

## HALCYON RADIOTHERAPY SYSTEM

# HIGH QUALITY OF CARE: Image-Guided Treatments Delivered Easily and Quickly

Halcyon™ is Varian's newest cancer treatment system, engineered to simplify and enhance virtually every aspect of image-guided volumetric IMRT. Halcyon was designed to revolutionize radiotherapy through innovation in three crucial areas: quality of care, operational excellence, and human-centered design. The synergy of these values gives the system a unique ability to positively impact the professionals who use it and the patients being treated by it.

### Halcyon Treatment : A High Quality of Care

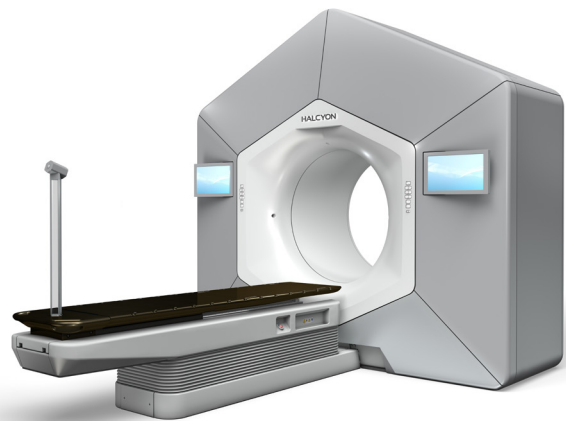
Halcyon achieves high quality care by optimizing rapid image-guided IMRT and RapidArc® radiotherapy. Every patient receives treatment characterized by a high level of clinical quality in terms of dose conformity and low dose to organs-at-risk because of three system attributes that work synergistically:

1. The machine's speed, which enables the use of more fields or arcs within a normal treatment time slot.
2. A unique dual-layer MLC that enables high modulation with low leakage for every field or arc.
3. A streamlined work whereby 100% of treatments are image-guided.

### Speed that Enhances Quality

The Halcyon system was designed to speed up every step of the treatment process without sacrificing quality:

- During IMRT treatments, the gantry rotates four times faster than a standard linac for fast image-guidance and field-to-field transitions. It rotates twice as fast for RapidArc treatments.
- Cone-beam CT imaging can be completed in about 15 seconds; 2-D orthogonal image pairs in seven seconds or less. Since the MV imager is always in the beam's path, no deployment is necessary, enabling fast imaging for every patient.
- The system's six MV FFF beam maintains a high dose rate of around 800 MU/min to keep treatment times short; it is optimized for RapidArc and fast IMRT.



- The dual-layer MLC, described more fully below, has leaves that travel twice as fast as a conventional MLC, enabling it to keep up with the gantry rotation speed and high dose delivery rate.

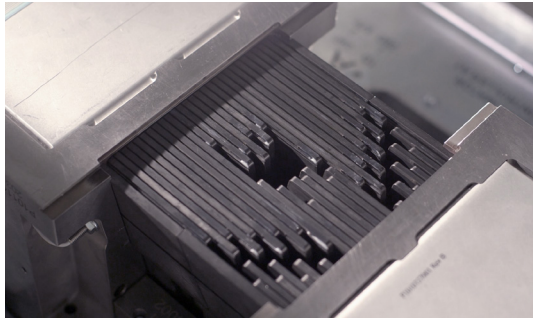
The Halcyon system's overall speed minimizes the patient's time on the treatment couch, allowing less time for patient motion which may result in greater treatment precision.



## The New Generation Dual-Layer Multileaf Collimator

Halcyon's dual-layer MLC is optimized for modulated treatments. Its design offers significant advantages:

- It achieves full-field modulation with 100 percent leaf overtravel.
- The Halcyon MLC also offers 100 percent interdigitation, which helps deliver accurate doses to complex tumors.
- It can rotate between fields or arcs. Treatment plans can employ multiple unique collimator rotations to enhance treatment conformity.



- The stacked design with staggering of leaves allows per-leaf jaw tracking and reduces the average leaf transmission to well below that of a standard MLC.
- The MLC leaves move at a rate of five centimeters per second, or double the leaf speed of a standard MLC, allowing excellent modulation for high-quality treatments.
- The penumbra is small and less dependent on leaf position or leaf-end geometry, allowing sharper dose fall off.

These MLC features, taken together, create the potential for delivering very high quality treatment plans for Halcyon treatments.

## High Quality IMRT and RapidArc Radiotherapy

The faster gantry rotation speed, MLC speed, and high dose delivery rate—carefully synchronized by Maestro, the system's comprehensive and integrated digital architecture—are what make Halcyon so ideal for delivering efficient IMRT and RapidArc radiotherapy. These capabilities make it possible to deliver complex IMRT plans in the same timeframe as a typical RapidArc treatment. They also enable the use of multiple RapidArc trajectories quickly when indicated for treatment quality. Consequently, clinical teams can choose the best Halcyon treatment for each patient without impeding throughput or operational efficiency.

## Treatment Planning Studies

To demonstrate the quality of Halcyon treatment, Varian undertook some treatment planning comparison studies. Using cases from previous years' AAPM and AAMD planning competitions, Varian dosimetrists worked to determine the best quality plans that would be achievable using this platform. Halcyon treatment plans consistently scored in the top 10% in terms of plan quality. Visit [Varian's Medical Affairs website](#) and click on "Halcyon Case Studies" to see these Halcyon treatment plans.

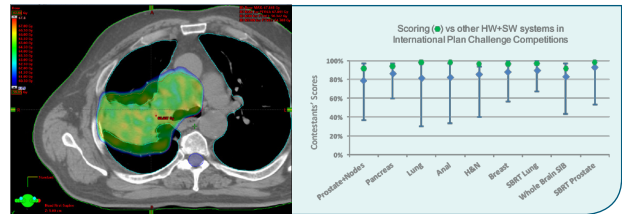


Chart showing how Halcyon treatment plans scored in a series of treatment plan comparisons.

### Intended Use Summary

Varian Medical Systems' linear accelerators are intended to provide stereotactic radiosurgery and precision radiotherapy for lesions, tumors, and conditions anywhere in the body where radiation treatment is indicated.

### Safety

Radiation treatments may cause side effects that can vary depending on the part of the body being treated. The most frequent ones are typically temporary and may include, but are not limited to, irritation to the respiratory, digestive, urinary or reproductive systems, fatigue, nausea, skin irritation, and hair loss. In some patients, they can be severe. Treatment sessions may vary in complexity and time. Radiation treatment is not appropriate for all cancers.

### DISCLAIMERS

Devices or features presented in this brochure may not be available for sale in all markets. Specifications and features subject to change without notice.



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