

# Advanced handbook

FELIX

# CONTAIN

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# Introduction

## 1.2 Frequently Asked Questions

### Noise issues

How do I choose the right quality level for my final render?

*Low res (from 1000 to 2000 pixels) exterior renderings: Quality 3.*

*High res (from 2500 to 6000 pixels) exterior renderings: Quality 2 or 3*

*Low res (from 1000 to 2000 pixels) interior renderings: Quality 3 or 4.*

*High res (from 2500 to 6000 pixels) interior renderings: Quality 2 or 3*

Why should I use a lower quality for high-resolution images?

*Often users opt for a higher quality to avoid the noise issue that appears during the rendering process. Since the noise is often not visible in the printed image, it is not actually necessary to increase the rendering quality level.*

### FELIX Tip!

Should I render my image again with a higher quality level when I notice that the noise issue is too visible?

*There is a simple trick that will save you a lot of time! Simply re-render the image at the same quality level and then open both images in a image editing software like Photoshop or Gimp and overlay one image on top of the other.*

*Then set to 50% the opacity of the image on top and merge the two layers. This reduces the noise issue by 50%.*

## 1.1 Minimum FELIX knowledge required

This reference guide is meant to provide useful tips to users with a basic understanding of FELIX render interface. Should you be new to Felix, we recommend to have a look at FELIX tutorial section downloadable at [www.felixrender.com](http://www.felixrender.com). Once you get familiar with camera movement, environment setting and placement of materials and objects in your scene, you will be able to make the most of this guide that is meant to provide key directions on how to use Felix for various projects of any scale.

### Geometry issues

While Importing the O3D file from Rhino to FELIX, I notice that my file has exceeded the maximum number of polygons. How can I increase this?!

*Increasing the maximum number of polygons is simply a matter of contractual conditions. By refining the maximum allowance in your contract you can increase this up to 16 million polygons for the O3D file + 6 million polygons for the objects.*

While importing the O3D file from Rhino to FELIX, I notice that my file has exceeded the maximum number of polygons. How can I reduce the polygon count in the O3D file?!

*If you are exporting Nurbs surfaces you can set lower parameters for meshing.*

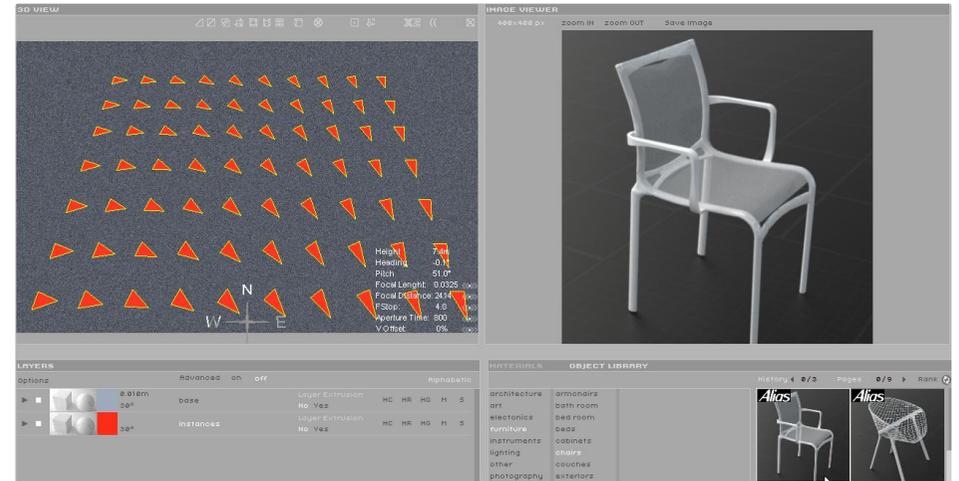
*If you are exporting Meshes (for example originally from Maya) you can use Rhino's "reduce-mesh" command for the most complex meshes. This allows*

## 1.3 Polygon replacement

The FELIX "polygon replacement" is a powerful tool, which allows you to enrich your scenes with almost an unlimited number of objects.

### How does it work?

For each object instance, create a **three-sided polygon**. You need to ensure that the three-sided polygons belong to the same plane of the joint surface. Once you have created the three-sided polygons, group into a separate layers all the triangles that represent the object you want to insert in your scene (e.g. group all the triangles defining the tree positions in a layer called "trees"). During the rendering process, objects from the Felix object library will replace the polygons on a layer by layer basis.

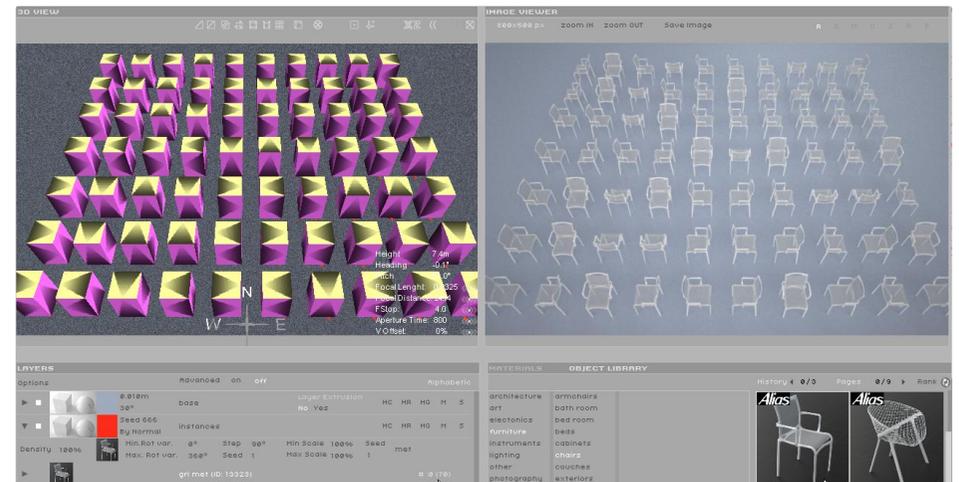


A ground plane and some three sided polygons.

## Standard Polygon replacement

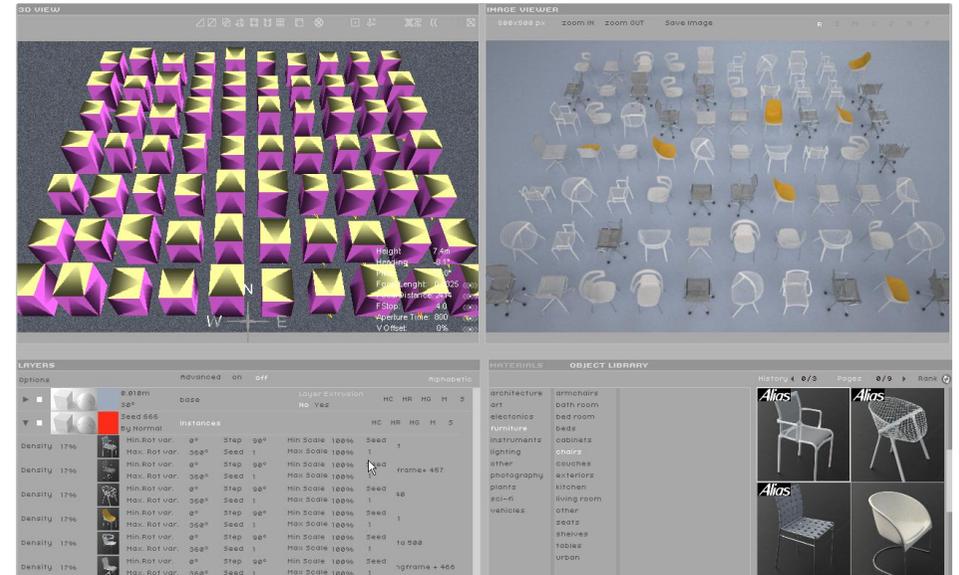
This technique allows you to replace each triangle with one or more objects. Properties such as size, rotation and scale are defined via the layer's settings.

By dragging one object to the edited layer, the object's "bounding box" appears with a black arrow showing the orientation. By default objects dragged into the scene are progressively rotated with 90 degrees increase.



A chair has been dragged on to the layer with the three sided polygons.

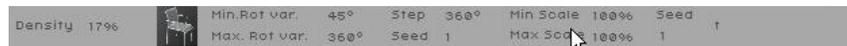
When dragging multiple objects onto the same layer, you may want to use FELIX feature of random alternation. This is a very useful way to quickly furnish the interiors of large buildings, to create realistic views of a park made with multiple trees or to arrange a car parking view with several different types of cars.



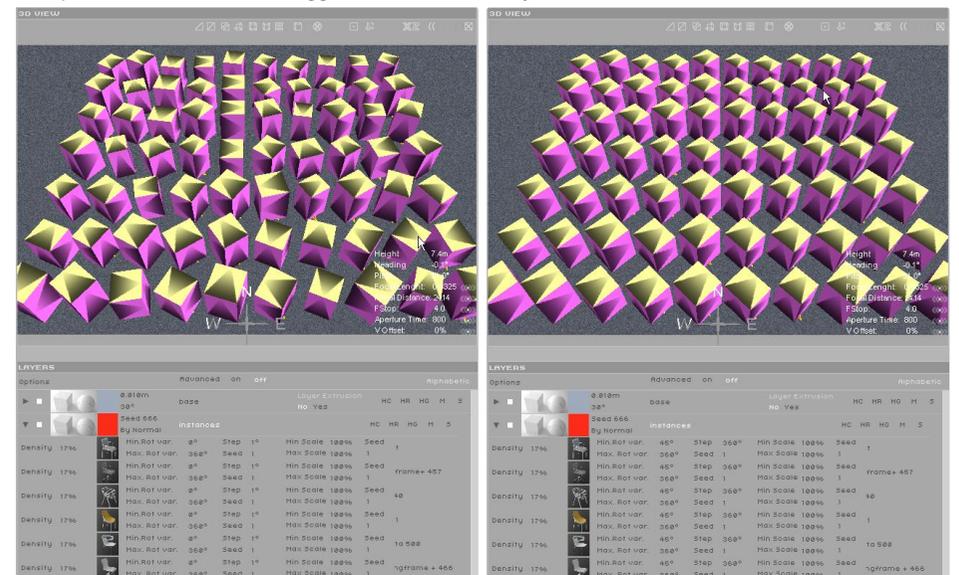
Multiple chairs have been dragged on to the same layer.

## Rotation and scaling

You can find the rotation and scaling controls by opening the layer detail tab.



These controls will help you to adapt the randomization to your specific needs.

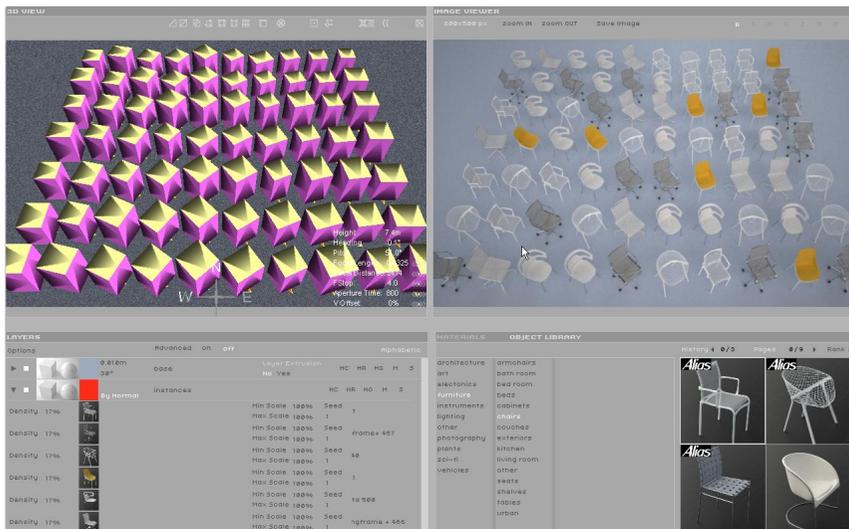


Rotation "Step" has been set to 1 for complete rotation freedom.

Rotation "Step" has been set to 360 and "MinRot var" to 45 degree.

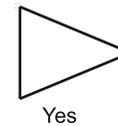
## "By Normal" Polygon replacement

You can use this option whenever you a full control of the object orientation is required. You just need to use long isosceles triangles in order to have a clear control of the direction of the object. The polygon "normal" has to be oriented towards the object's top side.



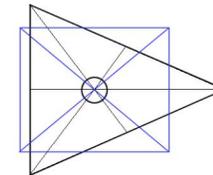
### FELIX Tip!

Remember to create long isosceles triangles in your modelling software!



In order to avoid error messages like "layer contains connected triangles" make sure that three sided polygons do not share any vertex.

Please note that FELIX places the centre of the object's bounding box in the polygon's centroid. Keep this in mind when the you



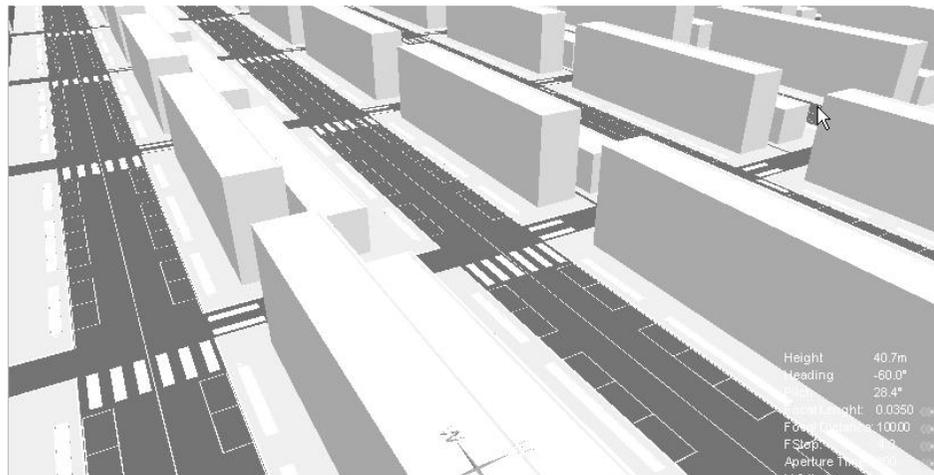
### For Rhino users!

In Rhino, use the command "3dface" to build the triangle. This will avoid the risk of getting the error message "Layer contains connected triangles".

# Exterior Views and Masterplan

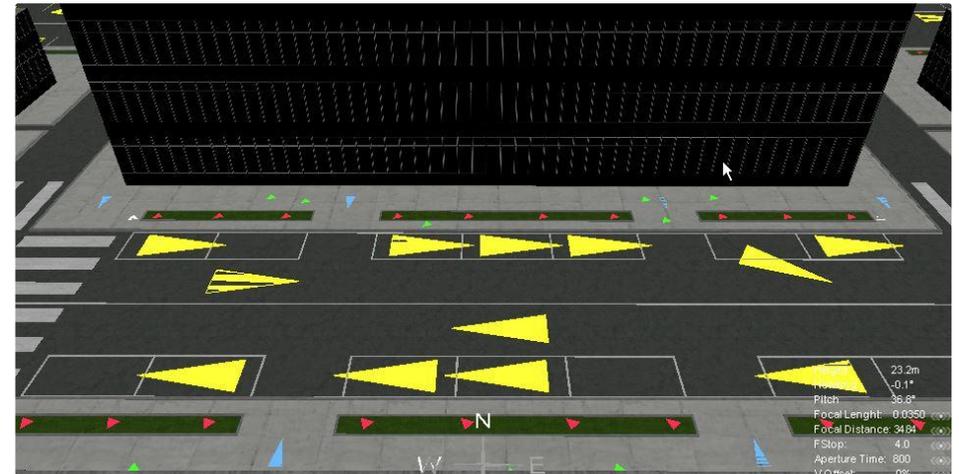
## 2.1 Felix Set-up

When working on the CGI of a Masterplan, you will find that the more detail you add in the model, the more realistic the view. In FELIX the polygon-to-object replacement system allows you to reach a very high level of detail since unlimited number of high quality 3D objects can be imported in the scene. The scene on the right was modelled using just a few boxes nonetheless the final rendering achieves a pretty good visual impact thanks to the high level of detail of the library objects.



## 2.2 Modelling tips:

Use your favourite modelling software for placing a large as many objects as you wish in lieu of an equal number of polygons. Please note that all triangles belong to the same plane of the joint surface. All triangles representing the library objects should be grouped into a separate layer i.e. all triangles defining the placements of trees should be classified under a layer called "trees". FELIX Library objects will simply replace! all the trees triangles with models of trees.



All yellow triangles belong to the same layer. In FELIX you can replace them with cars. Also visible are the red triangles as trees, blue triangles as streetlights and green triangles as people. Each set of triangles is placed on a different layer. Isosceles triangles are used in place of cars and streetlights. .

### FELIX Tip!

If Use your favourite modelling software for placing a large as many objects as you wish in lieu of an equal number of polygons. Please note that all triangles belong to the same plane of the joint surface. All triangles representing the library objects should be grouped into a separate layer i.e. all triangles defining the placements of trees should be classified under a layer called "trees". FELIX Library objects will simply replace all the trees triangles with models of trees.



## Vehicles

Drag various types of car models from the "Object Library" onto the "cars" layer, then activate the "By Normal" option. The orientation of the objects will match the orientation of the triangles..



An emitter material has been assigned to the car lights. For night views use wet asphalt (ID 3734).

## FELIX tip!

It is possible to change the car paint colours or to assign a light emitting material (e.g. ID 195) to the car lights for night time scenes. In order to edit or replace car materials, open the object's detail towards the bottom of the Layer list (material setup tab).



If some of the objects have an incorrect scale you can easily adjust this by changing their Min-Max scale in the material set-up tab.



Several different car objects have been assigned to the Layer "Cars". The "By Normal" options forces the objects to follow the triangle orientation. FELIX randomly alternates the cars.

### Check the orientation of your vehicles!

in the preview before placing them. This will avoid the risk of orienting the vehicles with the wrong direction (see the image below)

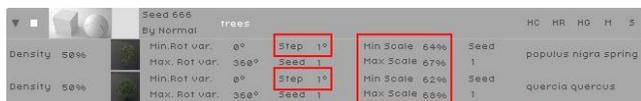


## Nature

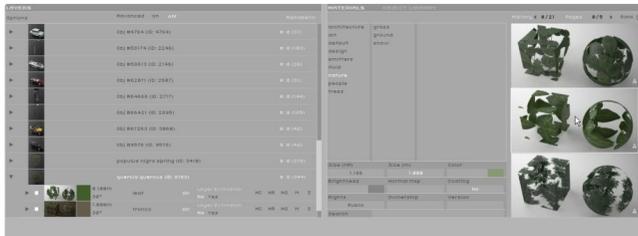
Assign one or more trees from the "Object Library" to the layer "trees". Usually 1 to 3 different tree offer enough variation on any one layer although the more tree models you add the wilder your scene will appear.

### FELIX Tip!

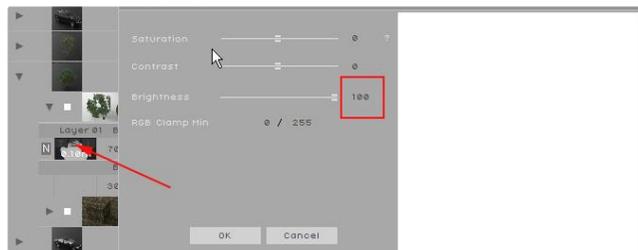
To achieve a more natural look for your scene, change the "step" value from 90 to 1 degree for each tree and modify slightly the Min-Max scale.



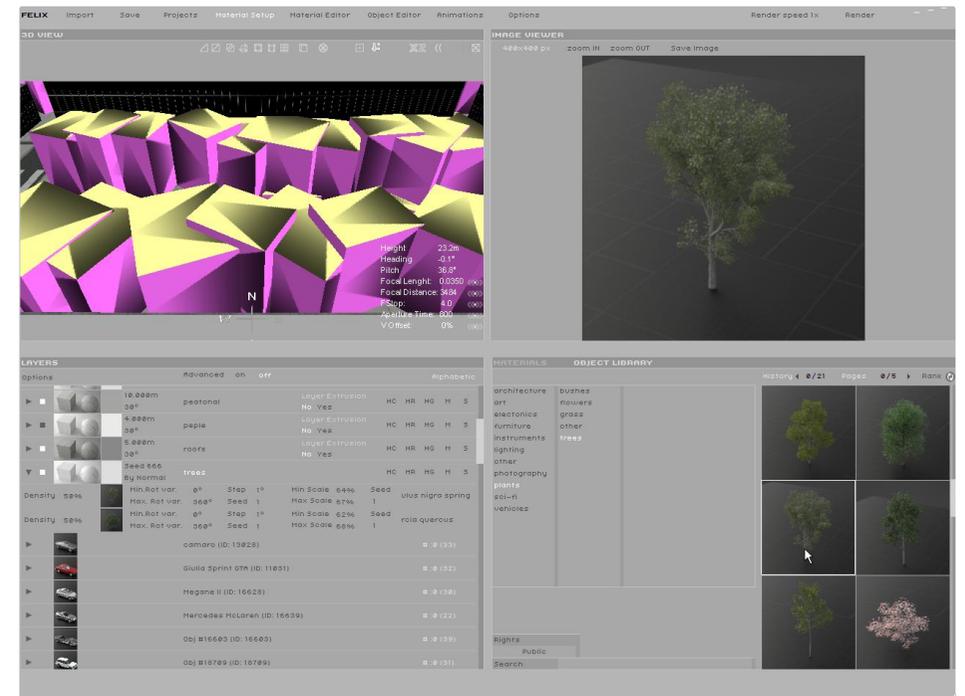
In order to change the colour of the leaves, simply replace the existing material with a different one from the "Nature/Leaves" category.



Are you experiencing slow rendering times? Use the "Image Editor" to increase the brightness of all black and white textures on Layer 01 in all leaves materials. This will speed up your rendering time up to 10 times! Also use the Efficiency Factor "eff" setting its values from 1 to 20. This is key to achieve fast and low-cost animations! You can find the Efficiency Factor "eff" button in the render list next to each item.



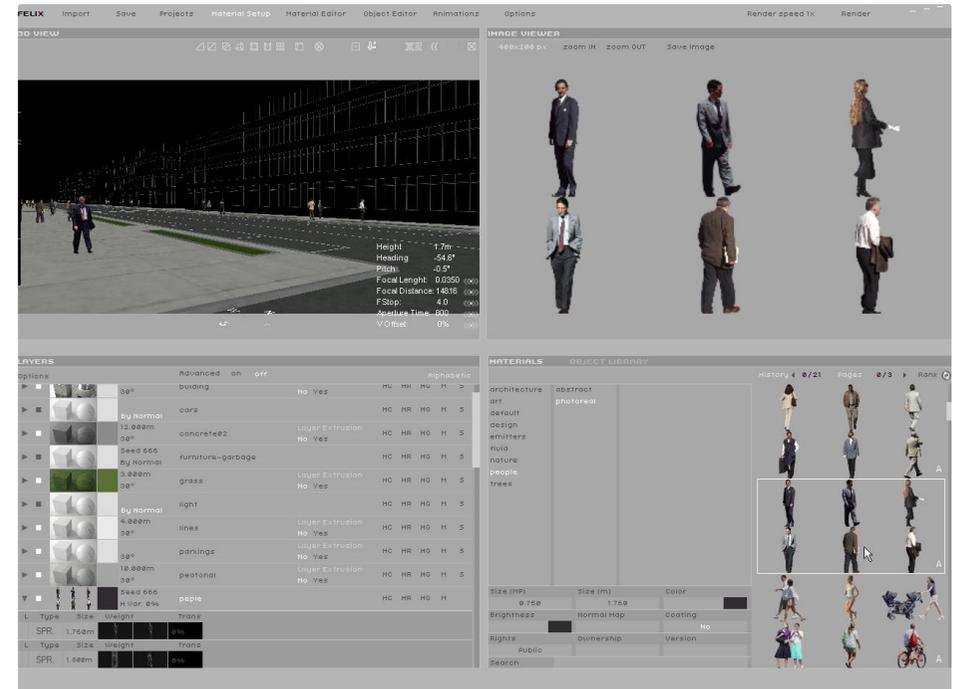
An example of a CGI of a park. The triangles are grouped into 9 different layers, one for each vegetation type.



Two different types of trees have been assigned to the layer "Trees". Random rotation and scaling avoid the serial repetition of the models.

## People

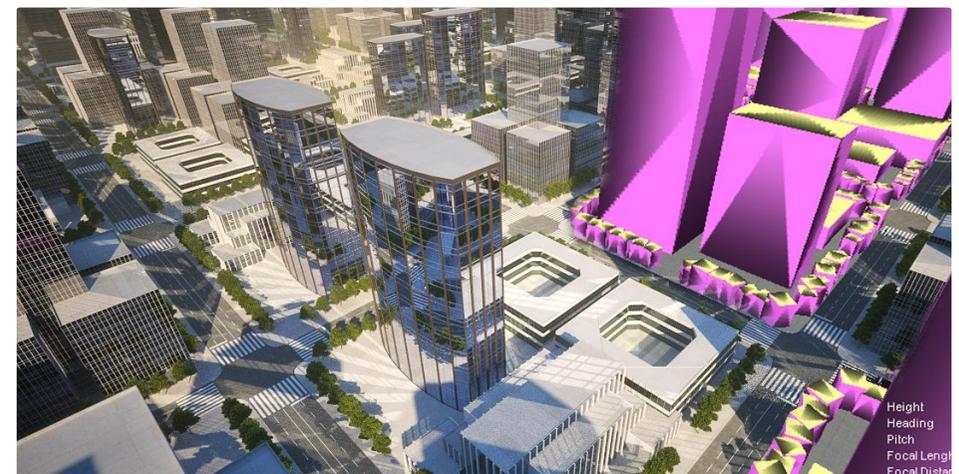
Simply drag a "People material" on the layer "People". The alternation of people can be managed in the material detail settings. The higher the number of people the least risk of noticing repetition in the rendered scene.! Additionally, the position of the characters can be changed by varying the "seed" parameter whilst the height can be modified by adjusting the "H Var" parameter.



A material from the "People/Photoreal" category has been assigned to the layer "People".

## Other polygon replacement employments

You can create entire cities by replacing polygons with building models taken from the 'Architecture' category in the 'Object Library'! Please note that the minimum distance between the triangles should be at 20 – 40 m. The same technique can be use to add street lights, furniture for public and private spaces or furniture for restaurants, bars and so on.



The buildings are from the "Object Library" category "Architecture".

## Important settings

For best results in post-production of the final image the "Render Parameters" panel has to be configured for each view. The "Render Parameters" panel can be activated simply right-clicking on the view.

### Parameters to activate:

- **Alpha**

Alpha allows immediate replacement of the background with any photographs of landscape or sky. In Photoshop apply the "Remove black matte" function (Layer/Matting) and this will get rid of the black pixels on the image boundary.

- **ID Material**

Material ID generates an image that includes all the various ID's of the materials used in the scene. This feature is particularly helpful for editing separately the different materials in post production.

- **ZBuffer**

ZBuffer generates the DepthMap of your view, which is particularly useful to add fog or dust to your scenes. You just have to set up as "max" value the farthest visible point in your view. You can find it using the "D" key to measure the distance.

- **Scattering**

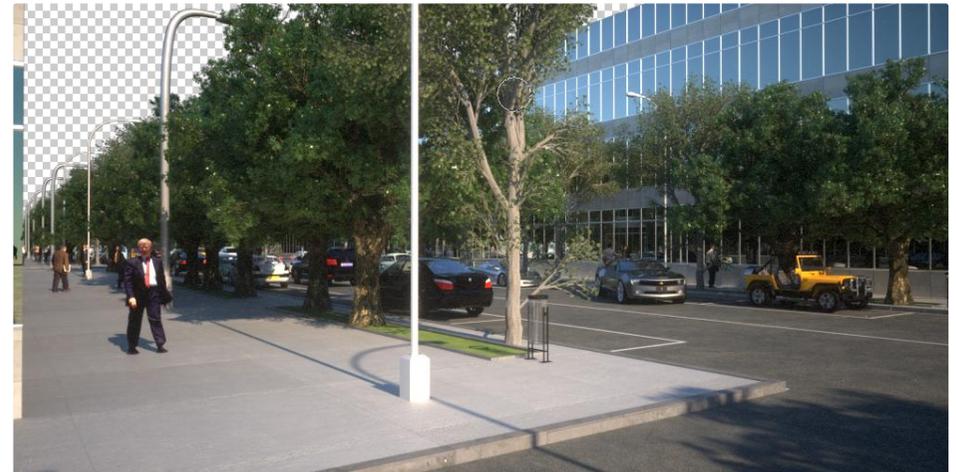
Scattering makes the highlights of your CGI glow. Normal values are between 2 and 10.

- **Devignetting**

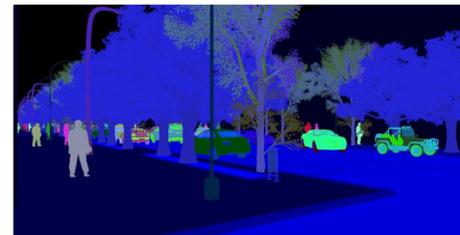
Reduces the vignetting effect (darkening on the borders). Devignetting is highly recommended if you use extreme wide-angle lenses. A value of 100 removes the vignetting effect completely.

#### FELIX Tip!

Material and ZBuffer can be found at the top of the "Image Viewer". Simply click the "M" or "Z" to view and save.



Rendering with Alpha channel. The sky pixels are transparent.



The Material ID channel.



The ZBuffer channel.



Scattering off.



Scattering on.

## 2.1 Postproduction in Photoshop

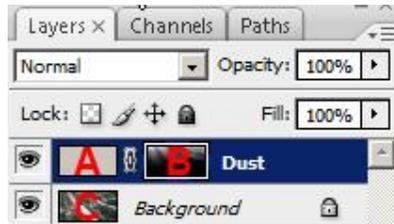
An element of postproduction is always required to achieve a good CGI quality. Photoshop easily allows you to modify the colour depth, to replace the image background, to adjust brightness and contrast, or to saturate the colours.

### Brightness and contrast

Changing the luminance is often necessary to achieve a good photorealistic result. In Photoshop you can adjust its luminance via the “brightness and contrast” command or by brightening the darkest areas with the drop-down menu image/adjustments/shadowhighlight. In order to avoid a fake-looking image we suggest you to use values below 30%.

### Zbuffer

You have to use following set-up in Photoshop:



**A:** Is the colour of the fog/dust you want for your image. Often the colour of the sky just above the horizon has the correct colour.

**B:** Copy the ZBuffer image onto a QuickMask then convert the ZBuffer to negative (CTRL+I) and use the levels command to increase/decrease the dust amount in the background and foreground.

**C:** Is this is your final rendering



Original image. Scattering intensity 10. ZBuffer Max Distance 300m



Photoshop: Brightness and contrast, Shadow/Highlight, Unsharp Mask.



Photoshop: ZBuffer is applied. Dodge tool (highlights) on Zbuffer Mask was used.

### **Modify selective colours**

Select Image/Adjustments/HueSaturation from the drop-down menu and choose the colour channel you want to modify (e.g. Greens). Fine-tune the colour range by holding the CTRL key while clicking on the green areas of you image. Apply the colour variations using the Hue and Lightness command.

### **Alpha Channel**

Alpha channel works better at quality levels 3 and 4 while at quality levels 1 and 2 the image will become slightly transparent. To remove the slightly darker pixels around the boundaries open the image with Photoshop and select Layer/Matting/RemoveBlackMatte.

### **Image sharpening for printing**

In order to improve the quality of your printed image, you can apply Filters/Sharpen/UnsharpMask. Based on the image size, set up radius value between 0,7 and 1 and intensity between 60 and 150.

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# Interiors



The first step to set up an internal view is to think about how to light up your space. Lighting tests should be carried out without materials and without furniture, this will speed up the rendering time and will allow you to focus exclusively on lighting. Try testing various light colours and intensities and as soon as you are satisfied with the lighting you move onto mapping materials and placing furniture.

### 3.1 Modelling tips :

If you are planning to use light-emitting surface, Please consider the 'normal' orientation. This has to be the same direction of the light. There is no need to thicken surfaces mapped with glass since the material in the material library will do it automatically.

### 3.2 Camera aperture time

FELIX camera aperture time is set by default to 1 /800 of second, which is a good setting for exterior scenes. When working with interior scenes, exposure time should be increased between 1/200 to 1/20 of a second. The actual measurement will have to take into account the amount of light the space.

### 3.3 Felix set-up

#### Lighting

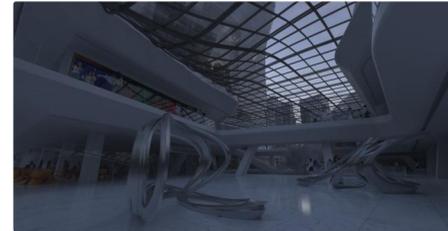
You have four options to light up your interior scene.

- **By using environments:**

The easiest way to light up your scene is from big wall openings that allow in enough light. It is possible to control the lighting by changing the environment type or rotating the environment (N key and Lmb). When openings are not big additional light sources are required in order to avoid noise in your image.

- **By using light emitting surfaces to simulate natural light**

This is a good set-up to light up scenes where small openings allow natural light in. This technique will drastically reduce the amount of noise in your scene; you just have to place a light-emitting surface outside the opening. Sometimes you can make it simple and use the glazing layer as an emitter: in tis case ensure the normals are oriented the same way as the light. The material is the ID 3044.



Environment only, aperture time 1/800.



Environment only, aperture time 1/80.



Option A. A light emitting surface has been placed outside from the opening.



Option B. The glazing surfaces are used as light emitting elements.



The left image is lighted up using emitter planes, while the right image uses a "Physical sky" environment. Both images are rendered at the same quality. You can notice how the amount of noise is drastically reduced in the image to the left.

In the scene to the right, the emitting material was applied directly to the windows layer. A good trick is to use three different layers in order to apply three light intensities and colours to the scene. By combining different light intensities and it is possible to have warm and strong light from the window to the right while keeping a neutral tone for the front and rear windows with the window to the left mapped with a cool and less intense colour. This kind of set-up allows a complete lighting control and a much wider range of atmospheres.



Final result of a scene lighted up using emitters.

- **By using light emitting surfaces to simulate artificial light:**

This set-up can be used to add artificial lighting to your scenes. You just need to create a light emitting surface (with no thickness) 1mm below the ceiling and then apply material ID 3044.

**FELIX Tip!**

Try to avoid intersections between light emitting surfaces and other geometries in the scene as this would increase rendering times and the amount of noise in your final image.

Try to keep the number of different light-emitting layers in your scene below 10 as going beyond this will increase the amount of noise.

If you are using a glass material from the "design" category ensure you activate the "HG" option on this layer: this will improve the lighting and reduce the amount of noise in your images.



Environment for natural light + light emitting surfaces (the light stripes).

- **By using light fixtures from the object library.**

Light fixtures from the “Object” library can be added one by one using drag-and-drop or by using the polygon replacement system. These fixtures have a light emitting surface. You can vary the light intensity and light colour by opening the object detail at the bottom of the layer list.

**FELIX Tip!**

Try to keep the number of different light-emitting objects in your scene below 10 as they increase the amount of noise.



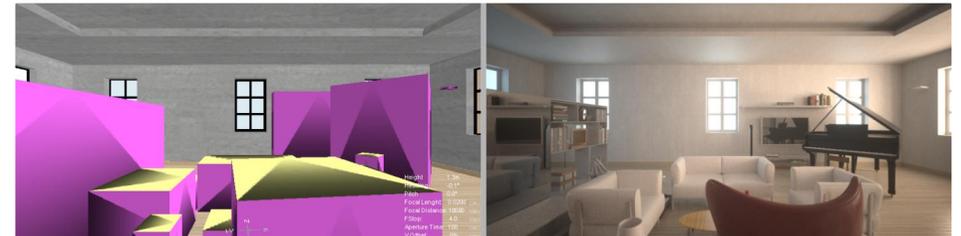
Environment for natural light + Light emitting objects.

## Furnishing

Try to use as much as possible objects from the "Object library". Objects can be introduced in the scene via drag-and-drop or by using the polygon replacement system.

**FELIX Tip!**

You can also create your own objects by using the “Object Editor”. Watch this video to see how to build your own object library: [Video](#)



Furniture added via drag-and-drop and final rendering.

You use this option with the 'By Normal' function activated ("By Normal" on) when you need a full control over the object orientation

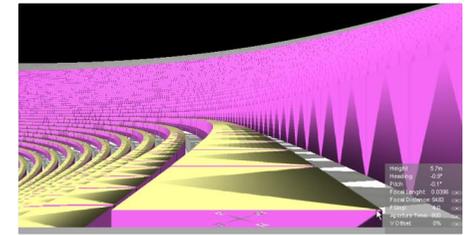
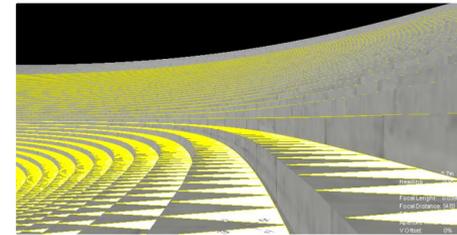


Use the standard polygon replacement system ("By Normal" off) if you need random rotation for your objects.

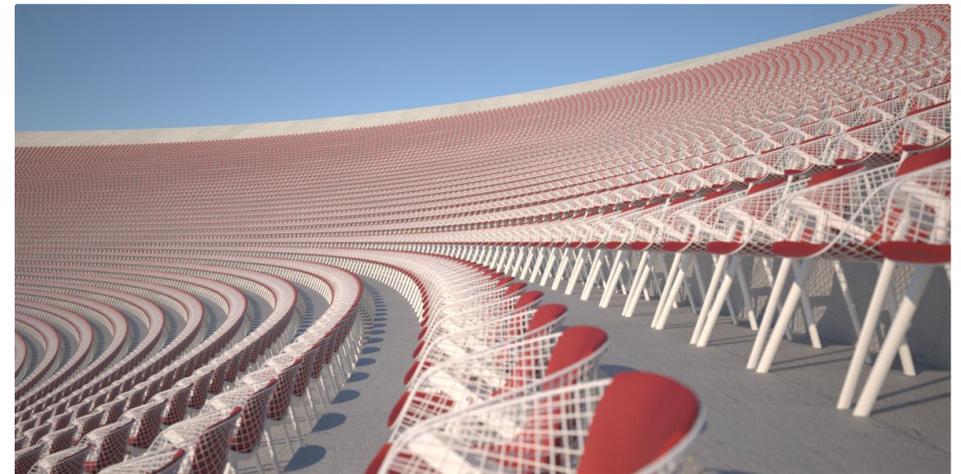
#### FELIX Tip!

You can easily replace an object with a different one by dragging the new object over the old one in the "3DView" or at the bottom of the "Layer list" (Material Set-up" Tab)

Object materials can be edited or replaced by activating the object's detail at the bottom of the Layer List (Material Set-up" Tab).



Isosceles triangles are replaced by FELIX with objects. Great for stadiums and theaters. "By Normal" has to be activated on the triangle Layer.



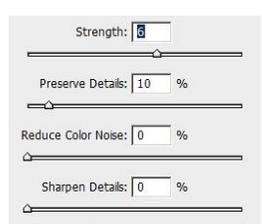
Polygon replacement ("By Normal" on) final results.

## 3.4 Postproduction in Photoshop

Interior images normally require very simple postproduction, with three main steps:

### Noise Reduction

Use Photoshop's Filter / Noise / Reduce Noise to reduce residual noise.



Strength: 8

Preserve Details: 10 %

Reduce Color Noise: 0 %

Sharpen Details: 0 %

These are the most common settings for interior images. Increase the "Strength" parameter for a stronger noise removal. Keep the "Strength" parameter below 10 otherwise you will lose the small details of your image.

### Brighness and contrast

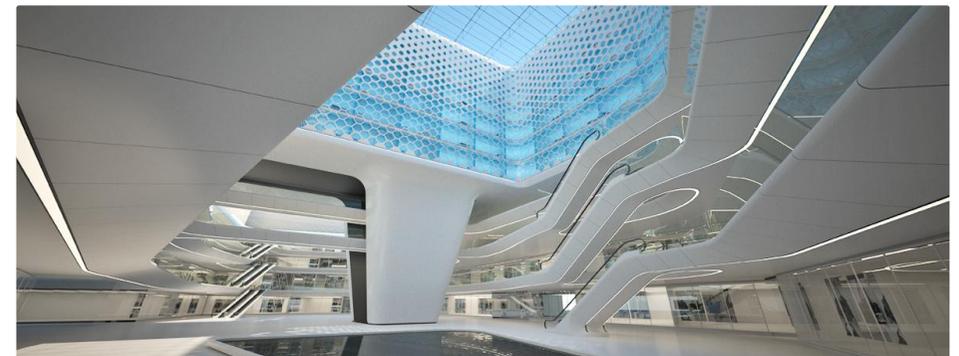
Varying the luminance is useful to achieve the desired CGI result. In Photoshop you can adjust luminance using the "brightness and contrast" command or brightening the darkest areas with the drop-down menu image/adjustments/shadowhighlight. In order to avoid fake-looking results values should not exceed 30%.

### Modify selective colours

Select Image/Adjustments/HueSaturation from the drop-down menu and choose the colour channel you want to modify (e.g. Reds). Fine tune the colour range by holding the CTRL key while clicking on the red areas of you image. Apply the colour variations using the Hue and Lightness command.



Original rendering.



Brightness and contrast + Shadow/highlight applied.

### **Alpha Channel**

Alpha works better at quality level 3 and 4 while at quality levels 1 and 2 the whole image will be slightly transparent. To remove the slightly darker pixels around the image boundary open the image in Photoshop and select Layer/Matting/RemoveBlackMatte

### **Image sharpening for printing**

In order to improve the quality of your printed image, you can apply Filters/Sharpen/UnsharpMask. Based on the image size, set up radius value between 0,7 and 1 and intensity between 60 and 150.



Unsharp Mask applied.



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