



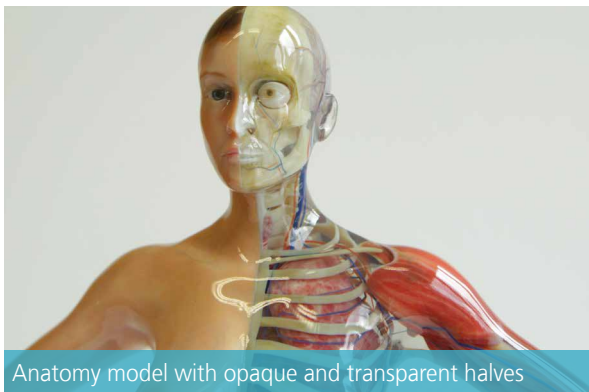
Design guidelines

for creating joint color and translucency 3D prints from RGBA-textured 3D models

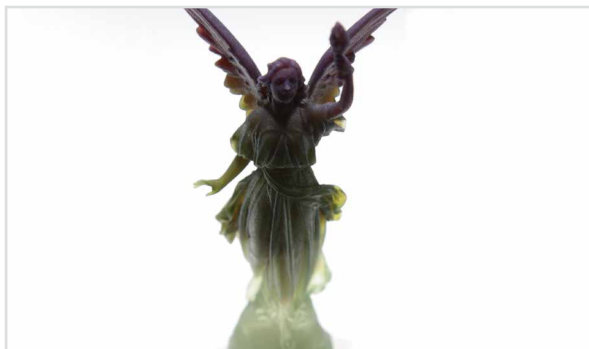
These design guidelines help you to create 3D prints with spatially-varying joint color and translucency from 3D models with RGBA textures.

Please use the OBJ file format to store the 3D model and the PNG file format to store the RGBA texture.

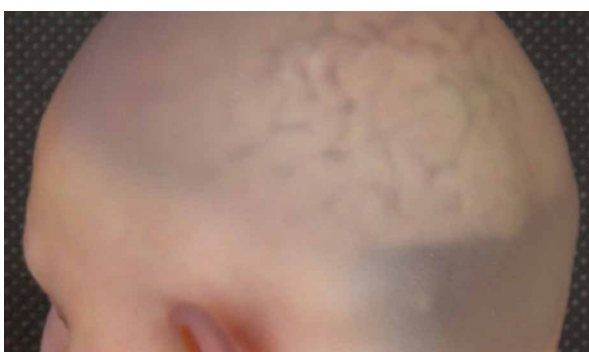
You can use standard software, such as Adobe Photoshop, to create and modify the RGBA texture.



Anatomy model with opaque and transparent halves



St. Lucy having different colors and translucency



Head model with translucency gradient and constant skin color

Design rules for RGBA:

- Color is encoded by sRGB, translucency by A [*]
- Each RGBA channel has the same range:
Most commonly 0-255 (8 Bit/channel)
but also 0-65535 (16 Bit/channel) is possible.
Please check the bit-depth when creating / saving the file.
The descriptions/examples below use 8 Bit/channel.
16 Bit/channel are accordingly.
- $A = 0$ indicates complete transparency with a color specified by RGB
- $A = 255$ indicates complete opacity with a color specified by RGB
- $0 < A < 255$ indicate some "milky" translucent appearance, whereas small A are less milky (more transparent) than large A (more opaque).
The color is specified by RGB.
Example 1: In the St. Lucy model three RGBA values are interpolated from bottom to top. The value of A is smallest at the bottom and largest at the top.
Example 2: The head model contains a gradient in the translucency parameter A without changing the RGB color. From the ear to the back of the head A is decreasing revealing the brain.
- $\text{RGBA} = [255, 255, 255, 0]$
corresponds to a colorless transparent object.
Example: Half of the Anatomy model's skin texture was changed to $\text{RGBA} = [255, 255, 255, 0]$ for making it fully transparent to reveal internal structures.
- $\text{RGBA} = [152, 0, 0, 0]$
corresponds to a transparent object with a reddish tinge.

[*] according to:
Philipp Urban, Tejas Madan Tanksale, Alan Brunton, Bui Minh Vu, Shigeki Nakauchi,
Redefining A in RGBA: Towards a Standard for Graphical 3D Printing (<https://arxiv.org/abs/1710.00546>)