

ClearCalc

INDEPENDENT CALCULATION SOFTWARE



Intelligent Automation in Radiation Oncology

RAD formation

Intelligent secondary plan validation.

ClearCalc is a secondary calculation software that independently verifies the accuracy of your treatment plan dose calculation. With support for photons, electrons, and brachytherapy, results are quickly calculated and displayed on a user-friendly interface.

ClearCalc can be accessed as a Varian Eclipse Treatment Planning System (TPS) scripting plugin via ClearCheck or as a Windows executable application, allowing full access for all users.

For clinicians. By clinicians.

ClearCalc was developed by physicists as an independent secondary monitor unit (MU) calculation to instantly verify treatment plan accuracy. With seamless ClearCheck integration, users obtain results without launching separate software or performing DICOM exports. Results can be automatically appended to the ClearCheck final plan report, making documentation needs effortless.

Have confidence in your calculations and automate your plan evaluation workflow.

ClearCalc

Rest assured knowing your plan calculations are accurate.



Multi-Modality
Compatibility



Eclipse
Integration



Tissue Heterogeneity
Correction



Automated Calculation
Point Selector



Intuitive User
Interface



Direct ClearCheck
Reporting

Direct Eclipse Integration via ClearCheck

With the option for direct integration with Eclipse and ClearCheck, ClearCalc takes automating plan evaluation one step further by providing instant processing of secondary plan calculations and eliminating the hassle of importing or exporting DICOM plans. ClearCalc results can be automatically added to the ClearCheck report for the final plan printout with a single click.

For users without Eclipse, there is a standalone option that accepts DICOM plan files from multiple treatment planning systems.

ClearCalc Secondary Calculation

Test, Patient (999999999a)
Birthdate: 11/22/2019
Sex: Male
Hospital: Radformation
Eclipse Version: 15.5.11

Course: C1
Plan: ProstateInit
Dose: 180cGy × 25 = 4500cGy
Prescribed Percentage 100%
100.00% covers 96.00% of Target Volume
(Value: 106.175%)
Status: PlanningApproved

Photon Properties
TPS Machine: Eclipse CAP
ClearCalc Machine: Eclipse CAP

MU Results

Field ID	Calculation Point	TPS MU	ClearCalc MU	Difference	Pass/Fail	Comment
Field 6	Isocenter 1	80.1MU	80.8MU	0.87%	✓	
Field 5	Isocenter 1	69.7MU	71.0MU	1.87%	✓	
Field 4	Isocenter 1	72.5MU	74.1MU	2.21%	✓	
Field 3	Isocenter 1	77.2MU	77.9MU	0.91%	✓	
Field 2	Isocenter 1	77.2MU	75.4MU	-2.33%	✓	
Field 1	Isocenter 1	72.5MU	72.7MU	0.28%	✓	
Field 7	Isocenter 1	78.2MU	76.2MU	-2.56%	✓	

Calculation Point Doses

Calculation Point	TPS Dose	ClearCalc Dose	Difference	Pass/Fail	Comment
Isocenter 1 -0.04cm, -0.10cm, 18.41cm	185.4cGy	185.2cGy	-0.11%	✓	

Custom Point Selection

Plan Points
Toggle display of points from plan
☐ Isocenter 1

Display Options
Scroll using mouse wheel.
Zoom using Ctrl + Mouse wheel.
Pan using Ctrl + Left mouse click/hold.
☒ Show dose wash
☒ Show central-axis field lines

ClearCalc Points Legend
ClearCalc recommended calculation points, color-coded
● Good agreement for all fields
● Good agreement for some fields
● Agreement not adequate for all fields

Field MU Results
Use the per-field Locate button to view or edit assigned calculation point.
With the Locate button active, click the point in the CT viewer to assign a new field calculation point.

Field ID	Calculation Point	TPS MU	ClearCalc MU	Difference	Pass/Fail
Field 1	Isocenter 1 <input checked="" type="checkbox"/>	73.1MU	72.4MU	-0.96%	✓
Field 2	Isocenter 1 <input checked="" type="checkbox"/>	76.9MU	74.2MU	-3.51%	✓
Field 3	Isocenter 1 <input checked="" type="checkbox"/>	77.9MU	78.5MU	0.77%	✓
Field 4	Isocenter 1 <input checked="" type="checkbox"/>	73.1MU	74.5MU	1.92%	✓
Field 5	Isocenter 1 <input checked="" type="checkbox"/>	70.2MU	71.3MU	1.57%	✓
Field 6	Isocenter 1 <input checked="" type="checkbox"/>	78.8MU	78.4MU	-0.51%	✓
Field 7	Isocenter 1 <input checked="" type="checkbox"/>	78.8MU	76.2MU	-3.30%	✓

Select Calculation Point for All Fields

Calculation Point Doses
Select a row to view the calculation point location.

Calculation Point	Location [x, y, z]	TPS Dose	ClearCalc Dose	Difference	Pass/Fail
Isocenter 1	-0.04cm, -0.10cm, 18.41cm	185.4cGy	186.6cGy	0.64%	✓



Save and Close Cancel

With ClearCalc's custom point selection tool, an optimal calculation point is chosen automatically, avoiding heterogeneities and dose gradients. Alternatively, with a number of points generated and viewable on the patient's CT within ClearCalc, selecting a point that makes the most sense for your department is simple.

Pass/fail dose point statistics for all calculated points in 3D space provides valuable information beyond the single point comparison.

One Platform for all Your Second Check Needs

Photon Calculation Module

The screenshot displays the Photon Calculation Module interface for a patient named 'Test, Patient (999999999a)'. The interface is divided into several sections:

- Course:** C1
- Plan:** ProstVMAT
- Dose:** 180cGy x 45 = 8100cGy
- Photon Properties:** TPS Machine, Eclipse CAP
- MU Results:** A table showing MU calculations for two fields.
- Calculation Point Doses:** A table showing dose calculations for a single isocenter.
- 3D Point Dose Statistics:** A table showing statistics for CTV, PTV, and PTVHD structures.
- Calculation Parameters:** A table showing parameters for Field 1 and Field 2.

Field ID	Calculation Point	TPS MU	ClearCalc MU	Difference	Pass/Fail	Verify	Comment
Field 1	Isocenter 1	257.1MU	258.7MU	0.62%	✓		
Field 2	Isocenter 1	257.1MU	255.5MU	-0.62%	✓		

Calculation Point	Location [x, y, z]	TPS Dose	ClearCalc Dose	Difference	Pass/Fail	Verify	Comment
Isocenter 1	-0.04cm, -0.10cm, 18.41cm	181.8cGy	181.9cGy	0.06%	✓		

Structure	Points Evaluated	Passing	Failing	Mean TPS Dose ± Std Dev	Mean CC Dose ± Std Dev	Mean Diff ± Std Dev (%)	Mean Diff ± Std Dev	Passing Percentage	Pass/Fail	Verify	Comment
CTV	250	250	0	8273.6cGy ± 92.8cGy	8357.5cGy ± 146.9cGy	1.01% ± 0.98%	84.0cGy ± 81.4cGy	100.00%	✓		
PTV	250	250	0	8231.7cGy ± 210.3cGy	8334.9cGy ± 232.2cGy	1.25% ± 1.03%	103.2cGy ± 84.8cGy	100.00%	✓		
PTVHD	250	250	0	8231.7cGy ± 210.3cGy	8334.9cGy ± 232.2cGy	1.25% ± 1.03%	103.2cGy ± 84.8cGy	100.00%	✓		

Field ID	Field 1	Field 2
Energy	6X	6X
Gantry Rtn [deg]	179.0 CCW 181.0	179.0 CCW 181.0
Collimator Rtn [deg]	0.0	90.0
Table Rtn [deg]	0.0	0.0

ClearCalc supports a full complement of clinical techniques, including 3DCRT, IMRT, VMAT, SBRT, SRS, virtual/ dynamic wedges, and CyberKnife plans. The hand calculation module allows for quick, manual verifications when needed.

The custom finite-sized pencil beam (FSPB) algorithm ensures that calculations are fast and accurate, fully accounting for tissue inhomogeneities.

One Platform for all Your Second Check Needs

Electron Calculation Module

The screenshot displays the Electron Calculation Module interface. On the left, a sidebar shows the 'Course' as 'Electrons', the 'Plan' as 'Test Plan', and the 'Dose' as '200cGy x 5 = 1000cGy'. A 'Diode' button is visible below the dose information. The main area is divided into three sections: 'Electron Properties', 'MU Results', and 'Calculation Parameters'.

Electron Properties

TPS Machine: EclipseCAP_TB
Dose Calculation Method: Prescribed Percent

MU Results

Field ID	TPS MU	ClearCalc MU	Difference	Pass/Fail	Verify	Comment
Field 1	199.7MU	199.4MU	-0.18%	✓		

Calculation Parameters

Field ID	Field 1
Energy	12E
Gantry Rtn [deg]	0.0
Collimator Rtn [deg]	0.0
Table Rtn [deg]	0.0
Dose [cGy]	200
Dose at Reference Condition [cGy/MU]	1.000
Depth Dose %	100.00
Equivalent Depth [cm]	2.892
Applicator Size [cm x cm]	10x10
Cone Factor	1.000
Cutout Factor Method	Sector Integration
Source to Skin Distance [cm]	100.5
Bolus	Bolus 0.5cm
Total Output Factor	1.003

Electron plan evaluation is made simple using ClearCalc. Compute field doses to a prescribed percentage or choose a reference point, with the option to enter measured cutout factors or use automated sector integration. Calculations are based on AAPM TG-71 formalism.

One Platform for all Your Second Check Needs

Brachytherapy Module

The screenshot displays the ClearCalc Brachytherapy Module interface. On the left, a sidebar shows the course 'Brachy', plan 'BrachyPlan', and dose '500cGy x 3 = 1500cGy' with a treatment date of '8/15/2019'. The main window is titled 'Radioactive Source Model' and shows 'TPS Source: GM12i Ir-192 HDR' and 'ClearCalc Source: GM12i Ir-192 HDR'. Below this is a table of source properties. The 'Calculation Point Doses' section shows a table with columns for Calculation Point, Location, TPS Dose, ClearCalc Dose, Difference, Pass/Fail, Verify, and Comment. The 'Treatment Plan Parameters' section shows three tables for Channel 1, Channel 2, and Channel 3, each with columns for Dwell Position, Nominal Dwell Time, Treatment Dwell Time, and Location.

Source Property	TPS	ClearCalc
Nominal air kerma strength [U]	40.3	40.3
Treatment air kerma strength [U]	2628.58	2628.58
Nominal activity [mCi]	9.902	9.902
Treatment activity [mCi]	645.843	645.843
Dose rate constant [cGy/hU]	1.118	1.118
Active length [cm]	0.35	0.35

Calculation Point	Location	TPS Dose	ClearCalc Dose	Difference	Pass/Fail	Verify	Comment
CheckName	2.60cm, -1.94cm, 18.41cm	2383.6cGy	2387.7cGy	0.17%	✓		
Reference Line, pt. #1	3.84cm, -2.09cm, 19.86cm	2994cGy	2998.4cGy	0.15%	✓		
Reference Line, pt. #2	4.19cm, -2.09cm, 19.22cm	1620.6cGy	1621.8cGy	0.08%	✓		
Reference Line, pt. #3	4.11cm, -2.09cm, 18.37cm	2006.8cGy	2009.8cGy	0.15%	✓		
Reference Line, pt. #4	3.89cm, -2.09cm, 17.78cm	3127cGy	3135.7cGy	0.28%	✓		
Reference Line, pt. #5	3.55cm, -2.12cm, 17.12cm	4827.5cGy	4815.5cGy	-0.25%	✓		
Reference Line, pt. #6	3.21cm, -2.12cm, 16.50cm	1096.1cGy	1103.7cGy	0.69%	✓		

Channel 1				Channel 2				Channel 3			
Dwell Position	Nominal Dwell Time	Treatment Dwell Time	Location	Dwell Position	Nominal Dwell Time	Treatment Dwell Time	Location	Dwell Position	Nominal Dwell Time	Treatment Dwell Time	Location
130.0cm	9197.6s	141.0s	0.29cm, -1.98cm, 19.94cm	130.0cm	10717.5s	164.3s	3.60cm, -1.98cm, 19.94cm	130.0cm	9996.5s	153.3s	
129.5cm	10483.6s	160.7s	0.29cm, -1.98cm, 19.44cm	129.5cm	13874.3s	212.7s	3.58cm, -1.98cm, 19.44cm	129.5cm	12549.2s	192.4s	
129.0cm	11087.7s	170.0s	0.30cm, -1.98cm, 18.94cm	129.0cm	16193.1s	248.3s	3.58cm, -1.98cm, 18.94cm	129.0cm	13465.1s	206.4s	

ClearCalc uses calculation methods outlined in AAPM TG-43. Incoming reference points are calculated and results are easy to interpret. Applicators, dwell positions, and dwell times are displayed for verification. User may now allow ClearCalc to automatically decay to a set treatment date for nominal sources.

ClearCalc is an automatic secondary plan calculation software that streamlines plan evaluation workflow.

- ✓ Full integration with Eclipse and ClearCheck streamlines planning workflows
- ✓ Accepts DICOM imports from multiple TPS vendors for flexibility in mixed environments
- ✓ The automatic calculation point selection workspace saves time and provides insightful 3D dose statistics for target structures
- ✓ Supports 3D, IMRT, VMAT, SBRT, SRS, brachytherapy, electrons, and more in a single solution
- ✓ Diode support allows users to calculate expected diode doses to compare with in-vivo measurements, as well as print diode result reports

ClearCalc simplifies workflows and gives users confidence in their final treatment plans, saving departments time and streamlining plan evaluation.