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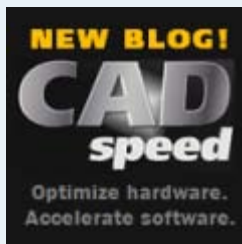
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Xeon: Intel's Workhorse for Workstations

While core-brand processors are capable, Xeon is geared more for professional, mission-critical applications.

By Alex Herrera

Editor's note: Through a sponsorship by Dell and Intel, Cadalyst editors bring you this feature, part of a special series of articles designed to educate CAD users and managers about the benefits and realities of professional workstations. Find even more information at the [CADspeed blog](#).

All Precision workstations, from the most affordable T1600 up to the no-holds-barred T7500, are built on a foundation of Intel processors. No matter which processor brand or SKU you choose — Intel's Xeon or Core — you'll reap the benefits of Intel's steady progression in processor microarchitecture and technology.

Core of CAD

What types of base microarchitectural improvements and advanced processor technologies are of most interest to workstation-caliber professionals in the mechanical design and manufacturing and AEC industries? Intel's Xeon and Core brand processors leverage a slew of them, such as TurboBoost. Introduced in the company's Nehalem generation and expanded upon in the company's 2nd Generation Core microarchitecture (a.k.a. Sandy Bridge), TurboBoost fine tunes core operation, dynamically dialing voltage and clock frequencies to wring every possible ounce of performance out of individual threads of execution. While professional computing's present and foreseeable future relies on multi-core architectures to deliver doubling after doubling of performance, a balanced approach to CPU design means single-thread performance can't be ignored. Parametric modeling in AutoCAD and SolidWorks, for example, is inherently single-threaded and therefore can use as much single-thread performance as a CPU can muster.

TurboBoost 2.0 cleverly manages thermal constraints by sharing the chip's power budget across on-chip resources and through a temporal modulation of power consumption. The result is the ability to "over-drive" cores more effectively, delivering best-in-class single-thread performance to complement a growing sea of processing cores. With the combination of TurboBoost and multi-core platforms, manufacturing, mechanical design, and AEC professionals have tools that can address the varying compute demands their workflow presents.

Where The Two Meet

Leveraging the same foundation of processor technology, both Core and Xeon brands deliver industry-leading single-socket performance, and both serve valuable roles for the

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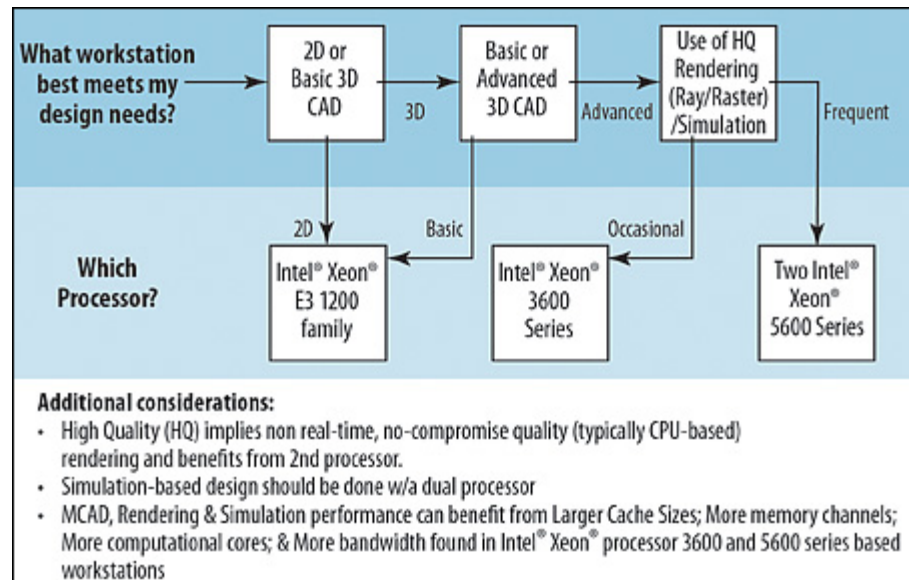
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CAD professional looking to make the most out of his or her primary computing tool, the workstation. But Xeon pushes beyond, aiming to deliver more of what workstation buyers value — namely reliability, compatibility, and the ultimate in CPU horsepower.

Where Xeon's core counts and frequencies are comparable to Core brand SKUs, its revamped L3 cache is up to 50% larger. Well-suited to handling the bigger data sets that CAD professionals employ, a bigger cache means fewer off-chip memory accesses, reduced latency, and higher overall throughput.



This decision-tree illustrates Intel's suggestions on how to choose between Xeon CPUs.

Xeon Takes the Lead

Xeon's professional-focused P3000 graphics shares that cache, and the combination of its bumped-up resources and a CAD-optimized driver, Intel promises up to 20% more performance than Core-brand SKUs. Intel purpose-built the P3000 for workstation use, integrating rendering styles, and modes optimized for popular CAD applications such as AutoCAD. P3000 is ISV-certified for many popular mechanical and AEC applications, including AutoCAD, Revit, Inventor, and SolidWorks.

But for workstation users, Xeon's appeal for compute and memory bound tasks isn't limited to single-socket configurations. Xeon-based models such as Dell's Precision T5500 and T7500 support dual Xeon processors, doubling not only the raw computes available but memory footprint and bandwidth as well.

Where the acronym CAD used to simply conjure up the notion of computer-assisted drawing, today's professionals must be jacks-of-all-trades. Drawing becomes just one piece of the daily workflow, complemented by a host of other critical compute tasks, from simulation to styling. Chores such as finite element analysis and computational fluid dynamics benefit from more processing cores, making dual-socket Xeon the better choice for those with broader compute demands that extend well beyond drawing.

CPU-based rendering, accomplished via raytracing or conventional raster-based means, remains a staple when it comes to producing finish-quality imagery for product styling, prototyping, and marketing. Highly-parallel in nature, such rendering scales well with incremental cores, threads, and sockets, making Xeon the CPU brand of choice when it comes to no-compromise CPU rendering.

Where a PC gamer might sacrifice reliability for a few more frames/second, a CAD professional can't afford any downtime — there simply is no substitute for dependability. Reflecting those priorities, Xeon and its companion C206 chipset integrate reliability features such as Error Correcting Code (ECC), which is memory technology that can detect and correct single-bit errors in memory. Xeon sees thorough testing for professional use, validation that dovetails with Dell's own ISV certification for Precision,

resulting in systems which manufacturing, mechanical designers, and AEC professionals can use with confidence, when schedules are on the line.

The Goal

Intel Core brand processors power capable workstation platforms, and entry buyers have the option to choose Core i3 in Dell's most affordable performer, the Precision T1600. But built specifically for professional use, it's Xeon that delivers the combination of application-tuned performance and reliability features that the most demanding, mission-critical CAD workflows demand. Whether your demands or budget make the Precision T3500, T5500, or T7500 a better fit, Dell makes a number of Xeon SKUs available to help you configure the machine to achieve your ultimate end-goal: maximum productivity.

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With more than 25 years of engineering, marketing, and management experience in the semiconductor industry, Alex Herrera is a consultant focusing on high-performance graphics and workstations. Author of frequent articles covering both the business and technology of graphics, he is also responsible for the Workstation Report series, published by Jon Peddie Research.



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What's New at Cadalyst.com

CAD *speed* Blog Post:

[Four Things to Do With Your Old CAD Hardware System, Part 1: Internal Needs](#)

Exponential growth in the capabilities of CAD software eventually will require companies to upgrade CAD hardware systems so an organization can benefit from the new design functions. The overall goal of any upgrade should be to maximize these benefits to improve the company's workflow (and the bottom line). [Read more »](#)

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