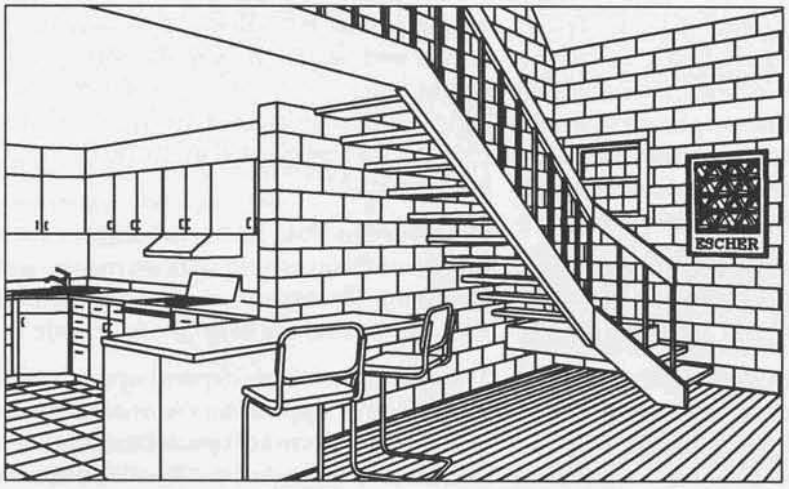
# Reference Point

*Volume 2, Number 3* *Technical Resources for DataCAD ®* *Summer, 1992*


# 3D Modeling Enhancements




*Stairs by **3DStairs**; Kitchen components by **Cases Templates**; Wall and floor poche by **TouchUp** using hatch patterns by Chris Glass*

**The 3D modeling** capabilities that are built in to DataCAD provide a powerful set of tools for the efficient construction of 3D models. Once the user is familiar with the ways in which selected views correspond with the creation or modification of 3D entities, very sophisticated models may be easily built. To further speed the process, a number of tools are available.

Beginning with the **AEC-Modl** macro, Cadkey, Inc. has developed a series of DCAL macros that provide parametric tools for the creation of complex 3D assemblies. **AEC_Modl** generates door and window assemblies, **RoofIt** builds roof elements, and the forthcoming **3DStairs** macro facilitates the creation of complex stairs constructions.

Third-party vendors have been active in providing tools for 3D modeling. Two roofing macros are available: **Roof Builder 2** and **Roofer**. Third-party sources have also created a number of libraries of 3D model components in symbol form. Casco Systems has recently released a DCAL macro, **TouchUp**, which places hatch (based) patterns on the surfaces of 3D models.

These tools, used separately or in combination, greatly enhance the creation of complex 3D models in DataCAD. Three articles in this issue provide an overview of the tools available as enhancements to the 3D modeling process.

## *In this issue:*

In addition to the series of articles on 3D modeling enhancements, a major article appears on the use of **DOS 5.0 tools** for the creation of an optimal system configuration for running DataCAD. It follows up on the article in the Winter, 1992 issue in which DataCAD operation and the allocation of RAM and other system resources to various of DataCAD's functions were discussed.

The DOS article comes in response to requests that *Reference Point* publish the contents of CONFIG.SYS and AUTOEXEC.BAT for a typical DataCAD installation using DOS 5.0. This seems like a simple enough request. As can be seen from the article, fulfilling the request is somewhat more complicated than one would first expect.

**Technical Support** contains information about a number of topics. A discussion of 'internal diagnostic fault 40' provides an interesting glimpse at how the introduction of new features can lead to a conflict. Solution to a problem when DXFing to AutoCAD is given. A method is discussed for recovering from a WINDOWIN\EXTENTS problem; definition of a display scale is described as part of the solution to the problem. Information is provided on the S3 graphics driver.

**Points of Reference** includes a report on a demonstration of David Pendery's rendering package. A new DCAL macro is announced: **SetPens**, by Bruce Kaplan. A listing of DataCAD training centers and contact people is provided.

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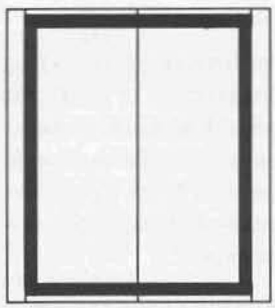
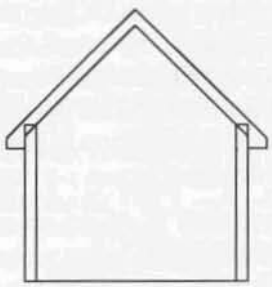
3D Modeling Enhancements:

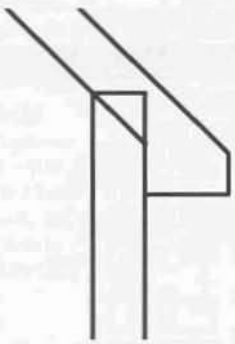
# RoofIt

*RectRoof insertion mode equal overhang*



*PolyRoof insertion mode user selected overhang*





*Building Section and Wall Section Detail bases generated from **RoofIt** model with Clip Cube and Save Image*

Cadkey's Spring, 1992 maintenance release, **RoofIt**, is a DCAL macro that functions as a parametric roof form construction tool. With it, the user may construct six basic roof types: Gable, Hip, Boston, Gambrel, Mansard, and Shed.

Menus control settings for: plate height, roof pitch (in architectural terms), and overhang. Soffits may be defined as horizontal or inclined; Fascia may be square (perpendicular to the roof plane) or plumb. EndWall toggles construction of wall 'infill' between the top of the wall (defined by the plate height setting) and the underside of the roof.

The Join command allows the user to tie roof forms together. **RoofIt**'s main menu provides access to the Layers, Hide, 3D Views, and 3D Entity menus.

**Some basic rules** apply to all roof types and construction methods:

- Snap to points on the ***outside*** of the walls.
- Select points in ***clockwise*** order.
- The first two points selected are ***lateral*** to the roof ridge line. The macro prompts refer to points 'lateral to' the ridge line; in most cases, this means parallel to it.
- When using Join, toggle Join on ***before*** drawing the roof form to be joined to an existing roof. Think of this as being similar to the SavImag option in Hide, which must be on before processing in order to save the image at the end.

Beyond the simple construction of models, **RoofIt** affords the user with some unique opportunities to link 3D modeling with other aspects of the design process.

Because **RoofIt** draws the lower edge of the roof thickness at the inside of the exterior wall (at the elevation determined by the plate height), wall and building sections may be generated from the model by using the Clip Cube and Save Image functions in DCAD 3D. *See illustrations at left.*

At first glance, all of this seems relatively straightforward. Many users, accustomed to the ways in which DataCAD operates and familiar with the similarities among various menus, tend to leap into new macros, etc. without ever looking at the documentation. Read **RoofIt**'s documentation.

***More than with any other DataCAD 'add-on,' the user is rewarded by a careful reading of the documentation for RoofIt.***

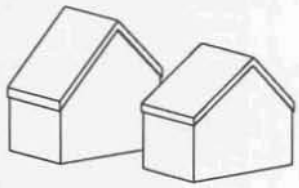
The real flexibility and power of the macro is not tapped until the user becomes familiar with the toggle between PolyRoof and RectRoof (F1 in the main menu) and with the options enabled by PolyRoof for Gabel, Gambrel, and Shed roofs.

**When set to RectRoof**, a rectangular roof is drawn and variation from the settings for plate height, pitch, or overhang is *not enabled*. Overhang, for instance is constant at all four sides of the roof. Roof forms created in RectRoof input mode are symetrical.

**When set to PolyRoof**, variation of the values for one of the available settings menus *is enabled*. Overhang, for instance, may vary at each side of a roof. *See illustrations at left.*

The options available depend upon the roof type selected and appear in the main menu when PolyRoof is selected (F1 position reads PolyRoof). The chart on page 7 of the **RoofIt** documentation illustrates the variables available for each of the supported roof types using PolyRoof input mode.

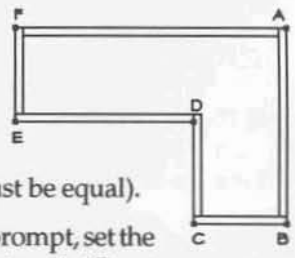
The ability to create a number of complex roof forms is enabled by the PolyRoof input mode. Some examples are illustrated in the following:



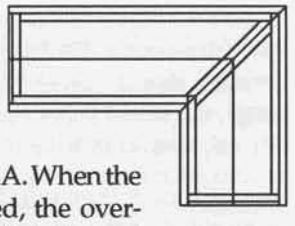
These two **Saltboxes** were draw using different options in the **RoofIt** menu; each roof was drawn using Gable and was placed over the same base.

The roof on the left was drawn using the PlatHght variable (8'-0" at the front, 10'-0" at the rear). The roof on the right was drawn using the Pitch variable (8:12 at the front, 12:12 at the rear).

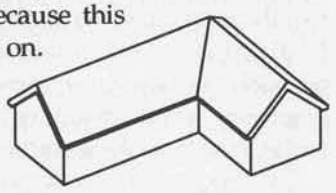
An **L-shaped Gabel roof** may be created by constructing two separate roof forms. Use PolyRoof with overhang as the variable. The following uses the base illustrated at the right (the length of the walls described by points B & C and points E & F must be equal).




Snap to point A; at the prompt, set the overhang to 1'-0". Snap to point B, set overhang to 6"; snap to point C, set overhang 1'-0". Snap to point D, set the overhang to 0. *An overhang of 0 establishes the location of the roof valley.*

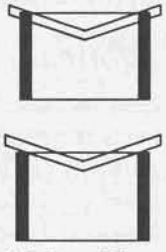


The sequence is repeated for the second roof. Note that JOIN is *not* used in this construction. The order of point selection is D, E, F, A. When the last point (A) is selected, the overhang is set to 0 to establish the roof valley, meeting that of the first drawn roof. The resulting roofs are shown in plan above. The 'extra' lines at the valley are the added ENDWALL polygons drawn because this option was toggled on. A hidden line image of the finished roofs is shown at the right.

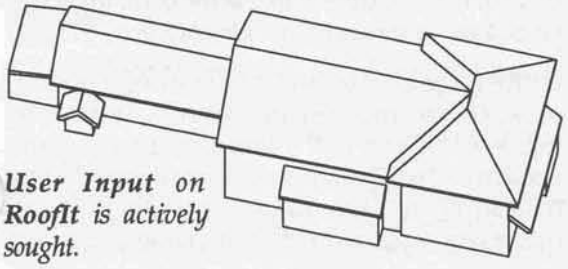


**Support of inverted roof forms** is one of the unique features of **RoofIt.** The particular application of such a roof will depend upon the overall roof form, but a couple of notes about the behavior of inverted roof forms are in order.

The means of creating an inverted roof is by setting a *negative* value for either the rise or run parameter of the roof pitch (having selected CUSTOM, under PITCH). *Which* of the two is given the negative value determines the relationship of the roof to the wall. The roof forms illustrated at the right were drawn with identical settings, except for the value for the roof pitch. The upper roof was drawn with pitch 4:-12, the lower one at -4:12. Note also that inverted roof forms present no difficulties when used with JOIN. They behave themselves when they serve both in 'master' and in 'slave' roles.



The POLYROOF input mode is designed to afford flexibility in the construction of roof forms. As users' experience with **RoofIt** is necessarily limited, much of its potential is yet to be realized. Users are encouraged to share their discoveries with others through these pages.



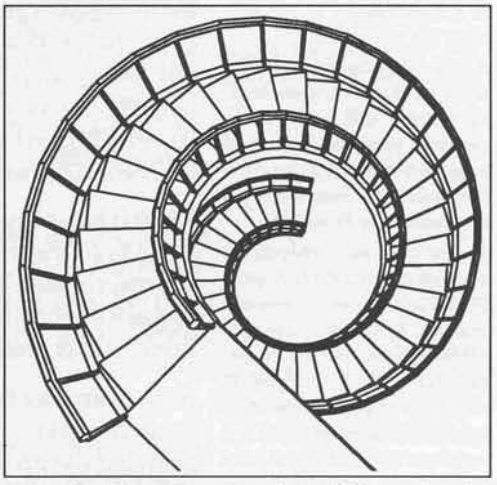
***User Input** on **RoofIt** is actively sought.*

3D Modeling Enhancements:

# 3DStairs Macro Previewed

Building stairs in 3D has in the past been a complicated modeling task. Cadkey has been developing a DCAL macro, **3DStairs**, that provides parametric tools for the creation of 3D stairs. It is planned as the Summer maintenance release. The following is based on experience with a pre-*beta* version of the macro; it is *generally* reflective of the features to be incorporated in the release version.

The macro has an interface similar to that in **AEC_Modl**. The user selects the stair type, from the 7 basic types (Single, Straight, Doubleback, Open Well, L-Shaped, Curved, and Spiral). The user then sets parameters for various stair elements: tread and riser dimensions, handrails, balusters, stringers, landings, etc. Color specification for each type of stair component is supported.



*Overhead perspective view of Curved stair*

Handrails, balusters, and newel posts may be drawn as round or rectangular shapes with sizes determined by the user. Additionally, newel posts and balusters may be specified as symbols, allowing the user to create custom shapes to be integrated with the operation of the macro. This option is facilitated in the main **3DStairs** menu by a choice for the TEMPLATE menu (menus for HIDE and 3D VIEWS are also included).

Once the stair type has been selected and the settings have been established, the user selects BEGIN. First, an insertion point is established; an outline of the stair is then displayed. The user rotates (dynamically) the outline into position; the macro then draws the stair.

Settings may be established in the individual menus or through the use of a FORM, similar in concept to the one in **AEC_Modl**. Additionally, settings may be saved out to external files from which they may be later loaded into the macro.

The macro also incorporates a rise/run calculator that allows the user to test the results of changes in dimensions. Once the desired dimensions have been figured out in the calculator, they can be sent to the appropriate menus in **3DStairs**. The main menu also incorporates menus facilitating direct access to the 3DVIEWS and HIDE menus. These allow quick testing of a stair model by viewing it and running the hidden line removal process on it.

TECH SUPPORT

## Internal Diagnostic Fault 40

Recently, a few users have been experiencing a problem in DataCAD while loading layers using the **LyrUtil** macro. The message 'Internal diagnostic fault 40' is displayed, the drawing file fails to load, and the user 'crashes' to DOS. This results from the following sequence of operations:

In the **ClipIt** macro a forced save is invoked (with the **F** keyboard interrupt) *while entities are in ClipIt's UnDo buffer*. Then the drawing file is exited without being saved. The drawing file is then re-entered (forced-save version), and saved out to layers with **LyrUtil**. When these layers are loaded to a new drawing file, the error occurs.

**Why it happens:** **ClipIt** uses a 'hidden' SELECTION SET to hold the information for its UNDO. Exiting the macro clears this SELSET. The above described sequence generates an anomalous condition which DataCAD is unable to interpret.

**Solution:** avoid the described sequence of operations. If working with a 'forced save' version of a drawing file generated while entities were in the **ClipIt** UNDO buffer, enter **ClipIt**, exit the macro to clear the buffer, *then* save the layers.

## DXFing to AutoCAD

Sometimes, when AutoCAD attempts to read in a DXF file generated by DataCAD, the user receives an error message 'Undefined block: xx' where 'xx' corresponds to a DataCAD symbol name. Many times this is due to the deletion or replacement of a symbol in DataCAD.

The user should re-enter the DataCAD drawing file and use the PURGESYM command (under DIRECTRY\SYMFILES) to clean out unused symbols. Then a new DXF file should be generated and read into AutoCAD. In most instances, the problem will have been resolved.

*Thanks to Stewart Brown of Architectural Intelligence for providing this solution.*

## WindowIn\Extents problem

Sometimes, after performing a WINDOWIN\EXTENTS (with or without a RECALC), the user is left with a blank screen and the message: 'Grid too small to display at this scale' or 'invalid window specification.' This usually occurs as a result of entities being placed at an extreme distance away from one another, far enough that all entities cannot be displayed at the largest display scale.

To address this problem: First, the user needs to create a display scale large enough to display all of the entities in the drawing file. To do this, enter the SETTINGS menu, select EDITDEFS, then SCALES. *(If using customized scales that have not been saved to a .SCL file, do so at this time).*

Select CHANGE, then select the 12" scale as the one to modify. At the prompt: 'Enter new string for this scale:' type: 1:100000. At the prompt: 'Enter new scaling value for this scale:' type: .0000008. This establishes a viewing scale of 1:100,000.

Exit the SETTINGS menu. In the SCALES menu, select 1:100,000. All of the entities should be displayed, probably in two groupings. Use WINDOWIN to determine which grouping is incorrectly placed, and MOVE or ERASE these entities. When a WINDOWIN, RECALC sequence is performed, all of the entities should display (at a scale less than 1:100,000). Return to a normal set of scales by selecting SETTINGS, EDITDEFS, SCALES, AND LOADFILE. Load the DCAD scale file or the saved customized scale file.

If this process does not work, use the LAYERS and ACTVONLY commands to select each layer sequentially. For each layer, perform WINDOWIN, RECALC until the layer containing the erroneous entities is identified. Find and move the *good* entities in this layer to a new layer, then delete the source layer.

## Information on the S3 graphics driver

Graphics cards based on the new S3 chip set are being shipped with DataCAD drivers. These cards perform really well for Windows and are very good cards for DataCAD, as well. There have, however, been problems with the DataCAD drivers. These drivers were not developed by Cadkey, but commissioned by S3, by the way. There are two DataCAD drivers: CK_911.EXE and DL_911.EXE. The former is a straightforward graphics driver. The latter, though, is an attempt at integrating both the graphics driver and the software display list driver. *It does not work properly.*

Users who wish to use one of the S3-based cards with DataCAD and who wish to run the software display list are advised to use the combination of CK_911.EXE and DISPLIST.EXE. *Do not use DL_911.EXE.*

Further, there has been at least one major revision of CK_911.EXE since its initial release. At this writing, **version 1.22** is the latest, and most stable version of the driver. It is available on the Cadkey bulletin board. Any future revisions to the S3 driver will be placed on the bulletin board, as well.

***Specifying a new system?***

*When specifying a new system, anticipate the possible RAM upgrade path for the machine. With the growing prevalence of Windows applications and the anticipated new Windows-based product from Cadkey, performance under Windows should be a consideration in the purchase of a new system.*

*A basic rule of thumb about Windows: the more RAM available, the better it will perform. The computer press talks about 16 megabytes of RAM as an effective amount for (near-term) future versions of Windows.*

*Typical clone motherboards are designed to socket RAM chips in SIMM's (single inline memory modules). Most boards have eight SIMM sockets, enabling the installation of 1, 4, 8, 16, or 32 megabytes of RAM, depending upon the number and size (1 or 4 megabyte) of SIMM's used. Most motherboard architectures require that SIMM's be installed in pairs and that all SIMM's must be of the same size.*

*A 4 megabyte system populated with 1 megabyte SIMM's can be upgraded to 8 megabytes with the addition of 4 more 1 megabyte SIMM's. However, to upgrade to 16 megabytes, all of the 1 megabyte units will have to be discarded and replaced with (4) 4 megabyte SIMM's.*

*The user might specify that a new system be configured with 4 megabyte SIMM's initially so that future addition of RAM will not require discarding the existing SIMM's.*

*Calls to three major mail order vendors indicate that such a strategy would add an extra $50-$100 to the purchase price of an 8 megabyte system. The extra cost would be recouped (and more) at the point of installing additional RAM.*

***New graphics driver:***

*A new version of ATC8514.EXE is available on the Cadkey bulletin board. It enables the selection of larger menu text sizes.*

POINTS OF REFERENCE

## *New Products*

A follow-up on **David Pendery's RenderMan® Interface:** At the May DBUG meeting, Pendery demonstrated the product. He showed the operation of the DCAL macro, through which light sources are placed, shadow casting elements are selected, and materials definitions/procedural shaders are assigned to entities. The macro then writes an output file which is processed outside of DataCAD by RenderMan.

Processing is accomplished in two steps. The first creates a file which defines the shadows cast in any view of the model. The second step processes for a specific view (established in DataCAD). Options for varying the resolution of the output, and thereby the speed of processing, allow the user to run quick trial renderings or full blown finished images. Not only are the results impressive, but the macro's interface is straightforward, making it easy to use (or as easy to use as any renderer).

This is an altogether impressive product. While pricing information cannot be listed in *Reference Point*, I can say that PenderMan (or whatever he finally decides to call it) is available for a *significantly reasonable price.*

**Set Pens** marks the entry of Bruce Kaplan into the world of DCAL macros. Bruce has previously addressed the subject of pen assignments for varying scales of plotted output through the use of keyboard macros. The Set Pens System keyboard macro continues to be available through Evan Shu's *Cheapware.*

While this methodology has proven successful, it is necessarily limited. SETPENS.DCX allows the user to save, load, and edit Pen Table Files. A Pen Table File is an external data file which holds the color/pen assignment for up to 99 pens. Pen Tables may be used to establish settings for different purposes: check plotting, plotting at different scales, using a plotting service, etc.

Additionally, the macro features the ability to place entities into SELSET 8 based on their pen assignment. Entities thus selected may be previewed from the macro (to verify visually their pen assignment) or replotted by accessing PLOTTER\PARTIAL\SELSET from the macro.

Based on experience with a late-*beta* version of the macro, I would predict that this product will become a welcome and regularly used tool in many DataCAD installations.

***RenderMan Interface***
*David Pendery*
*14 Tremont Street*
*Cambridge, MA 02139*
*(617) 661-2545*

***Set Pens***
*Bruce Kaplan*
*Kaplan & Associates, Architects*
*7003 Ballast Ct.*
*Burke, VA 22015-4401*
*(202) 267-9596 (day)*

## *DataCAD Training Centers & Contact People in the U.S. & Canada*

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Nikken Design Systems
2116 Arlington Avenue Suite 209
Los Angeles, CA
Roy Yoshino (213) 734-9433

**FLORIDA**
Indian River Community College
3209 Virginia Avenue
Fort Pierce, FL
Bill Sigurdson, Dean Zirwas
(407) 468-4700, x4269

**IDAHO**
Ricks College
Revburg, ID
Melvin F. Eckman (208) 356-1874

**INDIANA**
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4011 South Wayne Avenue
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Dennis Jeffrey (219) 744-3575

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John Murphy (704) 332-1557

**NEW JERSEY**
Advanced Micro Systems
511 River Drive
Elmwood Park, NJ
Pat Neary (201) 703-0404

**NEW YORK**
American Training Center, Inc.
118-21 Queens Boulevard
Forest Hills, NY
Arkady Kleyner (718) 544-8100
(800) 273-ACTI — New York only

**OREGON**
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Grants Pass, OR
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John Durichel (615) 238-2862

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David Demarest (214) 720-0270

**WISCONSIN**
CAD PROfessionals, Inc.
120 Bishop's Way, Suite 136
Brookfield, WI
Dan Warsh (414) 782-9199

**ONTARIO**
JB Marketing Associates
82 Spruceside Crescent
Fonthill, Ontario
John Bradford (416) 892-8025

**QUEBEC**
APPLICAD
11956 Boulevard Laurentien
Montreal, Quebec
Walid Hadid (514) 336-5959 (514) 335-4145

***Users Groups Corrections***
*The* only *Group in the Dallas/Ft. Worth area is:*

***Dallas Area DataCAD Users Group***
*Richard Ferrara Architects, Inc.*
*445 E. Walnut St. #131*
*Richardson, TX 75081*
*Rick Ferrara (214) 470-0171*

*A change of address:*

***DETAIL:***
*DataCAD Enthusiasts Trading Advice in Lancaster*
*The Business Advisory Group, Inc.*
*217 Granite Run Drive*
*Lancaster, PA 17601*
*Terry Bergen*
*(717) 560-9600 ext. 101*

# Using DOS 5.0 Tools to Configure for DataCAD

In the Winter, 1992 issue of *Reference Point*, 'Configuring for DataCAD' explored the allocation of system resources for optimal DataCAD performance. Three goals were defined:

- Maximize application space in conventional memory (number of Page Frames available) by loading device drivers and TSR's to High DOS Memory (between 640k and 1024k).
- Relieve the processor of some of its tasks through the use of the software display list.
- Maximize the speed of access to the .SWP files and DataCAD program files in RAM rather than hard disk through the use of a RAM disk and disk caching.

*See Figure 1 for recommended RAM allocations for various amounts of available system RAM.*

Inquiries from users have been received asking questions about methods of achieving these goals on 386 and 486 based systems. The following discusses an optimization strategy based on the resources available in MS DOS 5.0.

In the course of this discussion, some limitations of DOS 5.0 will become apparent. There are a number of excellent third-party products which address these limitations and offer significant benefits in the process of optimizing a system for running DataCAD. These will be briefly discussed at the conclusion of this article.

*Nomenclature:*
*Cold Boot = power off, power on*
*Warm Boot = Ctrl+Alt+Del*

Each system configuration for DataCAD is a unique one and depends upon its particular hardware configuration. Differing BIOS versions and mother board architectures have subtle implications for software set-up. Therefore, it is not possible to simply list the contents of 'ideal' CONFIG.SYS and AUTOEXEC.BAT files. Rather, in the following a step-by-step approach will be discussed, explaining the various elements of these files and their effect upon the system configuration. This should afford the user with the opportunity to experiment with his/her system settings to achieve an optimal DataCAD configuration.

| TOTAL SYSTEM RAM | RAM AVAILABLE FOR ALLOCATION | DISK CACHE | SOFTWARE DISPLAY LIST | RAM (VIRTUAL) DISK |
|---|---|---|---|---|
| 1 Megabyte | | | | |
| 2 Megabytes | 1 Megabyte | 384K | 640K | |
| 4 Megabytes * | 3 Megabytes | 2 Megabytes | 1 Megabyte | |
| 8 Megabytes | 7 Megabytes | 1 Megabyte | 1 Megabyte | 5 Megabytes |
| 12 Megabytes | 11 Megabytes | 2 Megabytes | 1 Megabyte | 8 Megabytes |

**Figure 1**
*Recommended RAM allocation for* ***DataCAD***
** see sidebar on page 3 for a discussion of 4 Megabyte systems*

## *Saving the existing configuration*

Prior to undertaking this process, the user should copy his/her current CONFIG.SYS and AUTOEXEC.BAT files, renaming them in the process, to provide a means of returning to the starting configuration if desired. Additionally, DCAD.CFG (which contains the configuration information for DataCAD) should be copied to a safe location/name so that the user may return to it if necessary. The following describes the steps for accomplishing this:

Create a subdirectory to hold backup copies of AUTOEXEC.BAT, CONFIG.SYS, and DCAD.CFG. At the C: prompt type:

```
MD\CONFIGS
```

Copy the files and name them distinctly. Type:

```
CD\CONFIGS
COPY C:\CONFIG.SYS CONFIG.OLD
COPY C:\AUTOEXEC.BAT AUTOEXEC.OLD
COPY C:\MTEC\DCAD.CFG DCAD.OLD
```

To return to the original configuration copy the three files out of the \CONFIGS subdirectory to their original locations and names.

***A bootable floppy disk should be on hand during the following as a means of disaster recovery.***

## *Booting 'clean'*

After saving AUTOEXEC.BAT and CONFIG.SYS to the \CONFIGS subdirectory, delete them from the root directory. *Cold boot* the system. At the C: prompt, type: \DOS\MEM to display the amount of used and free memory in the system.

On the tested system, MEM reported 592,112 bytes as the 'largest executable program size.' Other systems may show a slightly different amount of available memory; the numbers reported here should be used as a relative base line. This line in the MEM report indicates the amount of RAM *below the 640k barrier* available to DataCAD for the executable portion of the program and for the allocation of Page Frames. One of the goals in this process is to maximize this number, eventually providing to **DataCAD** the largest possible amount of RAM for its Page Frames.

## *Creating* CONFIG.SYS

At the C: prompt, type: \DOS\EDIT CONFIG.SYS. This opens DOS 5.0's text editor; since there is no file named CONFIG.SYS in the root directory, the editor starts with a blank screen. *Refer to the DOS 5.0 manual for instructions on the use of the editor.* Enter the following lines to CONFIG.SYS:

```
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
FILES=30
BUFFERS=10
STACKS=0,0
```

The first line installs HIGHMEM.SYS, DOS 5.0's extended memory manager. The second line loads a large portion of DOS, itself, into the High DOS Memory area (between 640k and 1024k). The FILES, BUFFERS, and STACKS statements establish necessary operational parameters. Exit the editor, saving the file as CONFIG.SYS.

*Cold boot* the system and type: \DOS\MEM. 637,312 bytes is now reported as the 'largest executable program size.' At this point, HIMEM.SYS is loaded to conventional memory (below 640k) and, with DOS relocated, a net gain of 45,200 bytes of available conventional memory has been realized.

## *Adding drivers to* CONFIG.SYS

Next, edit CONFIG.SYS, adding the entries shown below in bold type:

```
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
DOS=UMB
DEVICE=C:\DOS\EMM386.EXE 1024 RAM
FILES=30
BUFFERS=10
STACKS=0,0
DEVICE=C:\DOS\SMARTDRV.SYS 1024
DEVICE=C:\DOS\RAMDRIVE.SYS 5120 /E
```

EMM386.EXE does two things. First, it provides access to the computer's high DOS Memory. The addition of the DOS=UMB statement facilitates this. In a later step drivers and TSR's will be loaded to this area. DOS=UMB may also be implemented by adding it to the DOS=HIGH line as is shown in later versions of CONFIG.SYS in this article. Second, the 1024 RAM parameter tells EMM386.EXE to configure 1 megabyte of extended memory as *expanded* memory. The expanded memory will be accessed by DataCAD's software display list.

The SMARTDRIVE.SYS line establishes a 1 megabyte disk cache in extended memory. The RAMDRIVE.SYS line creates a 5 megabyte RAM disk in extended memory. Note that these values are those for a system with 8 megabytes of installed RAM. Refer to Figure 1 for the appropriate values for other amounts of system RAM.

## *Creating* AUTOEXEC.BAT

Next, use the editor to create AUTOEXEC.BAT. This file should contain PATH and PROMPT statements and all of the drivers necessary for running DataCAD. The following lists AUTOEXEC.BAT for the tested system:

```
PATH C:;C:\DOS
PROMPT $P$G
C:\COMFILES\MOUSE.COM
C:\STAR\UTIL\VMODE.COM VESA
C:\MTEC\DRV\DISPLIST.EXE
C:\MTEC\DRV\VESA256.EXE
```

In the tested configuration, a mouse driver is loaded for two reasons. First, it enables the use of the mouse with DOS applications that recognize one (the DOS Shell and Editor, for instance). Second, the system uses the Logitech Mouseman®, for which the Logitech driver is required as part of its configuration for DataCAD. The system uses the VESA256.EXE graphics driver with the Diamond SpeedStar card, for which the VMODE VESA command is necessary *(see the Spring, 1992 issue for a discussion of the* VESA *driver)*. The software display list is also loaded.

*Cold boot* the system and check the memory status. At this point MEM reports 553,728 bytes as the 'largest executable program size.' This is 83,584 bytes less than the conventional memory available with the first version of CONFIG.SYS created above. Later steps will increase the amount of available conventional memory. Before proceeding, the proper operation of DataCAD should be verified.

## *Verifying DataCAD's operation*

Enter DataCAD's configuration menus by typing:

```
CD\MTEC
CONFIG
```

In the software display list section, check that the settings are to 'use all available expanded memory' and that the path for display list (overflow) files is set to hard disk. In the Paths section, set the path for virtual files to the RAM disk (the next drive letter after that of the highest hard disk partition). *Save* the settings upon exiting CONFIG.

Enter DataCAD by typing: DCAD and load a relatively large drawing file. *(Note: do not use* RUNDCAD.BAT *to access DataCAD from this point on).*

***4 Megabyte system configurations** are the most problematic ones in terms of recommending RAM allocation. The allocation shown in Figure 1 is a very conservative and safe one.*

*The exact allocation that a user elects will be based on a number of factors, the most important of which are the typical drawing file size and the perceived utility of the software display list.*

*Users might choose to lower the amount allocated to the software display list. 752k is a good lower figure, less than this will probably result in frequent overflow of the display list to hard disk.*

*Users might also choose to use a RAM disk for the virtual files, sizing it at 2 Megabytes. The remaining 272k would then be allocated to disk caching.*

*This configuration will yield excellent performance but will run the risk of data overflow in the RAM disk. At 2 Megabytes, the user should be careful that drawing files no larger than 1.5 Megabytes be loaded.*

*Further, the user should avoid adding huge amounts of information to the drawing file. He/she should also avoid editing operations that would generate very large UnDo buffers. If the total size of the virtual (.SWP) files exceeds the size of the RAM disk, DOS will be unable to store data being generated by DataCAD and force DataCAD into 'crashing.'*

*Another strategy with a 4 Megabyte system might be to not run the software display list, allocate most of the system RAM to a RAM disk (say 2688k), and a smaller portion to a disk cache (384k). This would provide a 'safer' RAM disk at the expense of not running the software display list.*

*The solution for a 4 Megabyte system will depend upon the particular use to which **DataCAD** is being put. Experiment cautiously.*

If the DISPLIST menu appears under the DISPLAY menu, the software display list is active. Check its operation by changing views, noting the REFRESH/REGEN operation. Note, too, the hard disk activity light on the computer. Once the drawing file has been loaded, only minimal hard disk access should occur for reads of support files, templates, etc.

Perform some typical editing operations upon the drawing file; verifying that they execute properly. Attempt some *atypical* editing operations (MOVE all the entities in the drawing file, and then UNDO the move, for instance).

In the DIRECTRY menu, select MEMCHECK to see how many Page Frames of memory DataCAD has been able to allocate to itself. In the above described example, 20 Page Frames are available.

## *Loading device drivers in* CONFIG.SYS *to high DOS memory*

Edit CONFIG.SYS, changing the DEVICE= statements for SMARTDRV.SYS and RAMDRIVE.SYS to DEVICEHIGH=. Note that neither HIMEM.SYS nor EMM386.EXE may use the DEVICEHIGH statement; both of these must load in conventional memory. The changes are shown in bold type in the following:

```
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH,UMB
DEVICE=C:\DOS\EMM386.EXE 1024 RAM
FILES=30
BUFFERS=10
STACKS=0,0
DEVICEHIGH=C:\DOS\SMARTDRV.SYS 1024
DEVICEHIGH=C:\DOS\RAMDRIVE.SYS 5120 /E
```

*Cold boot* the system. A check of the memory status indicates that 579,312 bytes is the 'largest executable program size.' Upon entering DataCAD, 26 Page Frames are now available.

## *Loading drivers in* AUTOEXEC.BAT *to high DOS memory*

Edit AUTOEXEC.BAT to include 'LOADHIGH' (which may be abbreviated to 'LH') in front of each of the drivers. The ability to load these drivers to high DOS Memory is facilitated by EMM386.EXE and the DOS=UMB statements in CONFIG.SYS. The additions are shown in bold type in the following:

```
PATH C:;C:\DOS
PROMPT $P$G
LH C:\COMFILES\MOUSE.COM
LH C:\STAR\UTIL\VMODE.COM VESA
LH C:\MTEC\DRV\DISPLIST.EXE
LH C:\MTEC\DRV\VESA256.EXE
```

*Cold boot* the system and check the memory status. DOS *should* report something on the order of 630k as the 'largest executable program size.' DataCAD *should* report 37 or 38 Page Frames available. The word 'should' is emphasized in the preceding because, on many systems, the LOADHIGH command does not load the drivers to High DOS Memory under these circumstances.

On the tested system, MEM shows 579,312 bytes available, indicating that *none* of the four drivers have been loaded high. Using the MEM command with the /C switch verifies that the drivers had been loaded to conventional memory. The reason for this is that EMM386.EXE takes an extremely conservative approach to allocating sectors of High DOS Memory for access through the LOADHIGH command, essentially locking otherwise free memory areas from access by TSR's.

There is a solution. A switch (I=MMMM-NNNN) for EMM386.EXE specifies a particular address range to be *included* for an EMS page frame or for RAM. The task now is to determine, first, the amount of memory that needs to be included for the needed drivers and, second, which address ranges in High Dos Memory are available.

***Microsoft has provided to the user a relatively weak tool (the MEMORY command) for the purpose of analyzing memory usage.***

An advanced user, with a strong understanding of RAM addresses, *may* be able to coordinate the information provided by the MEM command (with its /C, /D, and /P switches alternately invoked) to make the appropriate specification in the EMM386.EXE line. But any number of very savvy users, dealers, and consultants have thrown up their hands in disgust at this point.

**There is hope, though.** On most 'standard' systems (i.e. ones that use a Phoenix or AMI BIOS, run VGA or SuperVGA graphics, and do not have many additional device drivers than those listed in the CONFIG.SYS discussed in this article), the memory area E000-EFFF is *generally* free. Edit CONFIG.SYS as follows to include this memory area (changes in bold type):

```
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH,UMB
DEVICE=C:\DOS\EMM386.EXE I=E000-EFFF 1024 RAM
FILES=30
BUFFERS=10
STACKS=0,0
DEVICEHIGH=C:\DOS\SMARTDRV.SYS 1024
DEVICEHIGH=C:\DOS\RAMDRIVE.SYS 5120 /E
```

*Cold boot.* If the four drivers loaded to the High DOS Memory area, MEM will report 629,248 bytes as the 'largest executable program size' and DataCAD will report that 37 Page Frames are available.

If MEM reports more than 579,312 bytes but less than 629,248, some of the drivers have loaded high and some have loaded to conventional memory. Use MEM with the /C switch to verify this.

**The order in which the drivers attempt to load high is a factor.**

Experiment with changing the order in which the drivers are listed in AUTOEXEC.BAT until the 'largest executable program size' reported by MEM is as large as possible and the number of Page Frames available to DataCAD is maximized. Confirm DataCAD's proper operation as described earlier.

Once AUTOEXEC.BAT and CONFIG.SYS have been finalized, save copies of them to the \CONFIGS subdirectory, giving them easily identifiable names.

## *Switching between configurations*

The complexity and specificity of the system configuration described above for DataCAD is not atypical of those required for sophisticated applications. The system requirements for **Velocity** and Windows, for instance, are significantly different than those for DataCAD. Users may save the CONFIG.SYS and AUTOEXEC.BAT files that have been optimized for particular applications, copy them to the root directory, and reboot the system to initiate them. Batch files created for the purpose of automating this process are extremely useful.

In the preceding, a subdirectory, C:\CONFIGS was created; in the following, it will be used to hold the file versions for a series of configurations. Start by saving the AUTOEXEC.BAT and CONFIG.SYS files created above. At the C: prompt, type:

```
COPY AUTOEXEC.BAT C:\CONFIGS\AUTOEXEC.CAD
COPY CONFIG.SYS C:\CONFIGS\CONFIG.CAD
```

A batch file for swapping these files to the root directory can be created. It should be placed in a subdirectory that is included in the Path statement of each version of AUTOEXEC.BAT. It should be given a clear name, describing its function, CAD.BAT, for instance. It would contain the following lines:

```
COPY C:\CONFIGS\AUTOEXEC.CAD C:\AUTOEXEC.BAT
COPY C:\CONFIGS\CONFIG.CAD C:\CONFIG.SYS
```

To access the DataCAD configuration, then, type 'CAD' at any DOS prompt, wait for the batch file to execute, and reboot.

The process of creating distinct versions of AUTOEXEC.BAT and CONFIG.SYS, saving them to discreet names, and loading them with a batch file may be repeated for every system configuration desired by the user.

In addition to application-specific configurations, it is recommended that the user also create a 'vanilla' configuration. It may be loaded for those occasions requiring that the system be booted 'clean.' The CONFIG.SYS might contain only FILES= and BUFFERS= statements. AUTOEXEC.BAT might contain only PATH and PROMPT statements.

## *Microsoft's new Smartdrive*

*A check with Microsoft's technical support indicates that copies of DOS 5.0 currently being shipped continue to include* SMARTDRV.SYS. *They have not switched over to* SMARTDRV.EXE *as part of the DOS 5.0 package.*

With the release of Windows® 3.1, Microsoft has significantly upgraded its disk cache utility. The version shipped with DOS 5.0, SMARTDRV.SYS, is generally regarded as slow and inefficient relative to third-party products like Multisoft's SUPER PC-KWIK®. The new Windows version of SMARTDRIVE has been completely rewritten and is now an executable file: SMARTDRV.EXE, run from AUTOEXEC.BAT, not CONFIG.SYS. It is placed by Windows' INSTALL routine in the \WINDOWS subdirectory.

Though this new version is specifically designed to integrate with Windows' memory management functions, it exhibits a significant boost in performance for DOS applications, as well. Users who have installed Windows 3.1 and wish to change their DataCAD configurations to take advantage of the new SMARTDRIVE need to make a couple of modifications to their CONFIG.SYS and AUTOEXEC.BAT files:

**CONFIG.SYS**

```
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH,UMB
DEVICE=C:\DOS\EMM386.EXE I=E000-EFFF 1024 RAM
FILES=30
BUFFERS=10
STACKS=0,0
DEVICEHIGH=C:\DOS\RAMDRIVE.SYS 5120 /E
```

**AUTOEXEC.BAT**

```
PATH C:;C:\DOS
PROMPT $P$G
C:\WINDOWS\SMARTDRV 1024
LH C:\COMFILES\MOUSE.COM
LH C:\STAR\UTIL\VMODE.COM VESA
LH C:\MTEC\DRV\DISPLIST.EXE
LH C:\MTEC\DRV\VESA256.EXE
```

Note that the LOADHIGH statement is *not* used with SMARTDRV.EXE; this new version *loads itself* to High DOS Memory upon execution. Cold booting to this configuration reveals that exactly the same

amount of conventional memory and DataCAD Page Frames are available.

The subjective impression is that DOS applications execute more quickly with the new version. Certainly the write-cache (new in this version) makes for smoother operation. Also, the start-up screen that is displayed upon execution assures the user that the RAM disk is not being cached. For users who have it, SMARTDRV.EXE is certainly preferable to SMARTDRV.SYS. A more thorough evaluation of SMARTDRV.EXE, comparing it with PCKWIK will be reported on in the next issue of *Reference Point.*

## *Third-party memory managers*

Considering the difficulties inherent in the use of DOS 5.0's LOADHIGH and MEMORY commands, it is not surprising that third-party memory managers continue to be one of the most popular categories of software on the market today. The two leading products, Quarterdeck's QEMM-386® and Qualitas' 386MAX® both offer to the user significant advantages over using DOS 5.0 alone.

Both products replace HIGHMEM.SYS and EMM.SYS with their own drivers, installed in CONFIG.SYS. They also replace the DEVICEHIGH and LOADHIGH commands with their own equivalents. Additionally, they *automate* the process of loading device drivers and TSR's to High DOS Memory.

In operation, the user constructs 'vanilla' versions of CONFIG.SYS and AUTOEXEC.BAT and allows the memory manager to determine which drivers and TSR's to load high and *where* to place them. Both products test combinations and sequences of their load high functions to maximize conventional memory availability. They also both provide tools that allow analysis of memory utilization should memory conflicts arise.

Because they require less conventional memory for their own installation than does the combination of HIGHMEM.SYS and EMM386.SYS, QEMM-386 and 386MAX both enable more free conventional memory for use by applications. They also both offer comprehensive memory reporting functions. These allow the user to understand exactly how High DOS Memory is being used.

### *Installing either of these products, the user should realize 40 Page Frames in DataCAD.*

With a street price of well under $100, the performance gains and the ease of configuration enabled by these products makes them well worth obtaining. The time saved in establishing a DataCAD configuration should recoup the cost of the software; the increased performance, because of the gain in Page Frames, is a bonus. If other configurations, as well, are implemented through the use of a third-party memory manager, the overall payback is considerable.

## *Software vs. hardware disk caching*

In the previous discussion, software was used to implement the disk cache. An alternative is available: hardware disk caching. Many systems are being sold today with caching hard disk controllers. These controllers use control circuits and RAM installed on the disk controller card to cache reads from and writes to the hard disk. Typically, these hardware caches are relatively small, 64k to 256k, and the RAM chips used on the cards are rated at slower speeds than system (mother board or expansion card) RAM.

On systems with this type of disk controller, the DataCAD user should be aware of the potential for speed degradation. If a software disk cache is used in addition to the hardware cache, disk reads will be 'double cached.' Some testing performed by DBUG members and reported to that group last year indicates that software disk caching is preferable to either hardware caching alone or in combination with a software disk cache.

Users are advised that, unless there is a compelling reason to do otherwise, a hardware disk cache should be disabled when a software disk cache is installed. Usually, this is accomplished by changing jumper settings on the disk controller card.

An exception to this is the case of cached disk controllers populated with large amounts (1 megabyte or more) of fast RAM. These controllers are typically used in network servers and are unlikely to be found on typical DataCAD stations.

On a somewhat related note, the use of software disk caching in conjunction with **disk compression software** (Stacker®, etc.) should be undertaken with great caution. Because of possible conflicts between two TSR's simultaneously processing hard disk reads, it is recommended that disk compression *not* be used on drive partitions that are accessed for the DataCAD executable, support, or virtual files. If a partition is dedicated *only* to the storage of .DC3 files, compression is probably acceptable, ***but don't cache it.***

3D Modeling Enhancements:

# Third Party Products

In addition to parametric tools used for modeling like **AEC_Modl, RoofIt,** and **3DStairs,** libraries of 3D symbols provide an important means of speeding the process of creating detailed 3D models.

Complementing the Cadkey-supplied 3D symbols (those included with the **AEC** macro), many users have created their own 3D symbols of furnishings and/or other repetitive elements used in models. A number of the resultant Template\ Symbol sets have been made available to users by their creators through *Cheapware*.

Additionally, two DataCAD architects have developed 3D symbol libraries of sufficient complexity to warrant marketing them to the **DataCAD** community.

Beacon Design Systems has recently announced their **Architect's Toolkit One.** About half of the 820 symbols in this product are 3D furnishings.

William Coppock has created a system of casework symbols for kitchen and bathroom cabinets and various residential fixtures. **Cases Templates'** modular symbols conform to standard cabinet sizing and have been drawn at their proper Z orientations. The user places them at Z=O, with no Z offset to quickly create whole kitchen models.

## *Surface Embellishment*

The final, and in many ways most difficult, aspect of 3D modeling (short of using a rendering package) is the generation of materials designations. The translation process from 2D to 3D elevations can be complex and time consuming. Users have developed any number of strategies for accomplishing this.

One of the most comprehensive techniques is one worked out by Rick Gleason and written up by him in the April, 1990 issue of *WindowIn on DataCAD*. It involves the creation and placement of 3D symbols used as elevations. As the design changes, the symbols are modified individually and the model is updated by using the UPDATE or REPLACE command in the TEMPLATE menu.

Rick has made available a complete explanation of his techniques. It can be downloaded from the B.S.A. bulletin board (file name: DEMO3D) or may be obtained directly from him. Send a self addressed stamped envelope with 52 cents postage to:

The Gleason Partnership
114 Commonwealth Avenue
Boston, MA 02114

Another variation on this theme is the use of 'texture' symbols. These are 'modular' units comprised of 3D lines which are placed by the user at gridded intervals to form complete fill patterns. Since they are constructed from 3D lines, they may be placed at any 3D orientation.

Many users have created in-house symbol sets that perform in this manner. A well developed package of this type of symbols is the **Organic CADD** Fill Pattern Module from Neo Graphix.

## *TouchUp*

**TouchUp** is a new DCAL macro, written by Bill D'Amico of Casco Systems. Through its use, textures (defined as hatch patterns) may be applied to 3D planar surfaces (polygons and slab faces).

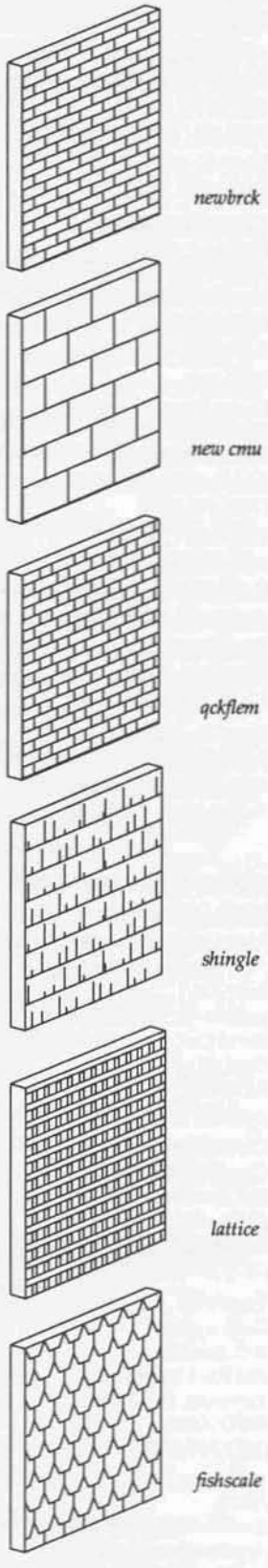
Working from a 3D view in the macro, the user specifies a pattern, its scale and angle, and then selects the face to which the pattern is to be applied. The macro flashes the selected entity for user verification; if a slab is selected, the user is asked if the (flashing) slab is the one intended. After answering yes, the macro makes one of the slab *faces* flash, asking if it is the intended surface. If an incorrect face has be chosen by the macro, the user answers no and the macro tries other faces of the slab until the user confirms correct selection.

Once the correct face has been selected, the macro hatches it. The actual operation of the process may be viewed by the user; it is fascinating to watch. The macro rotates the selected face from its orientation in the model down to the ground plane. It then hatches it, converts the hatch pattern to 3D lines, and rotates the finished entities back to the original placement in the model.

The macro includes a CORNERBOARD option which draws cornerboards at the edge of the face at a user-defined size and limits the hatching to edge of the cornerboard. Additionally, the user may select which edges of the surface are to receive cornerboards, including the sides of voids.

The macro's VIEWER option serves much the same function as EDIT PLANE in DCAD 3D. The user may find it simpler to understand the orientation of a selected view through **TouchUp's** VIEWER interface.

To really take advantage of this product, though, the user needs to define special hatch patterns which may be accessed by **TouchUp.** Since this is not a simple task for the average user, two products are available which can be of great help.




**Sample Panels**
*using hatch patterns by Chris Glass placed by TouchUp*

***Product Information:***

***Architect's Toolkit One***
*Beacon Design Systems*
*Box 7116*
*Paducah, KY 42002-7116*
*Gary Gresham*
*(800) 788-7436*

***Cases Templates***
*William L. Coppock, AIA*
*7170 W. 8th Place*
*Denver, CO 80215*
*(303) 237-7812*
*FAX: (303) 233-7106*

***DHatch***
*Design/Program Associates*
*Route 1, Box 114-C*
*Afton, VA 22920*
*John Fornaro*
*(703) 456-8686*

***Organic CADD***
*Neo Graphix*
*Rt. 660, P.O. Box 347*
*Earlysville, VA 22936*
*Fred Oesch*
*(804) 972-7090*
*FAX: (804) 296-8720*

***Roof Builder 2***
*People Software*
*2746 Barrett Pass Road*
*Pollock Pines, CA 95726*
*Eric Zetterberg*
*(916) 644-8841*
*FAX: (916) 644-8730*

***Roofer***
*River City Software, Inc.*
*9570 Regency Sq. Blvd.*
*Suite 325*
*Jacksonville, FL 32225-8100*
*David Deal, Scott McPherson*
*(904) 721-8246*
*FAX: (904) 727-9182*

***Special Hatch Patterns***
*Christopher Glass*
*Cheapware (Disk P27)*
*Shu Associates*
*10 Thacher St. Suite 114*
*Boston, MA 02113*
*(617) 367-9622*

***TouchUp***
*Casco Systems*
*P.O. Box 965*
*30A Rte 1 Suite 1*
*Yarmouth, ME 04096*
*Bill D'Amico*
*(207) 846-0772*

***Note:***
*A new edition of the* ***Cadkey Applications Guide****, listing DataCAD third-party products is due out in August. Contact Cathy Smith at ext. 7237 for further information.*

Chris Glass, an architect from Camden, Maine worked closely with Bill D'Amico while Bill was developing **TouchUp**. During that process, Chris created some very useful hatch patterns. They are available through *Cheapware*.

For users who wish to create their own hatch patterns but are daunted by the process of editing an ASCII file to do so, Design/Program Associates sells a DCAL macro: **DHatch**. It enables the user to create hatch patterns *graphically*.

In use, lines are drawn that describe the components of the desired hatch pattern. The offset distance, describing the repetition interval, is then defined. The pattern is named and saved to the hatch pattern file DCAD.PAT. The file I/O functions incorporated in the macro enable a variety of strategies for sorting hatch patterns within files and for loading to DataCAD different saved files.

Finally, as part of the **Organic CADD** series, Neo Graphics sells modules of clip art symbols. These are very cleverly designed to facilitate their use.

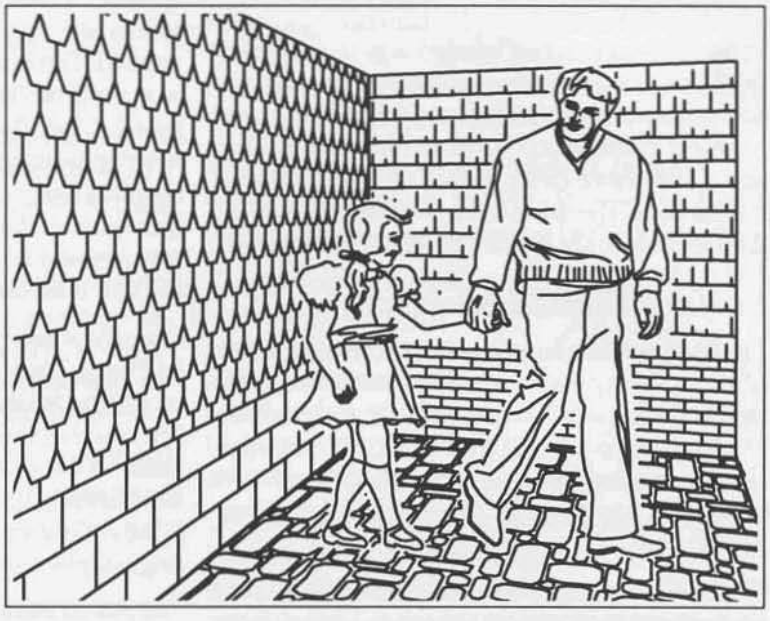
Each symbol is made up of two elements: the line work itself and an *invisible masking polygon*. In use, a symbol is placed exploded at a slight Z offset above a processed hidden line image. Using selection sets, the masking polygons are moved to a separate layer. The layer containing the line art it turned off and a hidden line process (in ortho view) is run on the HLR layer and the masking layer. The line art layer and the newly processed hidden line image are then combined for plotting.

Overall, 3D modeling in DataCAD is genuinely enhanced by these products. When they are used, the quality of the models generated is much more a function of their architecture than it is of the users ability to decipher the software involved.

*Shingle, brick, and block patterns by Christopher Glass; placed by* ***TouchUp***

*Floor paving by* ***Organic CADD*** *Fill Pattern module*

*Clip Art people by* ***Organic CADD*** *'People' Design Module*

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