Date/Time	set to GMT dd/mm/yyyy
	Language	English
	Video system	NTSC
	Sensor clearing	Auto cleaning enable
	Feature Guide	Disable
Menu tab 9	Custom Functions(C.Fn)	All set (1-13) to zero.
	Copyright information	none
	Clear settings	*[no action]*
	Firmware Ver. 1.0.0 or above	*[no action]*
Menu tab 10	My Menu settings	*[no action]*

APPENDIX C

Data Back-up

IMPORTANT: Failure to properly back up your digital images and client records subjects you to potential loss of data. Canfield Scientific accepts no responsibility or liability for lost or damaged data.

Canfield recommends you consult a qualified IT professional to assist you in developing a back-up plan. An IT professional should install and configure the necessary equipment and software, and train the staff member designated to perform back-ups.

Canfield's VECTRA software is a highly reliable program that will function predictably under ordinary circumstances. However, problems may occur as a result of power surges, disk failure, viruses or other damaging events that could render your database inaccessible or unstable. For this reason, it is essential that you regularly create back-up copies of your data and images so that you can restore the database if you experience a problem.

The practice IT resource should be directed to include the directories (and all associated subdirectories) listed below as part of the established back up procedures or as a separate, regularly scheduled procedure.

C:\Program Files\Mirror

C:\Vectra

NOTE: If the image data is stored on the network, that directory location must also be included in the back-up process.

See *Mirror PhotoFile User Guide, Appendix A* for more information on Data Back-up.

APPENDIX D

Support Information

Technical support

Technical support is available at 1-800-815-4330. Hours of support are from 6:00 a.m. EST to 8:00 p.m. EST Monday–Friday.

Warranty/repair

A one-year warranty is provided on VECTRA parts. Your warranty is automatically extended for one year if you have purchased our annual support and upgrade contract.

Should our technical support technicians determine that a part must be returned for service, a Return Merchandise Authorization number will be provided to you. In addition, a replacement part and a shipping carton will be mailed to you within two business days. Information on packing and shipping will be included.

Our shipping address is: Canfield Scientific, Inc.
253 Passaic Avenue
Fairfield, NJ 07004-2524 USA