

Argus IMRT Time-saving, automated QA for IMRT

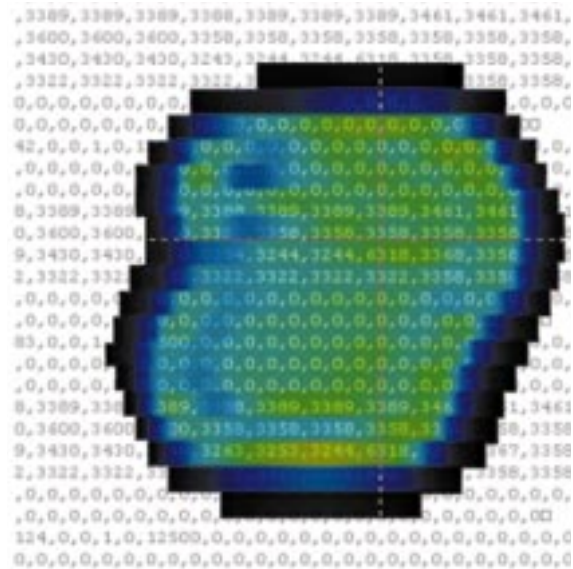
Argus™ IMRT introduces two key technologies that make IMRT QA far more efficient. The first, DynaLog™ Analysis, provides immediate analysis of MLC leaf positions. The second, DICOM RT transfer, allows the import of fluence maps from inverse treatment planning systems, facilitating faster IMRT plan validation. When used as a regular part of a comprehensive QA program, Argus IMRT can dramatically shorten the time needed to perform pre-treatment QA, greatly reduce dependence on film-based dosimetry, and help organize records for regulatory compliance.

Argus IMRT is one of the comprehensive line of Argus quality control information management products. It integrates seamlessly with Argus™ LINAC to provide a complete QA system for your IMRT program. Combining a broad base of MLC tests with sophisticated DMLC analytical tools, Argus IMRT validates linac and MLC mechanical operations with tests of mechanical and radiation isocenter accuracy, leaf positioning, and leaf motion. It can then be used to create trend graphs of these values to spot problems before they cause downtime. Argus IMRT also records DMLC test results and documents all safety checks for a comprehensive record. The net results are time savings, enhanced performance, managed liability risk, and improved patient care.

DynaLog Analysis

Argus IMRT analyzes the DynaLog files produced by all Varian MLCs during dynamic treatments to provide immediate analysis of leaf positions and gaps between leaves over the course of an entire treatment. Use this analysis to:

- Compare the actual and expected leaf motions using tolerances you define.
- Perform statistical analysis using histograms, RMS calculations, and trending to help detect weakening motors before they fail.
- See leaf motion simulations and in-depth graphical analysis of any individual leaf or gap.



All Varian MLCs generate special files, known as DynaLog™ files, during the course of each dynamic treatment. The DynaLog file records the actual and expected position of each leaf in the MLC as well as the cumulative dose fraction delivered every 50 milliseconds.¹

DICOM RT Transfer

Argus IMRT can import fluence maps from inverse treatment planning systems via DICOM RT file transfer.² For example:

- View fluence maps calculated from the DynaLog files and compare them to fluence maps imported from the Eclipse™ Integrated Treatment Planning system to validate treatments planned with Helios™ IMRT Planning.

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Tests

MLC (Static) Tests

- *Crosshair Evaluation*
- *Mechanical Isocenter Variation with Rotation*
- *MLC 50% Fluence Analysis*
- *MLC Leaf Positioning*
- *MLC Leaf Speed*
- *MLC Leaf Travel Range*
- *MLC Interdigitation*
- *MLC Positioning Repeatability*
- *MLC Collimator Backdrive*
- *Radiation Isocenter - Collimator (Spoke Shot)*
- *Radiation Isocenter - Gantry (Spoke Shot)*
- *Light vs. Radiation Field Coincidence*
- *IMRT Checklist*
- *MLC Shaper™ Checklist*

Dosimetry Test

- *Point Dose Measurements*

DMLC (Dynamic) Tests

- *DMLC Conformal Arc Test*
- *DMLC Sliding Window Test*
- *DMLC Step and Shoot Test*

These three tests verify that the treatment system will be able to perform the specified treatment type by analyzing system performance during a typical treatment cycle. For Varian Clinac® C-Series accelerators, this testing can be done by means of DynaLog analysis. For all other accelerators, non-DynaLog testing can be documented.

The following DMLC tests may be performed only on Varian Clinac C-Series or later linear accelerators equipped with Varian MLCs:

- *DMLC Field Verification*

This test performs an in-depth analysis of the DynaLog file generated by the Varian MLC during all dynamic treatments. Results include leaf positions and gap sizes for all leaf pairs throughout the treatment, detailed (and customizable)

statistical analyses of those values, and fluence maps generated from leaf position data. Each of these results can be tested against your specifications and tolerances. Argus IMRT's integration with the VARIIS® information management system and the Millennium™ multileaf collimator (MLC) makes QA setup and data acquisition even faster and easier. (See the section marked Varian System Integration for more details.)

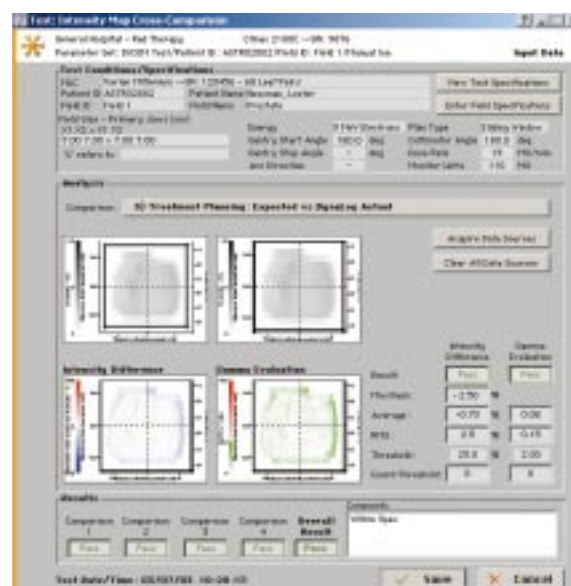
- *DMLC Plan Verification*

This test allows you to do a fast, efficient, pre-treatment validation of an IMRT patient treatment plan by applying DynaLog analysis to each field in a multi-field treatment plan. Argus IMRT's integration with the VARIIS information system and the Millennium MLC makes QA setup and data acquisition even faster and easier. (See the section marked Varian System Integration for more details.)

- *Fluence Map Cross-Comparison Test*

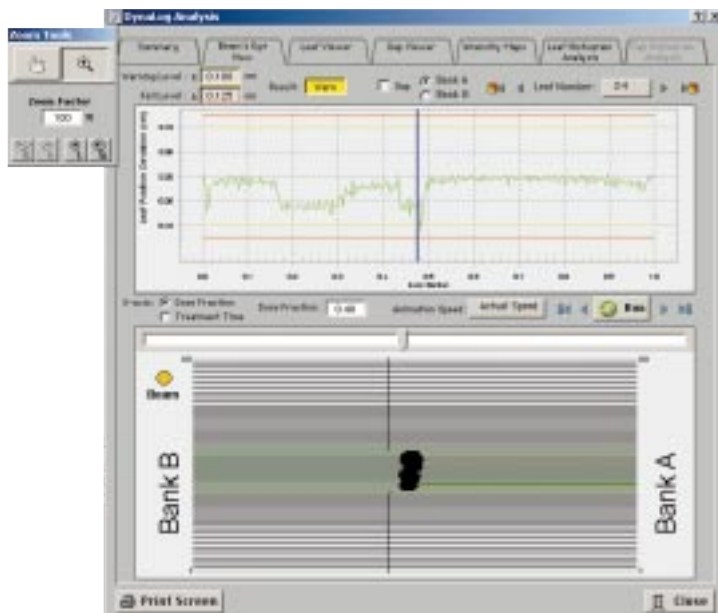
This test can be used to verify close correspondence between fields as represented by fluence maps. These fluence maps may be generated either by the treatment planning system (TPS) or by Argus through analysis of DynaLog files. You may compare TPS fluence to DynaLog fluence or you may compare two distinct sets of DynaLog files to each other.

Input from the TPS is accepted in the form of DICOM RT fluence objects as defined by Varian's Eclipse TPS.²



Fluence Map Cross-Comparison Test: Compare treatment planning system expected fluence to actual fluence as represented by the DynaLog file.

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DynaLog Analysis Beam's Eye View shows the performance of each leaf and gap over the course of the entire treatment.

Other Varian MLCs

Argus can import all versions of the DynaLog file. This allows the user to perform DynaLog analysis on all Varian MLCs that generate DynaLog files, including Varian Mark-Series MLCs and BrainLAB m3[®] micro-MLCs. For these MLCs, the user must use the manual method of DynaLog file acquisition described in the MLC documentation.

Eclipse Treatment Planning

Eclipse 7.1.35 users with Helios IMRT Planning can export fluence maps via DICOM RT, and then import those fluence maps into Argus IMRT for comparison to other treatment planning fluence maps or to fluence maps generated from DynaLog files.

Argus IMRT can export DynaLog files into MLC Shaper (rev. G) files. These files may then be re-imported by Eclipse and used for the purposes of analysis and comparison to the original plan.

Electrometer Interfacing

Argus IMRT interfaces with the following electrometers:

- Keithley 35040
- Standard Imaging Max-4000
- CNMC DataBridge™

Technical Requirements

Windows (Minimum Requirements)

- Pentium[®] processor or higher
- Windows 95 or higher; Windows 98 or higher for DICOM RT import
- Windows-supported monitor, 1024x768 resolution, 256 colors (True Color recommended)
- Windows-supported keyboard, mouse, and printer (color printer recommended)
- 1 GB hard drive with 100 MB available space
- 64 MB RAM (128 MB or greater recommended)

¹ This description of the DynaLog file pertains to sliding window and step-and-shoot fields. For conformal arc fields, the DynaLog file records the actual and expected position of each leaf along with the cumulative arc fraction.

² There is currently no defined DICOM RT standard for TPS fluence objects. Therefore, input to Argus IMRT must be in the form generated by the Eclipse TPS.

³ VARiS 6.5 or later requires Treatment 6.5 or later. Millennium MLC software 6.6 or later required for automatic DynaLog acquisition.

VARiS 6.1/6.2 requires Varian Generation 6 software. Millennium MLC software 6.4 or later required for automatic DynaLog acquisition.



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