

2021 Comprehensive Hardware Guide

TITLE:	2021 Comprehensive Hardware Guide
DATE:	May 2021
SUBJECT:	Hardware, laptops, desktops
ABSTRACT:	Advanced computer recommendations for SOLIDWORKS



This document has been written to provide insight on the suggestions made in the [Hawk Ridge Systems Hardware Recommendation document](#) and to answer common hardware questions for users building custom system configurations to run SOLIDWORKS, SOLIDWORKS Simulation and SOLIDWORKS Flow Simulation.

This is not a troubleshooting guide. If you have any technical issues with SOLIDWORKS please contact [Hawk Ridge Systems Technical Support](#).

Contents

2021 Comprehensive Hardware Guide.....	1
Introduction.....	3
Unsupported & Not Recommended Platforms	4
Operating Systems	4
Virtual Machines and Apple Support.....	5
Hawk Ridge Systems Computers	5
Hardware Overview.....	6
Potential Upgrades	7
SOLIDWORKS Visualize	8
Graphics Card	8
Intel Processor Graphics.....	9
Processors	10
Memory (RAM)	11
Storage	11
Required Components and Other Software	12
Display.....	12
Network Connection.....	12
Input Device	13
Microsoft Excel and Word.....	13
Internet Explorer	14
Optional Components and Software	14
Benchmarks.....	14
Other Hardware Guides	16
SOLIDWORKS Authored	16
Hawk Ridge Systems Authored	16

Introduction

The Hawk Ridge Systems hardware documents combine all HRS knowledge regarding hardware and are derived from multiple sources including but not limited to internal testing, customer experiences, user forums, hardware reviews, system/component availability, direct discussions with SOLIDWORKS Corp. representatives, the [SOLIDWORKS System Requirements](#) page and the [SOLIDWORKS Customer Portal](#).

Hardware recommendations are based on currently available hardware. Unless explicitly defined as no longer supported or confirmed by support as unsupported, it is assumed that older hardware with similar specifications should be able to run the current version of SOLIDWORKS. It should be noted that while users may stay on older hardware of equivalent specifications, there may be additional performance benefits from newer technology and “clean” systems.

Starting in SOLIDWORKS 2015, 32-bit operating systems are no longer supported. SOLIDWORKS 2021 continues this trend with no 32-bit support available.

Users that are concerned about whether their hardware meets the current specs should compare the specs of their systems to the current specs using benchmarks, user reviews, internal testing and if still concerned should contact [Hawk Ridge Systems Technical Support](#).

While this document does not include an exhaustive list of all hardware options or components available, resources such as www.tomshardware.com and <http://www.videocardbenchmark.net/> can be consulted for more information. Some additional comments about benchmarks are available at the bottom of this document.

While SOLIDWORKS does not publish specific optimal recommendations, the [Recommended Hardware Guidelines](#) has been written under the assumption that most users are looking for an optimal configuration rather than the bare minimum. For users looking for the bare minimum system requirements – please refer to the [SOLIDWORKS System Requirements](#) page.

Hawk Ridge Systems recommends pre-built computers from manufacturers like Dell and HP because these manufacturers develop drivers specifically for their hardware and have extensive QA for consistent performance and reliability.

Unsupported & Not Recommended Platforms

While it may be possible to install or run SOLIDWORKS products on unsupported platforms, the extent of support that can be provided is limited. Customers using platforms not supported by SOLIDWORKS will be exposed to potential support limitations. In order to properly troubleshoot many hardware and software related issues, support representatives and developers need to be able to reproduce those issues. Hawk Ridge Systems personnel will attempt to reproduce issues that are submitted to them with the supported platforms. However, if the issues are not reproducible or identifiable, Hawk Ridge Systems support personnel will have to close any issues that reach this point, as they are not covered by SOLIDWORKS development.

Similarly, customers using platforms described as not recommended may be exposed to similar issues that are generally less severe in nature, such as inconsistent behavior or limited performance. While these issues can be reported to development, a final resolution may not be obtainable or may result in an enhancement request to improve the software’s functionality under these system configurations.

Operating Systems

All operating systems should be updated 100% with Windows updates. Refer to the following table for specific version support of various Windows operating systems and releases of SOLIDWORKS.

- ✓ Supported
- ✓^x Supported with limitations. See notes below the table for more information. Outside of the limitations, the software has not been tested and cannot be supported.
- X Not Supported. Installation is not supported and while the software may install and run on these operating systems, these configurations have not been tested and cannot be supported.

	2015	2016	2017	2018	2019	2020	2021
Windows 7	X	X	X	X	X	X	X
Windows 7 64bit	✓	✓	✓	✓	✓	✓ (End of Life: SW2020 SP5)	X
Windows 8	✓	X	X	X	X	X	X
Windows 8.1	✓	✓	✓	✓	X	X	X
Windows 10	✓ ²	✓	✓	✓	✓	✓	✓

1. For SOLIDWORKS 2015, SP5 is the only service pack to support Windows 10.
2. SOLIDWORKS does not support Home or Basic versions of Windows. Only Business, Professional, Enterprise, and Ultimate versions are supported.
3. Windows 10 is the only recommended operating system at this time.

Virtual Machines and Apple Support

Beginning with SOLIDWORKS 2015, certain virtual environments are supported. Please refer to our [detailed guide on virtual environment support](#) and the official [SOLIDWORKS system requirements page](#) for more information.

Additionally, beginning with SOLIDWORKS 2015, certain virtual environments are supported for use on Apple computers. Bootcamp is still unsupported. Please refer to our [detailed Mac support guide](#) and the [SOLIDWORKS system requirement page](#) for more information.

Hawk Ridge Systems Computers

What is Hawk Ridge Systems using? The tables below show the systems currently in use at Hawk Ridge Systems. These systems are aligned with the recommended hardware guidelines with some upgraded for analysis and/or large assembly support purposes with more memory. Windows 10 is the primary operating system of our computers.

	Laptops	Desktops
Models	Lenovo ThinkPad P15	Lenovo P340 Dell Precision 3640
CPU	Intel Core i7-10750H	Intel i7-10700K
GPU	NVIDIA Quadro T1000 4GB	NVIDIA Quadro P2200
RAM	16GB	16GB
Storage	512GB SSD	512GB SSD
Screen	1920x1080p	1920x1080p

Hardware Overview

For the majority of users, use the following tables for our current 2021 hardware recommendations. We have specific use case upgrades to consider listed below as well.

	Laptops	Desktops
Models	Lenovo ThinkPad P15 Dell Precision 7550 HP ZBook Power G7	Dell Precision 3640 HP Z2 Lenovo ThinkStation P340
Operating System	Windows 10 Professional 64-Bit	Windows 10 Professional 64-Bit
GPU	NVIDIA Quadro T1000 4GB	NVIDIA Quadro P2200 5GB
CPU	Intel Core i7-10750H(6 cores, 2.6-5ghz)	Intel i7-10700k (8 cores, 3.8-5.1ghz)
RAM	16GB	16GB
Storage	512GB SSD	512GB SSD
Other	Microsoft Office 2016 or 2019 Internet Explorer 11 3-Button Mouse with Scroll Wheel	Microsoft Office 2016 or 2019 Internet Explorer 11 3-Button Mouse with Scroll Wheel

See page 14 for Internet Explorer compatibility

Potential Upgrades

Certain use cases require upgraded hardware. These include:

- Working with large assemblies and/or complex models
- Extensive multi-tasking (Multiple programs running simultaneously)
- Heavy Visualize usage
- Heavy Simulation or Flow Simulation usage

Component	Benefits	Notebook	Desktop
RAM	-General Performance -Multi-Tasking -Rendering and Simulation Size/Complexity/Speed -Rendering	32GB/64GB	32GB/64GB
CPU	Rebuilding Features -General Performance -Simulation Solving and Meshing Speed -Multi-tasking -Open/Save -Rendering Speed	Intel Core i9-10885H (8 Cores, 2.40ghz-5.30ghz)	Intel Core i9-10900K (10 Cores, 2.70ghz-5.3ghz)
HDD	-Open/Save Speed -Rebuild Time -General Performance	1TB M.2 PCIe SSD	1TB M.2 PCIe SSD
GPU	-Display Capacity (Number of Faces and Amount of Data Shown) -Rotate/Pan/Zoom performance	NVIDIA Quadro RTX3000-RTX6000	NVIDIA Quadro RTX4000-RTX8000
Models		Lenovo P17 Dell Precision 7750 HP ZBook Fury G7	Lenovo 520C Dell Precision 5820 HP Z4

SOLIDWORKS Visualize

For SOLIDWORKS Visualize users, we make an exception to the recommendation that workstation class graphics cards should be used in their systems. Visualize benchmarks show their best performance with NVIDIA GeForce graphics cards. This does not mean that NVIDIA Quadro cards will not work, but the recommendation here is that if you have a workstation dedicated for SOLIDWORKS Visualize, the workstation should have an NVIDIA GeForce graphics card setup. This should help to maximize your cost to benefit ratio. Please see the article below for an in-depth explanation along with performance benchmarks.

<https://www.pugetsystems.com/labs/articles/NVIDIA-Iray-GPU-Performance-Comparison-785/>

Here is a link to our SOLIDWORKS 2021 Visualize System Requirements:

[SolidWorks Visualize System Requirements](#)

Graphics Card

Consumer graphics cards such as the ATI/AMD Radeon, NVIDIA Geforce, or 2D cards such as the NVIDIA Quadro NVS or AMD FirePro Multi-View cards are not recommended due to graphics related performance and stability limitations. Hawk Ridge Systems highly recommends the use of 3D workstation graphics cards such as the ones in the table below.

	Brand	Entry	Mid-range	High-end
Desktops	NVIDIA Quadro	P1000	P2200	RTX8000/GV100
	Radeon Pro	WX 3100	WX 5100	WX9100
	Intel Pro Graphics	HD Graphics P530		
Laptops	NVIDIA Quadro	T1000	T2000	RTX4000/RTX6000
	Radeon Pro	WX 4150		
	Intel Pro Graphics	HD Graphics P530		

SOLIDWORKS maintains a list of certified graphics cards and their recommended drivers: _

<http://www.SOLIDWORKS.com/sw/support/videocardtesting.html>

- Recommended cards will show up with a green icon indicating they have passed all tests. Yellow rated cards are not recommended due to limitations observed during testing. Red rated cards are not supported due to severe limitations observed during testing.
- Please be aware that notebook systems will only be found under the system manufacturer.



- New systems or graphics cards may take several weeks to be certified, so please check back often to verify that it is certified before purchasing. In general, new cards which already have certified cards of the same family (for example the NVIDIA Quadro family) will also be certified and will perform well with the latest driver for the system or card manufacturer until a certified/tested driver is available.
- If the card/system is listed for older versions of SOLIDWORKS, but not for current versions, you can assume that your card is no longer be supported. See our [OpenGL document](#) for more information.
- Along with benchmark results and availability of a recommended driver, memory bandwidth and number of processing cores are important values when comparing graphics cards. Some sample specification comparisons are included below:
 - http://www.NVIDIA.com/object/IO_11761.html
 - <http://www.videocardbenchmark.net/>
 - <http://www.intel.com/content/www/us/en/workstations/certified-applications.html>
- When displaying greater amounts of graphical information (complex models, large monitors, multiple monitors or high resolutions) more powerful graphics cards should be chosen to improve display performance.
- NVIDIA SLI and ATI Crossfire technology are currently not supported, and no benefits are gained by having multiple graphics cards. Hawk Ridge Systems recommends substituting multiple graphics cards with a more powerful, single graphics card if necessary.
- At this time SOLIDWORKS does not leverage GPU processing.
- PhotoView 360 rendering capabilities are not improved by more powerful graphics cards.
- With Windows 7, Windows 8.1 and Windows 10, video cards with 256mb or less will experience reduced performance due to architectural changes in the operating system.

Intel Processor Graphics

Intel processor graphics (integrated into the CPU) provide the graphics and display for many of the recently launched 6th gen Intel Core and Xeon processors. With optimized performance for a range of common workstation and computer aided design (CAD) applications, Intel HD Graphics P530 and Iris Pro P580 provide designers, engineers, and media creators with entry-level workstation performance and visuals. With built-in graphics capabilities, many designers may no longer need a discrete graphics card.

More than 15 of the most-commonly used content creation and CAD applications are certified on Intel HD graphics P530 and Iris Pro Graphics P580. More information on Xeon E3v5 processors can be found [here](#).

Advantages of Intel processor graphics include:

- Lower System Cost
- Equivalent Performance vs Entry Discrete graphics card
- Better Battery Life vs Entry Discrete
- Quieter System Design
- Integrated eDRAM (Iris Pro) providing bandwidth up to 100gbps
- Incredible Form Factors
- Graphics memory shared with system memory

Xeon series of workstation/server graphics include:

- Optimized Workstation-class Graphics
- Application Certification

Processors

Users should make decisions based on the capabilities of a single core rather than the processor as a whole. In general, if you use the clock speed of the processor as the measurement, higher clock speed values and benchmark results will provide better performance. It should be noted that AMD processors are rated differently than Intel processors and the manufacturer should be contacted to ensure those differences are taken into account. These examples illustrate the selection process between Intel processors:

- Example 1: Similarly priced 2.5Ghz dual core vs. 2.0Ghz quad core, the dual core would be recommended because most operations would be done on a 2.5Ghz core instead of a 2.0Ghz core.
- Example 2: 2.5Ghz dual core processor vs. a slightly more expensive 2.66ghz quad core, the quad core would be recommended because most operations would be done on a 2.66Ghz core instead of a 2.5Ghz core and multi-threaded processes would benefit from the additional cores.

Recent benchmarks which compare single processors to multi-core processors/multi-processor systems in SOLIDWORKS show that users who multi-task (Opening Drawings, Draw Compare, Boolean operations, Updating Views), PhotoView 360, Simulation and Flow Simulation will benefit from parallel processing (multi-core or multi-processors). For other functions, it should be noted that the majority of parametric operations are required to be performed sequentially (like rebuilding features in the feature tree) and by nature are single threaded.

Here is a benchmark which compares current Intel and AMD processors to see how they stack up in SOLIDWORKS 2019:

<https://www.pugetsystems.com/labs/articles/SOLIDWORKS-2019-Intel-CPU-Performance-1347/>

As can be seen from this study, assembly rotation, rebuilding assemblies, and motion studies are almost entirely reliant on clock speed. Simulations appear to benefit from both core count and clock speed, with different simulations behaving slightly differently. Rendering seems to benefit the most from core count. If a lot of your time is spent rendering, you may want to consider a processor with a higher core count.

For modern generation processors (Intel Core CPUs) Hyper-Threading should be enabled. Testing so far indicates substantial benefits with turbo boost and hyper threading. However, results can vary depending on hardware setup.

Memory (RAM)

It is recommended to install as much RAM as is feasible to improve performance and stability by:

- Increasing the opportunity for RAM to be allocated to applications instead of the slower, more volatile hard drive-based page file.
- Reduce the amount of memory swapping between programs when there isn't enough RAM to satisfy the needs of all programs.
- Improve the memory threshold for computers. For more information on how RAM, and page file are related to virtual memory and SOLIDWORKS please see our [memory document](#).

In most cases, more RAM is better. However, more RAM does not always equate to more speed. It is recommended to have enough RAM to handle the needs of your applications.

Faster RAM can also provide performance benefits but please verify with your hardware manufacturer that faster RAM is compatible with your system and that existing RAM is of equal speed. Existing RAM that is slower may reduce the performance of new, faster RAM.

Storage

Having faster storage drives can impact the performance of the overall system as well as specific SOLIDWORKS functions, such as opening and saving documents. Finding specific SOLIDWORKS benchmarks for different storage drives will be difficult. However, newer storage technology has shown significant impacts on overall system performance.

Primary hard drives should have enough storage for the OS, other programs, virtual memory, temporary files, free space, file storage, SOLIDWORKS installer and program files (Up to 12GB). The minimum storage space we recommend is 120GB.

Storage Drive Type	m.2 PCIe SSD	SATA SSD	SATA HDD
Pros and Cons	<ul style="list-style-type: none"> +Fastest storage available, up to 4x faster than SATA SSD -Highest priced -Limited capacity compared to SATA SSDs and HDDs -Requires a new specific m.2 slot on the motherboard 	<ul style="list-style-type: none"> +Much faster throughput than traditional HDD +Moderately priced -Limited capacity compared to HDDs 	<ul style="list-style-type: none"> +Largest capacity per drive +Lowest cost -Slowest read/write speeds

Required Components and Other Software

Display

Widescreen monitors are recommended because of the widescreen nature of the SOLIDWORKS interface.

When displaying greater amounts of graphical information (complex models, large monitors, multiple monitors or high resolutions) more powerful graphics cards should be chosen to improve performance.

When using multiple monitors, the best compatibility is with monitors with the same resolution and color settings. This is the configuration that is used during SOLIDWORKS graphics card driver testing.

4k Monitors are becoming increasingly common. SOLIDWORKS began official support for 4k resolutions starting with version 2016 due to a user interface change to vector based icons and fonts. If considering a 4k monitor, be aware that version 2016 and later is recommended for optimal usability.

Network Connection

An internet connection is required to:

- Access to <http://customerportal.SOLIDWORKS.com> for SOLIDWORKS' knowledgebase, technical articles, SPR tracking, etc.
- Access to [Hawk Ridge Systems Help Center](#)
- Downloading software updates (Depending on installed software the download required averages around 1GB but can range from a few MB to 12GB. High-speed internet connection recommended.)
- Standalone license activation and obtaining SOLIDWORKS network licenses. (At minimum the activation process requires access to e-mail on at least one company computer)
- Remote support sessions and HRS Webinars. (High-speed internet connection recommended)

For optimal performance and less chance of latency or data loss, wired network connections are recommended for network licensing and accessing files over a network. Users working with wireless connections or VPN connections should borrow licenses or move files locally. It should be noted that Hawk Ridge Systems does not recommend working with files over a network and users that need this capability should consider a data management solution such as SOLIDWORKS PDM Pro or Standard.

Remote desktop connections or VPN connections to SOLIDWORKS clients are not supported.

SOLIDWORKS is tested only with Microsoft's Windows Networking and Active Directory network environments. Novell networks and non-Windows based network storage devices are not supported.

Input Device

A 3-Button mouse with a scroll wheel is required. Hawk Ridge Systems' experience shows the best compatibility is with Microsoft products with the most current drivers.

3D Controllers can be used but please check with the manufacturer to ensure that they are compatible with the version of SOLIDWORKS that you are using.

Tablets/Digitizers are currently not supported but should work in sketch mode. Please contact the hardware manufacturer for any compatibility concerns or for information on configuring the tablet for use in SOLIDWORKS.

Microsoft Excel and Word

Microsoft Excel & Word versions should ideally be from the same time period as your SOLIDWORKS version. The table below shows which versions of Word and Excel are supported by the more recent versions of SOLIDWORKS.

	2015	2016	2017	2018	2019	2020	2021
Excel/Word 2007	X	X	X	X	X	X	X
Excel/Word 2010	√	√	√	√	X	X	X
Excel/Word 2013	√	√	√	√	√	√	X
Excel/Word 2016	X	√ ²	√	√	√	√	√
Excel/Word 2019	X	X	X	X	√ (starting with 2019 SP2)	√	√

As of SOLIDWORKS 2016 SP3, Office 2016 products are supported.

Internet Explorer

Internet Explorer is used for installation, help files, and tutorials within the user interface. Use the following guide to ensure the correct version of IE is installed.

	2015	2016	2017	2018	2019	2020	2021
IE8	X	X	X	X	X	X	X
IE9	✓	X	X	X	X	X	X
IE10	✓	✓	X	X	X	X	X
IE11	✓	✓	✓	✓	✓	✓	✓

Optional Components and Software

- DVD-R/DVD-RW
- Anti-Virus/Anti-Spyware tools: SOLIDWORKS has published a list of compatible Anti-Virus tools: http://www.solidworks.com/sw/support/AntiVirus_SW.html
- Additional Cooling: Extra case fans or notebook cooler.
- System/Disk Imaging Software: Should not be used as it is not supported by SOLIDWORKS. If used, SOLIDWORKS should be installed after systems have been imaged or should be used with a network license.

Benchmarks

The best collection of SOLIDWORKS benchmark data is available at the [SOLIDWORKS Benchmark Website](#). This data is shared by SOLIDWORKS users and utilizes the built-in Performance Test found in the SOLIDWORKS RX tool. The RX tool is included in every installation of SOLIDWORKS and can be run at any time.

Here are our tips and notes from running benchmark tests:

- Use the same version of SOLIDWORKS and service pack when performance the RX Performance Test.
- Reboot the computer and do not use the computer while the RX Performance Test is running.
- System options can have a direct impact on performance. Use a Copy Settings Wizard file to standardize and test different options for valid results.
- Hard drive performance benchmarks apply to SOLIDWORKS for opening and saving functions.
- Graphics cards that perform well in OpenGL tests or in benchmarks for other 3D CAD applications based on OpenGL apply to SOLIDWORKS.
- Single-threaded application performance benchmarks apply to the majority of SOLIDWORKS functions, such as rebuilding.
- Multi-threaded application performance benchmarks apply to multi-threaded functions in



HAWK RIDGE SYSTEMS

SOLIDWORKS such as photo rendering and analysis. For more information about what processes are multi-threaded, please query the SOLIDWORKS Customer Portal Knowledgebase using the search term "multi" or review the comments above in the Processor section.

- Overall processor benchmarks will still give a decent idea of the performance of a processor as long as equal core processors are being compared. For example, the results of a quad core vs. dual core ideally not be compared. If compared, it should be kept in mind that most processor benchmarks take into account multi-threaded applications which may skew the results towards the processor with more cores.

Some of the most common benchmarks used for evaluating existing systems or for choosing new ones are listed below. These benchmarks have been performed by third parties not associated with Hawk Ridge Systems and the publishers should be contacted directly with any questions you might have.

SOLIDWORKS RX Benchmark:

- See the Add-in tab in the SOLIDWORKS RX utility (Start Menu> All Programs>SOLIDWORKS 2021 > SOLIDWORKS tools > SOLIDWORKS RX)
- <https://www.solidworks.com/sw/support/benchmarks.htm>

Passmark (Tests all components within a system):

- <http://www.passmark.com/index.html>

Other Hardware Guides

SOLIDWORKS Authored

- [SOLIDWORKS and SW PDM System Requirements](#)

Hawk Ridge Systems Authored

- [Recommended Hardware Guide](#)

This information is subject to change without notification. Please make sure you are using the most current version of the document