FUJITSU

intel

ACCELERATING AEC

WORKSTATIONS FOR ARCHITECTURE, ENGINEERING & CONSTRUCTION

From architect, BIM manager and design visualiser, to surveyor, project manager and contractor, Fujitsu CELSIUS workstations powered by latest Generation Intel® Core™ vPro® processor and Intel® Xeon® processor can handle the increasingly demanding workflows of the modern AEC professional

Digital construction offers huge potential for bringing new efficiencies to construction. It can enable new possibilities and workflows, to deliver increasingly complex building and infrastructure projects in shorter timeframes. Through the adoption of new technologies, optimised digital workflows, and the wider sharing of data, Architecture, Engineering and Construction (AEC) teams can become more productive, and their jobs made simpler, more convenient and efficient. Ultimately, this can lead to projects moving faster through both the design and build phases, leading to a reduction in costs and an increase in profits.

Training and education is key, but so is having the correct workstation hardware in place to properly support innovative new data-centric workflows. Unless everything aligns at the same time, AEC firms will be unable to realise the full potential of digital construction.

STRONG FOUNDATIONS

Building Information Modelling (BIM) forms the foundation of many digital construction processes. BIM authoring tools such as Autodesk Revit, Allplan, Graphisoft Archicad, BricsCAD BIM, Vectorworks, and Tekla Structures enable architects, structural and building services engineers to develop 3D models with structured information, which are continually enriched for design, execution and handover.

For those that rely heavily on such applications, workstation-class laptops or desktops are essential. Therefore, extended AEC teams also need access to powerful workstation hardware, in order to fulfil the true potential of model-based workflows. These include design review, model co-ordination, quality assurance, clash detection, issue resolution, and 4D construction simulation.

Data not only needs to move seamlessly between project teams, but collaborators need to be able to navigate freely around 3D models of ever-increasing complexity, from the office to the construction site.

THE NEW REALITY

Geometric data or intelligent parametric objects form the backbone to most digital construction processes. However, the use of reality modelling data continues to grow in importance as the 'as-designed' aligns with the 'as-built' at all stages of design and construction.

The immense detail delivered in site-scale point clouds or reality meshes demands vast levels of processing for both authors and consumers of the data.

▶ Over the page: spotlight on four key personas in architecture, engineering and construction

IMAGE COURTESY OF ENSCAPE

ARCHITECT / BIM MANAGER

Much of the work of the modern-day architect centres on the use of Computer Aided Design (CAD) or Building Information Modelling (BIM) software. The simple hand sketch still plays an important role at the conceptual design phase, but ideas can also be developed digitally on workstations as architects look to freeform 3D modelling tools to experiment with volumes and explore the relationships between spaces.

For conceptual design, there are several options, including dedicated push/pull modelling tools like Trimble SketchUp, Autodesk FormIT and blender. Also popular is the powerful surface modelling tool McNeel Rhino, which is typically combined with Grasshopper to produce complex forms using computer-generated scripts.

It's also common for firms to use BIM-centric applications, which while designed primary for detail design, now offer simple massing capabilities. Some can create complex forms beyond mere rectilinear boxes. This includes Autodesk Revit, Graphisoft Archicad, Bricsys BricsCAD BIM, Vectorworks and Allplan.

Architects that produce challenging designs typically utilise computational design tools to define complex geometry or automate repetitive tasks. CPUs in powerful workstations can make light work of user-programmable rules to define layouts of buildings or drive new architectural vocabularies. This has traditionally been done through coding or visual programming in applications like Grasshopper for Rhino or Autodesk Dynamo. However, more recently, new data-driven design tools like Generative Design in Autodesk Revit help less technical users generate design alternatives based on user-defined goals, constraints, and inputs, enabling the creation of many design alternatives.

Despite the rise of digital construction, documentation remains incredibly important, and most architects still rely on 2D drawings as the key design deliverable. Drawings can be drafted in 2D CAD tools like Autodesk AutoCAD or derived from 3D BIM models in plans, sections and elevations. Most firms typically convert these document sets to PDF for sharing and sign off.

Not all architects need to get hands-on with CAD and BIM software. Some just want to review designs in applications like Revizto, Navisworks and Bluebeam Revu. Others, especially BIM managers, take things further using model verification and checking tools like Solibri to help ensure consistent, high quality data flows in and out of the architectural practice.

Workstation advice:
CAD / BIM tools are largely single threaded, so benefit from a high GHz CPU, such as the 11th generation Intel® Core™ processor. Many applications are CPU limited, so only need a relatively low-powered GPU.

Desktop workstation recommendation:
Fujitsu Workstation CELSIUS W5011 with up to the Intel® Xeon® W-1300 processor

Mobile workstation recommendation:
Fujitsu Workstation CELSIUS H5511 with up to the Intel® Core™ i7-1185G7 processor

SURVEYOR

The role of the surveyor is changing dramatically. In conjunction with measurements from traditional total stations, new technologies like laser scanning, simultaneous localisation and mapping (SLAM), photogrammetry, drones / unmanned aerial vehicles (UAVs), and even autonomous robots, allow surveyors to capture as-built conditions much more quickly (and therefore more frequently), and provide important context.

Rather than having to focus on specific points or details, surveyors can capture entire buildings, infrastructure or construction sites at all stages of a new build or retrofit project.

Different technologies can be used in combination to deliver hybrid results. For example, laser scanning or SLAM devices can generate point clouds of interiors, while cameras mounted on drones can capture building exteriors and surrounding environments, with the resulting photos or videos processed with photogrammetry software to generate highly accurate 'reality meshes'.

Such technologies are enabling enhanced workflows such as scan-to-BIM (Building Information Modelling), as-built documentation, construction verification, remote inspection, visualisation, digital twins and more.

With Scan-to-BIM, for example, AEC firms can kickstart retrofit projects, taking point clouds and extracting features like doors, walls, windows and other building elements, so architects, structural engineers and mechanical, electrical and plumbing (MEP) specialists can then more easily work with reality data inside their familiar BIM environments.

Further downstream, construction verification allows 'as-built' point clouds to be compared to 'as-designed' BIM models to verify that components have been installed correctly on site.

Construction verification isn't new, but because technologies like laser scanning allow data to be captured much more quickly, the verification can now be done more frequently. This means any potential errors can be identified and resolved much earlier on, before they become expensive mistakes.

The challenge for the modern day surveyor is how to process the vast amounts of data generated through photogrammetry, SLAM and laser scanning applications. The importance of doing this on site can't be overstated. By using powerful mobile workstations, surveyors can check they have good, accurate coverage before leaving site. Once back at the office, the data can be adapted and processed further for many downstream workflows.

Workstation advice:
With mobile workstations, data can be processed and verified on site. This can help ensure important details are not missed. Once back in the office, data can be further processed for downstream workflows using powerful, multi-core desktop workstations.

Desktop workstation recommendation:
Fujitsu Workstation CELSIUS M7010 with up to the Intel® Xeon® processor W-2295

Mobile workstation recommendation:
Fujitsu Workstation CELSIUS H5511 with up to the Intel® Core™ i7-1185G7 processor

CONSTRUCTION PROJECT MANAGERS

Construction project managers have traditionally relied on printed drawings and Gannt charts to manage construction projects. However, this analogue approach often leads to significant bottlenecks, especially when information needs to be shared between design and construction teams. This can lead to delays when unexpected issues arise on site and need to be resolved quickly.

The reality today is more of a mix of analogue and digital methods. However, as the industry moves towards digital construction, 3D models are increasingly being placed up front and centre at the planning, coordination, and execution phases.

3D models enable more effective collaboration and communication and make for much more efficient tracking and management of work processes. Digital workflows can also help data move more seamlessly between design office and site and vice versa. Teams can collaborate more confidently, knowing that everyone is working off the latest revisions.

With Architecture, Engineering and Construction (AEC) collaboration software Revizto, for example, project teams can identify issues on site, or within the context of architectural, construction or as-built 3D models. Responsibility can then be assigned to individuals, deadlines and priority added, and each issue tracked until it's been resolved, with full accountability.

Digital construction software Bentley Systems Synchro can be used to extend the scope of the 3D construction model by adding an integrated 4D timeline. Construction managers can use model-based scheduling to plan and track projects, optimise the path of construction and identify potential issues before they happen by exploring multiple 'what if' scenarios.

With 4D simulation, teams can plan and visualise construction sequencing to help resolve conflicts virtually before they happen on site.

As modern designs become more complex for building and infrastructure projects, construction managers need powerful workstation hardware to handle large, site-scale, model-based AEC collaboration / digital construction workflows. This is not just for BIM models but sometimes reality modelling data as well, such as point clouds.

Complete portability through mobile workstations is essential so model data can be accessed from anywhere — at the office, at home or from the heart of the construction site.

Workstation advice:
Prioritise processor frequency over the number of cores in most project management, design / review, 4D scheduling or collaboration tools.

Desktop workstation recommendation:
Fujitsu Workstation CELSIUS J5010 with up to the Intel® Xeon® W-1200 processor

Mobile workstation recommendation:
Fujitsu Workstation CELSIUS H5511 with up to the Intel® Core™ i7-1185G7 processor

ARCHITECTURAL VISUALISER

The role of the architectural visualiser is changing. They used to be responsible for all aspects of visualisation within an architectural practice. However, with the rise of one-click real-time visualisation tools like Enscape that are designed for architects, now the emphasis is shifting.

Architectural visualisers not only need advanced computer graphics (CG) skills to produce high quality images, animations and real-time / virtual reality (VR) experiences, they must also be experts in the human elements of visualisation. This includes an understanding of the 'big picture', the target audience, and what the viz asset needs to portray. A good appreciation of narrative and composition is essential for the effective communication of complex ideas, stories and architectural concepts.

Advanced design visualisation can benefit all stages of architecture, and there are many different applications. These range from early-stage design exploration and client communication to generating visual assets for bids / competitions, planning applications, public consultations, and sales and marketing.

Light plays a very important role within architectural visualisation, as it does in architecture itself. With physically-based rendering, design visualisers can explore the impact of natural and artificial light on space and materials.

Understanding how sunlight penetrates a building at different times of the day or year can help architects make important decisions. These could relate to form, the placement of windows or facades, or the finish of materials. Visualisation can also be used to explore different artificial lighting strategies within a building.

Visualisation does not have to reflect absolute realism. It can also be used to sell an architect's vision, simply by creating compelling and engaging imagery. Here the design visualiser's skills as a digital artist can really come into play by using light to convey a specific atmosphere or mood, or to highlight specific aspects of a design.

The software used for visualisation is varied. The combination of Autodesk 3ds max for 3D modelling and Chaos V-Ray for rendering remains popular with many professional viz artists, and the most accurate results continue to be delivered through CPU rendering, making multi-core workstations essential.

However, the use of Unreal Engine for delivering interactive real-time 3D and VR experiences is on the rise. The software relies heavily on GPUs, but multi-core CPUs remain essential for key workflows.

Workstation advice:
Rendering using multi-core CPUs and lots of memory is important for the largest models / most realistic results. Tools like Unreal Engine from Epic Games are focused on real-time 3D but need multi-core CPUs for many processes including recompiling shaders, light baking and packaging projects.

Desktop workstation recommendation:
Fujitsu Workstation CELSIUS M7010 with up to the Intel® Xeon® processor W-2295

Mobile workstation recommendation:
Fujitsu Workstation CELSIUS H7510 with up to the Intel® Xeon® processor W-10885M

Intel® Xeon® processor

IMAGES COURTESY OF ENSCAPE

FUJITSU WORKSTATION CELSIUS H5511 OPTIMISED FOR CAD AND BIM

A workstation-class laptop is an obvious choice for AEC professionals, but when choosing one for powerful 2D and 3D software, the challenge is how to strike a balance between performance and portability.

Modern workstation laptops can now deliver phenomenal levels of performance, especially when it comes to 3D graphics, but laptops with powerful Graphics Processing Units (GPUs) are often bulky. Therefore, it is important that AEC professionals fully appreciate that high-end processors aren't needed for all workflows.

Computer Aided Design (CAD) and Building Information Modelling (BIM) are prime examples. Mature applications like Autodesk AutoCAD and Autodesk Revit are largely single threaded, which means most of the software code runs on a single CPU core. This means the Turbo frequency (GHz) of a CPU is typically much more important than the number of cores.

At the same time, CAD and BIM applications often do not place huge demands on a workstation's Graphics Processing Unit (GPU), both in terms of raw processing power and GPU memory. Bigger is not always better.

The Fujitsu CELSIUS H5511 mobile workstation has been specifically designed to cater to these types of users. Weighing less that 2.0 kg and with a height of 20.8 mm, the 15.6-inch professional workstation laptop is significantly thinner and lighter than other Fujitsu CELSIUS mobile workstations. But with a choice of 11th generation Intel® Core™ processors it still packs a big punch when it comes to processing.

PRECISE INPUT

The Fujitsu CELSIUS H5511 mobile workstation is protected against coffee mishaps with a spill proof backlit keyboard and numeric keypad for easy engineering input. A multi gesture touchpad with two mouse buttons offers a natural and comfortable Windows experience. Meanwhile, in desktop environments, for enhanced control and navigation in CAD and BIM applications, Bluetooth v5.1 and USB (Type A or C) connectivity gives plenty of options for an external mouse or 3Dconnexion SpaceMouse.

ULTRA-PORTABLE

Flexible working has never been more important and AEC professionals increasingly need to be able to move seamlessly between office, home, and construction site throughout the working week. With a height of 20.8 mm and weighing less that 2.0 kg, the Fujitsu Workstation CELSIUS H5511 is significantly thinner and lighter than other Fujitsu CELSIUS mobile workstations. Users on the move will also benefit from excellent connectivity, including fast Intel WiFi 6 AX201 and optional 4G/LTE. Also expect a full working day of cable-free runtime thanks to a powerful 69.7Wh battery with quick charge that can go from 0 to 80% in under an hour.

ADVANCED SECURITY

Security is of paramount importance, especially when away from the office. The Fujitsu Workstation CELSIUS H5511 comes with three different biometric login options for fast and secure access. These include facial recognition through Windows Hello and the IR webcam, a fingerprint sensor, or Fujitsu's optional PalmSecure technology that recognises users' unique vein patterns. For authentication, simply hover the hand above the sensor.

STAY CONNECTED

Collaborating with remote project teams has never been more important, so for video conferencing there's a built-in FHD IR Camera (Windows Hello certified) with Privacy Shutter and two digital array microphones. What's more, support for Intel GNA, AI-based dynamic noise suppression helps remove unwanted background noise, such as a barking dog or a crying baby.

BRICSCAD BIM SCREEN IMAGE COURTESY OF BRICSYS

Intel® Core™ vPro® processor

PROFESSIONAL 15.6 INCH DISPLAY

There's a choice of two LED backlit, anti-glare 15.6-inch FHD displays with a modern, slim-bezel design that maximises viewing area. The premium 100% sRGB HDR panel not only offers a wide colour gamut for vibrant rendering of images, but with 500 cd/m² brightness it can help improve visibility in direct sunlight, making it well suited to use on construction sites – or even on the beach!

EXCELLENT CONNECTIVITY

The Fujitsu Workstation CELSIUS H5511 is well equipped with ports.
1 SD XC Card Reader 2 3.5mm Stereo Mini Jack (Combo Jack)
3 two USB Type A, one with Anytime USB charge functionality
4 HDMi for external displays 5 full sized Ethernet (RJ-45) port with a status LED light 6 two USB Type C with Intel® Thunderbolt™ 4 (40Gbps), Power Delivery (15W), and DisplayPort 1.4a
7 Micro SIM card tray for models with integrated 4G LTE module
An optional Thunderbolt 4 Port Replicator supports two external 4K displays via DP 1.4++ and other peripherals

WORKSTATION CLASS CPU

With a choice of 11th generation Intel® Core™ processors, the Fujitsu Workstation CELSIUS H5511 delivers where it matters in many AEC workflows.

The top-end Intel® Core™ i7-1185G7 boasts a Max Turbo of 4.8 GHz to deliver impressive single threaded performance which is important for all CAD and BIM software. With four cores it can also handle multithreaded operations such as point cloud processing and rendering.

The Intel Core™ i7-1185G7 also supports the Intel vPro® platform, which has built-in features for performance, hardware-enhanced security, and stability. It can help IT departments manage, diagnose, repair and update the Fujitsu Workstation CELSIUS H5511 remotely, which is particularly beneficial for firms that offer flexible working.

PROFESSIONAL 3D GRAPHICS

The Fujitsu CELSIUS H5511 mobile workstation includes the CAD-optimised NVIDIA T500 GPU with 896 CUDA cores and 4 GB of video memory. The professional graphics card is perfectly matched to most AEC-focused CAD and BIM applications which tend to be 'CPU limited' so don't generally benefit from more powerful GPUs.

The NVIDIA T500 is even well suited to part and small assembly modelling in more demanding 3D mechanical CAD applications so product designers and more progressive AEC firms can also benefit.

HIGH CAPACITY MEMORY

With up to 64 GB of 3,200 MHz DDR4 memory, the Fujitsu Workstation CELSIUS H5511 enables AEC professionals to work with large models in BIM, reality modelling and other AEC workflows. Having sufficient memory can increase performance and also means 3D models don't have to be broken down into smaller chunks, which can dramatically improve workflows.

FAST STORAGE

Dual M.2 PCIe NVMe Solid State Drives (SSDs) with RAID support give users complete flexibility. Configured in RAID 0, both SSDs can be 'striped' for performance to deliver real benefits in data intensive workflows such as point cloud processing or video editing. Alternatively, 'mirror' the drives in RAID 1, so should one SSD fail, work can continue uninterrupted, and no data is lost.

Meanwhile, SSDs come with Self Encrypting Drive (SED) technology to automatically encrypt and decrypt drive data, protecting sensitive information.

FUJITSU CELSIUS WORKSTATIONS BUILT FOR ALL AEC WORKFLOWS

With Intel® Core™ vPro® processor and Intel® Xeon® processor, Fujitsu CELSIUS workstations can support AEC professionals in all workflows. Designed and engineered in Europe, these powerful machines have gained a reputation for being reliable and whisper quiet, thanks to advanced thermal management

As the world continues to adapt to the new reality, AEC firms need to ensure they have robust workstation technologies in place to properly support their staff wherever they need to work.

Fujitsu offers a range of CELSIUS desktop and mobile workstations built around the Intel vPro® platform, which spans the Intel® Core™ vPro® processor and Intel® Xeon® processor.

With Intel vPro, IT managers can reduce overall workstation maintenance and administrative costs, and remotely maintain, protect and repair machines even when powered off.

Built-in, hardware-enhanced security also provides a secure platform foundation which can help protect against attacks below the Operating System, coupled with remote recovery capabilities.

With a huge choice of Intel® Core™ vPro® processor and Intel® Xeon® processor, Fujitsu CELSIUS workstations can also be matched precisely to workflows to maximise performance in a range of AEC applications. This includes high frequency, low core count mobile and desktop processors which are ideal for single threaded CAD and BIM software, as well as high core count desktop workstation processors which are adept at accelerating multi-threaded processes such as point cloud registration, photogrammetry or ray trace rendering.

POWER ON THE GO

Fujitsu CELSIUS mobile workstations offer AEC professionals the flexibility to work from anywhere. With the high frequency Intel Core™ i7-1185G7 processor, the slimline Fujitsu CELSIUS H5511 in particular hits the sweet spot for CAD and BIM workflows. Meanwhile, the Fujitsu CELSIUS H7510 can be configured for more demanding multi-core CPU- and GPU-centric workflows.

SCALEABLE DESKTOP PERFORMANCE

On the desktop, there's a huge choice of Fujitsu CELSIUS workstation towers which have a strong reputation for reliability and whisper quiet operation, thanks to advanced thermal management.

The compact Fujitsu CELSIUS J series, for example, is ideal for CAD and BIM workflows, especially in space constrained environments, including home offices. Meanwhile, the Fujitsu CELSIUS M series, which can be configured with the powerful Intel® Xeon® W-2200 processor with up 18 cores and up to 512 GB of DDR4 ECC memory, is ideal for more demanding multi-threaded workflows.

FUJITSU CELSIUS J SERIES

No need to choose between performance and size in a Small Form Factor (SFF). CELSIUS J series workstations offer high-end performance in a compact design and are ideally suited to BIM and entry-level reality modelling and simulation workflows.

FUJITSU CELSIUS W SERIES

A great combination of performance, price, expandability and energy efficiency in a microtower design. The CELSIUS W series is a good all-rounder, well suited to BIM, visualisation, VR, simulation and reality modelling.

FUJITSU CELSIUS M SERIES

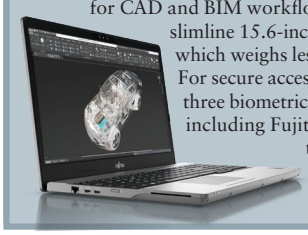
Optimised for the most demanding workflows including high-end real-time viz, VR, rendering, simulation and reality modelling, the CELSIUS M series combines high-spec CPUs, GPUs and memory with near silent noise emissions.

FUJITSU CELSIUS R SERIES

This reliable, high-end dual processor desktop workstation is optimised for extremely demanding and memory intensive multi-threaded workflows, including design visualisation, rendering, reality modelling and simulation.

FUJITSU CELSIUS H5511

The highly portable Fujitsu CELSIUS H5511 mobile workstation delivers optimised performance for CAD and BIM workflows in a stylish slimline 15.6-inch chassis which weighs less than 2kg. For secure access, there are three biometric login options, including Fujitsu PalmSecure that recognises users' unique vein patterns.



FUJITSU CELSIUS H7510

For work at the office, at home or on site, the Fujitsu CELSIUS H7510 mobile workstation combines stylish design with maximum security. Available in a 15.6-inch form factor, models can be configured for a variety of workflows including BIM, visualisation, VR, simulation and reality modelling.