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Tips and Tricks for Adobe® Acrobat® 3D

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## Bridging the Gap

Using Acrobat 3D Toolkit to make your 3D designs easier to share

by Robert Green

In the last issue of *Acrobat Insider*, I talked about why engineers, designers, and CAD specialists should take the time to investigate Adobe Acrobat 3D Toolkit. If you haven't had a chance to read the October issue ([Issue #7](#)), you may want to do so now as many of the concepts I'll build on this month refer to concepts explained there.

In this issue, I describe some of the functions you can exploit in 3D Toolkit to bridge the gap between design/CAD departments and graphic illustrators and artists. And since these functions are handy for engineers and illustrators alike, I'll write this issue of the *Insider* with both groups in mind. Here goes.

### Import Your Designs into 3D Toolkit

Before you can do anything with your design in 3D Toolkit, you first have to load the geometry. To do so, start 3D Toolkit and drag and drop the top-level assembly into the 3D Toolkit graphics window for quick conversion. (You can also browse in the Folders panel to where your geometry is stored and click the file name. Then select the Local tab in the bottom panel and select an assembly/part to import, as shown below).

DECEMBER 2006

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#### IN THIS ISSUE

Use Acrobat 3D Toolkit to optimize your designs for collaborating with others, even those without CAD software.

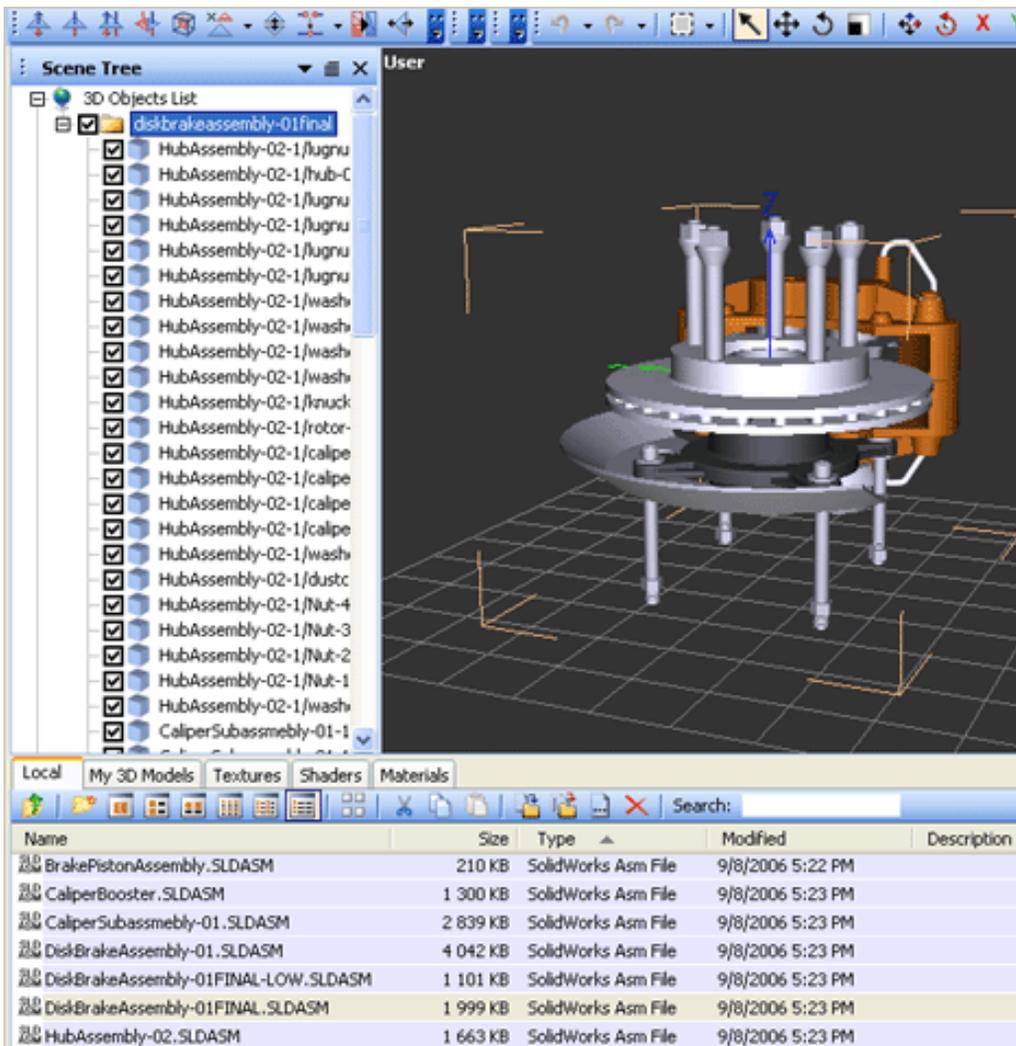
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To import the geometry into 3D Toolkit, simply drag and drop the top-level assembly into the graphics window of 3D Toolkit. All the parts and assembly-tree relationships are listed automatically in the Scene Tree.

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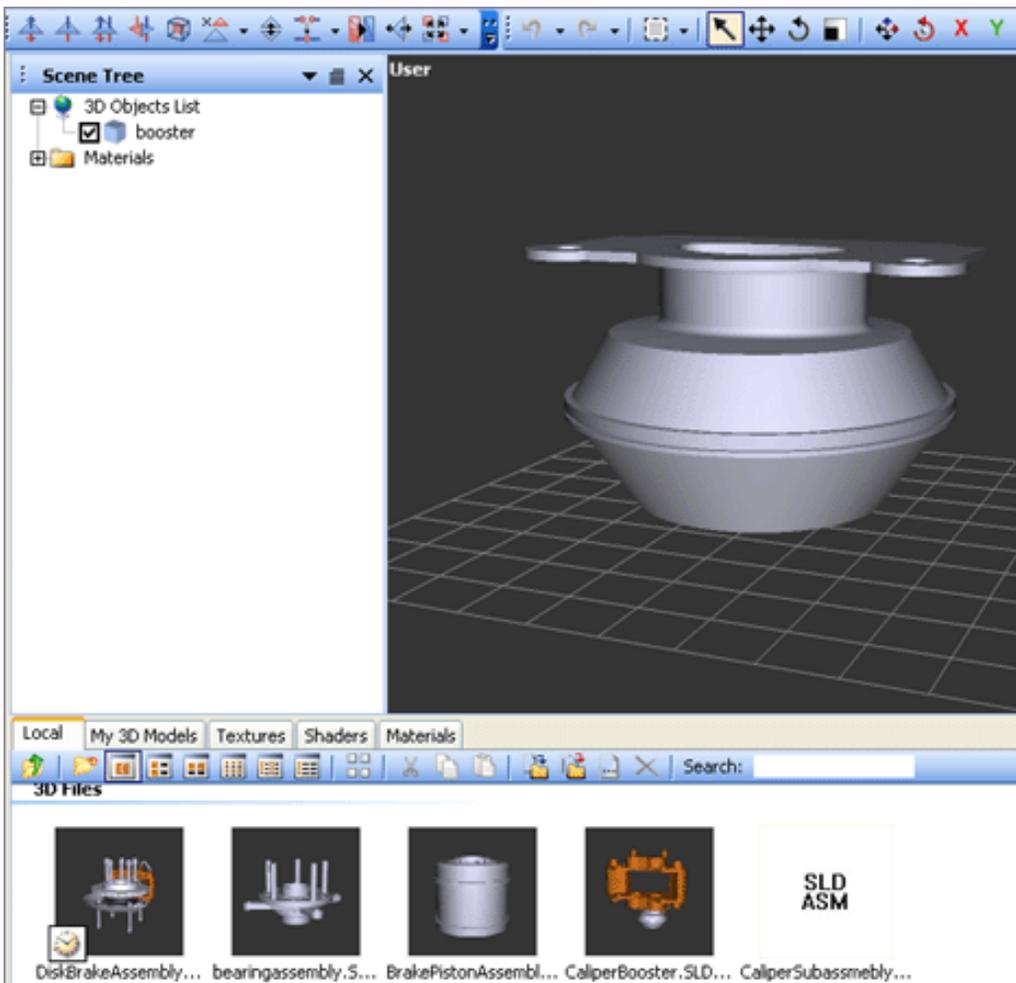
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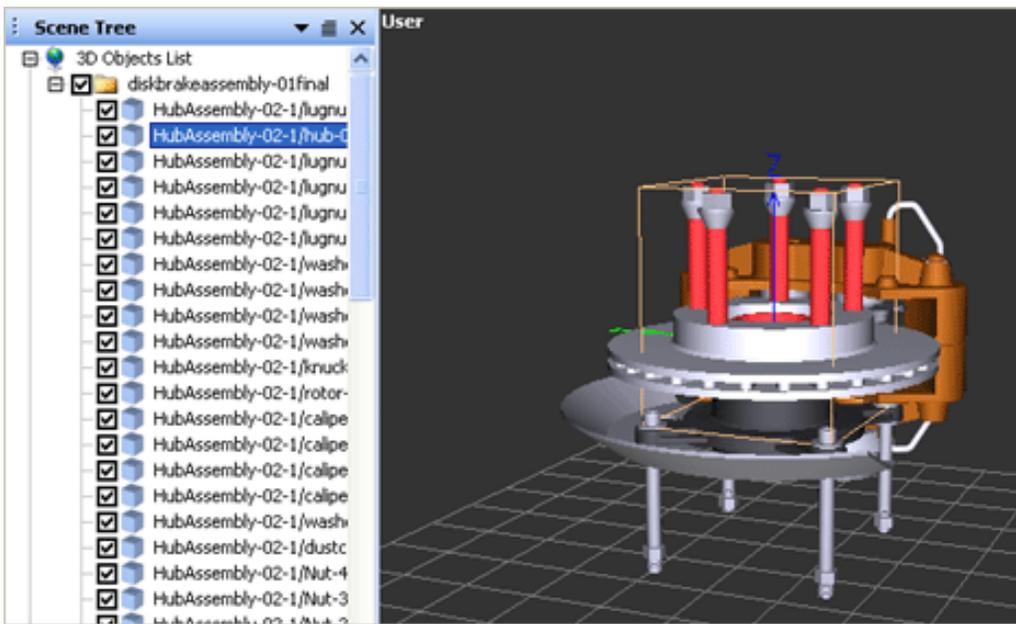


8 software will be available in spring 2007. Purchase the current version of Acrobat 3D (Version 7.0), and receive a free upgrade to Version 8. [Click here](#) to learn more.

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**To import a single part rather than an assembly, follow the same steps as above.**

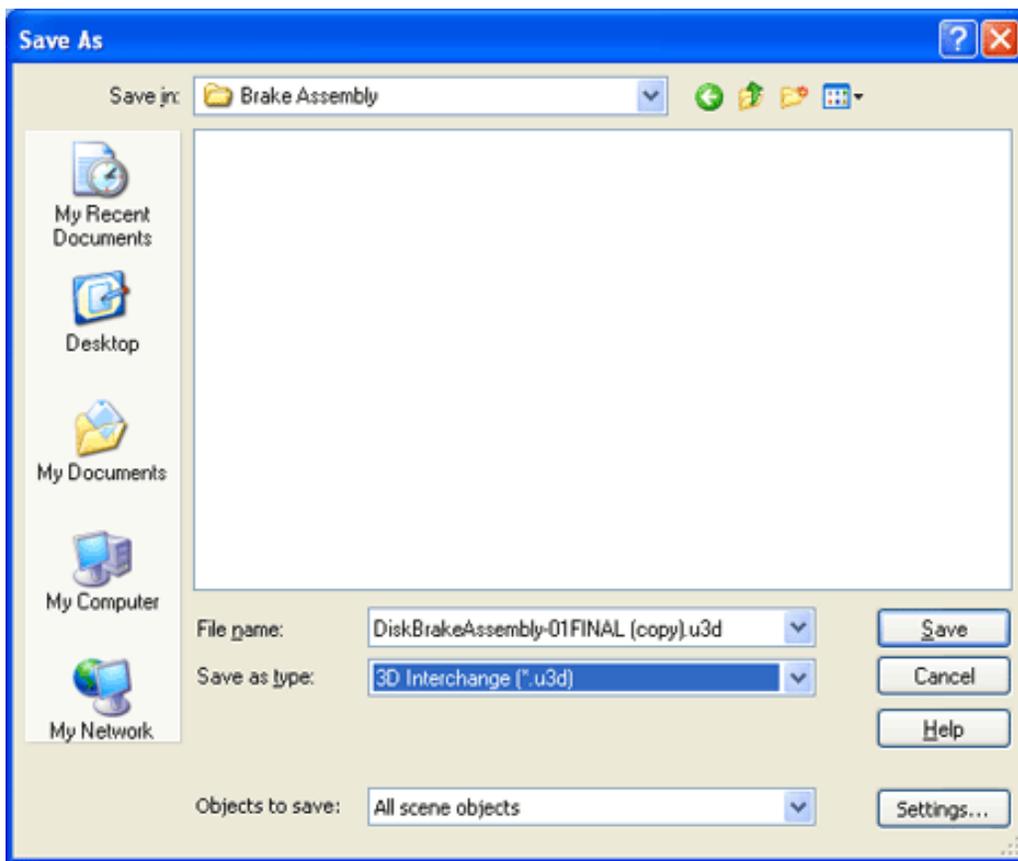
Once the assembly or part is open, switch your attention to the Scene Tree and expand the assembly scene to see all parts in the assembly. Clicking a part in the assembly scene displays the control frame for that element in the graphic. Conversely, clicking a component in the graphic automatically highlights that part or assembly in the Scene Tree panel.



This part of the window shows the relationship between graphical elements in the assembly and that part/assembly's entry in the Scene Tree list.

**Cool tip:** Click the F11 key to toggle between the default view and full screen to enhance visualization.

Now that you've loaded the geometry, you'll want to save your assembly scene so you can easily access it again later without having to import again. First you may want to adjust panel sizes or views to suit your tastes. Then save the entire scene in a compressed binary format by choosing Save As from the File menu and specifying U3D binary format.



Save your loaded geometry in U3D binary file format for fast reloading later.

### What is U3D?

The U3D ("Universal 3D") file format is an ECMA International standard designed to be a reliable and easy-to-use format for reusing 3D data. The U3D file addresses the growing need to use existing 3D data for applications and models outside the traditional engineering CAD environment where it was originally created. (To learn more about this format, visit the [ECMA website](#).)

By saving the file in U3D binary format, you'll not only retain all scene settings but greatly compress the file size as well. This makes the file easier to email, upload or download using FTP sites, or copy across network connections for collaborative functions (more on these functions in a moment).

The next time you use 3D Toolkit, your desktop settings will be retained and you'll be able to quickly reopen the U3D file you created rather than having to re-import the original design. Once you've got your desktop set up to your liking and saved your data, you can focus on optimizing the assembly scene for collaboration with others.

### Three Ways to Reduce File Size with 3D Toolkit

If you've ever worked with a 3D modeling system, you know how big the parts and assemblies can become. In fact, the data sets can get large enough to render email collaboration impossible and even make wide area network (WAN) collaboration painfully slow. This is a key benefit of using 3D Toolkit — it enables you to reduce file sizes and make it easier to collaborate with remote

personnel. The good news is that 3D Toolkit gives you three different ways to significantly compress your 3D files. You can:

- Save your designs in **U3D binary file format** (described above).
- **Eliminate or hide non-essential objects** in the assembly scene.
- Reduce the geometric complexity of entities in the assembly scene using **polygon reduction**.

## U3D Binary Files: Size and Security

When I saved the imported files in the initial scene above to a U3D binary file format, 3D Toolkit compacted 25 MB of data down to roughly 4 MB (achieving 6:1 file compression). Saving files in binary format has two additional benefits:

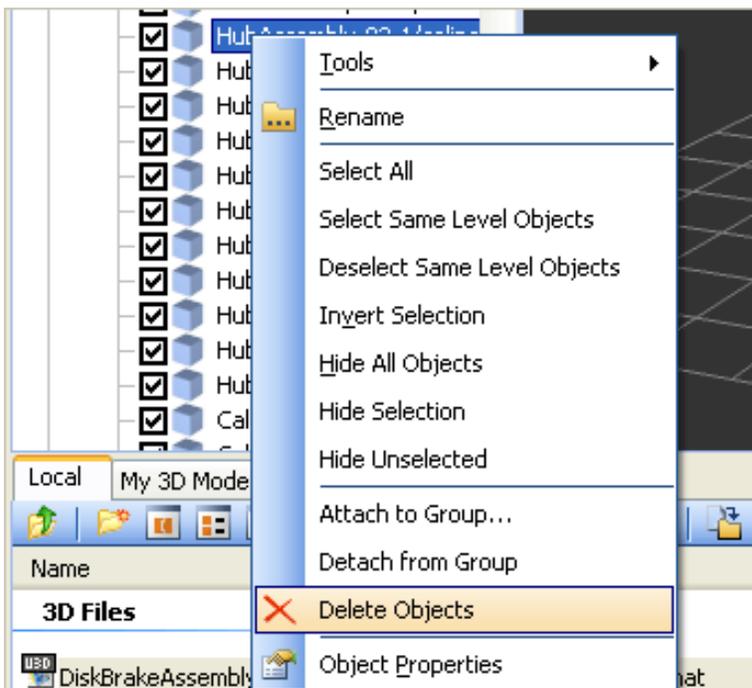
- **Single-file collaboration:** Rather than sending parts and assemblies as separate files, you can save this U3D file in PDF format by opening it in Acrobat 3D and saving as PDF. This optimized PDF file contains all assembly scene information, thus making collaboration as easy as emailing a file.
- **File security:** Since the actual geometry of the parts and assemblies is encoded as a graphical representation rather than native CAD data, you close the door on virtually anyone who might be tempted to tamper with your native CAD data.
- **An easy bridge to PDF:** Using Acrobat 3D, you can insert U3D files into an existing PDF for collaboration with those who don't have 3D Toolkit (see [Acrobat Insider #2](#) for details). And since Adobe Reader® is freely available, this process guarantees maximum collaborative transparency.

So by doing nothing other than importing and saving to a binary format, you can achieve substantial file compression and security benefits in just a few minutes.

## Removing Non-Essential Parts

Let's say your design includes a bunch of parts that aren't key to visualizing a design yet add to the size and complexity of the assembly. Examples might be internal parts like bearings, extra nuts and bolts, and covers or housings that might be omitted for clarity. By eliminating these objects from your assembly scene and then updating your binary U3D file, you'll create an even more compact file for collaboration.

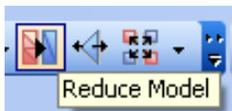
To remove parts from the assembly scene, right-click the part in the scene list and select Delete Objects from the menu. If you just want to hide a part or group of parts to reduce visual clutter — not eliminate them completely — select one of the Hide commands on the same right-click menu instead.



**Right-clicking in the Scene Tree list enables you to delete or hide parts, thereby reducing the complexity of the binary file produced by 3D Toolkit.**

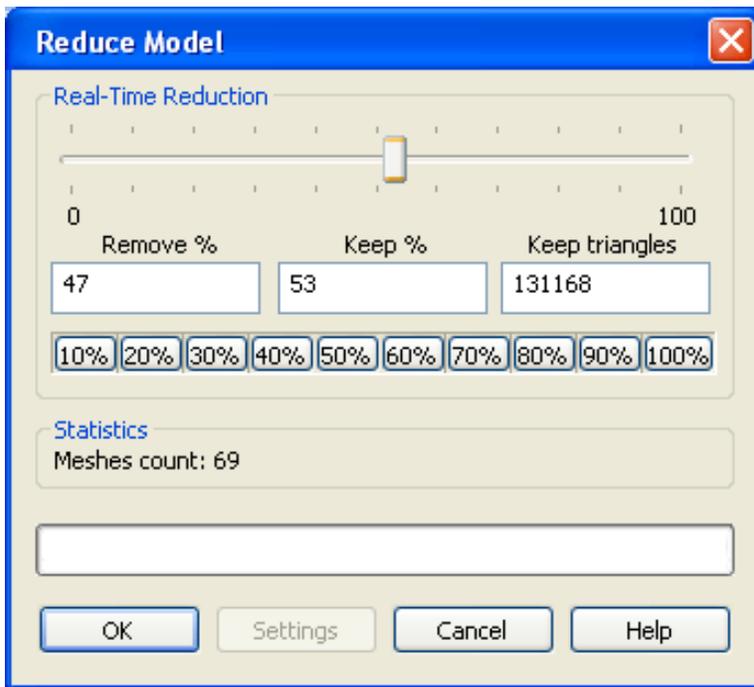
## Using Polygon Reduction

After you've compressed your assembly scene and deleted or hidden non-essential parts, there's another step you can take to further compact the scene and achieve even higher compression. Referred to as polygon reduction or "tessellation" of geometry, the key concept is that, when it comes to visualizing data, "good enough sometimes is." So if reducing the quality of visual images can compress file sizes in a way your users won't even notice, why not do so?



To reduce the model's tessellation, use the Reduce Model tool on the CAD Tools Toolbar. Then in the Reduce Model dialog box, use the visual slider to experiment with reducing the size of the model. The process is one of trial and error

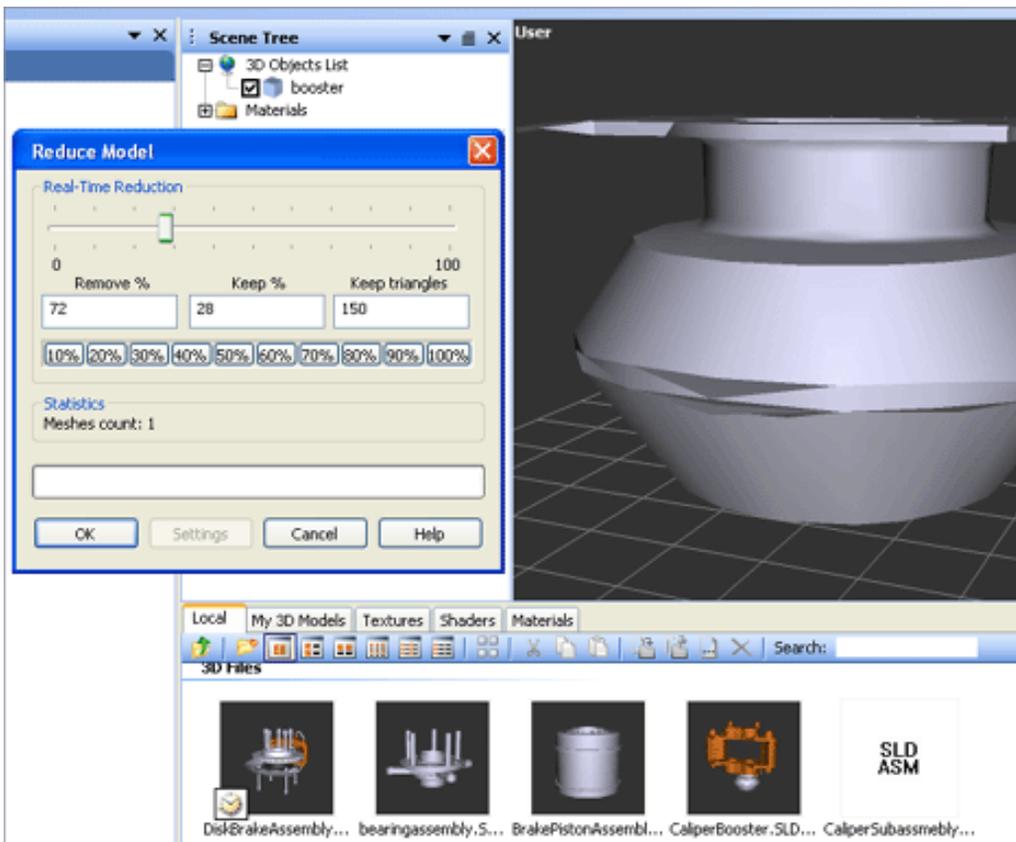
since it's hard to know how much the size can be reduced until you actually see a difference in image quality. Try a few different settings and see how much reduction you feel is acceptable.



**Reduce the model size by moving the Real-Time Reduction slider. Then finalize the results by clicking OK. Or you can selectively reduce the model size by operating on single parts rather than entire assemblies.**

When you arrive at a model reduction that's acceptable, use the Save As command to update your binary U3D file. You'll reap the benefits of an even more tightly compressed file that can be used for collaboration.

To reduce the tessellation of a few key parts within an assembly, simply use the Reduce Model tool on specific parts rather than on entire assemblies, as seen below.



Here you see the results of reducing the model size by 70% in the part at right. Note that huge reductions in the model yield only small visualization differences. In practicality, 50% reductions can frequently not be seen unless you zoom in close.

**Cool tip:** Use the Save As command to save several different versions of U3D files with different reduction values. Keep the original uncompressed copy at full resolution so you can easily retrieve it later if necessary.

## Sharing Binary Files

Once you've created and optimized your U3D binary file, anyone who has 3D Toolkit or Acrobat Professional 7.0 or later can open it and access all the 3D assembly and part information. They no longer have to receive native CAD data or fight with CDs full of massive data sets. Using Acrobat 3D, you can insert U3D files into an existing PDF (see [Acrobat Insider #2](#)), making 3D designs accessible to users of Adobe Reader. And since 3D Toolkit can be used easily by CAD users and technical illustrators alike, exporting CAD information via U3D binary files gives design engineers an easy way to get editable information to others without giving up design security.

Perhaps most importantly, virtually anyone can manipulate the 3D scene information stored by 3D Toolkit to move parts, annotate or change assembly scenarios, and then route the information back to the engineer without ever putting native information at risk of corruption. There's a lot of buzz in the

market about collaboration but few practical examples to explore. Acrobat 3D Toolkit makes the process easy to visualize and test on your own desktop.

**Cool tip:** Acrobat 3D Toolkit comes with a very detailed Help document that is searchable by topic and contains information on all menus, toolbars, and functions.

## Next Time...

In upcoming issues of *Acrobat Insider* I'll explore creating rendered type outputs and blending 3D Toolkit functionality with traditional PDF file types to create compelling visual documentation that anyone with a PDF reader can open. Until next time.

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## About the Author

Robert Green ([rgreen@greenconsulting.com](mailto:rgreen@greenconsulting.com)) performs CAD programming and consulting throughout the United States and Canada. He is a regular contributor to *Cadalyst* magazine. Robert lives in Atlanta, Georgia.

## Details and Availability

For a full list of features and system requirements, visit the [Adobe Web site](#). Microsoft Windows® 2000 with Service Pack 2, Windows® XP Professional or Home Edition, or Windows XP Tablet PC Edition is required for use with Acrobat 3D. Acrobat 3D for Windows, available on CD-ROM or by download, is \$995. \*\*

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