Jim Blinn's Blog

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Blinn’s Law and the Paradox of Increasing Performance

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Painters have their brushes, sculptors have their chisels, and VFX artists have their powerful workstations. All trades rely on specialized tools to get the job done, but what happens when rapidly advancing technology is applied to the modern creative process?

As a 3D artist, what are the advantages of upgrading and utilizing the latest processing power? One of the obvious answers would be that your renders will finish in less time. While this is certainly a key advantage, one could argue that it is just the low-hanging fruit when deciding whether or not to upgrade your hardware.

Let's think of a writer and the tools they use. Modern writers can churn out words, make edits, check spelling, and receive feedback at speeds that Shakespeare could only dream of. Does this mean that writing is easier today than it was 400 years ago? While it's clear that the speed at which one can write is drastically faster today, it still takes about the same time to write a novel.

Herein lies the paradox. Why can't a writer complete a novel in 10 days given the advantage of modern computers? The answer is because technological advances in the writing process have presented an opportunity for more creative iterations. More plots to explore and characters to develop.

This same concept applies to digital content creation, product design, or architectural engineering. When you upgrade your workstation or render nodes, you'll instantly notice a drop in render times thanks to the latest Intel CPUs. You'll also notice how easily you can interact with your model, analyze animation, and preview lighting conditions in your viewport thanks to the latest GPUs. After a hardware upgrade you can create faster, but does that always equate to a faster turnaround time of the final product? Should it?

It's true there will always be a need to upgrade or acquire supplemental processing power when your workload dictates it. You may pick up a new client, agree to a tight deadline, and simply need more

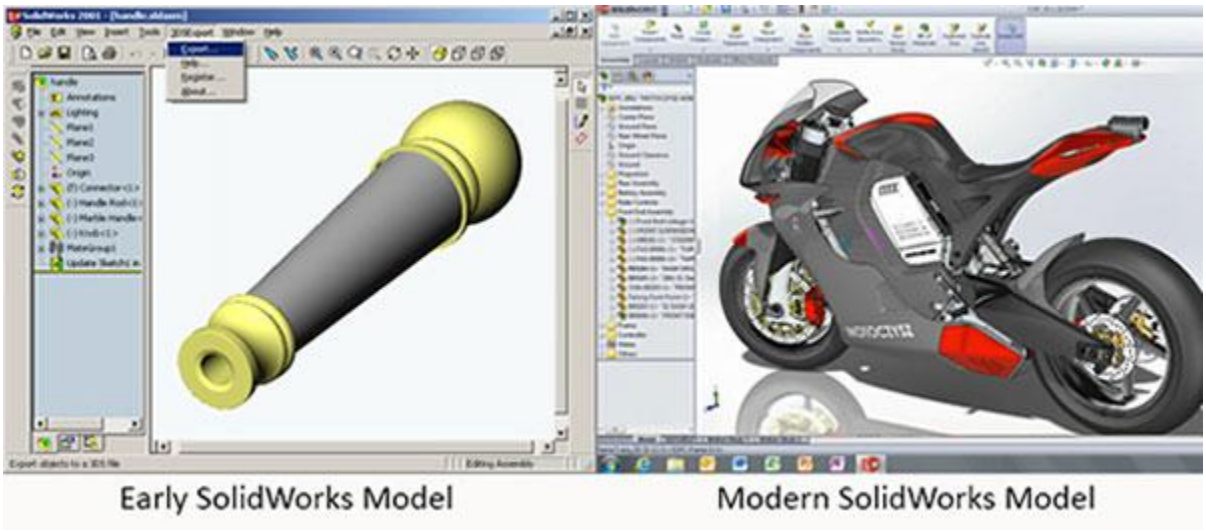
cores. But hardware upgrades also allow you to keep your competitive edge, which takes us to the concept of Blinn's Law.

What is Blinn's Law?

Most of you are familiar with Moore's law, which states that the number of transistors on a chip will double approximately every two years. This means that anyone using a computer will have access to increased performance at a predictable rate. For computer graphics, potential benefits relative to increasing computational power are accounted for with this concept.

The basic idea behind Blinn's law is that if an animation studio invests 10 hours of computation time per frame of animation today, they will invest 10 hours per frame 10 years from now, regardless of any advances in processing power. This idea carries with it certain assumptions. Most notably that visual effects artists will constantly push the envelope in order to create innovative work and to keep their skill set relevant. This requires implementing more computationally demanding techniques. Thus, any speed increases realized with newer hardware are quickly negated by the artist using more particles, more detailed meshes, larger sets, advanced shaders and more complex lighting scenarios.

According to available sources, a single frame of animation in the original *Toy Story* film took up to 30 hours to render at a mere 1,536 x 922 pixels. If those same scene files were rendered today on modern Xeon CPUs, the render times would likely be measured in minutes.



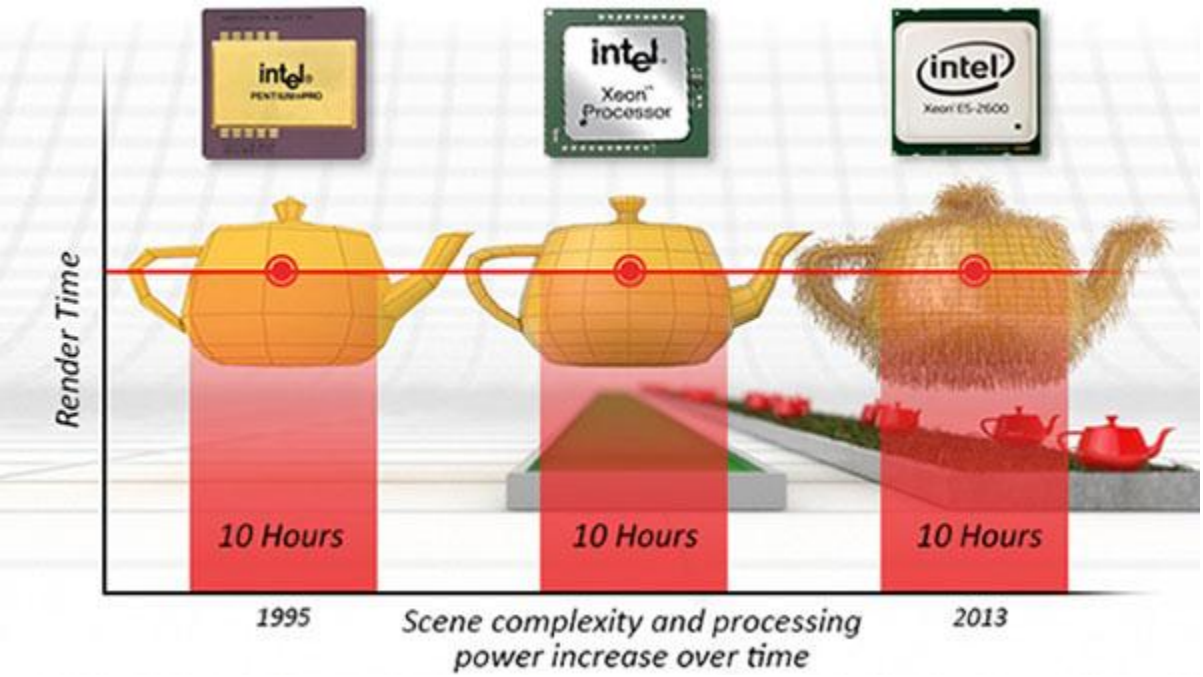
After the success of *Toy Story* in 1995, the talented folks at Pixar didn't rest on their laurels and the computer graphics industry didn't stand still. Animated films and visual effects are patently more complex and visually compelling than they were 18 years ago, enabled in no small measure by ever improving computer hardware.

This concept isn't limited to the computer the graphics industry. The fidelity of complex simulations found in fluid dynamics and structural mechanics is always increasing. By taking advantage of the latest hardware, an engineer can not only decrease simulation times, but also leverage the most contemporary simulation techniques that offer greater insight into design challenges.

Let's take a look at an application like SolidWorks for example. The amount of components and parts in a SolidWorks assembly is much higher today than it was in years past. Creating a complete model where each part is represented accurately ensures that there are no errors during manufacturing. Just like with rendering, loading and rebuild times haven't seen dramatic drops in completion because

the improvements in processing power are washed out by the use of more complex assemblies.

Like virtually all CAD applications, SolidWorks is single-threaded, meaning its performance is bound by the frequency of the CPU. Because of this, many of SolidWorks' tasks are restricted by Intel's frequency plateau. Boxx is the only manufacturer that safely overclocks and supports its CPUs, delivering an approximate 20% performance boost.



Justifying an Upgrade

If you have been holding off on upgrading your hardware, consider the benefits beyond improved render times and faster loading of datasets.

Whether it's visual effects for the next blockbuster, or the design of that "must-have" consumer product, quality expectations are higher than ever. You have a need to stay competitive with your peers. New hardware could make the difference when it comes to effectively learning new techniques and staying ahead of the curve.

Boxx engineers record-setting hardware solutions that are optimized for your creative workflow. Our performance enhanced workstations (the industry's only safely overclocked systems backed by a three-year warranty) will outperform our competition from day one and will continue to do so over the lifespan of the respective systems. Combine that with legendary technical support and you can rest assured that your hardware investment

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