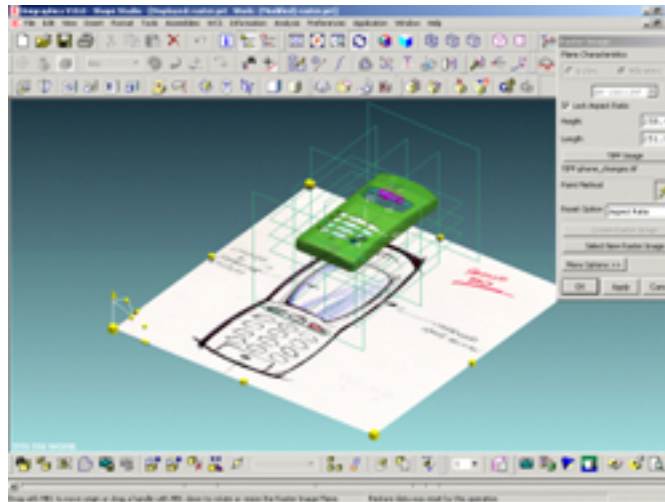


A Sneak Preview of Unigraphics V18

by Tom Gill

UGS is currently in the midst of putting the finishing touches on Unigraphics V18, its flagship CAD/CAM/CAE package. In this review, I look at changes in the user interface as well as several of the especially powerful new features, including Smart Models and Direct Modeling. I will also explore a few of the design optimization capabilities available. Testing was performed on Windows 2000 using V18 RC1, an early production release.



The Studio Display mode allows a model to be viewed and manipulated with dynamic lights and textures.

New Capabilities

New capabilities in V18 range from improvements in collaboration tools to more tightly integrated knowledge-based engineering solutions. Several of these new key enhancements are addressed in the following paragraphs.

UG/Collaborate allows Unigraphics sessions to share commands with other UG sessions on the network and will work without having all the same files loaded. If UG is not loaded, UG sessions can be shared via the embedded Netmeeting infrastructure.

Model healing has also been added. This allows removal of small features that might be invalid in other systems. When executing this function, a new file is generated which can then be processed with a data translator.

Smart Models is a combination of the embedded GD&T (Geometric Dimensioning and Tolerancing) product and some new functionality based on Knowledge Fusion technology called Product Definition information. Knowledge Fusion is a UG product that enables formal KBE (Knowledge Based Engineering) to be embedded in Unigraphics. (Note: You can check out a review of the V17 KBE capabilities in the December issue of MCADVision. [See Unigraphics V17 Knowledge Fusion.](#)) In V17, the raw capability of [Heide Corp's](#) Intent KBE language was embedded into the modeling and assembly modules of Unigraphics. In V18, this infrastructure is now being used to implement advanced functionality. Attributes, non-graphic information like strings, integers, and real numbers, have been available in Unigraphics for many years. In V18 they have been rewritten as KBE objects. Product

Definition capabilities allow simple attributes like drawing notes to be attached to features, but allow classes to be extended so that more complex information can be associatively attached to objects, features, solids, and assemblies. In the future I expect that this product definition capability will allow downstream automation, like product models signaling machining requirements to CAM software.

Knowledge Fusion - In V18, significant enhancements include full assemblies support for both top-down and bottom up methodologies, the exposure of CAE results for optimizations, and a new optimization class.

Direct Modeling is a set of functions within Unigraphics that allows faces to be manipulated without having to weed through the underlying history. It basically applies constraints that override existing constraints, and works on both parametric and nonparametric solids. It was introduced in V17, and V18 enhancements include:

Replace Face - This function allows planar or non-planar faces to be replaced with planar or non-planar faces. Blends that were attached to the original face will regenerate with the new face. A great application of this is to account for mold shrinkage to prevent sinking in a part.

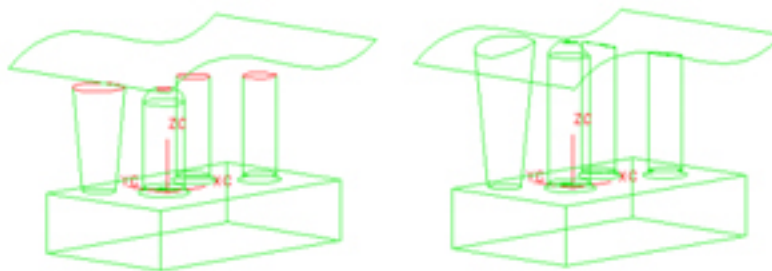


Figure 1. Replacing planar face with a freeform face.

Local Scale - This function allows non-uniform scaling to be added to a collection of faces, again from the mold-making world, extra material could be added to account for shrinkage on an odd shaped protrusion.

Pattern Face - This function allows feature arrays to be made from face collections on nonparametric models.

User Interface Changes

V18 continues the migration to a standard Windows User interface, as well as the wizard implementation. The first thing I noticed when starting up V18 was the graduated display, which looked just like Catia V5. (I guess imitation is a form of flattery.) After working in V18, I have to agree that it is a better way to look at a model with shading turned on. A big focus of the recent releases of Unigraphics is real-time dynamics and feedback. The Studio Display mode allows a model to be viewed and manipulated with dynamic lights and textures, if the graphics hardware supports it. A visualization performance function is built in to assess the capabilities of the hardware. I executed on my PC, and it returned the following info:

Graphics data has been formatted for optimal performance on this configuration.

Performance hints:

- Backface culling can improve shaded rendering performance up to 33 percent.

- Two-sided light has little impact on shaded rendering performance.
- An extra light has little impact on shaded rendering performance.
- An extra 3 distant lights have little impact on shaded rendering performance.
- Translucency can reduce shaded rendering performance up to 54 percent.
- Depth sorting can reduce wireframe rendering performance up to 30 percent.
- Wide lines can reduce wireframe rendering performance up to 79 percent.
- Line antialiasing can reduce wireframe rendering performance up to 59 percent.

In V18, one of the design goals was to minimize the need to move the cursor out of the graphics, and to reduce popup menus. To this end, both navigation aids and wizards have been added. For example, a new selection toolbar consolidates all the selection filtering methods. It can be docked anywhere around the graphics window, reducing the need to move your eyes or cursor far from the geometry.

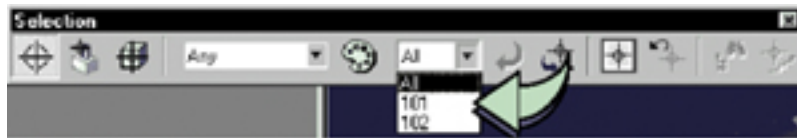


Figure 3. The Selection Filter can be docked anywhere around the graphics window.

And an example of the migration to the wizard interface is shown in Figure 4. Previously, 4 windows were required to insert a simple block primitive. (These are actually Unix ports of the original menu driven interface.) In V18, these menus are consolidated into a single form that is not order dependent.

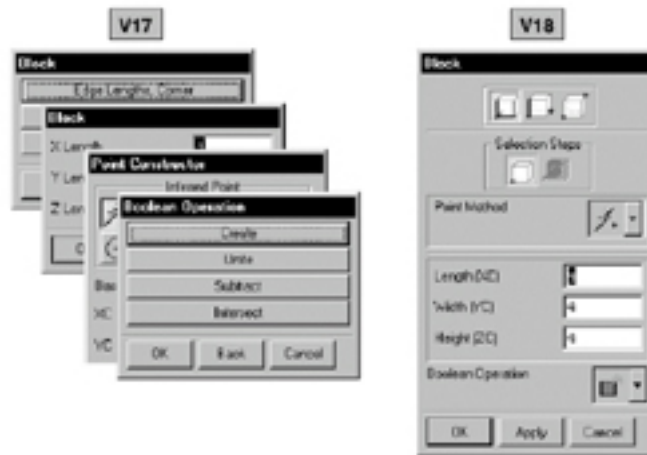


Figure 4. The wizard interface in V18 replaces the multiple cascading windows used in previous versions of Unigraphics.

Also new in the V18 interface is the dynamic Work Coordinate System (WCS), which allows rotating and repositioning of the WCS by dragging handles, and handles for spline, plane, and component manipulation. First seen on TriSpectives (now [IronCAD](http://www.ironcad.com)) in 1995, this feature has been copied by many vendors.

The new Shape Studio Display offers enhancements for industrial design. It is possible to define a plane (or surface) and overlay a TIFF image on it. The plane can be resized repositioned, or rotated by dragging the handles. If the plane is resized, the image updates. The display even works in the context of an assembly so that extra data does not have to be included individual files, and other team members can have read/write access to the file. Solid components can be modeled using the image as a template, and

images can be mapped onto completed solids to show textures in photo-realistic renderings. Much of this functionality was available in V17, but I am still impressed by it.

Strength Wizard

Strength Wizard is another new module in V18, which attempts to place simplified linear structural analysis in the hands of the design engineer. I am not fan of these simplified tools, but some of my prejudice comes from being a dedicated analyst many years ago. My other concern is that most designers have not had strengths of materials training, and typically the last thing they need is another task to perform.

That said, it can't get much easier to set up an FEA problem than with Strength Wizard. It is a subset of UG/Scenario for Structures. It uses the UG developed Structures/PE linear solver and a wizard interface shown in Figure 4. The wizard prompts for the solid body to analyze, the material, the boundary conditions, and the loads. It came preloaded with materials, and the library can be modified. Faces, edges and bodies can be selected for constraints. Loads can consist of forces, torques, pressures and gravity. Scenario utilizes a master model structure to keep the analysis data separate from the solid model. The analysis model will update as the solid changes. UG's face analysis display mode is used to present stress and displacement contour plots. A simple pass/fail color-coding is displayed based on the material yield point. An assessment of solution quality can be displayed. A reporting function allows automatic generation of HTML output containing images and values from the analysis.

I was able to quickly set up a simple cantilever beam model problem.

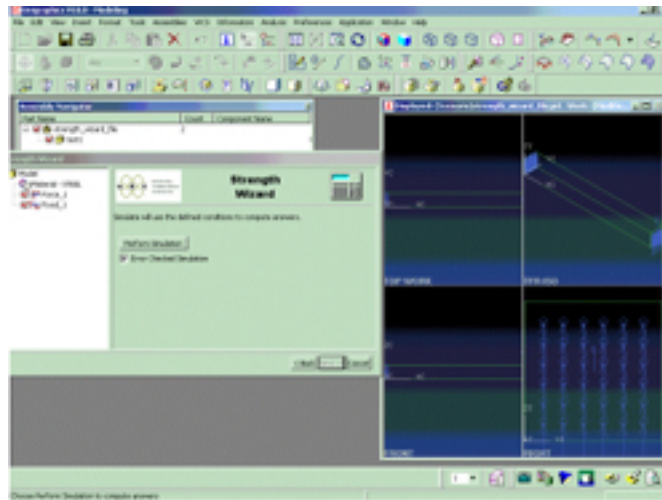


Figure 4. The Strength Wizard user interface and constrained model.

Conclusion

Unigraphics went through a major re-architecting in 1993 when moving from Version 9 to Version 10. While the early releases of V10 were rough, the architectural decisions were sound. Significant new capabilities have been added in each release without the code feeling bloated. The user interface has undergone a transition from a proprietary menu driven approach, to a more standard Unix/Motif approach, to Windows look and feel. The latest release adds a lot of polish to the user interface as well as new capabilities to improve product development capabilities.

Comments? Feedback? [Click here](#) to tell us what you think about this topic or if you have additional

information you'd like to share on this subject

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Unigraphics V18

Minimum System Requirements: Windows 2000, AIX, HPUX, Solaris, Irix

Price: Contact Vendor.

Availability: Now

Contact: UGS, www.ugs.com