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The application of realistic wear and tear, dirt, and grime is an art form in itself. Objects that interact with humans and the environment develop a wear pattern. The patterns may be oils from hands or machinery parts, and scratches from rubbing on another surface. When you study objects that receive heavy traffic such as furniture, you notice the corners are worn down to bare wood, and the large surfaces have scratches and dents. When objects are exposed to environmental elements such as sunlight and moisture, it causes paint to peel and cracks to form. Visit a large body of water and look at metal and wooden objects, noticing the water stains and rust formation. The bottom section of an object shows signs of decay and may turn white when minerals such as salt are deposited on the surface. Concrete shows a great deal of history, with cracks and the pot holes on street asphalt. A video game environment does not look like a clean hospital ward, but has skillfully placed areas of dirt and grime. Observe the real world process of weathering to create a convincing replica texture. Use the techniques outlined in this section, and your props and environments will look more realistic.

The image is the hood of a truck that has been in a hot climate near the ocean.

Pictured is a wooden table that has been outside for an extended period of time.

LEVEL 1

Localized Wear

Localized wear and tear happens to specific areas of an object over time. Mother Nature is the most powerful source of structure decay. Water, wind, and sunlight on the coastline effect the surrounding environment causing constant erosion. The metal on a power box is a good source to study for signs of breakdown. On the handle area where there is frequent access with tools, the paint is stripped, exposing the bare metal.

Aluminum does not rust very easily because it forms a layer of aluminum oxide, which protects the underlying metal. The sun causes paint to peel and fade over time, causing it to expand and contract. Be aware of the type of material an object is sitting on, such as dirt, concrete, or grass. Areas that have grass contain moisture in the topsoil, which disintegrates the metal over relatively short periods of time. Dirt often accumulates and sticks to the paint on lower sections of objects. The underside of lips and overhangs rust, causing streaks to form.

Pictured here is a diagram of a power box near the ocean.

Stickers add a touch of color to an object and display warnings

Chipped Paint exposing bare metal from frequent use

Heat has caused the paint to peel and notice the dirt gradient
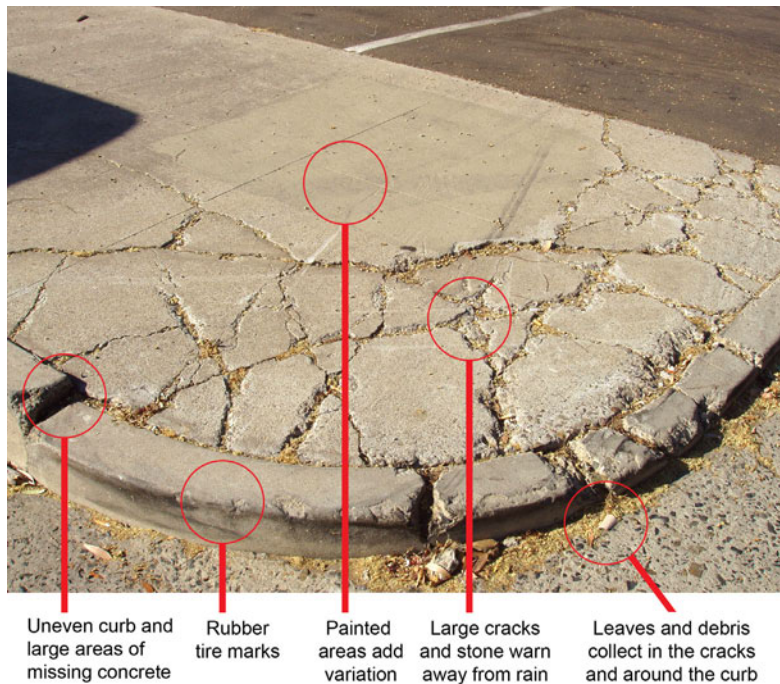
Water and salt in the air has started to disintegrate the metal

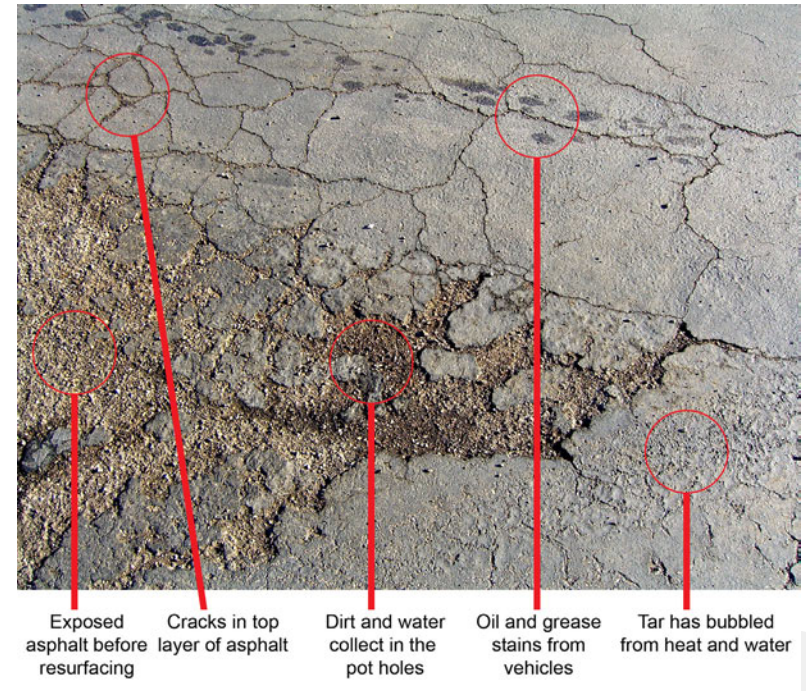The corners are worn from rubbing and scratches are visible

LEVEL 1

Water and the movement of the underlying ground cause cracks on a stone or concrete surface. Damage occurs when vehicles drive over the surface, and heavy objects drop on them. Water and dirt erode the surface and create deep cracks and holes. When creating a texture, find good top down reference of these details. You create variation by cutting out crack details and overlaying them on top of a similar surface. Dirt layers may be overlaid onto a clean version of concrete or asphalt. The key is to use sharp details from photos and subtle dirt layers fine tuned to the desired result. The diagrams show areas of detail that may be replicated in a real texture.

The photograph below displays distress on a concrete sidewalk.

Uneven curb and large areas of missing concrete

Rubber tire marks

Painted areas add variation

Large cracks and stone warn away from rain

Leaves and debris collect in the cracks and around the curb

The image is a photograph of distress on an asphalt lot.

Exposed asphalt before resurfacing

Cracks in top layer of asphalt

Dirt and water collect in the pot holes

Oil and grease stains from vehicles

Tar has bubbled from heat and water

LEVEL 1

Dirt and grime effects are applied in layers over the base textures. The dirt may be applied as streaks under windows and awnings. You apply grime as a treatment for a more uniform looking texture. Game engines support a second and third UV channel, and multiply the dirt layers over the base texture. Use a multilayer shader in a 3D package for use in a film. Large surfaces tend to look very tiled, even without a seam showing. Using a grim texture breaks up the repeating pattern and adds realism. Dirt gathers in the corners and along the bottom edges of the buildings, windows, and door trim. Details that are inset, such as vents, may be caulked with materials such as sealer or concrete. Polygon geometry pipes running along a building have a grime strip texture behind them to add depth. The buildings in the diagrams have not been cleaned for a long time, and have collected dirt in the corners. When it rains, the dirt runs down along a building's natural cracks or connection points.

The image displays areas where dirt collects and is washed away during rainy days.

| Dirt and water from A/C system | Layer of dirt along lower edges | Streaks from rain near windows | Painted and chipped areas | Exposed concrete areas around vents |

Surface Overlays

A solid library of textures enables you to build a convincing texture. There some textures essential to creating the effects described in this section. The black and white grime overlay is great for a full surface effect. In Photoshop, set this layer style to overlay, or multiply and adjust the layer's opacity. The concrete wall photograph is a real world example of the desired effect. Another way to create this effect is to use a dark grime texture, and place a black and white overlay texture in the alpha channel.

Black and white grime overlay


Concrete wall photograph

Alpha black and white grime

Dark grime texture

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LEVEL 1
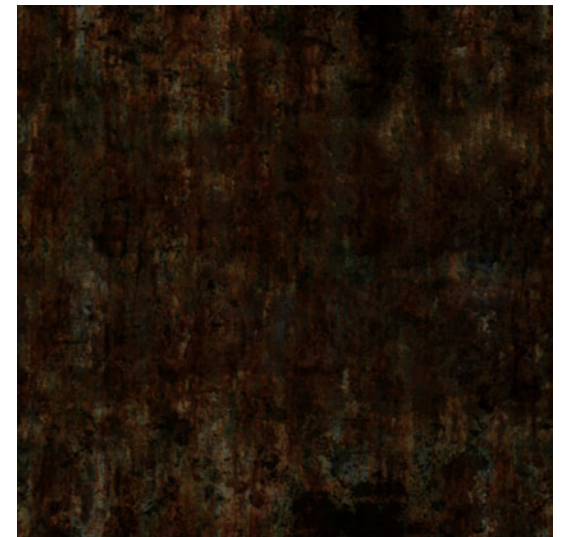
Selecting a color range makes it easy to choose localized areas for overlays. Apply rust and colored streaks directly onto a texture, or use as an alpha texture sheet. Take a photograph with streaks on it, use the Color Selection tool in Photoshop to select out that color, and paste it into a new layer. The new grime layer may be set to overlay or multiply. Make adjustments to the hue and saturation to tint the color. Place this new grime layer on areas that need localized wear and tear.
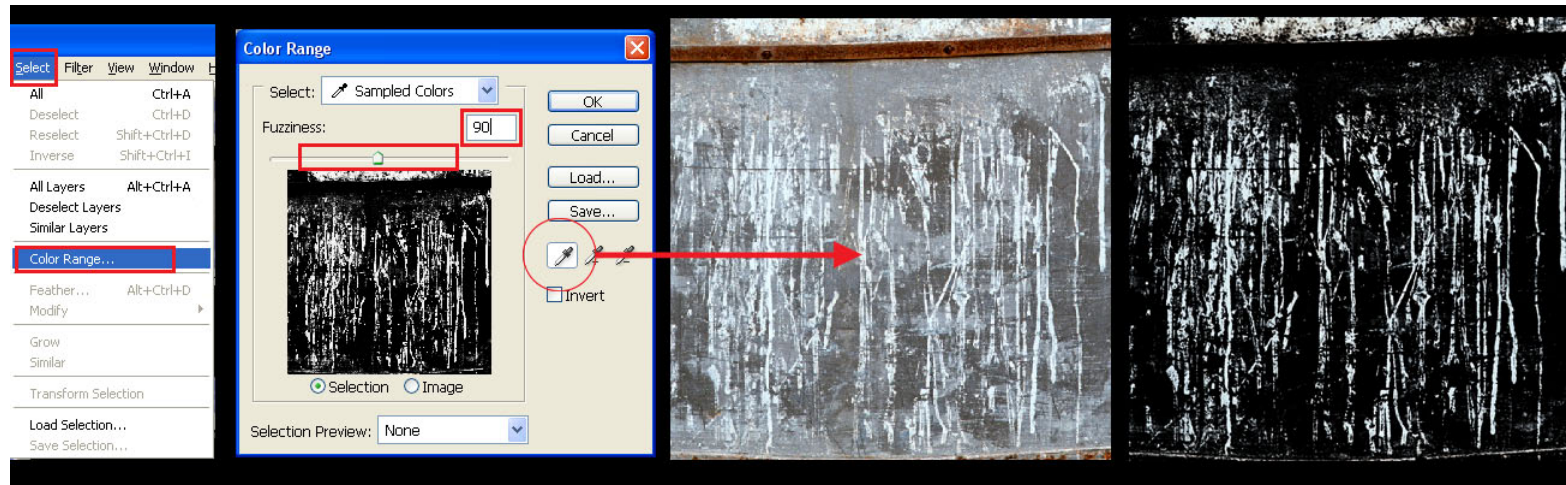
Select
Color Range

Select the white
using the color picker

Photograph used
for color selection

Color selection that
is overlayed, and colored

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Rust is a common detail that is separated by using the color selection method. Take textures while looking at buildings and finding areas of heavy run off.

Pictured is a layer selection of rust.

Edges may look worn down on the corners of the model's textures to simulate every day use. You use the Paint Brush tool and a light color to paint in the wear and tear. Use the specular map for the majority of this high contrast detail. When the light catches the edges of the surface, they create a nice highlight. The inset areas of an object usually collect dirt as illustrated in the diffuse texture. Dirt is trapped in the tread of a tire or along the trim of an automobile. Study real world objects with heavy outdoor use, and reproduce the localized areas on a texture.

The images displayed are the edges on a specular map and dirt on a diffuse map.
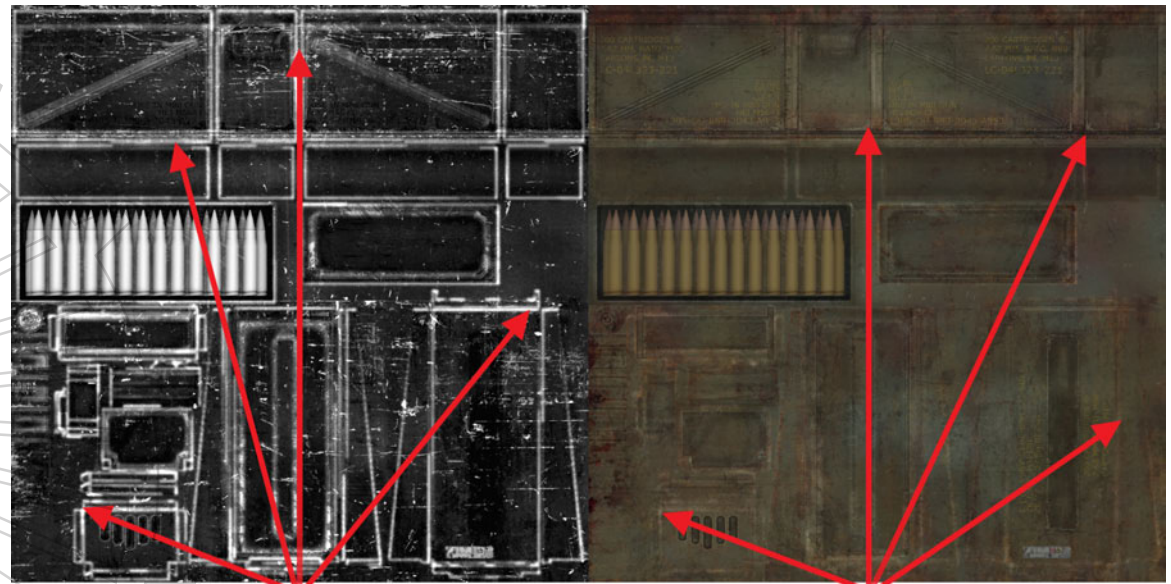
Edges are painted
lighter in the
specular map

Dirt and scratches
are painted
in the corners

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LEVEL 1

Color Correction

Texture polish refers to the time it takes an artist to refine a texture to match others. This can be a series of shader setting used by everyone working on a project. It takes time to become accustomed to using the Wacom tablet to draw in details. Painting by hand brings the external artist back into the more painterly and sculptural areas of art. The final texture looks like a piece of art, with clear form and resolution.

Color correction is done at the end of creating a texture or multiple textures. Adjust them all to within a value and color range, so they look similar. There are ways to adjust a texture when it is completed. You create a brightness contrast layer, or a levels adjustment layer. These filters are accessed in the Image and Adjustments list. Using the Levels windows makes it easy to adjust the minimum and maximum light values. The keyboard shortcut for adjusting the Levels is CTRL + L.

The images are an over saturated texture of the ammo case, and a color corrected one.


Pictured is the Levels tab. Levels are adjusting by using the sliders to clamp the color values.
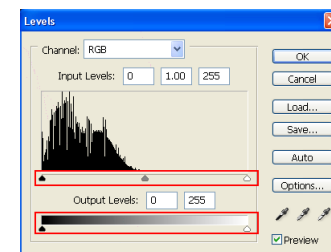
When the texture is finished, sharpen it for a grittier look. It adds bang for your buck when the texture is rendered. Use the Photoshop Sharpen filter or un-sharp mask to sharpen the texture. If the specular map is too sharp, the texture appears to flicker on the screen. To adjust the specular map use a Gaussian blur. Set the blur of a few pixels to offset it, so that the texture looks smooth.

The images display a diffuse texture that has been sharpened, and a specular texture that has been blurred.
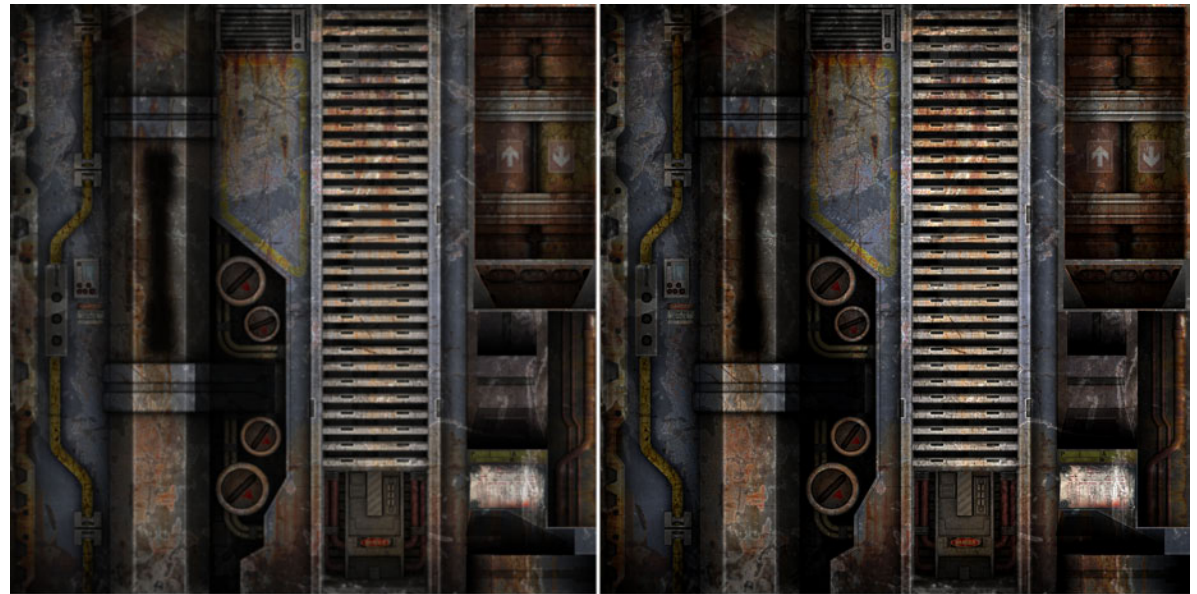
Normal Texture   Sharpened Texture
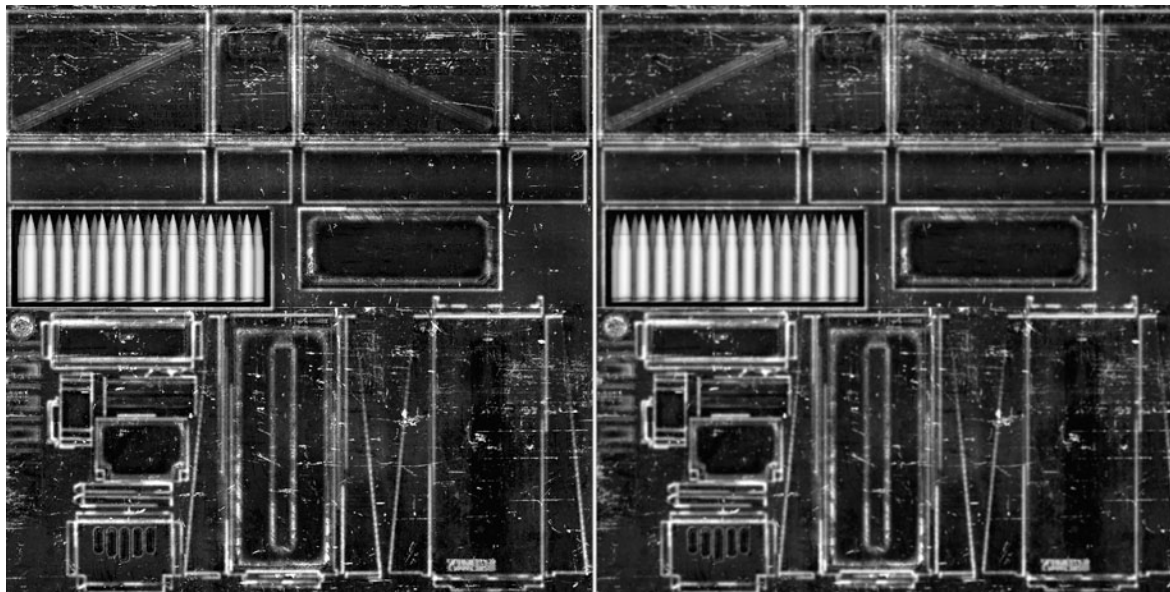
Normal Texture   Blurred Texture

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LEVEL 1

Rendering

When a texture has a light source directly over it, a bright area is created and shadows are cast. A secondary shadow map that includes lighting and color information is added as a multiply layer during rendering. The process bakes the lighting and shadows into the texture. This saves processing power and enables the computer to run faster. A light map is similar to a secondary ambient occlusion pass, multiplied over the diffuse layer when rendered in game or for film.

The images are textures that have lights and shadows baked into them.
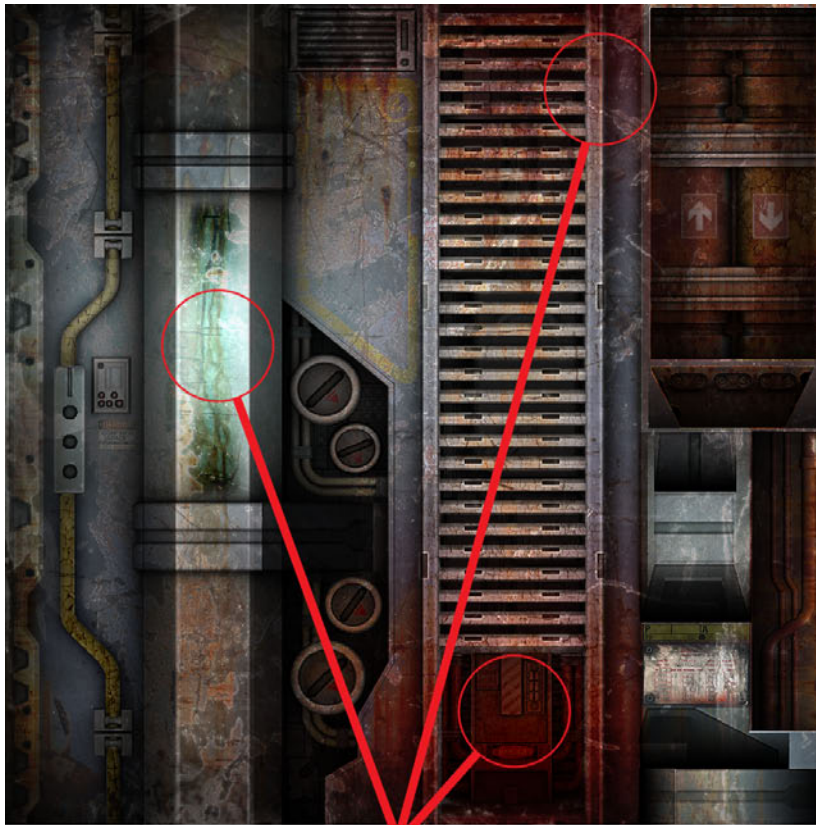
Blue and Red Lights
baked on the wall from
a light source
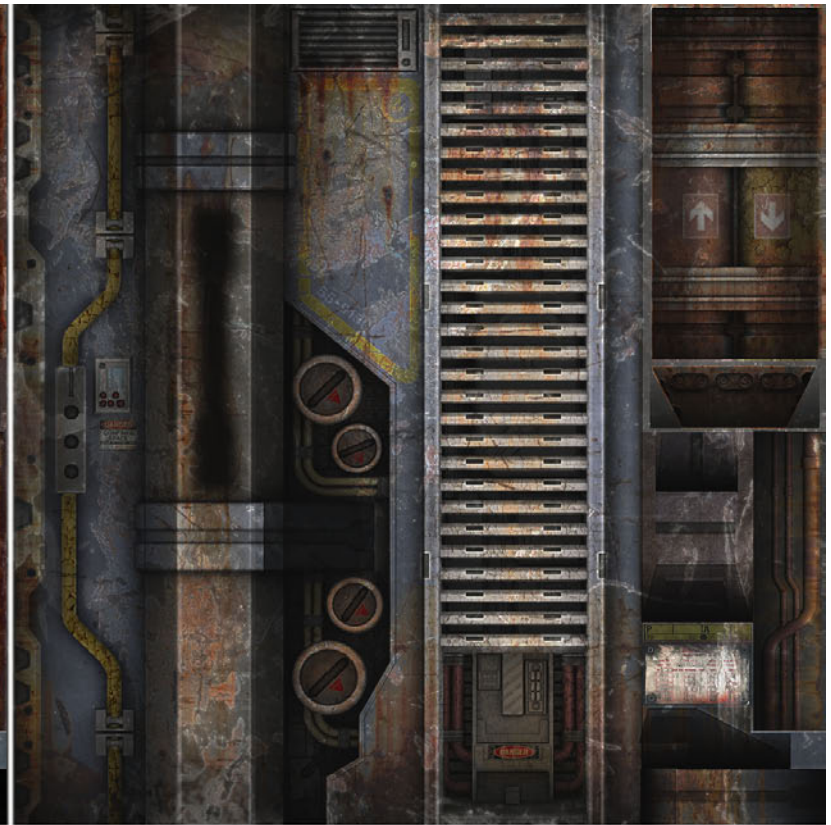
Texture with no lights baked,
only shadows

Rendering for video games and films is a different process. Video games attempt to get all of the artwork rendered in real time, which means it has to render it on the fly. In film and TV, it is rendered out to a video file that is replayed. This is called pre-visualization. Mental Ray is a rendering engine used for film that takes texture sizes up to 4096 by 4096 pixels. This is the standard for film quality resolution.

A video game engine may only handle 100 megabytes of texture memory at once, and may require lower quality textures, such as 1024 by 1024 pixels. 3D software packages such as Maya, Softimage, and 3ds Max render images in mental ray. Rendering a final shot and setting up the lighting may take hours. A specialized artist may only work on rendering and lighting for a project.

Pictured are renders of the Bio Chamber in mental ray.