Rendering and Technical Illustration with MicroStation 95

by Mark Chaney
Mark Chaney Computer Graphics
New York, New York

A single software package that meets both vector and raster graphic illustration needs doesn't exist at present. However, Bentley's MicroStation 95 addresses many of the real-world issues surrounding 2D and 3D illustrations. Seeing a demonstration of MicroStation 95 is the best way to appreciate its capabilities; and when the opportunity to do so presents itself, the following techniques for rendering and technical illustration will demonstrate how creative and productive this software can be.

Vector Data

MicroStation lends itself to illustration techniques using vector polygons and complex shape elements. Generating unique shapes, which may incorporate any element type, and boring holes through them is a simple task. There are primary shapes such as circles and rectangles, and there are polygons created by joining any MicroStation elements together. These may include lines, line strings, arcs and b-spline elements.

The design reference tools present unique opportunities for vector data layout and technical illustration within one file. Design reference files may be attached to each other simultaneously or attached to themselves more than once. The potential exists to attach 256 design reference files to any design file with each reference file having a unique set of 63 levels to display. Each file may be manipulated by typical scaling, moving and mirroring as well as multiple clip masks and clip boundaries. Another unique feature is the ability to copy isolated elements from any attached design reference file into the active design file.

More robust features allow a user to attach saved views, unfold a 3D model into various views and attach hidden line images. When attaching a design reference, it is possible to nest design references, therefore attaching many files with one command. Using new plot capabilities, pen tables and MicroStation Basic macros, it's possible to make many adjustments at plot time, such as rearranging the order of design reference files and modifying element symbology.

Color Fills

Many users have found the extension of large-format color plotters useful for presentation techniques. MicroStation 95 makes the extension to plotters smooth and easy. In conjunction with the complex shape tools described above, a shape may be placed as a typical wireframe vector image or as an opaque color fill image in the design file. The opaque color fills are input by setting a toggle switch, which does not increase the design file size more than typical elements and also does not adversely affect overall performance.

MicroStation allows one color table to be attached at a time to a design file with 256 colors available per table. However, it is possible to interpolate colors based on

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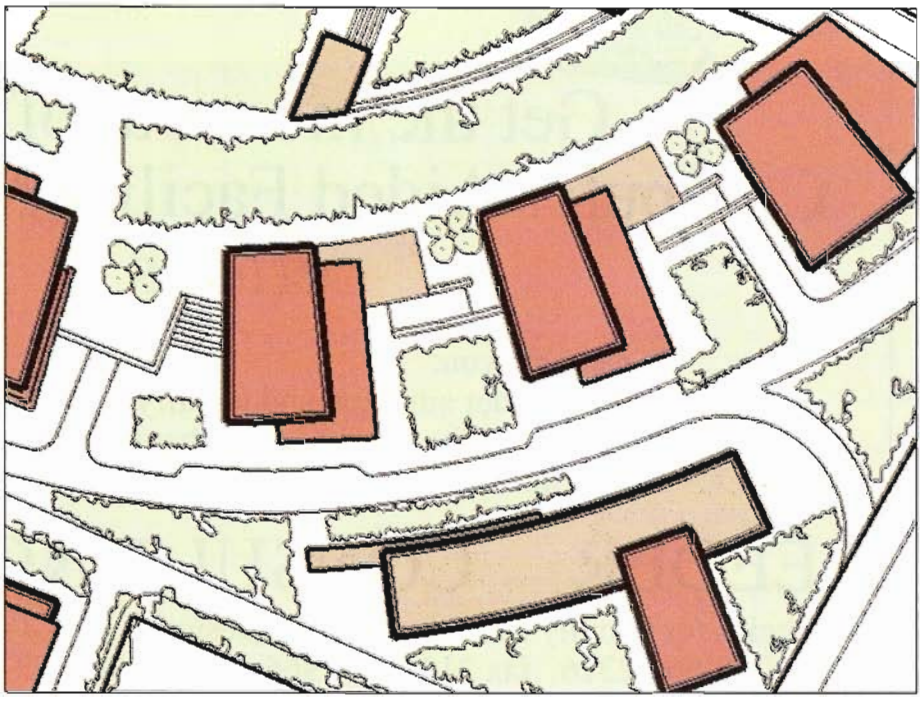

any combination of 256 red, green and blue units of color. This feature suggests there are over 16 million collors available from which to choose and save unique rgb values to custom color tables.

Adding the color fill elements to vector line work, then plotting to large-format color plotters, can produce beautiful results, which historically involved countless hours of hand coloring or cutting and pasting. With color fills and design references, it's possible to generate large-format technical illustrations without a desktop publishing package.

Raster Reference

Raster Reference files provide access to raster data in much the same way that design reference files link vector data through the same dialog box. There are 20 file formats that MicroStation 95 will read into a design file as raster data. Raster reference tools provide easy attachment and manipulation of raster data with the addition of preview capabilities and warping modification abilities not found in design reference files. Preview enables easy selection of raster files before attachment with toggles for transparent, invert, dither and plotting. Warping provides a technique for associating the raster pixels to accurate units of measure and proportionately modifying the image to a scale relative to the design file. Raster data update sequencing may be adjusted forward or backward in relation to vector data. Therefore, technical illustrations including scanned sketches and photographs, rendered images and vector data may easily be collected in one design file for illustration and presentation.

Model view Set-up

MicroStation 95 offers a variety of ways to set up a 3D model for rendering. Camera set-up is the original procedure and is still available, providing a photography analogy for setting camera and target points, clipping planes and lenses. Viewcontrol is a scrollbar set of viewing tools and provides quick, intuitive rotation around an object. There are tools for creating perspective, zoom controls, pan and window area. The dialog box gives data about a view already created and allows all set-up to be done from the dialog definitions.

MicroStation Master Piece has the most thorough view set-up device with accurate dolly, rotate, pan and horizontal level tools. Three perspective types and perspective correcting features round this out as an intuitive and easy solution for setting up accurate perspective views.

Color and Light

MicroStation 95 has standard high-end rendering package features for color and materials including base colors, pattern maps and bump maps. Dialog boxes for defining and assigning materials are easy to understand and include a preview of the current material definition. There are settings for ambient, diffuse, specular, finish, transmit, reflection and refraction. The size and scale of pattern and bump maps may be adjusted according to how they will be assigned. Assignment of materials

With MicroStation 95 shadows may be toggled on or off as well as setting resolution for shadow maps.

is based on level and color, offering over 16,000 possible assignments within one design file. Environment maps are defined to individual sides of an abstract box providing realism to the assigned materials in the design file.

Standard source lighting techniques are provided: "Spotlight" simulates a flashlight or stage light cone enabling scallops on a wall surface. "Point" light radiates in all directions as does a bare light bulb. It creates a wash of light on a wall but does not cast shadows. A "Distant" light illuminates equally all surfaces facing the direction of the source, but light never falls off in intensity. If placed outside a rectangular space, two walls would be lit equally by the source—one exterior and one interior. Typically, it is used to enhance ambient light dramatically with consistent highlights in a space. Each source light has potential for color and cone angle modifications as well as edge diffusion. Placement of source lights and modification after placement are easy to understand from one dialog box.

A second dialog box offers global lighting techniques: "Ambient" is the overall lighting in a space with sliders for intensity and color. "Glashbulb" creates a light source in the center of a view with shadows analogous to taking a picture with a camera and flashbulb. Solar simulates sun positions around the world according to latitude, longitude, date, time and year. A library of cities around the world is provided as well as a global map for positioning. Shadows may be toggled on or off as well as setting resolution for shadow maps. "Solar study" automates the process of rendering a model at various times during a given day. Given this complete set of color and lighting tools, dialog boxes are arranged in groups that are easy to work with.

Render and Edit

Two types of imaging are available: saving an image as a raster file and rendering a view on screen. There are currently six modes for generating raster files including wireframe, hidden line, filled hidden line, constant, smooth and phong. The image may be rendered in bands, allowing it to be split up for more than one machine; or in the case of interruption, it's possible to resume where it left off.

Raytracing with radiosity is provided through MicroStation MasterPiece, which dissolves into the same interface and uses the same color and light associations as those set up with phong rendering. Randering a view typically is performed as the model is being built and enhanced. A wiremesh mode is also available for viewing a model in which all aspects of the rendering process are performed under one interface, a timesaving feature as the model is tweaked for final imaging.

The rendering general dialog box controls stroke, antialiasing and shadow tolerance. Distance cuing and fog color set-up is provided as well. The "view attribute" dialog box provides toggles for renderinga view to see pattern, bump, shadow maps and transparency, which can save valuable time during set-up. The graphics acceleration toggle invokes MicroStation Quickvision, which allows rotating and viewing a model in a shaded or hidden line render mode. This provides information on color and lighting set-up in a real-time mode without enhanced hardware requirements.

Once a model is rendered and saved out to one of the 16 raster file formats, it is also possible to view and edit the raster data in MicroStation 95. Image display provides a viewer for raster data as well as a limited number of raster editing features. Obviously, raster editing packages have more specialized editing features; but the basics for sizing, cropping, rotating and mirroring an image are possible through image display. For color imaging it is possible to equalize, gamma correct, tint, negate and blur. There are five color modes from which to select grey scale to rgb. Should it be necessary to convert from one raster file format to another, MicroStation 95 has a utility to move among more than a dozen formats.

The most luxurious feature of MicroStation 95 is the ability to work from vector data to rendering raster data to technical illustrations, including both types of data, from one interface that is easy and productive in terms of the limited learning curve required for the variety of tasks. It may not be a magic potion, but it certainly relieves a lot of the pain of translating to and from many different software packages and provides creative, easy-to-use solutions for many typically requested presentation requirements. ▼

Mark Chaney can be reached at Mark Chaney Computer Graphics, 250 Front Street, #4, New York, NY 10038, 212/608-0627 phone. For more information about MicroStation 95 contact Bentley Systems, Inc., 690 Pennsylvania Drive, Exton, PA 19341-1136, 610/458-5000 phone, 610/458-1060 fax.