Points selected. Plan verified.

DIAMOND®
Secondary Check Software for Independent Patient Plan Verification
DIAMOND® is a clinically proven secondary check software that allows independent point dose verification calculations for a wide range of treatment plans.

It computes the dose at one or multiple dose points and compares the results with calculations from the treatment planning system (TPS), making routine treatment plan QA much faster and simpler. As an independent, software-based verification tool, it can complete and replace QA measurements for treatment plans with PTW OCTAVIUS® systems in clinical routine cases.

DIAMOND® utilizes a modified Clarkson integration and advanced optimization algorithms to ensure the most accurate calculations for dynamic IMRT delivery techniques. ROI-related density tables can be user defined to allow density correction.

Calculate IMRT fluence and dose maps and export them to your TPS or VeriSoft® patient plan verification software for comparison and detailed analysis.

**Key Facts**

- Independent patient plan verification – fast and efficient, no LINAC time required
- Dose comparison at one or multiple dose points
- Multiple treatment techniques supported, e.g., VMAT, IMRT step & shoot/sliding window, conventional 2D/3D techniques, including electron support
- Advanced ROI option for density correction
- DTA analysis
- Fluence/dose mapping
- Additional capabilities, e.g., support of wedges, corrections of “flash” and air in breast treatments
- FDA approved, CE certified

**DIAMOND® – a time-saving option for PTW OCTAVIUS® systems**

Dose verification by independent measurements with OCTAVIUS® systems for complex plans

Dose verification by independent calculation with DIAMOND® secondary check software for routine plans
## Independent Patient Plan Verification

Three simple steps is all it takes.

1. **Import DICOM RT Plan.**
   - 1. Patient database
   - 2. DICOM import
   - 3. Plan information
   - 4. Beam information

2. **Calculate and compare point doses.**
   - 5. Segment-related BEV
   - 6. Beam parameters
   - 7. Prescription information
   - 8. Calculation results
   - 9. Segment-related parameters

3. **Document plan results.**
   - 10. Calculation summary
   - 11. Passing levels
**Optimized Calculation Capabilities**

**Modified Clarkson Integration**
The effective square field size which is equivalent to an irregularly shaped field is accurately determined by a modified Clarkson algorithm.

**AcuTrack**
The AcuTrack algorithm is a unique MLC profile model that allows precise tracking of the measured MLC profile (MLC shape) which is particularly important for small field segments.

**PEV SC Integration**
The Points-Eye-View Integration is a proprietary head scatter algorithm that projects back into the collimator/MLC system to the flattening filter plane.

**DIAMOND®** performs its calculations based on machine data, modified Clarkson integration and optimized dose calculation algorithms.

**Distance-to-Agreement**
Define a search radius to calculate additional dose points and find the closest match to the selected calculation point. The DTA tool is particularly helpful for calculations when the calculation point is in a high dose gradient.

**VMAT & ROI**
Improve the accuracy of VMAT calculations and simplify IMRT calculations with the new VMAT & ROI option. VMAT & ROI for DIAMOND® allows you to import regions of interest (ROIs) and automatically calculate the effective depth for all imported calculation points at any gantry angle by taking tissue densities into account. A user-defined look-up table makes it easy to import ROIs quickly with predefined densities. Use the unique 2D fill mode to display selected densities of the imported ROIs as grayscale values or move the mouse over the ROIs to view them in color for a better analysis. The beam absorption of the treatment table and positioning aids are automatically accounted for by DIAMOND®, providing even more accurate calculation results.

**Fluence and Dose Mapping**
Calculate IMRT fluence and dose maps and export them to VeriSoft® patient plan verification software for a detailed comparison with TPS dose or fluence maps.
Additional Calculation Capabilities

Distance-to-Agreement
Define a search radius to calculate additional dose points and find the closest match to the selected calculation point. The DTA tool is particularly helpful for calculations when the calculation point is in a high dose gradient.

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Fluence and Dose Mapping
Calculate IMRT fluence and dose maps and export them to VeriSoft® patient plan verification software for a detailed comparison with TPS dose or fluence maps.

DIAMOND® provides specific tools for detailed plan analysis and optimized calculation.
**Basic Capabilities**

**Basic Calculations**
- Photon calculations for IMRT and conformal treatments
- VMAT calculation using density corrections (optional)
- Off-axis point dose calculation for open and wedged fields
- Calculations for SSD or isocentric treatment plans
- Field weighting, wedge and tray factors
- Inhomogeneity and compensator/modifier correction
- MU/degree calculation with arc angle entry
- $D_{\text{max}}$ (given dose) calculation for each field
- $S_c$ & $S_p$ calculation formalism for collimator and phantom scatter
- Unlimited treatment units in multiple institutions/departments
- Unlimited plans
- Unlimited fields for each plan
- Unlimited point dose calculation for each field
- QuickCalc calculation mode for fast check calculations

**Plan Import**
- DICOM RT
- Import Data Viewer

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**Advanced Capabilities**

**Dynamic Wedge Support**
- Varian Enhanced Dynamic Wedge using vendor-based GSTT
- Elekta Motorized Wedge with effective wedge angle calculation
- Siemens Virtual Wedge

**Multiple Outlines for Blocks, MLC or Air**
- MLC, blocks and air pattern
- Graphical entry of MLC outline
- Unique transmission or scatter values
- Correction for “flash” in breast treatments
- Correction for lung tissue in the proximity of the point

**Electron Calculations – two methods supported**
- Simple table look-up of output factors
- Extended MD Anderson method with depth dose and skin collimation (optional)
Data Handling and Management

Machine Data Entry

- Tree structure for quick access to all machine data
- Data entry by PTW or directly by the user
- Copy/paste and import
- PDD to TMR or TPR conversion
- Support of Cobalt-60 machines

Machine Data Management

- Comprehensive data management functions: import, copy, check-in, check-out, commission and retire
- Check-in/check-out to manage files with multiple data supervisors on a network
- Locking of all commissioned machine files
- Archiving of retired files in the machines folder for future reference

PTW Support

- Test version for 90 days, including all options
- Multiple machines supported
- Remote support for commissioning of the first clinical machine model

System Features

Network Capabilities

- Synchronized patient files
- Shared machine and patient data stored on network drive
- User login management
- Machine data file security with password and check-in/check-out

Minimum PC Requirements

- Operating system: Windows® XP, Windows Vista®, Windows® 7, Windows® 8
- Memory (RAM): 2 GB
- Hard disk: 200 MB of free space (excluding patient and machine files)

References

Radiotherapy pre-treatment dose validation: A second verification of monitor units (MU) with a commercial software, Iqbal Al Amri et al., Journal of Medical Physics 37 (2012)


Comparison of dose calculations performed by OMP, DIAMOND and RadCalc for 10 clinical VMAT plans, D. Johnson, S.J. Weston, V.P. Cosgrove, D.I. Thwaites, Poster Presentation ESTRO (2012)

Independent MU calculations with PTW DIAMOND, G. Stelczer, C. Pesznyak, T. Major, G. Kontra, Poster Presentation at 5th Alpe-Adria Medical Physics Meeting, Trieste, Italy (2012)

NOTICE: This program is not intended to be used as the primary means of treatment planning. It is intended to be a quality check device for the independent verification of plans supervised by qualified medical physicists.
Dosimetry Pioneers since 1922.

It all started with a brilliant invention - the revolutionary Hammer dosemeter in 1922. Ingenuity coupled with German engineering know-how shaped the company’s history, leading to innovative dosimetry products that later became an industry standard. Over the years, PTW has maintained its pioneering spirit, growing into a global market leader of dosimetry applications, well known for its product excellence and innovative strength. Today, PTW dosimetry is one of the first choices for healthcare professionals in radiation therapy, diagnostic radiology, nuclear medicine and health physics.

For more information on PTW products, visit www.ptw.de or contact your local PTW representative.