

# decimal eRT User Guide

## Overview

The decimal ElectronRT (eRT) application is used for planning of electron radiation therapy treatments. decimal eRT is an interactive end user application that allows users to design treatment plans and electron beam shaping devices (e.g.: bolus, blocks, and intensity modulators) and order those devices for fabrication by .decimal.

## Purpose

The purpose of this document is to provide guidance on the setup, access, and usage of decimal eRT.

## Getting Started

Proper use of this software is critical to safe and effective treatment of patients using plans generated by this application. Users are expected to read and understand this complete User Guide including the [Instructions for Use](#), which outlines the general usage principles and limitations of the decimal eRT app. Users must read and understand these instructions before operating the system for clinical use. Refer to each section below for complete details:

- **Instructions for Use**
  - [Overview and Indications for Use](#)
  - [User Responsibilities](#)
  - [Warning](#)
  - [Intended Use](#)
  - [User Profile](#)
  - [Product Features](#)
  - [Patient Data Model](#)

## Precautions

It is the responsibility of those utilizing this application to ensure that all usages of this product relating to patient treatments are performed by trained and qualified personnel only and that such personnel is aware that the quality of any generated treatment plans is highly dependent on the quality and correctness of the input data; therefore if any questions or uncertainties regarding the quality, units, or identification of input data arise, they must be investigated and resolved before the data are used.

## Initial Setup

Once decimal eRT has been purchased, .decimal staff will assist with beam model creation, software installation, and user training. Users will generally be trained at two separate levels, system administrators and end users. System administrators will be setup with appropriate access and tools for managing the software, including both the local resources and user accounts. End users will be primarily trained on the details of generating high-quality treatment plans using the local client portion of the application. Additionally, the medical physics team will be trained and assisted in completing the beam modeling and equipment setup processes, which are explained more fully in the [Commissioning Guide](#).

## Installation

The decimal eRT application is installed via the [decimal Launcher](#) client application. Refer to the decimal Launcher [user guide](#) for details on using the decimal Launcher.

The main high level requirements for using the decimal Launcher and decimal eRT application are:

1. .decimal Direct account credentials
  1. This account needs association with a Site ID (.decimal Customer Account number) that has been licensed for use of the decimal eRT application
  2. This account needs specific .decimal Permission for accessing the eRT modules
2. The decimal Launcher installed

Please refer to the decimal eRT [System Requirements](#) page for complete details on hardware and network requirements.

## Site Settings and Facility Model

When using the decimal eRT app for the first time users will be required to setup and configure their site facility settings. This includes organization level details (name, report logo, override materials, etc) and specific site details (ordering address, physicians, DICOM export servers, QA options, and machine commissioning).

The [Organization Configuration](#) user guide section describes each of the blocks and configuration interfaces.

## DICOM Receiver

The decimal ElectronRT application supports importing DICOM patients via a DICOM listener/receiver. Refer to the [ElectronRT DICOM Receiver setup guide](#) for instructions for enabling and configuring this method of DICOM patient import into the eRT application.

## Keyboard and Mouse Controls

The decimal eRT app utilizes keyboard shortcuts to help streamline many commonly used functions and display controls. A complete listing of these shortcuts along with a full description of the mouse controls is located at the [Keyboard and Mouse Controls page](#).

## Application Usage

The following sections are thorough guides providing complete information about each task within the decimal eRT application.

- [Launching decimal eRT](#)
- [DICOM Patient Import](#)
- [Patient Courses](#)
- [Electron Plans](#)
  - [Prescription](#)
  - [Patient Geometry](#)
    - [Points](#)
    - [Uniform Thickness Bolus](#)
  - [Imaging](#)
    - [Density Overrides](#)
  - [Electron Beams](#)
    - [Electron Block Creation](#)
    - [Electron Skin Collimator Creation](#)
    - [Electron Bolus Creation](#)
    - [Electron Intensity Modulator](#)
    - [Electron Beam Normalization](#)
  - [Plan Approval](#)
  - [Plan Reports](#)
  - [Plan QA](#)
  - [DICOM Export](#)
- [Organization Configuration](#)
- [Sandbox Testing](#)
- [App Settings](#)

## Improper System Usage

When using decimal eRT, as with any complex program, there is the potential for misuse. The decimal eRT app is a radiotherapy treatment planning tool that is intended to be used by experienced and knowledgeable professionals working in the field of radiation therapy.

# Known Application Limitations

Below are listed the known application limitations, defects, or inconsistencies.

## General

ID	Affected Version(s)	Description
1	All	<p>Simultaneous record access:</p> <ul style="list-style-type: none"> <li>• If multiple instances of the application have the same treatment plan record opened, changes will be prevented from being pushed to the patient database if the treatment plan is changed first by another user. This will cause the other simultaneous instances to become outdated. Changes to the local application on outdated instances will be blocked from pushing plan changes to the patient database, but the changes may still appear to have happened in the local application. Users will be warned of their changes being blocked by the error: “Plan revision is outdated. Please close and reopen the treatment plan to continue using this plan.”</li> </ul>
2	All	<p>Random Application Crashes:</p> <ul style="list-style-type: none"> <li>• If the <a href="#">local or network disk cache</a> becomes corrupted the application may crash at seemingly random places while calculations are computing. Clearing the <a href="#">local disk cache</a> within the application settings may help resolve unreproducible application crashes during calculations running.</li> </ul>
3	All	<p>Network patient database:</p> <ul style="list-style-type: none"> <li>• If the application is set to use a <a href="#">network patient directory</a> shared with multiple users there may be a risk for 'database is locked' errors. This is due to the application using SQLite as it's database engine, which does not robustly support concurrent database users and reading/writing. While normal usage between one or two users may not pose a problem with this, having a significant number of users simultaneously accessing the network database or the following scenarios can cause the database to lock and throw this error: <ul style="list-style-type: none"> <li>◦ The application crashes or a network connection is interrupted during a SQL commit that allows the 'unlock' step to be missed OR</li> <li>◦ The file is locked due to other network usage (e.g.: the file is in use by an external service such as an Antivirus scan, backup, etc) OR</li> <li>◦ Multiple simultaneous users are attempting to read/write to the database at the same time</li> </ul> </li> <li>• If you receive the error “database is locked” you'll have to wait and try again once the database is unlocked</li> </ul>

ID	Affected Version(s)	Description
4	All	<p>Application fails to load computed data: Under the following scenario, the application request and state handling has a known bug that results in computed data not loading within the application until a application close and re-open is performed:</p> <ul style="list-style-type: none"> <li>• A patient/plan is opened and a user interface or task is opened</li> <li>• Data begins computing (e.g.: a dose, beam, or device)</li> <li>• While the data is computing the user navigates to another user interface within the application</li> <li>• If the data finishes computing for the first user interface while the user is navigated to a new user interface and then the user navigates back to the first user interface, the application may not know the data is computed to display or use the results.</li> </ul>

## Site / Machine Modeling

ID	Affected Version(s)	Description
1	All	<p>The eRT Application currently supports only the following Electron Treatment Machines:</p> <ul style="list-style-type: none"> <li>• Varian C-Series Linacs (iX, TrueBeam, and Edge)</li> <li>• Elekta Linacs (Versa HD, Harmony, and Infinity)</li> </ul>

## DICOM Import

ID	Affected Version(s)	Description
1	All	Closing the application immediately after importing a DICOM patient and before the job 'copy_imported_dicom_files_to_course' completes will cause an incomplete CT Image Set when exporting DICOM later in the application.
2	0.9.0+	Only plan files with a valid bolus in at least one beam will import properly.
3	All	"Point" type items in RTSTRUCT files are not imported.

## DICOM Export

ID	Affected Version(s)	Description
1	All	The UI may freeze temporarily during Export, but recovers cleanly after exporting completes.
2	All	Exported CT images may be rotated from the originals for certain orientations, which changes the order of the pixel data in the CT image files, but does not change the CT information, so the original UIDs are still maintained.
3	All	Points defined in the eRT Application are not included in the exported DICOM Structure Set files.

ID	Affected Version(s)	Description
4	All	(Unapproved plans only) Files exported separately within eRT will not have matching reference UIDs as each export is treated as a unique instance (each export of an unapproved plan requires a unique approval waiver and as such is time stamped to that instance). If all files are exported at once, then all reference UIDs will be properly linked.

## Beams

ID	Affected Version(s)	Description
1	All	Adding more than one beam with an optimized thickness bolus can sometimes result in the DVH inspection performance being slow.
2	All	Optimized Bolus outside shape is generated to the target size and not the block size. So if manual edits are performed on the block that expand the block shape, the bolus extents may be undersized. This can be remedied by increasing the bolus block outer border.
3	0.0.3+	Skin collimator devices may cause interference with fitting inside of the electron bolus when fitting on the patient surface. This is due to sharp corners that result from a rough patient surface contour.

## Plans

ID	Affected Version(s)	Description
1	All	(Approved Plans) Users should understand that the eRT application stores only user input information and not computed data. However, since machine models and dose calculation algorithms can change over time, certain calculated data and equipment model data that is considered critical to the patient's treatment record is stored with each plan upon approval. This stored data includes: treatment device shapes (e.g. bolus, collimators, intensity modulators), 3D dose fields per beam, and beam model data. However, it should be noted that data derived from these stored results may be recomputed and is therefore subject to change if Approved Plans are loaded in future eRT versions. One such example would be DVH curves. While the dose is stored and will never change for an Approved Plan, the sampling scheme used in DVH calculations can change over time, therefore DVH curves may change even for Approved Plans if such changes are made in the eRT application. Patient-to-applicator collisions, structure volumes, and QA Dose Calculations are additional examples of information that could change in future application versions as this data remains computed, not stored, even for Approved Plans.
2	All	Plan Approval requires the approver to login to the eRT directly from Launcher, there is no separate login at the point of approval.
3	All	Patients imaged in a Decubitus position will display axial images in a rotated view. All direction labels and beam angles are correct and the software functions as intended, but the axial view maintains the vertical direction as AP/PA.
4	All	The eRT software application does not support manual/hand editing of contoured structures (including bolus/skin collimators) at this time.

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