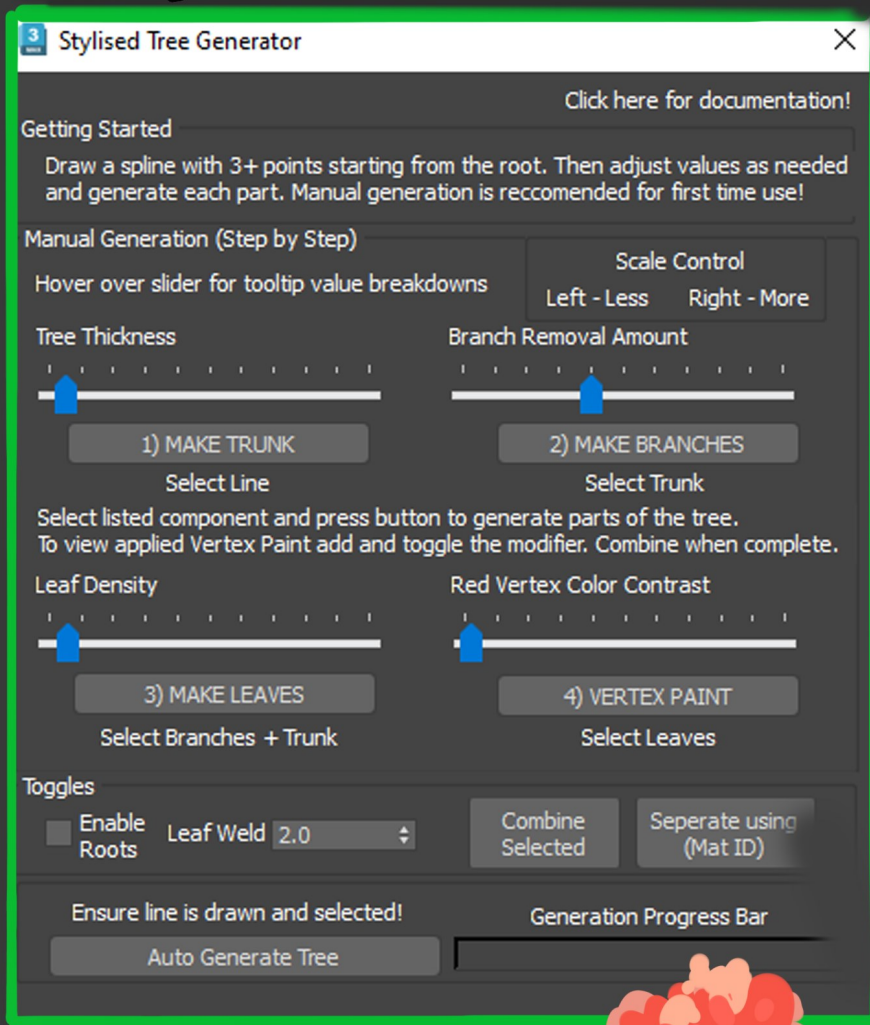


**Quick Tree
Generation from
Spline**

**Fully Adjustable
Parameters**

**Easy to Iterate
Shaders**



Stylised Tree

Generator

By Jesse Olchawa

Contents

How to Setup -	3
Using the Tool -	4
Generating Trunks -	5
Generating Branches	6
Generating Leaves -	7
Automatic Generation	8
Exporting from 3DSMax	8
Frequent Problems in 3DSMax	9
Import into Unreal Engine -	10
Recreating Shaders	11
Bark Shader -	12
Leaf Shader	13
Optimisations	14

How to Setup

1.0 Running the script

Download the .MS (Maxscript) file to a easy to access location e.g. Desktop. To run the script there are two main ways:

- The first being a simple drag and drop into the centre of 3DSMax.
- The second is on the very right side of the screen, select **Utilities > Maxscript > Run Script**. You can now **select the .ms file and run it**. A window will now appear.

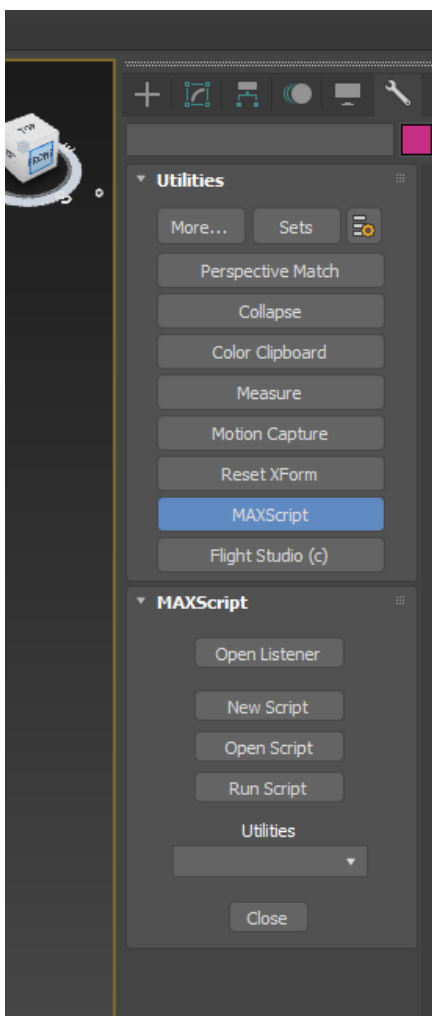


Figure 1.01 Utilities Tab in 3DSMax

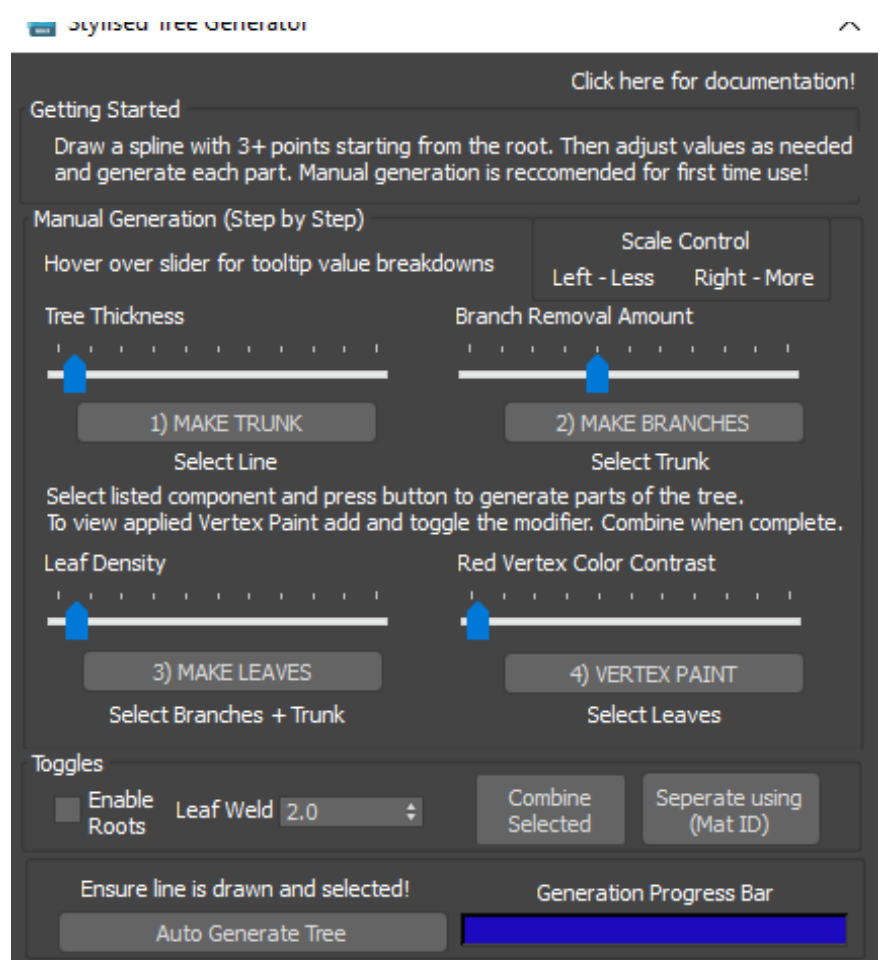


Figure 1.02 Screenshot of tool

CAUTION: This tool may crash or take long periods of time to generate elements such as leaves

Ensure you save your work and backup frequently

For how to correctly import your mesh into Unreal Engine please skip to **page 10**

Using the Tool

2.0 User Interface

This tool can generate trees **automatically** or **manually**. If this is your first time using the tool please use **manual mode** to better visualise the full process.

To use the tool in any mode, you need to draw a line spline, this can be found under the **Shapes > Splines > Line** on the right.

When drawing your spline ensure you start at the root (area closest to ground) and draw upwards.

There must be 3+ points for the tool to work correctly!

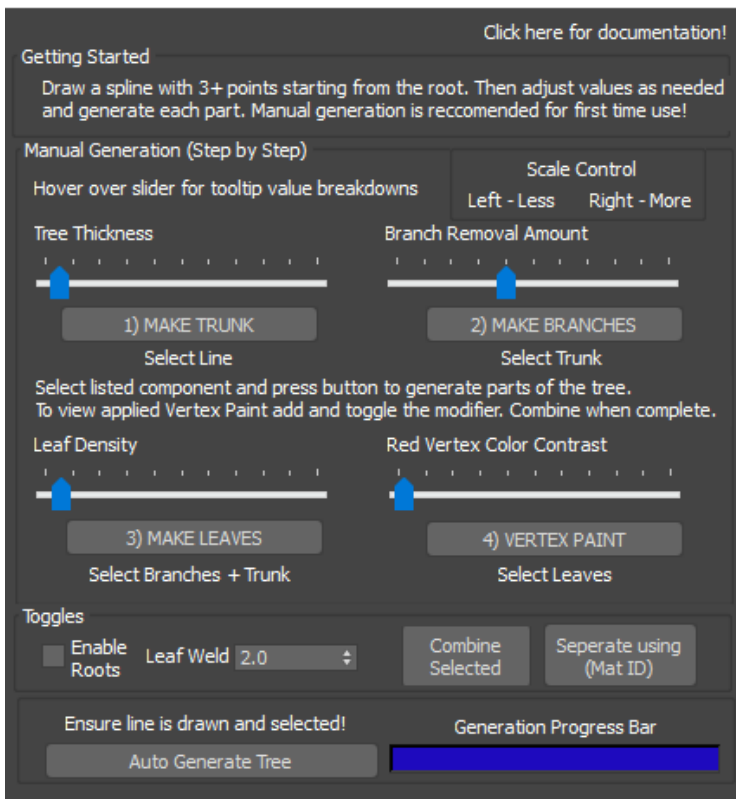


Figure 2.01 Screenshot of Tool

2.1 Adjusting Parameters

Before pressing any buttons its important to adjust “**Manual Generation**” to fit the scale of your tree.

- Higher trees (larger than 360cm) will need more denser leaves
- Smaller trees will need a higher amount of branches removed.

Hover over the parameter to see the tooltip and preview values of the parameter.

Let’s begin generation manually by selecting the spline and pressing **1) MAKE TRUNK**

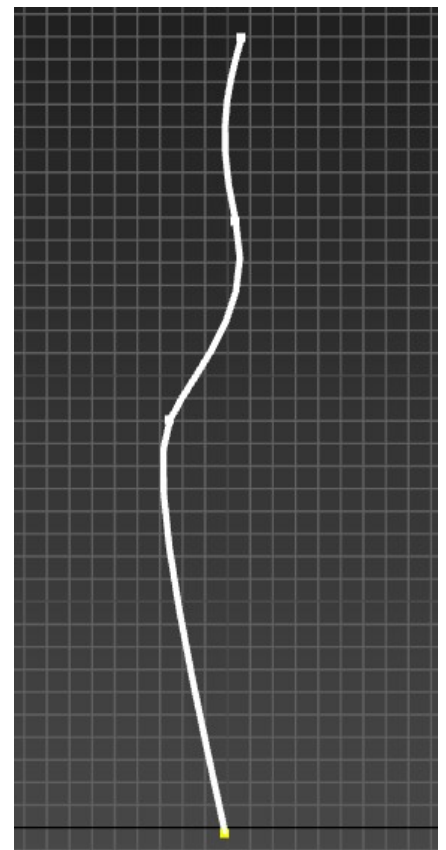
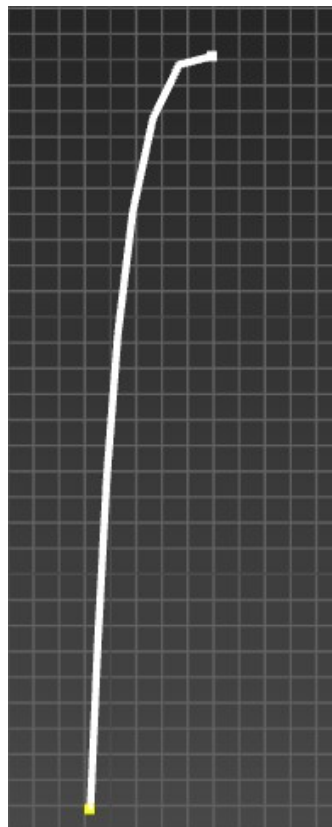


Figure 2.02 Incorrect (Left) and Correctly (Right) Constructed Splines

Generating Trunks

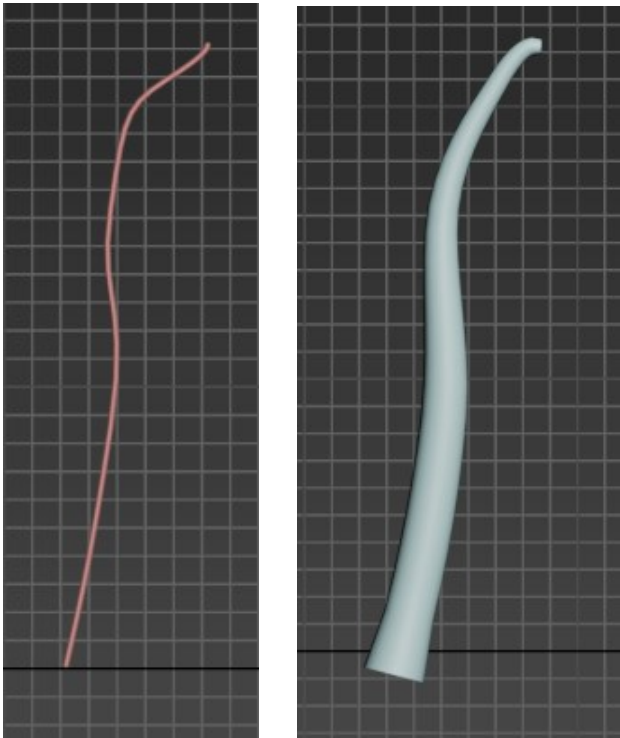


Figure 3.01 Spline and Generated Trunk

3.0 Beginning Generation

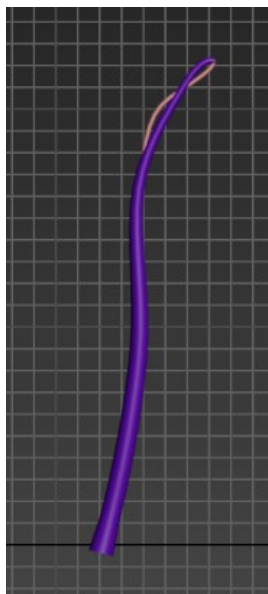
Let's begin generation manually by selecting the spline and pressing **1)MAKE TRUNK**

Ensure your spline has been drawn from root or else generation will fail.

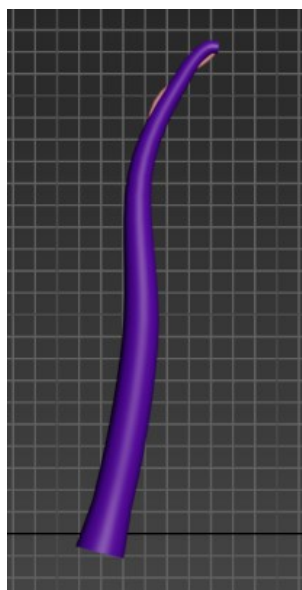
After a few moments you will get a result like this (on default thickness):

3.1 Adjusting Thickness

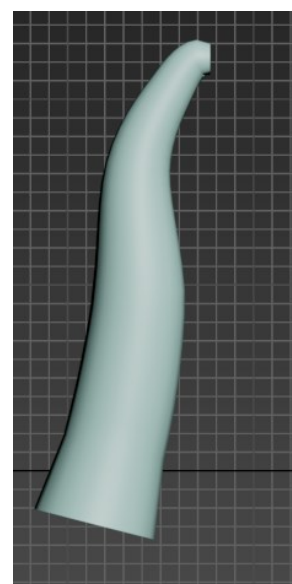
Using the same spline here are varying trunk meshes made by adjusting the thickness.



Thin Trunk



Thicker Trunk



Extreme Trunk

3.2 Roots

Depending on height, roots can be generated. If you are getting odd results you can disable roots **on both auto/manual mode using the checkbox.**

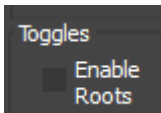


Figure 3.02 Varying trunk generated meshes

Generating Branches

4.0 Beginning Generation

Let's begin generation manually by selecting the trunk previously generated and pressing **2)MAKE BRANCHES**.

The thickness value from the trunk will also be applied to branches.

After a few moments you will get a result similar to this :

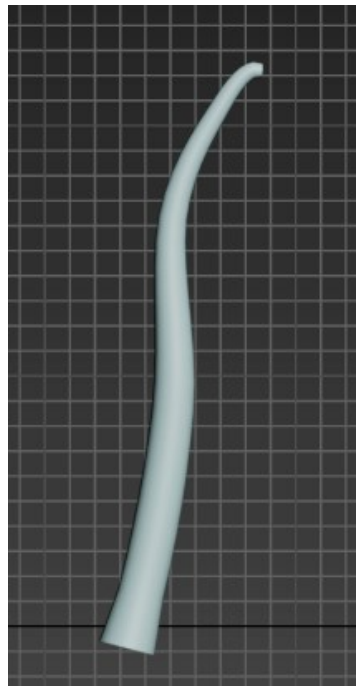


Figure 4.01 Trunk

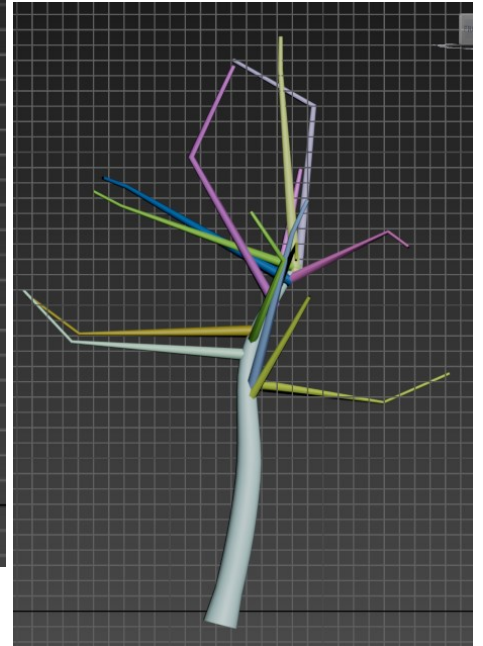
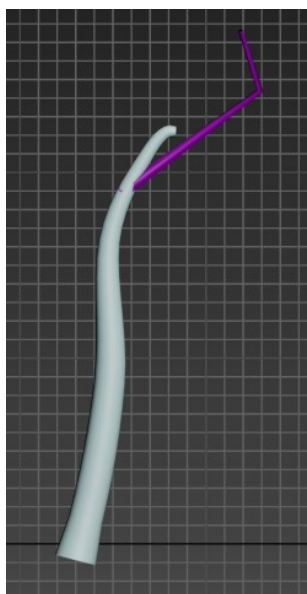


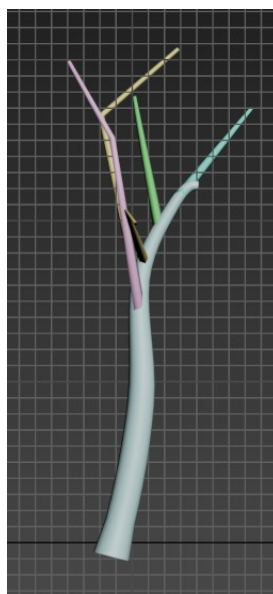
Figure 4.02 Branches

4.1 Adjusting Density of Branches

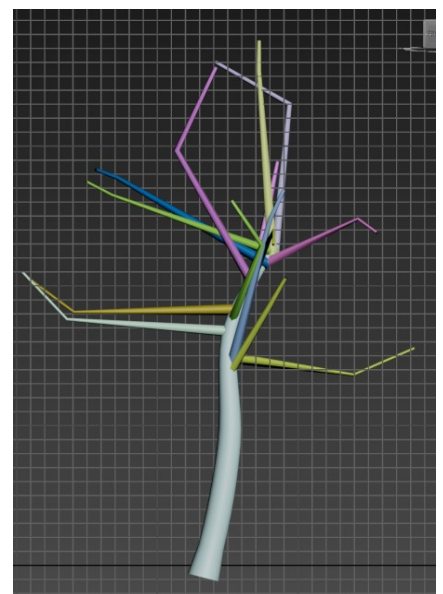
To get rid of more branches slide up the **“Branch Removal Amount”** slider. Here are some examples of varying branch amounts. **Placement is randomised**— typically taller trees will generated more branches. **You can remove and adjust positions after placement.**



*High Removal
Amount*



*Medium Removal
Amount*



Default Values

Figure 4.03 Varying branch generated meshes

Generating Leaves

5.0 Beginning Generation

Let's begin generation manually by selecting the trunk, all branches and pressing the

3)MAKE LEAVES button.

Please note this step takes considerable amount of time to spawn and may pause the 3DSMax program.

After a few moments you will get a result similar to this :

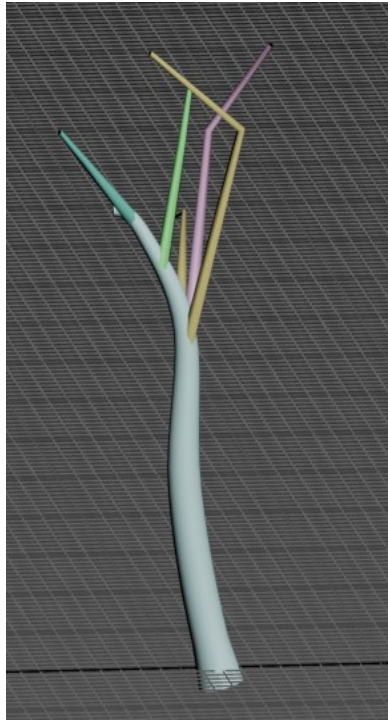


Figure 5.01 Trunk and Branches

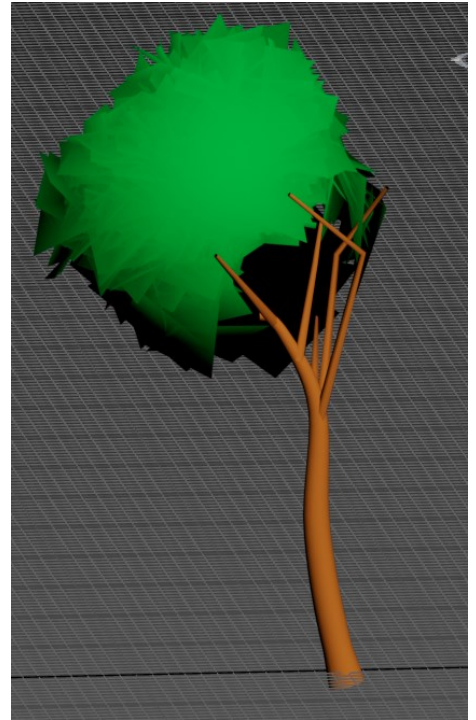
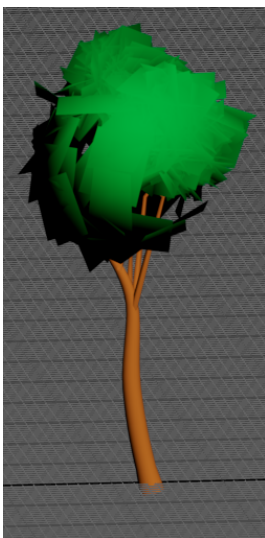


Figure 5.02 Complete Tree

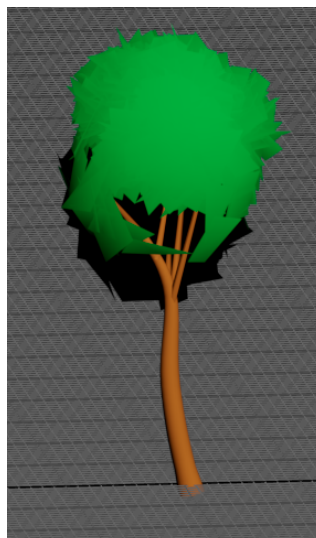
5.1 Adjusting Leaf Amount

The amount of leaves is highly dependent on tree height and branch values however you can control how heavy the leaf layering will occur. Here are some examples of reducing or increasing the leaf density slider.



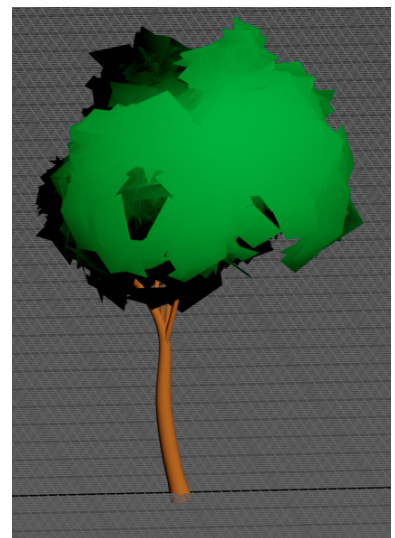
Less Leaf Density

2K Triangle Tree



Default Leaf Density

4K Triangle Tree



More Leaf Density

11K Triangle Tree

Figure 5.03 Varying leaf mesh generations

NOTE: Vertex Colour Contrast slider is covered on page 10

Auto Generation

6.0 Automatically Making Trees

All the previous steps can be covered automatically by pressing the **Auto Generate Tree** button. **CAUTION: As all steps are covered immediately, adjustments are only possible at the end. Please double check all generated meshes prior to engine export.**

Due to the time it takes for some steps to be covered e.g. leaf placement this button comes with a progress bar.

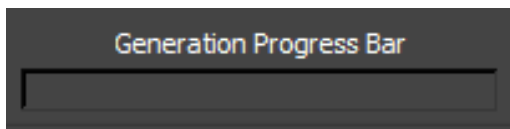


Figure 6.01 Empty Progress Bar

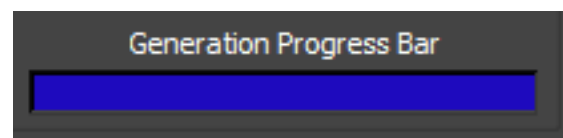


Figure 6.02 Completed Bar

Note: Manual UV Unwrapping for branches and trunk is RECOMMENDED for best results. Setting up a world aligned bark texture is covered later in documentation.

Exporting from 3DSMax



Figure 6.03 Export .FBX menu from 3DSMax

6.1 Exporting FBX

Centre your mesh to 0,0,0 and press Export Selected Mesh.

You may need to reset XForm for better results in Unity.

Ensure your exporting settings resemble those on the left.

Key problem areas:

- Not embedding materials
- Missing out smoothing groups or normal information
- Improper scale
- Mesh not combined/ improperly selected

Frequent Problems in 3DSMax

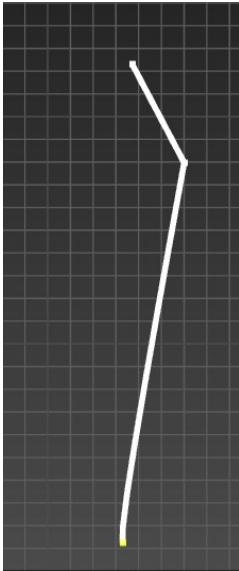


Figure 7.01 Mesh refusing to generate

7.0 Mesh not generating (common issue)

This problem happens when using the tool after just opening 3DSMax.

The easiest fix is to redrag and close the tool to refresh the instance, try running only Trunk generation until operational again.

Another cause is the spline being too short so add more points.

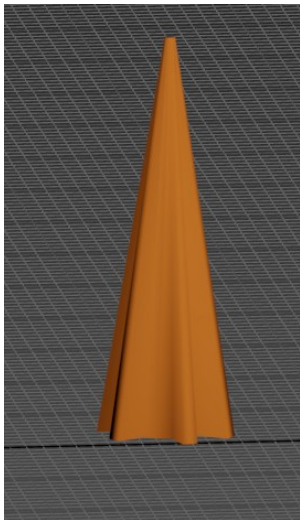


Figure 7.02 Broken Root Generation

7.1 Broken Root Trunk Generation

If the base of the tree does not have enough loops on the trunk, the roots may generate quite high up. Its best to disable root generation and manually model them later.

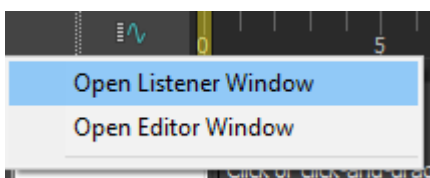


Figure 7.03 Small Leaf Ball

7.3 Leaf Generation Small

Depending on branch amount and height of the tree the spawn leaf spheres may be too small.

To fix this, adjust the **Weld higher** to force a larger area to spawn. You can also generate more branches or increase the leaf density slider.



Any further issues open the bottom left pink box with a right click to view the **Listener Window**.

Error messages are printed out here.

Import into Unreal Engine

8.0 Import Settings

When dragging your mesh into engine **its important to check vertex colour importing to replace**. This is key for our leaf shader later on.

This will automatically create the mesh and materials.

If you have my project file available select and right click both materials and textures. From the menu select **Asset Actions > Migrate** into your currently working project.

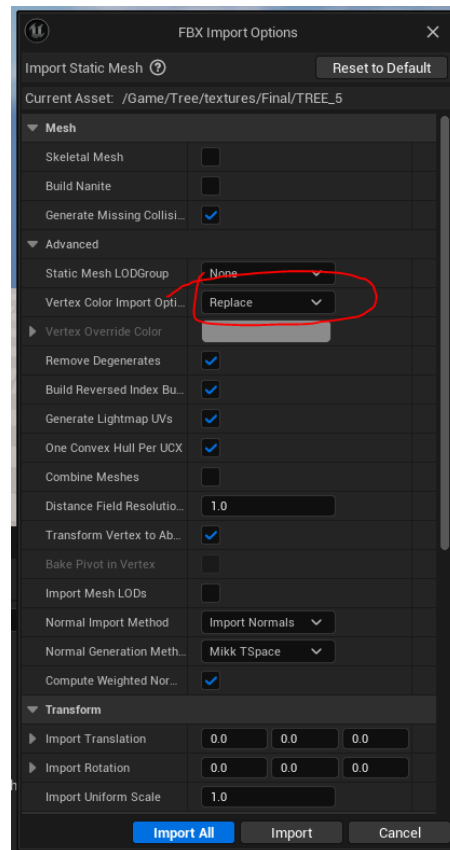
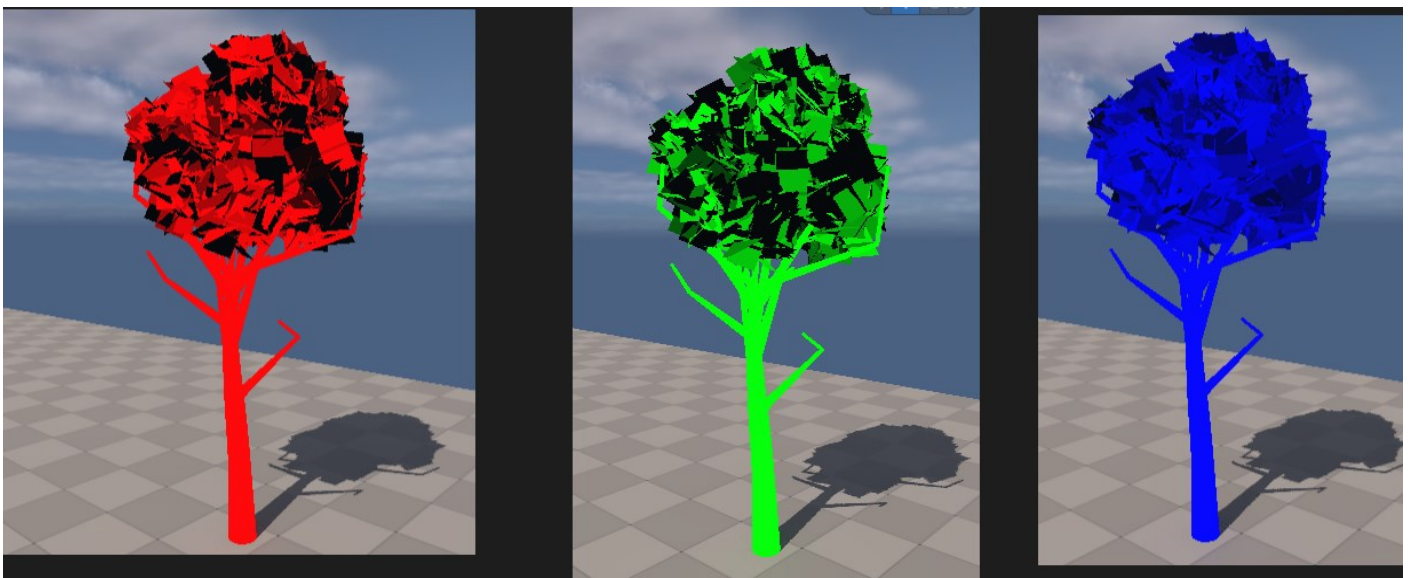


Figure 8.01 Import Menu for Unreal Engine

8.1 Red Vertex Colour Contrast

Vertex colours are crucial to the function of the leaf shader. The red **channel in particular generates highlights on leaf faces**. To draw more highlights, push up the slider in the tool and select the leaf mesh. This will need to be separated if combined to trunk



RED = Leaf Highlights, Rand Alpha and Offset

GREEN = Wind and Darker Underlayer Leaves

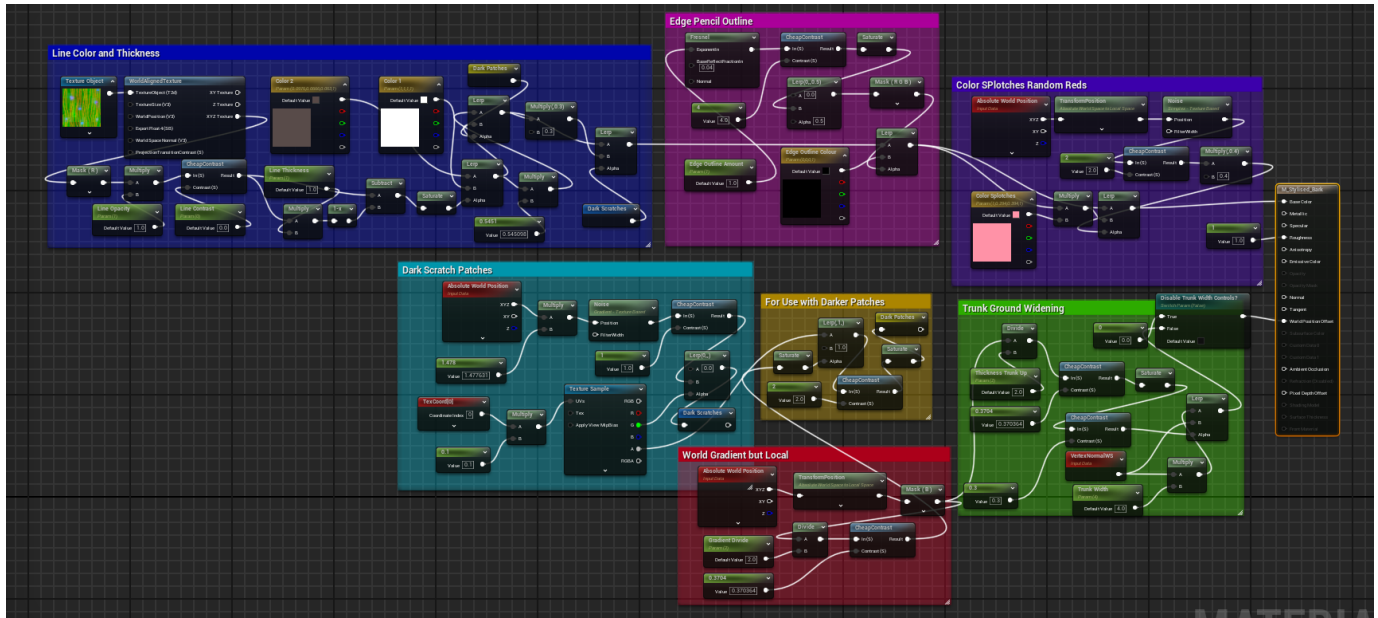
BLUE = Contrast subtract for highlights

Figure 8.03 Vertex channels and what they do within the leaf shader

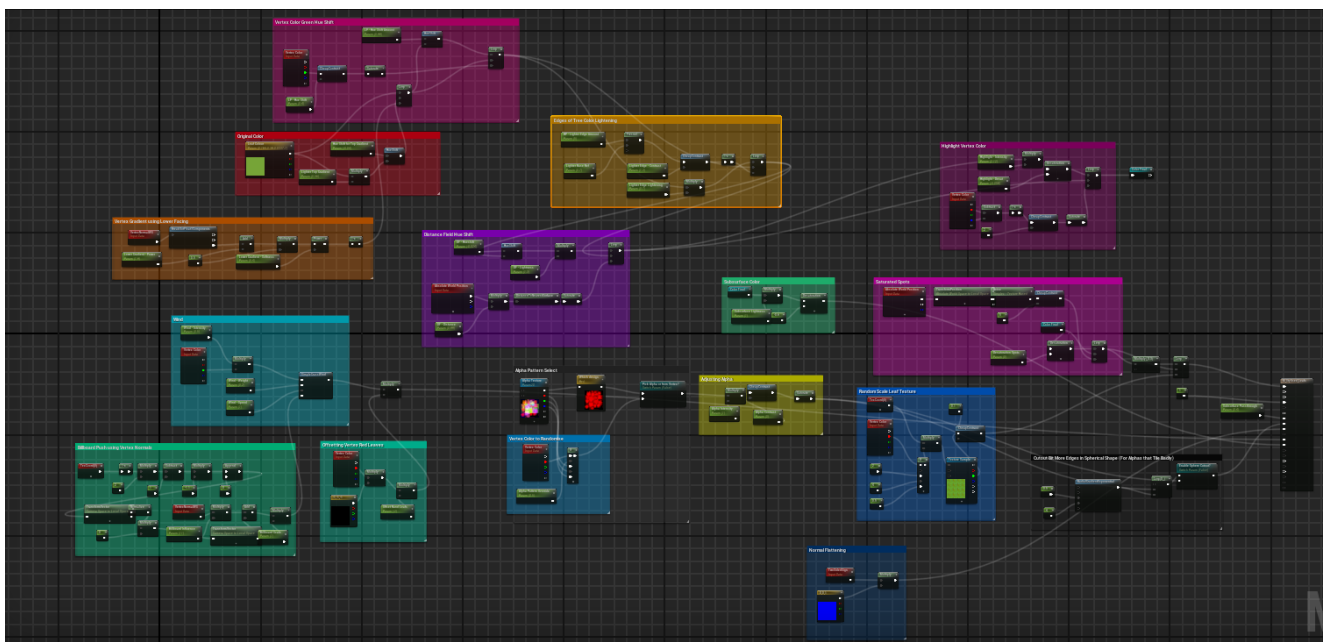
Recreating Shaders

9.0 Shader Transfer

Due to the complexity of the graphs I highly recommended simply pasting them across from my own **BlueprintUE** page into your material shaders.



Bark Shader Link: <https://blueprintue.com/blueprint/takn423i/>



Leaf Shader Link: <https://blueprintue.com/blueprint/xqx2249e/>

Features : stylised gradients, randomised vertex card distribution, flat shading and full colour customization from texture masks.

Figure 9.01 and 9.02 Bark and Leaf Shader Blueprints

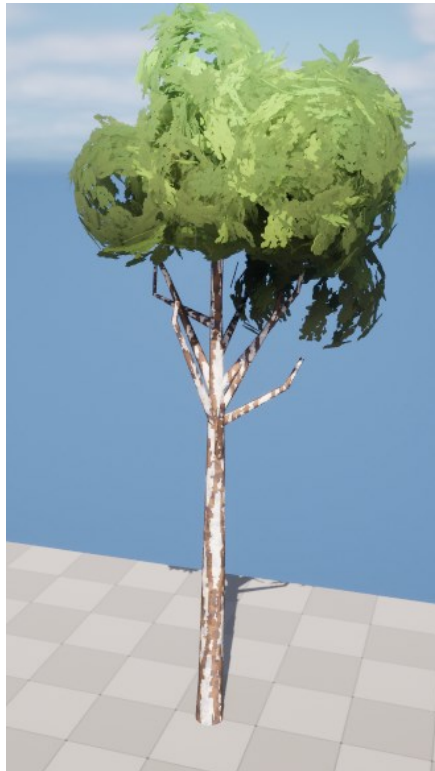
Bark Shader

10.0 Setting Up

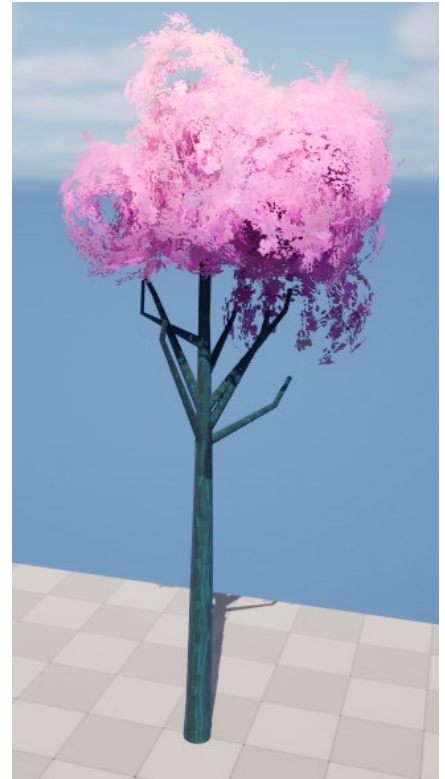
The bark shader comes with a variety of presets, **always create material instance duplicates of these presets to fit your own tree design**. If you have manually UV Unwrapped your tree you can replace the world align texture with a regular sampler.



Maple Bark



Birch Bark



Sakura Bark

Figure 9.01 Bark material instance presets

10.1 Adjusting Parameter Values

The core values to make your own instance are:

- **Colour 1:** Colour of Lines
- **Colour 2:** Colour of Bark
- **Scaling of Stripes:** How large to draw the stripes in
- **Spotch Colour:** stylised bark variation through circular splatters (scalable too)

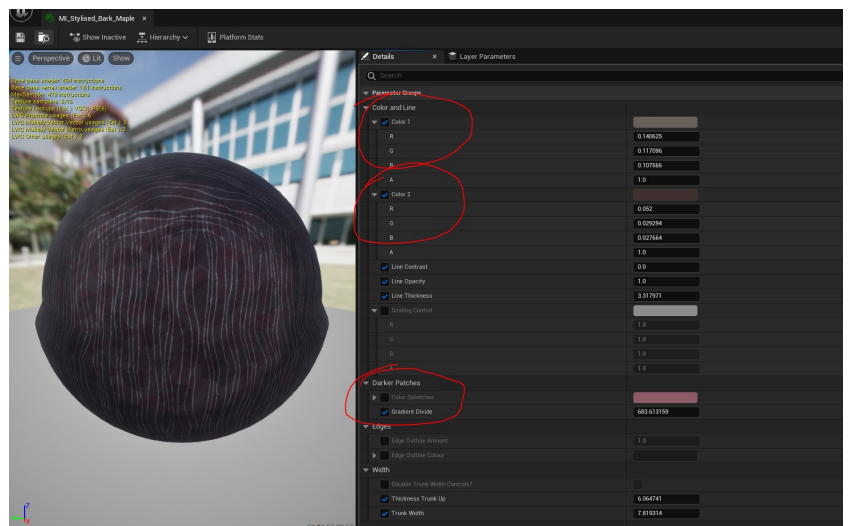


Figure 9.11 Bark material instance menu

Leaf Shader

11.0 Setting Up

The leaf shader comes with a variety of presets, **always create material instance duplicates of these presets to fit your own tree design**. It is highly recommended to create your own channel packed alphas to use as custom leaf symbols.



Figure 10.01 Leaf material instance presets

11.1 Adjusting Parameter Values

The core values to make your own instance are:

- Leaf Colour
- Channel Packed Alpha (for custom shapes)
- Wind Intensity
- Hueshift gradient values

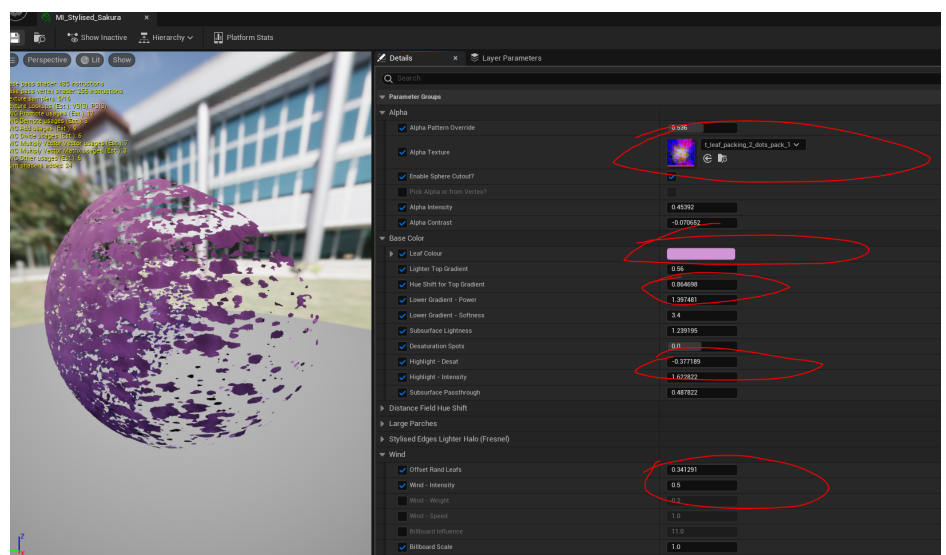


Figure 10.11 Leaf material instance menu

Optimization

12.0 Optimization Considerations

Here are some optimisations you could apply to boost your performance:

Bark Shader: By UV Unwrapping the mesh, you can change out the world aligned texture sample for a regular texture sampler. This will cut down on overall texture cost.

Leaf Shader: Apply culling to world position offset values (wind or offsetting) at a distance. This can be found on the mesh itself or implemented with Static Switch Parameters (applied as material instanced LODS).

Mesh Optimisations:

Creating billboards for these meshes will vastly reduce foliage card cost.

Furthermore creating LODS that use a more multiplied/filled out alpha cards but less geometry can help give a fuller tree look at a distance.

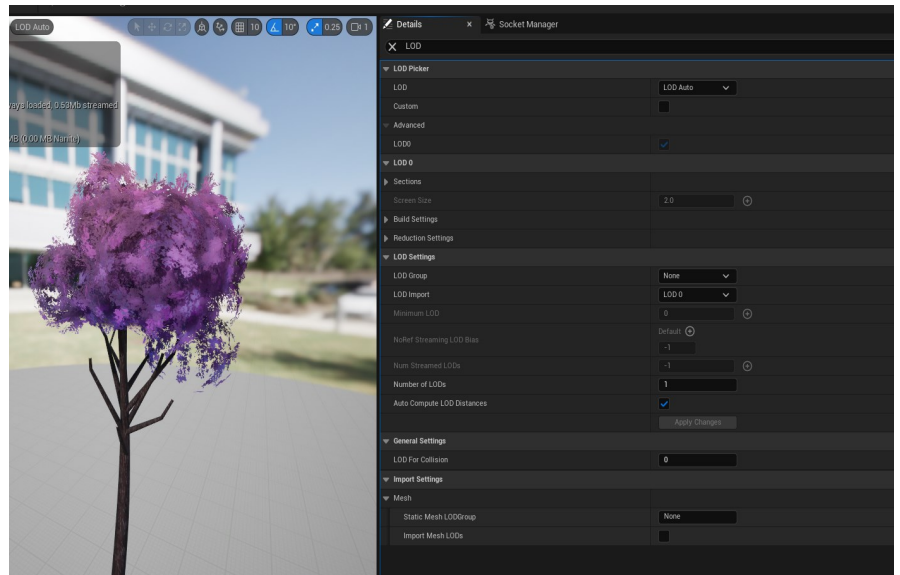


Figure 12.01 LOD Menu on Tree Mesh

12.1 Alpha Overdraw

Reducing the leaf density sliders during generation can reduce alpha overflow due to preventing excessive layering.

If you are using Unreal Engine you can also go the fully mesh route of nanite foliage creation. Whilst not supported by this tool, you could manually cutup geometry to apply to leaves for a blend of alpha cutout and fully geometry based meshes.

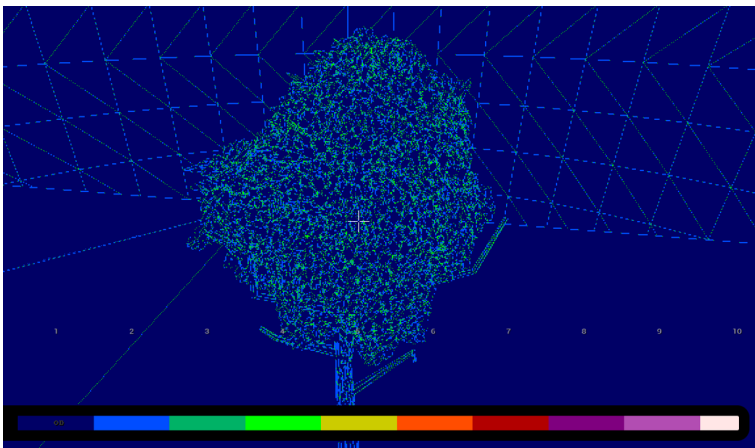


Figure 12.02 Alpha Overflow In UE5