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Each technology described here needs appropriate approval/clearance/certification by regulatory authorities of each country/region prior to market entry or clinical use.

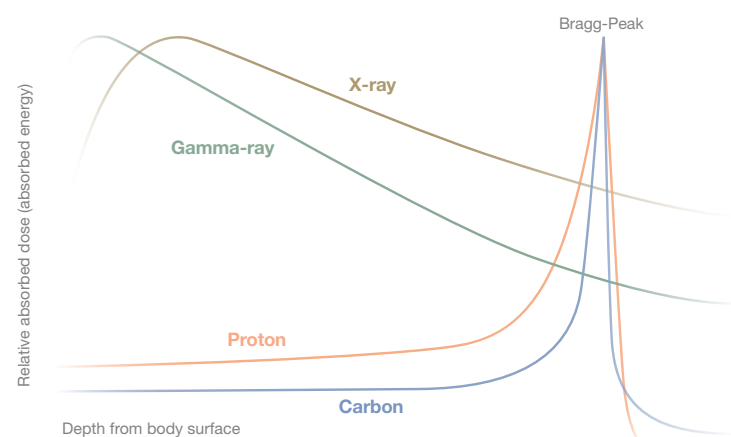


Hitachi's solution for particle beam therapy

Proton therapy is one of the most advanced forms of cancer therapy available. Pinpoint accuracy delivered through patient-specific treatments with minimal side effects are just some of the qualities that make this therapy so unique. But it did not happen overnight. Years of research, a broad range of technical and clinical experience, followed by collaborative work with world-class hospitals and cancer centers have given Hitachi a reputation for providing the medical community with the highest level of quality, exceptionally high clinical availability and cutting edge innovations in proton therapy. Discover why leaders in cancer therapy across the globe have chosen Hitachi as a long term partner to help patients fight cancer.

What is particle beam therapy?

For over 50 years, the potential advantages of charged particles in cancer therapy has motivated the medical community to advance the clinical application of particle beam therapy. It can maximize radiation dose to tumor sites, while sparing adjacent healthy tissues, and is especially effective in treating many rare cancers, especially pediatric cancers. Particle beams enter the body, releasing small amounts of energy until reaching the tumor site, where the particles' maximum energy is deposited and, then the beam stops, resulting in minimal exit dose. As a result, short term and long term side effects from radiation dose to normal tissues and organs, are reduced or avoided, unlike most other forms of radiation treatment. It is easy to understand why the number of particle beam therapy centers and patients seeking particle beam therapy treatment is steadily growing.



State-of-the-art

Hitachi is proud of its long history in Particle Beam Therapy. From the national centers in Japan 20 years ago, leading up to the installation at some of the most renowned cancer centers in the United States and Japan today, Hitachi's advanced R&D teams have earned a reputation for turning challenging collaboration projects and concepts into commercial reality. Leveraging a culture that thrives on innovation and customer satisfaction, Hitachi builds each proton beam therapy (PBT) system with an unmatched dedication to quality, performance and reliability.

Discrete Spot Scanning Technology

Hitachi was the first to bring FDA 510(k) cleared and clinically implemented spot scanning proton beam therapy technology to the U. S. market – today's new standard in precision PBT treatment delivery, which is also Pharmaceutical and Medical Devices Agency (PMDA) approved in Japan. Hitachi's Discrete Spot Scanning Technology allows the most advanced treatment application of PBT, such as Intensity Modulated Proton Therapy (IMPT). Hitachi's proton beam therapy systems have treated more than 10,000 patients to date, many of them treated with Hitachi's industry leading, clinically proven Discrete Spot Scanning system.

Discrete Spot Scanning Technology

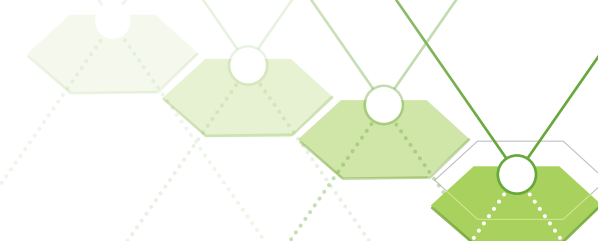


Collaborations with Innovative Partners

Proton Beam Therapy with Real-time image Gating

The treatment of moving targets affected by respiration, such as those in the lung or liver, require special care. This need has given rise to the highly anticipated combination of Hitachi's Discrete Spot Scanning Technology, Real-time image Gating and automated beam triggering, developed with partner Hokkaido University. As a result, this innovation is now in clinical use at Hokkaido University's Proton Beam Therapy System, achieving high dose delivery while significantly minimizing exposure to healthy tissue and organs.

Real-time image Gating

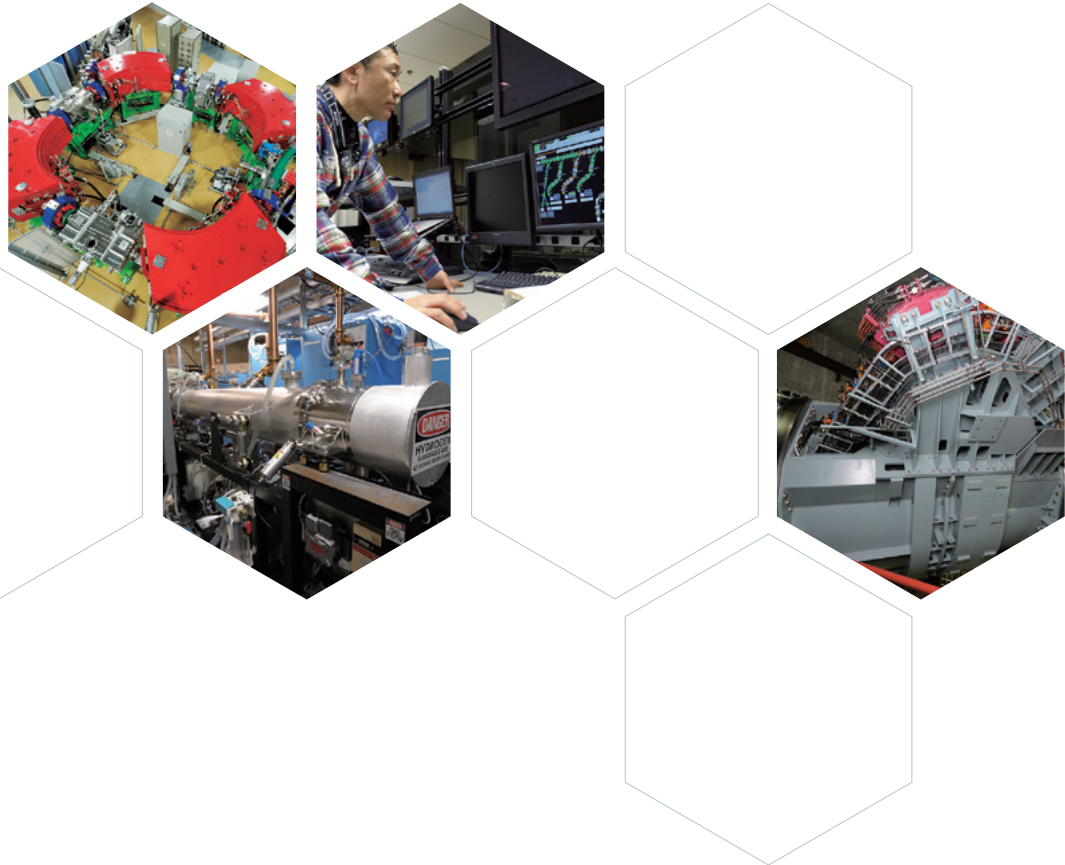


Reliability

Hitachi's fundamental quality standards in design and manufacturing have been continually improving clinical efficiency of its PBT systems, producing industry leading equipment reliability. To attain superior uptimes, Hitachi PBT systems are designed with features allowing highly efficient preventative maintenance to maximize clinical system availability.

Hitachi's strong and successful PBT system operating experience, performing with consistently high uptime, gives us the confidence to guarantee high system availabilities from day one. In fact, Hitachi has achieved availabilities greater than 98% over the last few years at MD Anderson in the U. S. and at Hitachi PBT centers in Japan as well – due in part to the seamless teamwork between the on-site maintenance team and Hitachi's remote 24/7 365 days/year monitoring system manned by Hitachi PBT engineers from its headquarters from Japan.

These key characteristics of Hitachi's system and operations have created a proven and stable platform, where the primary goal of Hitachi maintenance teams is to continually strive for 100% availability.



Customized proton solutions

Hitachi offers an extensive variety of PBT system configurations to meet every customer's needs, ranging from smaller single treatment room systems to larger multi-treatment room configurations. And, Hitachi also offers a new, compact, energy efficient synchrotron accelerator to power single and multi-room systems, with a complete selection of rotating gantries, including a full sized 360 degree gantry, a 360 degree compact gantry and a partial 190 degree gantry.

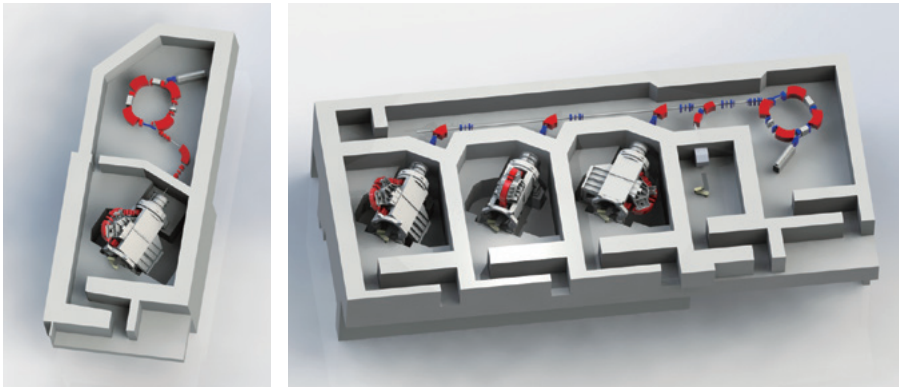
In early 2014, Hokkaido University began treating patients on Hitachi's first compact^{*1)} single room 360 degree gantry system, featuring two industry firsts: compact gantry mounted CBCT and Real-time image Gating. Hitachi's advanced, compact single room solution is expandable and does not require an added accelerator to power multiple rooms, and supports today's most advanced treatment application techniques, such as IMPT^{*2)}, RGPT^{*3)} and CBCT^{*4)}.

*1) 30% smaller footprint compared to previous design.
*2) Intensity Modulated Proton Therapy
*3) Real-time image Gated Particle Therapy: Co-developed with Hokkaido University in Japan.
Clinical use outside of Japan may require relevant approval.
*4) Cone Beam CT: Co-developed with Hokkaido University in Japan.
Clinical use outside of Japan may require relevant approval.



360 degree compact gantry room

Partial 190 degree gantry room



Single room

Multi rooms



Hitachi... more than just protons

Hitachi, along with the proton beam therapy system, is also dedicated to advancing carbon and other ion therapy technologies. Hitachi has a wealth of experience with particle beam therapy systems, both within Japan and abroad.

At the National Institute of Radiological Science (NIRS) in Japan, Hitachi supplied the magnets, control system, beam monitors and power supply systems for the accelerator. In 2002, Hitachi built the Wakasa Wan Energy Research Center complete with a proton, helium and carbon-capable accelerator. Hitachi also supplied the Heidelberg Ion-Beam Therapy Center in Germany with an RF acceleration system in 2006.

Through the extensive experience garnered from the design and manufacturing of many accelerators, Hitachi is the holder of many critical patents essential to this field. Based on this vast experience with particle accelerators, Hitachi has developed a compact carbon ion synchrotron while aggressively continuing advanced research on other particle beam therapy equipment. Combined with decades of experience in the delivery of proton beam therapy systems to hospitals, Hitachi has already earned the industry's trust in the delivery of particle beam therapy systems to market.

In 2014, Hitachi won the order for a carbon ion therapy system in Japan and thus became one of the few vendors in the world with both proton and carbon ion therapy offerings. This project involves the supply of a complete carbon ion therapy system including the compact synchrotron, beam delivery system and the advanced control system.

