Creating High-Quality Materials for Design Visualization

Michael Beale - Autodesk
Roberto Ziche - Autodesk

CD6535

This intermediate class will discuss the new physical based materials [we call 'Prism',] found in the cloud-rendering service and Fusion 360. We will discuss this new initiative and then take a peek into some future looking initiatives. The class will also discuss the basic material types available, how they are used and why they help achieve photorealistic design visualizations. The attendees will understand the requirements of texture creation/preparation and what makes a 'good material'. They will also learn how to fully take advantage of the material models and rendering tools in the Fusion 360 app and in the Autodesk 360 cloud-computing platform.

Learning Objectives

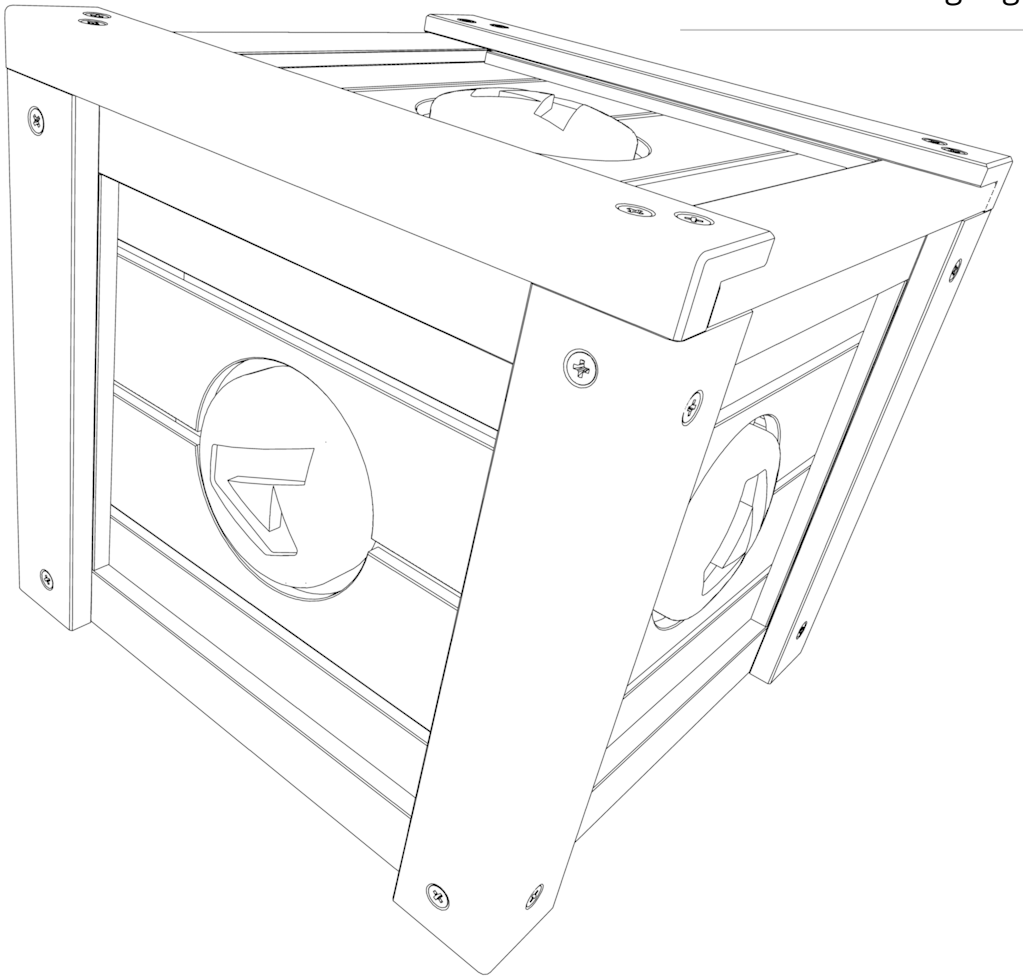
At the end of the class, you will understand:

- what are prism materials
- the basics of material properties
- what makes a 'good' material
- how to use these materials in Fusion360 and Autodesk360

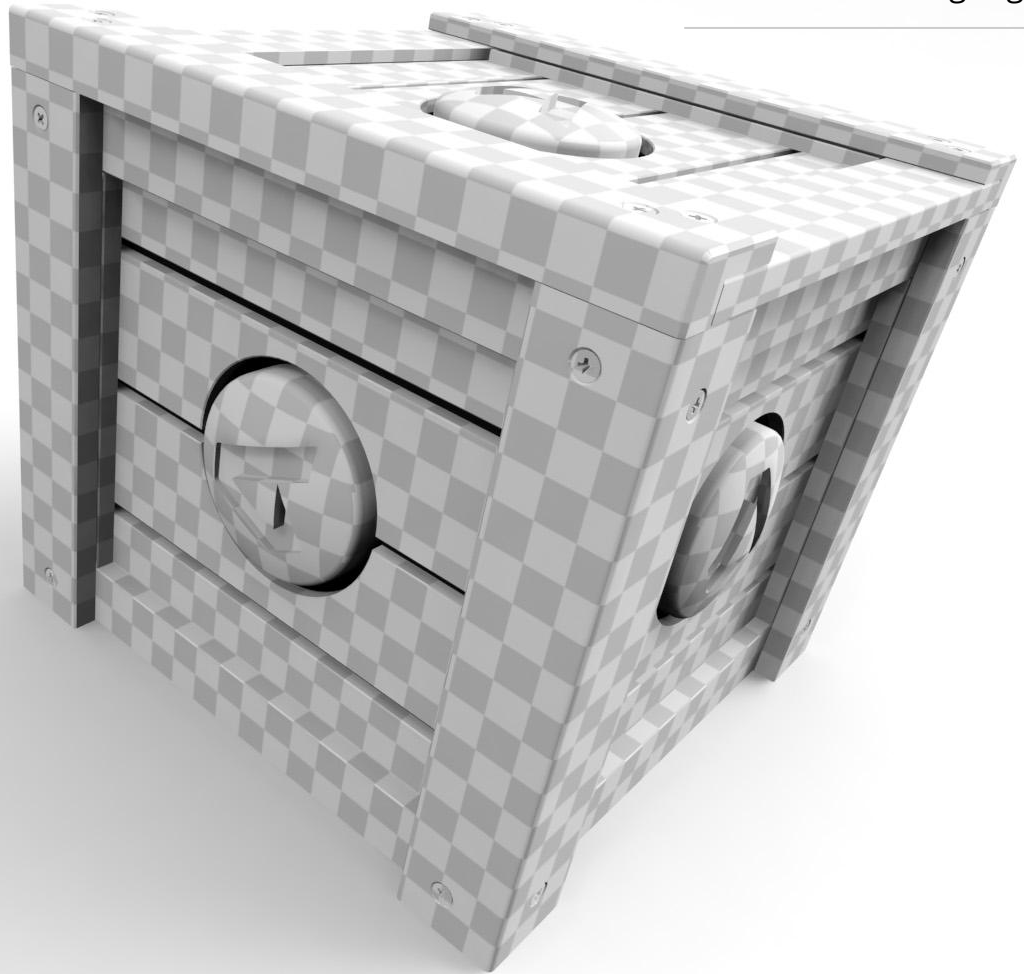
michael.beale@autodesk.com
roberto.ziche@autodesk.com

10am Thursday
Nov 4th, 2014

The importance of materials



The importance of materials



Many uses, not just to approximate reality

- UV check
- Lighting check
- Non photorealistic (NPR)

The importance of materials

Use pre-made Library materials to visualize your final model

But don’t stop there and call it a day

While library materials can be high quality, they are generic

The importance of materials

Spend some time tweaking materials to look good

Use your own textures

Adjust UVs

Often, physical correct materials is not what the marketing department wants

The importance of materials

Don’t overdo it!

Aging and weathering is what makes a model look real rather than computer generated

Avoid the videogame look

Always remember:
Bad materials can kill a great model

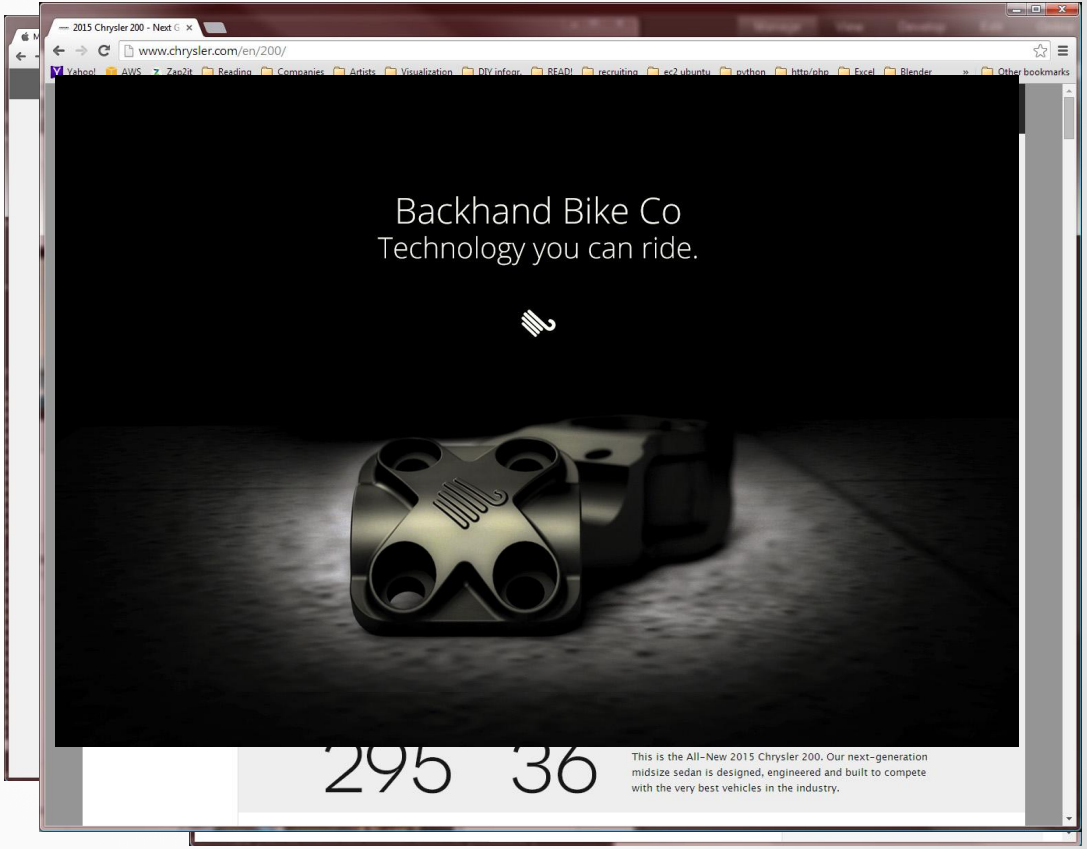
Today's visual trends

Clean look/Studio lighting. Isolated subject.

Carefully positioned reflections

Plenty of adjustments in Photoshop

See Jason's Lab class:
Design and Visualize



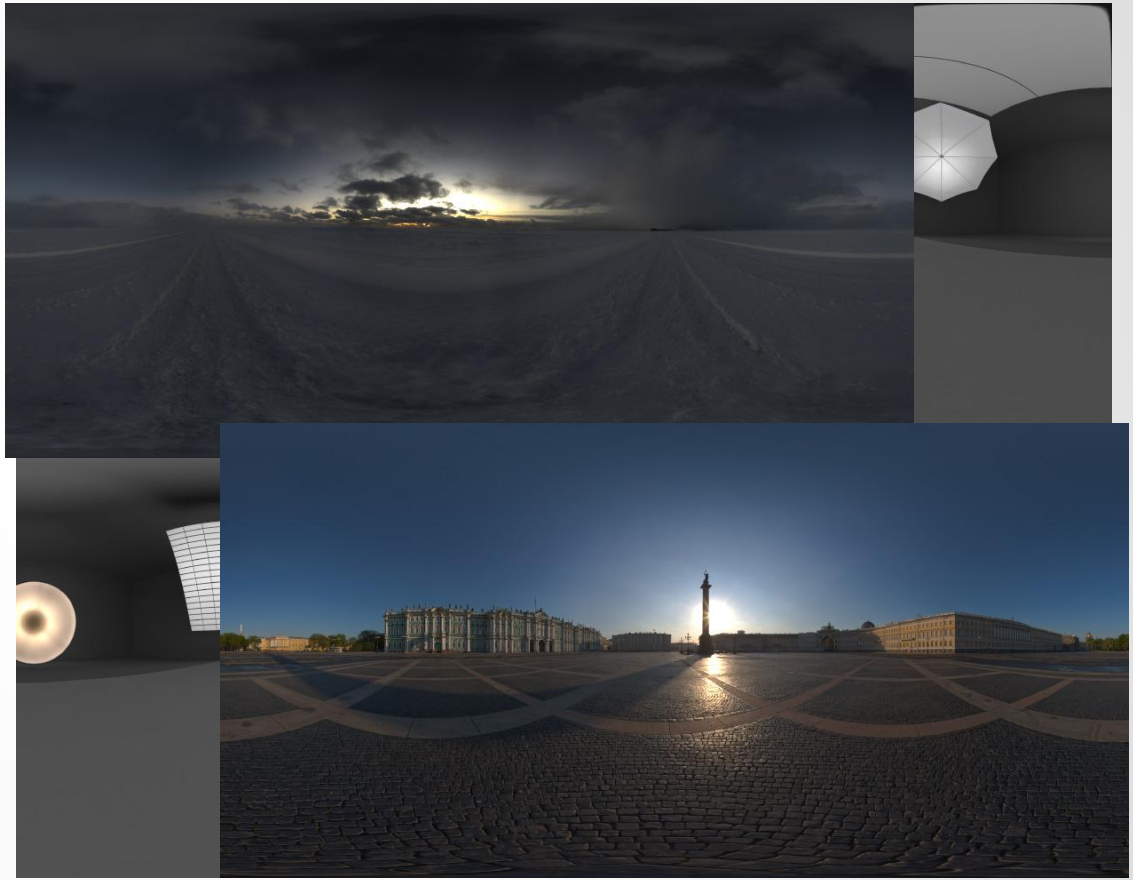
Lighting and materials

Both extremely important and interconnected

Lighting should bring out the best of each material

Fusion 360 and RaaS provide a set of lighting studios environments to simplify your workflow

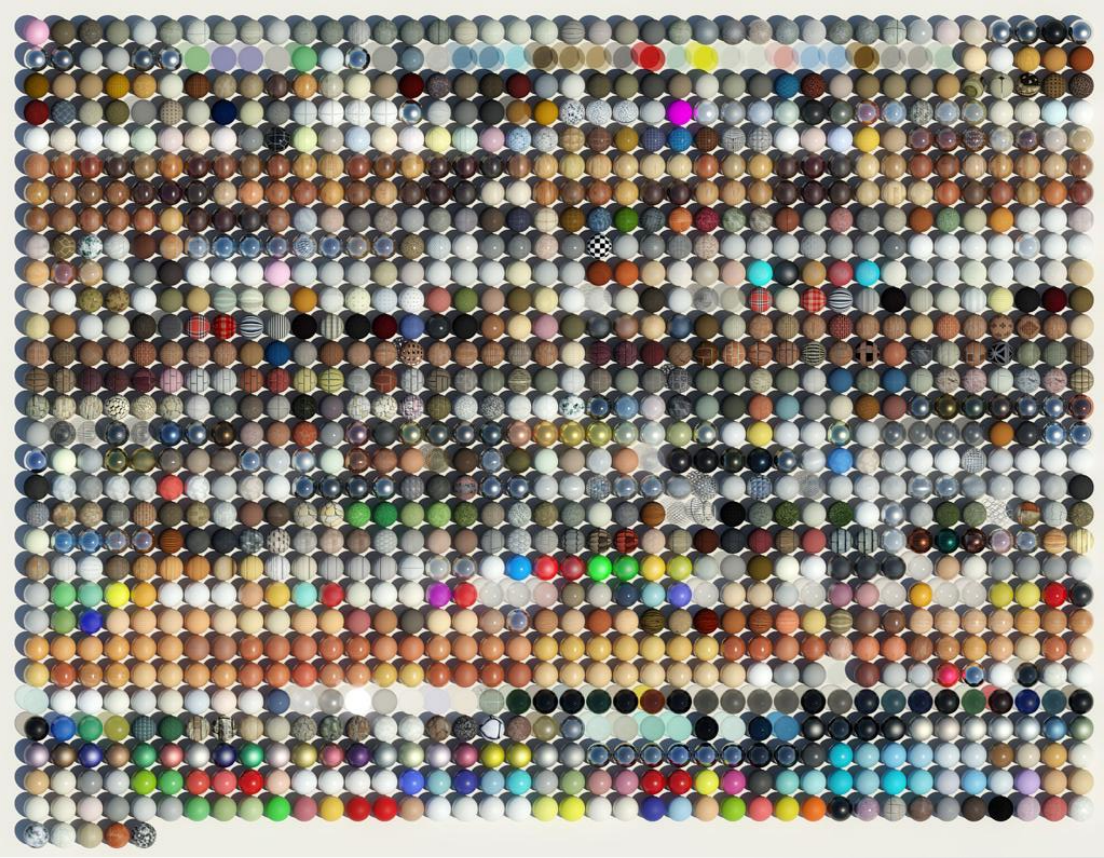
It also provides a library of more than 200 preset materials



Going beyond the materials library

We can provide only the most common materials and patterns

You have to create your own unique materials starting from the library



The Renderer

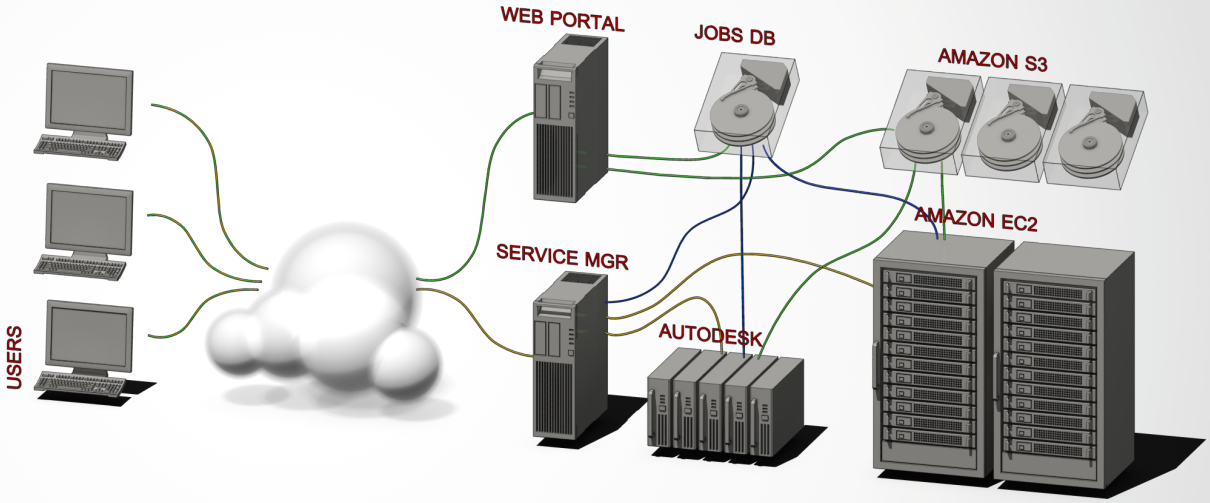
Forget for a moment about mental ray, V-Ray, iRay, etc.

Those run on your computer or render farm

RaaS uses a cloud renderer, developed from scratch to take advantage of that platform

It's simple, predictable, and high performing

RapidRT is a separate renderer running locally that closely matches RaaS



mental ray/V-Ray satisfy individual users

Raas satisfy thousands of users.

Prism materials

Four base shaders optimized for each class of materials
Each has its own set of parameters

Opaque

Metal

Transparent

Layered

Supported texture types

Each Prism material supports different sets of maps

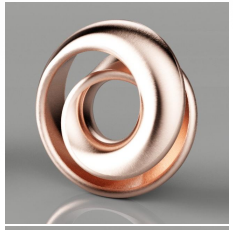
Please, don't just use Color
Be brave!

Better materials can make a lasting impression on your customers

Opaque

Color, **Reflectance**, **Roughness**, **Bump**, **Cutout**, **Anisotropy Amount** and **Orientation**, **Highlight Color, Translucency Weight**

Metal



Color, **Roughness**, **Bump**, **Cutout**, **Anisotropy Amount** and **Orientation**, **Highlight Color**

Transparent

Bump, **Roughness**, **Cutout**, **Highlight Color**

Layered

Metal and **Opaque** parameters plus **Weight** (mix amount between them)

Translucency

Recently introduced.

Our solution is a fast, but not perfectly accurate rendering of some translucent effect.

Omni scattering, no volume tracing

Even with limits, it makes a huge difference.

rotacaster omniwheel by Fazzlil Tuah from GrabCAD.com

Emissive materials

Just introduced

Simple parameters, easy to experiment with

Emissive materials do participate in the scene lighting

Do some research to get values right. Be aware of wide ranges

Materials creation process

A lot of manual work

Textures creation/acquisition

- Scanner
- Camera
- Photoshop
- 3ds Max

Textures post-processing

- Adjusting/Patching
- Tiling
- Compositing (noise, etc.)
- Derivative textures (bump/roughness)

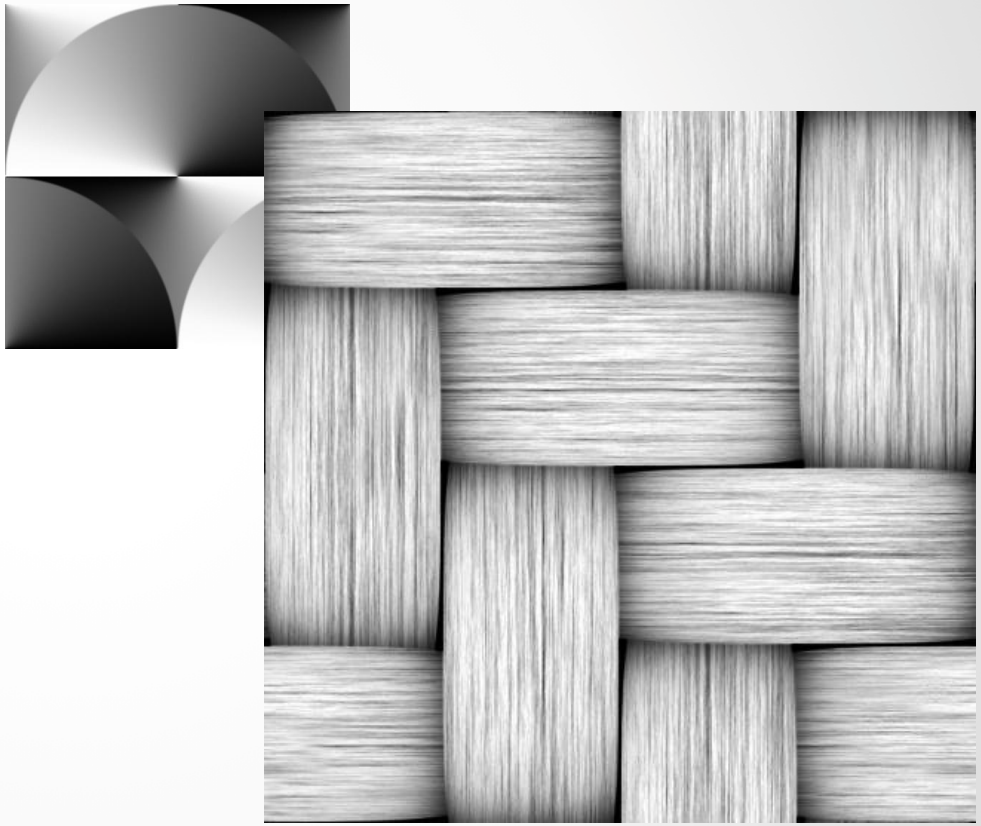
Procedural textures

Some textures are created from scratch to achieve maximum quality

Photoshop
Combining patterns, hand drawing, photo manipulation

3ds Max
Small details for normal, depth, and cutout maps

Processing/Python
If you like coding you can create tileable texture automatically



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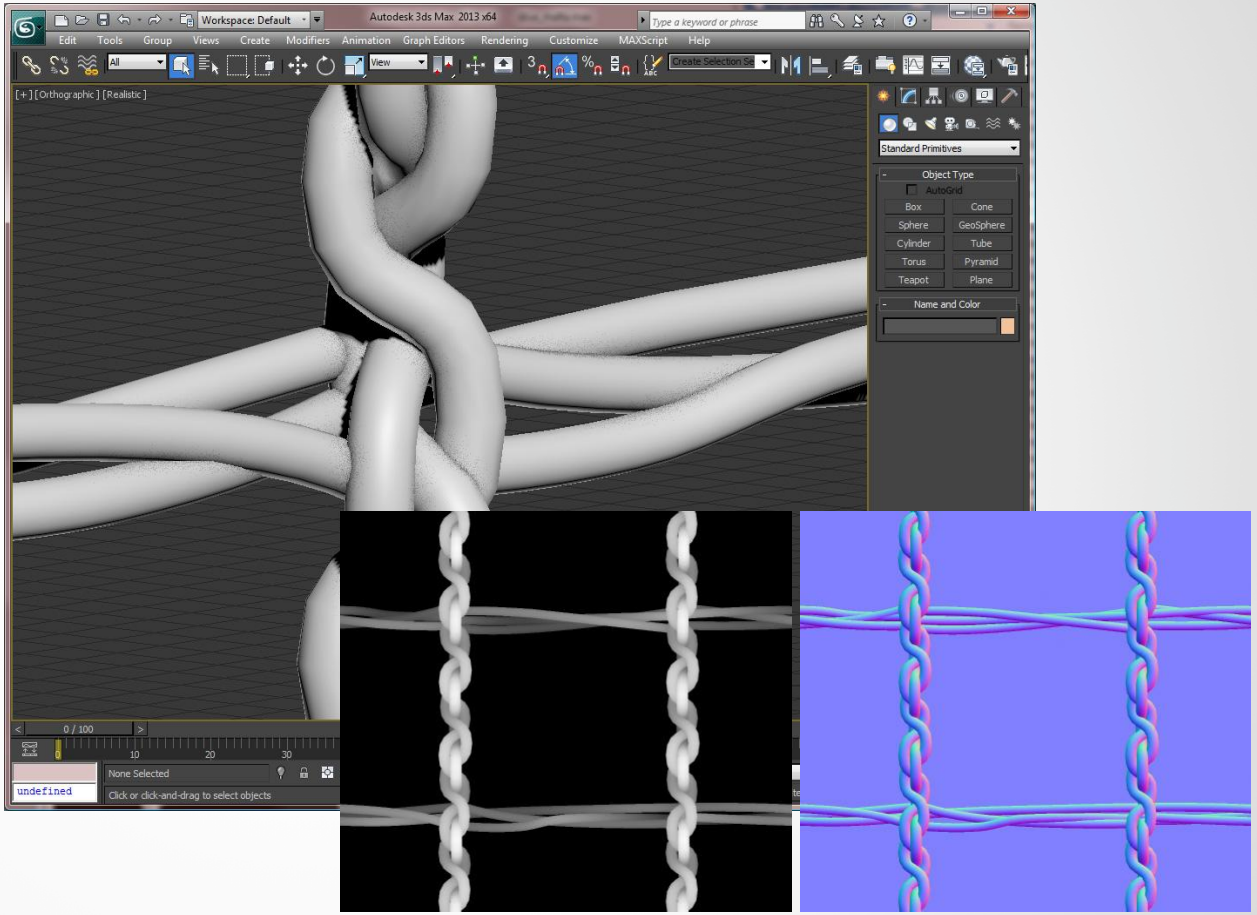

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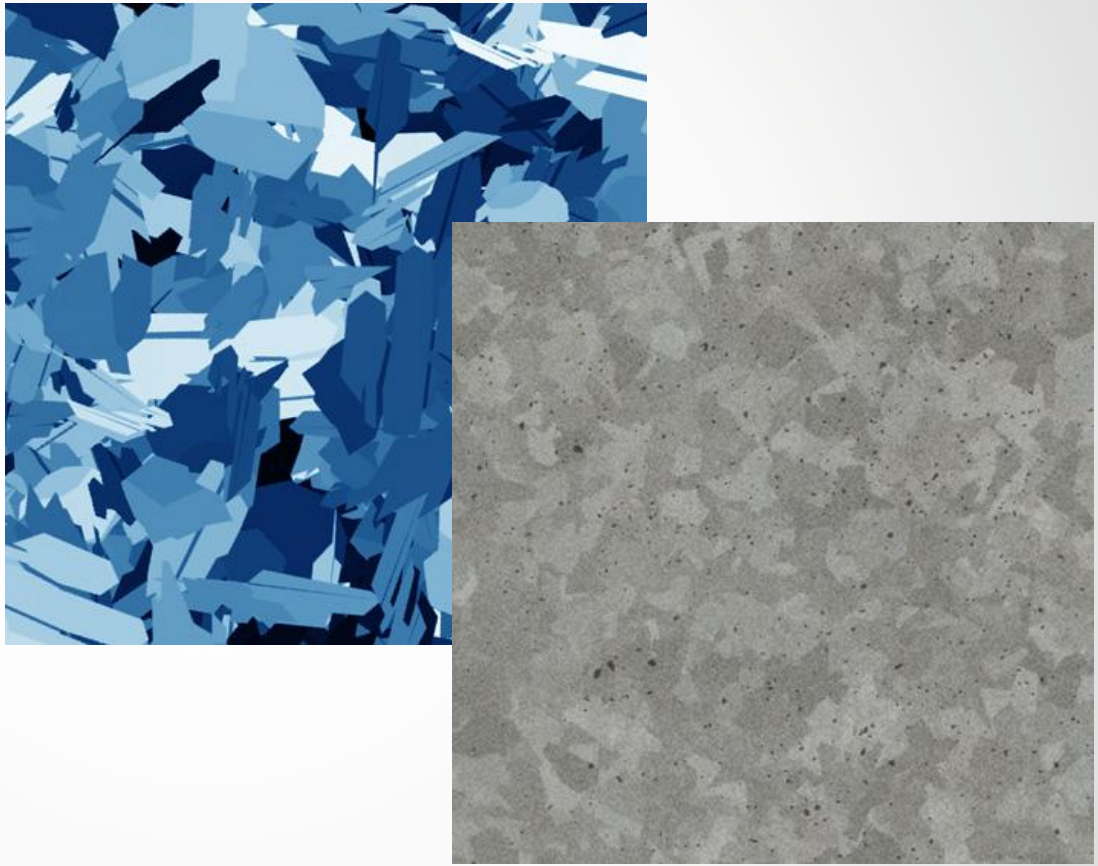
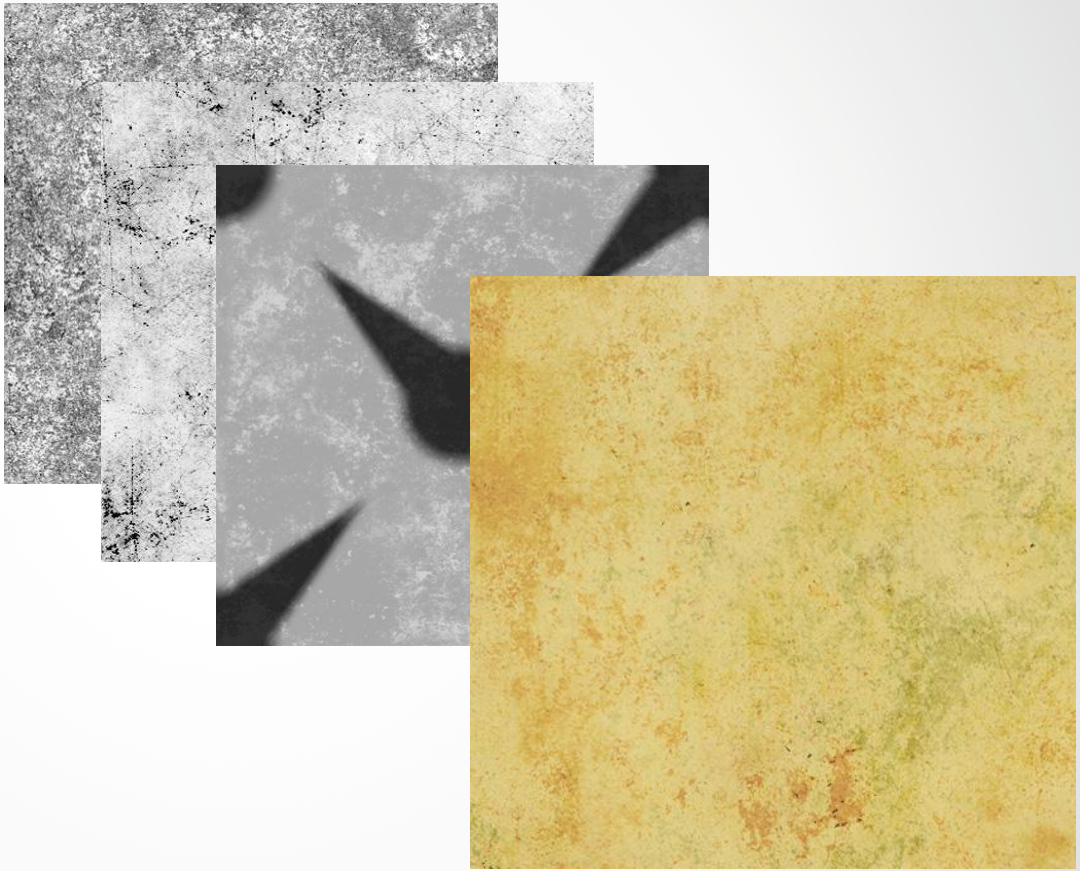


Imperfections

Clean look is good, but sometimes it justs screams “fake!”

Add noisy patterns or light grunge to color, bump, roughness

The (often forgotten) Roughness texture is your friend



Imperfections

Clean look is good, but sometimes it justs screams fake

Add noisy patterns, light grunge to color, bump, roughness

The (often forgotten) Roughness texture is your friend

Sometimes imperfections are really subtle, but completely change the perception of the material

(Enlarged images, pardon the pixilation)

Tileability and Size

Go large. Render nodes have plenty of RAM

Large textures gives fine details

Might be worth creating two LOD version of some textures

No sub-pixel details if possible. Renderer won't see those

BTW: There is no magic "Make it tileable" button

Original scans, 3 boards, 2500x20000 pixels

Final texture, hand tiled 2700x5400

Detail

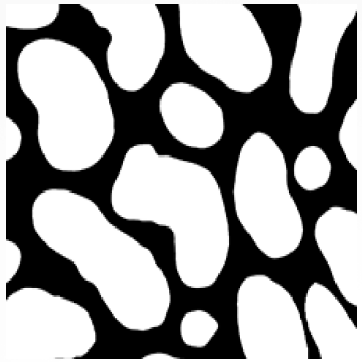
File formats and texture types

JPG: **lossy** compression
PNG: **lossless** compression

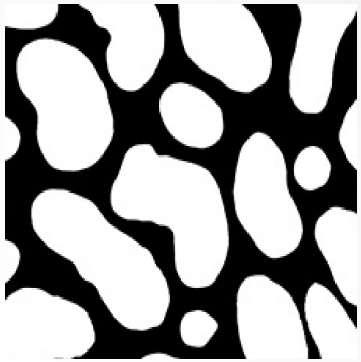
Avoid JPG on Bump and Cutout maps

Use Grayscale files if you need to reduce file size

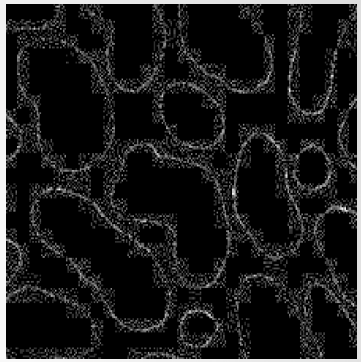
JPG is perfectly acceptable for Color textures



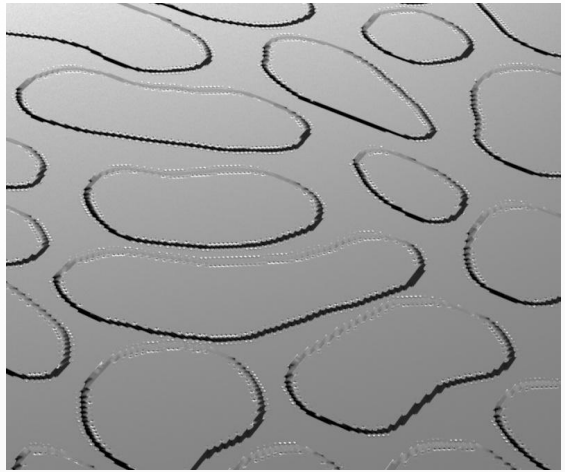
PNG

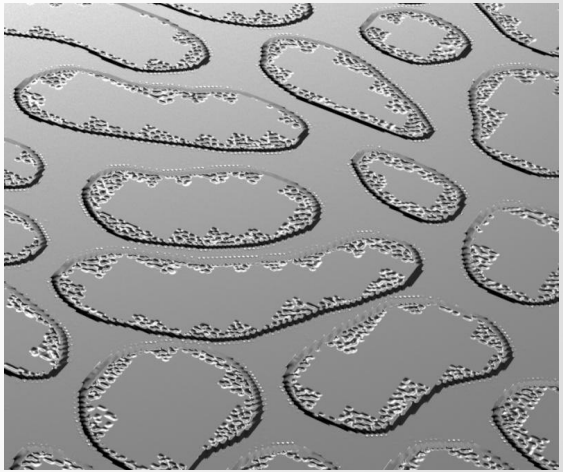


JPG (quality 90)



Difference



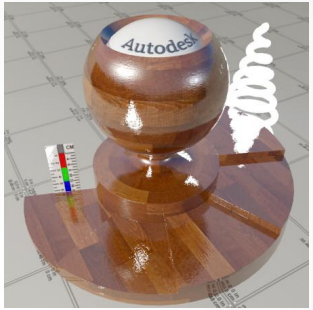


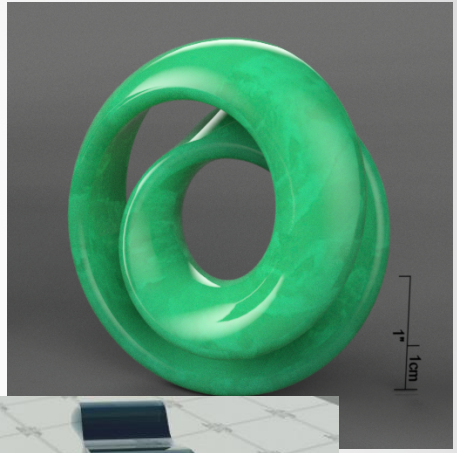
Testing your materials

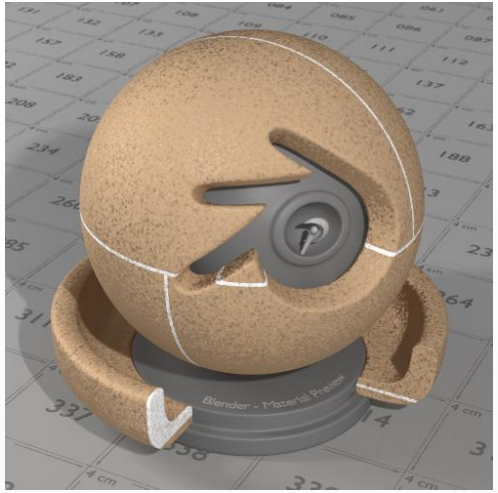
Swatches vs. real objects. No matter what application is used, there is always a disconnect

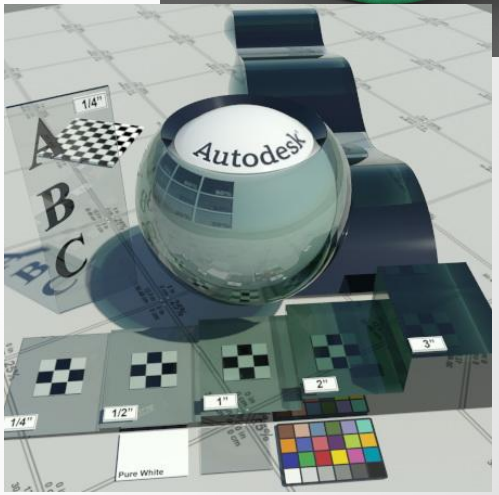
UV mapping (scale/orientation), lighting, exposure not always appropriate on swatches

Don’t rely just on a single “everything” swatch









Testing your materials

Swatches vs. real objects. No matter what application is used, there is always a disconnect

UV mapping (scale/orientation), lighting, exposure, not always what you need

Don’t rely just on a single “everything” swatch

Use swatches that makes sense for the material and the environment where it’s used