Working with Objects, Textures, and Materials

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DataCAD Plus vis provides many objects, textures, and materials that you can include in your project. Chapter 4 described how to position and manipulate objects in your project; this chapter deals with applying textures and materials to those objects. By doing this, you can help your client visualize the project and quickly incorporate changes.

In this chapter:

- ⊕ Catalog options
- ⊕ Textures
- ⊕ Materials

Catalog Options

When you right-click on icons in the Catalog, DataCAD Plus vis opens context-sensitive menus which offer further options. Two options that are usually active are Refresh and Open.

If you select Refresh, DataCAD Plus vis updates the information in the Catalog based on changes you made. For example, if you moved, copied, or changed any textures, objects, or materials using Windows or another program, these changes are updated in the Catalog when you select Refresh.

Open and Characteristics are two other options that may be available when you right-click on an item (as opposed to a folder) in the Catalog. The Open option displays the item's dialog box and the contents of the Preview tab. If you select Characteristics, the dialog box displays the item's Data tab.

For materials, there is no Data tab. You can create materials using DataCAD Plus vis. Therefore, Delete is available as an option when you right-click on materials in the Catalog.

Delete is grayed out (unavailable) for objects and textures, but it is available for materials because DataCAD Plus vis let you use objects and textures but not create them. You can delete objects or textures either with the programs you used to create them or with Windows Explorer.

Textures in the Catalog

The surface textures available in the Catalog can be used as floor coverings, wallpapers, etc. With textures, you can change the appearance of surfaces or "paste" computer-generated graphics onto three-dimensional objects. This lets you simulate natural textures.

You can manually place textures wherever you like. For example, floors can be covered with carpet, tile, or wood; walls and ceilings can be painted different colors. There are no predetermined limits for using textures.

You cannot modify or create textures in DataCAD Plus vis, itself. However, since textures are saved in the Windows bitmap format (with the .BMP extension), you can create your own pictures with Microsoft Paint or Adobe Photoshop and use them as textures. Just remember to save the pictures as Windows bitmap files and to place them in the appropriate Textures folder.

Loading Textures

You can load the textures into the Catalog's contents pane by selecting the Textures folder (in the directory pane), clicking on in the Catalog icon bar, or choosing Textures from the Catalog pull-down menu. The different types of textures are arranged in folders much like the objects were grouped into logical categories.

When loading many textures from a folder, a dialog box displays progress. You can cut this operation short by clicking on the Abort button. The contents pane shows only the textures that were loaded before you aborted the loading operation.

Clicking on the Loaded Textures icon displays only the textures you are already using (or those you used previously) in your project.
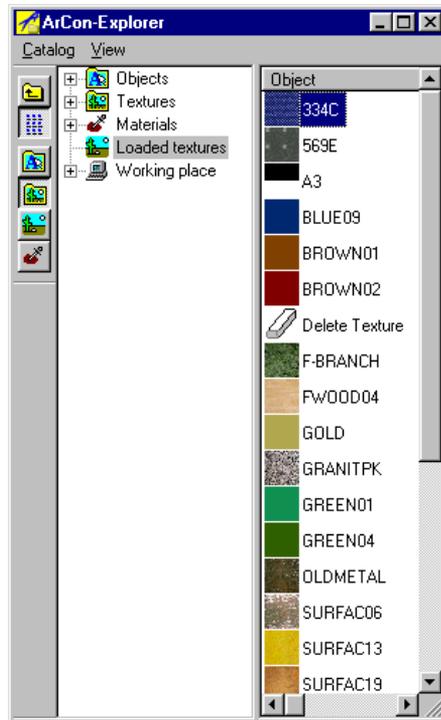
This lets you work with a subset of desired textures instead of the entire texture catalog. The Delete Texture "eraser" allows you to eliminate textures from your project. Just drag the Delete Texture eraser onto a surface or object; the existing texture disappears.

Use the ▦ icon to change the display of the contents pane. When the thumbnail sketches of the textures are smaller, you get additional information about the manufacturer and price (if available).

➔ To select a texture:

1. Open a texture folder and/or subfolder in the Catalog. The folder's contents appear.

2. Click on the texture you want to use. This highlights the selected texture to differentiate it from the unselected ones.

➜ To place the selected texture in your project:

1.   Drag a texture into your project from the Catalog by holding down the left mouse button. The cursor changes from $\overset{+}{\square}$ to $\overset{+}{\boxed{\text{OK}}}$ when you are over an area where a texture can be placed.

2.   Release the mouse button. The selected texture appears on the surface.

Many objects cannot accept any texture; some objects accept several textures. For example, on a dining room chair, you can apply one texture to the chair's framework and another to its seat cushion. When you want to paste a texture on an object, watch the cursor to make sure that texture is acceptable for the surface you want to cover.

➜ To replace one texture with another:

1.   Find the texture you want in the Catalog.

2.   Drag the desired texture into your project until the cursor is above the item you want to change.

3.   Release the mouse button. The new texture replaces the older one.

You can adjust the appearance of your entire project this way. This process of placing and changing textures applies to almost all areas and objects in your project. For example, you can change the appearance of a chair's upholstered seat or the color of a curtain.

➜ To delete a texture:

1.   Click on the Loaded Textures icon or select Loaded textures from the Catalog pull-down menu.

2.   Select Delete Texture and drag it to the object or surface whose texture you want to eliminate.

3.   Release the mouse button. The texture disappears, but no new one replaces it.

➜ To preview textures:

1.   Select Textures from the pull-down Catalog menu or click on .

2.   Double-click on a texture that you want to examine. The Texture dialog box appears with the Preview tab displayed.

Alternatively, right-click on the texture you want to examine and select Open. The Texture dialog box appears with the Preview tab on top.

In the preview window, the selected texture is tiled in an array of 3x3 frames.
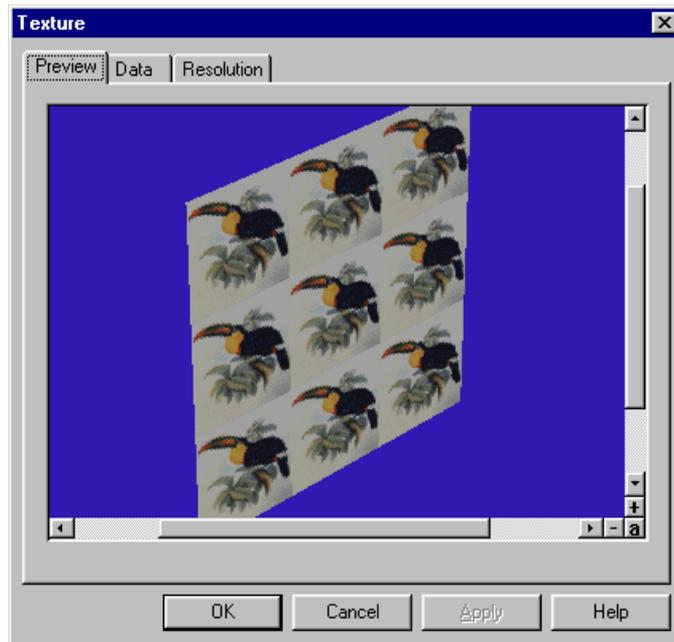
Resolution Tab

In the Catalog, double-click on a texture (or select Open or Characteristics when you right-click on a texture) to open the Texture dialog box and click on the Resolution tab. This tab contains information about the texture image file. If the file is a Windows BMP file, you can specify the texture's height and width in the input fields, adjusting it to appear as it would in reality. For example, if you have a 1 ft. square photo; you should specify 1 ft. for both the width and height for it to appear correctly. These specifications are stored in the BMP file itself; DataCAD Plus vis uses them with design features where you can edit the size.

Self-defined Textures

You can use pictures you've created as textures. In any directory on your hard disk, you can change and use whatever bitmap files are available there. However, keep the following in mind when you do so:

- Textures are stored internally with a maximum resolution of 256 x 256 pixels. Even if you load a picture that has a higher resolution, it will be reduced to this lower resolution.

- Textures are stored within the program using indexed color. Each pixel requires eight bits. If you load a genuine true-color picture, it will be converted to indexed color (8-bit).

- In addition to Windows BMP, DataCAD Plus vis supports the formats GIF, PCX, TIFF, JPEG and PNG. Especially with TIFF and JPEG formats, do not make pictures that are "too large." This slows down the program and increases the loading time.

- Consider your computer's available memory and disk space. If you use lots of textures, memory can fill up fast, requiring Windows to swap data to the hard disk. This will slow down DataCAD Plus vis and other programs you are running dramatically.

Materials in the Catalog

By assigning material properties, you can define textures and characteristics for objects. This lets you modify light effects and reflections, which are particularly suited to rendering with the Raytracer.

There are three ways to load materials:

- Click on the Materials folder in the Explorer portion of the Catalog.

- Click on ✒ in the Catalog icon bar.

- Select Materials from the pull-down Catalog menu.

➔ To select and place materials:

1. Click on ✒ in the Catalog icon bar.

2. Open folders and/or subfolders until you find the material you want in the Catalog. The selected material is highlighted.

3. Drag the selected material into your project by keeping the left mouse button depressed. When the cursor is over an area where a material can be placed or exchanged, it changes from $^+\square$ to $^+\boxed{\text{OK}}$.

4. Release the mouse button. The surface finish of the object changes. Now the selected material is assigned to the selected object or area.

Unlike textures (which you selectively apply to certain objects in your project), when you modify materials, all identical objects are changed simultaneously. For example, if you have the same type of tub in two separate bathrooms, changing the material on one affects the other, too.

This can be a problem if you want to have the same sink style but different colors in each bathroom. Unfortunately, there is no direct solution for this problem. The only way you can deal with this is to use Windows Explorer to make a copy of the sink and give the copy a new name. When you return to DataCAD Plus vis, drag both sinks (original and copy) into your project and apply a different material to each.

➔ To delete an existing material from the Catalog:

1. Click on ✒ in the Catalog icon bar.

2. Open folders and/or subfolders until you find the material you want to delete in the Catalog.

3. Right-click on the material you want to delete. A menu appears beside the material.

4. Select Delete. A confirmation box appears.

5. Select Yes or [Enter] to delete the material.

Editing Materials and Defining New Materials

If none of the predefined materials that DataCAD Plus vis provides meets your needs, you can edit them. In addition, you can create new ones based on existing materials.

➔ To edit materials or create a new one:

1. Click on ✒ in the Catalog icon bar.

2. Open folders and/or subfolders until you find the material you want to edit in the Catalog.
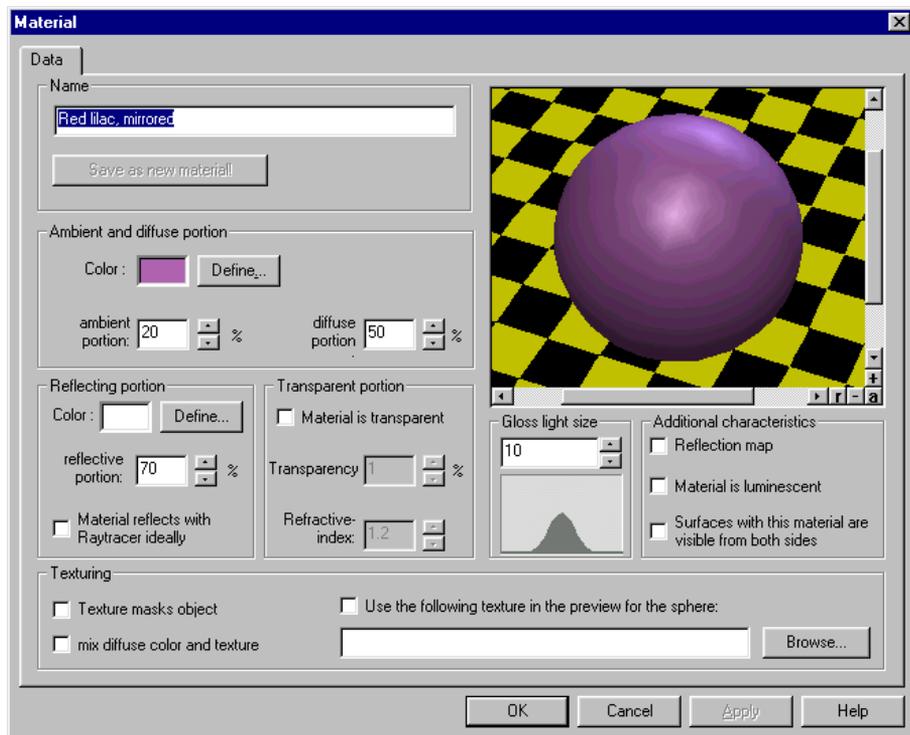
3. Double click on the thumbnail picture in the Catalog. Alternatively, right-click on the picture and select Open from the menu. The Material dialog box appears.

This dialog box has many sections, so you will probably need to experiment to learn how to control materials.

4. Leave the Name as is if you are just editing an existing material. Enter a new name if you are creating a new material based on an existing one.

Modifying the material's name activates the Save as new material button. If you click on the button, the adjustments made in this dialog box are saved as a new material with the name you entered.

5. Make changes to further define the material in the other areas of the dialog box. These areas or portions (Ambient and diffuse, Reflecting, Transparent, Gloss light size, Texturing, and Additional characteristics) are defined and described in the following paragraphs.

6. Notice that your changes affect the material in the preview window of the Material dialog box.

Certain characteristics of materials can only be seen when you raytrace. To make these characteristics visible in the preview window, you must click the ◩ button at the lower right corner of the preview window. This raytraces the preview window so you can see how different settings behave when they are raytraced.

7. Click OK when you are satisfied with the material.

If this is a new material (created from an existing one), give it a new name and click the Save as new material button.

Computer graphics can simulate the surface property of a material based on various parameters. The settings you use for these parameters allow you to create more or less realistic surfaces. DataCAD Plus vis based the standard material on the PHIGS PLUS graphic standard.

When you select an object from the Catalog, its material properties are affected by all the light sources that illuminate it. The object's appearance is based on the interaction of the light sources and the material, itself. In principle, a material's characteristics are affected by overlaying responses to different lighting effects. The ambient portion reflects environmental light; the diffuse portion simulates matte material properties; the reflective portion simulates polished material properties; and the transparent portion simulates transparency. Also, the textures associated with an object are also in principle material properties. DataCAD Plus vis stores materials and textures separately to make it easier for you to use one or both characteristics.

Ambient and Diffuse Portion

Clicking on the Define… button displays the Color dialog box. You can define your own color.
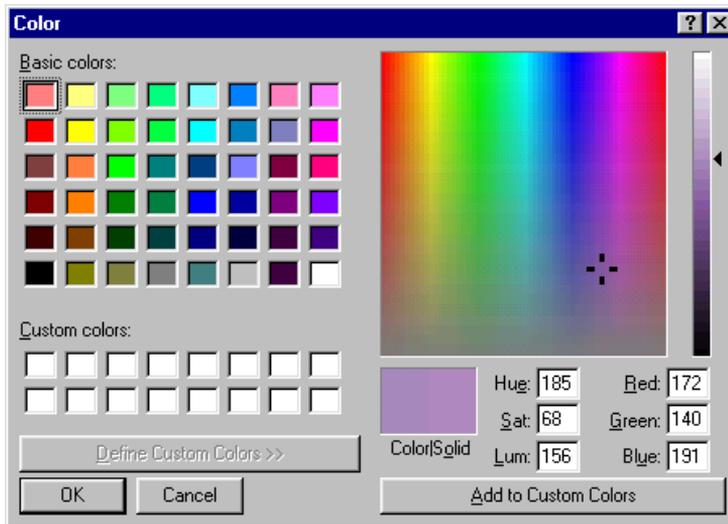
In the input fields, you specify the proportional degree for ambient and diffuse reflections. Alternatively, you can use the up and down arrows until you reach the desired percentage.

If the ambient proportion is too high, the object will appear relatively pale (like plastic) since it will very strongly reflect the environmental light. If the diffuse proportion is too high, the light from defined illumination sources (such as lamps) is reflected very strongly into various, nonspecific directions. However, you can input large diffuse values to simulate velvet.

Reflecting Portion

Here, you define both the color and the proportional degree for reflections. Define… lets you select the color of the gloss light on the object(s).

To understand how the reflective proportion overlays and affects the ambient and diffuse proportions, imagine placing a light glass disk on a red velvet surface. This surface looks like red velvet; nevertheless, it appears glossy (based on the color reflecting from it). The glass disk causes this effect. With the reflecting proportion, you define the characteristics of this glass.

You can activate (checkmark) or deactivate (leave blank) the toggle for Material reflects with Raytracer ideally. If you check this box, the preview window is not automatically updated. Instead, you must click on ◙ in the lower right corner of the preview window to display the sphere's reflecting surface.

Transparent Portion

Put a checkmark in the box if you want to indicate that the Material is transparent. If this box is inactive (no checkmark), the Transparency and Refractive index fields are also inactive (grayed out).

In the Transparency field, input the appropriate degree or percentage for the material. If you enter 50%, when you examine an object with this material, half of the color behind it shows through and half of the object's color is visible.

In principle, the Refractive index field lets you specify the "hardness" of the transparent material. To see changes based on values you enter in this field, click ◙ in the lower right corner of the preview window. Depending on the size, the material more or less chamfers. For example, to simulate glass, use a Refractive index of 1.2; to simulate bubbles in water, use a Refractive index smaller than 1.0.

Gloss Light Size

Adjustments in this portion are visible only if you set a relatively high reflective portion. Changing the value in the Gloss light size input field also affects the curve. In principle, this curve measures the intensity of a gloss light as a function of the angle. The higher the value, the smaller the gloss light. For matte materials (such as unpolished gold or anodized aluminum), use values around 3; for high gloss materials (such as polished gold or polished plastic), use larger values.

Additional Characteristics

If you activate (checkmark) Reflection map, an object's textures will not be handled as bitmap pictures (which modify the object's color pixel by pixel) but as quasi "mirror images." Depending on your viewpoint when you look at an object with this material, you will see different parts of the reflection map. This simulates ideal reflections where the object's environment is not reflected in it, but the texture is obvious. It produces the opposite effect of seeing the reflection maps in real time. The preview window will only show changes if you make adjustments in the Texturing portion, too.

Since the sphere in the preview window always looks the same from any viewpoint, it doesn't show how the reflection map will affect an object. All you see is the texture. But this view is somewhat effective because the sphere is actually composed of many small triangles. To better observe the behavior of reflection maps, you can define materials and pull them onto curved objects in your project and freely rotate them.

The reflection map is used only for objects that are actually assigned a texture.

If you activate (checkmark) the Material is luminescent option, you will see the material even if you did not define any light sources in your project and you switch to night vision. The material simulates a light source; however, it does not light up its surrounding environment. This material can be used for control lights or advertising labels.

Under normal conditions, you would inactivate (leave blank) the toggle for Surfaces with this material are visible from both sides. After all, you can only see one side of objects (for example, just the front half of a sphere). Showing the rear half of a sphere would require extensive computing time. But you may want to show both sides if you use textures to mask objects and you want to see into the object. In this case, you could activate (checkmark) this toggle to see the rear side of the sphere (even if only partially).

Activating this toggle may seriously affect your display speed.

Texturing

Activate (checkmark) options in this portion of the Material dialog box only if you are placing the material on a textured object. These options let you control the interaction of textures and the defined material.

Is an object textured? To find out, drag a texture from the Catalog to the object. If the cursor changes from $\square$ to $\boxed{\text{OK}}$, the object is textured.

If you activate (checkmark) Texture masks object, you will only see parts of the object where the texture is not totally black (color value of 0.0.0). You can use this option to "punch out" areas within an object. (For example, see the trees provided in the Catalog.) However, you will detect few modifications in the preview window.

Normally a texture replaces the object's diffuse color pixel by pixel. Therefore, it does not matter which color (red or green) you select for textured objects. However, you may want to mix both diffuse and texture colors together, especially if the texture has a gray tone. If you activate (checkmark) Mix diffuse color and texture, you can "brighten" the texture; thus, the diffuse color appears to be the actual color.

For example, imagine a texture that looks like a black-and-white picture. If you define a diffuse color of dark red and activate (checkmark) Mix diffuse color and texture, you will see something like a dark red wood. If you use the same texture with a diffuse color of yellow, the texture resembles a fir wood.

Use the following texture in the preview for the sphere control switch

Some material properties are visible only when they are applied to textured objects. If you activate (checkmark) Use the following texture in the preview for the sphere, you must also select a texture (by clicking Browse…, selecting the Texture folder, and double-clicking on the file you want to open). The sphere in the preview window displays the texture.

Activate (checkmark) this option if you checked Texture masks object (in the Texturing portion) as well as Reflection map and Surfaces with this material are visible from both sides (in the Additional characteristics portion) in the Material dialog box.

Tips for Using Materials

DataCAD Plus vis provides a set of predefined materials. We recommend that you try changing some settings and observing the results in the preview window of the Material dialog box before you actually apply them in your project. Changing a material's characteristics affects an object's appearance. For example, you can change a high-gloss steel armchair into a rustic leather one.

Replacing a Glass Material

What if you accidentally apply a glass material to a surface (such as a wall) and want to convert it to a more conventional texture (for example, brick)? When you try to apply the standard material by dragging it onto the glass surface, the cursor box doesn't say "OK." Thus, you have to use the following steps.

➔ To replace a glass material with a texture:

1. Apply a glass material to a surface.

2. Right-click on Standard Material in the main Material menu.

3. Select Open from the pull-down menu. The Material dialog box appears.

4. Activate (put a checkmark in the box) the option for Surfaces with this material are visible from both sides and click OK or press Enter. This returns you to the main Material menu.

5. Hold down Ctrl as you drag the Standard Material onto the surface you want to change. Notice that the cursor is now $^{+}$ OK .

6. Drop the Standard Material onto the glass surface.

7. Open the Texture menu.

8. Select a texture, drag it into your project, and drop it on the surface.