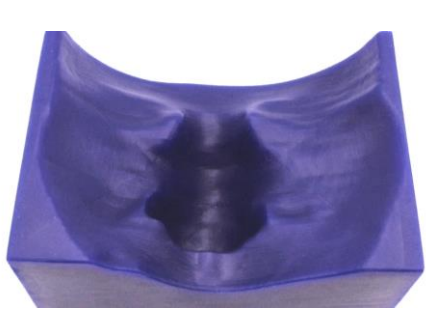
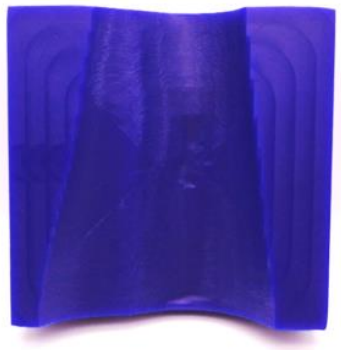
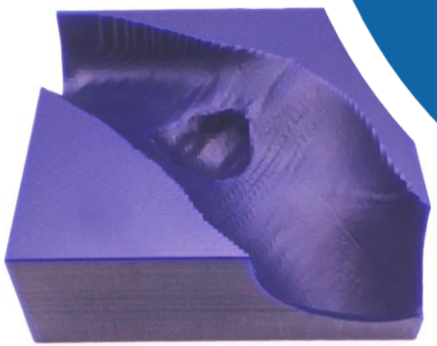
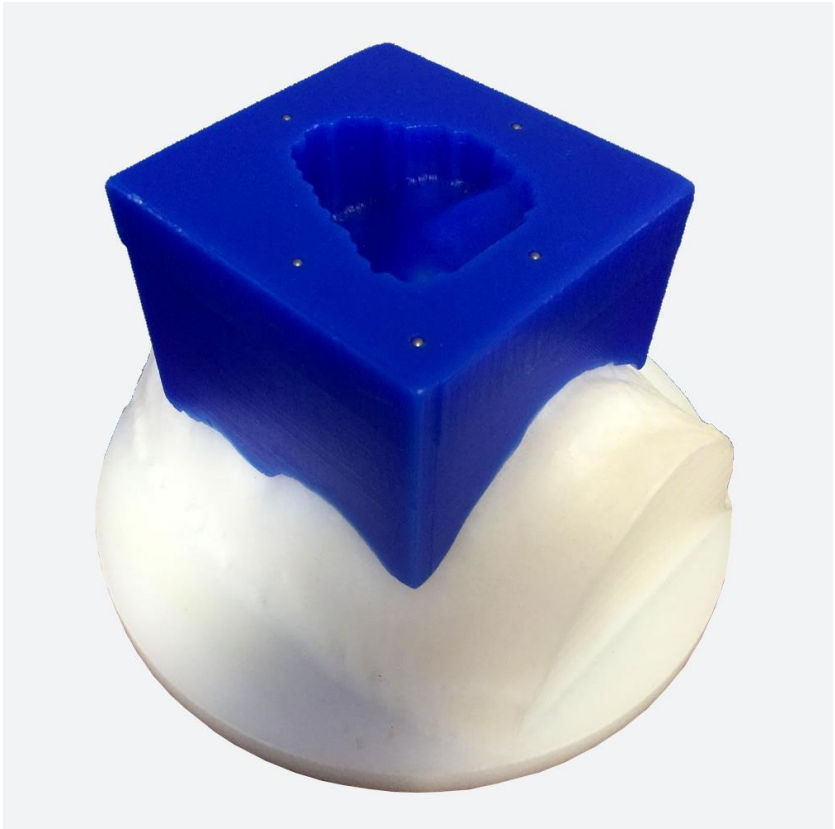





# ELECTRON BOLUS

## STARTER GUIDE





# SIMULATION CONSIDERATIONS

| Prior to Simulation | Considerations / Comments |
|---|---|
| **Field of View (FOV)** | Use an adequate field of view in imaging to ensure there is enough room to design the bolus and accommodate dose calculation. |
| **Scan Length** | The CT (or MR) simulation scan should go far enough beyond the target (5 cm or greater) in the superior and inferior directions to ensure adequate surface area for bolus design.<br>Of course, the scan range should also encompass all critical anatomy to be contoured for plan analysis. Consider a larger scan range if there are to be treatment beams with a rotated couch. |
| **Slice Spacing** | Use sufficient resolution in terms of axial slice spacing, because this determines how accurately and finely resolved your patient surface will be, and in turn your bolus design. Do not use greater than 3 cm slice spacing, and use even finer (smaller) if possible, especially for complex surfaces and/or small targets.<br>Do not use variable slice thickness, as our software requires equal axial plane spacing. |

# SIMULATION CONSIDERATIONS (CONT.)

| Prior to Simulation | Considerations / Comments |
|---|---|
| **Air Gaps and Complex Surfaces** | Air gaps can cause challenges in dose calculation and delivery accuracy, especially for complex patient surfaces and/or as the target volume gets closer to the patient surface.<br><br>The clinical team should consider prior to simulation how potential air gaps will be handled, e.g., if they need to be filled with tissue-equivalent material. If there are regions not filled prior to imaging that the physician wants to fill for treatment, then those regions can be contoured, and the treatment planner can do a density override for the purpose of dose calculation. |
| **External Shielding (e.g., Eye Shields) and Immobilization** | If external shielding is going to be placed against the patient and/or if any other external devices or immobilization will be used during treatment, then those volumes should be accurately captured during simulation (use shields or shield surrogates during imaging, image with treatment immobilizers, etc.).<br><br>It is important that the final patient external structure includes any physical devices that will be on or near the patient external shape, as this external structure will be used to model the patient-side bolus shape. |

# SIMULATION CONSIDERATIONS (CONT.)

| Prior to Simulation | Considerations / Comments |
|---|---|
| **Treatment Position (Bolus and Gravity)** | If you are going to use a bolus, consider that gravity will play a critical role in holding the bolus in place during treatments.<br><br>For example, if the targets are near the surface but on or near a patient's side or posterior, consider rolling and immobilizing the patient in a position where the bolus placement will be held by gravity.<br><br>If a patient roll is not practical, plan for how the bolus that is not held firmly by gravity can be immobilized during treatment.<br><br>*Note: If you would like generic test boluses (silicone, blue wax uniform, blue wax electron conformal, etc.) to see how they hold in various positions with respect to gravity, please contact us.* |
| **Treatment Position (Targets Near Limbs)** | If the target is adjacent a patient limb (e.g., arm) and that limb is not part of the target, consider positioning the limb so that it will not (or will only minimally) impact the bolus shape.<br><br>For example, if the target is a chest wall, an arm above the head may help mitigate future challenges with positioning the bolus against the irradiated surface. |

# PLANNING INSTRUCTIONS & CONSIDERATIONS

| Planning Instruction | Requirements / Considerations / Comments |
|---|---|
| **Correct the patient contour, where applicable (e.g., when impacted by metal artifacts)** | The patient external contour should be as smooth and accurate as possible. If any imaging artifacts (e.g., metal artifacts) or immobilization devices make the external contours inaccurate, make sure those regions are smoothed out to reflect the actual patient surface.<br>The patient-side of the bolus will be based on the external contour, so it is very important to make it smooth and accurate. |
| **Correct the patient contour, where applicable (e.g., if airways would be blocked due to bolus design)** | If the bolus will possibly cover both the nose and mouth, create a "bump out" as part of the external contour by contouring an "air pocket" over the patient's mouth extending down to the chin. This will provide a passageway for the patient to breathe comfortably. |
| **Ensure the PTV is inside the external contour** | Ensure the PTV volume is contained within the patient external contour, otherwise you may have difficulties designing the electron conformal therapy (ECT) bolus in the p.d software, e.g., the import or optimization may fail.<br>If you have a PTV that goes outside the external contour, and the external contour is correct, you could use a Boolean subtraction in your TPS to crop the PTV. |

# PLANNING INSTRUCTIONS & CONSIDERATIONS (CONT.)

| Planning Instruction | Requirements / Considerations / Comments |
|---|---|
| **Set the beam(s) SSD to 105 cm or higher** | To ensure clearance between the bottom of the electron cone and the proximal side of the electron bolus, we recommend that you set the beam SSD to 105 cm (or higher). |
| **Set a 1cm margin around the PTV when creating the electron block** | To ensure adequate dose coverage with the bolus in place, make sure you set a 1cm margin around the PTV.<br>*Note: this is a "rule of thumb" and the treating physician should review and approve the final dose and adjust the block margin as needed to meet the clinical goals of each patient.* |
| **Export the CT Images, Structure Set (RS), and Plan File (RP)** | p.d requires the CTs, Structure Set, and Plan File for bolus creation.<br>The Structure Set must include the patient contour and target volume. |

# EXPORT REQUIREMENTS (FROM P.D TO TPS)

For BolusECT, the bolus will need to be exported back to the TPS for a Verification Plan and calculation as well as final approval by a physician. The table below will outline the import requirements for most treatment planning systems.

| | Varian Eclipse | Elekta Monaco or XiO | Philips Pinnacle | RaySearch RayStation |
|---|---|---|---|---|
| **DICOM files to export from p.d** | RT Structure Set (all structures with body + bolus) | RT Images, RT Structure Set (all structures with body + bolus) and RT Plan | RT Structure Set (bolus structure only) | RT Structure Set (all structures with body + bolus) |
| **Wax density to set within TPS** | Approximately -80 to -125 Hounsfield units (adjust so that mass density reaches 0.92 g/cc) | 0.92 g/cc | 0.92 g/cc | 0.92 g/cc |

# VERIFICATION PLANNING IN THE TPS

Once the BolusECT is in the TPS, the structure is ready for final dose calculation, review, adjustment (if needed), and approval by a physician. Below are a few key pieces of information and planning steps that are necessary before returning to p.d for ordering.

- Verify that the planned energy matches the energy used in p.d
- Set the wax density before calculating dose
- Make sure the bolus is inside of the external contour if that is a requirement of your TPS
- The bolus structure is editable, however, manually editing an ECT bolus can be challenging due to the high sensitivity of electron beams to the slope of the incident surface

# ORDERING THE BOLUS

If no adjustments were made to the bolus, you can simply return to p.d and order the originally generated bolus through the p.d **Order Wizard**.

If any adjustments were made to the BolusECT structure, this structure must be exported back to p.d within the *DICOM Structure Set*, along with the *CT images* and *RT plan*. The adjusted structure can then be converted to a p.d bolus using the **Structure as Bolus** option of the p.d **Bolus Wizard** and then ordered using the **Order Wizard**.

*Prior to conducting treatments, all ordered devices must be tested and verified by simulating the patient with the devices in place. Devices must not be used if they do not meet your clinical acceptance criteria or if they have been damaged in any way.*