Monaco® 5
Comprehensive treatment planning

Accuracy accelerated
A Complete Planning System with Improved Speed and Accuracy

Monaco, an outstanding planning solution for years, now offers clinics the opportunity to do more, do it faster and do it more accurately than ever before. Monaco now consolidates support for all the most clinically useful delivery techniques in a single system, including flattening filter free and features refinements that bring planning speed and precision to new levels.

Your Single Source for Planning
With Monaco, you have a comprehensive system to support all major modalities of treatment, supporting 3D conformal radiation therapy, IMRT, VMAT, stereotactic MLC and cones. In addition, it supports Siemens mARC (rIMRT) as well as many of your 4D needs. The simulation package encompasses 4D contouring and the convenient EZ Sketch™ functionality.

A Higher Standard for Accuracy
Monaco has used the Monte Carlo algorithm – the most accurate dose calculation available – longer than any treatment planning system. Elekta’s 35 years of experience in treatment planning have enabled ongoing refinements in this algorithm to ensure the highest possible standard for planning accuracy.

To improve plan quality Monaco offers Segment Shape Optimization™, which smooths and clusters segments and then optimizes beam weights and shapes. In addition, the unique biological modeling capabilities of Monaco apply defined clinical objectives, maximizing confidence in plan assessment and selection.

Multi-criterial optimization assures organs at risk are spared to the highest degree possible while maintaining target coverage. Real time interaction during and after optimization provides the flexibility to precisely tune the plan results as needed.
Satisfying Your Need for Planning Speed
Monaco now provides a number of enhancements that accelerate your workflow. These include a better organized user interface configuration that improves access to tools, and a planning control toolbar that provides immediate access to beam or structure spread sheets, prescription, Dose reference points (DRP) and IMRT constraints.

In addition, compared to previous versions, Monte Carlo control point dose calculations are faster*. The addition of the Collapsed Cone algorithm with an available Graphics Processing Unit (GPU) card helps plan calculation efficiency.

Monaco now features a sleek and easy-to-follow user interface to guide you to advanced features intended to create accurate plans for you and your patients.

*Data on file
Enhance Planning Performance
Choose from a broad suite of planning tools and range of robust dose calculation algorithms. Clinicians can select the tools for the technique to optimize radiation therapy delivery for each patient. With a new, intuitive and user-friendly interface, Monaco allows users to quickly access important plan information including beam or structure spreadsheets, prescription, DRP, and IMRT constraints.

3D Conformal
With the addition of 3D conformal treatment planning capabilities, Monaco includes customizable templates that support efficient plan generation. By using a Graphics Processing Unit (GPU) for the collapsed-cone algorithm, Monaco increases the speed and performance of 3D dose calculations even further. And, Monaco supports a range of modalities to cater to the clinic’s needs for expanding the treatment planning capabilities, including support of wedges, bolus and VMC++ Electron Monte Carlo.

IMRT
Monaco integrates innovative biological cost functions with multicriterial constrained optimization, a powerful leaf-
sequence optimizer and a robust Monte Carlo dose calculation algorithm to create the most advanced IMRT planning solution available today. Monaco also can be used effectively in most clinical environments. As a vendor neutral IMRT planning platform, Monaco supports all major linear accelerators and connects to any record-and-verify information system, including Elekta’s MOSAIQ® Oncology Information System. Monaco includes fast pencil beam dose engine for “ideal” fluence optimization.

**VMAT**

Monaco’s Volumetric Modulated Arc Therapy (VMAT) functionality can optimize single or multiple non-coplanar arcs simultaneously, providing the flexibility and control needed for more complex treatment plans. Arc plans can be delivered with a single button push at the linear accelerator console. Gantry directions are automatically sorted and all control points are seamlessly integrated into a single deliverable arc sequence. Monaco offers the XVMC Monte Carlo dose engine, for electron and photon, for a continuous arc calculation as a single beam, rather than just dose approximations that occur with many discrete (control point) gantry angle positions. Monaco also offers the Dynamic Conformal Arc feature.

**Integration**

Monaco connects to Elekta’s MOSAIQ for a truly optimized clinical workflow and also supports all major OIS and Linac connectivity. Monaco fully integrates Elekta’s superior contouring and fusion capabilities, including the ability to contour 4D CT data, with the option of providing ABAS on the same hardware for a seamless transition from delineation to planning.
Monaco® features advanced concepts to enable complete planning for all techniques; complete stereotaxy planning for frame-based, frameless, APEX™ micro-leaf MLC, and cones; contouring for 3D and 4D data and more. These unique features drive much of the functionality for Monaco.

**Monaco Advances**

**Biological Modeling**
- Wide range of optimization cost functions, including dose-volume-based and biological cost functions
- Equivalent Uniform Dose and iso-effective volumes account for tissue response to dose per fraction and volume effect of organs
- Complete control of the DVHs for healthy tissue and tumor volumes

**Multi-criterial Goals**
- Multi-criterial optimization offers precise adjustments generated in real-time during optimization
- Automated tightening of constraints to optimize normal tissue sparing
- Fine tune the plan during the process and after the final calculation with constraint weight edits and a fast update

**Sensitivity Analysis**
- Unique sensitivity analysis tool easily resolves conflicts between target dose objective and dose limiting constraints
- Optimization evaluation tool shows interdependence of each constraint and objective on target dose coverage
Monte Carlo Dose Engine
- XVMC Monte Carlo dose engine – for accurate dose calculation
- Fast pencil beam dose engine for “ideal” fluence optimization – specifically created for IMRT
- Includes both electron and photon beams

Constrained Optimization
- Ensures that OAR dose limits are satisfied
- Changes to any constraint in the prescription don’t affect the other normal tissue constraints, only the dose to target(s)
- Enhanced voxel controls guide dose gradients between structures, making further “technical” volumes unnecessary

Sequencing
Segment Shape Optimization™
- Proprietary approach to smoothing and clustering segments, then optimizing beam weights and shapes enables clinicians to improve dose conformity, plan quality and delivery efficiency
- Reduce the number of segments, shortening treatment times
- Powered by Monte Carlo, develop plans that improve sparing of OARs and dose conformality

Smart Sequencing®
- Overcomes limitations of segmentation in plans – fluence smoothing in the first stage of optimization and segment shape and weight optimization in the final stage of the optimization results in fewer segments and lower Monitor Units without loss of quality in the dose distribution
- Faster Quality Assurance and less time for patients on the treatment couch
- With Monte Carlo, deliverable fields are determined with optimal precision, subject to the physician’s dose prescription to the patient

Stereotactic Planning
- Dynamic Conformal Arc (DCA) Therapy enables clinicians to deliver highly conformal stereotactic plans using the MLC to dynamically conform around a target as the beam rotates around the patient
- Create multiple arcs in a non-coplanar fashion to render more conformal plans
- Used in conjunction with micro-MLCs, such as Elekta’s Apex™ MLC, it can yield very conformal plans and streamline quality assurance measurements
- Supports stereotactic cone treatments for static and arc fields
A human care company, Elekta pioneers significant innovations and clinical solutions for treating cancer and brain disorders. Elekta provides intelligent and resource-efficient technologies that improve, prolong and save patient lives. We go beyond collaboration seeking long-term relationships built on trust with a shared vision, offering confidence to healthcare providers and their patients.

## Personalized Services – Beyond Standard Support

Elekta employs the largest full-time staff of dedicated radiation treatment planning professionals in the industry in the fields of research & development and customer support. Our physics services for beam data modeling will enhance the Monaco user experience and create efficiencies in moving to clinical use status. When you select our solutions, you gain access to our entire team:

- PhD and MS physicists
- PhD mathematicians
- CMDs and RTTs
- Professional software and hardware engineers

Support activities include:

- Global live and Web-Support
- Customer training conducted from RT professionals

For more information, contact your local Elekta representative.

*Monaco 5.0 is not available for sale or distribution in all markets. Please contact your Elekta representative for details.*