



By Shawn Billings, LS

Shawn Billings is a licensed land surveyor in East Texas and works for Billings Surveying and Mapping Company, which was established in 1983 by his father, J. D. Billings. Together they perform surveys for boundary retracement, sewer and water infrastructure routes, and land development.

## MicroSurvey CAD 2008

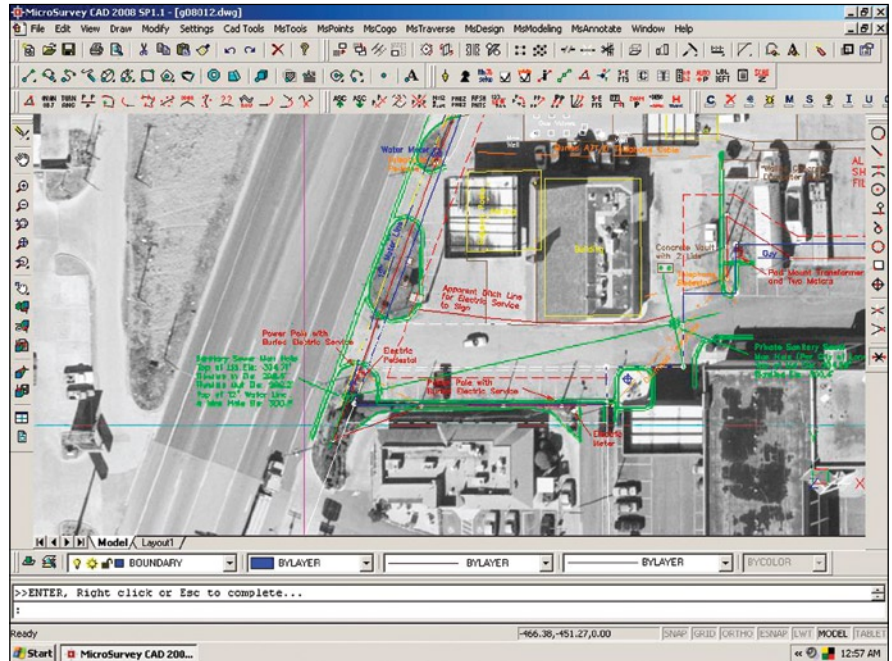
**M**icroSurvey CAD 2008 (MSCAD) represents the latest incarnation of their popular desktop drafting software.

MSCAD is a fully integrated COGO and design suite developed for the IntelliCAD platform, specifically, IntelliCAD version 6.4. For those of you unfamiliar with IntelliCAD, it is a consortium, or partnership, of CAD developers that pool resources for the purpose of developing a stable and full featured CAD engine that serves the needs of its membership.

IntelliCAD is included in the purchase price of MSCAD, is completely AutoCAD compatible, and doesn't translate files to and from Autodesk's dwg file format but actually natively works in and writes dwg files up to version 2007. The compatibility is so interoperable that I was able to not only open dwg files from other programs, but I was even able to perform a copy/paste from clipboard from AutoCAD to MSCAD/IntelliCAD with absolute fidelity. This is an important feature for any company that shares files with other design professionals, as the dwg file format has become the *de facto* standard CAD file format. No one wants an embarrassing loss of drawing features due to file conversions.

MSCAD 2008 is offered in three flavors: Premium, Standard and Basic. Premium was the version tested for this review.

Licensing is handled by a USB key (or dongle). Some of you may not be too enthused about keeping up with a USB key, but MicroSurvey contends that this allows maximum portability. You can

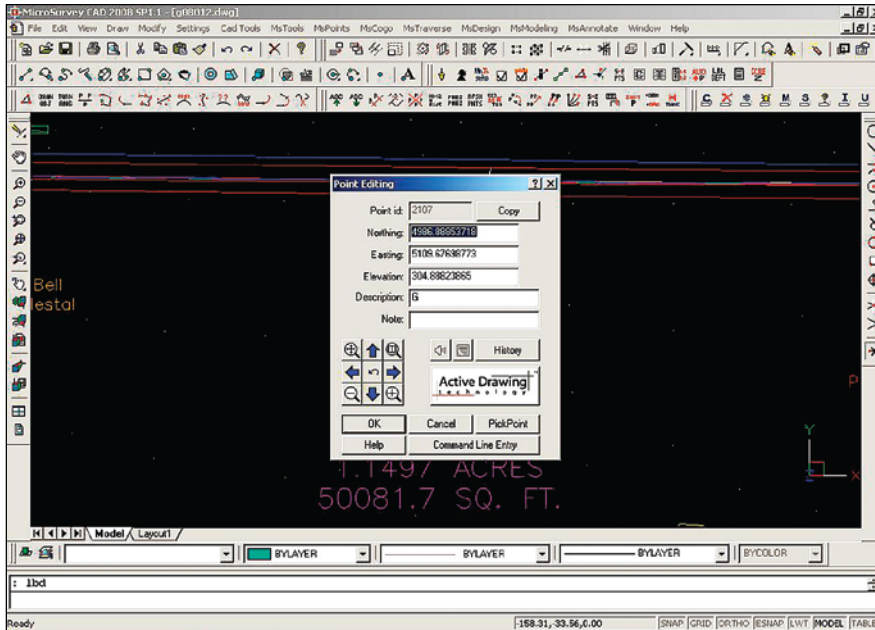


**MSCAD 2008 allows for the easy insertion of georeferenced aerial imagery as a backdrop to drawing line work. Here, the line work from a recent boundary survey is shown above an associated 6 inch resolution monochrome aerial depicting a service station, restaurant and motel.**

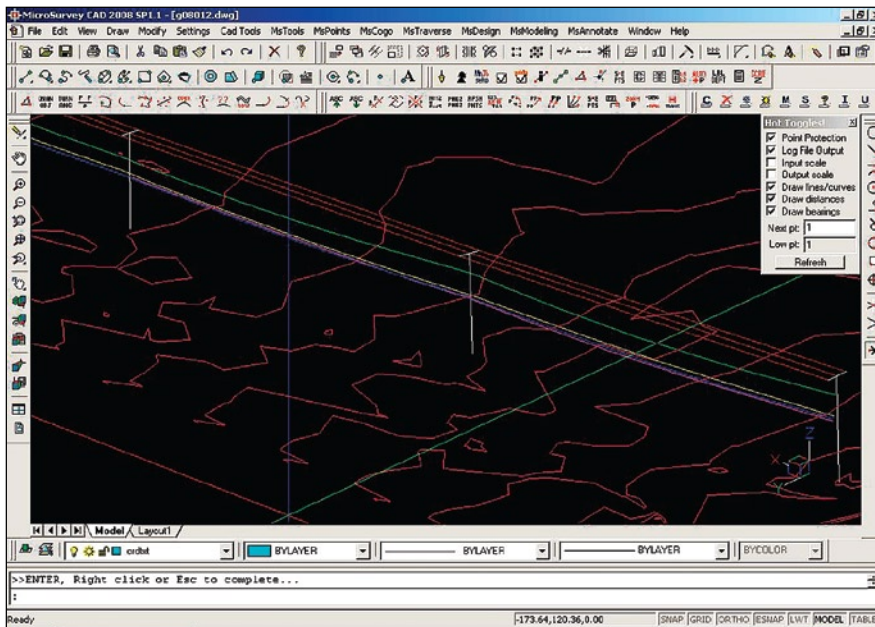
install it on as many computers as you find necessary. The office desktop, the office laptop, the computer at home, etc., could all be loaded up with your fully functional survey software. All you need is the small USB key to work on any one of them. Or if you need to upgrade your computer, you don't have to beg the manufacturer for a new key code when you start reinstalling your business software.

The basic CAD tools you would expect to see all seem to be there. Lines, polylines, 3D polylines, circles, ellipses,

polygons, boundary polylines, Mtext, Dtext, hatches, move, copy, copy/paste, explode, polyline edit, properties manager, layer control, parallel (a.k.a. offset), isolate layers, unisolate layers, ortho, snap, rendering...you get the picture. It's all there. Some of the keyboard commands are different from AutoCAD, but I found myself cozying up to them within a few hours of use. For common commands there is likely to be a toolbar with that task in it available for you to enable as well. One of the pleasant



The Active Drawing Technology allows the user to quickly view or edit a point or its attributes. Furthermore, any changes made to a point are stored in its History which can be viewed as well.



IntelliCAD offers dynamic 3D visualization. This screen capture depicts utility lines and poles and the ground contours beneath for an overhead clearance study. Turning the viewpoint for 3D drafting work can help catch blunders and help work with 2D linework buried under 3D linework and vice versa.

features I noticed was that a single pick on a line of text made the text editor immediately available. There was no need to find a command in a menu or to issue a keyboard command. To edit the properties of the text, a left crossing window followed by a right click on the mouse brings up a pop-up box of options including properties.

Mtext is fully supported as well and operates very much like the AutoCAD versions I've used in the past. Double clicking the text automatically displays the properties manager, which includes an area for editing text.

Let's talk about the elephant in the room when it comes to CAD, no matter whose CAD it is: Plotting. If you can't

get it from the screen to paper, you're in for some real frustration. If you aren't using Layouts in your CAD software, let me encourage you to look into them. For those projects that just don't want to fit on a single sheet of paper, or for those projects that need two or three views of the project on the same sheet of paper, layouts can be an excellent solution. Of course, like anything else there is a learning curve, but MSCAD eases that burden by making several tools available under the View pull-down that allow the user to quickly create and modify Layouts. My personal favorite was the Scale Layout Viewport, which allows you to pick a viewport boundary, view the current scale of that viewport and change it to whatever suits your needs. From the layout view, printing is easy to accomplish. I was able to generate a very pretty paper printout in seconds.

MicroSurvey has made several of my own personal "wish list" items into reality. For one, MSCAD 2008 really helps out the surveyor working in georeferenced coordinate systems. Most of the work Dad and I do is referenced to the State Plane Coordinate System using GPS ties to the NGS CORS network. I like State Plane Coordinates, but even in the relatively low elevations we work in, the scale factors are simply not acceptable to us for reporting distances around a property, so we document all of our work in horizontal distances measured at the surface of the earth. This can cause a great deal of going back and forth with calculations from grid distances to surface distances, which can be tedious. There is also the potentially hazardous effect that scaling coordinates has on your database. Do you scale from the origin, moving your points hundreds of feet from their actual location? Do you scale from a point in the survey, thereby necessitating keeping up with *which* point you scaled from?

MicroSurvey makes this quite easy right up front by prompting the user with an input and output scale factor. This way you can keep your coordinates in State Plane and label your distances at the surface—of course, just remember to explain that in your metadata.

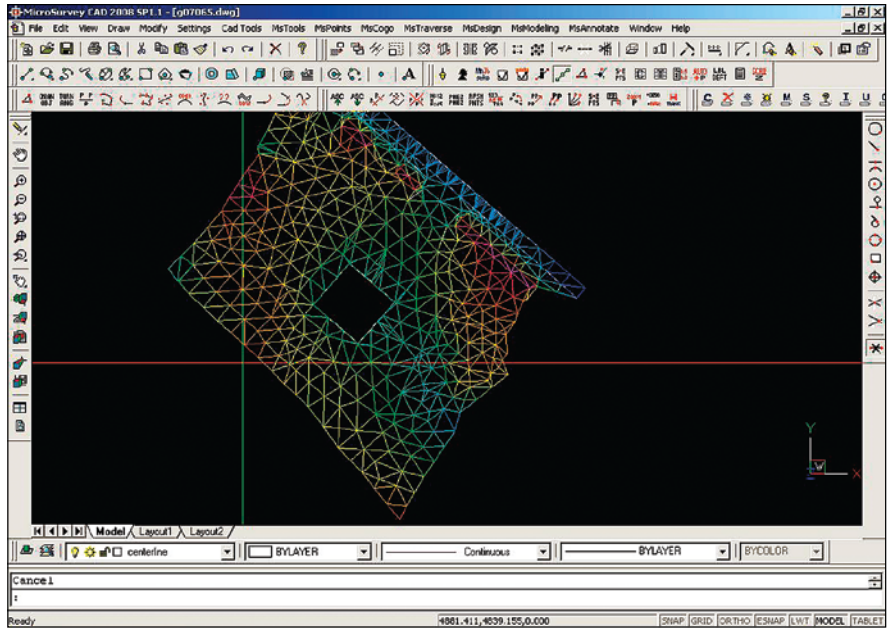
Also along the lines of working with georeferenced coordinate systems, MicroSurvey offers users the ability to work with a number of coordinate systems from across the globe. If you don't see what you need, you can even make your own custom projection.

Many of you may already be aware of the benefits of working with georeferenced coordinates, such as State Plane, for the use of importing georeferenced aerial photos. Most areas within the United States have at some point been photographed to varying degrees of resolution and accuracy. For making presentations, developing preliminary deed sketches, and rough mapping, aerial photos can be a real asset. MSCAD 2008 allows georeferenced imagery to be inserted into a drawing with ease.

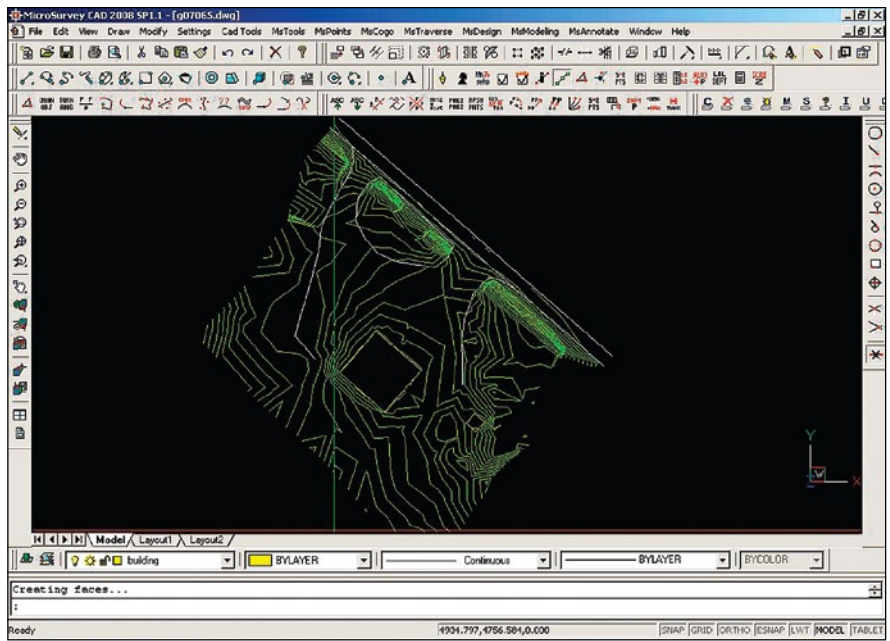
For getting your collected data from the field or sending your design data back to the field, MSCAD 2008 supports several data collectors directly and is able to upload/download their raw files and coordinate files. They, of course, have focused considerable energy on their own data collector, the Field Genius. While MSCAD is certainly a capable program for users of just about any data collector, they have focused a great deal of attention toward the workflow between these two products. Linework generated in the field on the Field Genius, for instance, can be imported right into MSCAD, and points with audio recordings associated with them can be listened to in MSCAD.

The COGO utilities included with the program are impressive. However, be advised that the COGO routines are point-based, meaning you can't just invert from the endpoint of a line to the center of a circle unless there are points in the database representing them. This can be a blessing or a curse. This methodology does limit the use of the very powerful COGO and annotation tools, but it also allows the software to update the linework and annotations anytime changes are made to the points which define them. Should Point 10 need to move over three-tenths after you already have the drawing finished, it is less hassle because when you move Point 10 over, all of the associated linework will move with it and the annotations of that linework will adjust as well.

I really appreciate the fitting tools perhaps because I've spent so many hours in the past attempting to compute the best alignments possible along old county roads for legal descriptions. The best fit line and best fit curve let the user specify points, assign weights to those points and determine the best fit line or arc between them. If one or more of the points appear to be out of kilter with the rest, removing it is done very easily and the line or arc is quickly recomputed. The process can be



Drawing the TIN for a surface aids in a better understanding of how subsequent contours are generated. Here the false coloring of the TIN is set to reflect differences in elevation with magenta being the lowest and blue being the highest.

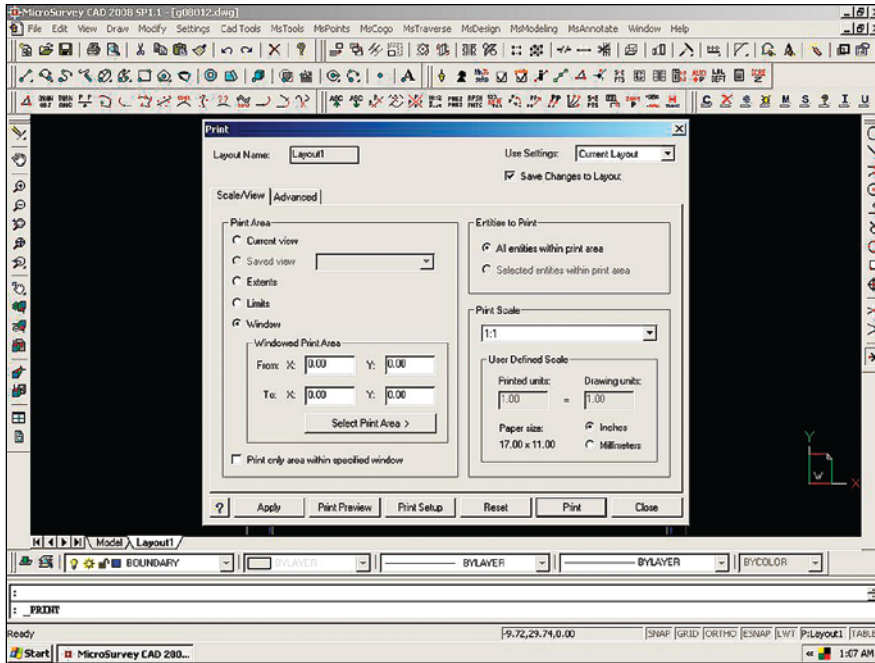


Here the contours have been drawn using the above TIN. MSCAD's use of breaklines is fundamental to fast and accurate surface modeling.

repeated as much as necessary until the user is satisfied, at which the new line or arc is drawn on the screen.

Similarly, under the MsPoints pull-down there is a Helmert transformation routine. This routine is perhaps one that doesn't get pulled off the shelf too often, but is extremely powerful. Let's suppose you are surveying a tract following a relatively modern survey. The tract

boundary has 20 corners, of which you have found seven dispersed around the tract. Obviously you need to find or set the remaining thirteen. Instead of selecting a single point to hold and a single point to rotate to, the Helmert transformation allows you to use all seven points to determine the best rotation, translation and, optionally, scale to move those calculated 20 points into the



Plotting at times can be a real hassle, however, I was able to plot my MSCAD drawings with very little setup or inconvenience. Plotting from Paper Space instead of Model Space may take a new user a little time to learn, but the benefits to using Layouts make the exercise very worth while.

same coordinate system as your seven. Furthermore, if one or two of those seven aren't matching up well, the Helmert transformation will notify you quickly and easily—maybe they were bumped or the real monument is a couple of feet away. It is basically a rapid way to see how well your points match the calls (or vice versa). Try it on your next boundary,

Area labels are configurable for text style, size, layer and color and can be obtained by selecting linework or by entering points. There are also routines for solving geometries based on predetermined areas using either sliding bearing, radial lot line, swing into a line or swing into a curve. There are quite a few entries that must be made to accommodate

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you'll think it's cheating when you see how fast and reliable it is.

For rotating, translating and scaling a set of points the program gives several options. For those situations that only require one of those operations, they can be performed singularly. For other times when you may need to do two or all three, there is a one stop program that allows you to handle all three on one screen.

these routines; it would be nice if they were more automated, but they were functional and I certainly wouldn't want to be without them.

The tools for creating, modifying and controlling the appearance of surfaces are found under the pull-down for MsModeling. The workflow for going from points and breaklines to finished contours includes building and naming a surface created from the points and lines,

then optionally drawing the surface as a TIN (triangulated irregular network), a grid or a triangulated grid, or skipping ahead and generating the contours from the surface itself.

MSCAD makes the visualization of 3D graphics a little easier by offering several user configurable coloring schemes. Contours can be drawn with colorations varied by height or by indexing. Height colorations can also be applied to the grids, should the user wish to draw them. Highlighting index contours by changing the width of the interval contours is fast. Once the contours are annotated, they can be smoothed, making the drawing more aesthetically appealing. The three dimensional graphics can be rotated and viewed from any perspective and rendered. Also within the modeling module are tools for determining volumes between surfaces or between a surface and an elevation.

For subdivision work, MSCAD 2008 has a routine for quickly dividing up a block into lots and automatically placing points at the newly created lot corners. The lots can be designed based on road frontage or setback distance. It would be nice to also have a minimum acreage setting for meeting minimum requirements in some subdivisions, but it is a nice tool nonetheless.

MicroSurvey excels at training through their product videos. If you have a question about a feature, chances are that they will have a video that will show you how it's done. If you are like most other surveyors, you need to get up to speed as quickly as possible with new software. As the software becomes more feature rich and complex, manuals just don't cut it anymore, except for quick reference. The videos are all short and to the point, laying out the procedures for only one or two commands in each segment. I was able to use them and get up to speed very quickly.

Adding to the wonderful training videos, the fact that the IntelliCAD engine (on which MicroSurvey is based) is so AutoCAD familiar, I really didn't feel like I was making a huge leap in using their software. If you are in the market for CAD software, you will certainly want to give these guys a look. Solid COGO, Surface modeling, and a number of great tools all on top of real dwg files at a price that won't break the bank...this software is definitely worth considering. *A*