**BRL-CAD**

**HOURGLASS**

The creation of a 3D model of an hourglass took about 1.5 hours. The basic shapes used to create this model were Right Circular Cylinder (rcc), Sphere (sph), and Elliptical Torus (eto).

The top and bottom bases of the hourglass were created using the **rcc** shape. Since both the bases are circular in shape and short, the height was reduced using **set H**. One of the bases was created while the other was cloned using **Primitive** Editor and **Primitive Selection**. The shapes were named as **main1.s** and **main2.s**.

The supports in the side of the hourglass were also created using the **rcc** shape. The commands **set H** and **Scale** were used to adjust the size of the supports. One of the supports was created while the other was cloned using **Primitive** Editor and **Primitive Selection.** The shapes were named as **side1.s** and **side2.s**.

After the creation of the bases and the supports, the glass was created. This was done using **eto** shape. The top part of the glass was created while the bottom part was cloned using **Primitive** Editor and **Primitive Selection**. The bottom part, after being cloned, was rotated 180 degrees around x-axis by selecting **Rotate** command and typing ‘**p 180 0 0**’ in the command window. The shapes, after creating, were adjusted using **Scale** and **set C** commands. The tips of both the shapes do not overlap in the centre. The shapes were named as **glass1.s** and **glass2.s**.

The sand was created using **eto** shapes. The same procedure which was followed for the creation of the glass was used here too. The sand in the bottom glass barely touches the floor while the sand in the top glass forms a funnel-type shape and its tip is just above the point of intersection of the glasses. The shapes were named as **sand1.s** and **sand2.s**.

The grains of sand falling from the top glass to the bottom glass were created using **sph** shape. One sphere was created and using **Scale**, its size was reduced. The sphere was cloned 14 times and each part was placed at different places between the sand in the top glass and the sand in the bottom glass. The shapes were named as **sph1.s, sph2.s, sph3.s, sph4.s sph5.s, sph6.s, sph7.s, sph8.s, sph9.s, sph10.s, sph11.s, sph12.s, sph13.s,** and **sph14.s**.

After the creation of all the parts of the hourglass, different regions were formed.

* **main.r**
* **side.r**
* **glass.r**
* **sand.r**
* **grain.r**

The regions were combined to form one top level combination **hourglass1.c**.

Each region was given different properties and colours and then blasted before being Raytraced.

