# CINEMA 4D

MODELING ● ANIMATION ● RENDERING

## CINEBENCH 2000

# CINEBENCH 2000

**Reference Manual**

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|---|---|
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| Manual | Michael Giebel |
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If you have any questions about the benchmark suite
or if you would like to send us your results, please contact us.

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# Contents

# Foreword

Welcome to the CINEMA 4D benchmark suite.
This program runs several tests to determine the
speed of graphics adapters as well as processor
speed.

# Before we Begin

**Important Note:**
*The performance results you gain from CINE-
BENCH 2000 are in no way comparable with the
results of any older CINEBENCH version … even
if it may look that way!*

The raytracer, the scenes used for testing, the
calculation methods … just everything has
changed.

So please, when you compare different machines
you should note somewhere that you have used
CINEBENCH 2000 and not CINEBENCH '98!

# Requirements

The following things are the least requirements you need in order to run CINEBENCH 2000 properly on your computer.

- 15 MBytes of free hard disk space
- 128MBytes of free physical RAM at least (assigned to CINEBENCH 2000 under Mac OS)

  Turning on virtual memory is not recommended because this leads to very inaccurate values (e.g. because of initiating disk swapping).

- 8 bit graphics card with a resolution of 1024x768 or greater
- Win 95/98/NT 4/2000 or Mac OS 8.0 or higher

**Note:**
*The test is held in English and won´t be translated to other languages.*

# Installation

Copy the "Cinebench 2000" folder from the CD-ROM anywhere on your hard disk. You need about 15 MBytes of free space there.

Do not change the location or the name of any of the folders or files that come with this benchmark suite.

No further installation procedure is required.

# Preparations

Before running this benchmark program you should eliminate any disruptive effects. Therefore quit all other applications and tasks. Turning on virtual memory is not recommended. This leads to very inaccurate results (e.g. because of initiating disk swapping). If you are connected to a network you should disable your access or log off from the network. While testing you shouldn't move the mouse nor hit any keys on the keyboard.

## Important Notes on Graphics Accelerators

Some graphics accelerators are known to silently switch OFF acceleration on resolutions higher than 800x600 pixels or higher than 1024x768 pixels. Some of these cards quit acceleration when your screen resolution is higher than the mentioned values others do so when your CINEMA 4D editor and output windows exceed these values. To be on the safe side you should run the benchmark suite with a maximum screen resolution of 800x600 pixels.

Then there are some accelerators (mainly OpenGL graphics adapters) that do not support hardware acceleration with color depths of 24 bpp (bits per pixel) or higher. That is "True Color" under Windows and "Millions of Colors" under MacOS. If that is the case, the operating system usually switches back to software-based support. Time, perhaps, to watch "Gone With The Wind" while the test completes itself. Therefore you should switch back to a 16 bpp colour palette, which is "High Color" under Windows and "Thousands of Colors" under MacOS.

We recommend that you do both, i.e. set the screen resolution to 800x600 pixels and the colour depth to 16 bpp.

Another very interesting statement regarding multi-monitor solutions under Windows 98 can be found on the ELSA support pages:

`www.elsa.com/SBase/C/FAQ/E_CADW98.htm`

*"When using more than one board, only software OpenGL is possible (due to restrictions in Windows 98)."*

# Running the Test

## Overview

To start the benchmark suite just double click the program icon inside the "Cinebench 2000" folder and the program will open its window (see picture below).

To quit the program just close its window.
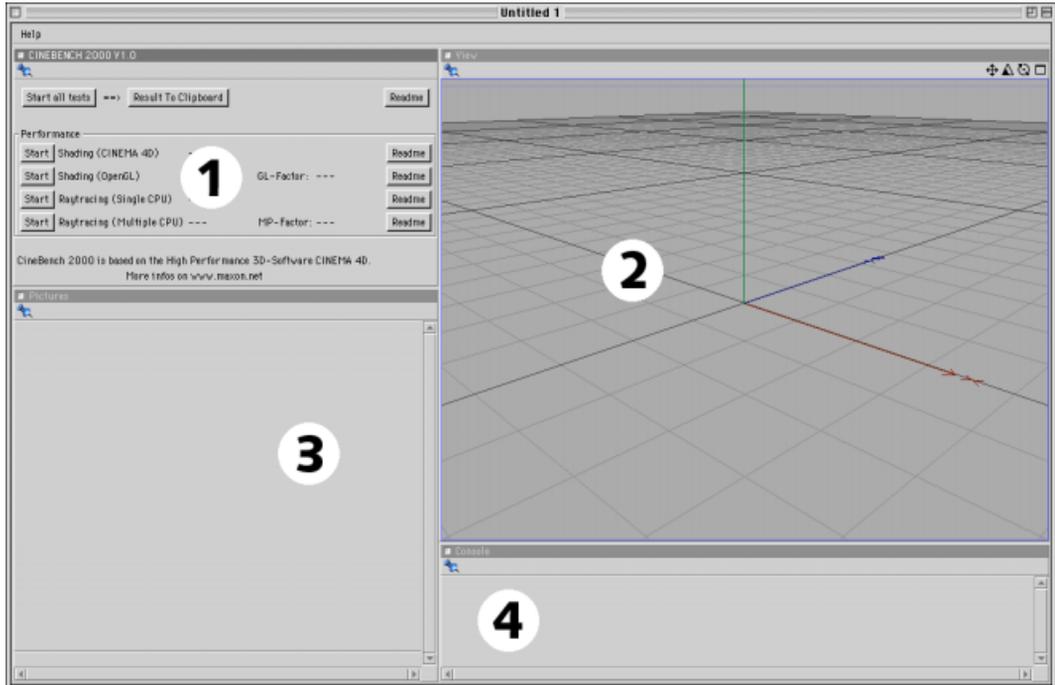
In the benchmark window you find four major areas:

1. The Control window
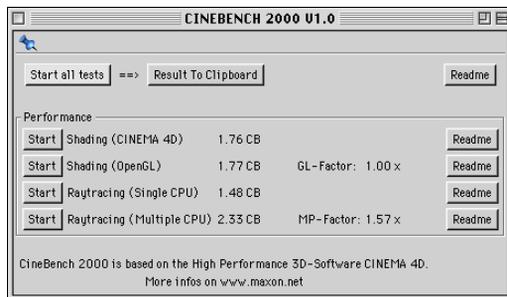


Here you start all the different actions.

You can either perform all tests by clicking on the "Start all tests" or run an individual test by clicking on one of the "Start" buttons below.

After the tests are finished you can copy the results to your computer's clipboard for further usage. To do so click on the "Result To Clipboard" button.

Open your prefered text editor with an empty document. Paste the contents of the clipboard into this document. Please fill out the missing data in the document header. Otherwise the data you gathered is pretty much useless. Save the text document. You're now ready to share your experiences with others.

You can also access the online help via the "Readme" buttons which will open linked PDF documents.

**Note:**
*In order to view the online documents you must have Adobe Acrobat Reader installed on your system. (You can find it on the CINEBENCH CD as well.)*

2. The View window

Herein the different test scenes will be loaded and the shading tests will perform.

3. The Pictures window



Herein the raytracing test will take place.

4.  The Console window
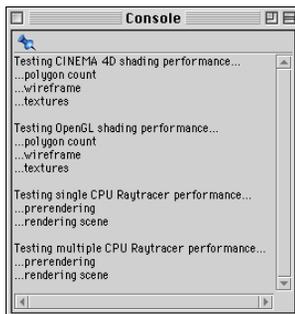


Here you get information about the stage of the individual tests and their sub-tests.

Also error messages might appear here. If this happens please check your installation.

## The Benchmark Tests

The suite will perform four different tests. Each can take several minutes depending on your hardware.

## Shading (CINEMA 4D)

The shading performance is calculated by running three different tests:

*T1 – Polygon count*
A fractal is displayed with an increasing number of polygons (64, 1024, 4096, 16384, 36864, and 65536) to test how well the shading algorithm deals with large polygon counts. For every test the total surface covered by the polygons is constant.

The result is computed from the area under the time polygon curve.

*T2 – Wireframe*
A scene with a camera walktrough is displayed in wireframe mode and animated to test the raw line draw speed of the shading engine.

*T3 – Textures*
A scene with a camera walktrough is displayed in texture shading mode and animated to test the shading and texturing speed of the shading engine.

Finally the three tests are combined by the following formula:

```
result = 0.4*T1 + 0.3*T2 + 0.3*T3
```

## Shading (OpenGL)

The shading performance is calculated by running three different tests:

*T1 – Polygon count*
A fractal is displayed with an increasing number of polygons (64, 1024, 4096, 16384, 36864, and 65536) to test how well the graphics adapter deals with large polygon counts. For every test the total surface covered by the polygons is constant.

The result is computed from the area under the time polygon curve.

*T2 – Wireframe*
A scene with a camera walktrough is displayed in wireframe mode and animated to test the raw line draw speed of the graphics adapter.

*T3 – Textures*
A scene with a camera walktrough is displayed in texture shading mode and animated to test the shading and texturing speed of the graphics adapter.

Finally the three tests are combined by the following formula:

```
result = 0.4*T1 + 0.3*T2 + 0.3*T3
```

## Raytracing (Single CPU)

The raytracing performance test is done by using one scene that uses heavy antialiasing, shadows, transparencies and refractions to stress the FPU (Floating Point Unit).

Each scene will be pre-rendered first in a very small resolution to eliminate any hard disk dependencies. (So all textures are loaded into your computer's physical memory.)

## Raytracing (Multiple CPU)

The raytracing performance test is done by using one scene that uses heavy antialiasing, shadows, transparencies and refractions to stress the FPU (Floating Point Unit).

Each scene will be pre-rendered first in a very small resolution to eliminate any hard disk dependencies. (So all textures are loaded into your computer's physical memory.)

MP raytracing is only available if you have a computer with at least 2 CPUs and an OS running that supports multiple processors. For example Mac OS 8 and Windows NT are able to use multiple CPUs but Windows 95/98 are not!

# The Benchmark Results

After the test has finished you're presented the results:
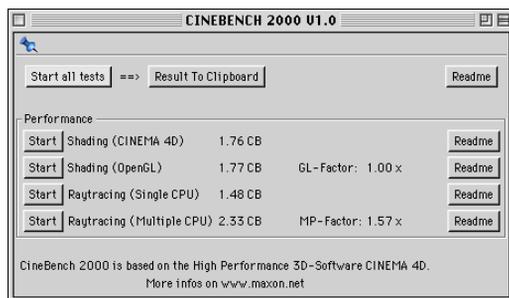


- The first line shows how fast CINEMA 4D's built-in software engine is in 2D and 3D.
- The second line shows how fast your graphics accelerator card is in 2D and 3D.
- Next to the shading results the values of the accelerator card and CINEMA 4D's built-in engine are compared.

    The "GL-Factor" is shown. You can easily determine which one is faster.

    If the value is greater than 1.00, then your graphics adapter running OpenGL is faster than CINEMA 4D's built-in drawing engine. For example, a value of 2.00 would indicate that the graphics accelerator is twice as fast as CINEMA 4D.

    If the value is less than 1.00, then CINEMA 4D is faster than your graphics *accelerator*. For example, a value of 0.50 would indicate that CINEMA 4D is twice as fast as the graphics adapter.

- The third line shows how fast CINEMA 4D's raytracer is with one CPU.
- The last line shows how fast CINEMA 4D's raytracer is with multiple CPUs. This value is displayed only if there is more than one CPU installed in your computer.

    The value displayed is the so called CINEMA 4D Index. Our reference computer is a Pentium 133 MHz which has an index of 1.00. The higher the values the better. A computer with an index of 4 is four times faster than a Pentium 133 MHz for ray-tracing.

- If you're using a multi-processor machine, you'll find an additional value—the "MP-Factor"—that compares the results of SP and MP raytracing. Usually you'll get about 160%–180% (i.e. values of 1.6–1.8) out of 2 CPUs and about 350% (i.e. a value of 3.5) out of 4 CPUs.

### Note:
*If you have multiple CPUs in your computer and you get only a low MP percentage, then something is wrong! Either your operating system does not support multiple CPUs (e.g. Win95/98) or you have general problems with your hardware (loose contacts, etc.).*

# Multiple CPUs
# and the CINEMA 4D Index

If you're using a computer with two or even four CPUs you might ask why the render performance does not lead to values twice or four times higher.

At the moment on all known computers all processors have to share one and the same memory area (RAM). Unfortunately only one processor can access memory at a time. All the others have to wait until memory acces has been finished and it's their turn—one after the other.

Of course we're losing time by this memory sharing architecture, time that leads to a lower CINEBENCH index.

Even theoretically – ideally using the fastest computer available – you'll get increases of 195% out of 2 CPUs and 380% out of 4 CPUs.

So when CINEBENCH 2000 gives you values of *just* 1.85 (185%) don't be angry with it—it's not the test's fault. By the way, such a value would be very close to the theoretically calculated value and a very good one though.

**Note:**
*Out of a dual Pentium computer you will get even lower values due to the fact that in addition these processors have to share the same L2 cache memory as well.*

# Interpreting the Results

Well, let's start with the easy ones, the single and multiple CPU factors. Actually there's nothing you really have to care about. The higher the value, the faster is your computer, the quicker you get any rendering results.

And now for the tricky ones, the speed results of the graphics tests. To get comparable results you have to test every graphics adapter in one and the same machine under the same conditions. If for example you compare a Diamond FireGL 4000 in a AMD-K6 266 MHz computer with an ELSA GLoria-XL in a Intel Pentium III 800 MHz environment, the best you can get is an upward or downward trend, but nothing really comparable.

You can minimize that trend result by building up relative values, e.g. dividing the card results by the CINEMA 4D results (as CINEMA 4D also profits from a higher CPU speed). However, it is more than likely that the speed increase with CINEMA 4D is not as great as speed increase with the graphics adapter – it's just … trendy.

By the way, this division is already made by the benchmark program.

**Again:**
*If you want comparable results, you have to test every graphics adapter in the same environment (i.e. on the same computer).*

One additional word about these hardware comparison tests. It's well known that—especially under Windows—you almost never get completely rid of any previously installed hardware drivers.

And some drivers or any of their entries in any of the initialization scripts, though they're not needed any more, can cause unpredictable results in your computer system's overall stability.

Better computer magazines e.g. always do a clean OS installation before adding new exchange hardware to the system (this starts with formatting your boot drive and beginning from scratch). So, if you really want to test different graphics adapters … well, good luck.

Oh, and before you start laughing: the same problems are known for Mac OS. However, it's easier to find all older driver components manually here.

# Improving System Performance

Now, you're the lucky guy who doesn't care about all that hardware comparison stuff. You have your one computer and that is that. You're asking yourself how you could possibly use the CINEMA 4D benchmark suite for your own benefit.

The first thing could be to share your experiences (the benchmark results) with your friends and neighbours (see next chapter). You then can either boast about your computer equipment or signal retreat. In either case recall our words of caution concerning what is comparable and what isn't!

But there's more to the CINEMA 4D benchmark suite. You can enhance your system performance (no joke). At the beginning I told you how to prepare properly for the benchmark. Run the first test as stated. Then simply run another test in your usual working environment (e.g. resolution 1280x1024, 32 bbp, network attached, etc.). You will then see if your system slows down considerably. If the system does slow down, you may want to go about eliminating the causes one-by-one.

You can also determine the best environment for graphics hardware acceleration by running several tests and thereby constantly reducing the system load (e.g. do test rows by first decreasing only the system's colour depth, then by decreasing only the screen resolution and finally by doing both).

# Ranking

Due to German law we are not allowed to provide you with a detailed list of tested hardware but you are free to spread the results you experience. If you do, you should use the template we're providing you with.

After the tests are finished you can copy the results to your computer's clipboard for further usage. To do so click on the "Result To Clipboard" button in the control window.

Open your prefered text editor (e.g. "Simple Text" under Mac OS or "Notepad" under Windows) with an empty document.

Paste the contents of the clipboard into this document. Usually you can immediately select the editor's "Edit / Paste" menu command to do so.

Please fill out the missing data in the document header. Otherwise the data you had gathered are pretty much useless.

Save the text document. You're now ready to share your experiences with others.

**Note:**
*You might also write down the version number of your graphics card driver. Sometimes overall performance and stability gets better when you use the latest driver available. (Be careful with beta drivers though!)*
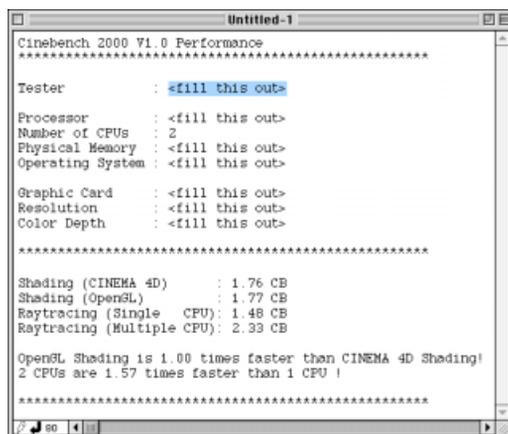
```
Untitled-1

Cinebench 2000 V1.0 Performance
********************************************************

Tester            : <fill this out>

Processor         : <fill this out>
Number of CPUs    : 2
Physical Memory   : <fill this out>
Operating System  : <fill this out>

Graphic Card      : <fill this out>
Resolution        : <fill this out>
Color Depth       : <fill this out>

********************************************************

Shading (CINEMA 4D)    : 1.76 CB
Shading (OpenGL)       : 1.77 CB
Raytracing (Single  CPU): 1.48 CB
Raytracing (Multiple CPU): 2.33 CB

OpenGL Shading is 1.00 times faster than CINEMA 4D Shading!
2 CPUs are 1.57 times faster than 1 CPU !

********************************************************
```
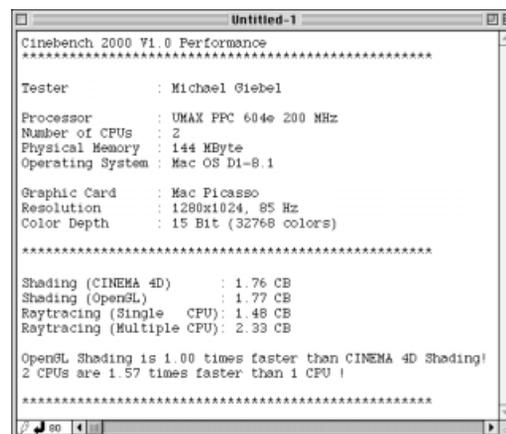
```
Untitled-1

Cinebench 2000 V1.0 Performance
********************************************************

Tester            : Michael Giebel

Processor         : UMAX PPC 604e 200 MHz
Number of CPUs    : 2
Physical Memory   : 144 MByte
Operating System  : Mac OS D1-8.1

Graphic Card      : Mac Picasso
Resolution        : 1280x1024, 85 Hz
Color Depth       : 15 Bit (32768 colors)

********************************************************

Shading (CINEMA 4D)    : 1.76 CB
Shading (OpenGL)       : 1.77 CB
Raytracing (Single  CPU): 1.48 CB
Raytracing (Multiple CPU): 2.33 CB

OpenGL Shading is 1.00 times faster than CINEMA 4D Shading!
2 CPUs are 1.57 times faster than 1 CPU !

********************************************************
```

# New CINEMA 4D Versions

There will be new versions of CINEMA 4D in the future. Now what, you might ask? On the one hand there's the benchmark suite, on the other hand there is this new improved version.

Please do not try to use a different version of CINEMA 4D for benchmarking other than the one provided with the benchmark suite.

We will provide you with new versions of the benchmark suite in the future. This might be the case for example when a new CINEMA 4D version is released with new improved features.

It is important to know that you cannot compare values you've determined with one benchmark version with values you determine with another. It is the same as with all the other usual benchmark programs. Noone compares the results of a Winbench 97 with the ones received in 1980.

And now have fun with the benchmark.