

Integral Quality Monitor

The future of Radiation Therapy Verification is here



Unrivaled versatility

One tool for all your QA needs

The IQM Core System

Your Complete Verification Solution

Real-time verification for Adaptive Radiotherapy

A New Level of Confidence for
your Adaptive Workflow

IQM SRS QA Expansion

Pushing the Boundaries of Precision
in Radiotherapy Quality Assurance

IQM Machine QA Expansion

Beyond Patient QA – Fully Automated
Machine QA

IQM changes the QA paradigm in Radiation Therapy. IQM makes every QA task an integral part of your clinical workflow.

IQM provides online QA for adaptive workflows, precise verification for stereotactic fields as small as 0.3×0.5 cm, accurate QA for all VMAT and IMRT techniques with any photon energy, and extends seamlessly to the largest fields, including TBI with up to $40 \text{ cm} \times 40 \text{ cm}$ field sizes.

With its Machine QA expansion, IQM automates linac quality assurance, ensuring consistent and reproducible results independent of user experience. The result: safer treatments, improved outcomes, and unmatched efficiency.



Fraction QA



Plan QA



Machine QA

Why IQM now?

The smarter way to automate QA, save resources, and improve patient care

Unrivaled Versatility

- **Three-in-one solution:**
One device supports online treatment monitoring, patient-specific Plan QA, and Machine QA – replacing the need for multiple separate systems.
- **Unified QA standards:**
Consistent performance across patient QA, machine QA, and online treatment verification.
- **Adaptable for all workflows:**
Designed to support a wide range of clinical protocols and linac models.

Workflow Integration

- **Zero additional time:**
Automated verification happens during treatment delivery, eliminating time-consuming setup and post-processing.
- **Fully automated analysis:**
Results are generated instantly, without manual setup or complex processing.
- **Seamless compatibility:**
IQM integrates seamlessly into existing treatment planning and delivery workflows.



Cost Efficiency

- **Lower capital investment:**
Replaces multiple single-purpose QA systems with one device.
- **Reduced service contracts:**
Minimize maintenance overhead with fewer QA systems to support.
- **Optimized staff resources:**
Save valuable staff time and redirect expertise toward clinical priorities.

Immediate Gains From Day 1

- **More treatment capacity:**
QA no longer blocks linac time, allowing more patients to be treated.
- **Faster patient throughput:**
Reduce delays and keep schedules on track.
- **Instant clinical benefit:**
Realize efficiency gains and safety improvements immediately after installation.

Increase your efficiency now.



Precision by design



The IQM gradient ion chamber detector is a breakthrough in QA technology, uniquely combining the signal stability of a large-volume ion chamber with the continuous spatial sensitivity of film - in one simple, robust device.

- **100% Active Detection Area**

100% of every beam segment is measured. Every time.
No interpolation. No extrapolation.

- **Unmatched Versatility**

From sub-centimeter stereotactic single or multi-lesions as small as 0.3 cm to 0.5cm to large total body irradiation of up to 40 cm × 40 cm, IQM delivers consistent accuracy across every beam shape, leaf motion, and treatment position.

- **Unique Beam Signatures**

Each beam segment produces a highly specific, reproducible signal that ensures even the smallest deviations are detected in real-time during the treatment delivery.

The result?

Reliable precision across all treatment techniques, with a detector design so simple it revolutionizes the way QA is performed.

Real-Time QA: Safeguard Every Treatment

Why real-time verification is more critical than ever

Radiotherapy is evolving rapidly. With **hypo-fractionation** and **dose escalation** techniques becoming standard, every single fraction carries higher clinical weight. A single error can have serious consequences. That's why QA can no longer be an afterthought – **it must happen exactly when it matters most: during the treatment delivery.**

The IQM System makes this possible. Its patented real-time verification transforms QA into an integral part of the treatment planning and delivery process:

Patient Safety First

IQM independently monitors treatment accuracy at every control point. If a deviation exceeds user-defined tolerances, IQM can trigger an immediate interruption - **stopping the error before it harms the patient.**

QA at the Speed of Treatment

Verification is performed automatically while the beam is delivered. Online monitoring, plan QA, and machine QA are completed the moment treatment ends – **without adding a second of clinical workload.**

Confidence in Every Fraction

By ensuring accuracy in real-time, IQM enables clinics to safely adopt advanced techniques while protecting patients and freeing staff resources.



Real-Time QA with IQM: The new standard of safety.

Fast. Automated. Adaptive.

Real-Time QA for Online Adaptive RT (oART)



As radiotherapy becomes increasingly adaptive, QA must evolve to keep pace. **Online Adaptive Radiotherapy (oART)** redefines how treatment plans are created and delivered – **requiring instant, reliable verification** of every newly adapted plan. IQM extends its real-time verification technology with a dedicated adaptive calculation service designed for the unique demands of oART.

Adaptive QA Without Delay

- A dedicated calculation platform processes adaptive plans almost instantly, ensuring QA never delays treatment.
- Adaptive plans are automatically fast-tracked while conventional plans continue on the standard service.
- All adaptive data are pre-loaded locally to eliminate potential network or server delays.

IQM delivers real-time verification exactly when it's needed – **during every adaptive treatment.**

Fully Integrated oART Workflow

- Supports all treatment techniques and Automatic Field Sequencing (AFS).
- Allows continuation of partially delivered adapted fields, even on matched machines.
- Handles multiple adaptive plans per patient per day (different PTVs or isocenters) and allows rolling back to the reference plan.

Transparency and Confidence

Updated IQM reports clearly identify whether the **reference** or an **adaptive plan** was verified, ensuring **traceability and clinical confidence** in your adaptive workflow.

IQM: Fast, automated, and fully integrated into your oART workflow.

SRS QA Redefined

A new level of accuracy. Uncompromised.

Treating **very small fields with maximum precision** is at the heart of modern radiotherapy. Unlike conventional verification systems, IQM's **patented gradient ion chamber** becomes more precise and more sensitive as field sizes decrease – making it the ideal solution for every stereotactic treatment technique.

Superior Sensitivity for the Smallest Fields

- IQM can verify field sizes as small as 0.3×0.5 cm, with unrivaled detection accuracy.
- Its continuous spatial resolution provides unique error sensitivity, even at extreme off-axis positions.
- IQM is the only system that increases sensitivity as field sizes shrink, ensuring precision where it matters most.

Unlimited Verification Capability

IQM overcomes the physical and geometric constraints of array-based QA systems, verifying:

- Any clinical field size or field shape, at any position.
- Any dose, from 0.1 MU to unlimited.
- Any dose rate or photon energy (including FFF).
- Any leaf motion, gantry, or collimator angle.

One System, Multiple Lesions, Total Confidence

IQM uniquely verifies **multiple lesions simultaneously**, with **no limitation** on number or spacing – ensuring comprehensive QA for even the most complex stereotactic treatments.

IQM delivers SRS verification accuracy that conventional systems can't match – real-time, segment-by-segment, and without compromise.



Effortless Machine QA

Consistent. Automated. Operator-Independent.

Quality assurance of the linear accelerator is essential for safe and effective radiotherapy – but traditional Machine QA often requires time-intensive, manual measurements that are prone to observer variability. The IQM Machine QA module changes that. It automates the entire linear accelerator QA process, transforming complex daily, monthly, and annual checks into a simple, reproducible workflow that delivers consistent results – independent of user knowledge or experience.

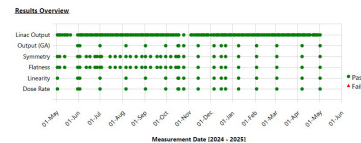
Reliable by Design

- Operator-independent verification ensures measurement consistency and removes intra-observer variability.
- Fully automated reporting provides immediate access to analysis results – no manual post-processing required.
- Seamless integration into existing workflows reduces workload and supports facilities facing staff shortages.

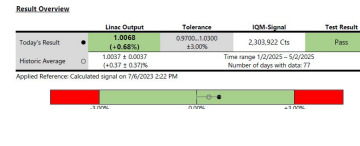
Some Machine QA Highlights:

Test	Evaluation Metric	Tolerance	Test Result
Linac Output	1.0068 (+0.68%)	0.970% - 1.030%	Pass
Dose Output (Gantry Angle)	Max Dev: +0.11%	±1.00%	Pass
Symmetry	In-Line: +0.26% Cross-Line: +1.03%	±2.00%	Pass
Flatness	In-Line: +0.42% Cross-Line: +5.52%	+2.59%L, +6.99%	Pass
Linearity	Max Dev: 1.0100 1.0450%	±1.00%	Pass
Dose Rate	Max Dev: -0.42%	±1.00%	Pass

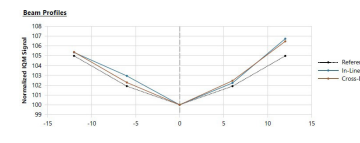
Pass/Fail Overview



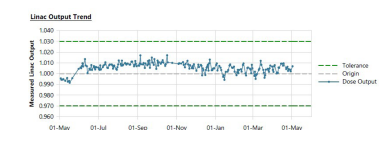
Annual Pass/Fail Trends



Detailed Analysis



Inplane and Crossplane Profiles



Long-term trends

Automated Accuracy

IQM automatically calculates and verifies key beam parameters directly from measured detector signals, providing precise and repeatable measurements for:

- Output constancy
- Output constancy by gantry angle
- Symmetry
- Flatness
- Dose linearity
- Dose rate dependency

(Additional tests are continuously being developed for future releases.)

Proven in Clinical Practice

Clinics around the world are already adopting IQM's effortless Machine QA to streamline routine linac quality management. Some of the world's leading radiotherapy centers are performing long-term implementation trials, evaluating how IQM's automation and reproducibility can redefine daily and periodic QA routine – safely, efficiently, and with minimal human effort.

IQM Machine QA – the foundation of consistent performance and effortless precision.

The IQM Reporter Service

Fully Automated. Fully Documented. Fully Transparent.



The IQM Reporter Service brings together all aspects of plan verification, treatment monitoring, and machine QA into one seamlessly integrated and fully automated workflow. Operating entirely in the background, it automatically recognizes and analyzes each beam sequence according to user-defined protocols for any treatment technique – from SRS, VMAT, IMRT, DCAT, and TBI to Machine QA and Real-Time Treatment Monitoring.

Automatic Reporting – No User Interaction Required

After each measurement, IQM automatically generates comprehensive PDF reports:

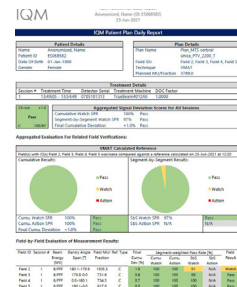
- **Patient Plan Daily Report (PPDR)** – provides a detailed evaluation of the treatment delivery accuracy for every beam, every field, and every control point in a single session.
- **Patient Plan Summary Report (PPSR)** – compiles the complete treatment history, showing the cumulative accuracy of every fraction and the overall quality of the entire treatment course.

Each report is automatically:

- Emailed to the user,
- Stored at a user-defined network location, and
- Saved directly in the Elekta Mosaik electronic patient file

All data is also stored in CSV format, enabling custom analytics and long-term QA tracking.

Every Fraction



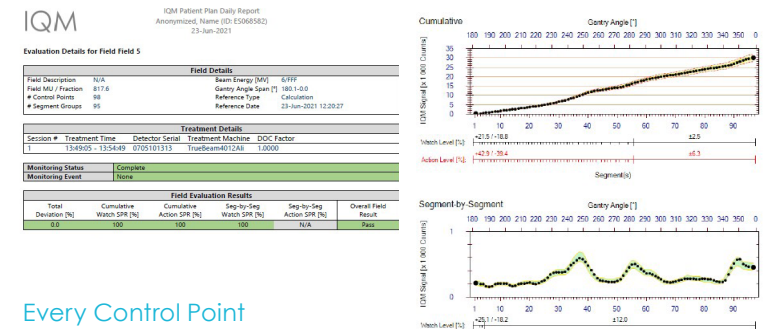
Every Beam

Unprecedented Insight and Traceability

IQM's automated reports deliver a level of clinical transparency previously unavailable:

- Segment-by-segment analysis for every control point.
- Beam-level pass rates and session quality indices.
- Fraction-by-fraction summaries that reveal trends over the entire treatment course.
- Comprehensive visualization of the complete verification history – from the first beam to the final fraction.

With IQM, every aspect of the treatment delivery is documented – automatically, accurately, and in real time.



Every Control Point

IQM Reporter Service – turning data into confidence

Unrivaled Versatility – One Tool for All Your QA Needs

IQM Core System

Complete Verification Coverage – Out of the Box

- Real-time QA and patient-specific Plan QA for:
- Volumetric Modulated Arc Therapy (VMAT) verification
- Dynamic Conformal Arc Therapy (DCAT) verification
- Intensity Modulated Radiation Therapy (IMRT) verification (static and dynamic MLC)
- Total Body Irradiation (TBI) verification (up to 40 cm × 40 cm field size)
- 3D Conformal Radiotherapy

IQM Online Adaptive Expansion

Confidence for your Adaptive Workflow

- Online Adaptive Radiotherapy (oART) real-time verification
- Offline Adaptive Radiotherapy real-time verification

IQM SRS Expansion

Pushing the Boundaries of Precision

- Multi-lesion Stereotactic Radiosurgery (SRS) and Stereotactic Radiotherapy (SRT) verification (all lesions verified simultaneously)
- Single-lesion Stereotactic Radiosurgery (SRS) and Stereotactic Radiotherapy (SRT) verification (field sizes as small as 0.3 cm x 0.5 cm)
- Stereotactic Ablative Radiotherapy (SABR) verification
- Stereotactic Body Radiation Therapy (SBRT) verification

IQM Machine QA Expansion

Beyond Patient QA – Machine QA in One Device

- Output constancy check
- Output constancy check at different gantry angles
- Beam symmetry check
- Beam flatness check
- Dose linearity check
- Dose rate check

Online Adaptive Treatments to Machine QA,
IQM is your All-In-One Solution.
One System. Every Task. Unmatched Precision.

Book your IQM presentation now: sales@i-rt.de

iRT Systems GmbH
Schlossstrasse 1
56068 Koblenz
Germany

iRT Systems Corporation
7777 Bonhomme Avenue,
Suite 1800
Clayton, MO 63105 USA

www.i-rt.de
www.iqm-system.com

