Using a predefined OCTAVIUS II CT scan

OCTAVIUS Phantom with OCTAVIUS Detector *seven29*

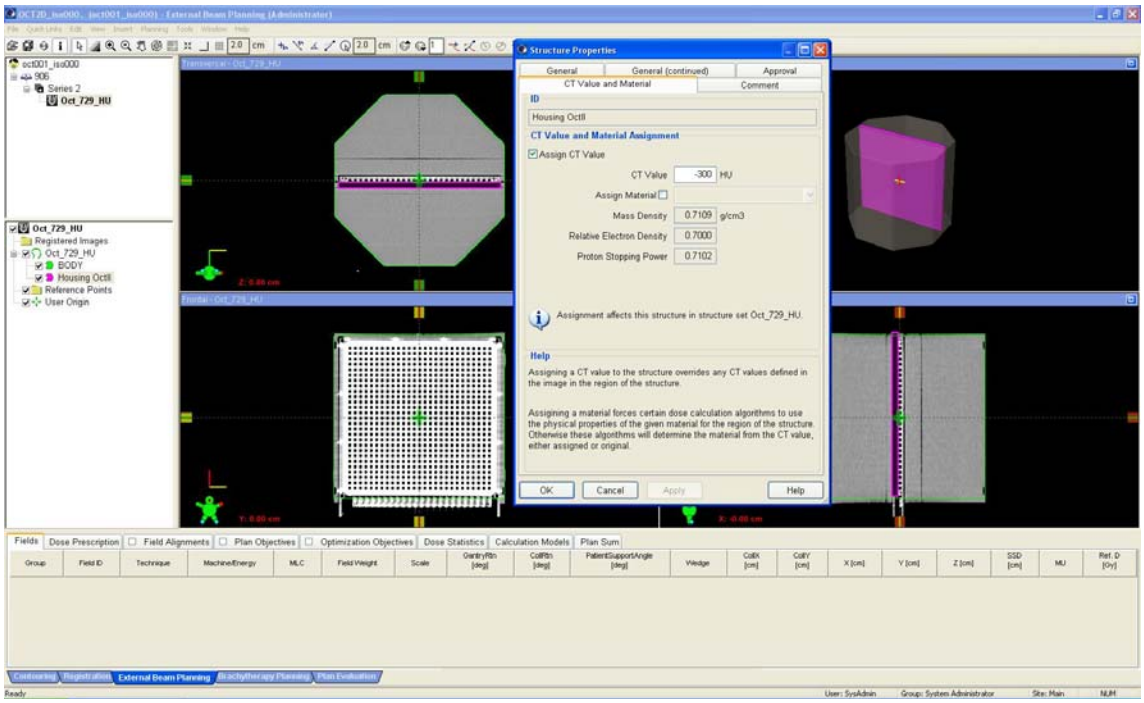
This document describes how to work with a predefined CT scan of the OCTAVIUS phantom together with the OCTAVIUS Detector *729* (T10040). You can download the described CT scans from the PTW website (http://ptw.de/index.php?id=2469). Filenames are Octavius729_HUm300.zip and Octavius729_HUm300_Vert.zip.

The screenshots are taken from Eclipse. The workflow might be a little bit different for other TPS, but it should be no problem to adapt the procedure to your TPS.

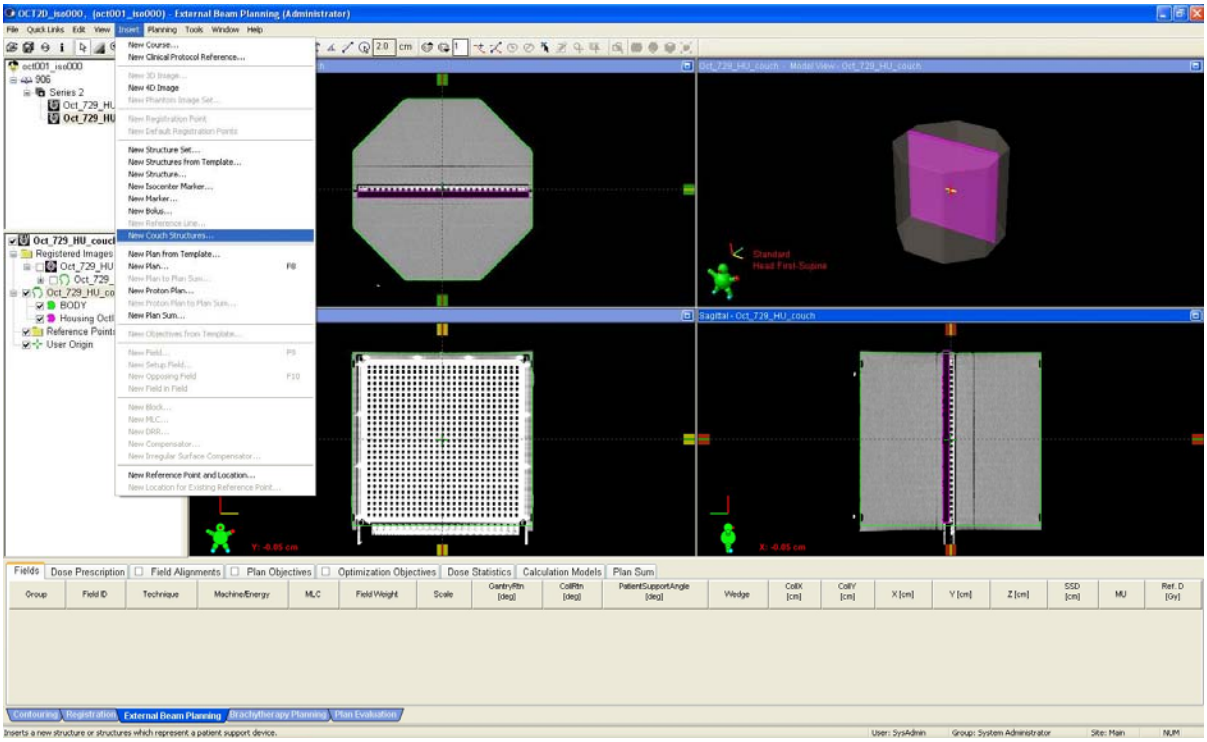
A. CT preparation:

1. Import the CT scan with the artificial housing contour into the TPS. The scan is acquired such that the image origin is in the effective point of measurement of the central detector.

2. Verify that the artificial HU values were imported correctly.
   For Eclipse assign a HU = -300 to the detector housing structure. This value was determined by measurements.
   For other TPS, use the density of 1.9 g/cm³ or the HU for this density. Do not use the density you see in the delivered CT scan, because this is not the true density of the housing material. To avoid CT artifacts caused by the high density of the housing material, a different housing with lower density was used for this CT scan.



3. Include the couch structure of your choice



This CT scan and its assigned structure set will be used for further dose calculation of the verification plan.

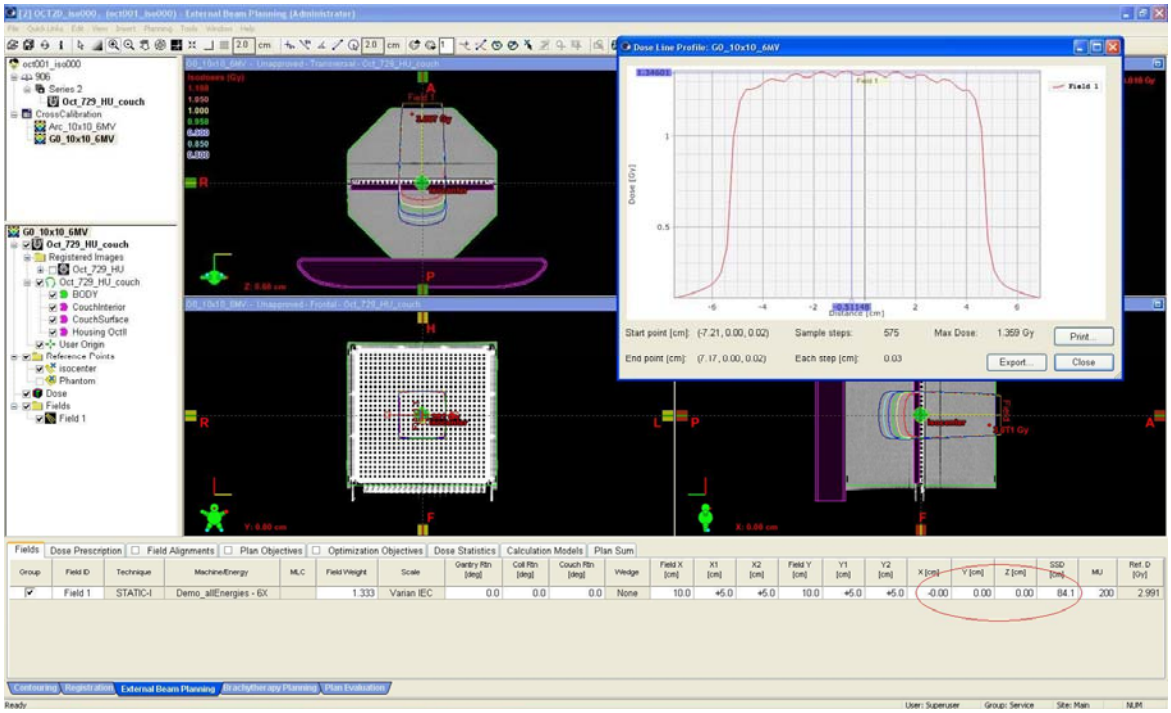
Proceed likewise for the vertical scan of the OCTAVIUS phantom if you intend to work with that as well.

B. Cross-calibration preparation:

The easiest way to perform an IMAT or IMRT patient QA is by performing a cross-calibration prior to the actual measurement. The cross-calibration procedure allows easy correction for the temperature and pressure and intrinsically compensates for the daily machine output fluctuations, thereby allowing the use of rather strict gamma evaluation criteria.
For the cross-calibration, we make use of the TPS dose calculation for an open 10x10 cm² field, (hereby assuming that the 10x10 cm² depth dose calculation is correctly handled by the dose calculation algorithm.)

1. Place a 10x10 cm² field, gantry 0° onto the OCTAVIUS phantom. Make sure that the isocenter is set to the image origin (x,y,z) = (0,0,0). This should correspond to a SSD = 84 cm (+/- 1 mm) due to the resolution of the body outline.

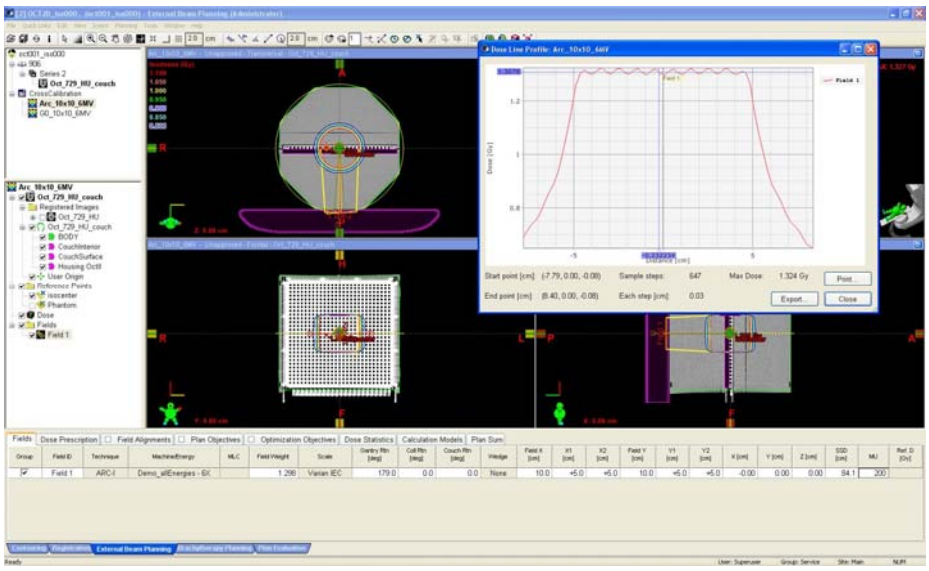
2. Calculate the dose for 200 MU. You can use the point dose reported to the isocenter to cross-calibrate the detector, but it is more advisable to draw a line profile and take an average value of the dose around the central chamber.



Write down the theoretical value to be used for the cross-calibration for each energy:

6 MV	G=0°, 10x10, 200MU, SSD=84 cm	…… Gy
10 MV	G=0°, 10x10, 200MU, SSD=84 cm	…… Gy
18 MV	G=0°, 10x10, 200MU, SSD=84 cm	…… Gy
…	…	…

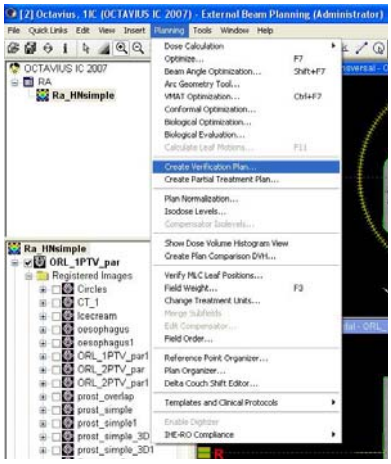
3. If you wish, you can also use the calculation of an open arc (e.g., XxY=10x10, 400 MU, G= 179 to 181), either as the most simplified verification of treatment versus delivery or for a cross-calibration in arc mode.



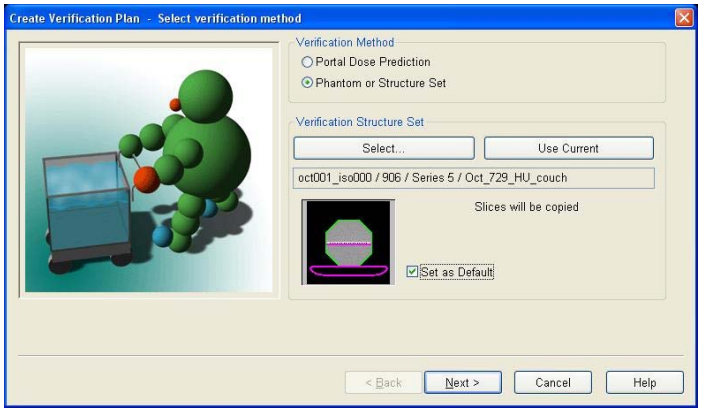
C. Patient treatment verification:

C1. TPS dose calculation:

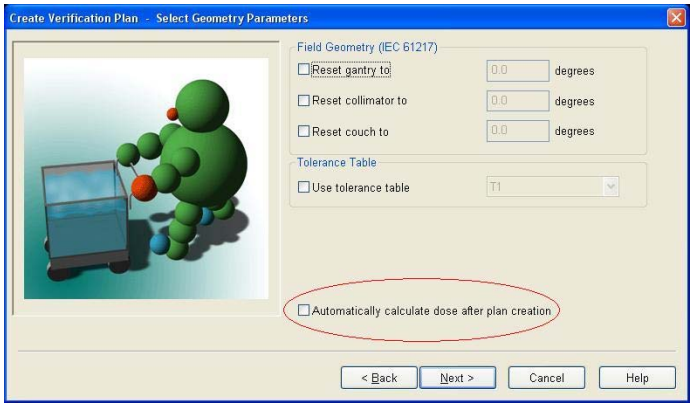
1. Select the plan for which you wish to perform phantom QA
2. Create a verification plan



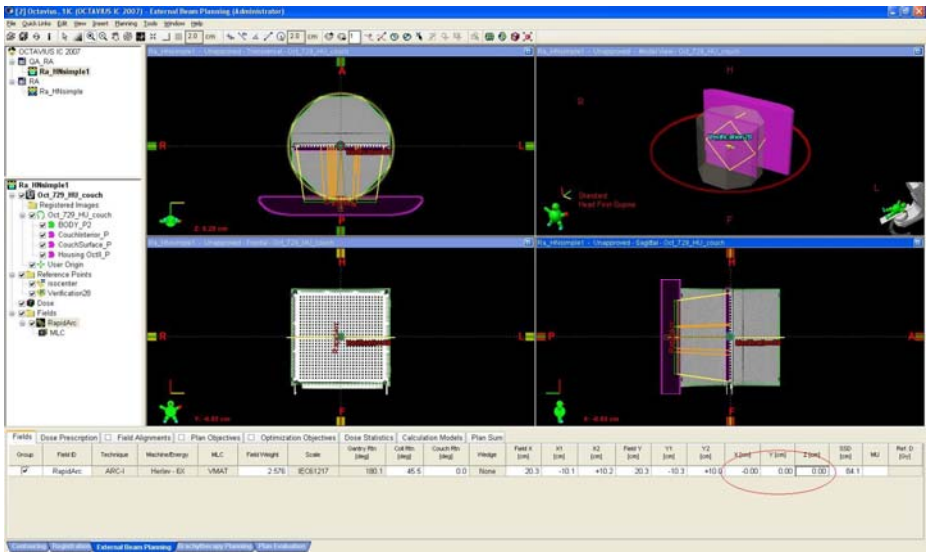
3. Select the scan of the above imported OCTAVIUS phantom (with artificial housing) including the couch.



4. Deselect the automatic dose calculation after plan creation to allow you to verify the correct position of the isocenter before launching the dose calculation.



5. When the plan has been generated onto the OCTAVIUS phantom, make sure that the isocenter is set to the image coordinates (x,y,z) = (0,0,0) and the SSD = 84 cm (+/- 1 mm).



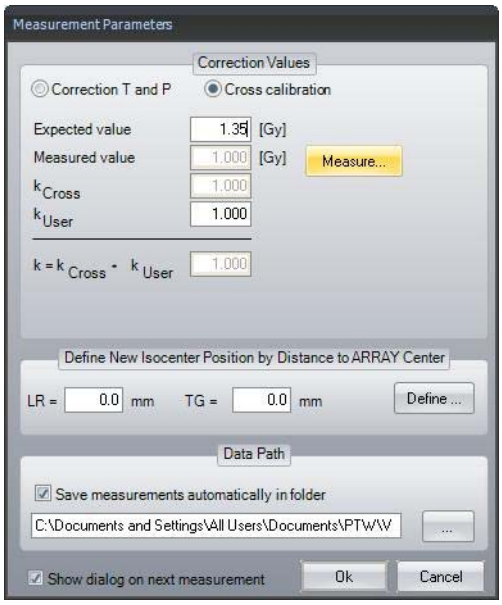
6. Calculate the dose to the phantom.

7. Export the planar or 3D dose.

C2. Dose measurement:

1. Position the OCTAVIUS phantom measurement setup.

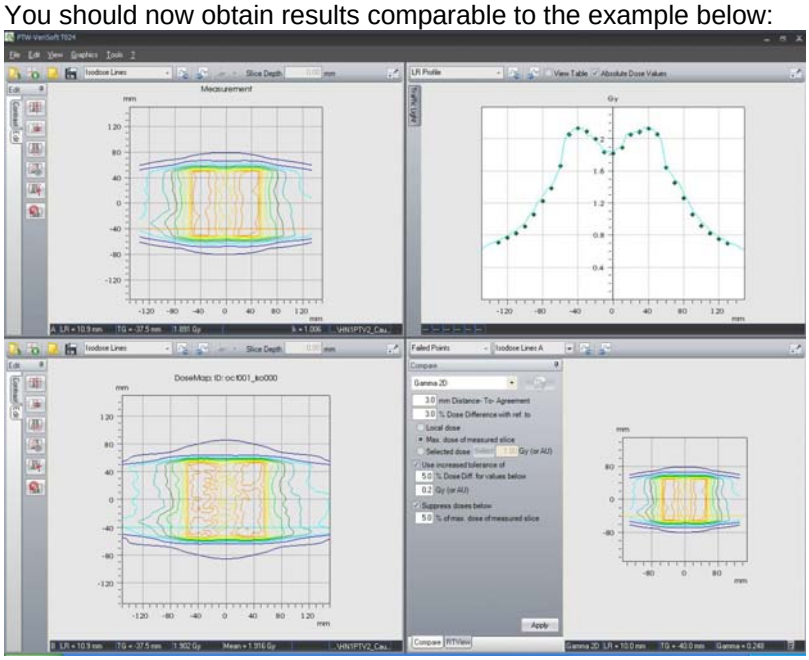
2. Perform a cross-calibration with the above prepared cross-calibration values. (Repeat the first measurements 3 to 4 times to make sure that the system has sufficiently stabilized.)



3. Perform the actual measurement using the above cross calibration factor.

4. Save and compare in VeriSoft software.

You should now obtain results comparable to the example below:



Thank you to Ann van Esch from 7Sigma, Belgium, who provided this information.

Disclaimer

Although the information in this document has been carefully prepared, PTW-Freiburg does not guarantee that this document is free of errors. PTW-Freiburg shall not be liable in any way for any consequence of using this document.

PTW-Freiburg
Lörracher Straße 7 • 79115 Freiburg • Germany
Phone +49 761 49055-0 • Fax +49 761 49055-70
info@ptw.de • www.ptw.de