

TECH BRIEF

## **AMD RYZEN™ THREADRIPPER™ PRO 7000 WX-SERIES PROCESSORS: SHATTERING THE CEILING ON PRODUCT DESIGN AND MANUFACTURING PRODUCTIVITY**

**THE PREMIER NEXT-GENERATION WORKSTATION COMPUTING  
PLATFORM, BUILT TO SERVE NEXT-GENERATION WORKFLOWS IN  
CAD/CAM/CAE**

With its introduction of the first AMD Ryzen™ Threadripper™ PRO processors in 2020, AMD ushered in a new era of high-performance workstation computing, marrying the best of superscalar and multi-core CPU design with the proven multi-die integration capability of the AMD Infinity Fabric architecture. Now in its third generation, the AMD Threadripper PRO 7000 WX-Series processors have again achieved dramatic performance scaling to serve the rapidly expanding range of modern professional workloads.

The 7000 WX-Series retains the breadth of available CPU core counts of the preceding 5000WX line to serve the full range of workstation-caliber workloads and computing professionals' budgets: from the 12-core 7945WX to the 64-core 7985WX. And with the 7000 WX-Series generation, AMD Threadripper PRO expands the performance scaling envelope a significant step further, raising the industry bar to 96 cores with the 7995WX.

Processor	Cores / Threads	Base / Boost Frequency (GHz)	Total Cache	TDP
AMD Ryzen™ Threadripper™ PRO 7995WX	96 / 192	5.1 / 2.5	480 MB	350 W
AMD Ryzen™ Threadripper™ PRO 7985WX	64 / 128	5.1 / 3.2	320 MB	350 W
AMD Ryzen™ Threadripper™ PRO 7975WX	32 / 64	5.3 / 4.0	160 MB	350 W
	24 / 48	5.3 / 4.2	152 MB	350 W
AMD Ryzen™ Threadripper™ PRO 7955WX	16 / 32	5.3 / 4.5	80 MB	350 W
AMD Ryzen™ Threadripper™ PRO 7945WX	12 / 24	5.3 / 4.7	76 MB	350 W

Table 1: Primary specifications of AMD Ryzen Threadripper PRO 7000 WX-Series workstation CPUs (Source: AMD)

AMD Threadripper PRO 7000 WX-Series generation leverages a trio of key technologies: the “Zen 4” microarchitecture, with major advancements in superscalar processing and instructions per cycle (IPC); a consistent progression in leading-edge manufacturing to enable higher-density on-chip cores; and the AMD Infinity Fabric architecture, a novel and proven approach to multi-die processor implementation that opens the door to massive performance scaling and a broad range of core counts. “Zen 4” microarchitectural improvements lead to a substantial generational jump in IPC, up to 14%<sup>i</sup> higher than previous generation “Zen 3” on the same workloads.

Boost and base clocks are cranked up significantly as well, the product of judicious design engineering coupled with a leading-edge 5 nm silicon process. AMD Threadripper PRO 7000 WX-Series manages boost clock rates on average 16.9% faster than previous-generation Threadripper PRO 5000WX, along with 13%<sup>ii</sup> faster base clocks. And finally, the combination of the 5 nm leap in transistor density, combined with the Infinity Architecture’s fine-tuned aptitude for multi-die implementation, once again allows AMD Threadripper PRO to shatter the ceiling on CPU core counts available within a single processor socket.

## A LEAP FORWARD FOR TODAY'S DESIGN AND MANUFACTURING (D&M) WORKFLOWS

What do all the latest AMD Threadripper PRO generation's advancements mean for professionals immersed in physical design, engineering and manufacturing? The 7000 WX-Series family's unique combination of leading per-core throughput and highest core counts make it uniquely positioned to address the range of today's most challenging D&M computing workloads – from parametric modeling, to 3D graphics and rendering, to engineering simulations in computational fluid dynamics (CFD) and finite element analysis (FEA). Looking forward, demands will only escalate given the rapidly emerging range of machine learning workloads, driving an explosion in AI-driven generative design that has already begun to permeate D&M workflows across the board.

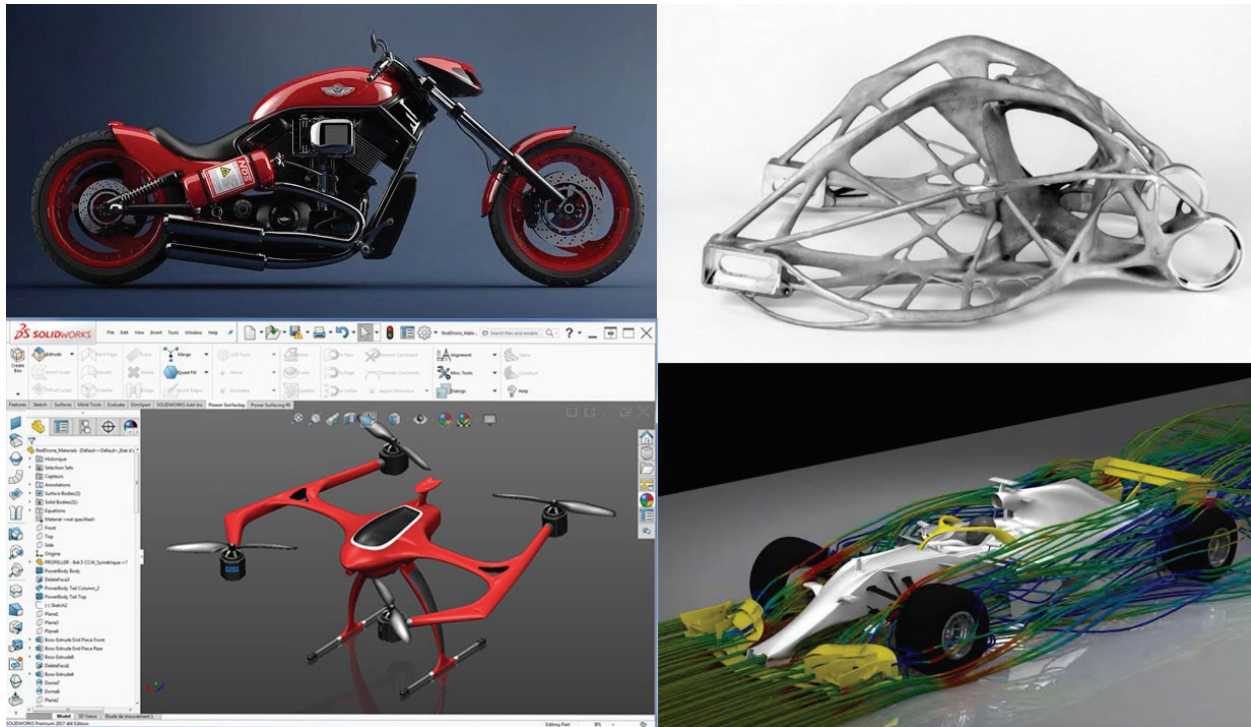


Figure 1: From interactive 3D graphics to rendering and simulation, along with emerging uses of machine learning like AI generative design, the computing demands on D&M professionals have never been higher nor more varied.

The 7000 WX-Series processors' jump boost frequency in combination with that lift in IPC yields on average 28% generational gain in single-thread (1T) performance – still crucial to the foundation of many CAD workflows: refine model, visualize, and repeat. Both parametric modeling and 3D graphics (from the perspective of CPU processing), pervasive across CAD applications, largely remain single-to-few threaded workloads.

While lightly threaded workloads can reap performance gains from the higher boost clock rates, the type of modern, heavy-duty, highly-parallel multi-threaded (MT) workloads – like rendering,



engineering simulations and machine learning for generative AI to accelerate design and manufacturing – rely primarily on sustained, long-duration base clock rates. Compound the base clock gains with “Zen 4” IPC improvements and scaling across the highest and widest range of CPU core count processors available, and the superior 7000 WX-Series MT performance is dramatic.

On average, comparing each 7000 WX-Series SKU with the same – or next lower – core-count SKU of the Intel Xeon W-3400 family, the 7000 WX-Series manages up to 47%<sup>iii</sup> faster<sup>iii</sup> rendering, and up to 17% higher performance running some of the most common MT tasks D&M professionals face in their core day-to-day workflows. Even when comparing each 7000 WX-Series SKU with the same or next higher core count Intel Xeon W-3400 SKU, AMD Threadripper PRO still manages up to 15%<sup>iii</sup> more throughput, supporting the proposition the former consistently delivers D&M professionals better performance with substantially fewer cores.

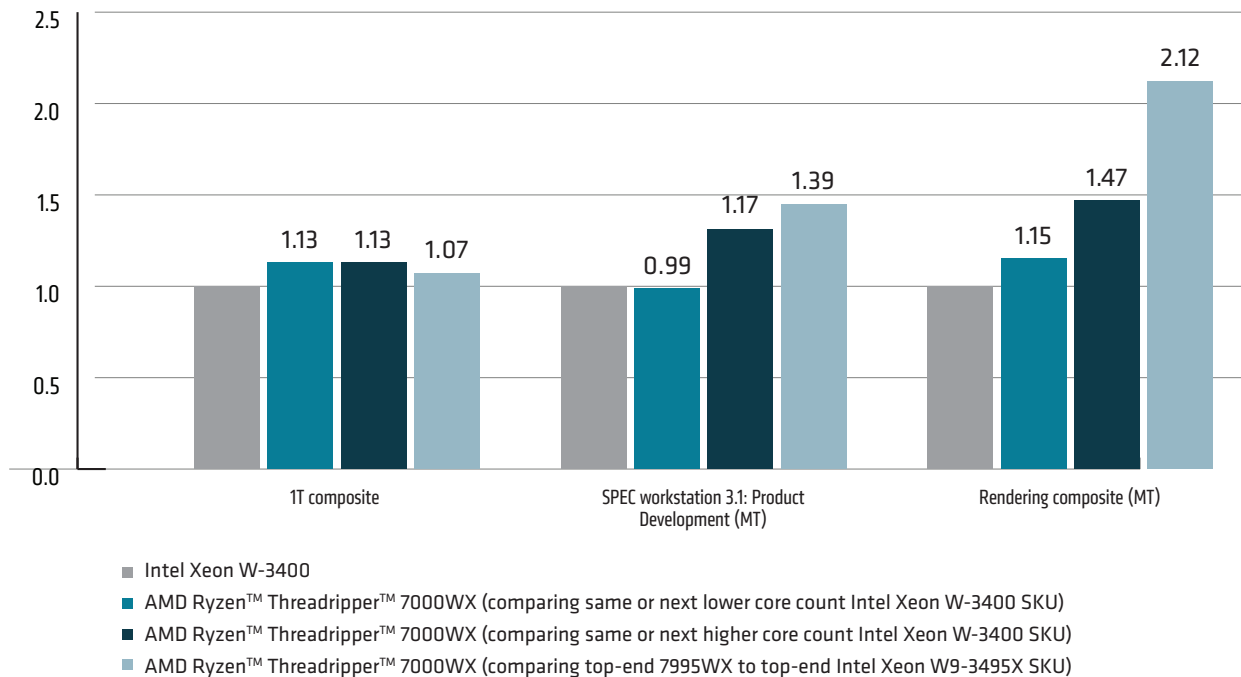


Figure 2: Aggregate performance advantage of AMD Ryzen Threadripper PRO 7000 WX-Series CPUs, normalized to the Intel Xeon W-3400 product line<sup>iii</sup>

Finally, consider the AMD Threadripper PRO 7995WX, with 96 cores that literally put it in a class of its own. Comparing the top-end members of the two competing product lines, the superior multi-threaded performance of the 7995WX is both clear and dramatic, achieving up to 112%<sup>iii</sup> higher performance<sup>iii</sup> than the 56-core Intel Xeon W-3400 SKU, the W9-3495X.

The ultimate beneficiaries of the 7000 WX-Series family, professionals demanding compelling generation-to-generation gains in productivity for mission-critical applications in CAD/CAE/CAM can now upgrade their computing throughput as they see fit: choosing from more performance with fewer cores at the lower end of the spectrum, to absolute best-in-class, no-compromise throughput at the top.

The AMD Ryzen™ Threadripper™ PRO 7000 WX-Series processors are now available in premium workstation models from leading workstation partner OEMs, including Dell, HP and Lenovo. For a deeper dive into Threadripper PRO's novel architectural approach to workstation computing, refer to [AMD Ryzen™ Threadripper™ PRO 7000 WX-Series Processors: Raising the Bar on Workstation Performance](#).

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<sup>i</sup> Based on AMD internal testing as of 09/19/2022, geomean performance improvement at the same fixed-frequency on a 4th Gen AMD EPYC™ 9554 CPU compared to a 3rd Gen AMD EPYC™ 7763 CPU using a select set of workloads (33) including est.SPECrate®2017\_int\_base, est.SPECrate®2017\_fp\_base, and representative server workloads.

<sup>ii</sup> Average boost clock gain for each of the 12C, 16C, 24C, 32C and 64C SKUs in the Threadripper PRO 7000 WX-Series line relative to the boost clock of the matching core-count SKU in the Threadripper PRO 5000 WX family.

<sup>iii</sup> Compares each of the four tested CPU SKU in the Intel Xeon W-3400 family with the comparable AMD Ryzen Threadripper PRO 7900WX SKUs. Where the 7900WX family has a core count that exactly matches one of the W-3400 SKUs, the comparison 7900WX SKUs include both the matching core count model as well as the SKU with the next fewer core count. Where the 7900WX family does not have a core count that exactly matches one of the W-3400 SKUs, the comparison 7900WX SKUs include both the next higher core count model as well as the model with the next fewer core count. In each of the four comparisons, scores for the W-3400 SKU and the comparable 7900WX SKU's scores are calculated from an average of the following tests, then normalized to the W-3400 SKU's scores:

## SPECworkstation 3.1: Product Development

Rendering composite (average of normalized results for Cinebench R23) and Blender Cycles 3.0.6 (geometric mean of all scenes)

Run with respective system specifications:

	Intel® Xeon® W-3400	AMD Ryzen™ Threadripper™ PRO 7900WX
SKUs tested	W9-3495X / W7-3465X	7945WX / 7955WX / 7965WX 7975WX / 7985WX / 7995WX
Memory DIMMs	DDR5-4800 with ECC	DDR5-5600 with ECC
Memory capacity (channels x rank x DIMM capacity)	128 GB (8ch x 1r x 16 GB)	512 GB (8ch x 1r x 64 GB)
Storage	(4) PCIe NVMe M.2 SSD (1 TB)	(1) PCIe 4.0 NVMe M.2 SSD (1 TB)
Operating system	Microsoft Windows 10 Professional	
Chassis volume (liters)	30.8	65.0
Cooling	Conventional air-cooling	