



**HipOpCT<sup>©</sup>**  
**SURGICAL PLANNING SYSTEM**

**USER MANUAL**  
**FOR VERSION 2.1**

## GENERAL

Left mouse button: rotations  
Central mouse button: translations/pan  
Right mouse button: zoom

## MENU FILE

### **Open**

Open a file saved in the HipOpCT storage format (msf extension).

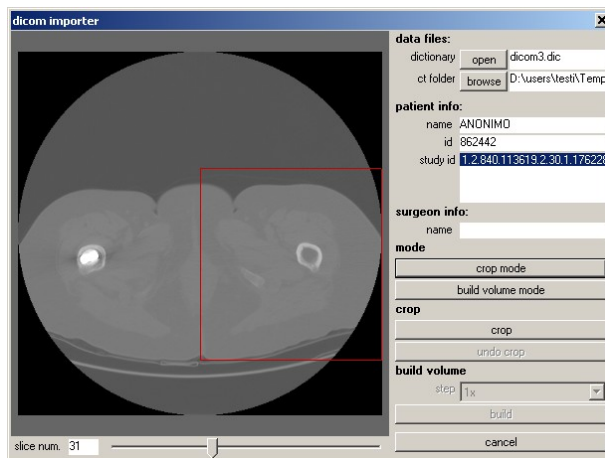
### **Save/Save as**

Save a CT dataset in the HipOpCT storage format together with all information about the planning (chosen components in the planned position).

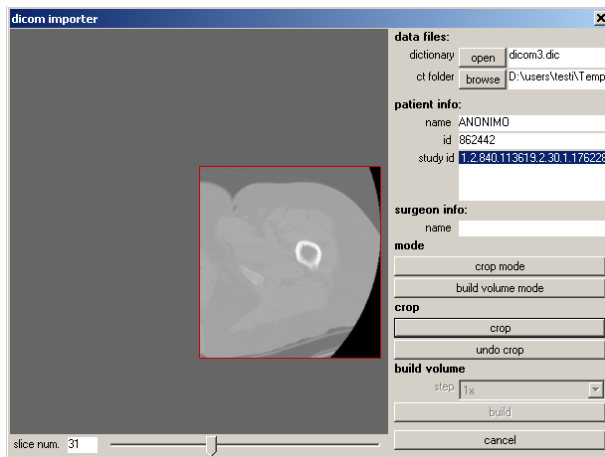
### **Import**

#### Dicom

Read a directory of DICOM CT images and create a CT volume eventually cropped and sub-sampled. Non DICOM files, DICOM Files generated from another modality than CT and scout files are simply ignored. If the directory contains more than one study the user is asked to select one of them. Hip-OpCT cannot load multi-study datasets and compressed DICOM files.

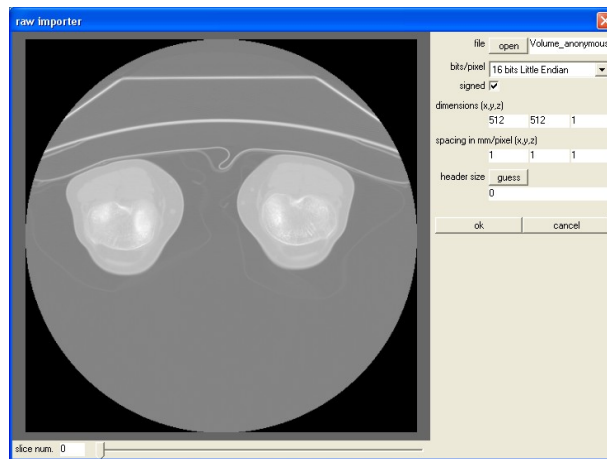


The user can also specify the name of the surgeon performing the planning to be stored and crop the region of interest by selecting with the mouse the region and checking in all slice the position of the rectangle by scrolling the slices with the bar at the bottom of the window.



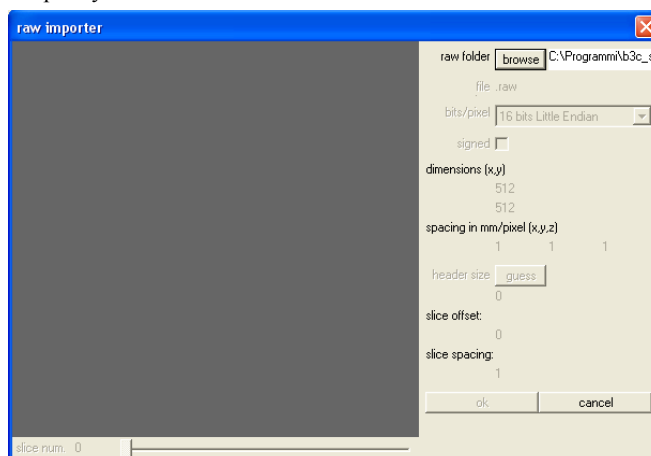
### Raw volume data

Read a volume data file in binary format. In this case, after selecting the file to be imported, the user must specify the dimensions and resolution of the CT slices.



### Raw image data

Read a series of CT images in binary format. In this case, the user must select the folder which contains the raw images, and must specify the dimensions and resolution of the CT slices.



## **Recent files**

Keeps the list of the most recent files opened or saved.

## **Quit**

Quit the HipOpCT program.

## MENU EDIT

### **Undo**

Cancel the effects of the last issued command.

### **Redo**

Re-apply the effects of the last issued command.

## MENU VIEW

### **Fit**

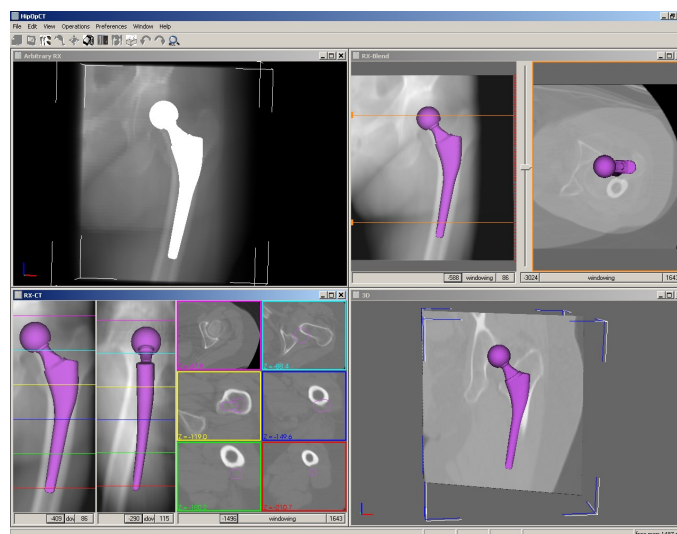
Adapts the visualisation in order to fit the selected object in the window size.

### **Fit all**

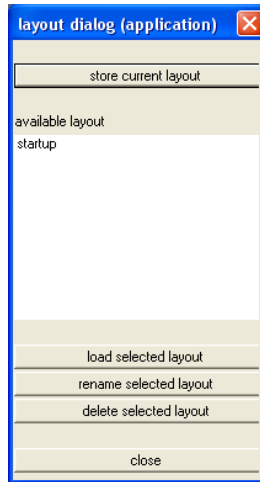
Adapts the window in order to fit the all objects in the window size.

### **Load/save views layout**

Each view can be opened by itself or in combination with others to help in planning and understanding the component position and the patient's anatomy. Furthermore, the user can save a particular layout of views and decide in which of the view to move the component (all other view will automatically update).

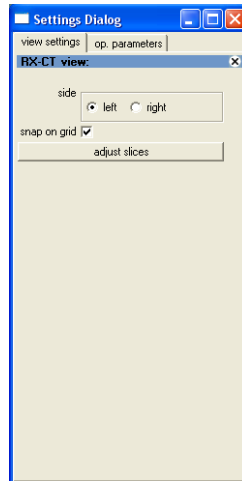


Different layouts can be stored and loaded at any time.



## Settings

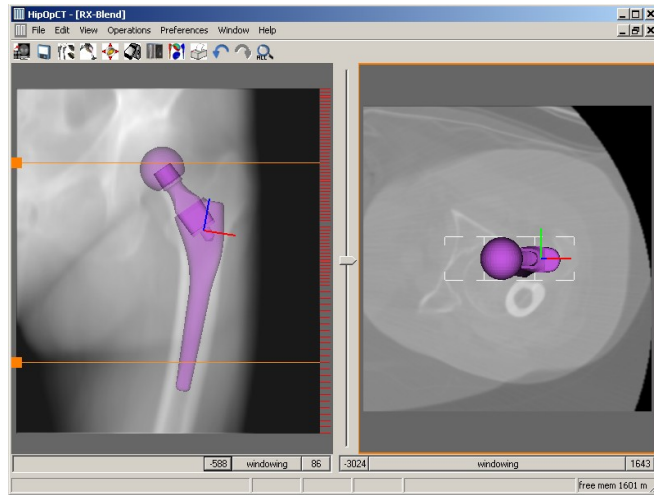
The settings panel is a floating window in which the user can find the parameters and options both for the current view and operation. The options changed automatically when selecting another view or operation.



For example, the adjust slices compares when the RX-CT view is opened and it automatically adjusts the location of the images displayed in the Slices window around the selected component.

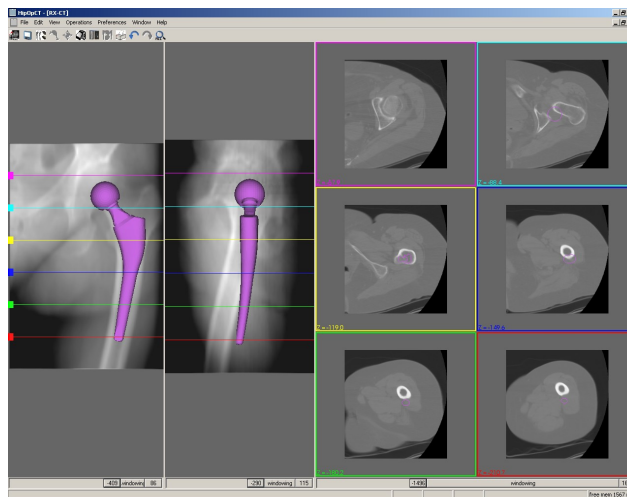
## RX-blend

Opens the RX-blend view. It represents the CT volume as a projection of the volume in antero-posterior direction (simulating an infinite focus radiograph) and an image obtained superimposing (using transparency) two CT slices selected interactively by the user moving two coloured lines on the RX projection. The level of transparency can be changed moving the central slider. The windowing sliders at the bottom of each image pane can be used to select which tissue densities are displayed.



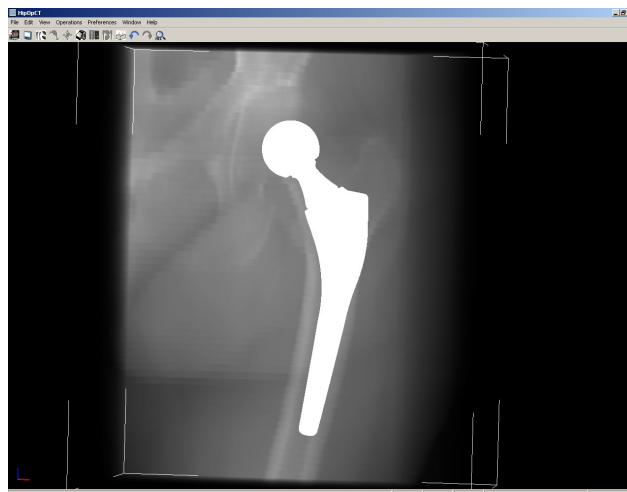
## RX-CT

Opens the RX-CT view. RX-CT view represents the CT volume by two projections of the volume, in antero-posterior and medio-lateral directions, and six CT slices that can be interactively chosen by the user moving the coloured lines on the projections. The windowing sliders at the bottom of each image pane can be used to select which tissue densities are displayed.



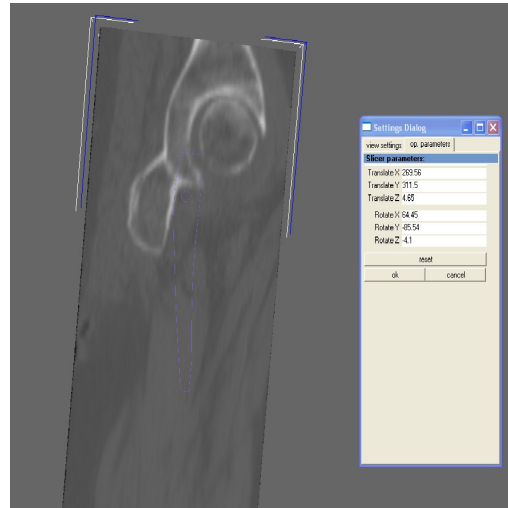
## Arbitrary RX

Opens the Arbitrary RX view. The arbitrary RX view allows the user to move (translating and rotating) the volume obtaining una an infinite focus projection from an arbitrary direction in order to verify in particular projection the position planned inside the host bone.



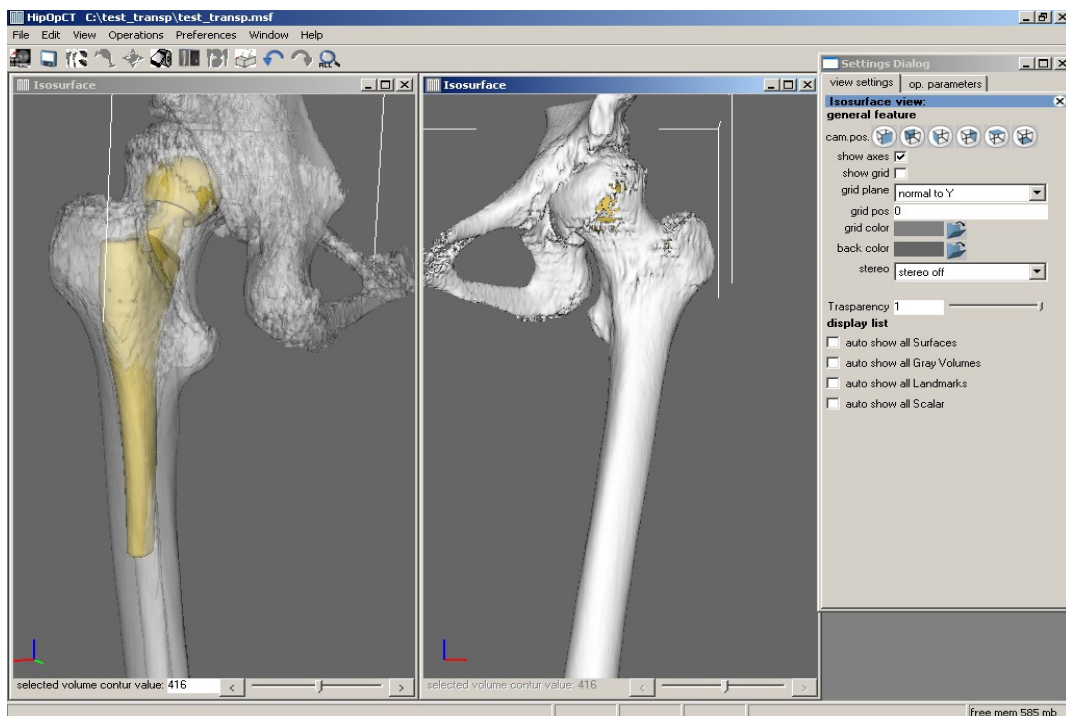
### 3D

3D view visualises a section of the prosthetic model together with an arbitrary section of the CT volume. The volume section can be interactively rotated and translated with mouse or putting numerical values in the interface. This is the only view in which the user can not move the component, but the view is automatically updated when the position of the component is changed in another view.



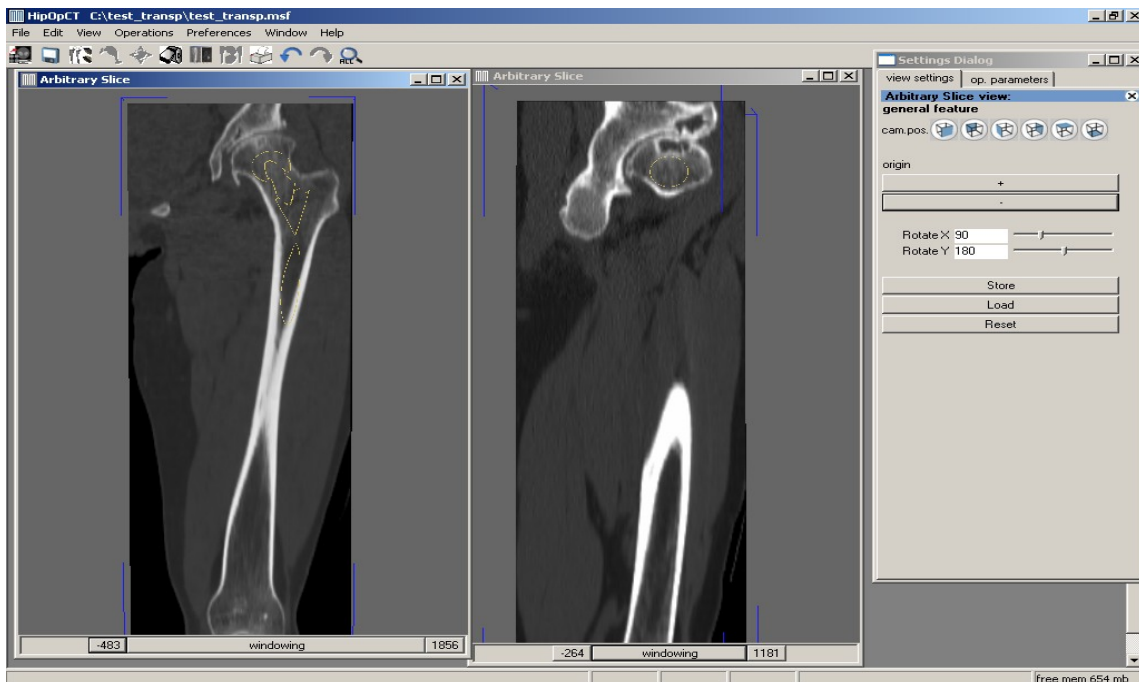
### IsoSurface View

The IsoSurface view visualise the 3D surface of the bone by defining a density threshold with the slider widget in the bottom of the Isosurface window. In the setting panel, it is available a slider control to change real-time the transparency level of the bone surface.



## Arbitrary Slice

As the 3D view, Arbitrary Slice visualises a section of the prosthetic model together with an arbitrary section of the CT volume. The volume section can be interactively rotated and translated with “+” and “-” buttons and sliders or putting numerical values in the interface. In this view the user can move the component or take measurements, differently than in the 3D View.



## Log bar

In this space are printed some runtime program info.

## MENU OPERATIONS

### Download prostheses

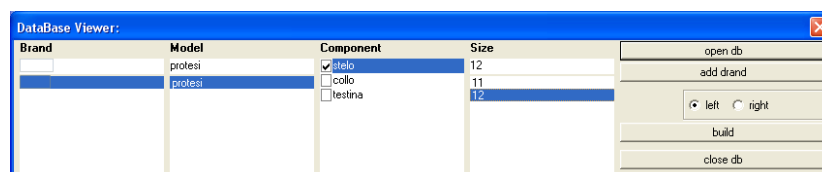
It opens the dialog for the download from the website of new prosthetic components. The downloaded files will automatically be stored in the proper folder and available for use.

### Show object

It allows the user to visualised objects that were hidden.

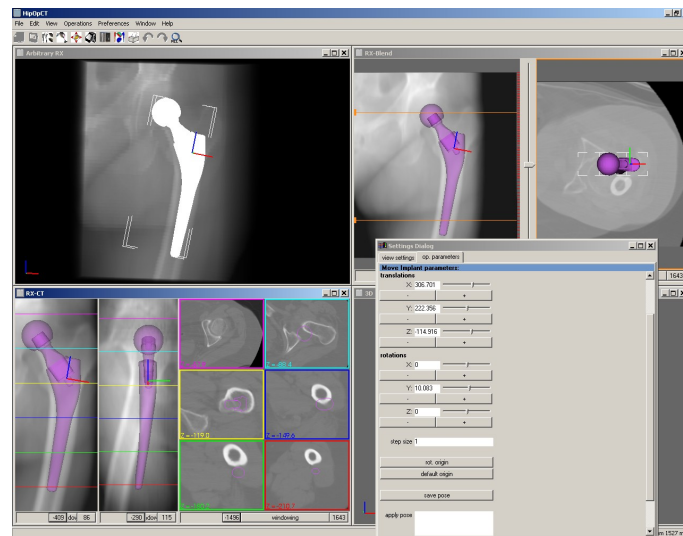
### Create/Modify

It allows the user to build/modify the prosthetic model. The user must chose the manufacturer database from those available, then select the prosthesis type and for each component the proper size. The build button creates the chosen model.



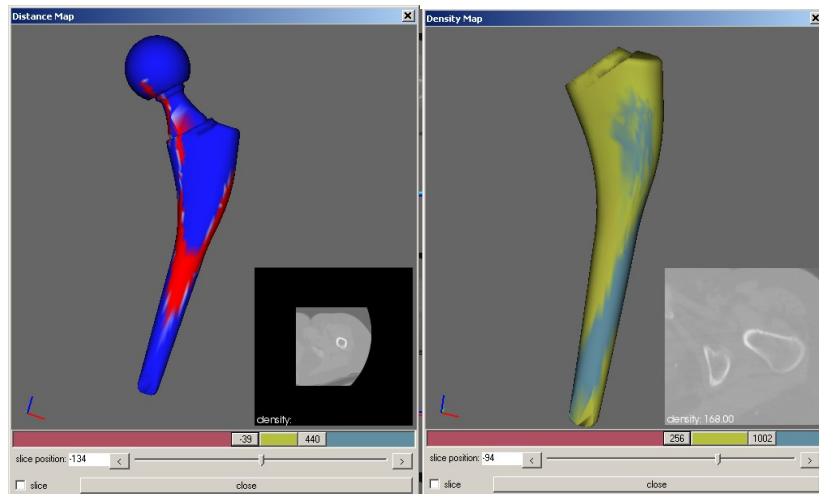
## Move implant

During the positioning of the prosthetic component, the surgeon can save intermediate positions that can be reloaded. The user can move the component both using the mouse or inserting numerical values in the operation interface. During the positioning the rotation centre can be modified and defined by the user.



## Maps

The distance map evaluates the prosthesis fraction area in which the distance from an isodensity surface (defined by the user) is higher than 1 mm (gap), between  $-1\text{ mm} \leq 1\text{ mm}$  (contact) and less than  $-1\text{ mm}$  (penetration). The density map evaluates the fraction of component area in contact with density lower than LT, between LT and HT, higher than HT. LT and HT are thresholds that identify the transition values between soft tissues and trabecular bone, and between trabecular and cortical bone. These thresholds can be modified, if necessary, by the user. For both maps, the results are provided both in percentage values of areas and as visualisation with colours.

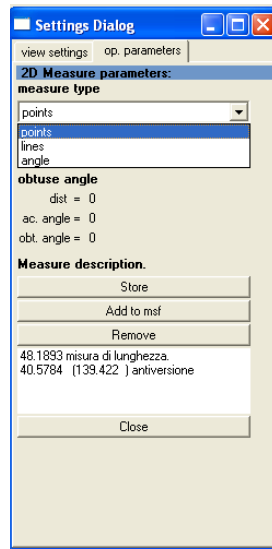


## Generate report

At the end of the planning, the surgeon can save a report which contains patient's data got from the DICOM header, type and size of the planned prosthesis, measurements performed and any image of the planning saved by the user (with a specific command inside the interface).

## 2D measure

It opens the 2D measure dialog. A combo box allows to choose the type of measurements: distance between points, distance between parallel lines, and angles. Each measurement can be carried out drawing the lines with the mouse on the selected image. All measures can be saved together with annotations which describe the type of measure.



## MENU HELP

### About

HipOpCT current version