

**PROCEDURAL PHYSICALLY BASED RENDERING  
WITH UNITY 5 AND SUBSTANCE DESIGNER**  
Photo-realistic rendering with low file size, great for mobile VR application

**UNITY 5.3 Updated Lighting & Materials:**

Realtime Global Illumination lighting on desktop builds:

<http://blogs.unity3d.com/2015/11/05/awesome-realtime-gi-on-desktops-and-consoles/>

Updated raytracing for better reflections and lighting:

<https://www.youtube.com/watch?v=nYBEndFphik>

Unity 5.3 now matches Substance software viewports for faster material workflows:

<https://www.allegorithmic.com/blog/unity-53-matching-substance>

**Unity's Asset Store:**

Marmoset Skyshop (HDR Environment Lighting). Think of mixing this with your remote photographers taking HDR panoramic photos on site::

<https://www.assetstore.unity3d.com/en/#!/content/8880>

SECTR Audio (Immersive 3D Environmental Sounds):

<https://www.assetstore.unity3d.com/en/#!/content/15325>

SSAO Pro (Screen Space Ambient Occlusion Lighting):

<https://www.assetstore.unity3d.com/en/#!/content/22369>

Candela SSRR (Screen Space Ray Traced Reflections):

<https://www.assetstore.unity3d.com/en/#!/content/41742>

Shader Forge (Node Based Material Editor, Unreal Style Material Editor):

<https://www.assetstore.unity3d.com/en/#!/content/14147>

**Allegorithmic's Substance Texturing Packaging For Procedural PBR Material Creation**

Basic Overview:

<https://www.allegorithmic.com/substance>

Substance Database (Over 1,000 photorealistic architectural textures ready to go):

<https://www.allegorithmic.com/products/substance-database>

Physically Based Rendering Guide, Theory and Practical Guidelines:

<https://www.allegorithmic.com/pbr-guide>

Gallery of User Created Content (Filter by Environments and Interiors):

<https://www.allegorithmic.com/gallery>

### **Benefits of Allegorithmic's Substance Package:**

Procedural materials can be generated at runtime with no heavy bitmaps. File size is kilobytes vs megabytes, 100x smaller file size, for photo-realistic materials so it's great for mobile applications. Can mix with high res bitmaps for important landmark areas or distinction areas.

Substances are dynamic. You can resize them in unity editor and at runtime. This flexibility allows for less files needed for platform customizations, LOD meshes and diverse realistic virtual environments.

Substance parameters can be exposed in unity so level designers can modify materials in the unity editor for asset diversity and programmers can have control over them at runtime for animated effects, swapping materials, user generated content, etc. Would be great start for a dynamic weather system, weather information could drive changes in materials like making them wet, dirty, frosty, icy, etc. Might be start of user generated content system.

Procedural materials also possess random seeds enabling great diversity of realistic textures with low overhead and mix that with the exposed parameters and can get huge diversity with small pool of materials.

Substance materials in unity can have different loading behavior. Best setting for mobile is to build on level load and then cache. This allows for possible seamless level loading once the initial app is loaded.

Substances are usable both in 3D applications and game engines. 3D modelers can use the materials as they are building assets, so they can understand how their models will look in game. Everyone is seeing the same rendering quality no matter their position in the pipeline.

### **Substance User Case:**

Ballistic - How Substance can reduce the size of your game data

[https://www.youtube.com/watch?v=DyvbF9a\\_2KE&list=PLB0wXhrWAmCzqcfI3LoUlfMhXN1t4movC&index=8](https://www.youtube.com/watch?v=DyvbF9a_2KE&list=PLB0wXhrWAmCzqcfI3LoUlfMhXN1t4movC&index=8)

### **SideFX's Houdini Procedural 3D Asset Creation:**

Great for procedural generation of cityscapes, landscapes, large levels. Houdini is doing a similar approach to 3D models and animation that Allegorithmic is taking with materials and shaders.

Procedural Game Art:

[https://www.sidefx.com/index.php?option=com\\_content&task=view&id=1590&Itemid=337](https://www.sidefx.com/index.php?option=com_content&task=view&id=1590&Itemid=337)

Houdini's Unity Plug-in:

[http://www.sidefx.com/index.php?option=com\\_content&task=view&id=2739&Itemid=381](http://www.sidefx.com/index.php?option=com_content&task=view&id=2739&Itemid=381)