

# Monaco<sup>®</sup> 5

Comprehensive  
treatment  
planning

# Monaco<sup>®</sup>

# Treatment

# Planning

**Monaco delivers a broad range of planning functionality for all major treatment techniques. The Monaco 5.11 release is fully compatible with XiO<sup>®</sup> 5.10. You can move patient data between these systems.**

## **Education & Training**

Visit Elekta's customer portal, Elekta Care™ Community, at [elektacarecommunity.com](https://elektacarecommunity.com) to find a variety of Monaco eLearning courses and training modules on the latest enhancements within Monaco.

## **Upgrades**

Standard upgrades within Monaco are available to you free of charge depending upon your level of service contract. Please contact your regional support—find contact information at [elekta.com/elektacare](https://elekta.com/elektacare)



## Your single source for planning

With Monaco, you have a comprehensive system to support all major modalities of treatment, including 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 smoothes 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

# Why Monaco?

- Comprehensive, single box solution
- Personalized packages to meet your clinical needs with future upgrade opportunities to Elekta software
- Utilization of the gold-standard Monte Carlo algorithm
- Segment Shape Optimization drives improved plan quality
- Unique biological modeling capabilities
- User interface tools accelerate planning
- Leading support and service team to advise you at every stage and level of treatment planning

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



## Bring Monaco into your clinical practice

### 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 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 MOSAIQ® Oncology Information System. Monaco includes a fast pencil beam dose engine for “ideal” fluence optimization.

### VMAT

Monaco 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 Dynamic Conformal Arc.

### Integration

Monaco connects to MOSAIQ for a truly optimized clinical workflow, and 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 advancements

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.

## 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 DVH 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

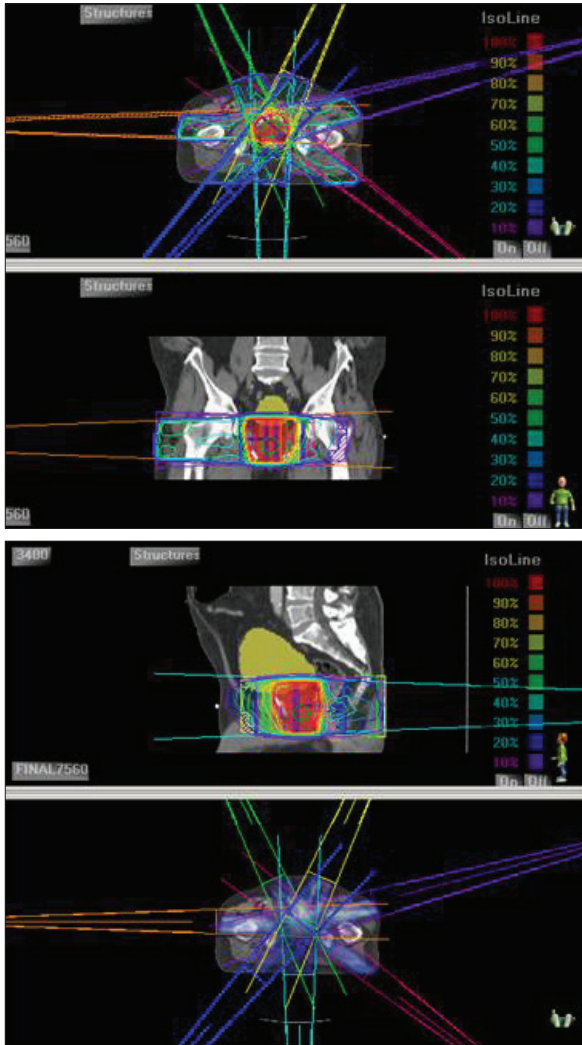
- XVMC Monte Carlo dose engine—for accurate dose calculation
- Fast pencil beam dose engine for “ideal” fluence optimization—specifically created for IMRT
- Includes electron and photon beams

## 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 OAR and dose conformity

## 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 for the patient

## Stereotactic planning

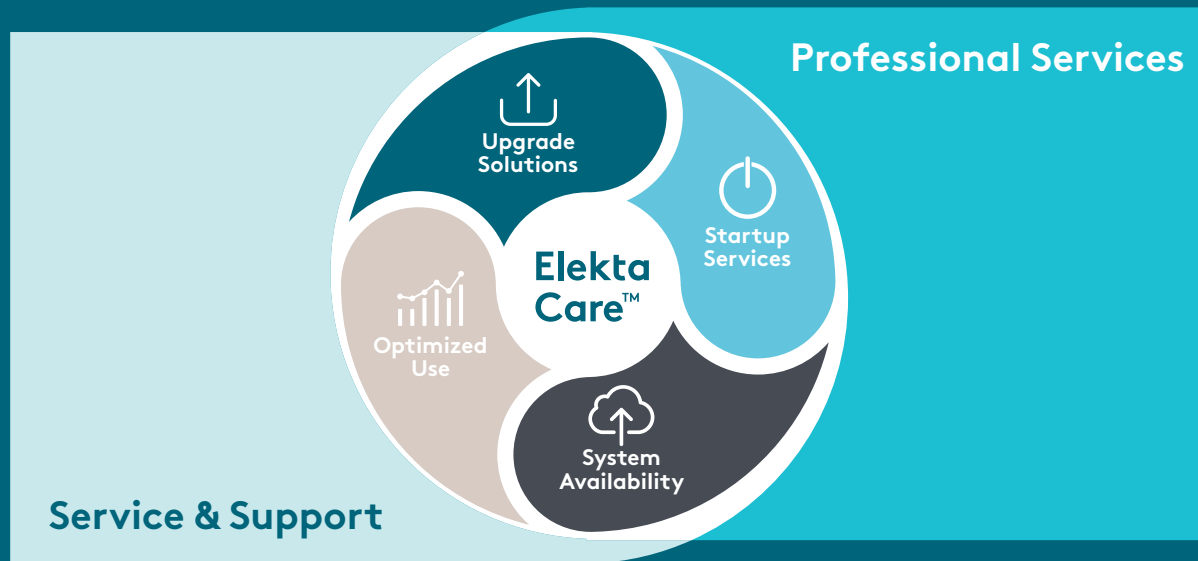
- Dynamic Conformal Arc (DCA) Therapy enables clinicians to deliver highly conformal stereotactic plans using the MLC to dynamically conform around a target as the beam rotates around the patient
- Create multiple arcs in a non-coplanar fashion to render more conformal plans
- Used in conjunction with 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

# Elekta Care™

## Get the most from your treatment planning solution

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



**Elekta Care is designed to help you maximize the use of your Elekta technology, so you can focus on your patients and your practice.**

Elekta Care supports you from startup through your product's lifecycle with comprehensive options from education, training and upgrades to solutions allowing you the highest uptime and improved operational efficiency.

**Learn more at [elekta.com/elektacare](https://www.elekta.com/elektacare)**

We are healthcare technology innovators,  
specializing in radiotherapy treatments  
for cancer and brain disorders.

We help clinicians to improve patients' lives  
through our forward-thinking treatment  
solutions and oncology informatics,  
creating focus where it matters to achieve  
better outcomes.



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