# **AR0771 - Textures**

**Constructing textures** 

Instr0\_2 /lecture

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**TOI – Design Informatics** 

**Delft University of Technology** 





















### **Textures:**

Defining the characteristics of the material.

- Color diffuse color
- Shininess of the material
- Reflection of the material
- Refraction of the material
- Transparency amount
- Texture of surface roughness

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### Geometry versus Textures:



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## Use of color information in materials:

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### Color

Biggest problem with creating the right color texture is to capture the complexity of surfaces with their imperfections, aged look and apply them in a non tillable fashion.



What is wrong with this image?



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Obvious solution is to increase the size of the colour map in photoshop and de- tile the image. Drawback is the increased size of the texture map.

The tilling effect is diminished



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Increase the canvas size of the texture and randomly fill the texture with clones of the texture. Adjust the edges of the overlapping parts.

Especially effective with textures with strong repetitive patterns like bricks and floor tiles.





To make sure the new image connects correctly at the edges, the image is offset by 50% and adjusted accordingly.



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In photoshop textures can be constructed. With the use of filters color textures can obtain the right look of the material.

Using the same texture a bump material can be extracted.





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Another option to prevent tilling:

Mix multiple textures with different patterns in one shader.

•Use the colour channels of the procedural textures to mix the different textures.

- •Use a layered texture
- •Use a layered shader.



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Use the color channels of the procedural textures to mix the different textures.





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Use the color channels of the procedural textures to mix the different textures.





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Use the color channels of the procedural textures to mix the different textures.



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Use the color channels of the procedural textures to mix the different textures.



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By making use of transparency maps (masks) we can combine several textures into one texture. The transparency map influences the way the textures are mixed.



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We can use layered textures to mix several textures in one texture. You can compare this with Photoshop layer filtering and the use of layer masks.



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## Color – dirt and ageing

We can use layered textures to mix several textures in one texture. So an object can obtain several different textures like brick and dirt.



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## Color – dirt and ageing

We can use layered shaders to mix several shaders. The difference with the layered texture is that the layered texture has only one option for the shader setting . A layered shader has multiple.



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### **Reflection color**

#### Using a texture map for the reflection color to simulate the dirt on the material

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### **Reflection color**

#### Using a texture map for the reflection color and bump to simulate complexity of the object

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### Glossiness

#### Using a texture map for the glossiness to simulate scratches on the material

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What is wrong with this picture ?



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### Reflectivity

Specular highlights on matte objects can give the object a plastic look.



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#### Especially metal objects have distinctive highlights



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## Reflectivity and color mapping



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Standard reflection of materials is set to 0.6 (60%).

The amount of reflection is based on the material properties like type and smoothness.

- A mirror 0.9
- Glass 0.3
- Shiny plastic 0.4
- Shiny floor 0.1
- Shiny metal 0.2
- Brick 0

Raytrace reflection will react to a bumpmap. Smoothness can be partially simulated with the bumpmap.

The diffuse reflection of brushed metals will need a reflection blur to simulate the microscopic scratches of the surface.



#### Standard reflection amount



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#### Effect of bump on reflection



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#### Glossiness



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### Transparency - mapped



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## Transparency - mapped



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## Cutout opacity - mapped

Cutout opacity (MIA material) is not the same as transparency. A transparent surface may still reflect and refract! 'Cutout' parts of a surface are <u>completely</u> ignored



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By adding a bump map the shader can simulate a more complex geometry by locally simulating depth of geometry . The effect is 2D and influences only the shading properties and shadow effects on the object

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The effect of the bump diminishes at a larger angle of view.

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The bump map is based on a greyscale image.

- 50% grey is a neutral position (no bump effect)
- White areas are protruded by the maximum distance (bump depth)
- Black is 'pushed' inward by the maximum

The gradient between black and white simulates different heights of the texture.



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- In photoshop this bump texture can be created by:
- Enhancing the contrast of the colour image and de saturate the result.
- Colour select the grooves of the brick wall and paint them black. De saturate the image.
- Manually draw the grooves in the brick wall with a black colour pencil or line.

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Extra detail of the geometry can be added by making a bump map, to simulate panels for example. In this case the bump map isn't related to the type of material but never the less intergrated in the shader.





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### **Displacement material**



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## Tips and tricks

- Analyse the material used in your scene on the following aspects.
   Color
- Photo or map made in photoshop
- Tilling aspects
- Age of material (combining textures or shaders)
- Dirt on material (combining textures or shaders)
- Size of texture maps used.
   Transparency
   Bump
- Analyse the roughness of the surface
- Adding extra geometry detail by using bump
- Effect on specular highlights and reflections.
   Specular shading
- Shinniness of the material
- Uniform or influenced by tiny scratches or dirt on surface (apply specular shading texture) Reflecting
- Amount
- Influenced by dirt or roughness of material.

Test textures with the least amount of geometry in the scene. If starting testing, save the implementation and testing of the settings of reflectivity and refraction for last due to rendertime

### **Final notes**

• When using file textures:

### Use Maya project (Create and Set project)

- When using grayscale images for properties such as transparency, bump, reflectivity, cutout, etc:
  - PNG files are preferred
    - Jpeg may produce strange artifacts due to lossy compression
  - Color Balance > Alpha is Luminance
    - To make sure it works as expected

Otherwise it uses the 'alpha channel' of the image, which in most cases is empty (unless you created in manually, e.g. in Photoshop) and jpeg images can't even have one.



