value is mapped to the last color in the color table and any scatter element whose data value is greater than the entered value is displayed using the color selected from the color pop-up menu below.

Reflection

Gizmo supports four types of surface object interactions with lights: ambient, diffuse, specular, and shininess.

Lights have ambient, diffuse and specular components.

Materials have ambient, diffuse, specular and shininess attributes.

Ambient

Ambient reflectance determines the overall color of the object. Ambient reflectance is most noticeable in object shadows. The total ambient reflectance is determined by the global ambient light and ambient light from individual light sources. It is unaffected by the viewpoint position.

Diffuse

A diffuse surface reflection scatters light evenly in all directions. This is the most important factor determining the color of an object. It is affected by the incident diffuse light color and by the angle of the incident light relative to the normal direction. It is most intense where the incident light falls perpendicular to the surface. It is unaffected by the viewpoint position.

Specular

Specular reflection governs the appearance of highlights on an object. The amount of specular reflection depends on the location of the viewpoint, being brightest along the direct angle of reflection.

Shininess

Shininess controls the size and brightness of a specular highlight. The shinier the object, the smaller and brighter (more focused) the highlight.

Normals, Lighting and Shading

When you display a scene with lighting effects, make sure to enable the calculation of normals for all objects in the display list. You can do this in the properties dialog for each object. Depending on the type of object, check the Calculate Normals checkbox or choose from the Normals pop-up menu. These settings are off by default to conserve graphics processing resources.

Normals are required because the shading of every pixel depends on the angle between the normal to the surface and the direction of the light source. In the special case of quadric objects (sphere, cylinder and disk) there are internal settings that let you choose between flat, smooth and no normals. All objects draw much slower when normals are calculated.

Transparency and Translucency

Proper implementation of transparency in OpenGL requires that objects be drawn from the back to the front of the scene, starting with the object that is farthest from the viewer and ending with the nearest object. For any fixed viewing transformation it is possible to sort the displayed objects as long as they consist of primitive non-intersecting elements. If you are drawing compound objects such as quadrics you have no control over the order of their constituent segments. Most wave-based objects are transformed into triangle arrays which can be distance-sorted as long as there are no intersecting triangles.

Distance sorting is computationally expensive so most applications avoid it using various tricks. The "poor man's" solution is to use alpha blending. This type of translucency can provide the desired effect for a restricted range of viewing angles and may require re-ordering the objects on the display list.

To use alpha blending, assign colors to two distinct objects on the display list. The translucent object should have an alpha value that corresponds to its opacity. An opaque object has alpha=1, whereas a transparent