ISO Analyze Software

Model 023-03

CIRS ISO ANALYZE
POWERED BY AQUILAB

USER GUIDE

CIRS
2428 Almeda Avenue Suite 316 • Norfolk, Virginia 23513 • USA • Tel: 757-855-2765
WWW.CIRSINC.COM

TABLE OF CONTENTS

1 INTRODUCTION

1.1 HARDWARE REQUIREMENTS

The minimum hardware requirements for the ISO Analyze™ Software workstation are as follows:

- High resolution 19" monitor
- Keyboard and mouse
- Central processing unit with:
  - Core Duo (Dual Core) processor
  - 1GB of memory
  - ATI or Nvidia 256 MB graphics adapter
  - 160GB hard disk
  - CD-ROM burner

1.2 SOFTWARE REQUIREMENTS

The software configuration of the ISO Analyze™ Software workstation includes:

- Microsoft® Windows XP Pro SP2 or later
- Internet Explorer

Note: The software and hardware requirements are provided for documentation and are subject to change without notice.

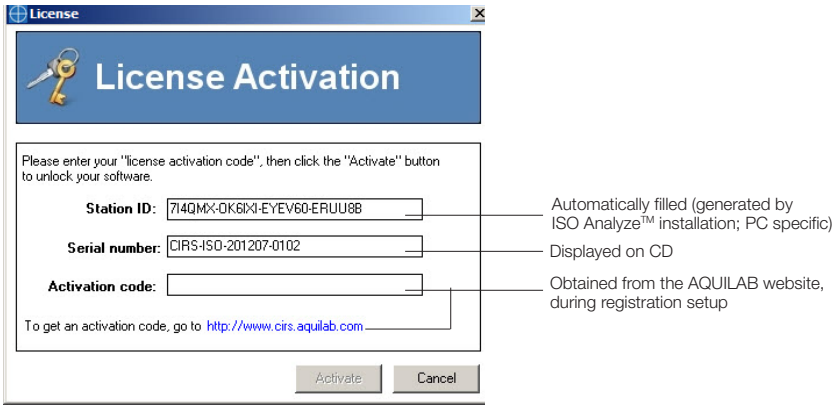
1.3 DESCRIPTION

ISO Analyze™ Software is an integrated solution that enables the isocenter quality assurance of your Linac by analyzing DICOM images acquired with the EPID detector and OBI system (CBCT). Controls are run automatically, analyzing CIRS ISO Cube™ Daily QA Phantom images and quantifying a large number of evaluation parameters. ISO Analyze™ Software allows report generation for each tested isocenter (collimator, gantry, couch, MV radiation, 2DkV, CBCT) as well as MV and kV pixel size.

Warning: ISO Analyze™ Software is designed to check consistency of equipment performance and can not be used for acceptance or commission of equipment.

1.4 LICENSE

During startup, the ISO Analyze™ Software prompts the user to activate the license using the dialog box shown on Figure 1: License Activation Window.



- Verify that the Station ID has been automatically filled in the Activation Window
- Fill in the Serial Number (Displayed on the CD-ROM)
- Click on “Generate Activation Code”
- Type in the "Activation Code" and press "Activate"

Note: To obtain activation code, go to www.cirs.aquilab.com and follow the instructions on License Activation Window.

2 IMAGE ACQUISITION

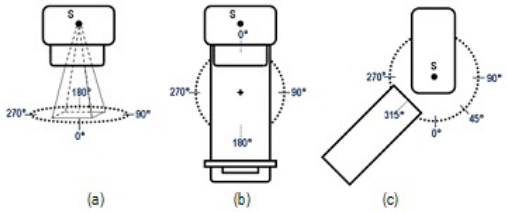
2.1 INTRODUCTION

Image acquisition for complete accelerator isocenter quality assurance requires two test-objects:

- CIRS ISO Cube™ Daily QA Phantom (Model 023)
- CIRS ISO Base™ (023-04) support platform for ISO Cube™ Daily QA Phanto (necessary when MV & kV pixel size are to be computed.)

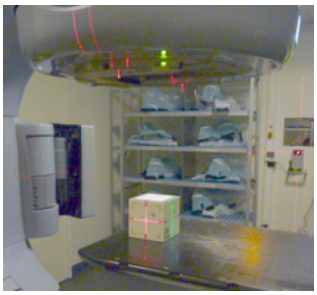
The image acquisition sequence proposed in this document is provided for information only and may be adjusted by the user. However, once the acquisition sequence has been established, the user should perform acquisitions in compliance with this sequence or run the risk of being unable to perform automatic mode analysis from a predefined protocol.

Note: The angular positions of the moving parts of the accelerator (collimator (a), gantry (b) and treatment table (c)) mentioned in this document comply with the names and directives of international standard IEC 61217. All ISO Analyze results are calculated in IEC 61217 Coordinate System.



2.1.1 CIRS ISO Cube™ Daily QA Phantom without the ISO Base™

Position the CIRS ISO Cube™ Daily QA Phantom test-object directly on the patient table. Adjust the table height to bring the laser alignment marks on either side of the cube onto the side lasers of the accelerator. Adjust the positioning of the table top to bring the laser alignment marks on to the sagittal laser and the transverse laser. Check the general positioning of the test-object and refine the adjustments as needed.



2.1.2 CIRS ISO Cube™ Daily QA Phantom with the ISO Base™

Position the CIRS ISO Cube™ Daily QA Phantom on the ISO Base™. Then, position the ISO Base™ on the patient table and adjust the table height to bring the laser alignment marks on either side of the cube onto the side lasers of the accelerator. Adjust the positioning of the table top to bring the laser alignment marks on to the sagittal laser and the transverse laser. Check the general positioning of the test-object and refine the adjustments as needed.

WARNING: Do not move or touch the test-object once initial positioning is complete. This positioning step is critical to obtain optimal results.

WARNING: In order to ensure accurate calculation of MV and kV pixel size, it is imperative that the ISO Cube™ rest against the bottom face of the pocket that is machined in the center of the ISO Base™.

2.2 ACQUISITION

2.2.1 Pixel size of the MV detector (Requires 023-04)

The MV pixel size is computed from one (1) image. A field size of 10x10 cm is advisable. Due to the distance between Pixel Size markers in the CIRS ISO Base the field size cannot be smaller than 9.6x9.6 cm to compute this parameter.

» Image obtained:

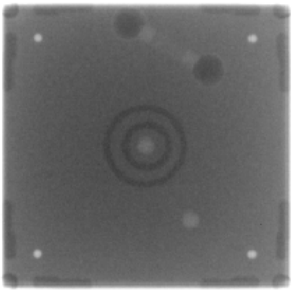


Figure 2: Typical image of the CIRS ISO Base™ with the CIRS ISO Cube™ Daily QA Phantom from the MV detector

Note: To compute the "Pixel Size of the MV Detector" parameter, the CIRS ISO Cube™ Daily QA Phantom must be positioned on the CIRS ISO Base™.

2.2.2 Pixel size of the kV detector (Requires 023-04)

Keep the test-object CIRS ISO Cube™ Daily QA Phantom in the same position used for the previous parameter. A 90° gantry rotation is executed to position the XR source above the test-object. An image is acquired from the kV detector without any collimation of the XR beam.

» Image obtained:

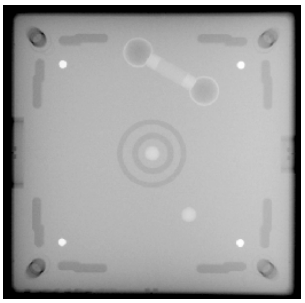


Figure 3: Typical image of the CIRS ISO Base™ with the CIRS ISO Cube™ Daily QA Phantom from the kV detector

Note: To compute the "Pixel Size of the kV Detector" parameter, the CIRS ISO Cube™ Daily QA Phantom must be positioned on the CIRS ISO Base™.

2.2.3 Collimator rotation isocenter

The collimator rotation isocenter is computed with either 4 or 8 images corresponding to various collimator positions. A field size of 10x10 cm is advisable. The following tables describe three possible acquisition sequences:

Acquisition sequence #1: 4 images

	GANTRY POSITION (°)	COLLIMATOR POSITION (°)	TABLE POSITION (°)
IMAGE #1	0	0	0
IMAGE #2	0	90	0
IMAGE #3	0	180	0
IMAGE #4	0	270	0

Table 1: Configuration of acquisition sequence #1

Acquisition sequence #2: 4 images

	GANTRY POSITION (°)	COLLIMATOR POSITION (°)	TABLE POSITION (°)
IMAGE #1	0	45	0
IMAGE #2	0	135	0
IMAGE #3	0	225	0
IMAGE #4	0	315	0

Table 2: Configuration of acquisition sequence #2

Acquisition sequence #3: 8 images

	GANTRY POSITION (°)	COLLIMATOR POSITION (°)	TABLE POSITION (°)
IMAGE #1	0	0	0
IMAGE #2	0	45	0
IMAGE #3	0	90	0
IMAGE #4	0	135	0
IMAGE #5	0	180	0
IMAGE #6	0	225	0
IMAGE #7	0	270	0
IMAGE #8	0	315	0

Table 3: Configuration of acquisition sequence #3

Note: The “Gantry Position” corresponds to the position of the MV source » Image obtained:

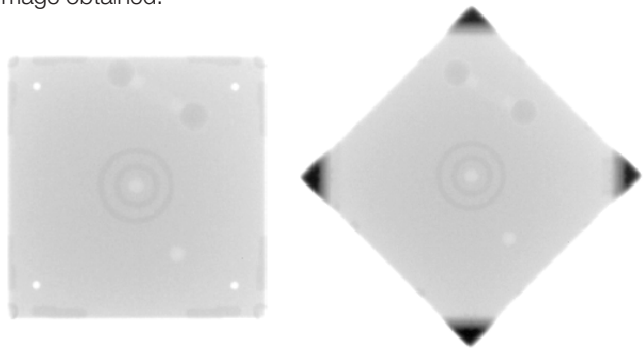


Figure 4: Typical images of the CIRS ISO Cube™ Daily QA Phantom for the collimator rotation isocenter parameter

2.2.4 Gantry rotation isocenter

The gantry rotation isocenter is computed with either 4 or 8 images (3 acquisition sequences) corresponding to various gantry and collimator positions. A field size of 10x10 cm is advisable. The following tables describe three possible acquisition sequences:

Acquisition sequence #1: 4 images

	GANTRY POSITION (°)	COLLIMATOR POSITION (°)	TABLE POSITION (°)
IMAGE #1	0	0	0
IMAGE #2	90	0	0
IMAGE #3	180	0	0
IMAGE #4	270	0	0

Table 4: Configuration of acquisition sequence #1

Acquisition sequence #2: 8 images

	GANTRY POSITION (°)	COLLIMATOR POSITION (°)	TABLE POSITION (°)
IMAGE #1	0	0	0
IMAGE #2	0	180	0
IMAGE #3	90	0	0
IMAGE #4	90	180	0
IMAGE #5	180	0	0
IMAGE #6	180	180	0
IMAGE #7	270	0	0
IMAGE #8	270	180	0

Table 5: Configuration of acquisition sequence #2

Acquisition sequence #3: 8 images

	GANTRY POSITION (°)	COLLIMATOR POSITION (°)	TABLE POSITION (°)
IMAGE #1	0	90	0
IMAGE #2	0	270	0
IMAGE #3	90	90	0
IMAGE #4	90	270	0
IMAGE #5	180	90	0
IMAGE #6	180	270	0
IMAGE #7	270	90	0
IMAGE #8	270	270	0

Table 6: Configuration of acquisition sequence #3

Note: The "Gantry Position" corresponds to the position of the MV source

» Image obtained:

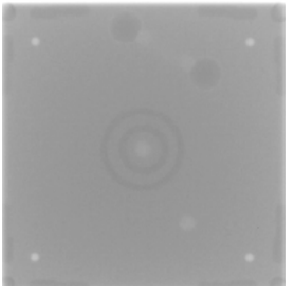


Figure 5: Typical image of the CIRS ISO Cube™ Daily QA Phantom for the gantry rotation isocenter parameter

2.2.5 Couch rotation isocenter

The couch rotation isocenter is computed with either 3 or 5 images corresponding to various couch positions. A field size of 10x10 cm is advisable. The following tables describe two possible acquisition sequences:

Acquisition sequence #1: 3 images

	GANTRY POSITION (°)	COLLIMATOR POSITION (°)	TABLE POSITION (°)
IMAGE #1	0	0	270
IMAGE #2	0	0	0
IMAGE #3	0	0	90

Table 7: Configuration of acquisition sequence #1

Acquisition sequence #2: 5 images

	GANTRY POSITION (°)	COLLIMATOR POSITION (°)	TABLE POSITION (°)
IMAGE #1	0	0	270
IMAGE #2	0	0	315
IMAGE #3	0	0	0
IMAGE #4	0	0	45
IMAGE #5	0	0	90

Table 8: Configuration of acquisition sequence #2

Note: The “Gantry Position” corresponds to the position of the MV source

» Image obtained:

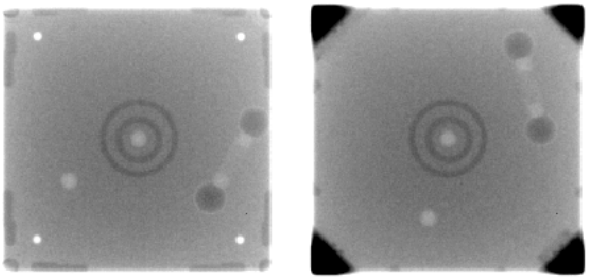


Figure 6: Typical images of the CIRS ISO Cube™ Daily QA Phantom for the couch rotation isocenter parameter

2.2.6 MV radiation isocenter

The MV radiation isocenter of the accelerator is computed with 8 images corresponding to various gantry and collimator positions. A field size of 10x10 cm is advisable. The following table describes two possible acquisition sequence:

Note: Images used for sequences #2 and #3 of the «gantry rotation isocenter» parameter can also be used to compute the «MV radiation isocenter» parameter. In this case, the user will not need to acquire images detailed below.

Acquisition sequence #1: 8 images

	GANTRY POSITION (°)	COLLIMATOR POSITION (°)	TABLE POSITION (°)
IMAGE #1	0	0	0
IMAGE #2	0	180	0
IMAGE #3	90	0	0
IMAGE #4	90	180	0
IMAGE #5	180	0	0
IMAGE #6	180	180	0
IMAGE #7	270	0	0
IMAGE #8	270	180	0

Table 9: Configuration of acquisition sequence #1

Acquisition sequence #2: 8 images

	GANTRY POSITION (°)	COLLIMATOR POSITION (°)	TABLE POSITION (°)
IMAGE #1	0	90	0
IMAGE #2	0	270	0
IMAGE #3	90	90	0
IMAGE #4	90	270	0
IMAGE #5	180	90	0
IMAGE #6	180	270	0
IMAGE #7	270	90	0
IMAGE #8	270	270	0

Table 10: Configuration of acquisition sequence #2

Note: The “Gantry Position” corresponds to the position of the MV source

» Image obtained:

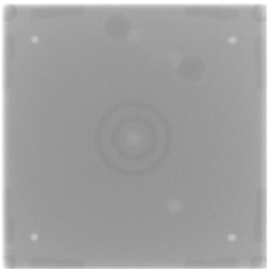


Figure 7: Typical image of the CIRS ISO Cube™ Daily QA Phantom for the MV radiation isocenter parameter

2.2.7 2DkV Isocenter

The 2DkV Isocenter is computed with 4 images corresponding to 4 gantry positions. No collimation of the XR beam is necessary. Therefore, the following table describes the only possible acquisition sequence:

	KV SOURCE POSITION (°)	TABLE POSITION (°)
IMAGE #1	0	0
IMAGE #2	90	0
IMAGE #3	180	0
IMAGE #4	270	0

Table 11: Configuration of acquisition sequence

» Image obtained:

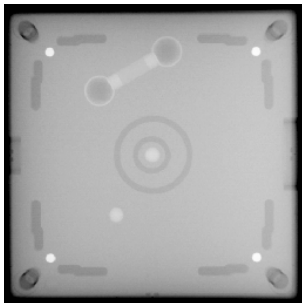


Figure 8: Typical image of the CIRS ISO Cube™ Daily QA Phantom for the 2DkV Isocenter parameter

2.2.8 kV-CBCT Isocenter

The kV-CBCT Isocenter is computed from an acquisition in CBCT mode, with a gantry rotation of 360° and the table at 0°. The acquisition conditions are those used in the routine clinical protocol.

» Image obtained:

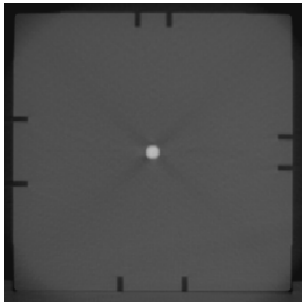


Figure 9: Typical image of the CIRS ISO Cube™ Daily QA Phantom for the kV-CBCT Isocenter parameter

3 LINAC MANAGEMENT MENU

3.1 ADD LINAC

By clicking on Add Linac, the Linac definition shown on Figure 10 appears. This window is split into 3 tabs. Each of these definitions are used for image analysis and report generation:

- Identity
- Acquisition conditions
- Acquisition sequences

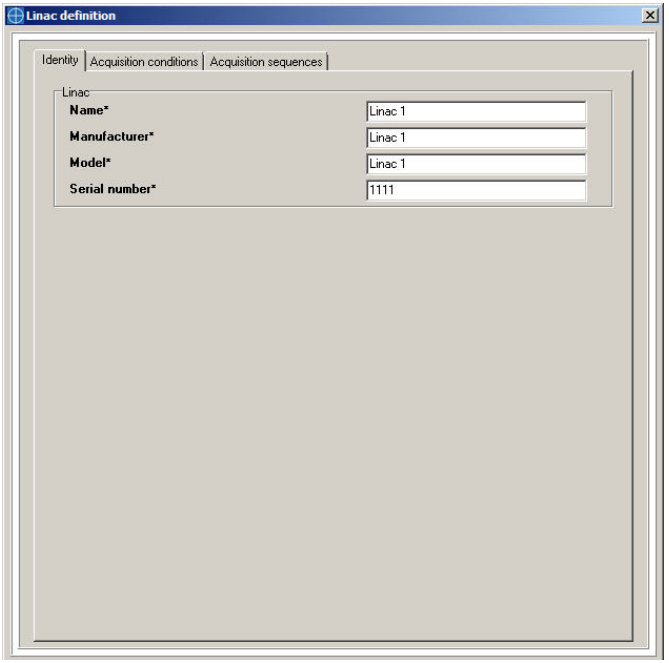


Figure 10: Linac definition Window – Identity tab

3.1.1 Identity

Four fields are mandatory to create the device:

- Name
- Manufacturer
- Model
- Serial Number

Note: These fields will be displayed on each report control.

3.1.2 Acquisition conditions

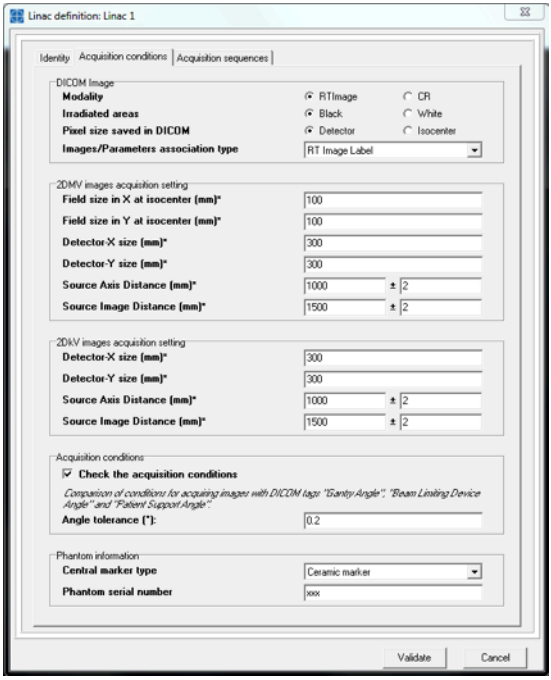


Figure 11: Linac Definition Window – Acquisition Conditions Tab

3.1.2.1 DICOM Images

- Modality: 2 DICOM modalities are supported by ISO Analyze:
  - RT Image
  - CR
- Irradiation areas: Gray level of the irradiation areas in the images. There are 2 choices:
  - "Black": ELEKTA and VARIAN Portal device
  - "White": SIEMENS Portal device
- Pixel size saved in DICOM: Specify if the pixel size saved in the DICOM header is given at the isocenter or at the detector. By default, the pixel size is given at the detector (following the DICOM standard).

Note: According to the DICOM standard, the pixel size stored in header of DICOM RT Image [tag (3002,0012) Image Plane Pixel Spacing] is given at the detector [at the value in the tag (3002,0026) RT Image SID]. Some manufacturers don't comply with this standard and the pixel sized stored in the header is given at isocenter [at the value in the tag (3002,0022) Radiation Machine SAD].

If the modality of images is set to CR then the "Pixel size saved in DICOM" option is not available.

Warning: It is very important that the “Pixel size saved in DICOM” option is checked correctly. Checking the wrong option for this info will lead to improper image segmentation as shown below.

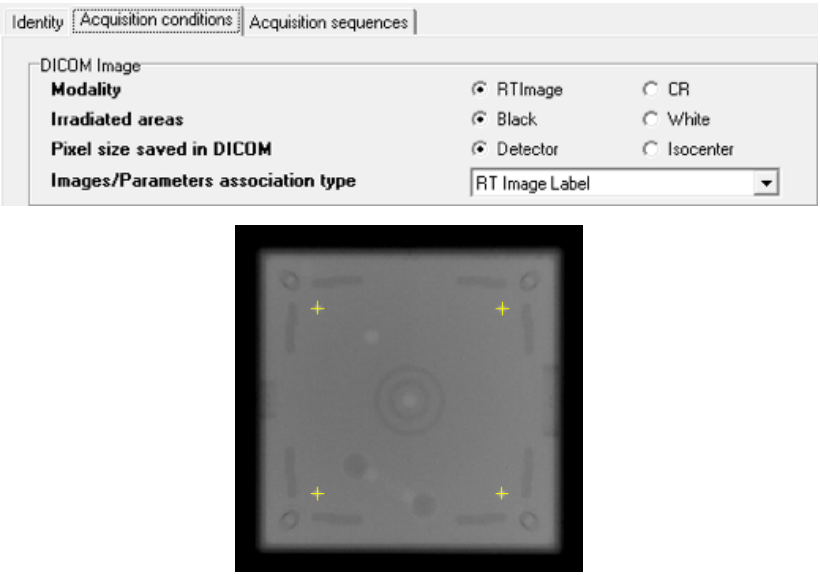


Figure 12: “Pixel size saved in DICOM” option checked correctly.

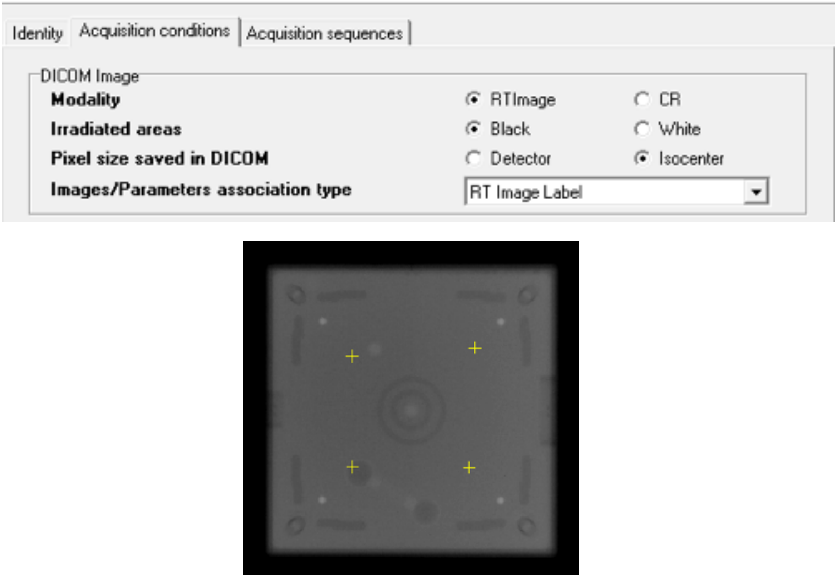


*Figure 13: “Pixel size saved in DICOM” option checked **incorrectly***

Note: If the user is presented with such improper image segmentation, the “Pixel size saved in DICOM” option may be checked incorrectly in the Acquisition conditions tab of Linac definition window. Review this option selection and click "Validate" for a new computation of the results.

- Images/Parameters association type: Selection of the DICOM field used to sort images in the lightbox and consequently the image-parameter association during the loading of the images. There are 2 choices:
  - o Acquisition order
  - o RT Image Label

Note: If CR images are used, the “Images/Parameters association type” is “Acquisition order”.

3.1.2.2 2DMV images acquisition setting

- Field size in X at Isocenter (in mm): Field size used in X direction (collimation) for the images acquisition.
- Field size in Y at Isocenter (in mm): Field size used in Y direction (collimation) for the images acquisition.

Note: As a reminder, field sizes between 5 cm x 5 cm and 11 cm x 11 cm (between 9.6 cm x 9.6 cm and 11 cm x 11 cm if MV Pixel size is to be calculated) should be setup for image acquisitions. A Linac cannot be validated with a field size outside of the 5 cm x 5 cm to 11 cm x 11 cm range.

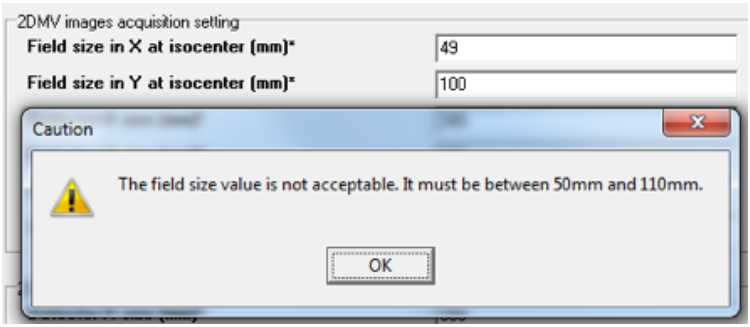


Figure 14: Error message regarding field size value outside of recommended range

Note: If images were acquired with a field size larger than 11 cm x 11 cm, there might be cases when the detected radiated field is different from what is being actually radiated due to sudden changes in values of pixels in the images being analyzed as seen in Figure 15. In such cases, which are also associated with large differences between the center of ISO Cube phantom and the center of the radiated field, it is advisable that a new set of images with a proper field size is acquired and analyzed.

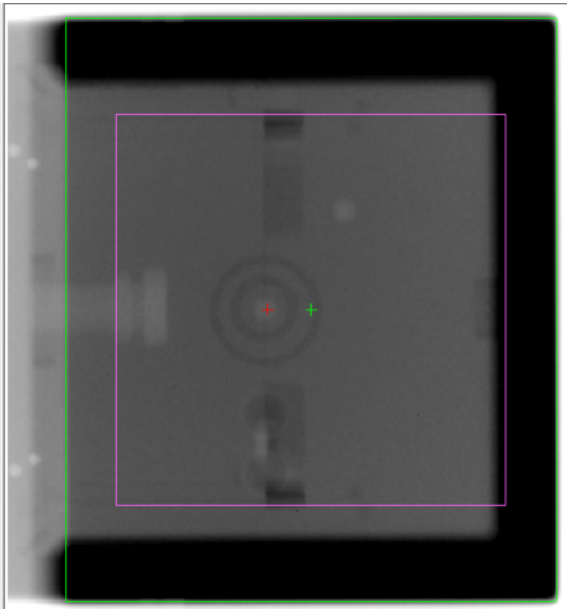


Figure 15: Improper detection of radiation field due to interface of ISO Cube and ISO base, which introduce a steep gradient in the values of pixels from left side of image.

- Detector-X size (in mm): Physical dimension X of the detector. This information is required to determine the theoretical pixel size at SAD when it is not given or present in the header of DICOM images. If the pixel size is present and filled in the header of RT Image or CR images are analyzed, then this information is not taken into account.
- Detector-Y size (in mm): Physical dimension Y of the detector. This information is required to determine the theoretical pixel size at SAD when it is not given or present in the header of DICOM images. If the pixel size is present and filled in the header of RT Image or CR images are analyzed, then this information is not taken into account.
- Source Axis Distance (in mm): Specify the distance and its tolerance between the MV source and the MV Axis of the device. The value entered is compared to the value entered in the tag (3002.0022) in the header of DICOM RT Image. If the tag is not present or specified then the value entered by the user is then taken into account for the calculation of various parameters. For CR images, the value entered by the user is taken into account for the calculation of various parameters.

- Source Image Distance (in mm): Specify the distance and its tolerance between the MV source and the MV detector of the device. The value entered is compared to the value entered in the tag (3002.0026) in the header of DICOM RT Image modality images. If the tag is not present or specified then the value entered by the user is taken into account for the calculation of various parameters. For DICOM images modality CR, the value entered by the user is taken into account for the calculation of various parameters.

3.1.2.3 2DkV images acquisition setting

- Source Image Distance (in mm): Specify the distance and its tolerance between the kV source and the kV detector of the device.
- Detector-X size (in mm): Physical dimension X of the detector. This information is required to determine the theoretical pixel size at SAD when it is not given or present in the header of DICOM images. If the pixel size is present and filled in the header of RT Image or CR images are analyzed, then this information is not taken into account.
- Detector-Y size (in mm): Physical dimension Y of the detector. This information is required to determine the theoretical pixel size at SAD when it is not given or present in the header of DICOM images. If the pixel size is present and filled in the header of RT Image or CR images are analyzed, then this information is not taken into account.

3.1.2.4 Acquisition conditions

- Check the acquisition conditions: Verify that the gantry, collimator and couch angles from the DICOM header of each image correspond to the selected acquisition conditions.

Note: Before activation of this option, be sure that these values are encoded in the DICOM header.

- Angle tolerance: Tolerance between angles from the DICOM header of the images to analyze and those in the queue by the selected acquisition sequences.

Note: If the Coordinate System of the Linac to be analyzed is different from international standard IEC 61217, it is advisable that the user unchecks the “Check the acquisition conditions” box and acknowledges the warning message in order to validate the Linac as seen in Figure 16.

A Coordinate System of the Linac to be analyzed different from international standard IEC 61217 and a checked “Check the acquisition conditions” box will lead to the software algorithm failing to analyze the images. A more burdensome fix of such cases is for the user to use a DICOM editor to edit the DICOM tags related to angles in such a way as to match international standard IEC 61217.

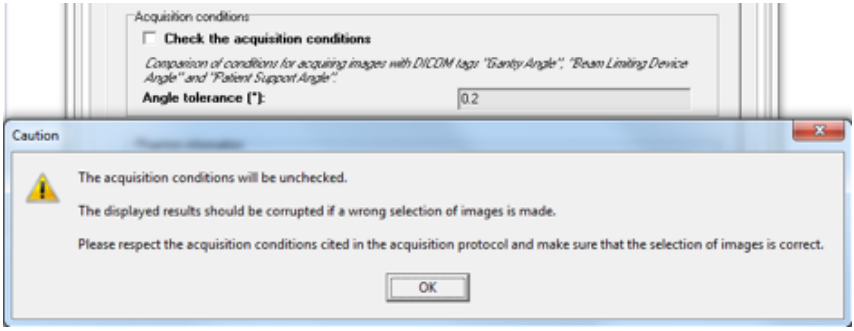


Figure 16: Message acknowledging that the angles specified in DICOM header for "Gantry Angle', Beam Limiting Device" and "Patient Support Angle" are not checked.

3.1.2.5 Phantom information

- Central marker type: Depending on the phantom's version, specify the central marker type used by selecting either "Air cavity" or "Ceramic marker".
- Phantom serial number: Specify the serial number of the phantom used for testing.

3.1.3 *Acquisition sequences*

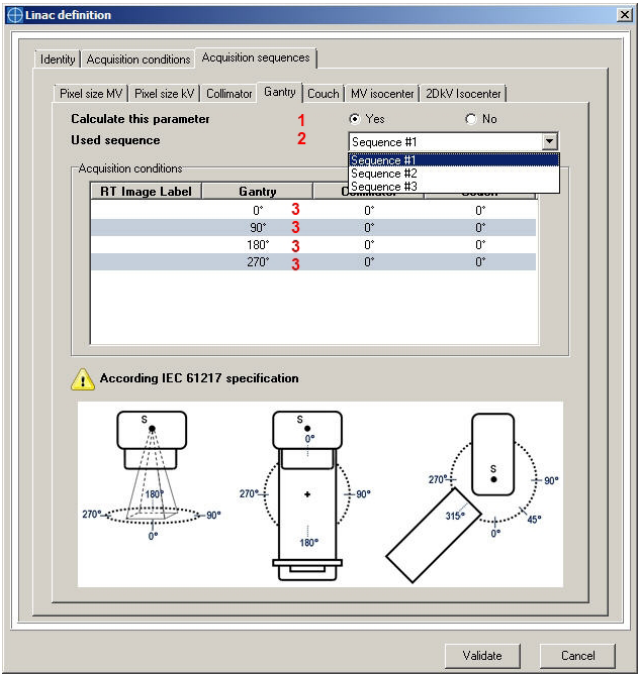


Figure 17: Linac Definition Window – Acquisition Sequences Tab

To configure each parameter, there are 2 options: compute or do not compute.

A. To Compute the parameter - 3 steps:

1. Activate the “Calculate this parameter” option
2. Select the used acquisition sequence (except for the Pixel size MV/kV and the 2DkV Isocenter parameters)
3. For each image, double-click on each line to specify

» The RT Image Label (if chosen in the “Acquisition conditions” (Figure 18)

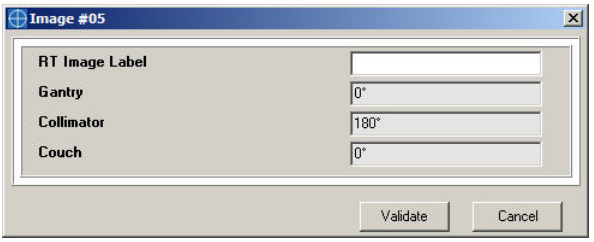


Figure 18: Specify the RT Image Label for each image

Note: Before activation of this option, be sure that these values are encoded in the DICOM header.

» The Index Image (if “Acquisition order” is chosen in the “Acquisition conditions”) (Figure 19)

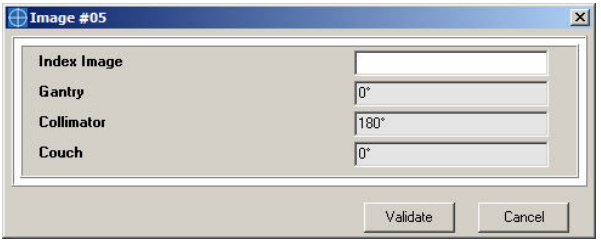


Figure 19: Specify the Index Image for each image

B. Compute without the parameter

1. Deselect the “Calculate this parameter” option

Note: Sequence #2 of the Gantry = sequence #1 of the MV Isocenter. Sequence #3 of the Gantry = sequence #2 of the MV Isocenter. Consequence: It is only necessary to acquire the considered sequence once. These images can be used for both parameters.

3.2 RECONFIGURE A LINAC

The user can reconfigure each added Linac by selecting the Linac in the Linac Management Menu as shown in Figure 20. This will open the Linac Definition Window.

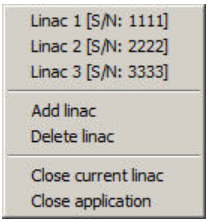


Figure 20: Linac Management Menu

3.3 DELETE LINAC

To delete a Linac:

- Open the Linac deletion window (Figure 21)
- Select the Linac that you want to delete
- Validate

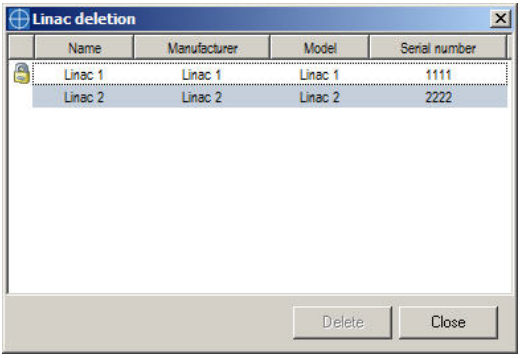


Figure 21: Linac Deletion Window

The icon shows that the associated Linac is already selected. A selected Linac cannot be deleted (see error message shown on Figure 22).

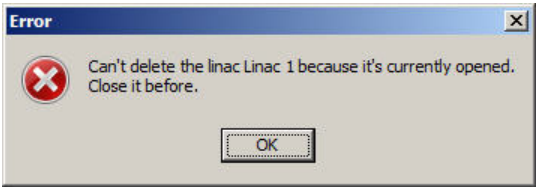


Figure 22: Message error shown when deleting a selected Linac

3.4 CLOSE CURRENT LINAC

This button closes the current Linac. After this action is executed, no image can be analyzed. Select a Linac to analyze images.

Note: The user must generate a report before closing the current Linac to keep a record of the results.

3.5 CLOSE APPLICATION

This action closes the application.

Note: The user must generate a report before closing the current Linac to keep a record of the results.

4 OPTIONS

There are 2 configurations in the menu options shown on Figure 23:

Figure 23: Options Window

- **Import directory:** This option allows the user to define the image import directory:
  - To define a directory, click on
  - To delete the defined directory, click on

- **Personalized logo:** This option allows the user to choose a personal logo which will be displayed in the header of control reports.
  - To define a personal logo, click on
  - To delete a defined logo, click on

  (In this case, the CIRS logo will be displayed by default)

5 MAIN INTERFACE

Once the user has opened the ISO Analyze™ Software, it offers a single interface for managing all the functionalities shown on Figure 24.

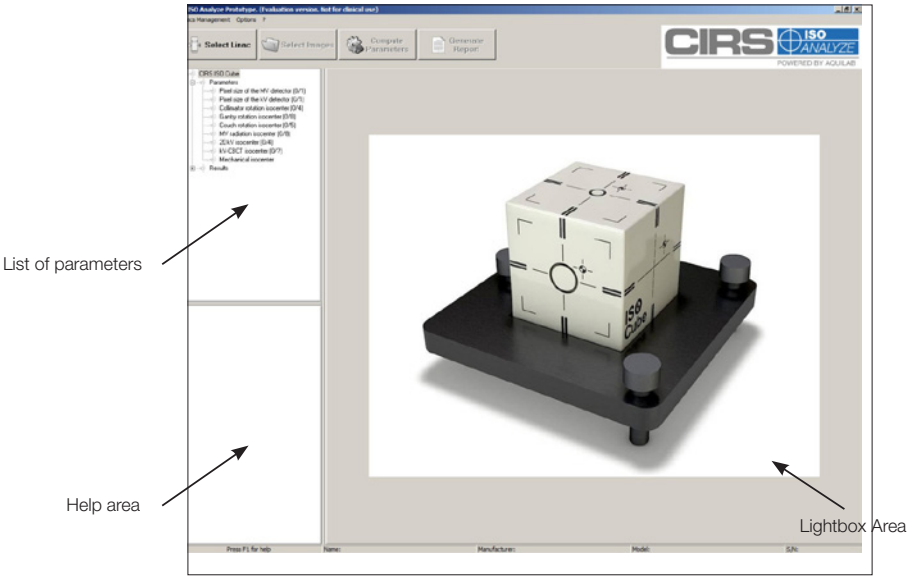


Figure 24: Main Window

The upper section of the interface gives access to the various functionalities of the software via a series of menus.

The lower section contains a text field describing the currently opened study. If no images have been loaded, the field (with Filename, Device, etc) will be empty.

The central section of the interface is split into 3 areas:

- Top left: This area is dedicated to parameters and contains the list of parameters and the results computed for the current images. If there is no loaded image, the results area is empty.
- Bottom left: This is the help area containing information about current image and the main image acquisition parameters. If there is no loaded image, the area is empty.
- Right: Current images are displayed on this lightbox area. If there is no loaded image, the area will be empty.

5.1 LIGHTBOX FUNCTIONALITIES

Right-clicking on a lightbox image will open the menu displayed on Figure 25.

Figure 25: Lightbox Functionalities

5.1.1 Main Window control / Zoom control

The control choice determines whether the right button of the mouse is used for controlling the visualization window or the zoom.

- Main Window control
  When the **Main Window Control** mode is active, right-click while dragging the mouse over the view. If the mouse moves from bottom to top, the window center value is modified proportionate to the mouse movement. If the mouse moves from left to right, the visualization window width is modified proportionate to the movement of the mouse.

  - Zoom control
    When the **Zoom control** mode is active, right-click while dragging the mouse over the view. If the mouse moves from bottom to top, the image is enlarged in real time, proportionate to the movement of the mouse. If the mouse moves from top to bottom, the image is reduced in real time, proportionate to the movement of the mouse.

    To control the **Pan** mode (movement within the image), press both buttons of the mouse at the same time or press the left mouse button and the **Spacebar** while dragging the mouse. The image is moved in real time in conjunction with the movement of mouse.

    The Zoom and Pan apply to the entire series; the values remain unchanged during movement through the series of images.

It is also possible to select one or the other mode by left-clicking to activate the buttons provided for this purpose on the left side of the lightbox as indicated on Figure 26 (next page).

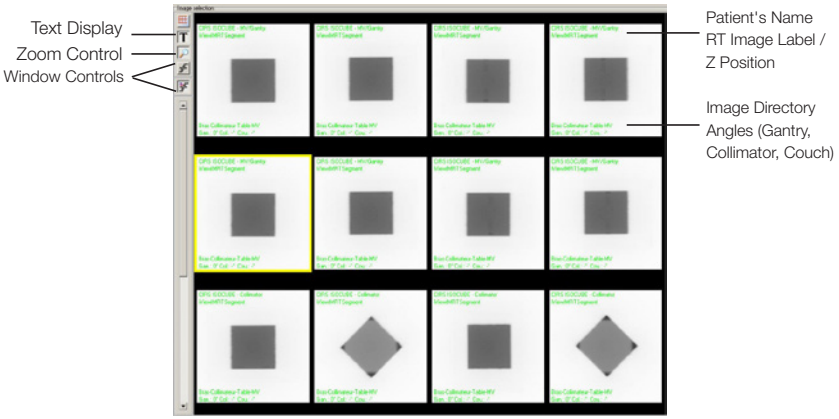


Figure 26: Control Mode Shortcuts

5.1.2 Main Window Control

The selection of the **Manual** sub item of the **Main window** item opens the Window adjustment interface as shown in Figure 27 .

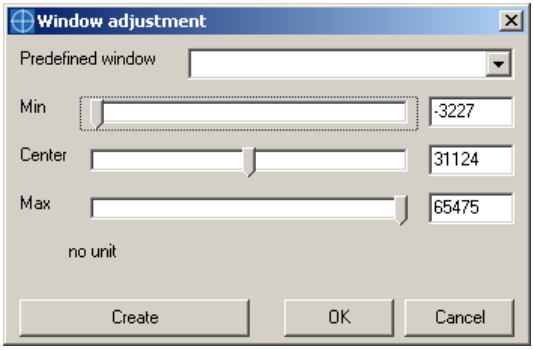


Figure 27: Window Adjustment Interface

- Predefined window
  This is used to select a predefined display window from the proposed list. By default, this list is empty.
- Min
  Moving the cursor with the mouse allows interactive adjustment of the minimum visualization window value.
- Center
  Moving the cursor with the mouse allows interactive adjustment of the central visualization window value.

- Max
  Moving the cursor with the mouse allows interactive adjustment of the maximum visualization window value.

  To make adjustments to the lightbox images, left-click on the **OK** button.

  Clicking on the **Cancel** button closes the window without making any modifications.
- Create a predefined window
  Clicking on the button **Create** will open the backup window as shown in Figure 28. Then, just fill in the field and click on **OK** to validate the creation of the new window.

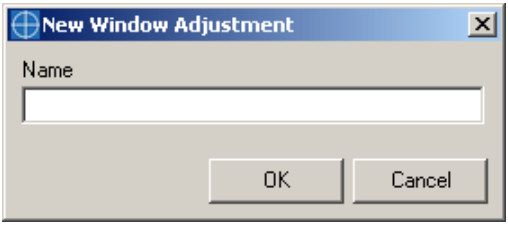


Figure 28 : Window Creation Window

If a predefined window is already loaded, it is possible to save the modifications by clicking on the **Replace** button.

Note:

- Clicking on the Cancel button will stop the current procedure and trigger return to the previous window.
- When saving a specific window, the saved values remain active for the current session.

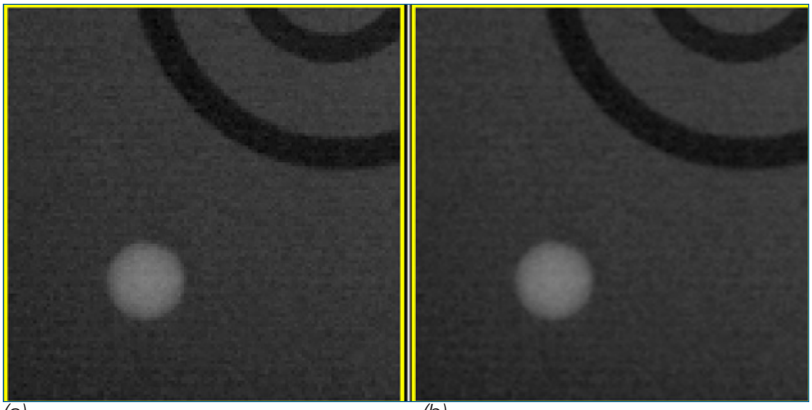
5.1.3 Auto Window

The **Auto Window** function applies the visualization window coming from the DICOM file of the selected image if these parameters are present. If the parameters are absent, the window is registered to between the minimum and maximum pixel values contained in the image.

Note: The Auto Window mode is selected by default when the images are loaded.

5.1.4 Smoothing

Smoothing in the lightbox is obtained by selecting the Smoothing item from the lightbox menu. Smoothing aids in the elimination of the pixelization effect as displayed on Figure 29.



(a) (b)

Figure 29: Lightbox view a) without smoothing and b) with smoothing

Note:

- Smoothing activation applies to all images loaded
- It is always possible to activate or deactivate the smoothing
- Smoothing only applies to the display of the images and will not influence calculations

5.1.5 Modification of LUT (Main LUT)

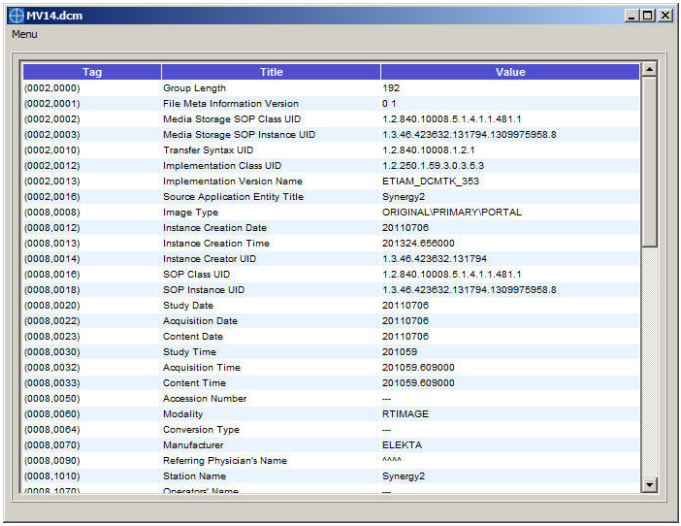
This option is used for applying predefined **Look Up Table** elements to the current view. The various tables available are indicated in the list.

5.1.6 Reset zoom

The **Reset zoom** option resets the zoom in all the images of the lightbox depending on the selected option.

5.1.7 Dump

The **Dump** option displays the interface in Figure 30 which gathers the information contained in the DICOM header of the selected image.



Tag	Title	Value
(0002,0000)	Group Length	192
(0002,0001)	File Meta Information Version	0 1
(0002,0002)	Media Storage SOP Class UID	1.2.840.10008.5.1.4.1.1.481.1
(0002,0003)	Media Storage SOP Instance UID	1.3.46.423632.131794.1309975958.8
(0002,0010)	Transfer Syntax UID	1.2.840.10008.1.2.1
(0002,0012)	Implementation Class UID	1.2.250.1.59.3.0.3.5.3
(0002,0013)	Implementation Version Name	ETIAM_DCMTK_353
(0002,0016)	Source Application Entity Title	Synergy2
(0008,0008)	Image Type	ORIGINAL\PRIMARY\PORTAL
(0008,0012)	Instance Creation Date	20110706
(0008,0013)	Instance Creation Time	201324.656000
(0008,0014)	Instance Creator UID	1.3.46.423632.131794
(0008,0016)	SOP Class UID	1.2.840.10008.5.1.4.1.1.481.1
(0008,0018)	SOP Instance UID	1.3.46.423632.131794.1309975958.8
(0008,0020)	Study Date	20110706
(0008,0022)	Acquisition Date	20110706
(0008,0023)	Content Date	20110706
(0008,0030)	Study Time	201059
(0008,0032)	Acquisition Time	201059.609000
(0008,0033)	Content Time	201059.609000
(0008,0050)	Accession Number	---
(0008,0060)	Modality	RTIMAGE
(0008,0064)	Conversion Type	---
(0008,0070)	Manufacturer	ELEKTA
(0008,0090)	Referring Physician's Name	^^^^
(0008,1010)	Station Name	Synergy2
(0008,1070)	Operators' Name	---

Figure 30: Main "Dump" Interface

The information supplied in the standard display mode comprises the TAG, the title and the value of the various non-proprietary DICOM field details in the image.

There are several information display modes which can be selected from the menu displayed on Figure 31.

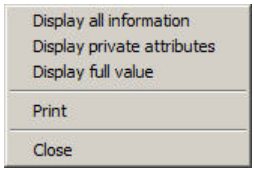


Figure 31: "Dump" Menu

The display of all information gives access, for each field, to the VR type and size, in addition to the previously mentioned default fields.

The display of private attributes gives access to the proprietary fields that are potentially loaded into the DICOM image.

The display of full value provides access to the entire value, that is, without the truncation of the field.

Any combination of these three first items can be selected simultaneously. The next two items on the menu are used for printing the Dump and quitting the interface.

6 IMAGE ANALYSIS

Select a Linac by clicking on the **Select Linac** button and choosing the Linac in the **Linac selection** window shows on Figure 32. If no Linac is available see §3.1.

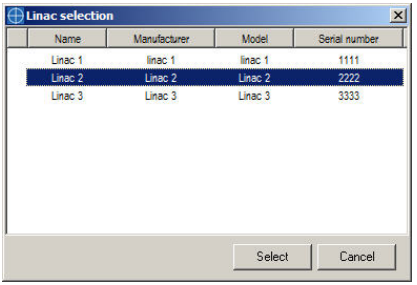


Figure 32: Linac Selection Window

If another Linac is already opened, the window shown on Figure 33 will be displayed.

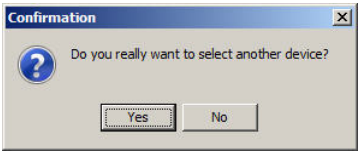
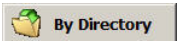


Figure 33: Window Confirmation to select another device

- Select your images by clicking on 

in 2 ways:

- 

: Select the directory where images to analyze are stored
- 

: Select the directory where images to analyze are store (Allows individual image selection)

Warning:

- Before selecting your images, ensure that your Linac is correctly configured (see §3.1.2)
- When selecting your images ensure that they belong to the select Linac.

- Click on 

. The selected parameters will be automatically computed.

6.1 RESULTS WINDOW

When results have been computed, they are displayed as seen in Figure 34. The parameters computed by ISO Analyze are given with a precision from 2 to 4 decimal places.

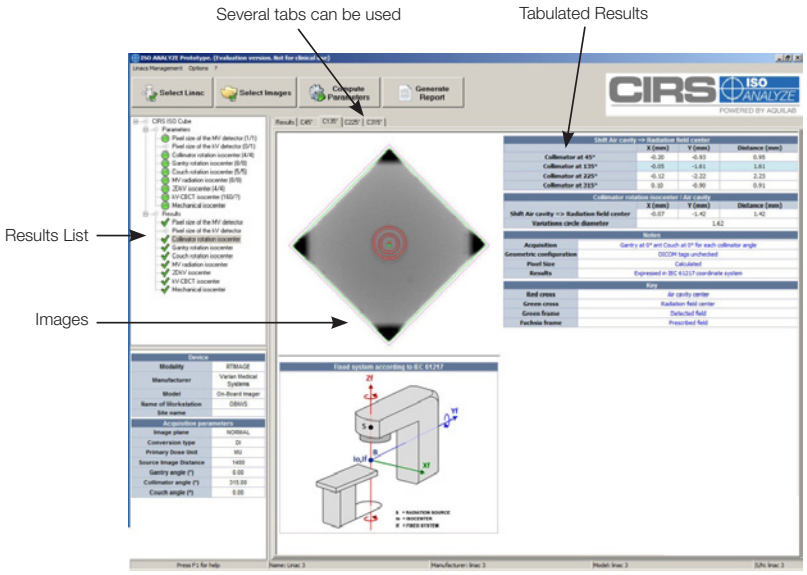


Figure 34 : Results Window

6.1.1 List of results

The list of results refers back to the list of parameters.
The parameters for which computation has been performed are marked with the following symbols:

- ✔ : Computation took place normally
- ✖ : Computation did not take place normally (generally occurring when an image selection is not appropriate).

The results of a parameter can be displayed by clicking on its name in the results list. If this parameter is marked by a red label, clicking on its name will cause a return to the image selection of the main interface.

6.1.2 Tabulated Results

Each parameter is characterized by a given number of elements. These elements are computed from the selected images and the values obtained are displayed under a tabular format.

7 REPORT

After computing parameters, you can generate a report by clicking 

. This will display a report as shown in Figure 35.

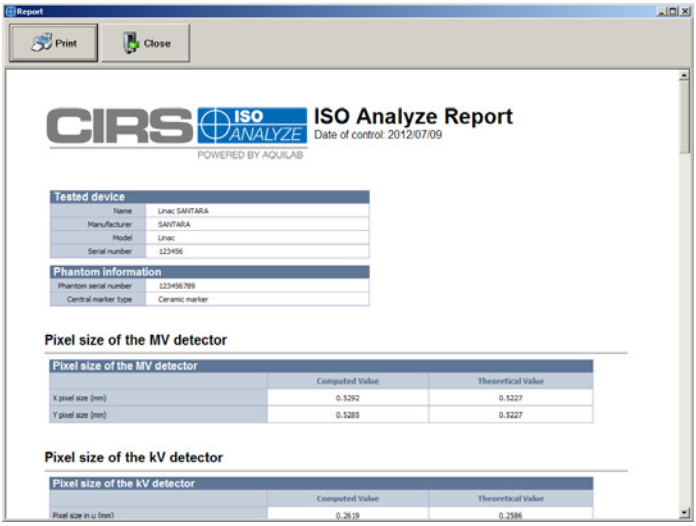


Figure 35: Typical Report

Note: All the distances presented in the report are calculated using the "Theoretical Value" of Pixel size for both the MV and kV detectors. The user can see and assess the impact of the "Computed Value" of Pixel size on these distances by multiplying them with the ratio between the "Computed Value" to "Theoretical Value".

The report can be printed on any previously configured physical or virtual printer on the workstation by clicking on the **Print** button. The values are grouped by parameters in a tabular format. Click on the **Close** button to close the report.

Note: The "Date of Control" displayed on the report corresponds to the acquisition date of the oldest image analyzed in the control

8 WARRANTY

All standard CIRS products and accessories are warranted by CIRS against defects in material and workmanship for a period as specified below. During the warranty period, the manufacturer will repair or, at its option, replace, at no charge, a product containing such defect provided it is returned, transportation prepaid, to the manufacturer. Products repaired in warranty will be returned transportation prepaid.

There are no warranties, expressed or implied, including without limitation any implied warranty of merchantability or fitness, which extend beyond the description on the face hereof. This expressed warranty excludes coverage of, and does not provide relief for, incidental or consequential damages of any kind or nature, including but not limited to loss of use, loss of sales or inconvenience. The exclusive remedy of the purchaser is limited to repair, recalibration, or replacement of the product at manufacturer's option.

This warranty does not apply if the product, as determined by the manufacturer, is defective because of normal wear, accident, misuse, or modification.

NON-WARRANTY SERVICE

If repairs or replacement not covered by this warranty are required, a repair estimate will be submitted for approval before proceeding with said repair or replacement

RETURNS

If you are not satisfied with your purchase for any reason, please contact Customer Service prior to returning the product. Call 800-617-1177, email rma@cirsinc.com, or fax an RMA request form to 757-857-0523. CIRS staff will attempt to remedy the issue via phone or email as soon as possible. If unable to correct the problem, a return material authorization (RMA) number will be issued. Non-standard or "customized" products may not be returned for refund or exchange unless such product is deemed by CIRS not to comply with documented order specifications. You must return the product to CIRS within 30 calendar days of the issuance of the RMA. All returns should be packed in the original cases and or packaging and must include any accessories, manuals and documentation that shipped with the product. The RMA number must be clearly indicated on the outside of each returned package. CIRS recommends that you use a carrier that offers shipment tracking for all returns and insure the full value of your package so that you are completely protected if the shipment is lost or damaged in transit. If you choose not to use a carrier that offers tracking or insure the product, you will be responsible for any loss or damage to the product during shipping. CIRS will not be responsible for lost or damaged return shipments. Return freight and insurance is to be pre-paid.

WITH RMA NUMBER, ITEMS MAY BE RETURNED TO:

CIRS
Receiving
2428 Almeda Avenue Suite 218,
Norfolk, Virginia, 23513 USA

PRODUCT	WARRANTY PERIOD
Model 023-03 ISO Analyze™ Image Analysis Software	48 Months

COMPUTERIZED IMAGING
REFERENCE SYSTEMS, INC.
2428 Almeda Avenue Suite 316
Norfolk, Virginia 23513 USA

Toll Free: 800.617.1177
Tel: 757.855.2765
Fax: 757.857.0523
Email admin@cirsinc.com

www.cirsinc.com

Technical Assistance
1.800.617.1177

Publication: 023-03 SW UG 021114

Computerized Imaging Reference Systems Inc. has been certified by UL DQS Inc. to **(ISO) 9001:2008**. Certificate Registration No.10000905-QM08.