3D in Layar
The manual
v1.0

by Stefan Wassink

Content

Welcome to 3D in Layar

This guide is for people who have worked with 3D before and know terms like vertices, normals, faces and textures. You do not need to be an expert! Everyone can work with 3D layers and I am going to tell you some pointers end tricks to make sure you get the result you want.

Who am I?

I am Stefan Wassink, a 3D artist and I have worked for games on the Nintendo DS, PC games and animation work. I am now at Layar as the 3D visual artist and I work with others here at Layar to make the content for games and applications that we develop here. I have experimented with the options and possibilities of 3D in Layar and will document these for everyone to use.

Why this guide

Everyone can make layers and work with the newest tools we have to offer. We want you to develop your best concepts and if this includes 3D then you can get a head start by tapping into our knowledge and experiences while making 3D layers and games.

Who can use this guide

As I mentioned before this guide is for people who have worked with 3D before and know the basics. There is also a presentation available for beginners on the Layar website made by Ronald van der Lingen (http://layar.com/3d-tutorial-for-layar/) that will teach you the first basics. After understanding what is said and having done a little 3D work this will be the next step towards your own 3D Layar.

If you have worked for mobile games or with game engines before the rules will most likely be known to you, but feel free to look for new tips and tricks. Also if you have a suggestion to make this guide better you can send a mail to developers@layar.com and I will take a look at your comment.

Guidelines to working with slow rendering hardware

Before you begin with shaping your object you need to know the rules for working with hardware like mobile phones. You might have made some object for the PC or just still images before, but working for mobile phones brings a lot of trouble for you if you do not work clean and with an eye on efficiency. You need to use simple models and small textures and still have a good looking object at the end of the day.

Before starting modeling, think about these things:

- The screen is small, subtle detail will often not be seen and only make the object slower to load.

- Textures do not need to be 1024x1024 on a screen that supports 320x480

- Faces that the viewer can't see don't need to be there.

- While working keep in mind that the engine works with triangles and this will increase a lot compared to polygons/faces.

- Don't forget to keep your object centered on the grid, when you export these values will be included.

- Make sure your 3D software can export .OBJ files.

Creating your object

When you have your idea ready, and you got a sketch and/or images from the internet with reference material you can start making your model. First you should turn on the information of your object so you can see how much vertex points, faces and triangles you have in the shape. At the moment you should keep the triangles under 5000 for your model, but when you model for a 3G internet connection try to keep it far as possible under this number.

Guidelines:

- Always check your model to see if the normals are facing out, otherwise you will not see the model right when you render it in Layar.

- Things like windows, doors, buttons and ridges should not be included in the model, these details you should add in the texture.

- You can add multiple textures en shapes, but always try to keep it as close to one as possible.

- Try to keep your models as clean as possible. There shouldn't be vertexpoints floating around, don't just position 2 shapes in each other or have 2 faces overlapping each other. If you add something like a chimney you must extrude this out of the existing shape, don't add an extra box in the shape.

- Start with just the basics and start adding details after the base is ready.

- If you have a big model, make a simple version so people don't have to wait a long time before they see something.

- Connect vertex point to squares so you avoid having NGONS (faces with more than 5 vertex points) to keep as much control as possible

Making the texture

Off course you want your models to look good and you can do this by making the textures as precise en efficient as possible. Go with the lowest size possible and test it with lower levels of quality when you save them.

Guidelines:

- Always use textures sizes to the power of 2, 64x64, 128x128, etc.

- Use UWV mapping to make your texture

- Start with high resolution texture and while testing work your way down until you got just the right level of details and the smallest size.

- You can go for a JPEG or a PNG image. To add transparency you must go for PNG

- You can add transparency, but above 0% it's not true transparency. You will see the camera image trough the material, but not other added objects.

- Work with tricks like baking ambient occlusion maps to fake realistic lightning effects

Do Not!

- Work with multisubs, converter does not recognize this techniques

- Work with standard materials from the library, it must be a standalone image file

- Work according to the shading in the 3D software, this will be ignored in the L3D convertor

Exporting the model

When you're done or you want to test your model you need to export it. It is not possible to export it directly into a usable format for Layar so you are going to need the Layar3DModelConverter. This tool is able to load your .obj and .mtl file and convert it to the accepted L3D file. In the convertor you can make some changes to your model, but you should try to make it as perfect as can be in your 3D software so you don't have to make the changes every time you update the object.

When you loaded a model in the convertor you can select 3 view options.

1. Overview
2. Materials
3. Preview

In overview you can see the statistics of your model like faces, vertices and size. In materials you see the texture and you can make some light changes. In preview you can see how the model will display in Layar.

The changes you can make are:

- *Drop normals*
  Causes the client to calculate smooth vertex normals by using the average of the normals of all faces that the vertex is part of.

- *Calculate face normals*
  Causes the vertices to have the normals of the faces they are part of. This results in hard edges.

- *Flip Faces*
  Changes the vertex order of each face, which turns the model "inside out".

- *Optimize materials*
  Reorders the faces to be sorted by material. This improves rendering speeds.

- *Rotate*
  Rotate the model around the x-axis by 90 or -90 degrees.

- *Scale*
  Re-size the model by specific factor

- *Ambient Color*
  The color of the material that is used for environment light

- *Specular color*
  The color of the highlight in the model

- *Shininess*
  The amount of highlight. High values give a small highlight and low values bigger highlights.

After your model is ready you can save it as a L3D file and upload it to the server.

Use case: Let's make a building

To put all the tips and tricks above to use I will now make a building and tell you what I do en when I do it. I am going to model a building close to the Layar headquarters here, the Sluyswacht café in Amsterdam.

First I will search the net for some photos as reference material (fig.1,2&3). When I got enough angles I'm ready to start.

Sources for images:
Google maps, Google search engine and Flickr.

Now start with the basic shape en don't add the details yet. We first want the basic shape to be ready and then we can decide what details are big enough to include in the shape.

FIG 1

FIG 2

FIG 3

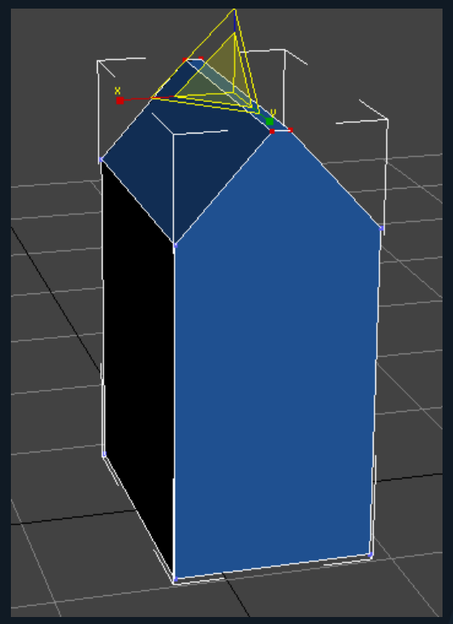


FIG 4

First I start with making the shapes that will form the object, in this case the wall and roof.

This is the basic form (fig.4) that shows us that it is a building. What I need to decide now is what I need to add in the shape and what I can just add in the texture. I want to add the 4 pillar shaped elements because it's very obvious on the building, the roof vaults, the chimney and the peaks at the top of the building. Also I will make the edges between the roof and the wall. This will allow me to get some nice shading done by the 3d software and it's still within the acceptable faces limit for 3G internet.

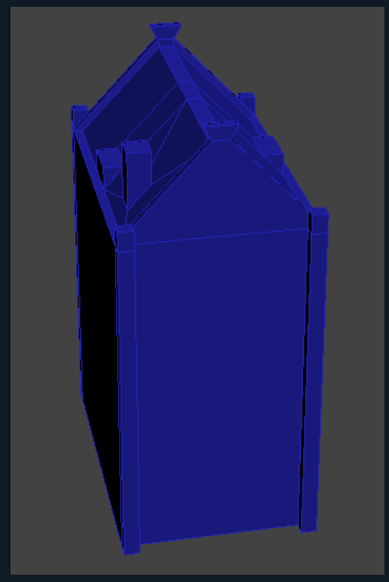


FIG 5

Now that I have the details worked in the shape (fig.5) I am going to spend 10 to 30 minutes (depends on complexity) on searching and fixing floating vertex points, overlapping faces etc. I want the model to be this clean because it allows me to have full control and I won't run into weird faces when I make the uwv unwrap. Also I will delete the bottom of the model because this will never be on screen, so it doesn't need to be there.

This is also the next step. After making the model spotless and to my satisfaction I will create the unwrap.

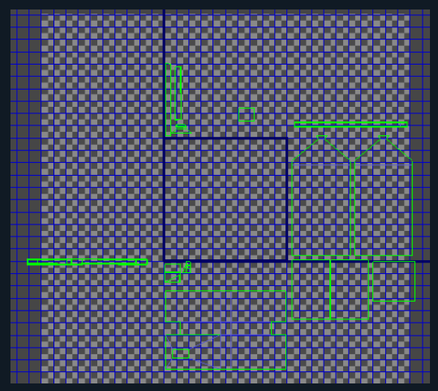


FIG 6

For everyone who now thinks: What is UV Unwrap? This is a coordinated system for your textures. You can just load a texture on your object and hope it will kind off fit, but if you want to work the right way you will position the faces yourself. In this tool you can set make your own layout of the model (fig 6). I will not go into the specific tools because I do not know in which of the programs you are working. But this can be easily found in Google for most of the software.

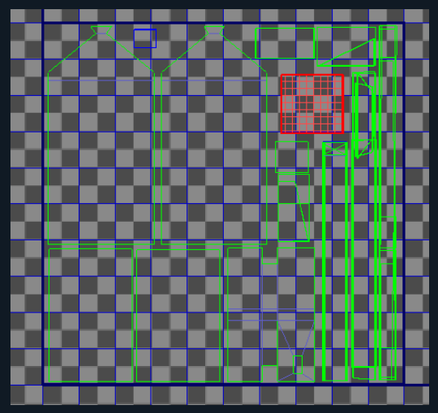


FIG 7

Now I have the faces on the right position (fig.7) so I can export the map and go to work in the 2d software to make the texture. Faces that will most likely not be seen I will put together and give an little space so I have more room for the pieces where the details will be visible.

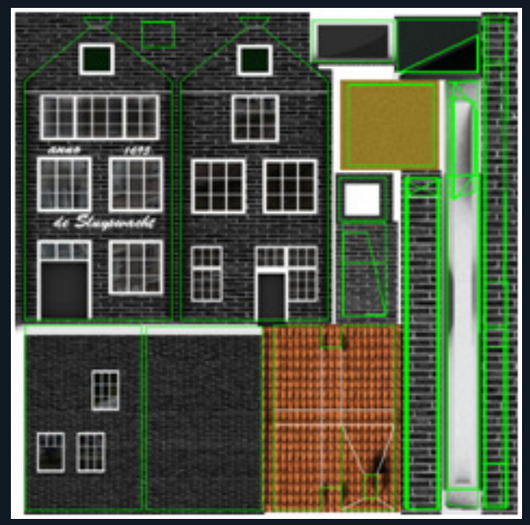


FIG 8

What follows is a long process of trial and error. You fill in the map according to your unwrap and check regularly if it is still correct so you don't run into big problems at the end. If you have positioned wrong you do not want to figure this out when you think you're done. At the end you should have something like seen in fig.8.

In this texture is have used some trick to make it more realistic. I have made a Ambient occlusion map (fig.9) to add lighting details that the opengl engine cannot provide for me, painted shading in it where it was still missing, added reflections to the windows, and some tricks to add depth to the door openings and window edges.

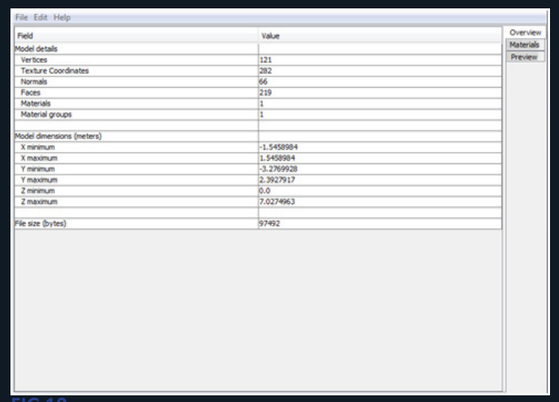
In this case I still have to manipulate the texture a lot after adding the ambient occlusion because it doesn't deliver all the lightning details I want. If I would have added the windows in the 3d shape these light values would be added, but for the sake of keeping the model down in size this must be done by some old fashion manual labor now.

FIG 9

Now I need to export the model to the .OBJ format. I choose to let the exporter automatically make triangles of the faces to get the best result and then export. Now I am ready to load it in the L3D tool provided by Layar and make some last changes.

In the overview screen (fig.10) I can check the properties, in the material screen (fig.11) I can make some lighting changes to the material en in the preview screen (fig.12) I can see the end result of my labor.

I will scale the object a bit to make it fit the screen and then I am ready to save it to the L3D format. For a complete overview of the possibilities to make changes look up in the manual in the exporter section.



Field	Value
Model details	
Vertices	121
Texture Coordinates	282
Normals	66
Faces	219
Materials	1
Material groups	1
Model dimensions (meters)	
X minimum	-1.5458984
X maximum	1.5458984
Y minimum	-3.2769928
Y maximum	2.3927917
Z minimum	0.0
Z maximum	7.0274963
File size (bytes)	97492

FIG 10

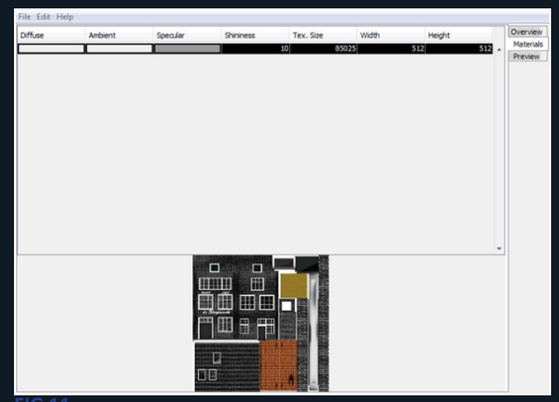


FIG 11

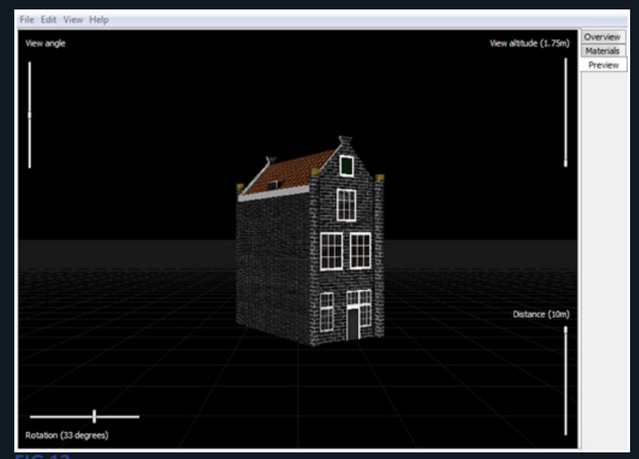


FIG 12

Now I need to export the model to the .OBJ format. I choose to let the exporter automatically make triangles of the faces to get the best result and then export. Now I am ready to load it in the L3D tool provided by Layar and make some last changes.

In the overview screen (fig.10) I can check the properties, in the material screen (fig.11) I can make some lighting changes to the material en in the preview screen (fig.12) I can see the end result of my labor.

I will scale the object a bit to make it fit the screen and then I am ready to save it to the L3D format. For a complete overview of the possibilities to make changes look up in the manual in the exporter section.