# Using Depth of Field in Vue

Vue has the ability to render objects showing the appropriate depth of field. Other objects in the foreground or the background of the focused object can be blurred to a controllable extent to make render as out of focus.

#### **Position Marlene:**

To demonstrate this, we will place a character in the center of our scene. To be sure of the center point of the scene and appropriate scale, we will make use of the orientation Object

and scale in the upper; **Object** panel

Position	9	Position
Orientation	B	
Size		
Twist	8	
<b>Pivot Position</b>	A	x 0m 🜩
		Y Om 🜩
M		7 0m 📥

We will begin by loading the Marlenestand

.VOB object from character group of default .VOB objects. This is a figure of a female, standing. Where ever she winds up in the scene, we will place her in the dead center.

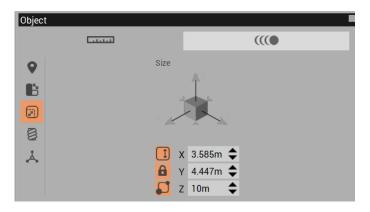
- > With Marlenestand highlighted, through the scene or World Browser also click the Position icon in the Object panel, above.
- Set the X, Y and Z position to be zero.
- With Marlenestand still selected, right-click the name in World Browser and select: Frame Selection – All Views from the displayed list.

We can see that she is partially buried into the ground and of a very large size as initially loaded. We will begin by getting the relative size to the right value, then raise her up to stand on the ground.

With Marlenestand highlighted, Click on the Size icon in the Object panel.

Notice that there is a lock icon at the Y size value. It is on by default meaning that changing one size will correspondingly change the other sizes.

Change the 10m Z value to 2 meters, about right for a tall-ish female like C. J.



- Use one of the view gizmos to raise her up and then drop her to the ground level.
- You will find that Marlenestand is leaning a bit backwards. Use the rotation gizmos in any view to stand her straight up again.
- Then rotate her so she is facing directly forward in the Main Camera view.

#### **Position Camera:**

There are many options for control of the camera. Most can be seen in **Object – Aspect** panel when the **Main Camera** is selected in the **World Browser**.

Active Camera: Main camera

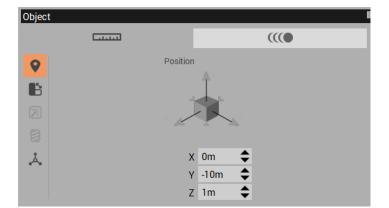
- Select the Main Camera in the World Browser now. The Object panel now shows the parameters for the camera position.
- Set the X to be aligned to Marlene at a value of 0 (default)
- Set the Y to -10m (default)

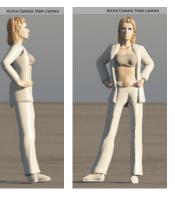
++ +

Set the camera height; Z to 1m above the ground

amera view under default camera position and orientation with a proper – sized

Camera view under default camera position and orientation with a proper – sized **Marlene** character placed at ground level.





#### **Camera Controls**

Above Active Camera display:

Toggle between Main Camera view and Perspective view There is always a **Main Camera** and a **Top Camera**. Many can be added. These two Buttons switches to previous or next cameras; Main & top and any more added.

Below the Active Camera display:



Pan the camera by click and drag. Movement in all directions; -Y and Z planes.



Move the camera in the X plane forward to object or backward from object.



Rotate the camera, can be in all directions, a full  $360^{\circ}$  if desired.



Rotate or Orbit the camera around the selected object.



Focal Length. Click & drag to change; up to zoom in, down to zoom out



Left-click: Frame selected objects to fill the view. Right-click: Frame all objects to fill the view

Secure the Active Camera. Change settings in Perspective view then store into the main camera

#### **Object – Aspect controls for Main Camera** (when Main Camera is highlighted)

- Lock Camera Attributes
- Always Keep Level
- Select and load a Back
- Select Focus Target
- Manage Cameras

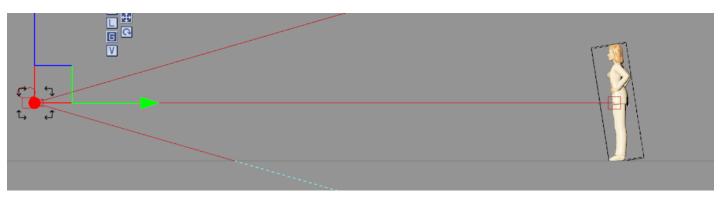
Object - Aspect		
A	Main camera	a 🔻
	Focal	35.00mm 🗲 🦳
	Blur	0.00%
*	Focus	100m 关
$\Phi$	Exposure	0.00
à	Height 🔒	1m
	-	``
Б		
· · ·	Orthogona	I projection

Set Focal length Set Blur amount Set focus point Set Exposure level Set camera height

- We almost always want to keep the camera level so this is active by default..
- If we are looking to show depth of field, we also need to specify what will be in focus.



- We do this by clicking on the Select Focus Target, then from the Focus On dropdown list to the right, select the Marlenestand object.
- Doing this will de-select the Main Camera in the World Browser again so click it to highlight it.



In the Side View the camera's focus square is placed on the "target" which is Marlene. To change scene to have Marlene fill the frame we won't use the **Frame Selected Object** icon, instead we will use the **Focal Length** icon.

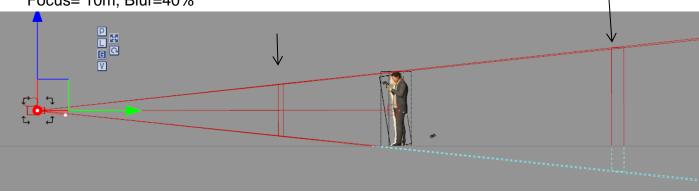
Click and drag the Camera Focal forward to increase the camera's focal length until Marlene is almost filling the Active Camera. It should be about 95 mm.



Page4

The blur effect that we get from the Depth of Field is determined by the **Focus** distance of the camera is to the object that is targeted, the **Blur** value in the Object Aspect panel and the **Focal** length of the camera. We'll test a few settings.

We begin with a new character, Boris, at equal distance from the camera. Focal=95mm, Focus= 10m, Blur=40%



Note that in the Side View, there are two square markers in the camera's view field, one before the couple and one after. These denote the "in focus" depth of field at focal length of 95 and focus of 10m and blur of 40%.

The near boundary is at -3.2m and the far boundary is at 6.3m.

Place Boris at -5m and render:

Some level of blurriness showing ...

 Place Boris at -8m rise camera to face level.

Considerably more blurry

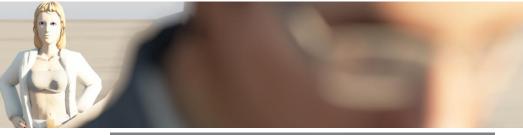
Finally try -9m

Very Blurry and edge incorrect.

➢ Now out to +10m









Page **5** 



.....And at +50m

#### Increasing the Focus length and therefore, Focal length

In the previous graphics targets were placed at the 0 position and the camera was placed at 10m from the camera, focal length of 95m

- Now we will see the effect of placing the camera very much further in front of the targets. We've moved it to 50m away, or a Y value of -50m.
- The Focus Target has not changed and should still be on Marlene at point 0m.
- Again, adjust the Focal control until the targets just properly fill the frame as shown in the graphic to the right: This should be at a focal length of about 450mm.
- Note that at this focal length, the background already looks quite blurry.
- The "In focus" depth of field is about the same as it was earlier.





- Place Boris at -9 or 9 meters closer to the camera, as before.
- Boris looks far less blurry that at the focal length of 95m, earlier
- Now try placing Boris at 50m beyond Marlene.
- Boris looks closer at this focal length but about as blurry as earlier; a 95mm.



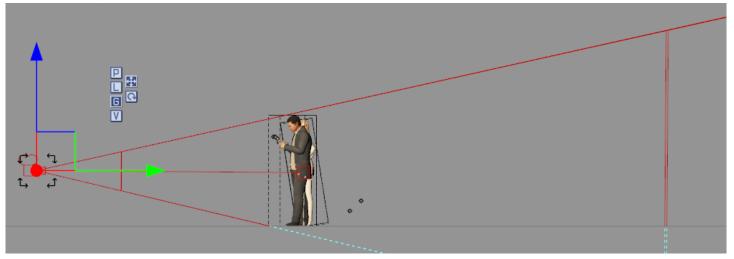




Next we'll try to set the camera much closer to the couple. Instead of a distance of 10m or 50m away we'll try the effect of placing the camera only 5 meters from the targets.

- Place the camera distance from the couple (Y distance) to -5m
- Use the Focal icon to zoom the couple to just fill the Active Camera screen gain. (@ 44mm)
- Ensure that the Focus Target is set once more to Marlene. (focus = @ 5.037m)
- Notice again that the "in focus" boundaries are about at the same distances as before and the two figures are about screen sized and in focus, as is the skyline background.





- Notice here, that the focal length of 44mm, the visible spread is much wider than at focal length of 440mm or 95 mm, before.
- Move Boris closer to the camera, just a bit closer than the closest boundary line @ -3.7m
- Now move him back just beyond the far boundary line. About 7.6m.
- Again we see a bit of blurring of Boris but not nearly as much as at before.





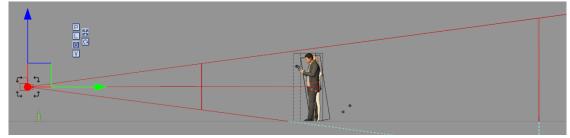
- He certainly is much smaller than at 95mm or 440mm.
- Now move Boris to 50m back from Marlene;
- He is smaller and far more blurry.

#### Effect of changing the Blur value

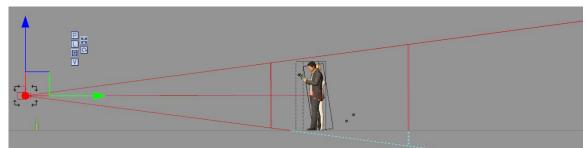


Up until this point we have been using a blur

value of 40%. Changing the Blur value effectively changes the "in focus" area in the camera view field. In all of the previous renders the in focus field has been; near boundary is at -3.2m and the far boundary is at 6.3m. See below:

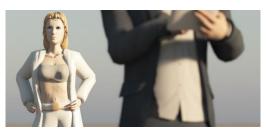


> Now, let's be extreme and set the **Blur** value to 100%.



- The "in focus" boundaries are much closer together. The Blurry factor as Boris is moved forward or backward from the current 0m point will be more pronounced.
- Place Boris, as before, at the -3.7m point:
- He now appears quite a bit more blurry at 100% Blur. And not as magnified...

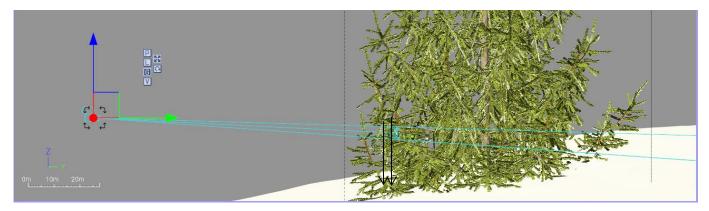
### **Blur Factor**



Blur is shown as ranging from 0% to 100%, but as the case for so many Vue parameters, the value can be set way beyond that, even to 10000%. The value of the blur has a major impact on the "in focus" boundaries we will see in a camera side view. So the Blur value has a major effect on the "out of Focus" part of a scene.

### Ornament in a Christmas tree.

As a final test I want to have a very tight –narrow "in focus" range and have blurred scene all around it. We'll have a single ornament in a Christmas tree and focus very tight on the ornament, which will be in focus while most of the tree branches around it will be out of focus.



Here the blur value is extreme, set at 1500%

Object - Aspect			Object		
B	Main camera	a 🔻	555 ×		((((●
	Focal	490mm 韋		Position	
	Blur	1500.00% 🗢	9	POSICIO	AZ.
*	Focus	117.3m 🜩	B		
<b>+</b>	Exposure	-0.04 🜩			
Ó	Height 🔒	40.24m 🖨			
6	Orthogona	al projection	Å		( 37.5m 🗢
	onnogone				/ 505.3m 🜩
				Z	47.34m 🖨
Camera Control					

The resulting active camera view will be pixelated



Page C

The calculation of the blur effect will add quite a bit of time to the render. The picture will be shown as unblurry and then the time continues calculating the blur effect.



#### **Aliasing effects**

From the shot above we can see that there are a number of undesirable aliasing effects

(arrows) that we can see in the image.

The way to illuminate these is to go into the render settings again and select **User settings**.

- Click the Depth of Field checkbox to ON if it is off. —
- To the right of the Depth of Field line, click on Edit.
- This will open the Blur
   Rendering Options window.

	Render quality	Picture size and resolution
OpenGL E		Aspect ratio
OPreview	Enable sub-rays	Television 16/9 (16:9) 🔹
Final	✓ Trace cast shadows	Full screen 800x450
Broadcast	✓ Trace reflections Edit	
Superior	<ul> <li>Trace transparency</li> </ul>	
O Ultra	<ul> <li>Enable super-sampling</li> <li>Soft shadows</li> </ul>	640x360     1920x1080     Other
O Path Tracer E		
• User settings		4000 🜩 x 2250 🜩
φ φ	Depth of field	Units pixels 🕶 DPI 600 💌
Renderer	Enable motion blurring Edit	Add information strip Edit
• Internal	Optimize last render pass	
External	Apply motion blur to object deformation	Panoramic rendering
Use network	Compute physically accurate caustics	360° VR panorama
RenderNode Network	Force use of reflection map	
	Ignore indirect lighting on plants	
Render destination	Progressive refinement	
<ul> <li>Render in active camera view</li> </ul>	Advanced effects quality	Stereoscopic
<ul> <li>Render to screen</li> </ul>	• 46% Edit	Interpupillary distance 6cm
Render off-screen	Faster Better	
Save render to disk	Anti-aliasing	Top-bottom     Side by side
Auto save every 30 n	Cobject anti-aliasing	Convergence mode Off-Axis
D:\Dropbox (main)\dropbox\Vue Bro		Parallax depth
	Energy Conservative	Same as focus
Render what?	<ul> <li>Anti-alias Z-Depth</li> </ul>	OCustom: 20m ≑
Everything 🔹	Use GPU anti-aliasing	
<ul> <li>Always render lights</li> </ul>	Indirect lighting solution	Render area
<ul> <li>Use automatic scene hierarchy</li> </ul>	Re-use indirect lighting	Position X 0 Y 0
Hide infinite planes from alpha	Deterministic indirect lighting	Size 4000 x 2250
Enable G-Buffer		
Enable Multi-Pass		
Enable Diagnosis buffers		Memory optimizations
Enable Alpha Enable Z-Depth		<ul> <li>Clear OpenGL data before render</li> </ul>
Enable Relighting		Beep when render completes
Lindole Helighting		If rendering exceeds 1min 🖨
		In rendering exceeds Infill +

ок



#### **Blur rendering Options**

In the **Blur rendering method** there are three options. The **Distributed ray-tracing** method is the most time consuming but yeilds the best results.

The **Hybrid 2.5D** method is faster and can yeild reasonable results. The **Number of Passes** should be set to a reasonably high value, say 10 or higer for best results.

The third, **Fast Hybrid 2.5D** method is the fastest and least thorough of the three methods but, if the number of passes is high enough, cand give reasonable results as well

Original image before Blur is applied

Page1



<b>Blur Rendering Options</b>		
Blur rendering metho Distributed ray-tra Hybrid 2.5D Fast Hybrid 2.5D		
Number of passes	Better	5
ОК	Ca	ncel
Blur Rendering Options	;	
Blur rendering metho Distributed ray-tra Hybrid 2.5D Fast Hybrid 2.5D Number of passes		
Faster	Better	15
ок	Ca	ancel
Blur Rendering Options		
Blur rendering metho Distributed ray-tra Hybrid 2.5D Fast Hybrid 2.5D	od	
Number of passes -		

10

Cancel

Bette

Faster

οк

## Original Uncorrected Image



Corrected - Distributed Ray-Tracing method (quite Fast) But leaves little definition



Resolution: 4000x2250		
Render in progress:	8%	Abort
Time left:		10h58′
Hit Space to hide, E	sc to st	op ≣

Corrected -Hybrid 2.5D method (very Long)

No image.....way too long.

Resolution: 4000x2250			
Render in progress:	8%	Abort	
Time left:		1h38′	
Hit Space to hide, Esc to stop 🛛 🌐			

Corrected - Fast Hybrid 2.5D method (mildly long)



Light reflection in the ornament is apparent but blurred showing better quality and fidelity of original image.