Types of Projection in 3-D Drawing

Before attempting to define the various projection styles, the concept of a View Plane (also referred to as a ‘Picture Plane’) should be established first. The View Plane of any image is the implied flat, two-dimensional area where the subject matter is being ‘projected’ onto. The View Plane could be compared to a window through which the subject matter is viewed. Common examples are images viewed on paper or on an electronic screen.

The 3-D subject matter displayed on the View Plane is always artificial since it is depicted on a 2-D surface and is not being observed first hand in the natural world. This means that it is important for the designer to convey sufficient information about the 3-D subject matter so that it can be interpreted correctly when it is viewed by others. There are several ways to present a 3-D object. Some methods might use exaggerated or controlled vantage points, others may attempt to more accurately simulate what the human eye would actually see in the natural world. Either way, describing 3-D objects in 2-D space requires strategic utilization of lines, shapes, angles, and points of reference such as center lines, horizons, etc.

In general, the styles of 3-D drawing methods fall into one of the two categories (paraline and perspective) shown in the boxes below:

### Paraline Views

Paraline views rely on the Cartesian coordinate system of x, y, and z planes/grids. All 3-D objects depicted in this system are assumed to fit within boxes (see the Box Method below). Since the implied boxes surrounding 3-D objects are defined on a grid for reference, the edges of those boxes are aligned parallel to the x, y, and z planes. The edges of those boxes, as well as the planes that make up their parallel sides are therefore considered infinitely parallel to each other in space. This is why the term ‘Paraline Views’ applies to these types of images.

#### The Box Method

The Box Method is a tactic that allows us to envision 3-D objects, even complex forms, within a defined 3-D box. Once the implied box is envisioned with the 3-D object, we can proceed with translating the object into orthographic views:

- **Paraline Views**
  - **Perspective Views**
  - **Orthographic Views** (also known as Multi-View drawings)
  - **Axonometric Views**

### Perspective Views

Perspective views are rendered by strategically drawing lines that all converge at points (known as vanishing points). Perspective drawings can be one-point, two-point, or even three-point, and each version is used to represent how an object or scene recedes into space. Perspective drawings are usually assisted with the presence of reference items such as a center line of view, and a horizon line (one and two point perspective).