

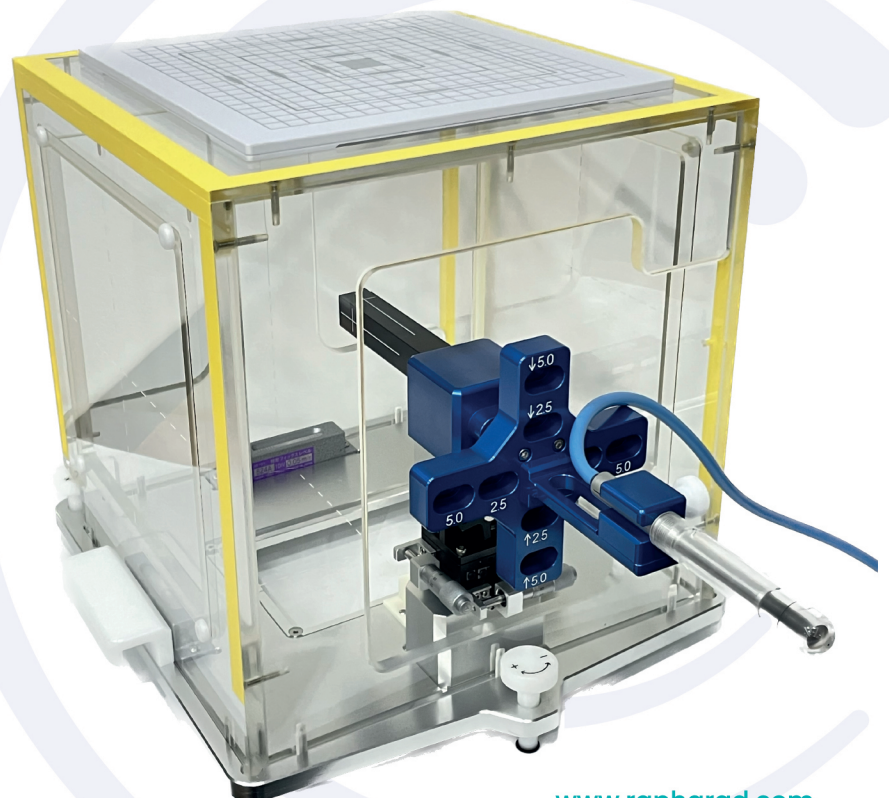
Linac

Isocenter

Manager

Accurate & Efficient Linac QA System

Couch-top Reference for Linac QA



Accurate & Efficient Linac QA System

Couch-top Reference for Linac QA

Features of Linac Isocenter Manager (LIM)

LIM
can do



• Laser alignment

• Winston-Lutz test

• Gantry & Collimator angle verification / calibration

• Light-Radiation coincidence

• Field size verification

• Applicable to CBCT

Laser Alignment

Features

01. Radiation-based alignment

Accurate

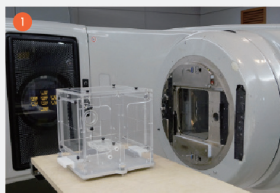
02. Deterministic method

Straightforward

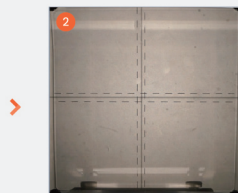
03. Non-iterative procedure

Fast

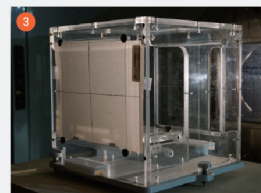
Workflow (Optical Align. + Radiation Align.)



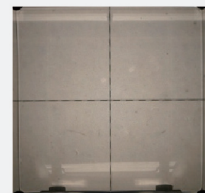
Device setup



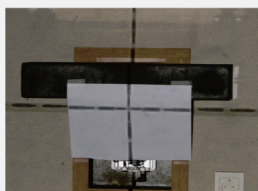
Before optical alignment



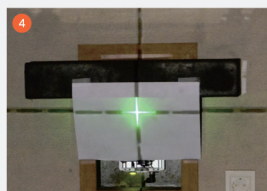
After optical alignment



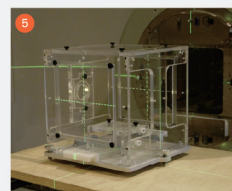
On the screen



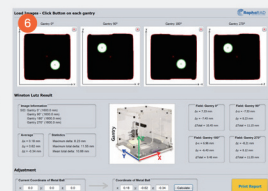
On the wall



Adjust laser "position"

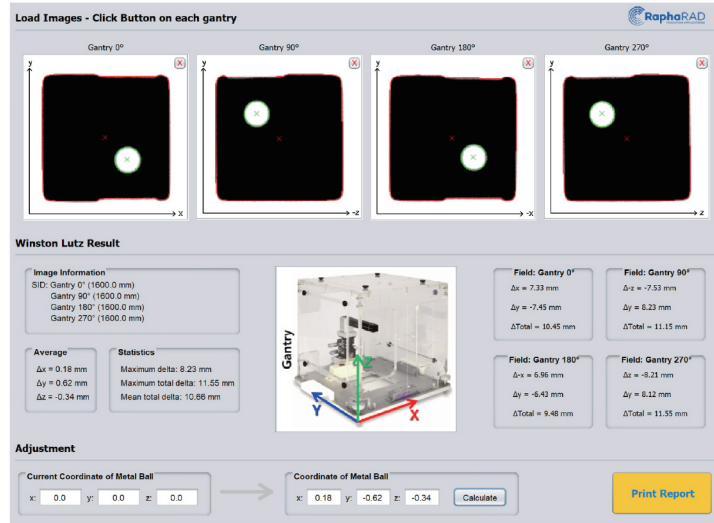


Adjust laser "direction"



Radiation alignment

Winston-Lutz Test (to find radiation isocenter)



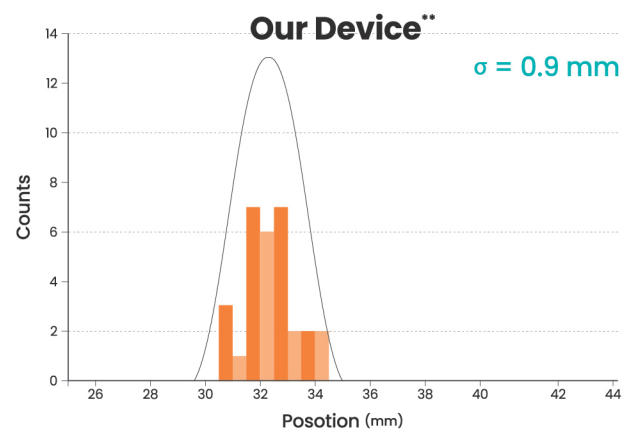
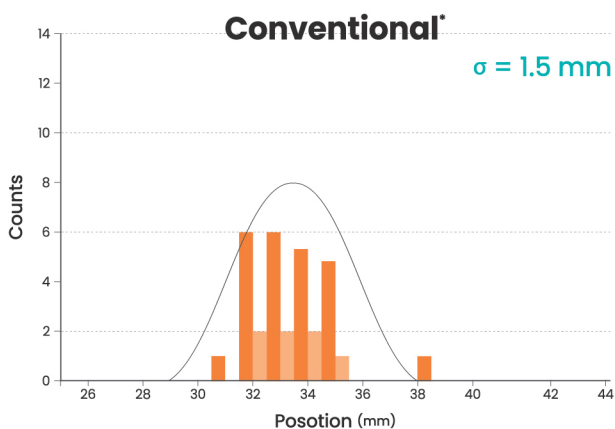
Comparison of QA

Efficiency of QA

QA Method \ QA Item	Laser Alignment	Winston-Lutz Test	Gantry/Collim. Angle Calib.	Light-Radiat. Coincidence	Field Size Verification
Conventional	Specific device	Specific device	Specific device	Specific device	Specific device
Our Device	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Accuracy of QA

QA Method \ QA Item	Align. Reproducibility on room wall	Distance bw. both lasers on room wall	QA Time
Conventional	1.5 mm*	2.1 mm	~ 60 min
Our Device	0.9 mm**	1.4 mm	< 20 min





QA Solutions for Linear Accelerators

Recommended in TG-142

Frequency	Feature	Tolerance		
		Non-IMRT	IMRT	SRS/SBRT
Daily	• X-ray/Electron output constancy (all energies)	3%		
	• Laser Alignment (Cross-Hair)	±2 mm	±2 mm	±1 mm
	• Optical Distance Indicator (ODI)	±2 mm	±2 mm	±2 mm
	• Collimator Size Indicator	±2 mm	±2 mm	±1 mm
Monthly	• Light/Radiation Field Coincidence	2 mm or 1%	2 mm or 1%	2 mm or 1%
	• Laser Location	±2 mm	±2 mm	±1 mm
	• Gantry/Collimator Angel Isocenter	1.0°	1.0°	0.5°
	• Cross-Hair Centering (Walkout)	1 mm	1 mm	1 mm
Annual	• X-ray/Electron output constancy vs gantry angle	±1% from baseline		
	• X-ray/Electron off-axis factor constancy vs gantry angle	±1% from baseline		
	• Collimator/Gantry/Couch Rotation Isocenter	±1 mm	±1 mm	±1 mm
	• Coincidence of Radiation and Mechanical Isocenter	±2 mm	±2 mm	±1 mm

Test Report

- > A test report would be provided with the QA device and software.



Patents & Papers

- > 방사선 치료용 레이저 정렬장치 및 정렬방법 Korea, 2014
- > A new method and device of aligning patient setup lasers in radiation therapy JACMP, 2016

