

Table of Contents

Initial Simulation Requirements.....	1
Initial Planning Requirements.....	2
Export Requirements.....	3
Bolus Starter Checklist.....	4

Prior To Simulation	What Should Be Considered/Completed
Field Of View (FOV)	Use a large Field of View (FOV). This will ensure that there is enough room to create the bolus and accommodate calculation.
How Far To Scan	The scan should be done from 5cm superior to 5cm inferior to the tumor edges. If there is the possibility of a table kick this may be increased to 10 cm.
Slice Thickness	The maximum slice thickness should be 3mm. For small tumors or tumors of the head and neck (H&N) 1.5mm slice thickness or smaller is recommended. This will ensure a smoother patient side surface as well as a better fitting bolus. p.d. cannot handle variable slice thickness.
Air Cavities/Air Gaps	It should be discussed with the physician prior to simulation if air cavities should be packed with a tissue-equivalent material. If the cavity is not to be packed this could lead to a hot spot and therefore a poor dose distribution. The same goes for air gaps, such as areas behind the ear. These can either be packed with a tissue-equivalent material or the ear can be taped to the skull. If the physician decides after the simulation that these areas are to be packed the planner can contour in a structure and override the density during the planning process prior to sending it to p.d. The planner must remember to override the density of the structure in p.d as well.
Eye Shields/External Shielding	If eye shield or any other external shielding that may alter the external contour is going to be used during patient treatment, the patient should be simulated with a surrogate in place to mimic the shield. These surrogates can then be contoured in the TPS as part of the external. This step ensures that the bolus will fit with the shielding in place.
Position Of Patient	If possible, position the patient so gravity is utilized to aid in holding the bolus in place. For example, roll the patient on their side or turn their head so that the bolus will be close to an anterior position. Attempt to position patient limbs outside the area to be treated so the bolus will not extend up to any nearby limbs when generated (i.e. in the case of a chest wall, position the arm above the head, so that it is not in the way of the bolus.)

.decimal[®]

Initial Planning Requirements For p.d

The information in the table below will go through tips for initially planning the patient in the TPS for import into p.d.

After Simulation	What Should Be Considered/Completed
Export The CT Images	These images are required for the p.d application operators to generate the bolus.
Export The RT Plan (RP)	Plan info provides the data for the beam, aperture, and other pertinent information needed to create a bolus.
Export The RT Structure Set (RS)	The patient side of the bolus is constructed based on the external contour. The optimized thickness bolus is based on the posterior edge of the tumor.
For ELECTRON Plans, Set The SSD To 105cm	To ensure clearance between the bottom of the cone and bolus, an SSD of 105 cm is recommended.
Ensure The Tumor (PTV) Is Inside The External	When the tumor volume is outside the external contour, p.d may not complete the import process. To correct this, Boolean the tumor volume and external contour.
Contour Out Any Metal Artifacts	The external contour should be smooth and not include any wires, BB's or metal artifacts. The patient side of the bolus is based on the external contour.
Ensure The External & PTV Are Contiguous Structures	If the external structure or PTV structure are not contiguous this may cause the import process to p.d to fail.
DO NOT Include Dose (RD) In Export	Do not send the dose over to p.d - it is not needed.
Make Sure Patient Can Breath With Bolus On	If the bolus will possibly cover the nose and mouth, create a "bump out" as part of the external contour by contouring an "air pocket" over the patient's mouth. Or if the dosimetry will not be altered, the bottom slices of the bolus may be removed once the bolus is created.

Once the files are imported into p.d, the bolus can be constructed. If the bolus being created is a 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 Bolus from p.d will be exported as a DICOM structure. In the next section, the guide will list the export requirements necessary to continue the planning process with the new bolus.

The information in the table below will go through what to export out of p.d for plan verification within the TPS.

Feature	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 & RT plan)	RT Structure Set (bolus structure only)	RT Structure Set (all structures with body + bolus)
Density Within TPS	Approximately -80 to -125 Hounsfield units (adjust so that relative electron density reaches (0.92 g/cc))	0.92 g/cc	0.92 g/cc	0.92 g/cc

For Monaco Only: If energies were changed in p.d, the calculation depths within the TPS must be changed.

The next section will discuss a few processes that should be considered in the planning prior to sending the bolus back to p.d for ordering.

Verification Planning In The TPS – BolusECT Only

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

- ▶ The BolusECT is a DICOM structure which is **EDITABLE**.
- ▶ If the BolusECT does not come over as part of the external/body contour, the planner must boolean the bolus with the external/body.
- ▶ Once recalculated in the TPS, the planner can adjust the bolus structure as desired or requested by the physician. It then must be recalculated again until the physician approves.
- ▶ Adjust the external contour for more accurate calculations if the bolus is edited.

Once all adjustments, if any, are made to the BolusECT structure, it can then be exported back to p.d with the CT images and RT plan for final generation as a Bolus from Structure and ordered using the Order Wizard. If no adjustments are made, then the originally generated BolusECT within p.d can be ordered through the Order Wizard.

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

Bolus Starter Checklist

As a quick reference guide, use this checklist to ensure all items are completed.

Initial Simulation Requirements

Use a large Field of View and position the patient away from the edge of the Field of View.

The recommended minimum distance to scan from the tumor edge is 5cm superior and 5cm inferior. (If a table kick will be utilized, then the 10cm superior and 10cm inferior is recommended.)

Slice thickness is a maximum of 3mm per slice. (1.5mm is recommended for head and neck or small tumor volumes.)

Discuss with the physician if packing any air cavities/air gaps is necessary.

Determine if eye shields will be used. Use wax surrogates if lead shields will be present.

Determine the position of the patient.

Initial Planning Requirements For p.d (From TPS to p.d)

Include CT Images/Data

Exclude RD Dose from export

Include RP Plan

Boolean tumor volume and external contour if tumor is outside external contour

Include RS structure set - Tumor volume and external contour

Smooth external contour, contour out wires, BB's, & metal artifacts.

Set the SSD To 105cm for electrons

Ensure the external and PTV contours are contiguous

Bump out external contour for air passage if desired

Export Requirements For p.d (From p.d to TPS) - BolusECT Only

Export DICOM files based on TPS requirements with the bolus as a structure.

Set the bolus density in the TPS so that the relative electron density reaches 0.92 g/cc.

If energies were changed in p.d, change the calculation depths to match. (For Monaco Only)

Verification Planning In The TPS - BolusECT Only

BolusECT is a DICOM structure and may be edited.

If the BolusECT does not come over as part of the external/body, boolean the two structures together.

Once the plan is recalculated, adjust the bolus as needed or requested by the physician.

Adjust external contour for a more accurate calculation.

(This concludes the Bolus Starter Guide)