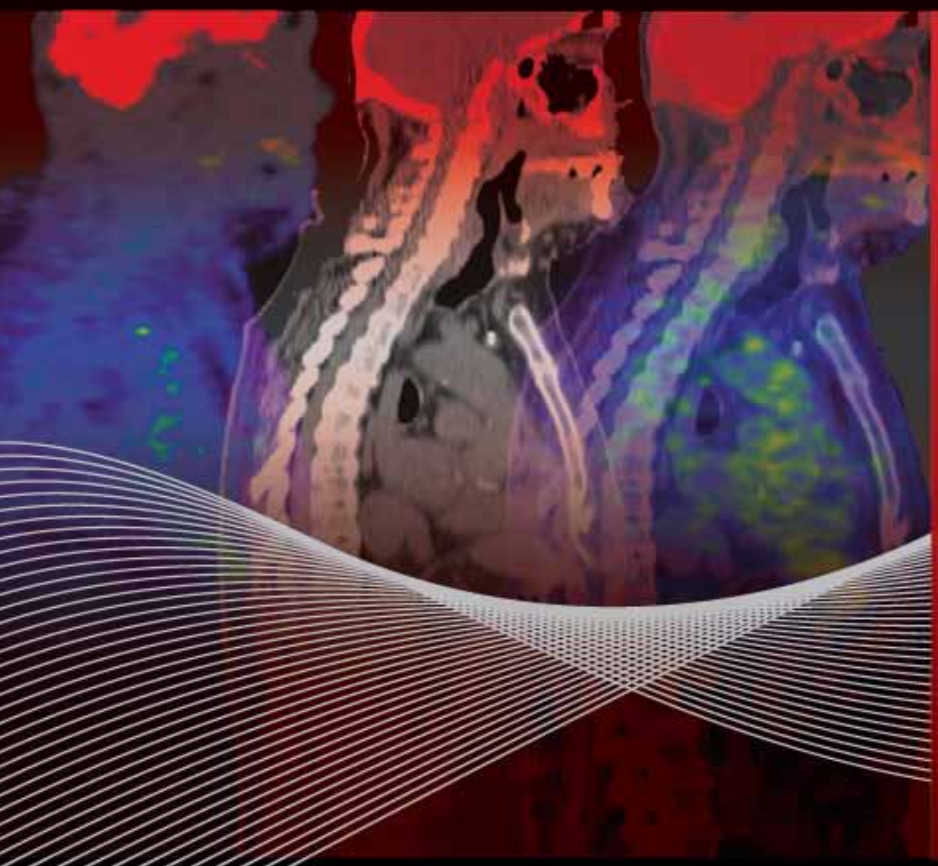

InteleViewer Image Fusion

User Guide
1.2.4

Intelerad®
Distributed Radiology Solutions

INDICATIONS FOR USE

IntelePACS is a device that receives digital images and data from various sources (such as, CT scanners, MR scanners, ultrasound systems, R/F units, computer and direct radiographic devices, secondary capture devices, scanners, imaging gateways, or other imaging sources). Images and data can be communicated, processed, manipulated, enhanced, stored, and displayed within the system and/or across computer networks at distributed locations. Post-processing of the images can be performed using Multi-Planar Reconstruction (MPR).

Lossy compressed mammographic images and digitized film screen images must not be reviewed for primary image interpretations. Mammographic images may only be interpreted using an FDA approved monitor that offers at least 5 Mpixel resolution and meets other technical specifications reviewed and accepted by FDA.

Typical users of this system are trained professionals, physicians, nurses, and technicians.

Caution: Federal law restricts this device to sale by or on the order of a physician.

Intelerad Medical Systems Incorporated
Central Station
895 de la Gauchetiere St W, Suite 400
Montreal, QC Canada H3B 4G1

DECLARATION OF CONFORMITY

We hereby certify that the IntelePACS product, which includes InteleViewer, IntelePACS Browser, Reporting Worklist Module, and Transcription Module, is a Class IIa Medical Device and is in compliance with Council Directive 93/42/EEC and marked with

CE 0413

EC REP Emergo Europe
Molenstraat 15, 2513 BH
The Hague, The Netherlands

AUSTRALIAN SPONSOR

Emergo Asia Pacific
201 Sussex Street, Darling Park, Tower 2, Level 20
Sydney, NSW 2000, Australia
tel: +61.0.2.9006.1662

Title:	InteleViewer Image Fusion User Guide
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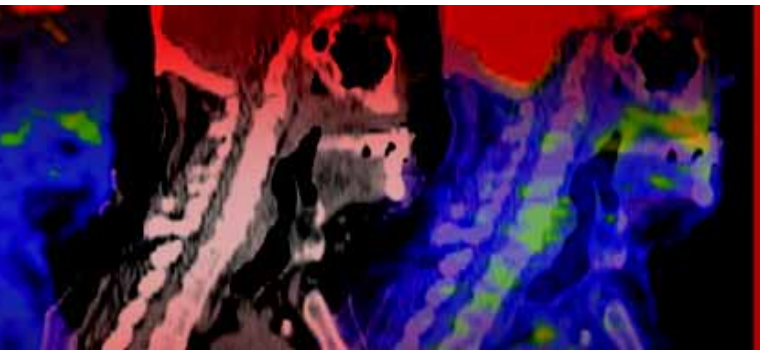

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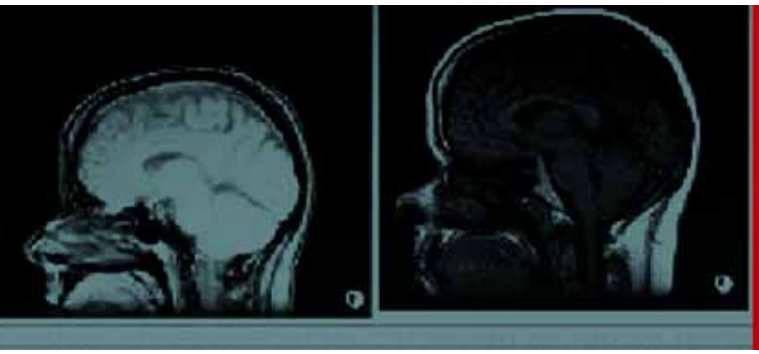

1 Getting Started

Use Image Fusion to read fused data from standalone PET, SPECT and CT scanners and hybrid scanners.

In this Chapter:

About Image Fusion 2
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About Image Fusion

Image Fusion is a clinical application integrated with InteleViewer that provides access to the tools required for reviewing combined PET/CT images and SPECT/CT images, also referred to as *fused images*. Use these tools to review images from a CT modality, referred to as *primary images* and images from a PET or SPECT modality, referred to as *secondary images*.

Fused images allow you to view the anatomical information provided by the CT images with the functional information provided by the PET or the SPECT images to localize lesions accurately.

Image Fusion includes access to specific statistics such as maximum and average Standard Uptake Values (SUV) and volume measurements, which are used for the diagnosis, planning, and monitoring of treatments for cancer patients.

You can view Multiplanar Reformatted (MPR) fusion views and rotating Maximum Intensity Projection (MIP) views of the PET or SPECT image data. Use the MIP view to triangulate the MPR fusion views to a specific point of interest.

Additional key features of Image Fusion include:

- window leveling and color maps to isolate hot spots
- synchronizing actions
- saving images on the IntelePACS
- exporting images
- comparing current and prior studies
- measuring regions of interest and volumes of interest
- adjusting the percentage of anatomical image data displayed
- registering images

New Features

There are no new features in this version of the Image Fusion module.

Using the Documentation

This guide contains detailed information about Image Fusion.

Viewing the Documentation

You can view this guide online and you can access this guide and more in the Documentation Library of the Intelerad Education and Support Center:

`http://support.intelerad.com`

In addition to this user guide, two other documents are included with InteleViewer:

• *InteleViewer Quick Reference Card*: Contains a reference to the InteleViewer tools, icons, and keyboard shortcuts, as well as basic information about starting and using the application.

• *InteleViewer Release Notes*: Contains information on new features for each product release, as well as installation notes and troubleshooting information.

The User Guide and the Quick Reference Card are provided as Adobe Portable Document Format (PDF) files and require that you open them with Adobe® Reader®, a free application for viewing and printing PDF files. If you do not have Adobe Reader installed on your system, go to `http://www.adobe.com` for more information.

To view the InteleViewer Image Fusion user guide:
From the Image Fusion application, choose Help | User Guide.

Obtaining Printed Documentation

Additional printed and bound copies of the *InteleViewer Image Fusion User Guide* and other Intelerad product documentation can be obtained for a small fee. For information, send email to:

`documentation@intelerad.com`

Notation Conventions

Several notation conventions are used throughout this guide. A list of these notations and examples of their use is provided below.

Convention	Example
Text that you type in a field, or on a command line, are in `Courier font`.	In the Date field, enter `2003/04/04`.
Keyboard commands are in **SMALL CAPS AND BOLD**.	Press **CTRL+C** to copy text.
New terminology or concepts are *italicized*.	The process of automatically distributing the images is referred to as *autorouting*.
Menu choices are separated by vertical lines.	Choose File | Exit to close the application.

Comments and Questions

At Intelerad, we strive to create accurate and intuitive documentation that provides you with effective product training and troubleshooting support. To better help us develop documentation products that meet your needs, we encourage you to send your comments and questions to: `documentation@intelerad.com`

System Requirements

For workstations intended for clinical or diagnostic review, the following information outlines the recommended system requirements for using Image Fusion.

Note: The DICOM Service receives images on port 5035 by default. If you are using Windows XP with Service Pack 2 or later versions of Windows, the firewall, which is activated by default, may block access to this port. InteleVieweralso must be able to connect to port 5022 of your IntelePACS server. For information, contact your IntelePACS administrator.

Image Fusion Diagnostic Review Workstation Recommended Requirements

For workstations being used for diagnostic review, this table outlines the recommended system requirements for using InteleViewer. For more information on equivalent alternatives to these requirements contact the Intelerad Support Center.

Small Clinic (CR and US Modalities only)	Large Imaging Center or Hospital
Intel® Xeon® processor, quad-core, E5520 2.2 GHz	Intel® Xeon® processor, quad-core, E5520 2.2 GHz
Microsoft® Windows® 7 64-bit version	Microsoft® Windows® 7 64-bit version
3GB DDR3 RAM	6GB DDR3 RAM
NVIDIA® Quadro® FX 580 (for the Reporting Worklist Module or (RIS) screen)	NVIDIA® Quadro® FX 580 (for the Reporting Worklist Module or RIS screen)
250GB SATA hard disk	146GB SAS hard disk for operating system and 300GB or 600GB SAS hard disk for local image storage
CD/DVD burner drive	CD/DVD burner drive

InteleViewer Clinical Review and Technologist Workstation Recommended Requirements

For workstations intended for clinical review and for technologist workstations, the following information outlines the recommended system requirements for using InteleViewer.

• Intel® Core™ 2 Duo 2.53 GHz processor

• Windows® 7 64-bit version

• 80GB SATA

• 2GB RAM

• NVIDIA® Quadro® FX 580

• 3-button wheel mouse

• CD/DVD burner drive

Note: The DICOM Service receives images on port 5035 by default. If you are using Windows XP with Service Pack 2 or later versions of Windows, the firewall, which is activated by default, may block access to this port. InteleViewer also must be able to connect to port 5022 of your IntelePACS server. For information, contact your IntelePACS administrator.

Starting Image Fusion

Start Image Fusion from the InteleViewer toolbar. To use Image Fusion, InteleViewer must be connected to IntelePACS. You cannot access Image Fusion if you open a study burned to a CD or open InteleViewer in standalone mode. For more information on InteleViewer, refer to the *InteleViewer User Guide*.

The PET/CT or SPECT/CT study must contain at least one transverse PET or SPECT and CT series pair which share a common frame of reference. If the PET/CT or SPECT/CT series pair being loaded do not share a common frame of reference, a warning message will appear when you start Image Fusion.

To start Image Fusion:

1. Open a PET/CT or a SPECT/CT study.
2. Do one of the following:

   • In InteleViewer, choose a series layout where one PET series and one CT series is loaded in the viewports.

   • In InteleViewer, choose a series layout where one SPECT series and one CT series is loaded in the viewports.
3. Click the Image Fusion tool  .

   If you start Image Fusion before all the PET or SPECT and CT images are streamed, an error message appears. If this occurs, click Cancel Launch and start Image Fusion again.
4. If there are more than one possible pair of compatible series available in InteleViewer, the Choose PET/SPECT and CT Data for Fusion dialog appears. Select the PET and CT series or the SPECT and CT series that you want to fuse.

5. Click Launch.

   The Rendering Fusion Views dialog appears indicating the progress of the image fusion stage. The Image Fusion - 1 window opens.

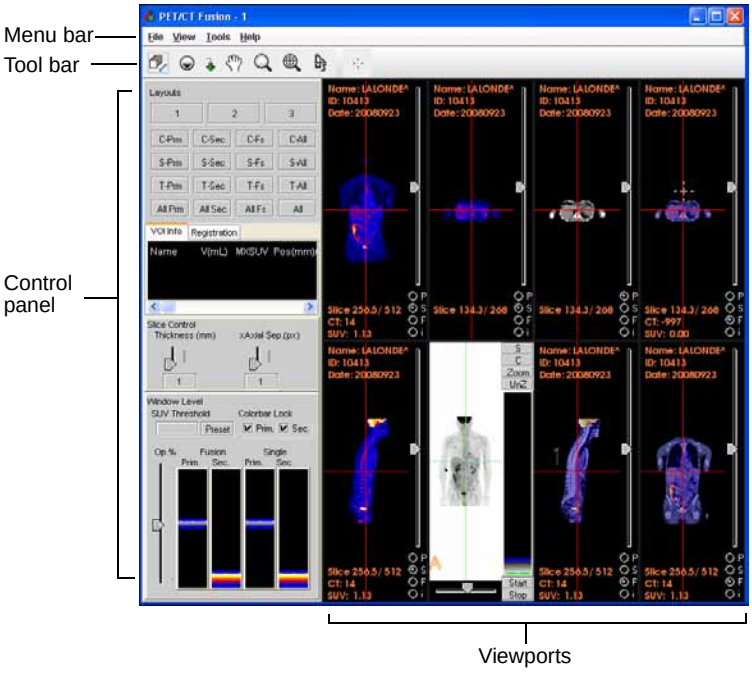
To exit Image Fusion:
Do one of the following:

- Choose File | Close.
- Click the “x” icon in the top right corner of the window.

The application closes. The size and position of the window is remembered the next time you start Image Fusion.

Understanding the Interface

The main elements of the Image Fusion interface are the menu, toolbar, control panel, and viewports. In the menu, you can choose among most of the key functions, many of which are also accessible from the toolbar. Images and related information appear in the viewports.



The Image Fusion window displays two types of viewports: a 2D Multiplanar Reformat (MPR) fusion viewport and a 3D Maximum Intensity Projection (MIP) viewport.

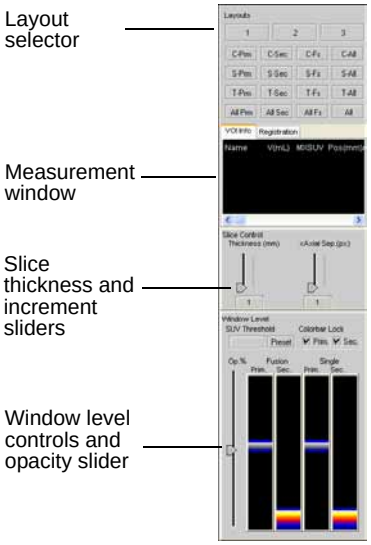
The MPR fusion viewports can display a single modality (CT, PET, SPECT) or two modalities (PET/CT or SPECT/CT) in fused view.

The Maximum Intensity Projection (MIP) viewport provides a rotating 360° 3D MIP view of PET or SPECT volumes. By rotating the viewport, you can get a general overview of the radiopharmaceutical within the body and draw attention to possible areas of focal or abnormal activity to be closely inspected on subsequent complete reviews of image data.

Displaying the Control Panel

The main elements of the control panel are the layout selector, measurement window, slice thickness and increment sliders, window level controls, and opacity slider.

You can display or hide the control panel. If you have two Image Fusion windows open, that is, if you are working in synchronization mode, you can synchronize the appearance of the control panels in both Image Fusion windows.



To display the control panel:

1. From the menu, choose View | Control Panel (**V**).
2. To hide the control panel, choose View | Control Panel (**V**).

Displaying Annotations

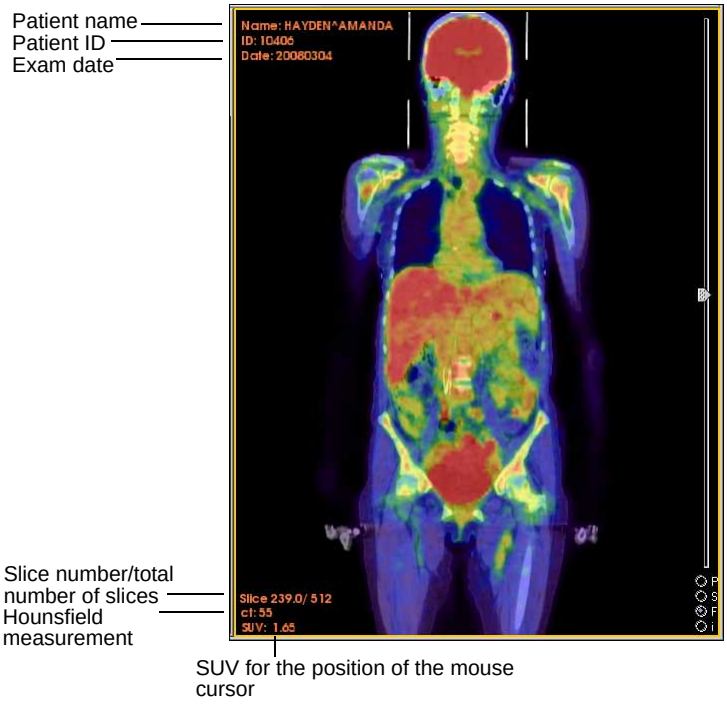
You can show or hide annotation information in the MPR fusion viewports. The patient name, patient ID, and exam date are displayed in the top left corner of the

viewport. The slice number and total number of slices are displayed in the bottom left corner of the viewport as you stack images.

For CT studies, the attenuation coefficient of different types of tissues is measured and displayed in Hounsfield units (HU). For PET and SPECT studies, pixel intensity values at the current triangulation crosshair location appear. For PET images, the standard uptake value (SUV) appears as you move through the images. For SPECT images, the event count at that point appears labelled NM (Nuclear Medicine).

Note: For lossy DICOM JPEG images that include a compression ratio, PET, SPECT and CT images are loaded at the maximum compression ratio. In this case, the word “lossy” appears in red along with the compression ratio in the annotation text, Lossy:P100, C50:1. If the lossy images do not include a compression ratio, then “??:1” appears in the annotation text, as in Lossy:P??, C??:1

Example of displaying annotations for a PET/CT study



To display annotations:

1. From the menu, choose View | Annotations (**A**).
2. To hide annotations, choose View | Annotations (**A**).

Displaying the Triangulation Crosshair

You can show or hide the triangulation crosshair in viewports.

To display the triangulation crosshair:

1. From the toolbar, click  .

2. To hide the triangulation crosshair, click  .

Opening a Second Image Fusion Window

You can open a second Image Fusion window to work with prior studies of the selected patient. Opening another Image Fusion window is also useful if you opened a study that contains both attenuation corrected (AC) and non-attenuation corrected (NAC) image data.

You can also open another Image Fusion window to display the coronal fused MPR viewport for the current study and in another window you can display the coronal fused MPR viewport for a prior study.

Note: You can open a maximum of two Image Fusion windows.

To open a second Image Fusion window:

1. Choose a series layout where one PET or SPECT series and one CT series is loaded in the viewports.
2. Click the Image Fusion Tool  .
3. Select the series that you would like to fuse, and then click Launch.

   The Image Fusion - 2 window appears.

4. Resize both windows to the same size.

   The size and position of the windows is remembered the next time you start the application.

5. Triangulate the viewports in each window so that they are approximately in the same position. See “Triangulating Viewports to a Specific Point” on page 37.

Synchronizing Image Fusion Windows

You can synchronize Image Fusion windows so that the actions that you perform in one window apply to both windows simultaneously.

Image Fusion allows for bidirectional rather than unidirectional synchronization. In the case of unidirectional synchronization, actions are always performed and initiated in the same window but displayed in both windows. With bidirectional synchronization, you can perform and initiate actions in either window of your choice.

Bidirectional synchronization actions you can perform include:

• changing layouts

• capturing DICOM images (same image in both windows)

• capturing images to the clipboard

• stacking (by dragging your mouse cursor using the stack tool, using the mouse wheel and using the scroll bar)

• panning

• triangulating

• window levelling

• zooming

• rotating the MIP

• activating the triangulation crosshair

To synchronize windows:

1. Open a second Image Fusion window. See “Opening a Second Image Fusion Window” on page 9.

   A second window opens with the Image Fusion - 2 label.

2. Ensure that both windows are the same size by dragging the corners of each window to the appropriate size.

3. Position the triangulation crosshair so that it is on the same physical point in the patient anatomy.

4. In the second window identified as Image Fusion - 2, choose Tools | Synchronized (**Y**).

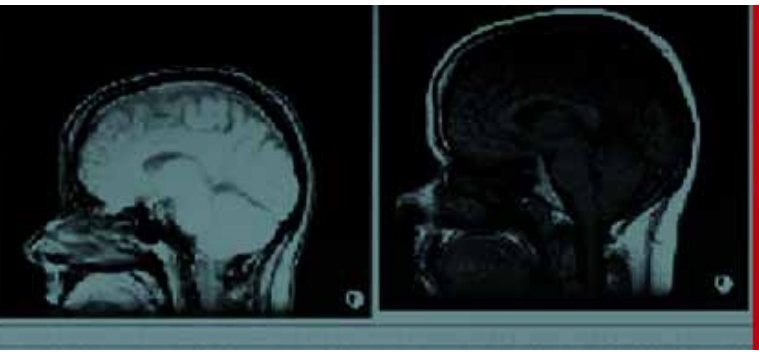
   The Synchronize option is activated in the second window and the word "Synchronized" appears in the window title. Some actions you perform in the second window now also occur in the first window.

5. To change the window that controls the synchronization, click in the viewport of the window you want to control the synchronization.

   Control of the synchronization is transferred to this window. For example, if you clicked a viewport in window 1, window 1 now controls the synchronization for both windows.

6. To disable the Synchronized option, in the second window choose Tools | Synchronized (**Y**).

   Note: To remember the size and location of both windows, close window 1 and then close window 2.



2 Setting Preferences

Set the viewing and handing preferences for images.

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About Setting Preferences

Set user preferences to customize the interface behavior, appearance, and image layout.

Setting the General Preferences

You can set the general preferences for viewport display and behavior.

To set the general preferences:

1. Choose File | Preferences.

   The Preferences dialog opens.

2. Click the General tab.

3. Do one of the following:

To:	Then:
Move the triangulation crosshair or stack images in one viewport and change the related images simultaneously in other viewports	Enable Update all Viewports when Moving Cursor.
Move the triangulation crosshair or stack images in one viewport and change the related images in other viewports only after you release the mouse button	Disable Update all Viewports when Moving Cursor.
Hide the triangulation crosshair from DICOM secondary capture images	Enable Hide Cursors on Image Export.
Include the triangulation crosshair in DICOM secondary capture images	Disable Hide Cursors on Image Export.
Select the type of triangulation crosshair to display in the viewport	Choose one of the following:  Standard (the default)  Standard, Small Gap  Standard, Large Gap  Circle  Circle Narrow Edges  Circle Wide Edges
Adjust the size of the measurement text (ROI, VOI, and linear measurements) displayed in the viewports	Choose an option from the ROI Text Font Size list. The minimum size is 8 pixels and the maximum size is 30 pixels. The default size is 12 pixels.

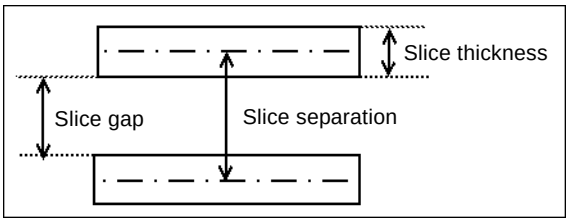
4. Click OK.

   The changes take effect when you restart Image Fusion. The new measurement text font size is immediately applied and remembered the next time you start Image Fusion.

Configuring the Slice Thickness and Separation

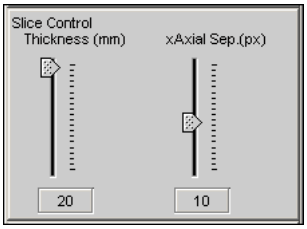
You can change the thickness of slices displayed in an MPR fusion viewport. You can also view thick slices or *thick slabs* of image data. A thick slab is the average, minimum, or maximum intensity of all pixels extracted from the number of slices specified by the Slice Thickness slider.

When configuring slice thickness and separation, it is important to understand the effects that your settings have on the result view. It is common to set the thickness and separation to equal values, reducing the gap between slices to 0. In cases where the slice separation is larger than the slice thickness, the result will have gaps between the slices where there is no image information.



To configure the slice thickness and separation:

1. Select the required MPR fusion viewport.
2. To set the required slice thickness, click and drag the Thickness slider to the required value. By default, the slice thickness is set to 1.



3. To set the slice separation, click and drag the Separation slider to the required value. By default, the slice separation is set to 1.

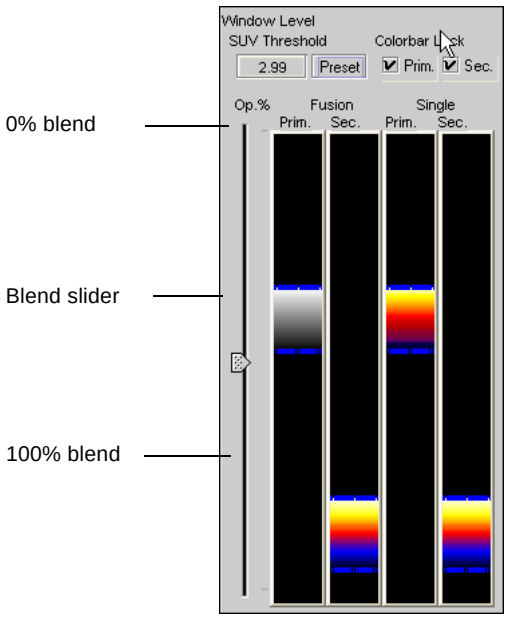
   Note: The slice separation value also specifies the number of images that you can stack through in coronal and sagittal viewports. For example, if the slice separation value is 10 pixels, then you can stack through 10 images at a time.

4. To view thick slabs of image data, right-click in the viewport and choose Thick Slab, and then select one of the following options:

Select:	To:
Average	Display the average pixel value for the slice (average intensity projection). All slices are added and the mean is computed.
Maximum	Display the maximum pixel value for the slice (maximum intensity projection). The maximum intensities of all pixels are extracted and displayed.
Minimum	Display the minimum pixel value for the slice (minimum intensity projection). The minimum intensities of all pixels are extracted and displayed.

Adjusting the Opacity

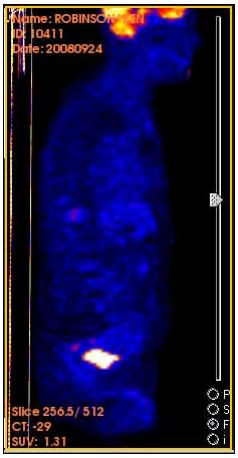
The opacity setting determines the blend value of the primary and secondary images in an MPR fusion viewport as you move the cursor on an image. The blend value is the combination of pixel information from both the primary and secondary images. By setting the opacity, you determine the proportion of primary versus secondary pixel information that appears in the image.



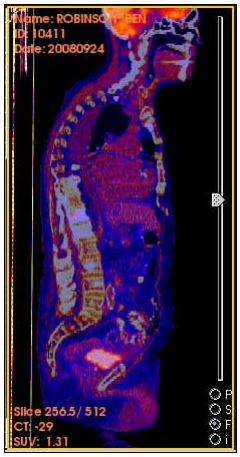
A blend value equal to 0% means the fused image contains contribution from only the secondary image. A blend value equal to 50% means the fused image contains blended pixels with equal contributions from the primary image and the secondary image. A

blend value equal to 100% means the fused image contains contribution from only the primary image.

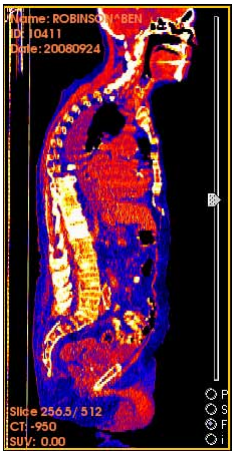
0% Blend



50% Blend



100% Blend



Setting Opacity Preferences for Secondary Images

By default, the opacity for secondary images is 50%. You can however change the opacity that Image Fusion applies to secondary images by setting a new opacity value. Image Fusion applies your new opacity setting the next time you open Image Fusion.

To set the opacity preferences for secondary images:

1. Choose File | Preferences.

   The Preferences dialog opens.

2. Click the Color Maps tab.
3. In Startup Secondary %, type the opacity percentage to apply by default to secondary images.
4. Click OK.

   The changes take effect when you restart Image Fusion.

Adjusting the Window Level

Use the window level to change the contrast and brightness of primary and secondary images.

You can adjust the window level interactively for fused, primary, and secondary images or choose predefined window level presets for primary and secondary images.

Window level presets allow you to apply predefined settings to primary and secondary images in the selected series.

Note: If the window level defined in the DICOM header information for an image is too small, the color bars on the window levels are small. The image appears with few colors in the viewport. Additionally, if the window level settings are placed in a position where there are no corresponding image pixels, the image may appear washed out or dark. In both cases, you need to open the window first and then adjust the window level settings.

To adjust the window level of images interactively:

1. Apply a color map to primary or secondary images. See "Setting Window Level Presets" on page 20.
2. Do one of the following:

   • Choose Tools | Window Level (**W**) or click the Window Level tool  . Click and drag in the viewport.

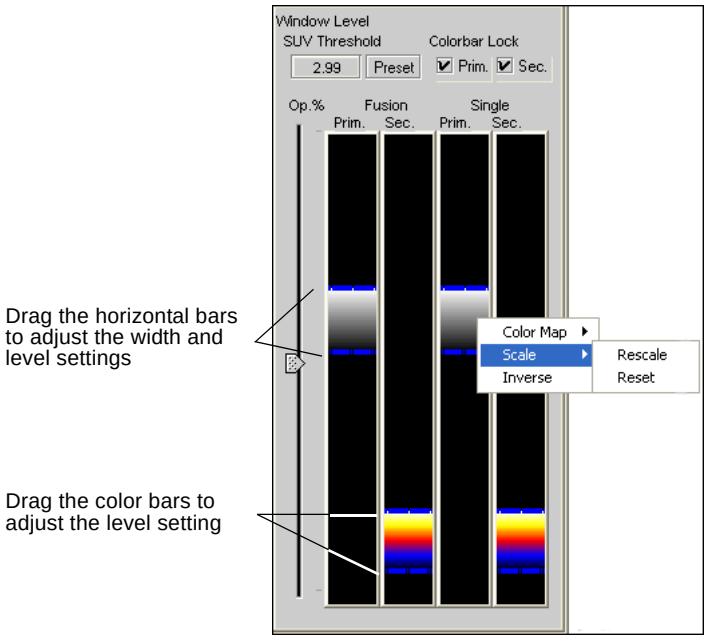
   The mouse cursor changes to indicate you are adjusting the window and level.

Drag:	To:
Up	Decrease the brightness of primary images, secondary images, or both.
Down	Increase the brightness of primary images, secondary images, or both.
Left	Decrease the contrast of primary images, secondary images, or both.
Right	Increase the contrast of primary images, secondary images, or both.

   You can also click the middle mouse button and drag in the required direction.

   Note: Dragging the mouse cursor in a viewport displaying secondary images adjusts the window level setting of only the top position of the window. Dragging the mouse cursor in a viewport displaying both primary and secondary images adjusts the window level setting of only the primary images. Furthermore, pressing and holding the **CTRL** key while window leveling a fused imaged only affects the PET/SPECT. Window leveling a fused image (without pressing the **CTRL** key) affects the CT only.

• In Control Panel, drag the color bars to adjust the window level.



3. For fine window level adjustments, right-click in the color bar and then choose Scale, and then select Rescale.

   This places the horizontal bars at the top and bottom of the color bar; however, the maximum window level values correspond to where the sliders were before you selected Rescale.

4. To reset the horizontal bar to the previous settings, right-click the required color bar and then choose Scale, and then select Reset.

To adjust the window level by using presets:

1. Select the required series.
2. Do one of the following:

   • Choose a setting from the Window Level menu  .

   • Press the key that corresponds to the window level preset that you want to use. For example, press **F5** to apply the lung window level settings.

Choose:	To:
DICOM	Set the window level to correspond to the DICOM data contained in the primary image.
Chest	Apply chest window level settings (width=350, level=40) to primary images.
Abd/Plv	Apply abdominal/pelvis window level settings (width=350, level=40) to primary images.

Choose:	To:
Lung	Apply lung window level settings (width=1500, level=-600) to primary images.
Brain	Apply brain window level settings (width=60, level=38) to primary images.
Bone	Apply bone window level settings (width=2500, level=480) to primary images.
Head/Neck	Apply head/neck window level settings (width=350, level=90) to primary images.
SecPresets 1 - 6	Apply custom window level settings to secondary images.

Setting Window Level Presets

Customize the window level settings for primary and secondary image presets.

To customize the default window level presets for primary images:

1. Choose File | Preferences.

   The Preferences dialog opens.

2. Click Primary WL.

3. Modify the window or level presets and then click OK.

   The changes take effect the next time you restart Image Fusion.

To create custom window level presets for secondary images:

1. Choose File | Preferences.

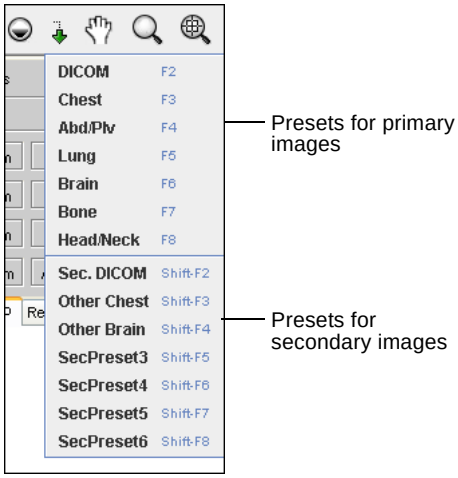
   The Preferences dialog opens.

2. Click Secondary WL.

3. Modify the name, window or level presets and then click OK.

   The changes appear in the Window Level menu the next time you restart Image Fusion.

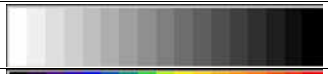
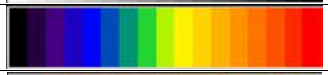
Window level menu



Working with Color Maps

By using the Color Map Editor, you can create your own color maps or edit existing ones. Image Fusion provides eight predefined color maps.

The following table displays the predefined color maps and corresponding color bar that you can apply to primary, secondary, and fused images. By default, the Gray color map is used for all images.

Color map	Color bar
Gray	
Hot Iron	
Hot Iron BK 1	
Hot Iron BK 2	
Inverse Gray	
PETCT	
Thermal	
Thermal BK	

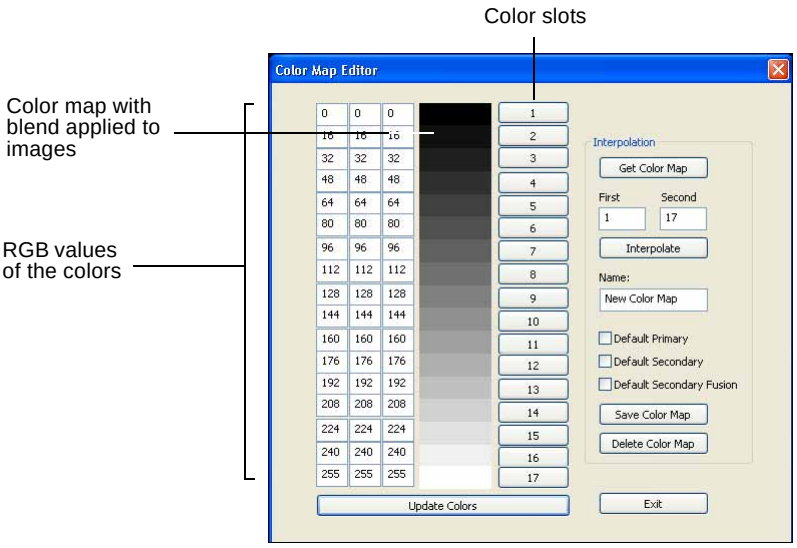
Note: The color maps ares stored with a .map file extension in the colormap folder. These files define the RGB color values of the color slots that appear in the Color Map Editor. The default files are: gray.map, Hot Iron.map, Hot Iron_BK1.map, Hot Iron_BK2.map, Inverse Gray.map, petct.map, and thermal.map, thermal_BK.map.

Color maps include 256 levels of color (red, green and blue) and are used to assign an arbitrary color to the pixel value in primary, secondary, and fused images. The Color Map Editor allows you to enter a color for 17 color slots (1st, 17th, 33rd, 49th…256th) in the 256 color slots which make up the color map. Image Fusion performs linear interpolation to obtain all intermediate values.

To create a color map:

1. Choose Tools | Edit Color Maps.

   The Color Map Editor appears.



2. In the Name field, enter the name of the new color map.

   The name you type appears in the list of color maps in the Color Map menu when you right-click a window leveling control. This is also the filename of the color map.

3. To use colors from an existing color map, click Get Color Map, select the color map, and then click Open.

4. To set a new color, do one of the following:

   • Click a color slot button, and use the Color dialog that appears.

   • To specify the red, green, and blue value of the color, enter a value from 0 to 255 in each of the RGB text boxes.

5. To set more new colors in the color map, repeat step five as many times as necessary.

6. Click Update Colors to see the new colors.

7. To perform a RGB color interpolation between two colors, enter a value from 1 to 17 in the First field and then the Second field, and click Interpolate.

   This action fills the specified range with an RGB interpolation between the colors in the first color slot and the second color slot.

8. To specify the default color map for primary, secondary, and fused images, do one of the following:

Activate:	To:
Default Primary	Specify the default color map for primary images.
Default Secondary	Specify the default color map for secondary images.
Default Secondary Fusion	Specify the default color map for secondary fused images.

   Image Fusion remembers the new default color map the next time you start the application.

9. Click Save Color Map.

   The color map is saved with a .map file extension in the colormap folder.

10. Click Exit to close the Color Map Editor.

To edit a color map:

1. Choose Tools | Edit Color Maps.

   The Color Map Editor appears.

2. Click Get Color Map and select the color map that you want to edit.

3. Modify the color map, as required.

4. Click Save Color Map to save your changes.

5. Click Exit to close the Color Map Editor.

To delete a color map:

1. Choose Tools | Edit Color Maps.

   The Color Map Editor appears.

2. Click Get Color Map and select the color map that you want to delete.

3. Click Delete Color Map.

4. Click Yes to confirm.

   The color map is deleted from the colormap folder.

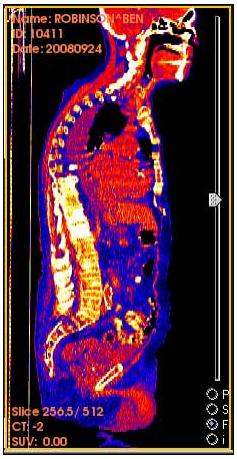
5. Click Exit to close the Color Map Editor.

To invert an image color map:

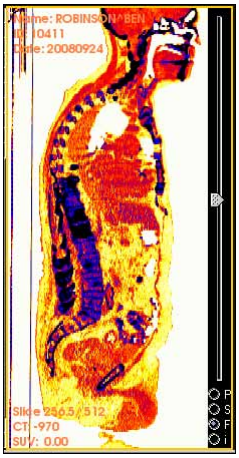
1. In the Window Level area of the control panel, right-click the required color bar and choose Inverse.

   Depending on the color bar selected, all primary or secondary images are inverted in the viewport.

Original Primary Image in a Fused Sagittal Viewport Using the Hot Iron Color Map



Original Image Inverted



2. To reset the image color map, click the required color bar again and choose Inverse.

Setting Color Map Preferences

Choose the color maps that Image Fusionapplies automatically to primary, secondary single and secondary fusion images when you open a new session. You can choose from system color maps or custom color maps.

To set color map preferences for images:

1. Choose File | Preferences.

   The Preferences dialog opens.

2. Click Color Maps.
3. Select a color for primary, secondary single and fusion view images.
4. Click OK.

The changes take effect the next time you restart Image Fusion.

Setting Colorbar Locking Preferences

Use the Colorbar Lock to control primary and secondary window level adjustments.

For example, by enabling the Primary colorbar, adjusting the window levelling affects all primary images at the same time. By disabling the Primary colorbar, you can adjust the window levelling of each primary image separately.

You can set colorbar lock preferences; each time you open Image Fusionthese colorbar preferences apply. You can also set colorbar preferences for a given session.

To set colorbar locking preferences:

1. Choose File | Preferences.

   The Preferences dialog opens.

2. Click Color Maps.

3. Do one of the following:

   • Enable Lock Primary Colorbars or Lock Secondary Colorbars, or both, to do simultaneous window leveling for primary or secondary Images.

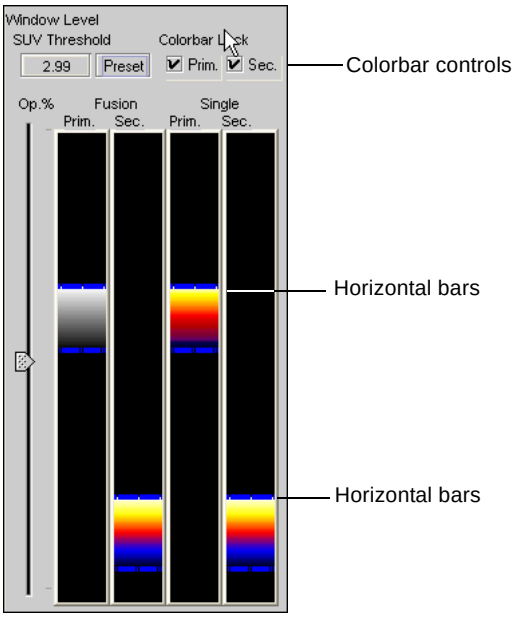
   • Disable Lock Primary Colorbars or Lock Secondary Colorbars, or both to do independent window leveling for primary and secondary images.

4. Click OK.

   The changes take effect the next time you open Image Fusion.

To change the colorbar locks interactively:

1. In the Window Level area of the control panel, enable Primary or Secondary, or both.
2. Click and drag the fusion primary or single primary horizontal bars or fusion secondary or single secondary horizontal bars.

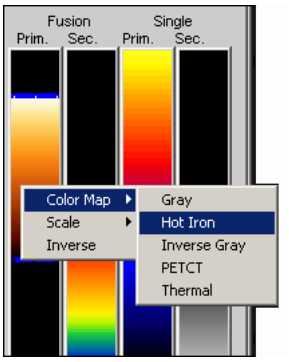


Applying a Different Color Map

You can apply another color map to primary, secondary, or fused images in an MPR fusion viewport. You can also reverse the color map of primary, secondary, and fused images to view it as white-on-black rather than black-on-white.

To apply a different color map:

➤ In the Window Level area of the control panel, right-click the required color bar and choose Color Map, and then select a color map.



Setting Smart Fusion Preferences

Smart fusion enhances PET and SPECT images by fusing everything but the "coldest" PET or SPECT colors in the selected color window, allowing the CT part of the image to be displayed without obstruction or degradation. For example, when using a thermal color map, the coldest color is black. Depending on the color bar settings, all black pixels in the PET or SPECT portion of the fused image are not fused, regardless of their SUV or pixel value. If the thermal map is inverted, the coldest color is then white. In that case, white pixels are not fused.

Since the resulting image may not be what you expect, you can set a preference value. You can set Smart Fusion preferences so that each time you open Image Fusion the Smart Fusion preferences you set apply or you can enable or disable Smart Fusion interactively as you go.

To set Smart Fusion preference:

1. Choose File | Preferences.

   The Preferences dialog opens.

2. Click the General tab.

3. Enable or disable Smart Fusion.

4. Click OK.

   The changes take effect when you restart Image Fusion.

To enable or disable Smart Fusion interactively:

➤ Choose View | Smart Fusion.

The feature is enabled or disabled for the current session only.

Setting the SUV Threshold

Set a threshold above which only standard uptake values above the threshold are displayed in the fusion viewport.

You can set the threshold so that it applies when you open a new session. You can also make the threshold available as a preset that you can use when necessary.

To set the SUV threshold:

1. Choose File | Preferences.

   The Preferences dialog opens.

2. Click the Color Maps tab.

3. In Value, type the SUV limit.

4. Do one of the following:

   • Enable Apply at Startup to apply the threshold when you open new sessions.

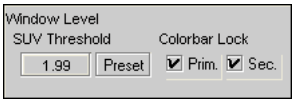
   • Disable Apply at Startup to create a preset. The threshold is available immediately as a preset in the Control Panel.

5. Click OK.

To apply the SUV threshold:

➤ From the Window Level, click Preset.

The preset value appears and the color maps are updated to reflect the threshold.



Setting Image Export Preferences

You can set the preferences for exporting images to a PDF document. Image Fusion applies the export preferences automatically when you export images.

To set PDF image export preferences:

1. Choose File | Preferences.

   The Preferences dialog opens.

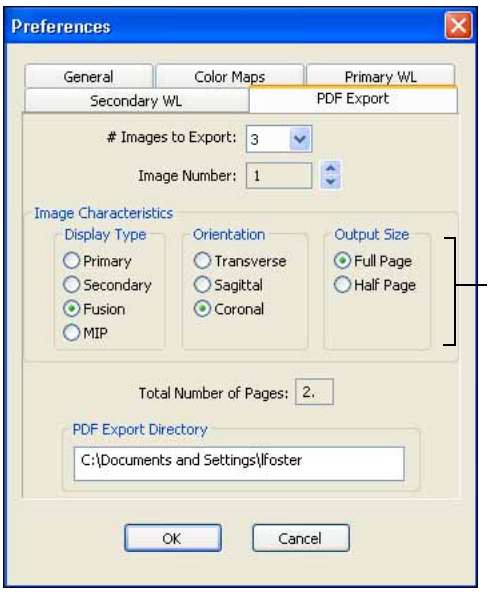
2. Click PDF Export.

3. Set the total number of images to export at once.

4. Define the exporting instructions for each image in your set of images by selecting an image number and by setting the image characteristics.

   For example, set the first image in your PDF collection to be a fusion viewport, with a coronal orientation, occupying a full page. Set the second image to be a secondary viewport, with a sagittal orientation, occupying half a page.

   The Total Number of Pages changes according to the output size for your images.

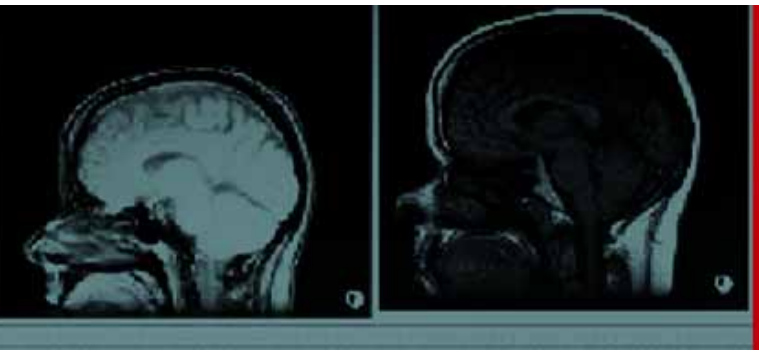


5. In PDF Export Directory, indicate where you want to save the PDF by typing the path name.

   For example `C:\Documents and Settings\lfoster`

6. Click OK.

   The changes take effect when you open Image Fusion.



3 Manipulating Viewports

Use the Image Fusion application to read fused data from standalone PET and CT scanners, SPECT and CT scanners and hybrid scanners.

In this Chapter:

Selecting Viewports 32
Changing Viewport Layouts 32
Triangulating Viewports to a Specific Point 37
Rotating the MIP Viewport 40
Cine Playback in the MIP Viewport 40

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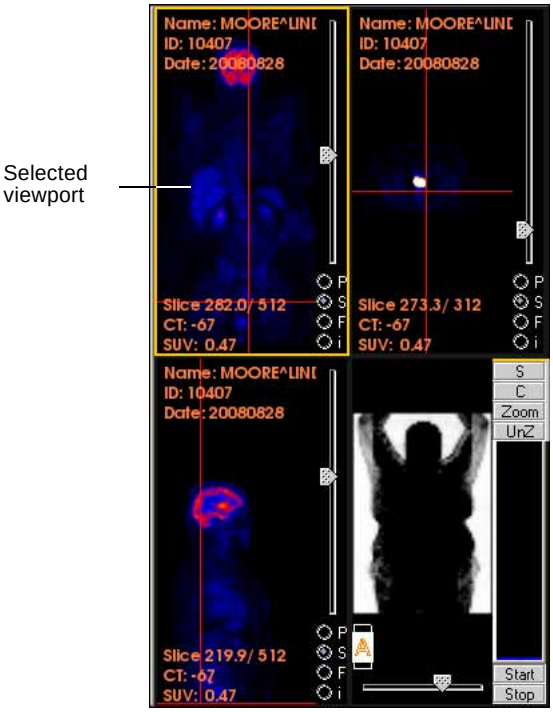
Selecting Viewports

To perform certain functions, such as zooming images, you must first select the required viewport. When you select a viewport, the outline of the viewport is highlighted, indicating that it is the current viewport.

To select a viewport:

➤ Click the required viewport.

The viewport is highlighted to indicate that it is selected.



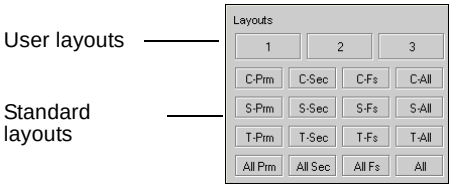
Changing Viewport Layouts

Use viewport layouts to control the number and location of the viewports in the Image Fusion window.

The Image Fusion application contains two types of layouts, user layouts and standard layouts both of which are used for displaying single and fused volumes in transverse, coronal, and sagittal views.

By default, Image Fusion includes three predefined user layouts. If required, however, you can add an unlimited amount of customized user layouts to meet your needs. To

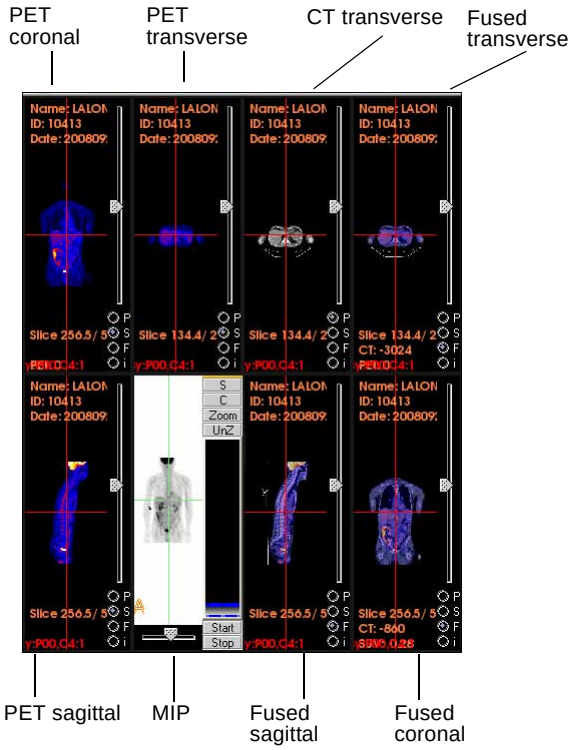
create new user layouts or modify existing ones, contact your IntelePACS administrator.



User Layouts

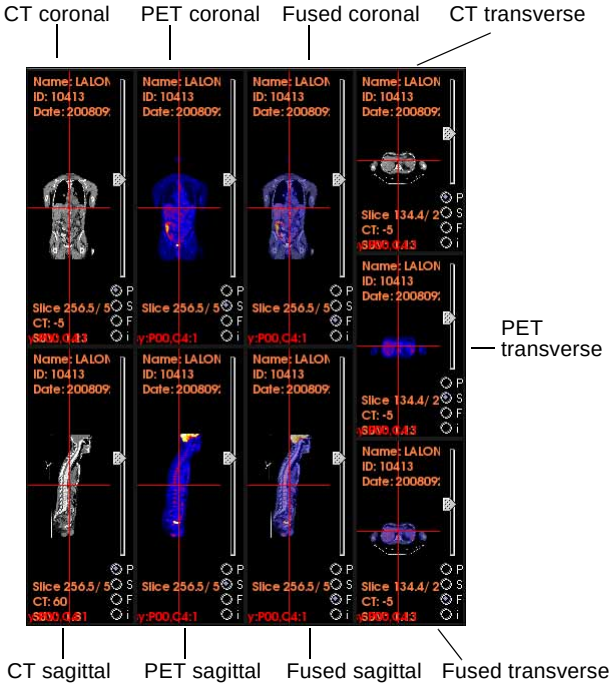
User layout 1 displays a single study in three fused MPR viewports (transverse, coronal, and sagittal view), a 3D MIP view of the PET AC volume, three PET or SPECT MPR viewports (transverse, coronal, and sagittal view), and one CT transverse MPR viewport.

User layout 1 appears by default when you start Image Fusion. Applying a viewport layout modifies the view for your current window only. If you restart the Image Fusion application, or open a different Image Fusion application, User layout 1 is used.

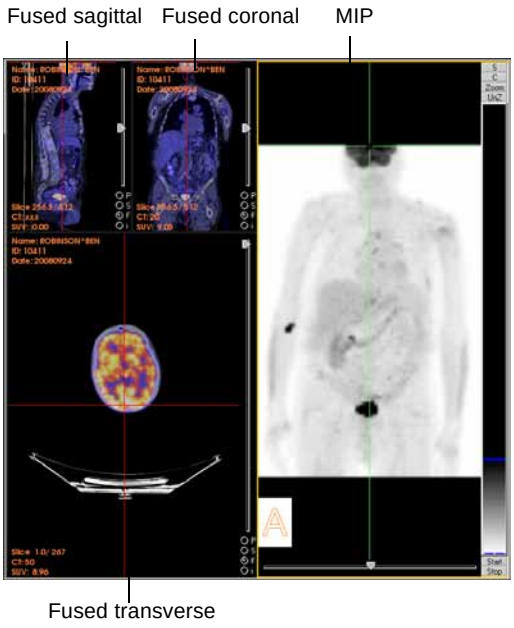


User 2 layout displays a single study in three fused MPR viewports (transverse, coronal, and sagittal view), three PET or SPECT MPR viewports (transverse, coronal,

and sagittal view), and three CT MPR viewports (transverse, coronal, and sagittal view).



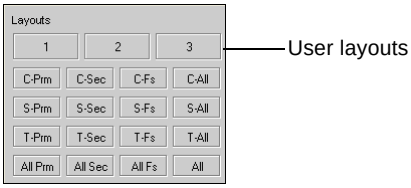
User 3 layout displays a single study in three fused MPR viewports (transverse, coronal, and sagittal view) and a 3D MIP view of the PET or SPECT volume.



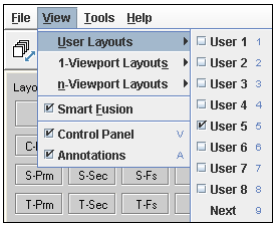
To apply a user layout:

➤ Do one of the following:

• In the Control Panel, click the required user layout button:1, 2, or 3. Only the first three layouts are available for selection from the Control Panel. The subsequent layouts are available from the View menu.



• Choose View | User Layouts and then select the required layout.



• On your keyboard, press the number that corresponds to the user layout. For example, press number 4 to apply user layout 4.

To move between layouts:

1. Press the **TAB** key on your keyboard to move from one user layout to the next.
2. Press the **SPACEBAR** to apply the layout.

To quickly set a 1-viewport layout:

1. Select the required MPR fusion viewport.
2. Right-click and select Toggle Full Zoom.

   The image is displayed in a 1 x 1 layout. If your system is configured with multiple monitors, the image expands to fill a single monitor.
3. To revert to the previous layout, right-click and select Toggle Full Zoom again.

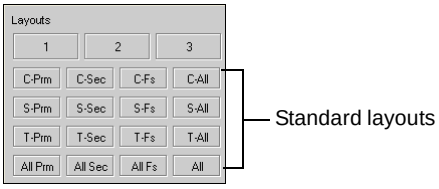
Standard Layouts

Image Fusion comes with 16 predefined layouts that display single or multiple images based on the anatomical position (transverse, sagittal or coronal) and type of image (primary, secondary or fused) you want to view.

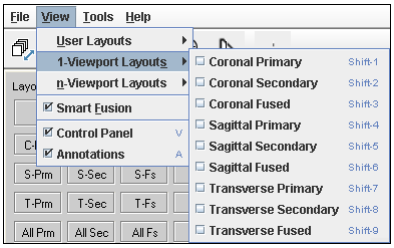
To apply a standard layout:

➤ Do one of the following:

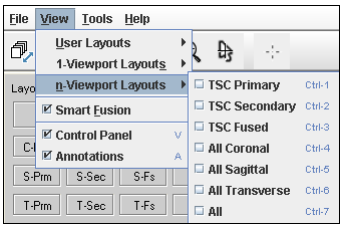
• From the Control Panel, click one of the 16 layout buttons.



• From the menu, choose View | 1-Viewport Layouts. Select the required layout.



• From the menu, choose View | N -Viewport Layouts. Select the required layout.



To move between layouts:

1. Press the **TAB** key on your keyboard to move from one standard layout to the next.
2. Press the **SPACEBAR** to apply the layout.

Triangulating Viewports to a Specific Point

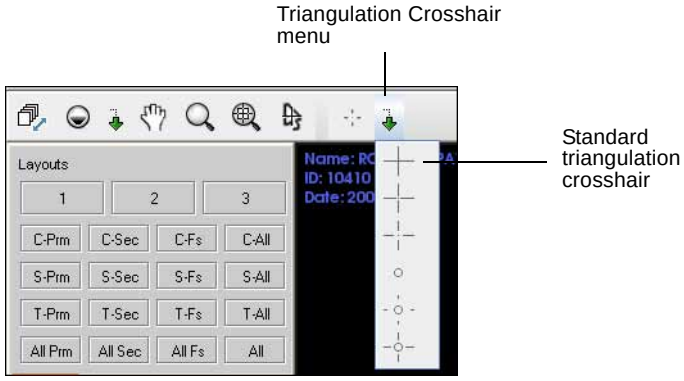
Image Fusion provides triangulation between all primary, secondary, and fused images in the same layout. Whether in the MPR fusion viewport or the MIP viewport, clicking on a region automatically snaps all viewports to the same location.

Triangulating viewports centers the crosshairs at the specified point in all the viewports. If you select a measurement in the Measurements window, all the viewports are triangulated to the position of the selected measurement.

Note: You cannot triangulate the MIP viewport afer panning and rotating the viewport. Select the coronal or sagittal view and then triangulate the viewport.

To triangulate viewports to a specific point:

1. Select the required viewport.
2. To choose the triangulation crosshair that you want to use, select a type from the Triangulation Crosshair menu.



The standard triangulation crosshair is used by default.

Note: You can use a default triangulation crosshair in the Preferences dialog. See "Setting the General Preferences" on page 14.

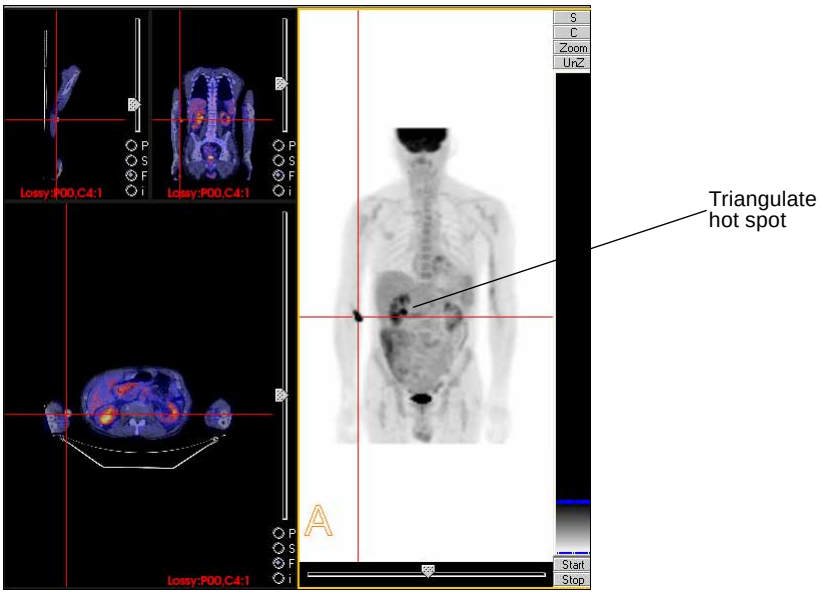
3. If you selected an MPR fusion viewport, do one of the following:

   • Choose Tools | Triangulate.

   • Click the Triangulate tool  .

4. On the required image, click the left mouse button on the hot spot you would like to triangulate.

   The red triangulation crosshairs are centered at the specified point in all the viewports.



Clicking a point in an MPR fusion viewport that is not the maximum intensity point in the depth direction on the MIP viewport displays that point with green crosshairs in the MIP viewport.

Clicking a point in the MIP viewport may not display the point as expected in the MPR fusion viewports. Click another point in the MIP viewport until the red crosshairs are centered to that point in the MPR fusion viewports.

Triangulating Synchronized Viewports

When triangulating viewports to a specific position, triangulation may not be exact. Since there is no common frame of reference between the first and second window, synchronization is based on the relative mouse positions within each window only. To optimize triangulation between the windows, ensure that both windows are the same width and length. For more information, contact your IntelePACS administrator.

Triangulation from the MIP viewport is not synchronized. If you triangulate from a point on the MIP viewport in the second window, either do the same in the first window or manually stack to the new position.

Rotating the MIP Viewport

You can manually rotate the MIP viewport.

To rotate the MIP viewport:

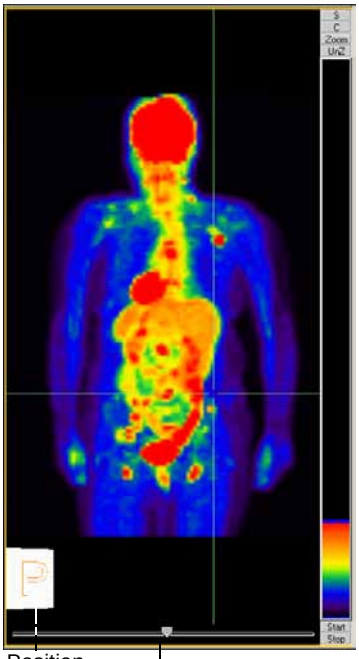
1. Select the orthogonal view that you want the volume to be rendered in.

To render the volume in:	Click:
Sagittal view.	S
Coronal view.	C

2. At the bottom of the MIP viewport, click and drag the slider left or right to rotate the viewport along the Z axis.

   The icon in the bottom left corner of the viewport indicates the relative position of the body: A (Anterior), P (Posterior), L (Left), R (Right), H (Head), and F (Foot).

Posterior 3D MIP AC Sagittal PET Image



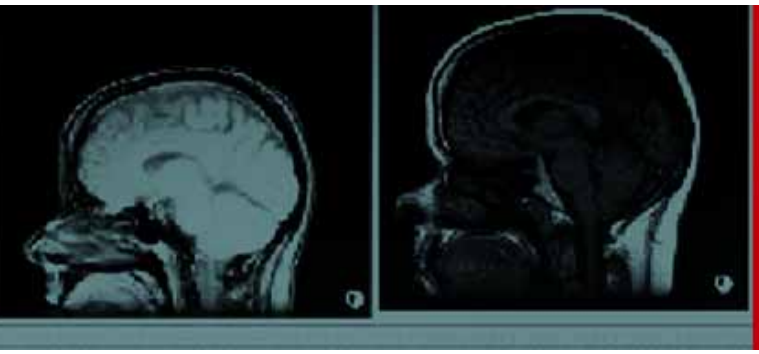
Cine Playback in the MIP Viewport

You can automatically rotate the MIP viewport to move any of the orthogonal views through the PET or SPECT volumein a step-wise manner. This enables you to see a

series of parallel sections through the patient, as intersected by the current orthogonal view.

To cine the MIP viewport:

1. Click the Start button at the bottom right of the viewport.
2. To stop cine in the viewport, click the Stop button.



4 Manipulating Images

Use a full range of image manipulation tools to facilitate image viewing. The comprehensive toolset includes contrast and window level presets, slice selection, triangulation, pan, zoom, and stack.

In this Guide:

About Manipulating Images 44
Changing Displayed Images 44
Orienting Images 45
Stacking Images 47
Measuring Lines, Areas, and Volumes 48
Registering Images Manually 56
Peeking Inside Secondary Images 58
Capturing and Exporting DICOM Images 58
Exporting Images to PDF 60

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About Manipulating Images

The Image Fusion application provides you with a comprehensive set of image manipulation tools that include contrast and window level presets, slice selection, triangulation, pan, zoom, and stack.

Changing Displayed Images

You can change the images displayed in MPR viewports to display primary, secondary or fused images. For example, if you applied a layout that includes viewports displaying only fused images and primary images but you want to see secondary images instead, change the image type.

Viewport Displaying Primary Images

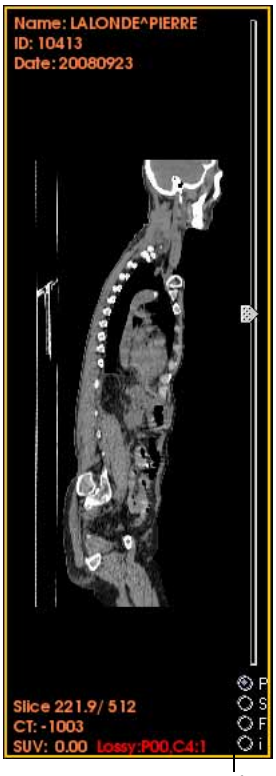


Image buttons

Same Viewport Displaying Secondary Images

Image buttons

To change the image display:

1. Select the required MPR viewport.
2. To select the image that you want to display in the viewport, click one of the following buttons along the bottom right side of the viewport:

Click:	To:
P	Display primary images in the viewport.
S	Display secondary images in the viewport.
F	Display fused images in the viewport.
i	Display primary images and a movable window of secondary images to show a fused image in the area covered by the window.

The viewport displays the selected image.

Orienting Images

You can zoom and pan primary, secondary, or fused images to reorient them in the viewport. Images in viewports of the same orientation are panned, zoomed, and reset together. In synchronization mode, resetting the pan and zoom occurs in both windows simultaneously.

Zooming Images

In an MPR fusion viewport, you can zoom a specific area or a selected part of a primary, secondary, or fused image. In a MIP viewport, you can zoom a specific area of a PET or SPECT volume to increase its magnification.

To zoom an image in an MPR fusion viewport:

1. Select the required image in the MPR fusion viewport.
2. Do one of the following:
   - Choose Tools | Zoom (**Z**).
   - Click the Zoom tool  .

   The mouse cursor changes to indicate you are zooming.

3. Position your mouse cursor over the area in the viewport you would like to zoom, and then click and drag.

Drag:	To:
Up	Increase the magnification of the area (zoom in).
Down	Decrease the magnification of the area (zoom out).

Note: You can also right-click and hold your mouse and drag up (to zoom in) or drag down (to zoom out).

When zooming fused images, the zoom settings are applied to both the primary and secondary images. If the selected MPR fusion viewport is displaying fused transverse images, releasing the left mouse button also zooms fused sagittal and fused coronal images in the other MPR fusion viewports.

4. To revert the image to its original position, right-click the image and select Reset Pan/Zoom.

To zoom an image volume in the MIP viewport:

1. Select the MIP viewport.
2. Do one of the following:

Click:	To:
Zoom	Increase the magnification of the image volume (zoom in).
UnZ	Decrease the magnification of the image volume (zoom out).

Note: You can also right-click the image and drag up (to zoom in) or drag down (to zoom out). If your system is equipped with a two-button mouse with a scroll wheel, you can use the mouse wheel to zoom in and zoom out.

To zoom in a selected area:

1. Select the required image in the MPR fusion viewport.
2. Do one of the following:

   • Right-click and choose Mouse Mode, and then select Zoom Selected.

   • Click the Zoom Selected tool  .

   The mouse cursor indicates that the Zoom Selected tool is active  .

3. Click and drag an outline of the area you want to select.
4. To complete your selection, release the left mouse button.

   Only the selected area is zoomed in the viewport.

Panning Images

When zooming a primary, secondary, or fused image, a region of interest may move out of the MPR fusion viewport. You can pan images to position them as required.

To pan an image in an MPR fusion viewport:

1. Select the required image in the MPR fusion viewport.
2. Do one of the following:

   • Choose Tools | Pan (**P**).

   • Click the Pan tool  .

   The mouse cursor changes to indicate that you are panning.
3. Click the image and drag in the required direction.

   Note: You can also left-click and hold your mouse and drag in the required direction.
4. To revert the image to its original position, right-click the image and select Reset Pan/Zoom.

To pan an image volume in the MIP viewport:

1. Select the MIP viewport.
2. Click the middle mouse button and drag in the required direction.

Stacking Images

You can stack through a series that contains multiple primary, secondary, or fused images, viewing each image in the sequence.

To stack images:

1. Select the required series in an MPR fusion viewport.
2. Do one of the following:

   • Choose Tools | Stack (**S**).

   • Click the Stack tool  in the toolbar, and then click and drag in the required MPR fusion viewport.

   The mouse cursor changes to indicate that you are stacking.

Drag:	To:
Down	View the images in sequential order.
Up	View the images in reverse order.

3. Click and drag in the required viewport.

   Note: If your mouse has a scroll wheel, you can stack by scrolling up or down.

   When the Update All Viewports When Moving Cursor general preference is enabled, you can stack images in an active MPR fusion viewport without updating the other viewports at the same time. This greatly improves image stacking performance in that viewport and is especially useful on slower computers. See "Setting the General Preferences" on page 14.

Measuring Lines, Areas, and Volumes

You can measure straight lines, regions of interest (ellipse, circle, freehand, and piecewise), and volumes of interest. You can create multiple measurements of the same type or different types on a selected image, up to a maximum of three measurement results per image. Image Fusion can be configured to allow you to create more than three measurement results per image. For more information, contact your IntelePACS administrator.

Note: If a drawn region of interest (ROI) has too few screen pixel points, it is automatically deleted. You need to try again.

You can adjust the size of the measurement text displayed in the MPR fusion viewport. For more information, see "Setting the General Preferences" on page 14.

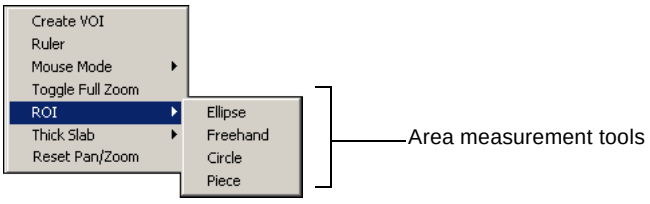
The measurements taken depend on the type of images being displayed in the MPR fusion viewport. For example, if the viewport is displaying both primary and secondary images, the Image Fusion displays measurements for both types of images.

To save your measurements, you can copy the image to the system clipboard and then paste it into another application (such as an image editing application), or save it as a new DICOM Secondary Capture series.

Note: It is recommended that you use a test phantom to verify that Image Fusion is displaying accurate measurements.

To select a measurement tool:

➤ Right-click the required MPR fusion viewport and select the required tool.



This tool is active until you choose a different one.

Measuring Straight Lines

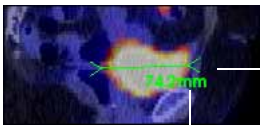
Use linear measurements to measure a straight line.

To measure a straight line:

1. Select the required MPR fusion viewport.
2. Right-click and select Ruler.

   The mouse cursor changes to indicate that the ruler tool is active.
3. On the required image, click where you want the line to start.
4. Click where you want the line to end.

   A measurement appears along with text describing the length of the line in millimeters.



5. Repeat steps 2 to 4 for each measurement you want to take.

To move or resize a linear measurement:

➤ Do either of the following, as required:

- To adjust the line length, click and drag either the start or end point.
- To move the line, click and drag the line connecting the end points.

The line updates to reflect your changes.

Measuring Elliptical and Circular Areas

You can create an elliptical or circular measurement to define and measure a region of interest on the image. For PET, the area, PET average and SUV average of the ellipse or circle are measured in Bq/ml. For SPECT, the area and average NM counts are measured.

Once you create the measurement, you can rotate, move, and resize it as required.

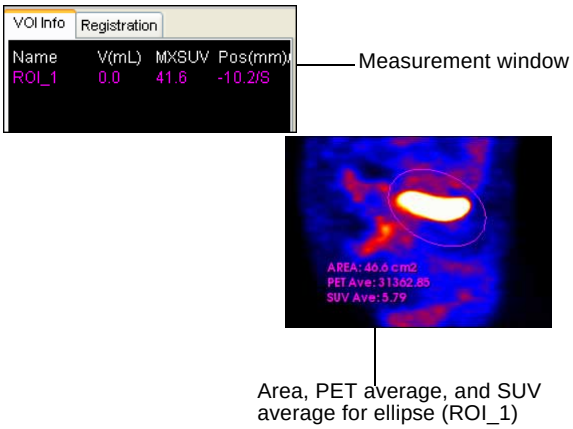
To measure elliptical or circular areas:

1. Select the required MPR fusion viewport.
2. Right-click and choose ROI, and then select Ellipse or Circle.

   The mouse cursor indicates that the elliptical or circular measurement tool is active.

3. On the required image, click at the starting point of your measurement and drag to adjust the size and shape of the ellipse or circle. Release the mouse button at the end of your measurement.

   For SPECT images, the NM average appears on the image. The maximum NM also appears in the Measurement window in the control panel. For PET images, the area, PET average and SUV average appear on the image. The maximum SUV appears in the Measurement window in the control panel.



4. Repeat step 2 for each measurement you want to take.

Measuring Freehand Areas

Use the Freehand measurement tool to draw an outline around an area on an image. This tool measures area in square millimeters for a calibrated image or square pixels for an uncalibrated image.

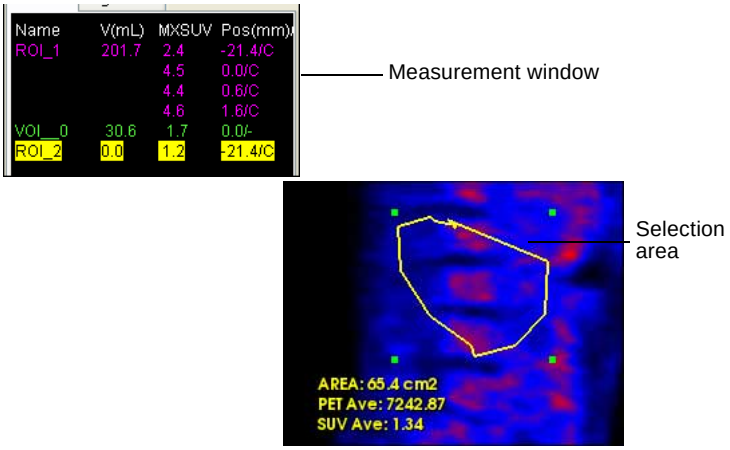
To measure a freehand area:

1. Select the required MPR fusion viewport.
2. Right-click and choose ROI, and then select Freehand.

   The mouse cursor indicates that the freehand measurement tool is active.

3. Click and drag an outline of the area you want to select.
4. To complete your selection, release the left mouse button.

   For SPECT images, the area and NM average appear on the image. For PET images, the area, PET average and SUV average appear on the image. The maximum SUV value appears in the Measurement window in the control panel.
5. Repeat steps 3 to 4 for each freehand area you want to make.



Measuring Piecewise Areas

Use the Piecewise measurement tool to draw a closed polygon around an area on an image that does not have a distinguishable edge. This tool measures area in square millimeters for a calibrated image or square pixels for an uncalibrated image.

To measure a piecewise area:

1. Select the required MPR fusion viewport.
2. Right-click and choose ROI, and then select Piece.

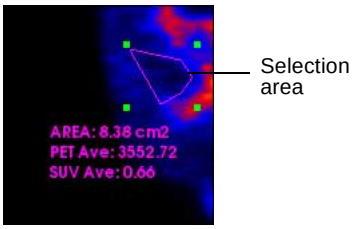
   The mouse cursor indicates that the piecewise measurement tool is active.

3. Click and release the left mouse button to start the drawing.
4. Move the mouse cursor to the next point along the boundary.
5. Click the left mouse button again to confirm the point.
6. Repeat step 5 to draw more points along the boundary.

7. When you are close to the starting point, click the right mouse button to close the boundary.

   For PET images, the maximum SUV value appears in the Measurement window in the control panel. For SPECT images, the maximum count value in the 2D ROI appears.

8. Repeat steps 3 to 7 for each piecewise area you want to measure.



Measuring Volumes

Use the Volume of Interest (VOI) measurement tool to draw a region of interest over a lesion or portion of tissue visually demonstrating the greatest radiopharmaceutical activity on attenuation-corrected image data. This tool measures the total volume of the area, in milliliters (mL), of the region. It also measures the maximum PET and the maximum SUV. For SPECT images, VOI measures the maximum count value.

You can also triangulate all the viewports to the maximum SUV value of the currently-selected volume area.

Note: Image Fusion supports body weight-based SUV calculations in Bq/mL (Becquerel/milliliter) units. If the DICOM header does not specify pixel units in Bq/mL for PET images, then the SUV is not calculated. The pixel units are then unknown and labelled as "PET," but usually related to counts. Similarly, for SPECT images, if the DICOM units are not CNTS, the units are labelled as "NM."

To measure a volume area:

1. Select the required MPR fusion viewport.
2. Right-click and select Create VOI.

   The mouse cursor indicates that the VOI measurement tool is active.

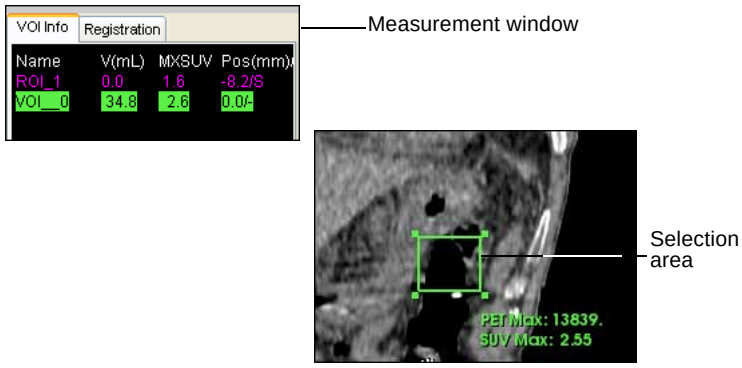
3. Click and drag an outline of the area that you want to select in the image.
4. To complete your selection, release the left mouse button.

   For SPECT images, the maximum count value appears. For PET images, the maximum PET, and maximum SUV values appear. A numbered volume region beginning with "VOI" and the volume measurement and maximum SUV (or max

NM) also appear in the VOI Info tab of the Measurement window in the control panel.

The other MPR fusion viewports are updated with the corresponding profile of the volume area.

PET images



5. Stack to another image and repeat steps 3 to 4 for each volume you want to measure.

   You do not have to draw regions in consecutive images.

   Note: When you select a volume measurement in the Measurements window, the viewport triangulates to the position of that VOI.

To triangulate all viewports to the maximum SUV value of the current volume area:

➤ Right-click the VOI and select Go to Max

All viewports are triangulated to approximately the same position.

Measuring Volume ROIs

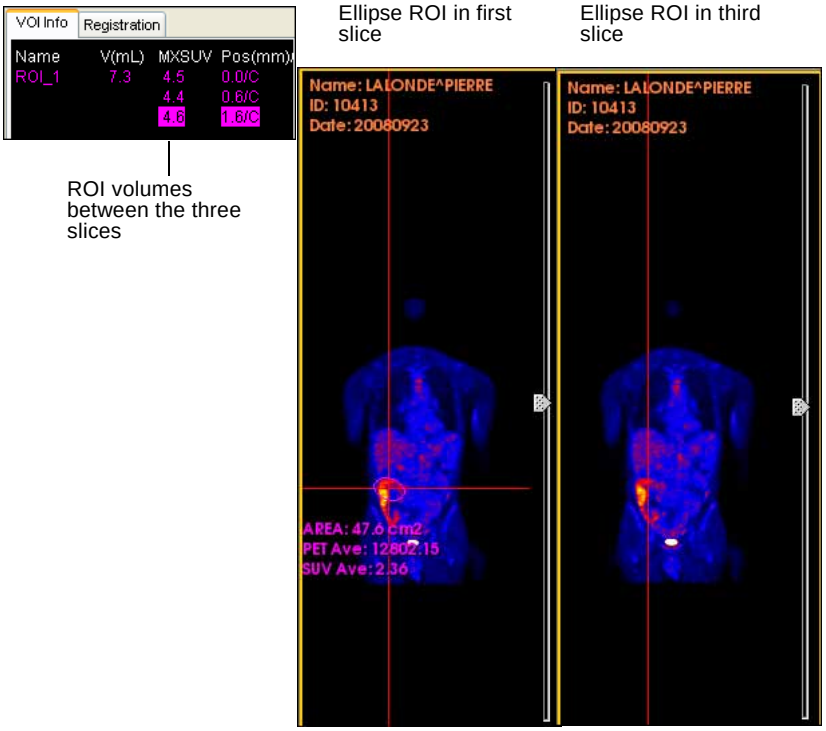
You can use regions of interest created on several images in a contiguous set of slices to measure the volume of an arbitrary area.

To measure a volume ROI:

1. Select the required MPR fusion viewport.
2. Draw the region of interest (ellipse, freehand, circle, or piecewise) that you want in the first image.
3. Stack to another image and draw another region of interest.

   The region of interest is drawn in the same color as the previously-drawn region of interest. The application assumes that the drawn ROIs at the two scroll positions correspond to the same physical structure and calculates the volume between the ROIs as the average area of the ROIs multiplied by the distance between them. The

calculated volume is displayed in the VOI Info tab of the Measurements window in the control panel.



4. Continue drawing as many regions of interest as you want on different images to improve the volume estimate.

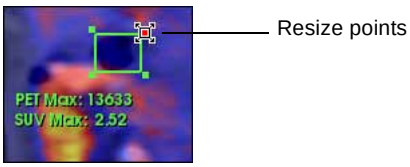
Moving and Resizing ROI and VOI Measurements

You can move and resize ROI and VOI measurements on an image.

To move and resize an ROI or VOI measurement:

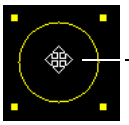
1. Click a measurement to select it in the viewport.
2. Do either of the following, as required:

   • To adjust the size, click and drag any of the resize points at the corners of the measurement.



The measurement updates to reflect your changes.

• To move the measurement, click the cross hairs and drag it anywhere in the viewport.



Deleting Measurements

You can delete a selected measurement on an image.

To delete a selected measurement:

➤ Do one of the following:

• Right-click the measurement that you want to delete and choose Delete.

• Right-click the measurement that you want to delete and press **DELETE.**

The measurement is deleted.

Recalculating SUV

If incorrect patient information such as the wrong patient weight or incorrect dose concentration results in a faulty SUV, change the SUV calculation values temporarily in order to recalculate the SUV.

Note: The changes you make to the SUV Calculator do not affect the information contained in the DICOM header or the values calculated in the viewports.

To adjust the SUV value:

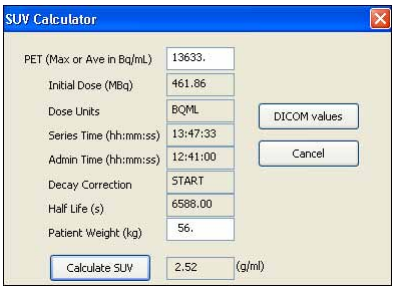
1. Select a viewport.
2. Choose Tools | SUV Calculator.

   The SUV Calculator appears with the DICOM values.
3. Modify the required patient information and then click Calculate SUV.

   The SUV value for the selected viewport appears at the bottom of the SUV Calculator.

   Note: You can click the ROIs and VOIs in the ROI/VOI control panel window. If the SUV calculator is present, the max dose concentration within that ROI or VOI is shown in the SUV calculator, and the SUV is recalculated.

4. To return to the original values, click DICOM Values.



Registering Images Manually

When primary and secondary images are acquired on the same scanner, it is assumed that the patient has remained in the same position throughout both scans. The primary and secondary images are fused automatically based on DICOM coordinates.

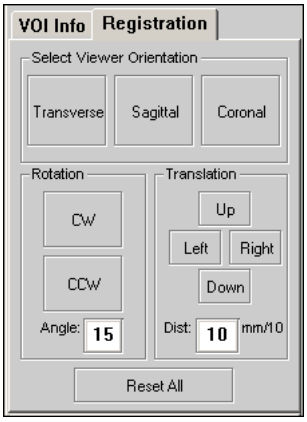
If the primary and secondary images are acquired on different scanners and there are differences in temporal resolution between both scanners, then a potential misregistration between the primary and secondary images can occur. In this case, you can register the primary and secondary images manually through visual inspection of secondary images superimposed on primary images. You can define the orientation, rotation and translation of the secondary images for registration.

If there are any ROI and VOI measurements on images when you try to register them manually, a warning appears. You can save these images before registering them manually.

To register images manually:

1. Select the required MPR fusion viewport.
2. Click the Registration tab in the control panel.

Manual Registration Settings



3. Click the required viewer orientation button: Transverse, Sagittal, or Coronal.

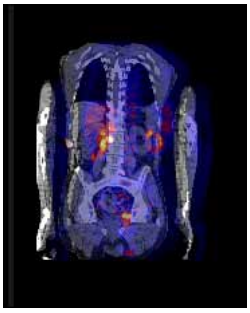
   The outline of the affected viewports is highlighted in yellow.

4. Do one of the following:

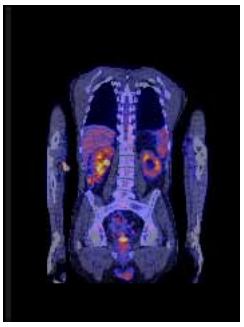
   • To rotate the images, click the required rotation button: CW (clockwise) or CCW (counterclockwise). You can also enter the rotation angle in the Angle field, using increments between 0° and 99°.

   • To translate the images, click the required translation button: Up, Down, Left, or Right. By default, the translation distance is a 40mm/10 increment. You can also enter the translation distance in the Dist field, using increments between 0 and 999 mm/10.

Misregistered primary and secondary images



Registered primary and secondary images



Images in all affected viewports are also registered.

5. To reset images to their original registration, click Reset All.

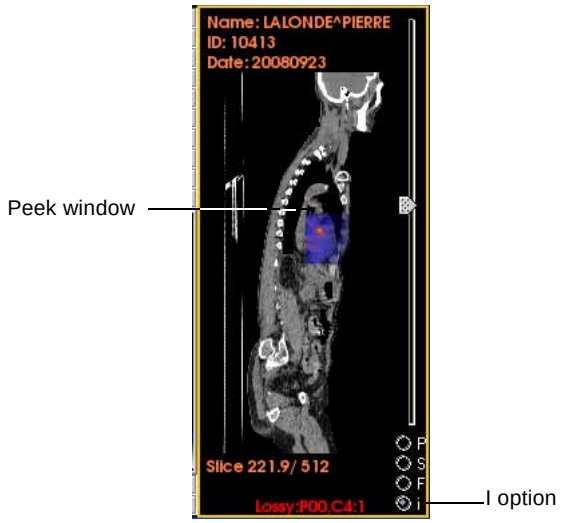
Peeking Inside Secondary Images

In an MPR fusion viewport, you can display secondary images in a rectangle on top of primary images to quickly view functional and anatomical information together.

To peek inside secondary images:

1. Select the required image in the MPR fusion viewport.
2. Enable I.

   A rectangle, referred to as the *Peek window,* appears in the viewport.



3. Click and drag the rectangle to the required area on the image to view the secondary image.

Capturing and Exporting DICOM Images

You can capture images in a single viewport, all visible viewports, or capture an image of the entire screen. These images are saved as a *DICOM secondary capture series* and sent to IntelePACS for permanent storage. Once sent to IntelePACS, a DICOM secondary capture series is saved with the original study.

In the InteleViewer Search tool, a modality of “OT” and the words “IMAGE FUSION SECONDARY CAPTURE” in the Series Description indicate that the series contains DICOM secondary capture images.

You can capture images from both synchronized windows. In your captured images, images from instance 1 appear on the left while images from instance 2 appear on the

right. If you are comparing a current study to a prior study, Image Fusion saves the screen captures to the current study.

Note: To capture images, your user account must have the Send Data to PACS privilege. For more information, contact your IntelePACS administrator.

To capture an image:

1. Select the required MPR fusion viewport.
2. Choose Tools | DICOM Capture, and then select the type of capture.

Select:	Press:	To:
Image	**SHIFT+I**	Capture the active viewport.
Viewing Area	**SHIFT+V**	Capture all visible viewports.
Screen	**SHIFT+S**	Capture the entire screen.

The image is captured as a 24-bit color image with no image compression and is saved as a DICOM secondary capture series with the original study on the IntelePACS system.

If you search for the original study in the InteleViewer Search tool, the DICOM secondary capture series is indicated by a modality of “OT” (for secondary capture).

It may take a few moments for the DICOM secondary capture series to appear in the Search tool, depending on the number of images being transferred.

To capture a series:

1. Select the required MPR fusion viewport.
2. Choose Tools | Export DICOM Series (C).

   The image is captured as a 24-bit color image with no image compression and is saved as a DICOM secondary capture series with the original study on the IntelePACS system. The DICOM secondary capture series is indicated by a modality of “OT” (for secondary capture).

Copying Images into Other Applications

You can copy an image to the system clipboard and then paste it into another application, such as an image editing application.

To copy an image:

1. Select the required MPR fusion viewport.
2. Choose Tools | Copy to Clipboard, and select the copy option.

Select:	Press:	To:
Image	**CTRL + I**	Copy the active viewport.
Viewing Area	**CTRL + V**	Copy all visible viewports
Screen	**CTRL + S**	Copy the entire screen.

   The image is copied to the Windows system clipboard as a 24-bit color image with no image compression.

3. To paste the information, open the application into which you want to copy the image and press **CTRL + V**.

Exporting Images to PDF

You can automatically export images directly to Adobe Portable Document Format (PDF) to create a scrapbook of images. You can also export images to your local temporary file where you can manually create a PDF of images. This feature offers you flexibility and tailoring in terms of layout and choice of images.

When you export images directly to PDF, Image Fusion captures each configured viewport at its current position. When you click the SUV in the ROI/VOI Measurement window, all viewports triangulate to the maximum point in the lesion. You can then adjust the image (window/level, zoom, pan, stack, etc.), and export the configured set of viewports to a PDF file to create a set of images with different views (transverse, coronal, etc.) of the same lesion. Repeat for all lesions and then create the PDF file.

Note: SUV calculations are included in image captures.

To export images to PDF directly:

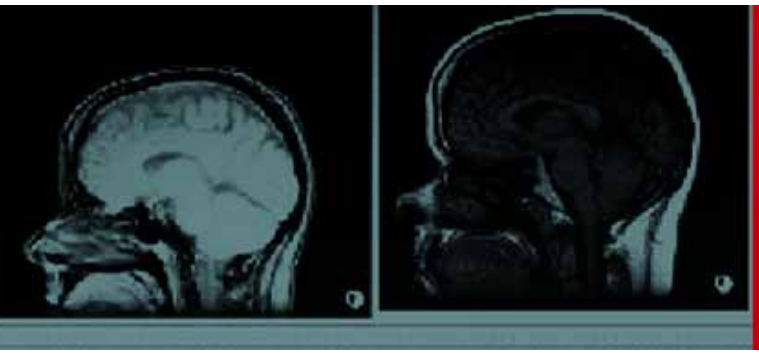
1. Set your PDF export preferences if you have not done so already. See “Setting Image Export Preferences” on page 29.
2. Click Tools | Export to PDF and then select Generate PDF.

   The PDF file appears in the location you designated in your preferences.

To export images to a temporary file:

➤ Click Tools | Export Images for PDF.

The images appears in your temporary files. Use the images to create a PDF.



A
Keyboard and Mouse Shortcuts

Use keyboard and mouse shortcuts to quickly access the Image Fusion application features.

In this Appendix:

List of Keyboard Shortcuts 62
List of Mouse Shortcuts 63

Intelerad®

List of Keyboard Shortcuts

The Image Fusion application provides the following keyboard shortcuts:

User Layouts

To:	Press:
Choose user layouts 1 through 8	1 through 8
Choose user layouts 9 or more	9 or more
Choose coronal layout - primary	Shift+1
Choose coronal layout - secondary	Shift+2
Choose coronal layout - fused	Shift+3
Choose all - coronal layout	Ctrl+4
Choose sagittal layout - primary	Shift+4
Choose sagittal layout - secondary	Shift+5
Choose sagittal layout - fused	Shift+6
Choose sagittal layout - all	Ctrl+5
Choose transverse layout - primary	Shift+7
Choose transverse layout - secondary	Shift+8
Choose transverse layout - fused	Shift+9
Choose transverse layout - all	Ctrl+6
Choose all primary layout	Ctrl+1
Choose all secondary layout	Ctrl+2
Choose all fused layout	Ctrl+3
All	Ctrl+7

Tools

To:	Press:
Copy image to clipboard for image	Ctrl+I
Copy image to clipboard for screen capture	Ctrl+S
Copy image to clipboard for viewing area	Ctrl+V
Export DICOM series	C
Export secondary capture for image	Shift+I
Export secondary capture for screen capture	Shift+S
Export secondary capture for viewing area	Shift+V
Hide/display annotations	A
Hide/display the control panel	V

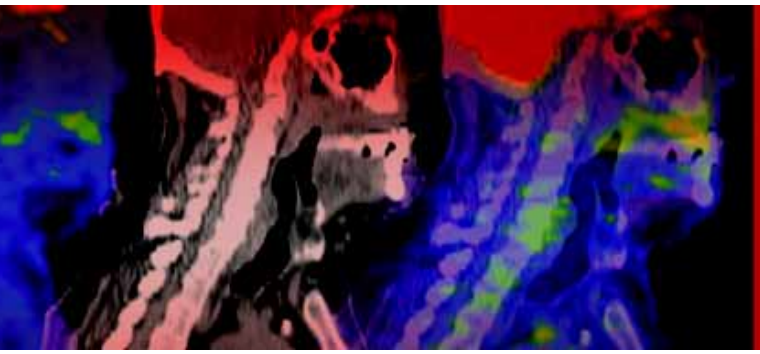
To:	Press:
Pan	P
Stack	S
Synchronize instances	Y
Triangulate	T
Window level	W
Zoom	Z

Window Level Presets

To:	Press:
Choose window level presets - DICOM	F2
Choose window level presets - Chest	F3
Choose window level presets - ABD	F4
Choose window level presets - Lung	F5
Choose window level presets - Brain	F6
Choose window level presets - Bone	F7
Choose window level presets - Head/Neck	F8
Choose secondary window level presets	Shift F2-F8

List of Mouse Shortcuts

Button:	Tool:	Icon:
Left	Triangulate (MIP viewport)	
	Zoom (MPR fusion viewport)	
Middle	Pan (MIP viewport)	
	Window level (MPR fusion viewport)	
Right	Zoom (MIP viewport)	
	Pan (MPR fusion viewport)	



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