

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: ProstateNit 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

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 (999999999)'. The interface is divided into several sections:

- Photon Properties:** Shows the TPS Machine as 'Eclipse CAP'.
- MU Results:** A table with columns: Field ID, Calculation Point, TPS MU, ClearCalc MU, Difference, Pass/Fail, Verify, and Comment. It shows two fields, both passing with a difference of 0.62%.
- Calculation Point Doses:** A table with columns: Calculation Point, Location [x, y, z], TPS Dose, ClearCalc Dose, Difference, Pass/Fail, Verify, and Comment. It shows one isocenter with a difference of 0.06%.
- 3D Point Dose Statistics:** A table with columns: 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, and Comment. It shows results for CTV, PTV, and PTVHD, all with 100.00% passing percentage.
- Calculation Parameters:** A table with columns: Field ID, Field 1, and Field 2. It lists parameters like Energy (6X), Gantry Rtn (179.0 C CW 181.0), Collimator Rtn (0.0), and Table Rtn (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 sidebar, the course is 'Electrons', the plan is 'Test Plan', and the dose is '200cGy x 5 = 1000cGy'. A 'Diode' button is visible. The main area is divided into three sections:

- Electron Properties:** Shows 'TPS Machine' as 'EclipseCAP_TB' and 'Dose Calculation Method' as 'Prescribed Percent'.
- MU Results:** A table showing results for 'Field 1'.
- Calculation Parameters:** A table listing various parameters for 'Field 1'.

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

| 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

Radioactive Source Model

TPS Source
GM12i Ir-192 HDR
GM12i Ir-192 HDR

| 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 Doses

| 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% | ✓ | | |

Treatment Plan Parameters

| 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 |
| 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.