

Creative Efficiency Research: **MODO 801 vs. 3ds Max 2015**

From CAD file to finished rendering: How MODO stacks up in a real-world workflow situation



About this Benchmark Project

► Overview

This benchmark project was conducted to measure the efficiency gains of MODO 801 compared with 3ds Max 2015 in a typical workflow situation.

The benchmarks were defined and executed by product experts with many years of experience with the two software packages. Please refer to the methodology section at the end of this report for details on the execution of the benchmarks.

► The Workflow Scenario

To assess the real-world efficiency of the two applications, we used a common workflow situation: **the transformation of a CAD file provided by a client into a photo-realistic rendering** for a product presentation, under severe time-constraints.

We used CAD data of stereo headphones for this example. The workflow steps that needed to be completed were the following:

- Sculpting the creases of soft ear pads
- Applying materials from the texture library
(Two distinct versions of the headphones had to be created)
- Setting lighting and rendering environment
- Fine-tuning materials
- Rendering a 2K high-quality version of the image, including depth-of-field and global illumination
- Outputting special-purpose channels for image processing, such as ambient occlusion.

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Introduction: Key Elements of Efficiency

► Overview

With great power comes great complexity.

Stalwarts of the imaging pipeline such as 3ds Max have been around for decades. In the process, they have become home to many different professions, modeling experts, lighting specialists, riggers, animators, rendering professionals...

However, it has become almost impossible for a single user to completely master all of the different aspects of these programs. The cognitive load of 3ds Max is such that even an experienced user can spend some time locating a specific feature or setting he needs at a given time. **Features and granular settings do not only give you power —they also can slow you down.** In terms of user interface and architecture, MODO is a more modern and streamlined application, and in many cases, the productivity advantage of MODO in these benchmarks was a direct result of efficiency and coherence of the user interface.

► Speed of iteration

Iteration of settings is a key aspect of the 3D imaging workflow: analyzing the current state of a scene, changing a setting, executing a quick render, analyzing the result, modifying another setting,

rendering again, until you get it right is the typical workflow loop in which every second counts— and this is another aspect where MODO clearly outperformed its competition.

There is a simple reason for that: MODO offers an interactive render-view which not only constantly updates, but which allows the user to direct rendering to a specific portion of the scene simply by “mousing” over it, eliminating the time necessary for time-consuming render operations.

► Speed of rendering

Finally, **the speed of the rendering engine is vital.** In our benchmarks measuring the time to render the final image with global illumination and depth of field applied, **MODO was over 3 times faster** than 3ds Max, providing identical (if not superior) image quality at the outcome.

This is not to suggest that 3ds Max users should replace their favorite program, but rather to demonstrate **that there can be a real efficiency benefit to including MODO in the overall imaging pipeline.** Because in the end, the most important thing is always to get the job done as fast as possible.

Efficiency Measures: **Complete Project**

► Shorter is better

3ds Max 2015

2 h. 50 min. 35 sec.

MODO 801

55 min. 47 sec.

Enhancing the CAD Data: **Sculpting Free-Form Objects**

► **Overview**

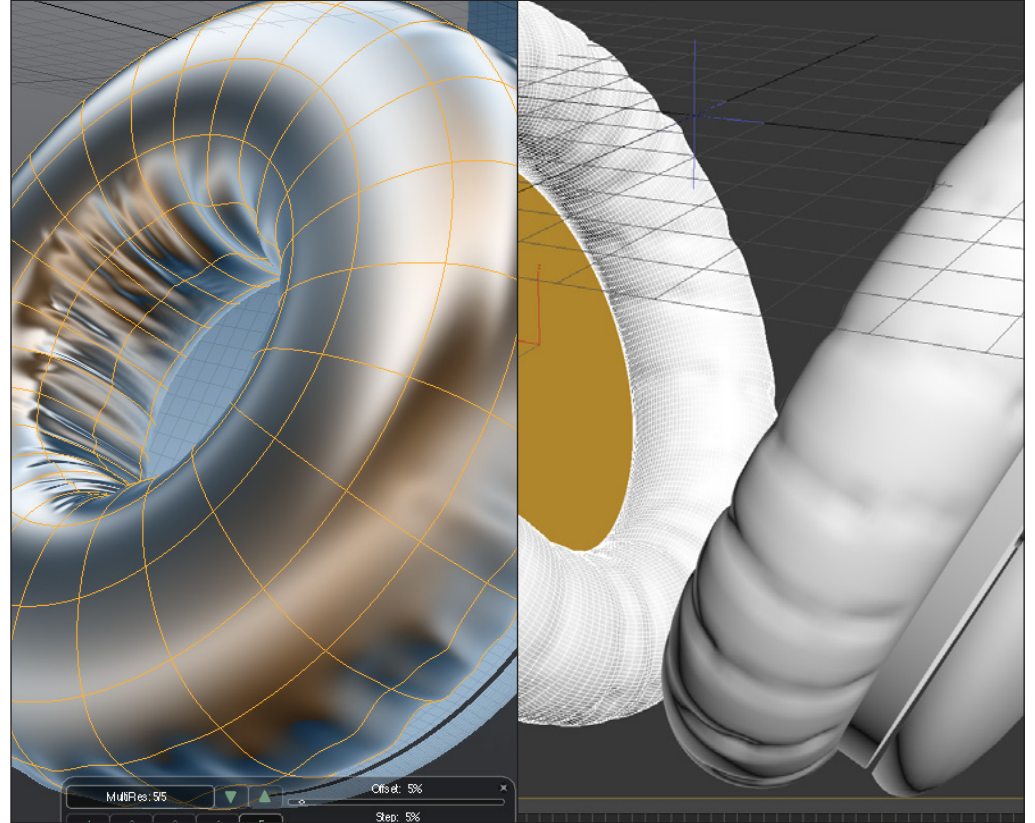
Sculpting is an essential part of the modern modeling process. Unlike 3ds Max, which offers only very limited sculpting features, **MODO 801 provides sophisticated sculpting functionality** without the need of an add-on program.

► **Key Points**

MODO, like specialized applications, can sculpt multi-resolution subdivision objects, **allowing the creation of extremely complex models impossible with programs like 3ds Max**, which restrict sculpting to polygon meshes.

► **Benchmarks**

While MODO was clearly faster in these benchmarks, speed is beside the point as far as sculpting is concerned. **In reality, users of 3ds Max almost always rely on applications such as Mudbox or ZBrush for sculpting—which means buying and learning an additional application**, and adds yet another element in an already complex production pipeline.



The sculpting environment in MODO (left) offers sophisticated shading modes to assist the creative process. 3ds Max (right) requires high-resolution polygon meshes for sculpting that severely limit creative possibilities and significantly impact the speed of the sculpting operation.

Efficiency Measures: **Sculpting Free-Form Objects**

► **Shorter is better**

3ds Max 2015

17 min. 13 sec.

MODO 801

9 min. 35 sec.

Recreating the Real World: Applying Materials and Textures

► Overview

In terms of materials and textures, the question with modern 3D imaging applications **is not so much what can be achieved, but how long will it take** to achieve an excellent result. Each rendering environment usually has its own, complex set of rendering and shading options that need to be mastered in order to produce high-quality results.

► Key Points

In the present workflow situation, the key differentiator between applications is the quality of presets and assets that are provided. In this respect, **MODO has a clear advantage, both in terms of variety and quality of presets provided.**

► Benchmarks

The benchmark consisted in applying materials to the different parts of the CAD file using available presets. **The speed difference between MODO and 3ds Max in this benchmark is the direct result of a more streamlined user interface and lower cognitive load:** 3ds Max often requires the user to find settings and options through a succession of dialogs and lists, which is more time-consuming.



MODO's texture libraries offer a great variety of sophisticated material and shader presets that can provide a good starting point for texture explorations and increase productivity in deadline-driven projects.

Efficiency Measures: Applying Materials and Textures

► Shorter is better

3ds Max 2015

3 min. 57 sec.

MODO 801

1 min. 52 sec.

Setting the Scene: **Setting Up Environment and Lighting**

► **Overview**

Lighting a scene and setting up the right rendering environment are key to produce photo-realistic images.

► **Key Points**

MODO provides over 70 rendering environments grouped by indoor, outdoor and studio environments. 3ds Max does not provide HDR environment maps with its assets.

► **Benchmarks**

The benchmarks included **finding and testing the environment map, setting up three different light-sources and rendering a test of the set-up.** In the case of 3ds Max, it was necessary to find an environment map on the Internet.

The efficiency advantage of MODO came from the availability of environments and render speed: while MODO an 3ds Max take about the same time to set up three light sources and setting their colors, **MODO's Render viewport provides interactive feedback, and eliminates the need for an additional render operation to verify the set-up.**



MODO supports environment-based lighting. Environments can be dragged from the Environment Browser to the render view and are immediately taken into account.

Efficiency Measures: **Setting Up Environment and Lighting**

► **Shorter is better**

3ds Max 2015

16 min. 27 sec.

MODO 801

6 min. 01 sec.

Getting it Right: Fine-Tuning Materials

► Overview

Fine-tuning the appearance of an object is one of the most time consuming operations in the process of creating a final image, since it requires to go back and forth between adjusting settings, and testing the result by rendering a detail.

► Key Points

One of the key productivity advantages MODO is offering is the interactive render view, which allows the user to interact with materials or adjust the camera position. Even the area where the ongoing render process focuses can be interactively changed, providing significant productivity gains.

► Benchmarks

The benchmarks measured the time necessary to fine-tune several of the key materials used of the model, including setting a bevel to hide the sharp edges common with CAD models. **Iterating materials and settings interactively is one of the areas where MODO shines**, as these benchmarks demonstrate.

3ds Max offers an interactive render view, but it is less efficient and offers less interactive control.



In MODO, Materials can be dragged from the Materials Browser directly to the Render window, which immediately updates to show the changed settings. "Mousing" over a specific area in the render view directs the rendering operation to that detail.

Efficiency Measures: **Fine-Tuning Materials**

► **Shorter is better**

3ds Max 2015

35 min. 28 sec.

MODO 801

11 min. 12 sec.

Finalizing the Output: **Rendering the Final Image**

► **Overview**

Setting up and executing the final render of a scene is time-consuming. Setting the right distance for a depth-of-field rendering can be a process of trial and error, for instance, and sophisticated rendering options such as global illumination are taxing even for powerful workstations.

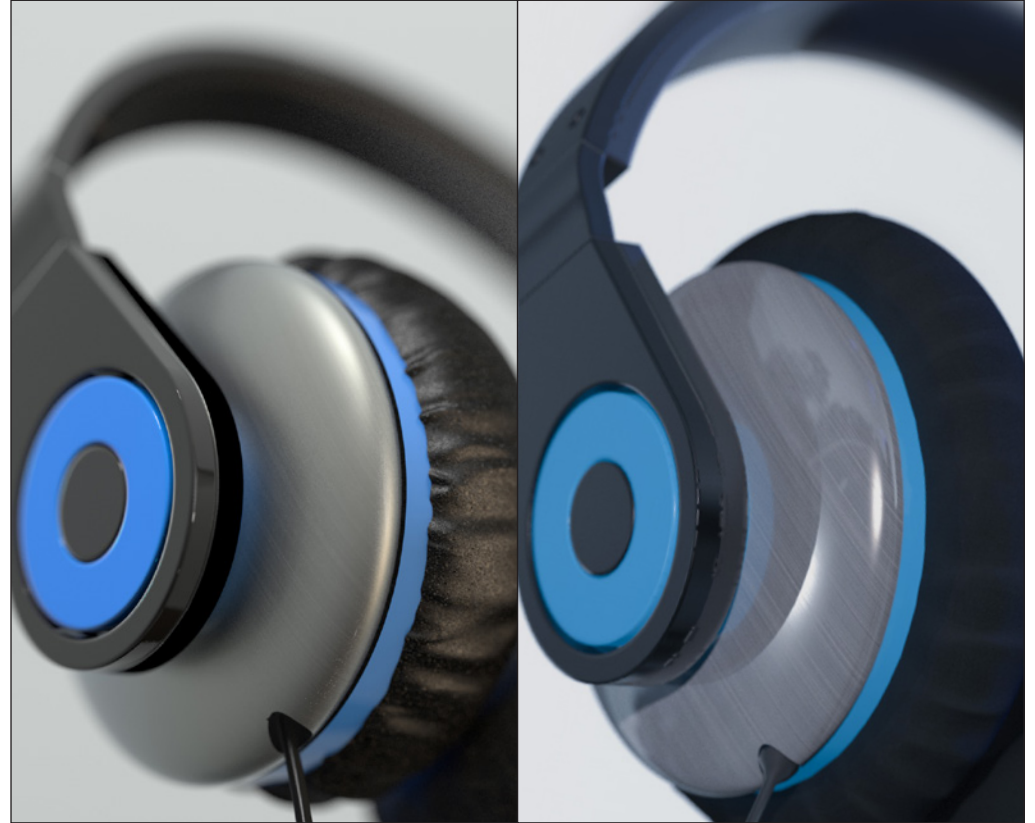
► **Key Points**

MODO and 3ds Max offer very similar options for rendering photo-realistic images, but vary significantly in terms of rendering speed.

MODO also has a more streamlined user interface and offers settings that closely mimic the behavior of a camera, including an auto-focus option that insures that with shallow depth of field the center of the scene is in focus.

► **Benchmarks**

In our benchmarks, **MODO was consistently two to three times faster than 3ds Max for comparable rendering operations**, contributing strongly to the overall productivity of the software.



Final rendering of the headphones in their metal finishing, rendered as a 2K image with depth-of field and global illumination: MODO (image on the left), 3ds Max (image in the right)

Efficiency Measures: **Rendering the Final Image**

► **Shorter is better**

3ds Max 2015

1 h. 45 min. 51 sec.

MODO 801

30 min. 58 sec.

A Question of Integration: **Fitting into the Imaging Workflow**

► **Overview**

Beyond creating photo-realistic images, modern 3D applications are **required to facilitate the creation of a wide variety of additional image channels** necessary for further processing.

Some of these image types, such as alpha channels and depth maps, have been around for a long time; others, such as ambient occlusion, have been added more recently as a response to emerging requirements for increased realism in rendered images.

► **Key Points**

MODO offers Ambient Occlusion as one of **dozens of render channels that can be added to the output file at render time**. Other channels that can be rendered in MODO include Object Masks, Depth Masks, Reflection Occlusion, Motion Vector Output, and more

► **Comparative Analysis**

The speed of rendering Ambient Occlusion is not the most important aspect: While MODO renders a AO properly, **3ds Max treats Ambient Occlusion as a material override**, meaning that at render time, Mental Ray will replace any material present in the scene with a special Ambient Occlusion shader. The downside of this approach is that none of the material properties such as bump mapping are taken into account in the Ambient Occlusion output. (See illustration on the right.)



Ambient Occlusion rendered by MODO (Top image): Material properties such as bump mapping are faithfully rendered. Ambient Occlusion in 3ds Max, rendered using a material override option (Bottom image): Geometry is properly rendered, but material attributes are not taken into account.

About the Benchmarks: **Background Information**

► **Methodology**

This benchmark project was commissioned by The Foundry and independently executed by Pfeiffer Consulting.

All the productivity measures presented in this document are based on real-world workflow examples designed and executed by professionals with many years of experience with the programs involved:

Andy Probst has been a Maya user since version 1.0, and has been a certified Maya and MODO trainer for years. He also has been using both programs extensively for professional image production through his company Meilenstein Digital.

Clément Fuzier is an independent designer and creative director, who has used 3ds Max in the course of his professional work since version 4.0 of the program.

► **How We Design the Benchmarks**

The basic approach is simple: in order to assess productivity gains that a new release or a different product may (or may not) bring, we start by analyzing the minimum number of steps necessary to achieve a given result in each of the applications that have to be compared.

Once this list of actions has been clearly established, we start to execute the operation or workflow in each program, with the help of seasoned professionals who have long-standing experience in the field and with the programs that are tested.

► **How We Prepare Hardware for Testing**

We use factory-standard configuration hardware, that has been completely re-initialized prior to benchmarking. Only the system software and application software necessary for tests, as well as all required updates at the time of testing, are installed on the benchmark system.

► **Hardware**

Benchmarks were conducted on a Dell™ workstation equipped with a 2.83GHz quad-core Intel® Xeon® processor and with 16 GB of RAM, factory-configured for 64-bit Windows® operating systems.

► **About Pfeiffer Consulting**

Pfeiffer Consulting is an independent technology research institute and benchmarking operation focused on the needs of publishing, digital content production, and new media professionals.

For more information, please contact research@pfeifferreport.com

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