



*Epiqa*

**E  
p  
i  
q  
a**

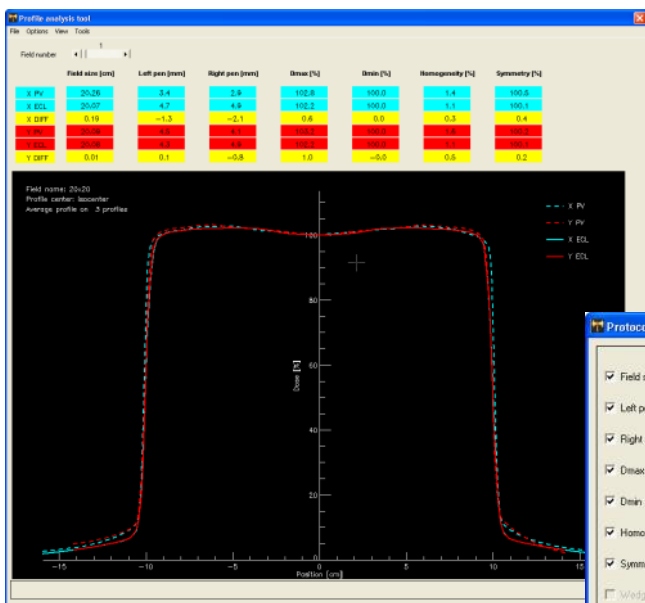


**ATHENA**  
**Machine QA**



# Symmetry & Homogeneity Verification

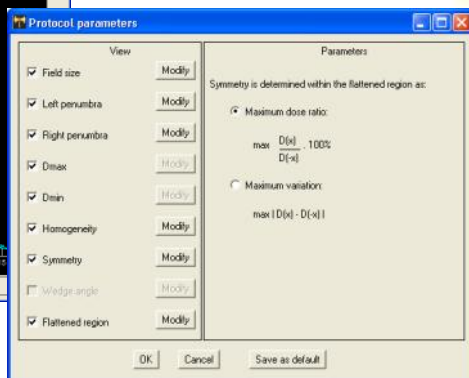
**Beam symmetry and homogeneity evaluation** - determination of the core beam parameters and its long term stability. 2D map comparison of the reference and measured dose map provides instant results for your morning check out protocol.



## Profile Analysis Window

Example of open field analysis

- ◆ Solid line - Eclipse
- ◆ Dashed line - Measurement



**Flexibility** - The detector installation at the gantry provides possibility to verify beam quality at any gantry angle without need of tedious installation of the array holder.

**Speed** - Create plan with the field sizes required for beam parameters testing and acquire portal dosimetry images in no more than 50 MU per field, i.e. 5 seconds per field with 600 MU/min.

**Simplicity** - Export acquired images and load them in Epiqa software. All fields and results are calculated by one mouse click. Print protocol and sign - done.

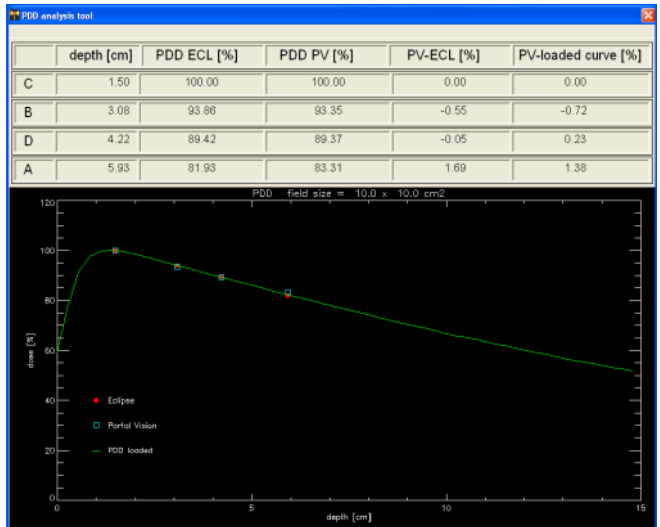
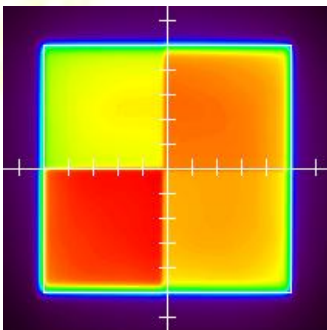
# Beam Energy Verification



**Beam energy stability verification** - using small build up phantom placed on the surface of the imager. Analysis of single phantom image provides dose information of 4 different depths and along the depth dose curve measured in water.

## Build up phantom image

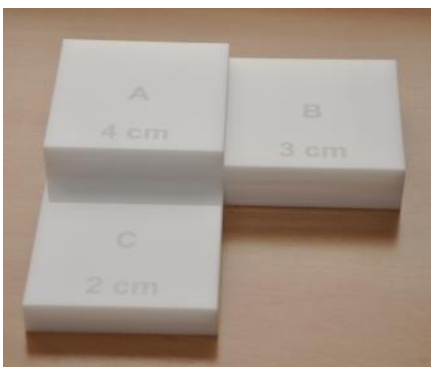
Each sector is covered by different material thickness resembling different detector depth.



## Depth Dose Curve Analysis Window

Example of energy stability analysis:

- ◆ Green line - Water phantom measurement
- ◆ Red dots - Eclipse
- ◆ Blue squares - Measurement using EPID



## Plastic phantom delivered with Athena module

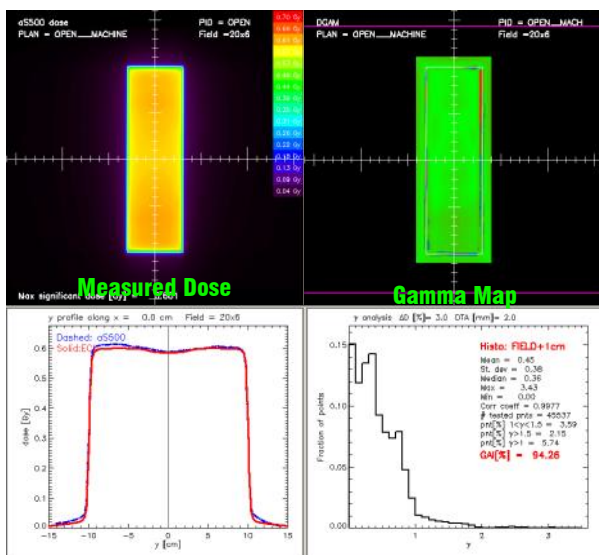
The phantom size is carefully designed not to trigger collision switch of the imager cover.



# Machine Commissioning

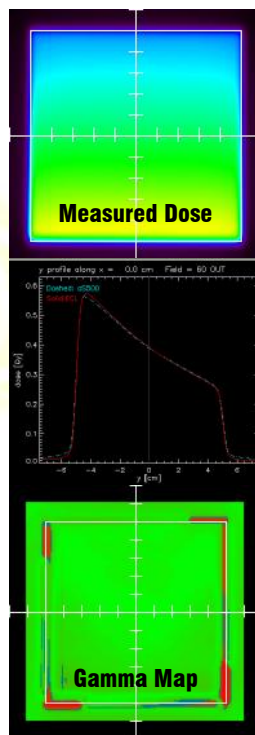
**Qualitative analysis of the TPS performance after initial beam data collection** - by comparing calculated open fields and wedged fields module Athena provides great help to quickly assess TPS output with the real beam without need to use film or water phantom.

## 1. Open field evaluation - TPS vs. measurement comparison at 2D level.



## 2. Wedge field evaluation

Mechanical and dynamic wedge calculation vs. measurement analysis using profiles and gamma method based on dose maps.



## 3. Output and wedge factors evaluation - comparison of the field factors calculated by TPS vs. measured.

Field name	Wedge type	Wedge angle	Wedge orient	OF ECL	DF PV	Diff %
10 IN	DYNAMIC	10.00	IN	0.950	0.953	-0.3
15 IN	DYNAMIC	15.00	IN	0.920	0.931	-0.6
25 IN	DYNAMIC	25.00	IN	0.878	0.881	-0.4
30 OUT	DYNAMIC	30.00	OUT	0.852	0.853	-0.1
45 OUT	DYNAMIC	45.00	OUT	0.760	0.773	-0.5
60 OUT	DYNAMIC	60.00	OUT	0.657	0.662	-0.7
10X10 OPEN	NONE			REF ECL	REF PV	