

EnSight Graphics Rendering An Overview for Users

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Graphics hardware

Graphics cards are divided into two classes

Consumer, gaming

- NVIDIA GeForce
- ATI Radeon
- Intel
- All other brands

Workstation

- NVIDIA Quadro
- ATI FirePro

Advantages of Workstation Cards

- Much faster line drawing performance
- Better stability
- Drivers tested with EnSight
- Stereo inside a window
 - Consumer cards only offer full-screen stereo
- Emphasis on precision
- Support from the manufacturer

Graphics rendering

- EnSight uses OpenGL for 3D rendering
- ‘Software rendering’ means performing the rendering calculations on the CPU
- ‘Hardware rendering’ means performing the rendering calculations on the graphics card
- Hardware rendering is many times faster
- EnSight uses hardware rendering by default
- Software rendering can be selected using the command line parameter -X

EnSight Features that are only available with Hardware Rendering

- Volume rendering (9.1)
- Depth peeling (9.1)
 - Faster transparency
 - Allows use of palette transparency
- Hardware picking (9.0)
 - Faster response of right-click menus
- Part selection highlighting (9.1)
- Compositing (9.2)
 - Faster annotation manipulation

Some of these features lower overall rendering speed. They can be turned off by setting the environment variable:

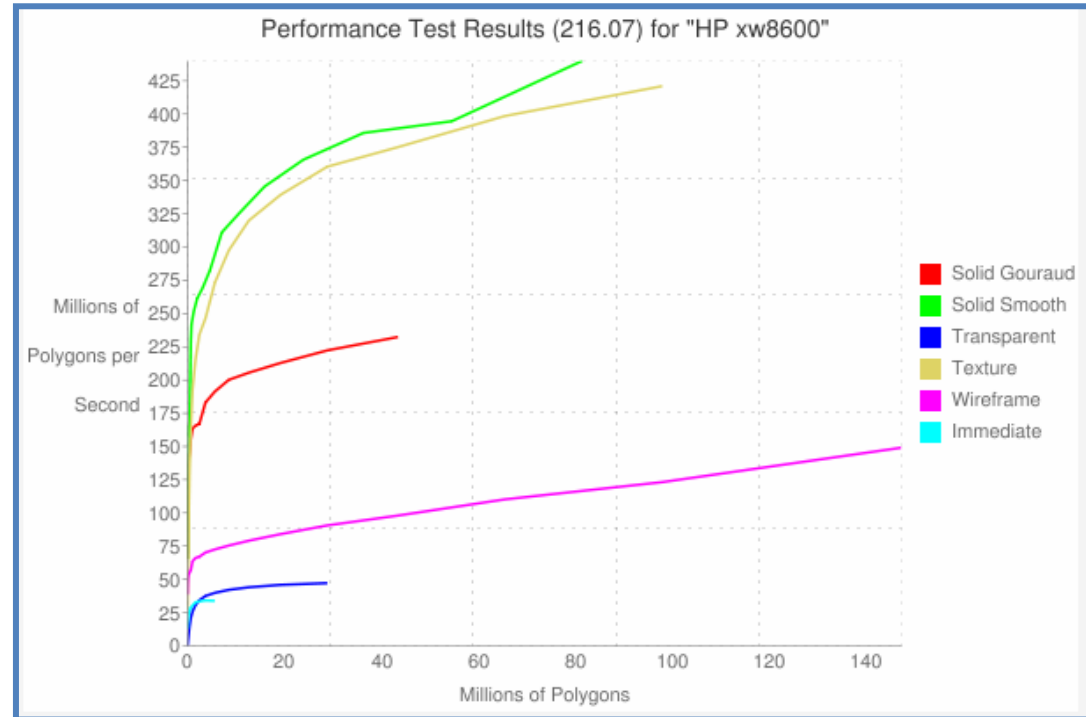
```
CEI_NUM_AUX_BUFFERS=0
```

Graphics card generation

- Graphics hardware speed has improved even faster than CPU speed
- The generation of a graphics card is the most important factor in its performance
- If you have a great graphics card from a few years ago it may not be as good as a low-end card available today
- Newer cards are also required for some EnSight features:
 - Cards supporting at least DirectX 10 are needed for volume rendering
 - Cards supporting at least DirectX 9 are needed for hardware picking, depth peeling, and compositing

Graphics Performance

- See performance tests on our website:
<http://www.ensight.com/EnSight/ensight-90-hardware-performance.html>
- EnSight is a standard benchmark for workstation graphics cards



- Gouraud shading is the default, but smooth shading is $\sim 2x$ faster
- Wireframe mode is much slower
- Transparent surfaces are much slower

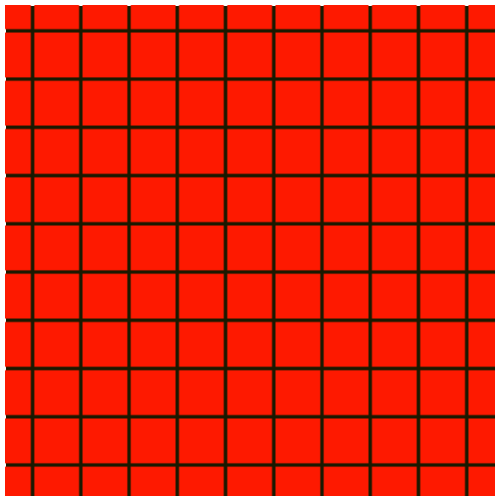
Model Size and Rendering Speed

- Model size does not always correlate with rendering speed
- What matters is the amount displayed, not the total data size.

Example:

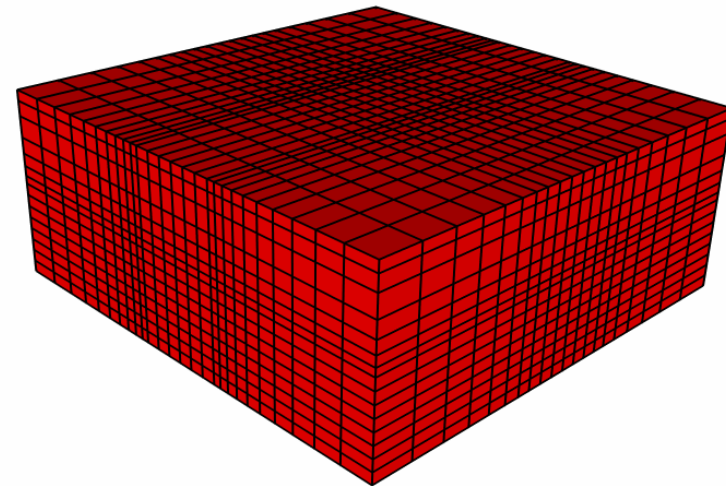
Data: 2D sheet of 1,000,000 elements
1000 x 1000

Display: 1,000,000 elements
1000 x 1000 (full rep)



Data: 3D cube of 1,000,000 elements
100 x 100 x 100

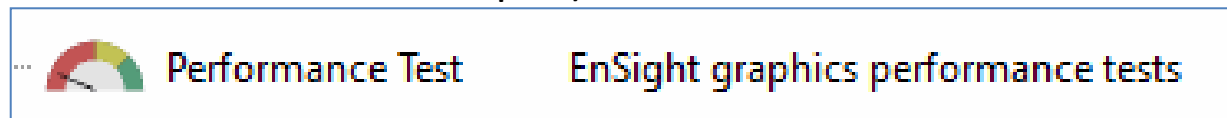
Display: 60,000 elements
100 x 100 x 6 (border rep)



The 3D dataset will render much faster!

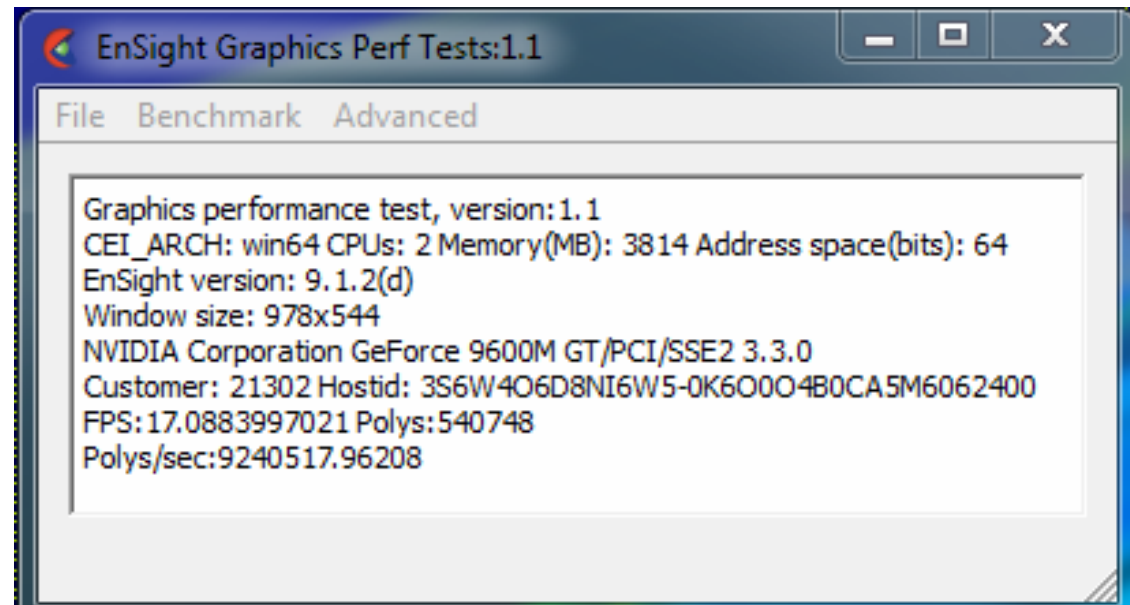
Test your rendering speed in EnSight

- Start EnSight and load a model
- Open User Defined Tools -> Utilities -> Performance Test
(may take several seconds to open)



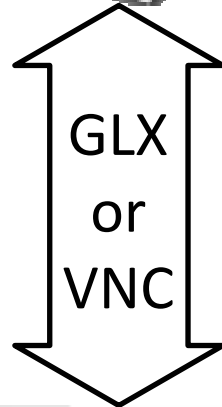
- For a quick test, go to Advanced -> Current FPS
- Results:

- **FPS**
(frames per second)
- Polys
(number of polygons)
- Polys/sec



Remote visualization

Remote rendering



EnSight client-server

