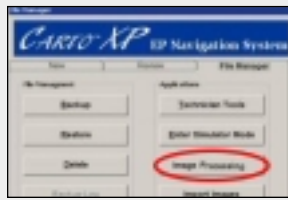


CARTOMERGE™

IMAGE INTEGRATION MODULE

IMAGE PROCESSING INSTRUCTIONS

- 1 Open the Image Processing Software.

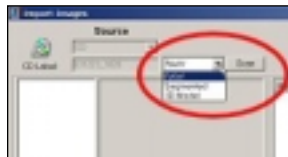


- 2 Place the CD with your image data in the workstation CD drive.

- 3 Import images by clicking the icon.

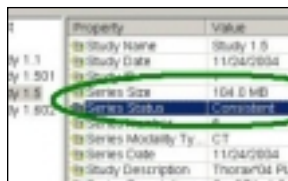


- 4 Select the type of data to import:
a. Raw (DICOM 3)
b. Segmented (Edited data set)
c. 3D Model (CardEP only)




- 5 Click Scan. After a few seconds a list of "study" information appears in the left panel.

- 6 Select the Image Study marked "Consistent" (Series Status). You can also check for the largest size.



- 7 Click ADD to add to the queue, and then click Start.

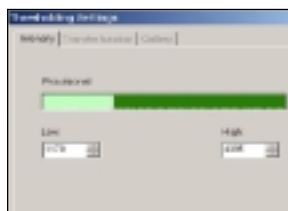
- 8 After import, select the Default study and click Open Study.

- 9 After the volume appears, click Slice Tools () in the left panel.



- 10 Drag the green corner of the MPR frame to display the structure of interest (SOI).

- 11 Set the Threshold Intensity by clicking the up/down arrows for the LOWER parameter.




- 12 When satisfied with the results, left-click the red area of interest.

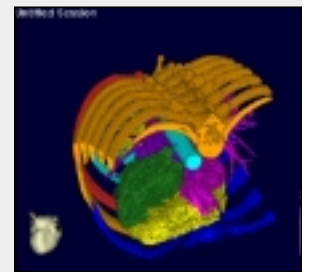
- 13 Place seeds on the 2D slice or on the 3D segmented volume.



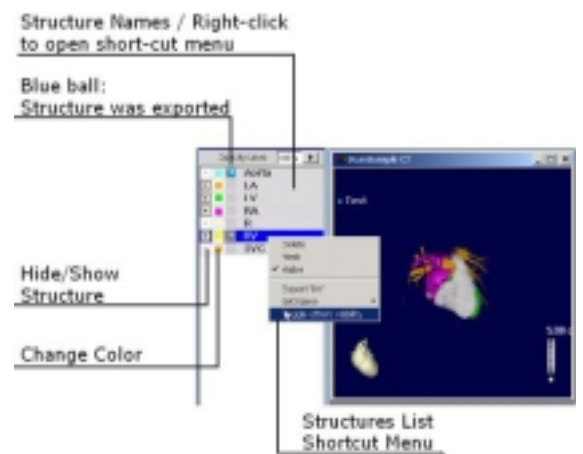
Left-click to place seeds. Place one seed in the center of each SOI to be segmented or deleted (eg. Spine, Sternum, Aorta).

- 14 Click Segment ().

➤ You now have an initially segmented volume.

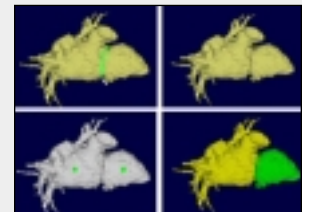


- 15 Set structure display options as desired.

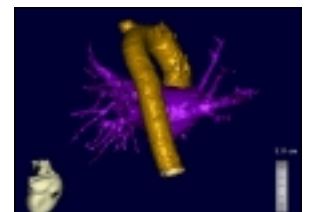


- 16 Further segmentation of SOI's can be performed by activating the SOI in the structures list and repeating steps 13-15.

➤ Other options for refining segmentation include: Punch Tools (punch an area or a line), 2D Edit, or Combine SOIs. For details, see the online help on your system.



- 17 Right-click to export the selected SOI and create a surface image.



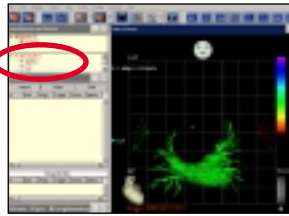
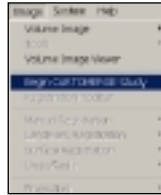
- 18 Exit the Image Processing application.

- 19 Begin a study for the patient. On the Image Menu, click Begin CARTOMERGE™ Study to begin working with the segmented surface image in the CARTO™ XP System.

IMAGE REGISTRATION INSTRUCTIONS

1 To begin a Registration session, start a new CARTO™ XP System study.

2 Click on Image→Begin CARTOMERGE™ Study. A “Select Image Study” window will appear. Choose your desired study by clicking on it and choosing OK. Now you will see the study and the segmented chambers appear in the left panel of the screen.



3 You can click on the name of any of these chambers to drag and drop the image into the Map/Additional Viewers.

4 Reduce CARTO™ XP System fill threshold to zero to view the pre-acquired anatomy.

5 Registration in any heart chamber is a two step method:

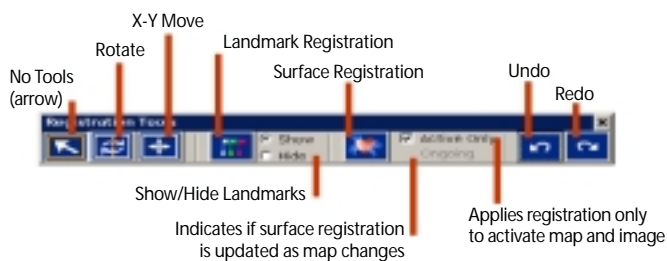
- Initial registration
 - Using Landmark Registration
 - Visual alignment+surface registration in a well defined structure like the Aorta
 - Manual alignment with the aid of defined structures (i.e. PVs)
- Final registration using Surface Registration in the chamber of interest.

6 There are three different kinds of Registration algorithms to apply:

- Visual Alignment
- Landmark Registration
- Surface Registration

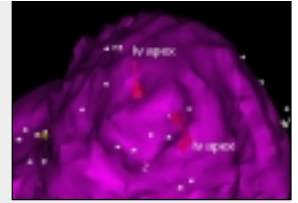
7 Registration algorithms b and c utilize the Registration Toolbar below.

8 This toolbar appears once a chamber has been dragged and dropped into the Map Viewer. You may also retrieve it by selecting Image→Registration Toolbar from the Main Toolbar.



9 All techniques require the creation of one or more landmark pairs. Follow these steps to create landmark pairs:

- Navigate to an anatomically defined point.
- Acquire a CARTO™ XP System point.
- Right-click on the point and select Landmark→Create New. Type in a name for the landmark, i.e. “LSPV”. A flag will appear at the point.
- Now you must identify this same point/location on the 3D chamber you have imported. Right-click on the point in the 3D chamber and select Landmark→Attach and choose the name of the landmark. A flag will appear on the 3D chamber with the same name as the landmark on the CARTO™ XP System point.



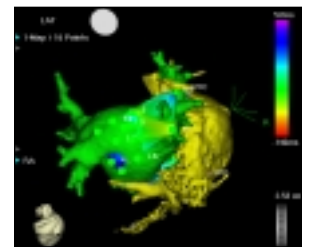
10 The following are steps for performing an initial registration using the Visual Alignment + Surface Registration technique:

- Create only one landmark pair in a well defined structure such as the Aorta
- Right-click on the landmark point and select Landmark→Visual Alignment
- Acquire 20 more CARTO™ XP System points equally distributed within all the structure walls.
- Click on Surface Registration in the Registration Toolbar. Your image is now initially registered.

e. Check registration accuracy by checking/doing the following:

- Clinically check accuracy by dragging the catheter in the structure validating registration
- Right-click on the arrow before the Map name in the Map Viewer and select Registration Match View. Here you have the option of selecting Coloring Only or With Labels. “Coloring Only” will color code all the points based on their distance from the 3D chamber. “With Labels” will also label each point with the numerical distance. The bottom of the window displays the average and SD of these distances. The points are color coded using the following table:

- Less than 5 mm
- Between 5-10 mm
- More than 10 mm



• If the initial registration is not accurate, continue to take additional points throughout the chamber of interest and perform Surface Registration again.

11 The following are steps for performing the Landmark Registration + Surface Registration technique:

- Create at least three landmark pairs. Common landmarks include: SVC-RA junction, IVC-RA junction, CS Ostium, LIPV Ostium, LSPV Ostium, RSPV Ostium.
- Click Landmark Registration in the Registration Toolbar.
- Acquire 20 more CARTO™ XP System points equally distributed within all the chamber walls.
- Click on Surface Registration in the Registration Toolbar. Your image is now registered.
- Check your registration accuracy using the same steps as for the Visual Alignment + Surface Registration technique.

