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VIRTUAL SCENES RENDERING

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V I L N I U S  
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## 1. Scene setup

Scene for iLumographic printing can be created in any 3D modeling program that allows to setup virtual camera with custom field of view (FOV) and custom camera motion parameters. Scene positioning and rendering camera settings are very important and shall be setup only in accordance to this instruction.

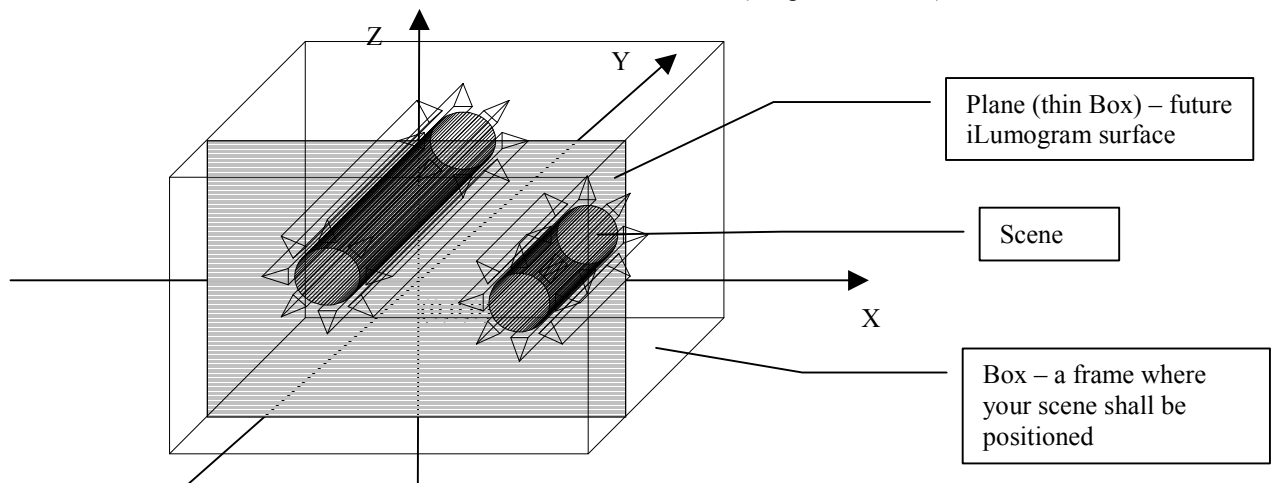
The centre of the scene shall be placed in the centre of the coordinates ( $x=0, y=0, z=0$ ). It's convenient to adjust the size of the scene in centimeters, according to the size of the forthcoming iLumogram. In order to preview the upcoming iLumogram, it's convenient to create standard primitive "Plane" or "Box" (semitransparent, non-renderable), correspondent to the size of future iLumogram and placed at same coordinates ( $x=0, y=0, z=0$ ). For example, for a iLumogram in size 1000x1500 millimeters, the "Plane" is created with the same dimensions 1000x1500. (If you will prefer to use a "Box" – it shall be 1500x1000x5). This Plane (thin Box) will represent the surface of your iLumogram – all what will be viewable at this Plane – will be as well viewable on iLumogram

Your scene shall be created in the range of this "Plane". The size of the scene must not be bigger than 1000x1500 (the size of the iLumogram) x1500 (iLumogram's depth) mm. The scene of this size must not come out of the iLumogram surface (Plane) for more than 400mm. Practically, this number (400mm) could be higher, but this may cause the coming out details of the iLumogram look inaccurate (blurred).

If the desired iLumogram shall be smaller than 1000 x 1500 mm, the scene's fragments coming out of the Plane shall be as well smaller. For example, if the iLumogram size will be 500x750mm, the scene shall not come out of the Plane for more than 200 mm (of course, for the artistic effects you can make scene coming out for more, but you shall keep in mind that in such a case scene's edge will be blurred)

The deepness of scene also has its limit - the clear image depth of a iLumogram in size of 1000x1500mm will be 1100mm – the scene's details that will be placed deeper, would be also viewed, but will look blurred.

It's also convenient to create semitransparent, non-renderable primitive "Box" with size 100x150x150cm and place it in such a way that 40cm of it would be in front of the Plane and 110cm – behind it (see picture below).



All parts of your scene that fit into this box will be visible when iLumogram viewer is in front of the iLumogram. Parts of the scene that are outside of this box either will be blurred, or visible only from certain angle of view.

When creating the scenes for the smaller size iLumograms, accordingly smaller primitives “Plane” and “Box” shall be created. The contrast depth and the part of the image coming out of the iLumogram will be also accordingly smaller.

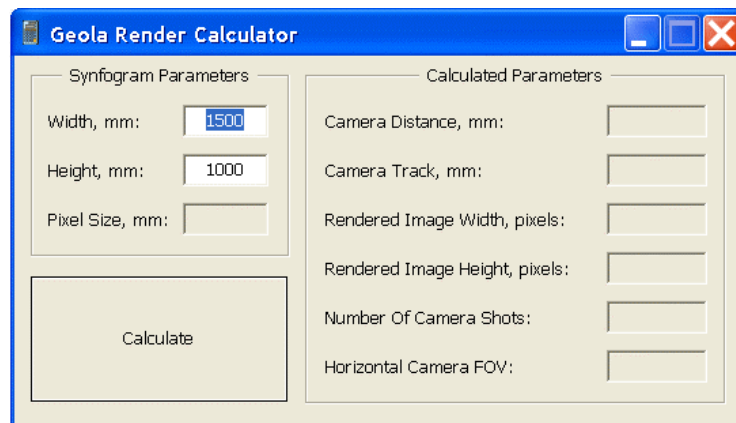
## 2. Camera setup

To render scene properly and obtain files suitable for iLumographic printing, you will need to setup a virtual camera exactly as per instructions below. In iLumography, camera shall move in front of the scene from left to right and in parallel to the Plane representing iLumogram surface. Geola Digital program called “Geola Render Calculator” (available for download from [www.geola.lt](http://www.geola.lt) download section) will tell you exact length of the camera’s moving track, camera’s distance from the scene and other necessary rendering parameters.

Virtual camera setup in 3D StudioMax will be in details described below. As an example we will take camera setup for the iLumogram in size 1000x1500mm.

First you need to create “Free camera” at coordinates  $x=0, y=0, z=0$ . The parameters of the camera for the particular iLumogram size shall be taken from Geola Render Calculator.

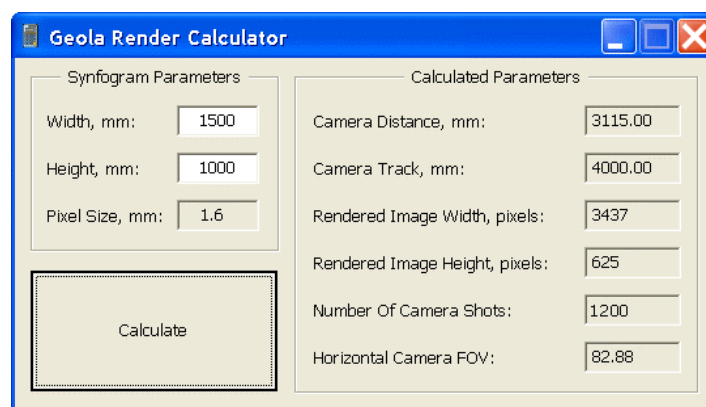
When Geola Render Calculator is launched, the window appears:



The screenshot shows the 'Geola Render Calculator' window. It has two main sections: 'Synfogram Parameters' on the left and 'Calculated Parameters' on the right. In the 'Synfogram Parameters' section, 'Width, mm' is set to 1500, 'Height, mm' is set to 1000, and 'Pixel Size, mm' is empty. There is a 'Calculate' button at the bottom of this section. The 'Calculated Parameters' section contains seven empty input fields for 'Camera Distance, mm', 'Camera Track, mm', 'Rendered Image Width, pixels', 'Rendered Image Height, pixels', 'Number Of Camera Shots', and 'Horizontal Camera FOV'.

You shall enter the desired iLumogram parameters in the corresponding fields. Enter iLumogram width and height, then press button “Calculate”.

Press button “Calculate” – program will give you camera and rendered images parameters for your iLumogram and will inform you about holopixel size:



The screenshot shows the 'Geola Render Calculator' window after the 'Calculate' button has been pressed. The 'Synfogram Parameters' section remains the same. The 'Calculated Parameters' section now displays the following values: 'Camera Distance, mm' is 3115.00, 'Camera Track, mm' is 4000.00, 'Rendered Image Width, pixels' is 3437, 'Rendered Image Height, pixels' is 625, 'Number Of Camera Shots' is 1200, and 'Horizontal Camera FOV' is 82.88.

As we can see from the picture, for the iLumogram in size of 1000x1500mm, the camera has to be placed at the distance of 3115 millimeters from the centre of the scene and horizontal camera's “FOV” must have 82.88 degrees. Then camera shall move in front of the scene for 4000 mm and 1200 frames shall be taken during that movement.

That means that during rendering your camera shall move from coordinates  $x=-2000, y=-311.5, z=0$  to coordinates  $x=2000, y=-311.5, z=0$ .

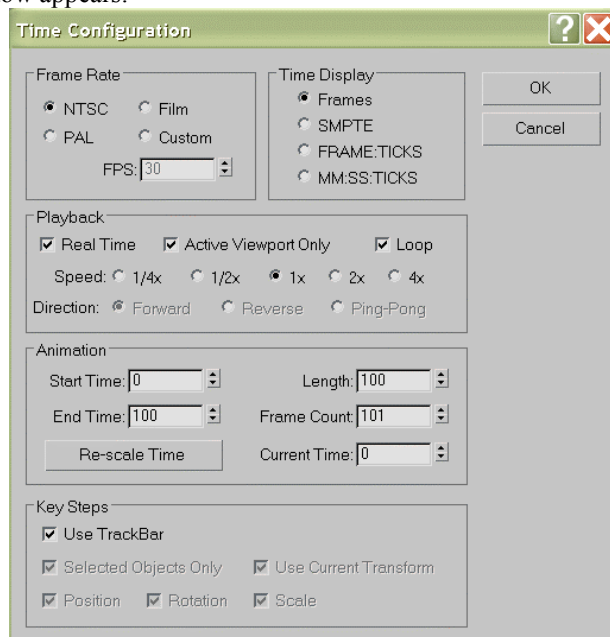
Let’s setup camera. Place Free Camera at coordinates  $x=0, y=0, z=0$  and enter camera FOV=82.88 degrees.

Now you need to tell program how many frames shall be taken with this camera. As you see, for 1000x1500mm iLumogram printing you will need to have 1200 frames rendered.

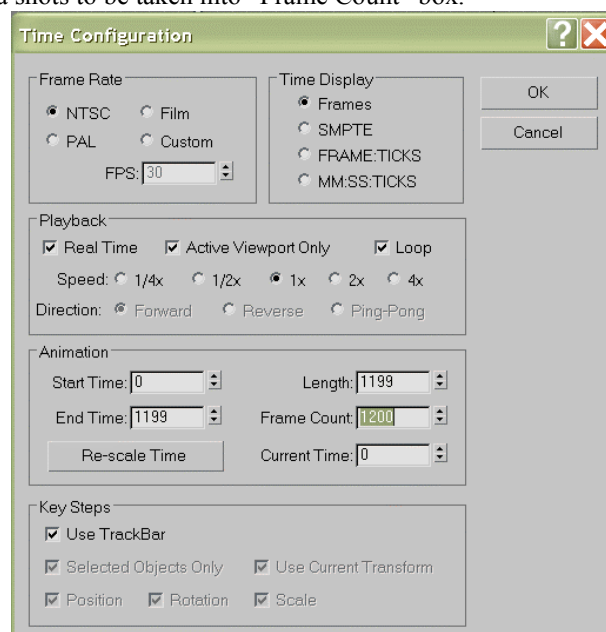
In 3D Studio Max, number of virtual camera shots to be taken is defined through “Time Configuration” window. Button that launches Time configuration button is at the left down corner of GUI:



When pressed, the following window appears:



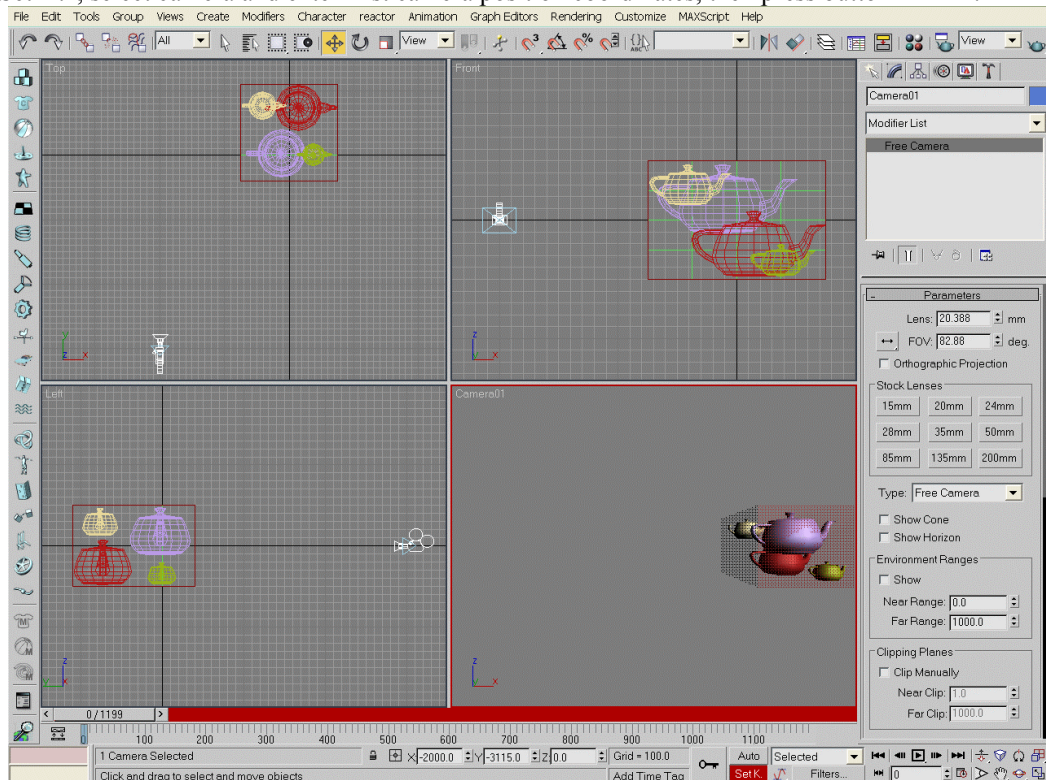
Enter the number of virtual camera shots to be taken into “Frame Count” box.





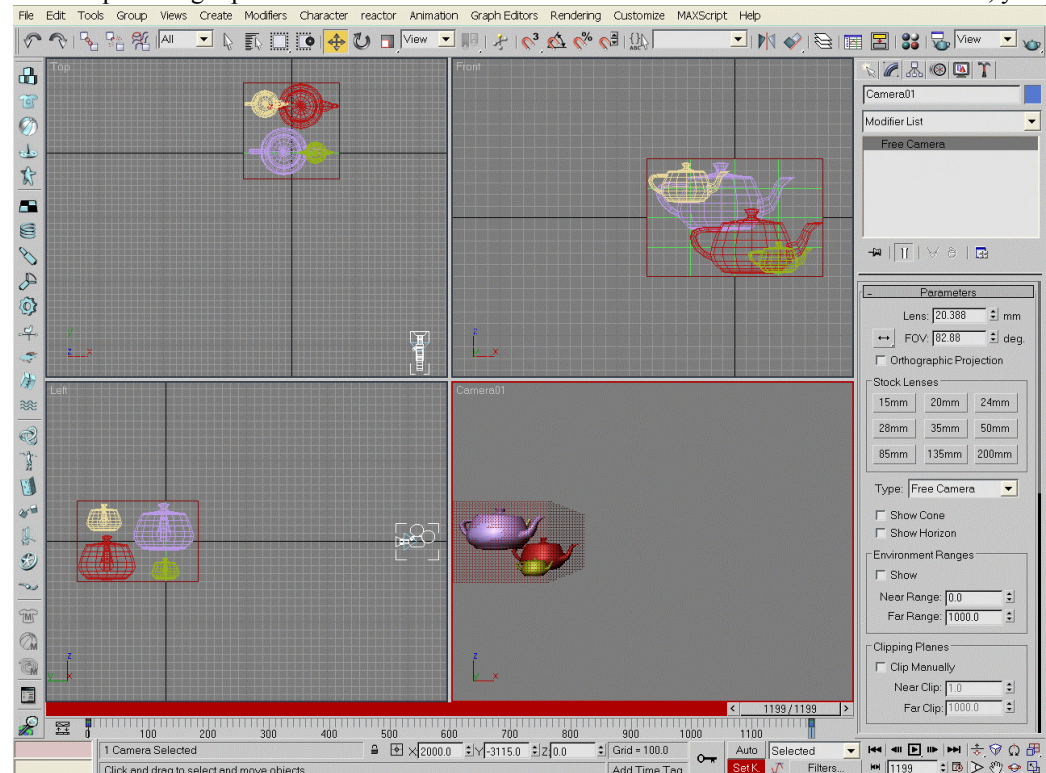
Now you need to enter camera movement coordinates. First camera's shot shall happen when it is at coordinates  $x = -2000$ ,  $y = -311.5$ ,  $z = 0$ .

Press button "Set K.", select camera and enter first camera position coordinates, then press button  :



The position of first shot is set.

Move the slider to the upmost right position and set the coordinates of the camera for the last shot:  $x = 2000$ ,  $y = -311.5$ ,  $z = 0$ .



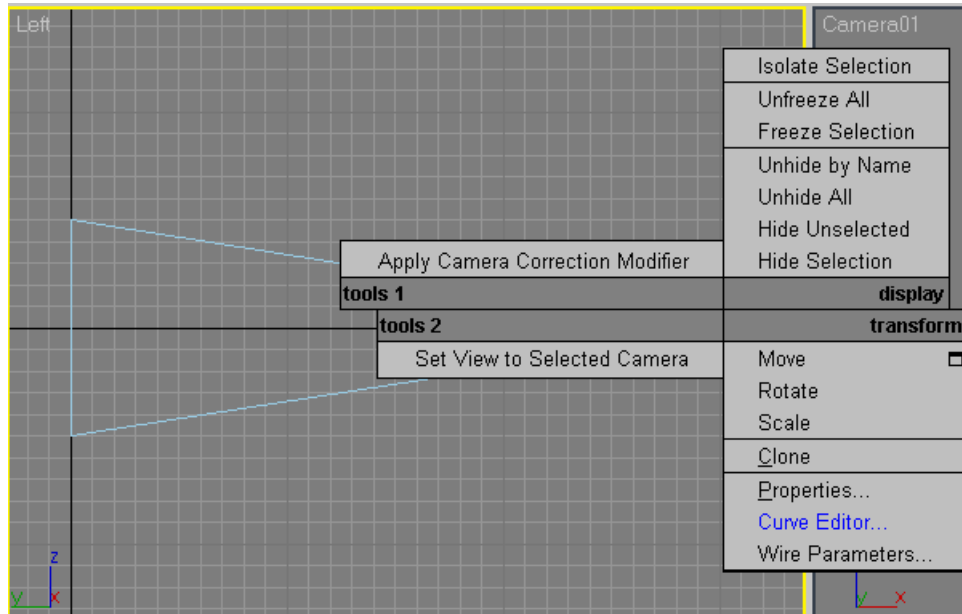
Again press .

Release button "Set K." – camera movement track is set. Check if camera moves when you are dragging slider from left to right. Now when moving the slider, the whole scene can be viewed from the different angles.

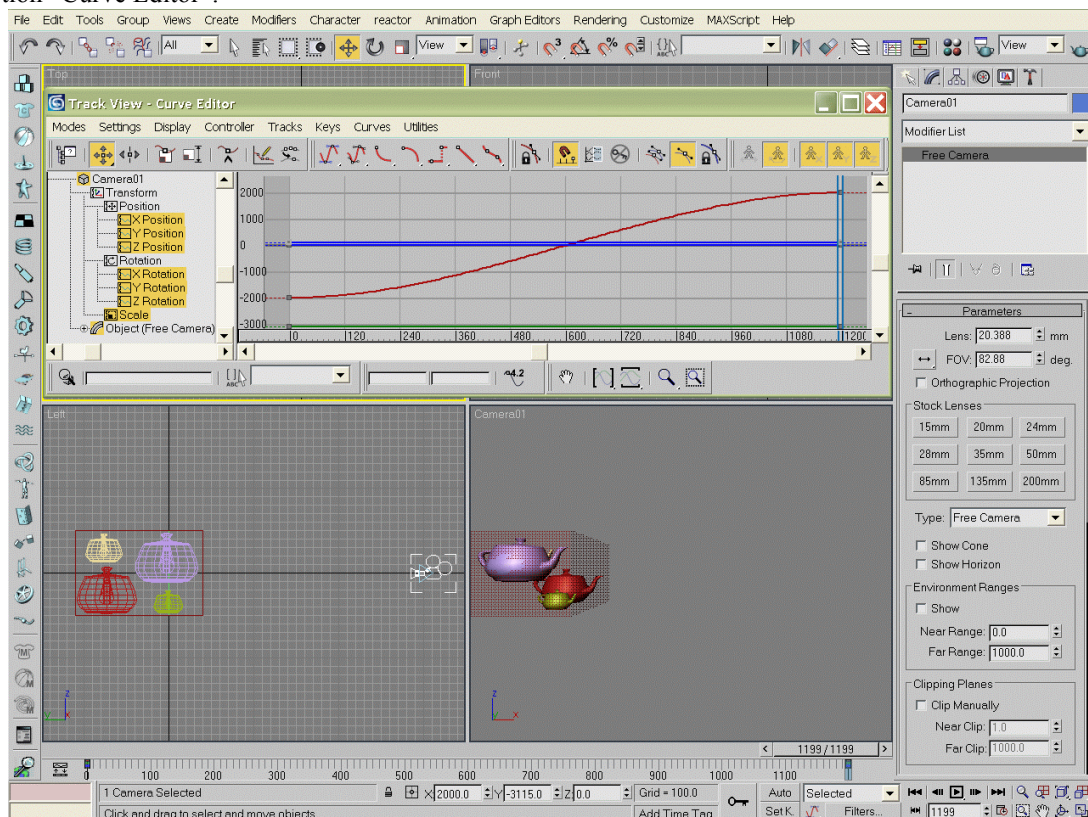


For iLumographic rendering camera shall move with continuous velocity. By default 3D StudioMax sets camera to move with variable velocity. Some other programs also can have such default settings. If rendering is made with camera moving with not constant velocity, then such files cannot be used for iLumographic printing.

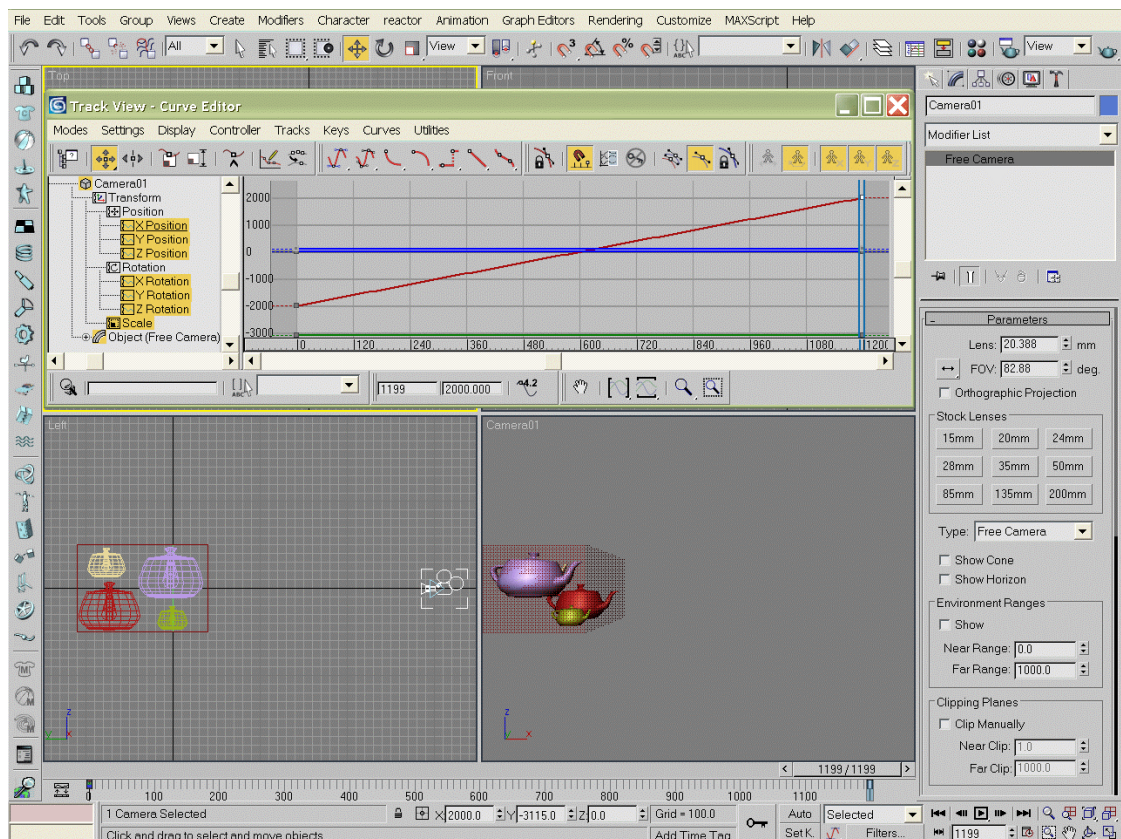
In order to set up constant velocity camera movement, click on camera with right mouse button in any of orthographic projection windows:



Open the option “Curve Editor”:

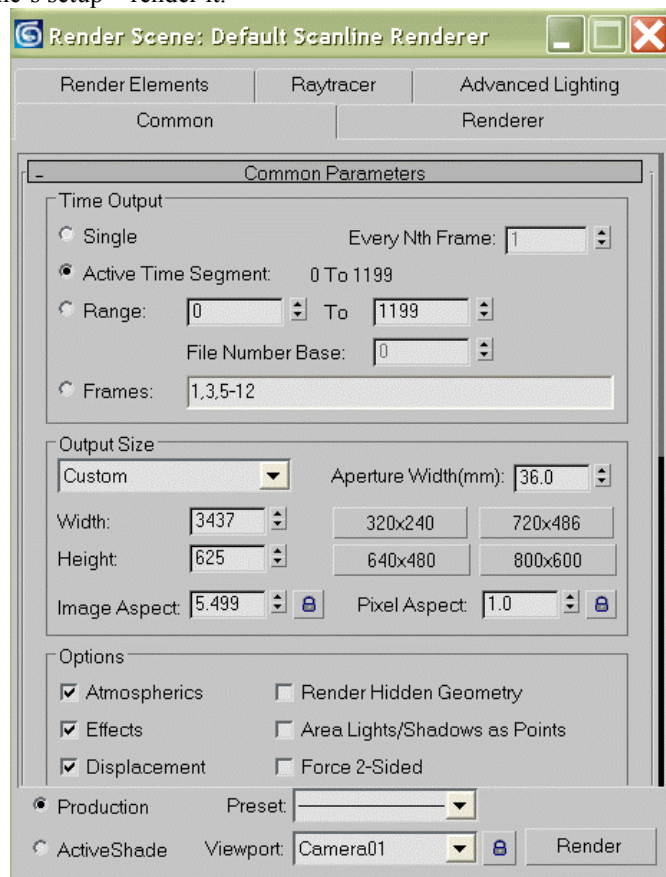


Click "X position", click at the most left point and click , click at the most right point and again click .



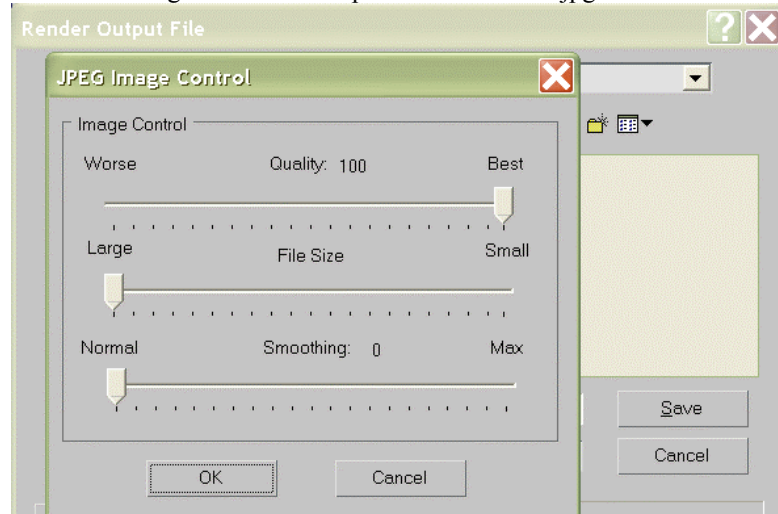
Close Curve Editor window. Now moving the slider, you will see exactly what iLumogram viewer will see while walking in front of the iLumogram.

If you are satisfied with the scene's setup – render it.





In Render Scene window you need to tick Active Time Segment checkbox, in boxes Width and Height enter corresponding parameters obtained from Geola Rendering Calculator. Output files shall be in jpg format with best quality settings:



Rendered files can be recorded to CD and sent to Geola Digital, alternatively, you can place them at some fast connection FTP server and give us an access to it.