

Lenovo™ recommends Windows.

LENOVO™ WORKSTATION SOLUTIONS FOR DESIGN ENGINEERS.

The Lenovo™ ThinkStation® P Series workstations and Lenovo™ ThinkPad® P Series mobile workstations: Innovative technology that provides what engineers demand.

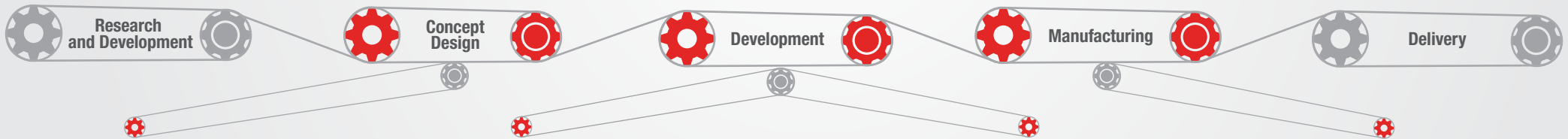
Exceptional agility is a must for design engineers as products, markets, regulations and customer needs evolve faster than ever before. So it's no surprise that today's manufacturing industries are turning to advanced IT solutions to design and manage products and processes, spur innovation, corral and leverage data, reduce costs, enhance productivity and meet customer demands.



Lenovo™

THE MANUFACTURING WORKFLOW

PRODUCT DEVELOPMENT PHASE



CONCEPT DESIGN

Innovative ideas must be expressed as conceptual product designs and product renderings. These are often accompanied by industrial design models, experimental prototypes, and 3D printed items. Engineers use Computer-aided Design (CAD) and concept design to create 3D concepts and turn them into 3D models.

PRODUCT DESIGN

The art of engineering is to design products that are easy and cost-efficient to manufacture. Potential obstacles must be identified and fixed, and key process factors must be considered. Designers create engineering 3D models using CAD tools to effectively communicate their ideas and assess the manufacturability of the design and estimate costs.

ANALYSIS AND SIMULATION

Rigorous simulation and analysis of the 3D model is used to validate designs before committing to final physical testing, but also earlier in the design process to test and optimize new concepts prior to physical prototyping. This process optimizes designs to enable increased innovation and creativity while ensuring cost-efficient manufacturing.

MANUFACTURING ENGINEERING

The digital 3D model generated in CAD is transferred to the Computer-aided Manufacturing (CAM) system, where the physical characteristics of the product are rendered as a precise set of fabrication instructions. The culmination of the process is the automatic production of finished products using computer-controlled machinery.

90% OF WORKSTATIONS ARE USED IN THE PRODUCT DEVELOPMENT PHASE

MANUFACTURER'S MINDSET

KEY PEOPLE IN MANUFACTURING



- WANTS**
- Quicker innovation
 - Shorter development cycles
 - Better equipment, input materials and processes
 - Faster times to market
 - Easier adoption of technological advancements

- CHALLENGES**
- Heightened, global competition
 - Reduced differentiation with competing manufacturers
 - Rising costs and reducing margins
 - Growing volumes of data
 - Increasing complexity of demands by their customers



I.T. MANAGER

- Wants products and suppliers that are easy to manage

- Lenovo™ is the No.1 supplier of commercial computing devices and knows the importance of workstations to businesses.
- ThinkStation® workstations and ThinkPad® mobile workstations keep costs down and are more reliable than the competing products.
- ThinkStation® modular components and tool-free expandability take manageability to the next level.

- Needs highly reliable hardware with reasonable life cycles

- Lenovo™ P Series workstations are based on a clean sheet approach to workstation design after extensive R&D focusing on performance and simplification.
- Sharp reduction in number of moving parts like fans, reduces the possibility of system failure without sacrificing industry leading thermal management.
- The key to electronic reliability is effective cooling. Lenovo™ ThinkStations® have patented tri-channel cooling with a unique air baffle, that means air cools the components and exits the unit without recirculation. Our competitors recirculate air.
- Lenovo™ ThinkStation® have 3 system fans, while our competition has 10 or 12 fans which makes it less reliable and more noisy.
- Lenovo™ ThinkPad® have a unique cooling design that makes them more reliable and dependable. They pass very stringent MIL-SPEC testing and can tolerate rugged use.

- Wants to stretch his budget as much as possible

- ThinkStation® offers the maximum configuration flexibility in the industry, that ensures customers only pay for the performance they truly need.
- ThinkStation® class leading modular design and upgradability of all models means there is always headroom for growth.
- ThinkStation® have 92% efficient power supplies, a ThinkStation® saves money every day. Our competitors typically use 85% and 90% efficient power supplies.



CAD MANAGER

- Provides a budget for all CAD technology items
- Assigns and maintains CAD licenses
- Provides production CAD support and training
- Develops, implements and enforces CAD standards
- Organizes the CAD environment

- Needs to maintain technical design leadership within the organization

- ThinkStation® workstations are fully tested and certified for all major 3D modeling and engineering applications which means that the CAD team will rarely find a disabled feature in the software they use, and will receive full support with the ISVs.
- Only Lenovo™ provides diagnostics on its high-end ThinkStation® workstations, so CAD managers can either quickly eliminate hardware issues when diagnosing a problem, or find the problem right away without opening the unit.
- ThinkStation® offer the very latest in performance and some unique performance configurations, so users can get the maximum performance from a desktop workstations.
- Lenovo™ ThinkPad® P Series mobile workstations offer the top on the line performance in a mobile workstation. Our 17" P70, Intel® Xeon® processors, ECC memory and the latest NVIDIA® mobile graphics, is a breakthrough for those that render or do complex analysis and our 4K screens enhance visualization.

- Needs to have tools that enhance the CAD process

- ThinkStation® workstations allow applications to run to their limits with cutting-edge NVIDIA® Quadro® graphics cards, the very latest Intel® processors and up to 16 GB DDR4 memory slots. Only Lenovo™ offers the FLEX Connector which is specifically designed for industry leading PCIe drives, that are substantially faster than SATA SSDs.
- ThinkStation® P Series are historically the most reliable workstations in the market – 24% more than Dell and 15% more than HP.
- Our mobile workstations allow great performance on-the-go and a range to choose from depending on the need for performance or lightweight.
- The P70 offers the fastest processor and graphics along with M.2 PCIe storage. Our P50 offers great performance and reliability in a 15" form fact, and our W550s offers a lightweight certified mobile workstations that can run all-day on battery power.

- Prefers hardware that is flexible and easy to handle

- P Series workstations offer the new FLEX configuration system for ultimate customization and flexible configuration, so users within the CAD team can swap and share very large CAD models as needed. Our ThinkPad® mobile workstations offer docking stations to make it simple and easy to utilizes more monitors, external keyboards and mice.

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ENGINEERING MANAGER

- Responsible for leading the design engineering department

- Needs to provide high-performance reliable engineering support for product design

- Lenovo™ P Series workstations are built by engineers for engineers, and the internal design of the ThinkStation® is an engineering masterpiece that engineers will appreciate.
- ThinkStation® workstations with the latest Intel® Xeon® processors and NVIDIA® Quadro® graphics cards provide unmatched computing and visualization performance.
- ThinkPad® P Series workstations offer 6th generation Intel® Core™ and new Intel® Xeon® processors for mobile workstations and the latest NVIDIA® Quadro® mobile graphics. The P70 offers maximum mobile graphics capability on a 17" mobile platform that provides the best performance in the industry. Those that render and do analysis now have previously unavailable mobile performance capabilities.
- Lenovo™ offers exclusive performance configurations on our ThinkStation® from the FLEX connector with PCIe storage, to the ability to run 3 Quadro® M6000 or 3 Tesla™ in the P900 vastly improving rendering performance, to the advantage of 12 memory slots in the P700, to the ability to run RAID 0, 1, 5 or 10 in our P300.

- Needs to reduce cost and improve manufacturing outcomes

- ThinkStation® workstations offer exceptional computing and graphics performance for superior visualization and decision support certified for their applications.
- They can buy exactly what they need, as ThinkStation® offers 4 tailor-made models for different requirements.
- Our ThinkPad® mobile workstations offer a variety of improvements including 4K resolutions to improve visual clarity helping to spot errors that might not be caught until they are downstream.

- Needs to have knowledge of top technology trends

- ThinkStation® design implements several breakthrough features in industrial and product design such as the patented tri-channel cooling and the new air baffle.
- ThinkStation® workstation's modular design and tool-less upgradability is the next wave in computing device design.
- ThinkPad® P Series mobile workstations have the very latest powerful technologies, including the new Xeon® processors for mobile workstation, ECC memory, NVIDIA® mobile graphics, screen resolutions and color calibration, to enable the best in your design work.

PRODUCT MANAGER

- Develops product roadmaps
- Maintains product specifications and details
- Seeks product approval and support from organization
- Works with various teams to develop new products

- Needs to balance customer needs with the technical capabilities of the organization

- ThinkStation® workstations are ISV-certified on the leading design and engineering suites which ensures that all new and critical features are available to the design and engineering teams.
- Our new P50 and P70 ThinkPad® mobile workstations provide unparalleled design capability and design clarity when on-the-go, and reviewing designs with customers.
- Our new P40 Yoga ThinkPad® Mobile Workstation is unique with its sketching capability, Wacom® technology and certified of engineering applications, Users can easily create and capture ideas.

- Needs the design and engineering teams to have the technology that delivers products faster

- Superior 3D model development speeds up design iterations, due to the latest Intel® processors, NVIDIA® graphics performance and the fastest storage technology. Our unique FLEX connector with PCIe drive capability is a Lenovo™ exclusive and provides extremely fast loading and storing of files.
- Lenovo™ offers exclusive performance configurations from the FLEX connector with PCIe storage, to the ability to run 3 Quadro® M6000 or 3 Tesla™ in the P900 for the fastest rendering performance in a desktop, to the ability to run RAID configurations up to RAID 0, 1, 5 or 10 in our P300.
- Our Lenovo™ ThinkPad® P70 offers a 17" design that provides the maximum processor and graphic performance in a mobile workstation. While our ThinkPad® W550s offers a light 15" mobile workstation with the battery power to work all-day-long.
- Lenovo™ products come with color calibration, so what you design today will show up as the same color days, weeks and months from now.

- Values reliability and uptime in the entire chain of product development

- ThinkStation® workstations are known for exceptional reliability over other workstations with component MTBF higher than average.
- Our P series mobile workstation offer a Lenovo™ unique cooling design. Heat is the enemy of electronics, and having the coolest design allows better reliability and improved performance with Intel® Turbo Boost.
- Lenovo™ mobile workstation are MIL-SPEC tested and pass providing strong durability and dependability.

CEO

- Knows that implementing a new technology is a complex decision

- ThinkStation® workstations offer unmatched performance with negligible downtime that allows focus on business, not IT.
- ThinkPad® mobile workstation provide unmatched cooling and reliability, so mobile workers can focus on getting the job done, while providing the exceptional on-the-go, performance they need.

- Understands the factors that impact the core business

- ThinkStation® workstations reduce the time taken to perform CAD and engineering tasks resulting in increased efficiency.
- ThinkPad® mobile workstations can come with 4K resolution, providing clear visualization on-the-go, making it easier to avoid missing any design defects prior to production where they are much more costly.

- Needs strong reasons to consider a change in computing devices, brand or supplier

- Lenovo™ is the No. 1 PC supplier in the world, across consumer and commercial.
- Lenovo™ is one of the world's top 25 most innovative companies according to BCG.
- Lenovo™ is a Fortune Global 500 organization.
- Lenovo™ ThinkStation® workstations have leadership in minimizing the environmental impact with less electrical usage to power the units. They also emit less heat that needs lesser air conditioning. This is due to 92% efficient power supply which reduces the heat lost in power conversion by 250% when compared to an 80% efficient power supply and 25% when compared to a 90% efficient power supply.
- Lenovo™ ThinkPad® mobile workstations are known for their dependability.

WHY THINKSTATION® P SERIES WORKSTATIONS?



THE POWER TO ACHIEVE.
THE POWER TO INNOVATE.

Lenovo™ ThinkStation® P Series workstations shatter the limits of what's possible for engineering design, planning and control. They deliver unparalleled performance, reliability and usability and unmatched flexibility. Customers can now customize the ideal system for any product development environment.

REMARKABLE RELIABILITY

- A 2012 TBR Workstation Repair Rate Study confirmed ThinkStation® workstations were up to 24% more reliable than top competitors. Since that report, we've further reduced monthly repair rates by 56%.
- Without adding fans, our redesigned system draws in maximum airflow through our patented, tri-channel architecture, using a one-of-a-kind air baffle to direct cool air straight to each component, while forcing warm air out the back.
- Unique direct cooling air baffle, without fans and no recirculated air means better cooling.
- Plug your Android™-based tablet or smartphone into the USB port for system analysis, to quickly determine whether a problem is hardware or software-related, saving you time and money.
- Ensures 24/7 uninterrupted performance.

UNMATCHED USABILITY

- No more messy cables. Intuitive red touch points guide your hands to quick and easy component changes.
- Access components – even the motherboard – without the need for a single tool.
- Easily lift and carry your system and fit it conveniently into your workspace or mount it into a rack.
- New FLEX configuration for ultimate customization and flexible configuration.
- Runs whisper quiet at only 24 dB idle noise.

POWERFUL PERFORMANCE

- Up to 72% faster than previous ThinkStation® models 2.
- The latest Intel® Xeon® processors and NVIDIA® Quadro® graphics cards provide unmatched computing and visualization performance.
- The ThinkStation® P900 supports up to four powered graphics, three NVIDIA® Tesla™ compute cards, or two Intel® Xeon Phi™ compute cards. The P Series also supports FLEX Drives (M.2 PCIe SSDs) which are about three times faster than standard SSDs.
- The P900 supports the highest capacity of DDR4 memory to handle any complex computational task with RAM to spare.
- Fastest available storage.

FLEXIBILITY LEADER

- Power Supply – Easily remove the tool-less power supply without worrying about cables. For the P700 and P500 models, match the size of the power supply to your system's unique configuration. Only pay for the performance you truly need.
- FLEX Tray – Newly designed HDD trays support both 2.5" and 3.5" hard disk drives. And with one tray supporting up to two HDD, you can add a staggering 14 drives on the P900.
- FLEX Connector – Increase functionality without sacrificing rear PCIe slots using a mezzanine card that connects to the motherboard—allowing for support for SATA / SAS / PCIe storage and advanced RAID solutions.
- FLEX Bay – How can a single 5.25" drive bay be so much more? We designed the FLEX Bay to support an optical drive or the FLEX Module, which can be used to support an ultraslim optical drive, a media card reader, and Firewire (IEEE 1394).

FULLY ISV-CERTIFIED

- The P Series is certified to work on all key ISV applications. In fact, many of the world's largest ISVs developed their software using ThinkStation® workstations.



ThinkStation® and ThinkPad® mobile workstations are certified on all of today's key ISV applications including:

• Adobe®	• Bentley® MicroStation®
• Altair®	• Dassault CATIA
• ANSYS®	• Fluent®
• Autodesk® AutoCAD®	• PTC® Creo™
• Autodesk® Inventor®	• Siemens NX
• Autodesk® Revit®	• Solid Edge
• AVEVA	• SolidWorks



Why ThinkPad® Mobile Workstations



REMARKABLE RELIABILITY

- We tested this workstation against 20 MIL-STD methods to ensure it can handle any environmental hazards you may encounter on the job.
- FLEX performance cooling system reduces temperature up to 25% and runs as much as 15% quieter than top competitors.
- Heat is the enemy of electronics, and our unique cooling allows more problem free operation.

UNMATCHED USABILITY

- 4K UHD display lets the user see more detail and access more space on screen with a higher resolution – 3840 x 2160 and up to a 100% color gamut.
- FHD touch panels with 10-point touchscreen and optional ThinkPad® Pen Pro with Wacom® technology makes it easier for users to interact with their work.
- Panels change over time, but a users work relies on color accuracy. The integrated X-Rite® Pantone® color calibrator – exclusive to Lenovo™ – keeps colors accurate throughout the life of your machine.
- Award winning keypad allows for ease of input.

POWERFUL PERFORMANCE

- The first ever Intel® Xeon® processors for mobile workstations feature the highest performance while supporting ECC memory.
- The latest NVIDIA® Quadro® GPUs give you the highest graphics power on a mobile workstation, allowing quick and smooth rotations, and GPU computing.
- Move huge files, such as 4K video, in an instant with Thunderbolt™ 3, the fastest possible connection – at speeds up to 8x faster than USB 3.0.
- 64 GB DDR4 memory with increased speed, so users can handle any compute-intensive task.
- Up to 1 TB of PCIe Gen 3 x 4 NVMe storage. Users can access critical data up to 5x faster than before.
- FLEX performance cooling system allows users to utilize Intel® Turbo Boost technology longer and get the fastest GHz performance.

One Machine Across Multiple Workflows

ThinkPad® P40 Yoga



Laptop Mode



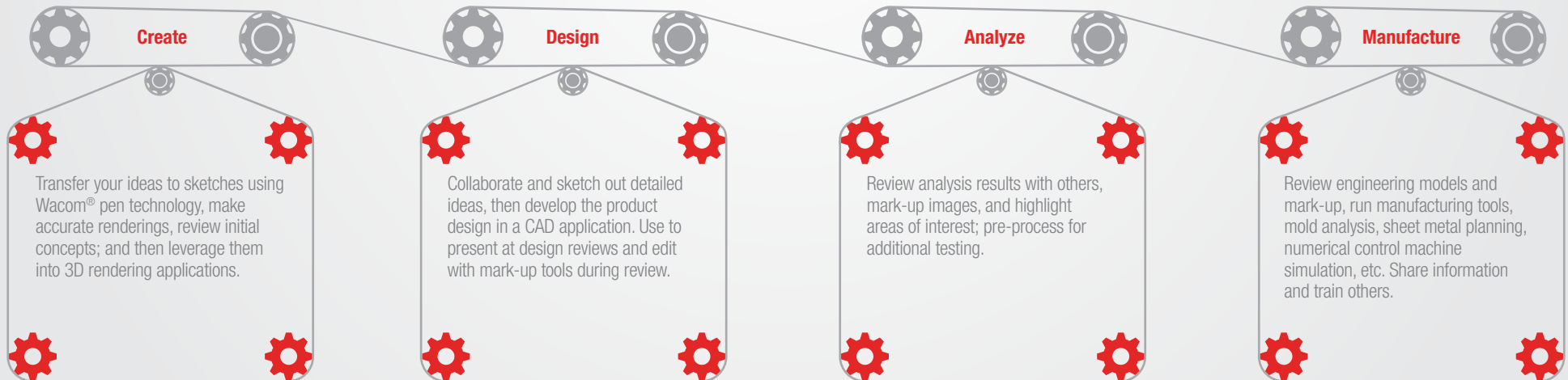
Stand Mode



Tent Mode



Tablet Mode



LENOVO'S WORKSTATION PORTFOLIO

PERFORMANCE



ThinkStation® P310

The power of a workstation; the price of a desktop:

A reliable ISV-certified 1P tower or Small Form Factor (SFF) workstation for entry-level 3D and 2D CAD or general purpose applications.



ThinkPad® P40 Yoga

Sketch, collaborate and design; on one device

Combining the first-class digital sketching experience of a tablet and Wacom® pen with the power and performance of a mobile workstation; CAD users now can do it all on one device without sacrifice.



ThinkPad® P50s

15.6" Ultrabook™ for CAD

With all the feature, exceptional display, certified applications, lightweight, 32 GB of memory, NVIDIA® Quadro® Graphics and up to 17 hours of battery life. Run all-day on a single charge.



ThinkPad® P50

Power and mobility for mainstream CAD users

With the new Intel® Xeon® processors for mobile workstations, ECC memory, NVIDIA® Quadro® mobile graphics, PCIe M.2 SSDs, and high resolution monitors, these mobile workstations are ideally suited for on-the-go engineers.



ThinkPad® P70

Extreme power in a mobile device

With a 17" screen, maximum mobile graphics capability, along with the processor speeds, and memory expansion to 64-bits. These systems are ideal for rendering and analysis in a mobile platform.



ThinkStation® P500

Mainstream performance and flexibility

For CAD users who need the extra memory capacity, and higher end graphics and the fastest storage with the FLEX connector and PCIe M.2 SSDs.



ThinkStation® P700

Versatility and power in a compact form factor

Features the most x16 slots and the highest storage capacity in the industry for a compact 2P workstation, plus interchangeable PSU.



ThinkStation® P900




Extreme performance

Perfect for resource-intensive rendering and simulation with the most I/O and the highest storage capacity in the industry.

Lenovo™ recommends Windows.

THERE'S A THINKSTATION® AND THINKPAD® MOBILE WORKSTATION FOR EVERY STAGE OF THE PRODUCT DESIGN CYCLE



WORKFLOW POSITIONING WITH RECOMMENDED CONFIGURATIONS	DESIGN – ENTRY LEVEL MANUFACTURING ENGINEERING	DESIGN – ENTRY LEVEL ENGINEERING	MOBILITY TO SKETCH DESIGN, COLLABORATE LIGHTWEIGHT	MAINSTREAM 3D DESIGN, BASIS RENDERING OR ANALYSIS		EXTREME MOBILE POWER FOR VISUALIZATION AND ANALYSIS	PRODUCT RENDERINGS, ANALYSIS AND SIMULATION	EXTREME POWER FOR VISUALIZATION, ANALYSIS AND SIMULATION
USAGE SCENARIO	2D and Entry Level 3D Design	2D and Entry Level 3D Design	Wacom® Sketch Multimode	Mainstream 3D Design and Entry Level Simulation and Rendering		High-end 3D Mobile	Mainstream Analysis Simulation Rendering	High-end Visualization and/or Simulation
CPU	 SINGLE PROCESSOR  DUAL PROCESSOR 							
WHICH WORKSTATION	ThinkPad® P50s	P310 Series	ThinkPad® P40 Yoga	P500 Series	P50	P70	P700 Series	P900 Series
CPU SUPPORT	6th Generation Intel® Core™ i7 Dual-Core	Single Intel® Xeon® E3-1270 v5 Processor	6th Generation Intel® Core™ i7 Dual-Core	Single Intel® Xeon® E5-1630 v3 Processor	Intel® Xeon® Processors for Mobile Workstation	Intel® Xeon® Processors for Mobile Workstation	2 x Intel® Xeon® E5-2690 v3 Processors	2 x Intel® Xeon® E5-2687 v3 Processors
MEMORY	2 SODIMM Slots 32 GB Max. (1600 MHz)	4 Slots Recommend 32 GB ECC Memory DDR4 (2133 MHz)	1 SODIMM Slot, 16 GB Max. SDRAM DDR3L (1600 MHz)	8 Slots Recommend 4 x 8 GB DDR4 DIMMs (32 GB minimum)	4 Slots Recommend 4 x 8 GB ECC Memory DDR4 (32 GB total)	4 Slots Recommend 4 x 16 GB ECC Memory DDR4 (64 GB total)	12 Slots Recommend 192 GB ECC Memory DDR4 ((2133 MHz)	16 Slots Recommend 192 GB ECC Memory DDR4 (2133 MHz)
FLEX CONNECTORS	No	No	No	1 Recommend 1 x 512 GB FLEX Drive (M.2 PCIe SSD)	No FLEX Connector Recommend PCIe SSD Storage	No FLEX connector Recommend PCIe SSD Storage	1 Recommend 1 x 512 GB FLEX Drive (M.2 PCIe SSD)	2 Recommend 2 x 256 GB FLEX Drives (M.2 PCIe SSDs)
SUPPORTED GRAPHICS	NVIDIA® Quadro® Graphics M5000M	NVIDIA® Quadro® K2200 with 4 GB of Memory	NVIDIA® Quadro® Graphics M5000 M	NVIDIA® Quadro® K2200 with 4 GB of Memory	NVIDIA® Quadro® Graphics M2000M	NVIDIA® Quadro® Graphics M5000M	NVIDIA® Quadro® K2200 with 4 GB of Memory (for non-GPU acceleration), NVIDIA® Quadro® K5200 with 8 GB of Memory (for GPU acceleration, which supports both GPU processing and displays)	NVIDIA® Quadro® M6000
TYPICAL APPLICATION FOR WORKFLOW (all applications shown are certified for Lenovo™ ThinkStation® workstations)	AutoCAD® SolidWorks Siemens NX PTC® Creo™ Dassault CATIA Inventor® Solid Edge Bentley® MicroStation®	AutoCAD® Bentley® MicroStation® AVEVA Plant MasterCam® Delcam Solid Edge SolidWorks	AutoCAD® Sketchbook® Sketch up Adobe® Illustrator® Autodesk® Revit® Autodesk® Formit®	SolidWorks Solid Edge Autodesk® Inventor® PTC® Creo™ Siemens NX Dassault CATIA HSMWorks™	SolidWorks Autodesk® Inventor® PTC® Creo™ Siemens NX Dassault CATIA Solid Edge	3ds Max® Alias® ICEM VRED™ ANSYS® Mechanical ANSYS® Fluent®	3ds Max® ICEM, Alias® TeamCenter Vis ANSYS® Mechanical ANSYS® Fluent® Simulia, Abaqus HyperWorks®	3ds Max® ICEM, Alias® TeamCenter Vis ANSYS® Mechanical ANSYS® Fluent® Simulia, Abaqus HyperWorks®

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