Enhanced dose conformance for patient-specific treatment
Speed or Accuracy – Why choose?

Clinical data has shown that around 50% of patients would benefit from IMRT treatment but need it to be done safely, quickly and efficiently from planning through to delivery. As a result, Elekta developed rotational IMRT, a delivery technique known as Volumetric Modulated Arc Therapy (VMAT).

VMAT is an advanced radiation therapy technique that delivers high radiation doses precisely to the tumor target while reducing dose to the surrounding tissue and organs. Using single or multiple radiation beams that sweep in uninterrupted arcs around the patient, it enables treatment times to be reduced dramatically.

Greater control – Greater flexibility – Greater conformance

Elekta VMAT allows target dose delivery to be optimized to each individual patient’s needs and their pathology. In this way, it provides highly personalized patient treatment and opens up new treatment opportunities. It does this by offering the freedom to simultaneously vary a number of parameters during treatment delivery without having to compromise your treatment plan or delivery accuracy.
High dose conformance to the target, while reducing risk to critical structures

Optimize target dose delivery for all different patients and pathologies

Reduced treatment time, reducing the risk of patient movement

Increase patient throughput, resulting in reduced waiting lists
Utilizing the mechanical flexibility of the digital linear accelerator, Elekta’s treatment planning solution, Monaco, uses biological dose modeling to ensure the best treatment is delivered to the target while sparing surrounding tissue. Monaco can optimize single or multiple coplanar or non-coplanar arcs simultaneously, providing the flexibility and control needed for more sophisticated treatment plans. With the Monte Carlo-based planning algorithm, excellent plan quality can be obtained quickly and intelligently.

Monaco with VMAT offers many sophisticated features to make VMAT treatment planning easier, more reproducible and clinically reliable. These include:

**Monte Carlo Dose Engine**
Monaco is the first treatment planning system to use the powerful and accurate XVMC Monte Carlo dose engine. It is considered to be the gold standard algorithm due to the accuracy and the quality of the treatment plans it produces. It has gained this reputation as a result of its true representation of the dose behavior as it travels through the anatomy in the body.

**Biological Modeling**
This feature allows the user to define all the biological structures within the treatment field. It goes on to recognize whether it is a parallel or serial structure, giving Monaco knowledge on the maximum dose constraint that each particular structure can tolerate and enabling it to intelligently optimize the dose distribution.

**Sensitivity Analysis**
Monaco guides the user quickly and easily with unique sensitivity analysis to discover what is preventing the tumor from receiving the best coverage. The interdependence of each dose constraint and each dose objective is visible with this unique optimization evaluation tool, allowing the user to choose what will improve the quality of the plan.
Digitally Controlled, Clinically Focused

The VMAT treatment plan is sent to the treatment delivery system, Integrity™, via MOSAIQ®, the dedicated oncology information system. The intelligent and unique Integrity™ control system provides digital control to all the treatment parameters simultaneously to deliver the prescribed dose within the mechanical flexibility of the treatment delivery system. Using real-time communication, Integrity checks the actual performance against the ideal state and ensures treatment is delivered as prescribed.

**Integrity provides digital control for:**
- Leaf alignment
- Leaf speed
- Dose rate
- Gantry speed
- Monitor units
- Collimator position
- Gantry position

Integrity has three tiers of safety for absolute confidence in the delivery of radiation dose. It ensures the treatment is delivered as originally prescribed.

**First Tier of Safety**
The first tier verifies the prescription when it is received from MOSAIQ and checks that all the linac parameters are set up correctly according to the prescription.

**Second Tier of Safety**
The second tier constantly checks and controls the MLC leaves, gantry, collimator and the dose rate to ensure that all parameters are in the correct position and the correct dose is being delivered.

**Third Tier of Safety**
Overseeing all of this is the third tier, the Guardian, which supervises and checks that all the systems are operating correctly. This monitoring by the Guardian ensures that the treatment will be paused immediately should any parameters fall outside of tolerance. Treatment is then automatically re-started from the point at which it was paused.

*Integrity is works in progress and not available for sale or distribution in all regions.*
Avoid Critical Structures

The desire to deliver high doses to the target area is finely balanced against the growing need to minimize dose to healthy tissue outside of the target volume. Ultra-low dose 3D volumetric imaging, using XVI, and Elekta’s low transmission MLCi2 allows you achieve this fine balance through innovative and integrated design. It ensures enhanced dose conformance to each patient’s anatomy and pathology, allowing the maximum dose to be delivered to the target tumor while ensuring minimal irradiation of organs at risk.

Modulation is Key
Accurate and fast conformal beam shaping to the tumor area is essential to minimizing dose outside of the target volume. MLCi2 builds on these key requirements with its active leakage reduction mechanism to reduce transmission. This feature plays a valuable role in reducing integral dose to the patient and therefore minimizing the risk of secondary induced cancer.

Seeing is Believing
XVI brings ultra low dose 3D anatomical soft tissue visualization. Through imaging at the time of treatment, seeing both the target and surrounding structures means confidence in target dose placement is achieved with the added benefit of margin reduction. This ensures highly conformal dose distributions can be delivered precisely to the right place in the patient.
Elekta VMAT allows treatment times to be reduced significantly compared to conventional delivery and helical tomotherapy. The speed of VMAT delivery allows you to offer the excellent conformity and dose distribution to a larger proportion of your patients, without compromising the efficiency of the clinic. Working together one-button operation, continuously variable dose rate* and MLC interdigitation delivers a smooth and efficient treatment delivery.

**The Perfect Balance**
Continuous variable dose rate allows the dose rate to be constantly adjusted to the ideal value during delivery. It results in smoother and faster prescription delivery when compared to discrete dose rates. Developed in collaboration with clinical partners for clinical relevance and practicality, it has been shown that continuously variable dose rates can reduce delivery times by 30%.

**Making Complex Simple**
The MLCi2 is able to achieve seamless field delivery. With its continuous 40x40cm field size there is no need for split fields when large field sizes are required. This combined with interdigitalization means MLCi2 eliminates complex planning workarounds for large treatment areas. It efficiently optimizes and delivers the treatment field shape, while maintaining the accuracy and precision required for VMAT.

*Continuous variable dose rate is a feature set of Integrity.
Elekta provides all the training, service and support required to give customers the confidence they need to offer a reliable and professional radiation treatment service – from implementation and commissioning, throughout the life of the equipment. In addition, Elekta IntelliMax now offers unparalleled connectivity and serviceability.

**Elekta IntelliMax**

Elekta linear accelerators are fully digitally controlled, providing rich, unbiased operational data. Elekta IntelliMax translates this data into simple information for proactive service and management actions. Unlike any other system, the combination of the Elekta digital control system and Elekta IntelliMax facilitates unprecedented remote support capabilities to ensure optimized equipment availability and fine-tuned clinical performance.

**VMAT Quality Assurance Requirements**

Quality assurance requirements are increasing in every area of healthcare, including radiation therapy. Advanced treatment techniques, such as VMAT, require fast and accurate dosimetric verification of planned versus delivered doses as well as dedicated Linac QA. Elekta offers a full range of QA tools and works in collaboration with leading suppliers in quality assurance products to ensure that all your clinical needs are met.

**Inspiring Confidence**

Elekta is committed to helping customers feel confident in the use of Elekta equipment so that they can achieve the very best clinical results. Our comprehensive education and training program includes:

- Clinical training in collaboration with leading hospitals worldwide
- Comprehensive on-site application training for confidence in clinical practice
- Technical training to help clinics optimize the use of their equipment
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.