Carlson UPdate

June 1998 | The Quarterly Newsletter of Carlson Software, Inc. | VOL.8 NO.1

New SurvCADD Module Ships! Advanced Mining

SurvCADD 98 has added a new module: Advanced Mining. It is a $5000 add-on to the basic Mine Module. The Advanced Mining routines together with the standard 5 modules of SurvCADD offer a high-end coal engineering solution for just $10,000 (considerably less than alternative programs).

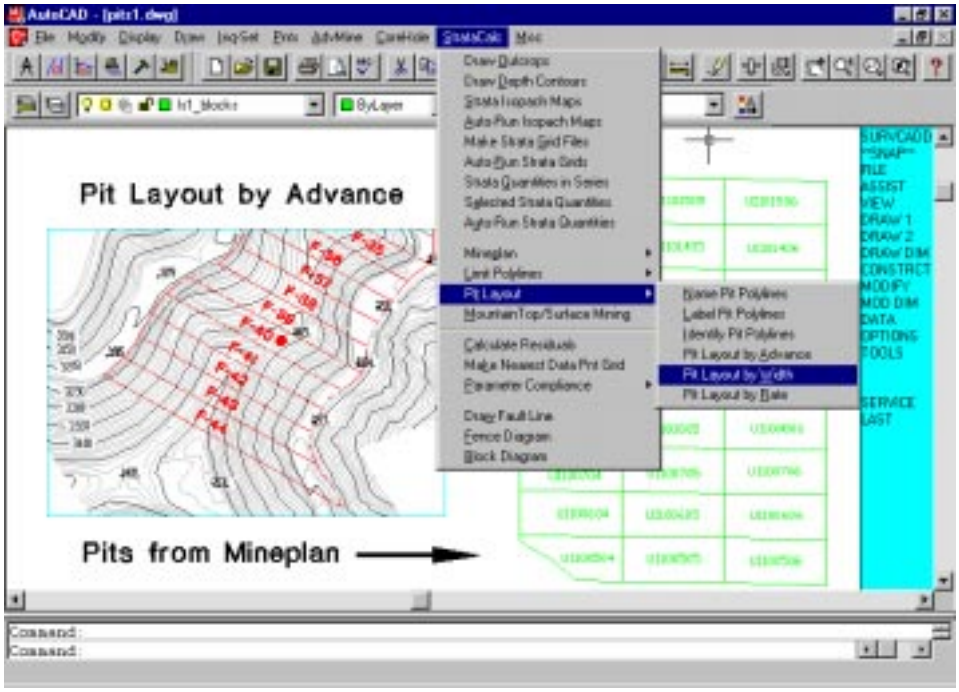
We are often asked to distinguish the standard Mine Module from the Advanced Mine Module. The short answer is that the standard mining routines are geared to mapping and to quantity estimation using "on-the-fly" selections of on-screen drillhole data. The Advanced Mine Module allows the user to work from stored grid models of all strata parameters, and to conduct mine simulation and equipment scheduling for surface and underground operations.

Surface Mine Design

The following sequence summarizes the new world of surface mine scheduling:

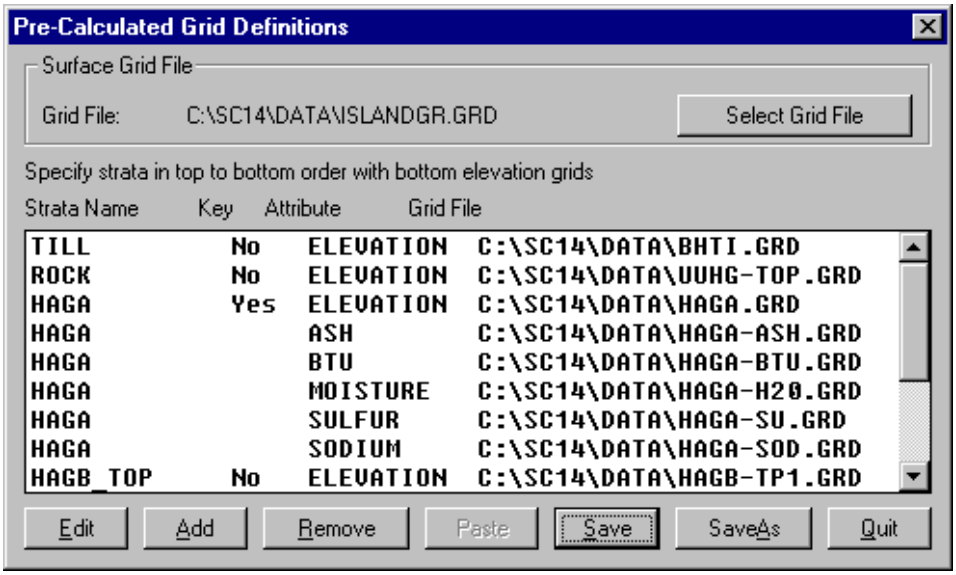
Mine Model → Pit Layout → Equipment Selection → Calendar → Quantities → Timing.

The Mine Model is made by a new command called "Define Pre-Calc Grids". Grids for surface topo, base elevations of strata and qualities of strata are carefully made and organized as shown below, top to bottom. The new Grid File Utilities (GFU) options found in the DTM menu allow alteration of grids subject to conditions, grid equations and grid macros.



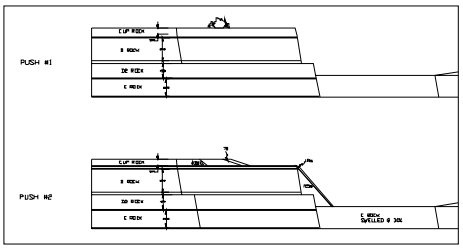
Pits for quantities and timing can be defined by simply attaching a pit name to a closed polyline ("Name Pit"). Other options include converting polylines with interior text to pits ("Pits from Mineplan") and laying pits out by "advance" along a centerline or by parallel "widths".

Equipment such as draglines, shovels and dozers can be assigned to individual pits, or to vertical segments of pits. A flexible "calendar" is provided which assigns working days and shifts to individual pieces of equipment. The calendar has been described as the "most powerful in the industry". Factors such as move delays, maintenance delays and location-based timing effects can be built into the calendar and pits. Pits are also assigned grid-based or absolute value



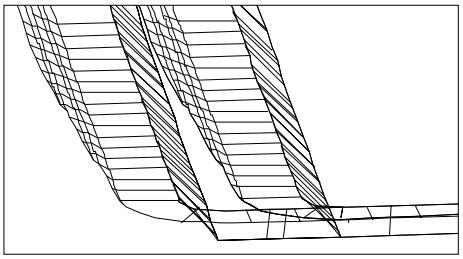
HIGHLIGHTS

quantity and quality data. Surface Timing is then selected to develop reports and color-coded pits based on user-defined time periods or overburden/coal amounts. Any number of "what-if" scenarios can be attempted.

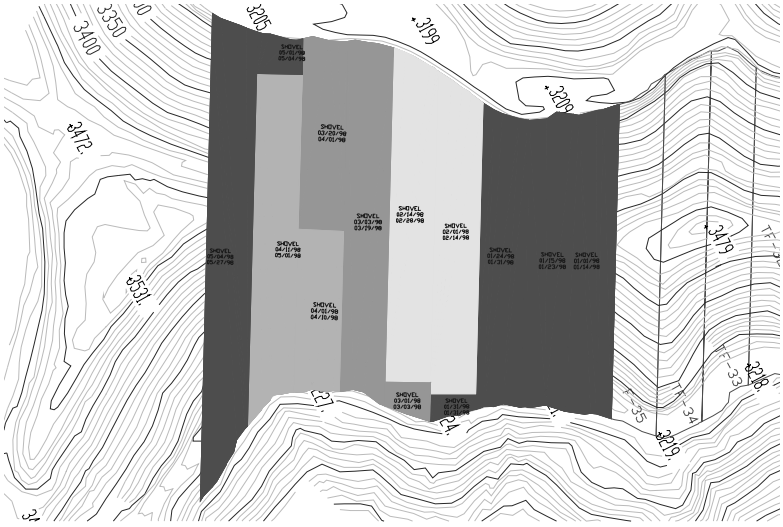


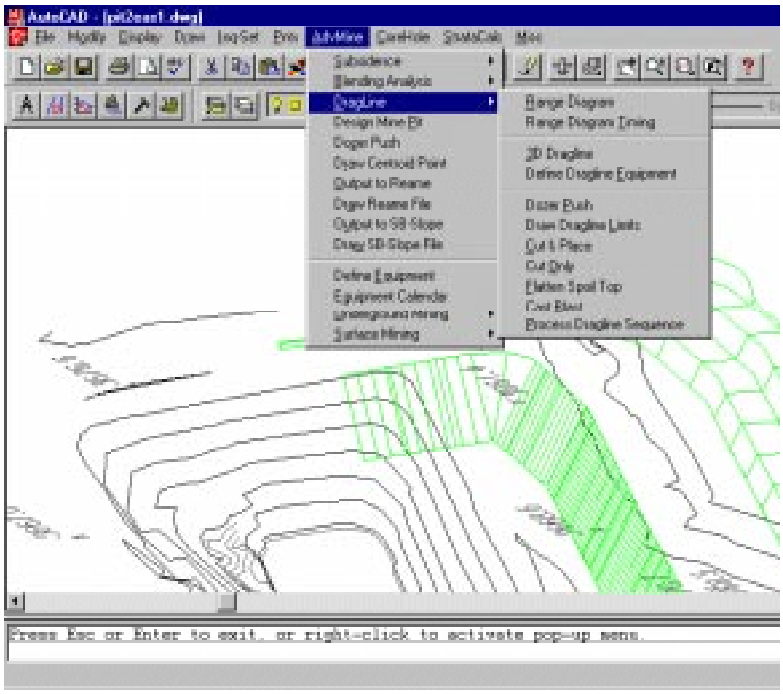
DOZER PUSH EXAMPLE

Note the greater monthly mining in the center zones at right because of the lower overburden. Sophisticated users can develop grid file "models" that reflect "mining" grids as opposed to pure "geology" grids. Mining grids contain the often lesser qualities and greater coal thickness recovered where partings cannot be precisely separated and top and bottom rock is mined along with the coal. Still another critical issue is the matter of true "lean-back" overburden quantities versus the vertical "cookie-cutter" quantities computed above. While the above example is excellent for long-term planning, the Advanced Mine Module will associate correct multi-slope quantities such as those at right using "Design Mine Pit". This assists short-term planning.



The Advanced Mine Module includes a wide variety of tools for designing mines in cross section view and in 3D view. These methods are fully integrated with the actual mine model grid files, leading to real-world estimates and correct final plan view layouts.





Underground Mine Timing

Schematic or Full Projection Timing: The underground mine timing can be based on panel centerlines or full projections. The layout of panel centerlines uses dialog-based input for the number of entries, pillar dimensions and cut dimensions. Alternately, full projections with panel outlines and pillars can be generated using the Advanced Projections routine, which has been modified to create precisely dimensioned panels requiring little or no editing. For mines with symmetry, entire panel sections can be copied and repositioned. Mines can consist of combinations of "schematic" and "full projection" designs (see graphic on next page). Actual pillars offer the advantage of obtaining true extraction ratios. Even "frozen" pillars will be detected for timing purposes. Complex timing plans can be developed quickly using coal tons or linear feet of advance.

Panel Linkage and Equipment Options: Panel sections are linked either by directly connecting centerlines (Place Panel) or simply by graphically picking the order of mining (Pick and Place). "Pin points" define where equipment stops in a panel and turns up side panels prior to proceeding. The timing handles both "advance" and "retreat" extraction ratios for each panel. "Difficulty Factors" will slow down or speed up equipment based on mine conditions. Panels can be assigned a difficulty factor, or a difficulty grid file can apply to the entire mine. Precedence can be assigned to panels such as longwalls to prevent mining prior to completion of adjacent, mandatory sections. Multiple equipment can be launched at any location within the mine, with move times covered by user-defined "delays". Equipment will progress forward through seam thickness grids and quality grids, leading to precise tonnage and quality predictions by time period. Final maps are color coded according to preset or user-defined calendar periods.

Costing: The Advanced Mine Module will report all time, tonnage, volume, quality and area-based values for any timing exercise. The "User-Defined Attributes" option will allow derived calculations for roof bolts based on area, labor costs based on time and

equipment, track costs and electrical costs based on centerline distance or linear feet of advance—in short, any cost that is based on time, equipment, tonnage, area or distance traversed. In this way, mine plans can output hard numbers for both quantities and costs. All reporting can be exported to Excel or Lotus. The Excel link opens Excel and populates the table automatically.

Production Timing

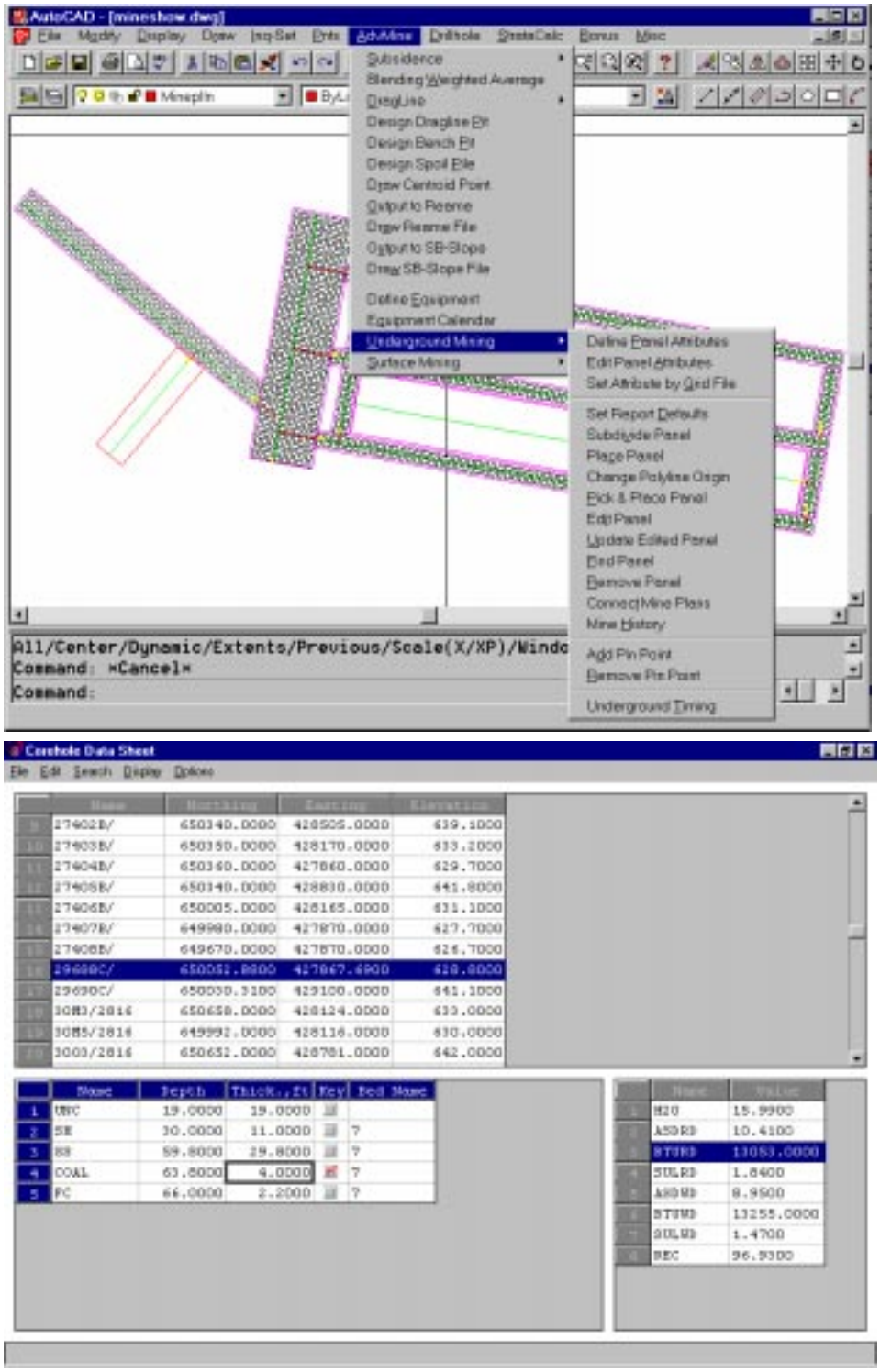
Underground and Surface: Production-based timing is the fastest form of timing in the Advanced Mine Module. It applies to both surface and underground mining. No calendar or predefined equipment is involved. The user simply enters production goals based on waste cubic yards or tons of mineral extraction (selected from a list of timing variable options). These goals are associated with user-defined time periods in a dialog box. Then any surface or underground layout of pits and panels can be sequenced through based on the mine model information. It's a 1,2,3 process. (1) Layout the pits or deep mine panels in numerical order. (2) Assign direction to the pits/panels. (3) Select Production Timing, verify your production goals and calculate. The same color-coded timing plans with full text reporting will result. A new columnar text report summarizes the data in a compact, yet highly readable form.

Mine Simulation

Dragline and Dozer Simulation: The Advanced Mine Module has incorporated into the AutoCAD environment cross-sectional simulation of dragline and dozer push operations. In addition, a 3D dragline routine is provided. The dragline routines can help determine the relative merits of extended bench, 2-pass and spoil-side dragline mining. Dragline reach and bucket dimensions as well as angle of repose can be entered. Users can then look for situations that cause rehandle or otherwise impede or slow mining. There is even a "cast blast" routine that lets the user define a cast blast profile and distinguish overburden removed by blasting versus equipment. All cross-sectional and 3D analysis is based on actual terrain models in the form of section and grid files.

Geology Enhancements

The Advanced Mine Module includes a simple Drillhole Editor as shown. All drillholes, strata within drillholes and qualities within a strata can be reviewed at a glance. The editor is useful for data review, editing and initial entry. A new Pit/Channel Sample routine allows the user to define any combination of thickness, structure and quality data to be associated with a pit or channel sample. These samples can then be added to the screen/data base and used in future modeling.



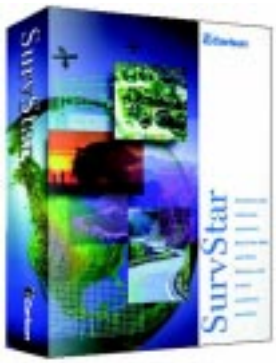
Geologic modeling now includes sector-based sampling of coreholes and the ability to limit the number of coreholes (total or per sector) utilized within any zone of calculation. Other new features include "Residual Analysis" for determining the best modeling method and "Strata Limit Polylines" for constraining where strata outcrop or subcrop.

Summary

The Advanced Mine Module brings to the Windows and AutoCAD platform the functionality previously reserved for Unix operating environments, with the added advantage of ease of use and convenient drawing and data exchange. It represents the logical progression for coal engineering.

GPS/Total Station News

SurvStar 1.41 Released



With the market for GPS continuing to grow, Carlson Software's data collection software, SurvStar, is growing with it. SurvStar now works with Nikon/Novatel GPS, Trimble, Ashtech, and the Wild/Leica MC1000 receivers. For the surveyor that is looking for software that can interface with a total station, SurvStar is working on Nikon, Topcon, Zeiss, Wild/Leica, Geodimeter, Sokkia and Pentax total stations. SurvStar is available to run on the Husky FS series hand held computers as well as the Microflex DAP systems. Both are DOS-based and capable of withstanding the rugged conditions of the field, i.e. temperature, weather, and dust.

As a surveyor's tool, SurvStar offers total integration and simplicity. Whether you want to collect data, stakeout points, or stakeout elaborate TIN files, SurvStar makes it easy with clear menus that guide you through your work. Survstar also brings SurvCogo-(our full Cogo program) to the field, allowing you to not only inverse, traverse, and take sideshots, but use bearing-bearing, bearing-distance, distance-distance, and coordinate transformation, to name just a few.

Combining Survstar with SurvCADD '98 or our new Carlson Survey, delivers the premium high-end "Office-to-Field" software solution.

SurvStar Packaged with Nikon/Novatel GPS

After presenting SurvStar to Nikon/Novatel in New York this past September, Nikon's survey instrument division decided to package SurvStar with the Novatel GPS Outrider RTK system. SurvStar was chosen to be sold by Nikon/Novatel GPS dealers throughout the U.S. and South America.

The Novatel Outrider RTK system provides centimeter accuracy and is a complete solution for GPS surveying and mapping applications. Please call Nikon at 1-888-NIKON GPS (645-6647) to find your closest dealer. Or call our Maysville office and we will be happy to direct you to a dealer near you.

Survstar Grade Control and Navigation

Developing cutting edge technology has always been Carlson Software's specialty and our latest GPS application carries on that tradition. Harnessing the power of GPS, our Grade Control and Navigation software is in a position to change the way dirt is moved and coreholes are drilled. By mounting ruggedized GPS receivers on dozer and drill rigs, the software is able to relay precise information to the equipment operator and tell them the "cut" and "fills" necessary to achieve a desired grade or how to navigate to a corehole point.

First the grading. You begin with an existing surface and its topographical data. From that data you create a grid file in the DTM-Contour module of SurvCADD that contours the existing ground. You then create a plan-view file of what you ultimately want the site layout to be. Those files are uploaded into the ruggedized field computer located in the cab of the dozer. The field computer is then connected to the mounted GPS unit and the operator is ready to begin. Using the real-time GPS unit to update the dozers elevation in relation to the desired grade contained in the plan-view grid file, Survstar Grade Control is able to relay to the operator the exact cut and fills necessary to achieve the desired grade to within 0.1".

Using the same technology and software with Navigation, in the Cogo-Design module of SurvCADD you create a plan view file containing the points where you want to navigate a drill rig to drill core holes. The ruggedized computer displays a plan view of a vehicle and a target symbol for each point. The screen displays the current azimuth of the vehicle and the distance and azimuth to the target. When you are close to the target the screen displays O.K. You then know that you are at the precise position to drill.

Husky Dealer

Carlson Software is now a registered dealer for Husky Computers. We are offering the complete FS series line, including the new FS/3 with 10 MB of RAM. We are also offering the FC-486 and the new FC-PX5, Husky's ruggedized field computers. Please call us for a price on any of these units.

DAP Dealer

Carlson Software is now a registered dealer for DAP Technologies Microflex hand held field computers. We are offering the complete PC line which includes the 9500 and the new 9800. Please call us for a price on these units.

National Mine Design Senior Project Competition

Beginning this year Carlson Software will be supporting a National Mining Engineering Senior Project Mine Design Competition. The competition is open to all universities with accredited BS programs in Mining Engineering and all Mining Engineering Seniors. Seniors interested in competing should use the Carlson Software SurvCADD package in their final project to be considered. Each mining school will be allowed to submit one project for review by Carlson Software judges. Carlson Software will provide each participating school with a plaque to recognize the winning student selected by its faculty, as well as the first, second, and third place awards to the National Finalists.

Projects must be submitted no later than June 30, 1998. Awards will be made on July 15, 1998. National Finalists will be written up in the SurvCADD Newsletter, which is sent out to all SurvCADD Users. Seniors scheduled to graduate in December, '97, are also eligible for consideration, however their projects will be considered with the Spring, 1998 graduates.

Awards

Plaques will be awarded to recognize the wining student at each university.

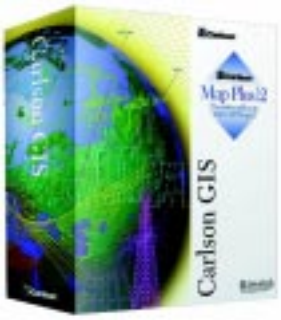
Third Place National Finalist will receive a plaque and $500.

Second Place National Finalist will receive a plaque and $1,000.

First Place National Finalist will receive a plaque and $2,000.

To be considered for this competition, see your advisor. Enhance your future while improving your job skills.

CarlsonGIS Product MapPlus™ Now Available!



GIS Solutions: As the information age reaches maturity, the Geographic Information System or GIS has become more than just a buzzword throughout the mapping community. Automated mapping has become one of the fastest growing software markets. Users across the nation, public and private, are looking for solutions that make their mapping tasks easier. The user who keeps paper or digital records that refer to geographic regions is already managing a Geographic Information System (GIS). The advantage of software is efficiency; doing the same tasks in less time, therefore requiring fewer resources.

GIS Advances at Autodesk: Autodesk, realizing the importance of providing automated mapping solutions, has entered the market with a family of GIS products. The Autodesk GIS products include AutoCAD Map, Autodesk World, and Autodesk Map Guide. AutoCAD MapR2 was released in the second quarter of 1997. Since its release, Carlson Software has gone to work maximizing the utility of AutoCAD Map and its collection of GIS tools and features.

GIS Advances at Carlson Software: Carlson GIS, the GIS development arm of Carlson Software, has produced MapPlus, an AutoCAD Map add-on, released in June 1998. MapPlus is a GIS solution realizing the consumer need for CAD capabilities and database management. The added functionality of AutoCAD Map and MapPlus yields an easy to use GIS system.

Database Connections: Automated database connectivity is among the many features of MapPlus. The user can edit, create, and manage ODBC compliant database tables within the AutoCAD Map environment. Table links are automatically registered with the MapPlus system. Analysis of map features becomes a simple point-and-click process. MapPlus reduces database configuration time, effort, and maintenance. Data handling can be the most cumbersome part of a GIS. A PC-based mapping system can require coordinated effort, using many separate applications. MapPlus makes external databases accessible from within the AutoCAD environment. The user does not need to exit the graphic interface to manage external data.

Topology Improvements: MapPlus enhances the topology functions of AutoCAD MAP. Links, polygons and nodes, can be added to a topology, as easily as drawing a polyline. Multiple topologies can now be cut against each other, yielding complex analysis results from a single selection process. Bonus display, draw, and modification functions make data input easier and reduce many keystrokes required to do straightforward tasks.

Query Improvement: The topologies and externally linked tables of a drawing can be queried with new MapPlus Query functions. The results of these queries can be output to a printer, or to a file. Information can be retrieved about the area and perimeter of drawing polygons and printed using the MapPlus Process Layerized text routine.

Database Linkage and Drawing: MapPlus allows the user to link blocks in the drawing to fields in the database. Once linked these attribute blocks can be automatically updated using the MapPlus Data Label routines. This Data Label process is bidirectional. The database, once linked to drawing blocks, can be updated from the drawing as well.

Data Capture: In response to requests from our customers to create database tables from drawing text and block attributes, MapPlus includes Data Capture routines. Using a selection of sample text or blocks, Data Capture writes the text or attribute values out to the database.

Future plans for Carlson GIS will be to continue development of applications for AutoCAD MapR2 and MapR3 (due later this summer). Future developments will include industry specific mapping solutions. The three products to watch in the future will be the Carlson Utility GIS, Mining GIS, and Parcel GIS. Utility GIS will be designed specifically to handle the special needs of the electric, water and gas utility companies. Mining GIS will address land management, legal compliance, and productivity in the coal and mineral mining markets. Parcel GIS will provide land parcel management solutions for planning departments, tax assessors, and citizens. The future of GIS is now, and Carlson GIS will work to produce affordable GIS solutions.

Upgrading AutoCAD R14 or MapR2?

When you upgrade from your present R12 or R13, you face a critical decision since you are involved in mapping. You face a choice of upgrading to standard AutoCAD R14, which is excellent, or pay a little more for AutoCAD MapR2. List prices are:

R14 Upgrade from R12	$695
R14 Upgrade from R13	$495
MapR2 Upgrade from R12	$895
MapR2 Upgrade from R13	$695

An easy deduction from the information above is that MapR2 costs only $200 more. This is true if you upgrade straight to MapR2 from R12 or R13. However, if you upgrade to R14, then decide that you need MapR2, the upgrade price is $695. That means you would end up paying $500 more by not going straight to MapR2. Is this extra $200 justified, it depends on the users needs. In almost all cases, we suggest that you go ahead and upgrade to MapR2. Here are some of the reasons why.

Drawings: You can attach multiple drawings and query only the objects you want into the current drawing. A frequent problem in mapping is the desire to obtain portions of four or more tiled drawings. The area you need falls into the middle. With conventional AutoCAD, you would need to open each drawing, WBLOCK out the corners, then being a new drawing and insert the pieces. With AutoCAD Map, you simply select the drawings as source drawings, specify the area (as a rectangle, circle, or polygon) you wish to import, and its done. You also have control over the layers that come in, and the ability to alter properties as they come in. An example being to change the width of all major contours as the geometry is imported.

Data Integration & Exchange: You can prepare yourself for flexible data exchange using MapR2. Import/export maps in ESRI ARC/INFO Coverages, ESRI ArcView® Shape, MicroStation DGN, MapInfo® MIF/MID files, DXF, Autodesk MapGuide SDF, and DWF (export only).

Link map objects to external databases through direct drivers for dBase3, Oracle, and ODBC-compliant databases.

New Employees

Steve Richards, P.E., M.S. Engr Mgmt, MBA, with 22 years mining experience, joined the company in December 1997. Dedicated to providing customer support and training for the Mining and Advanced Mine Modules.

Andrew V. McNeill, graduate of Centre College in Danville, Ky, joined the company in September 1997. Dedicated to sales and support of Carlson's GPS line of software.

Stephen Berry, B.S. in Geography from the University of Georgia, joined the company in July 1997. He is dedicated to the development & support of CarlsonGIS products.

Gautam C. Kasturi, Graduate MS, Geotechnical Engineering, Syracuse University, NY, joined the company in June 1997. Currently involved in programming for SurvCADD's Cogo, Hydrology, DTM, and Carlson Survey modules.

Carrie Morton, E.I.T., M.Eng in Civil Engineering from MIT, joined the company in September 1997. Dedicated to the development of GPS & Total Station applications.

Derek E. Cross, A.A.S., joined the company in February 1998. He is dedicated to AutoCAD and SurvCADD technical support.

Grant Wenker, E.I.T., M.S. in Geological Engineering from the South Dakota School of Mines and Technology joined the company in March 1998. He offers mining support and sales for the western U.S. region.

Barkley Hensley, R.L.S., joined the company in April 1998. Dedicated to survey services and technical support.

Steven J. Schafrik, undergraduate intern VPI, Mining & Mineral Engineering, Senior, joined the company for Summer 1998. Currently involved in programming pilot projects for Carlson GIS.

Training Schedule

Description	Days	Price
AutoCAD R14 Upgrade	(2-day)	$500.00
AutoCAD Map R2	(2-day)	$500.00
AutoCAD Level 1	(2-day)	$500.00
AutoCAD Level 2	(2-day)	$500.00
AutoLISP Level 1	(2-day)	$600.00
SurvCADD Fundamentals	(1-day)	$250.00
SurvCADD Cogo/Design	(1-day)	$250.00
SurvCADD DTM/Contour	(1-day)	$250.00
SurvCADD Sect/Profile	(1-day)	$250.00
SurvCADD Hydrology	(1-day)	$250.00
SurvCADD Mining	(1-day)	$250.00
SurvCADD Road Templates	(1-day)	$250.00
CarlsonGIS MapPlus	(1-day)	$250.00
AdvMining Surface Timing	(1-day)	$250.00
AdvMining Underground Timing	(1-day)	$250.00
AdvMining Geology	(1-day)	$250.00
AdvMining Dragline/Dozer Push	(1-day)	$250.00

Training Calendar

July 1998

Monday	Tuesday	Wednesday	Thursday	Friday
		1	2	3
6 SurvCADD Fundamentals	7 SurvCADD Cogo/Design	8 SurvCADD DTM/Contour	9 SurvCADD Sect/Profile	10 SurvCADD Templates
13 AutoCAD Level1	14 AutoCAD Level1	15 AutoCAD MapR2	16 AutoCAD MapR2	17 MapPlus
20 AdvMine Surface	21 AdvMine Underground	22 AdvMine Geology	23 AdvMine Dragline/ Dozer	24
27 AutoCAD Level2	28 AutoCAD Level2	29 AutoLISP Level1	30 AutoLISP Level1	31

August 1998

Monday	Tuesday	Wednesday	Thursday	Friday
3 AutoCAD 14 Upgrade	4 AutoCAD 14 Upgrade	5 AutoCAD Level2	6 AutoCAD Level2	7
10 SurvCADD Fundamentals	11 SurvCADD Cogo/Design	12 SurvCADD DTM/Contour	13 SurvCADD Sect/Profile	14 SurvCADD Templates
17 AdvMine Surface	18 AdvMine Underground	19 AdvMine Geology	20 AdvMine Dragline/ Dozer	21
24 AutoCAD Level1	25 AutoCAD Level1	26 AutoCAD MapR2	27 AutoCAD MapR2	28 MapPlus
31				

Carlson Software, Inc.

102 West 2nd Street, Suite 200
Maysville, KY 41056
Phone (606) 564-5028 Fax (606) 564-6422