

Theme: Physics

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Abstract Title: Compact Rotating Gantry for Heavy-Ion Radiotherapy System

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Abstract

Toshiba has successfully developed the world's most compact carbon-ion beam rotating gantry by the use of superconducting technology. The compact rotating gantry is manufactured by utilizing Toshiba's proprietary technologies. This presentation will briefly introduce Toshiba's compact rotating gantry, and the features of the beam QA system and QA measurement equipment.

Compact rotating gantry

Key technological features that enabled the compact design of our gantry:

- Compactness enabled by high magnetic field strength of superconducting magnets (Fig. 1)
- Space-saving beam delivery system realized by adopting a short scanning magnet and shortening the distance to the iso-center (Fig. 2)

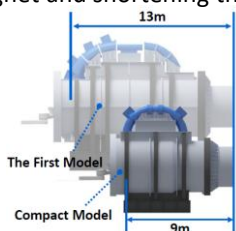


Fig1. Compact rotating gantry

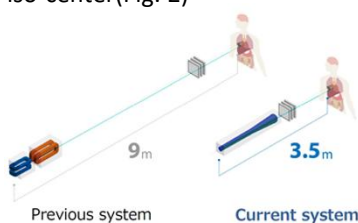


Fig2. Short scanning system

Beam QA Efficiency Improvements

➤ Integrated Control of Beam Irradiation and Beam QA Measurement

- Integration of beam delivery and QA device operation
- Automation of measurement control processes
- Streamlined QA workflow with reduced manual steps
- Significant reduction in operator intervention
- Enhanced efficiency and reproducibility in QA procedures

➤ Proprietary QA Devices Supporting Integration

- Simplified interfaces and intuitive operation for daily QA tasks.
- Purpose-built to work seamlessly with irradiation systems
- Automated positioning and measurement functions for efficient QA execution
- Provision of various proprietary QA devices;

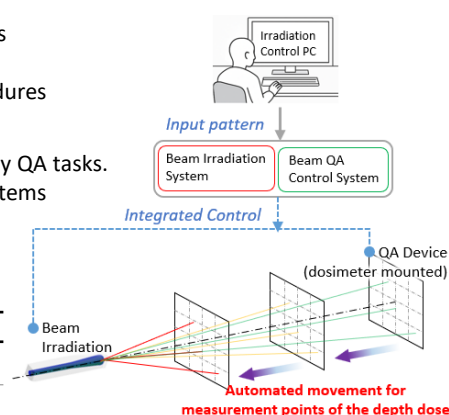


Fig3. Automated QA through Integrated Beam and Measurement Control

Device Name	Measurement item
Daily QA device w/ tough water	• Daily MU calibration factor • Range check
Water phantom	• 3D dose distribution • MU calibration constant
Treatment plan QA device	• Treatment plan QA • 3D dose distribution • Full-angle gantry measurement supported

Summary

Our compact rotating gantry has been installed at heavy-ion radiotherapy facilities in Japan and Korea and is already in clinical operation. Toshiba has also provided several beam QA devices that enable measurement of parameters such as beam axis accuracy and beam size quality in clinical gantry systems, contributing to the assurance of beam quality in daily treatment.