



Heidelberg Ion-Beam Therapy Center (HIT) | Case Study Medical Technology

Heavy Ion and Proton Therapy

The Heidelberg Ion-Beam Therapy Center (HIT) treats tumors with heavy ion and proton therapy. This method allows precise targeting of tumors deep within the body or in highly sensitive areas while sparing surrounding healthy tissue. The control systems for the particle accelerator were provided by Eckelmann.

“In the fight against cancer, we have taken entirely new paths with ion and proton therapy. The charged particles are accelerated to a maximum of 70 percent of the speed of light and then precisely directed toward the tumor. Eckelmann has been a valued development partner since the planning of the Heidelberg Ion-Beam Therapy Center — also for the long-term support and further development of the existing systems. The collaboration with Eckelmann has always been exemplary.”

Professor Dr. Thomas Haberer | Technical Director HIT



Objective

The Heidelberg Ion-Beam Therapy Center (HIT) treats tumors with heavy ion and proton therapy. This method allows precise targeting of tumors deep within the body or in highly sensitive areas while sparing surrounding healthy tissue. Due to their unique physical properties, ions pass through tissue as a sharply defined beam. Only shortly before the particles come to a stop do they unfold their maximum biological effect directly in the tumor.

Specialists from the Eckelmann Group developed, implemented, and supplied the control systems for the particle accelerator and the therapy area on behalf of HIT.

The Customer

The Heidelberg Ion-Beam Therapy Center (HIT) was the first therapy facility in Europe to work with heavy ions. As the world's first center, HIT used its own gantry — a movable beam guidance system that can rotate the beam exit 360° around the patient for optimal irradiation.

Performance by Eckelmann

- › Hardware/firmware/production.
- › Eckelmann provides long-term support and further development of the existing systems as part of a long-term commitment.
- › In case of malfunctions, the experts of the development team are available to HIT around the clock, seven days a week, and respond within the shortest possible time upon request.

Application

The charged particles are accelerated to a maximum of 70 percent of the speed of light and then precisely directed toward the tumor. The penetration depth of the beam into the tissue depends on its energy (= speed): The higher the energy, the deeper it penetrates the body. This control system regulates a large number of electromagnets and RF systems that force and accelerate the ions into their circular path, as well as numerous beam diagnostic devices.

The main tasks of the therapy control system include the reservation and safe arbitration of treatment slots at the accelerator and the request and precise application of defined ion beams according to specified treatment plans. During treatment, the ion beam must be continuously monitored and analyzed; it can be automatically shut off within 200 millionths of a second in an emergency.

Gantry Diameter	Gantry Weight	Particle Acceleration up to	Possible Combinations of Beam Parameters
13 m	670 t	70 % c	100 +



➤ HIT uses a gantry — a movable beam guidance system — that can rotate the beam exit 360° around the patient for optimal irradiation.

Special Features

- The therapy control system was developed and produced according to the strict guidelines of the Medical Devices Act.
- Eckelmann meets the high regulatory requirements, for example with ISO 13485 as a supplier for medical technology and the DIN standard DIN EN 62304 (Medical Device Software).



Do you have any questions?

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