COMPUTER-AIDED ILLUSTRATION

CAD Illustration and lighting techniques

TEXTURE MAPPING

- Used by CAD Technicians, texture mapping is the process of applying a 2D pattern or texture to a 3D object.

- The 2D bitmap image is 'wrapped around' the 3D objects similar to applying wallpaper or paint to a real object.

- The software will distort the pattern or detail on the image so the detail appears to be correctly applied.

- Benefits of this include the production of realistic rendering which enhance the realism of a 3D CAD model. It allows the designer to visualise the finished product.

BUMP-MAPPING

- Used by CAD technicians Bump Mapping is the process of applying a texture to a particular surface.

- In its simplest form each pixel within the image has its own designated level of brightness which creates the appearance of light shining down the edge or the creation of a shadow.

- By turning each pixel into a vector the level of brightness can be changed as the software carries of a series of calculations to create the desired effect.

- For more complicated textures within the gaming industry more complex calculations are required.

- Benefits include the ability to create complex scenes and environments in the gaming and architectural industries.

LIGHTING TECHNIQUE: REFLECTION

• Light that is bounced of an object or subject, the light retraces back into the same medium, meaning that it must bounce off at the same angel that it was initially generated.

• Some surfaces reflect better than others, a shiny metal object will reflect light better than a darker dull wood surface.

• A darker object will absorb more light meaning that less light is reflected.

• This will allow engineers to create realistic rendered images of products.

LIGHTING TECHNIQUE: SPECULARITY

- This determines the level of reflectiveness a particular surface has, working with bitmap images white pixels will provide full specular highlights and black remove the highlights completely.

- Adjusting the levels of the specular highlight will determine how reflective the appeared image is, equally an object can be made to appear glossy and or blurry in its reflection by changing the level of specular reflection.

- If a surface is deemed to be rough, it will spread the light out more meaning it will have a blurred reflection.

LIGHTING TECHNIQUE: AMBIENCE (AMBIENT LIGHTING)

- Ambient or Available light is a source of light which is used for providing an area of a 3D environment with a constant illumination.

- Ambient lighting applies the same lighting, of a fixed intensity and fixed colour, to all surfaces.

- Ambient lighting appears to have no particular source and no particular direction.

- This style of lighting is mainly used to provide an environment **with a simple form of lighting,** it can look bland and is generally not used when completing dramatic rendered views in CAD packages.

LIGHTING TECHNIQUE: DEPTH-OF-FIELD

- DOF is the distance between the nearest and farthest objects within an image.

- The primary purpose of the depth of field is as a visualisation aide, for improving the understanding of the relationship between objects in a 3D projection.

- The applications of depth of field include visualization of highly complex data sets, such as CAD designs and file structures.

- Depth of field has the potential for being an intuitive way to increase the users sense of depth in both projected and immersive environments.

LIGHTING TECHNIQUE: IMAGE BASED LIGHTING/HIGH DYNAMIC RANGE IMAGERY (IBL/HDRI)

- IBL is the process of illuminating objects and scenes with objects from the real world.

- It allows you to light your scene by applying an HDR image to a virtual sphere that encompasses your scene or environment.

- This is particularly useful if you want your object to appear in a real environment.

- When using the HDR image the reflections used on this environment will also appear on your model.

LIGHTING TECHNIQUE: VOLUMETRICS

- Volumetric rendering refers to a technique for generating a visual representation of data that is contained in a three dimensional space (volume).

- It is used to render objects based on their complete structure as opposed to the surface render.

- These type of renders are used within the scientific and medical professions.

- Particularly good for rendering of smoke/fog/mist/shafts of sunlight in the games based industry.