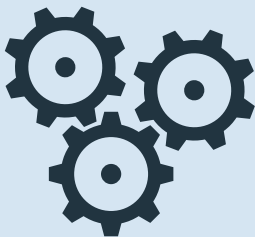**Up to 50% less time to complete a rendering task in Autodesk Fusion 360 with the HP Z4 vs. HP Z2**

Up to 22 minutes less time to complete a rendering task in Autodesk Revit with the latest-gen HP ZBook Fury 15 G7 vs. the previous-gen HP ZBook 15 G6

Architecture, engineering, and construction (AEC) workload comparison: HP Z2 vs. HP Z4 and HP ZBook 15 G6 vs. HP ZBook Fury 15 G7

Architects, engineers, and other project designers frequently simulate and render products, tasks that require powerful processors to ensure projects can finish on time. In the Principled Technologies data center, we compared the performance of two sets of workstations completing example AEC tasks:

- Tower workstations: HP Z4 with Intel® Xeon® W-2295 processor vs. HP Z2 with Intel Xeon E-2278G processor
- Mobile workstations: HP ZBook Fury 15 G7 with Intel Xeon W-10885M processor vs. HP ZBook 15 G6 with Intel Xeon E-2286M processor

In our tests, the HP Z4 with Intel Xeon W-2295 processor completed a rendering task in Autodesk Fusion 360 in up to 50% less time than did the HP Z2, which shows the time savings designers might expect from selecting the more powerful HP Z4 over the entry-level HP Z2.

The HP ZBook Fury 15 G7 outperformed the previous-generation HP ZBook 15 G6 on a rendering task in Revit, reducing the time to complete the rendering task by up to 22 minutes, showing the benefits designers can gain by updating their systems to the latest technology in mobile workstations.

Our results

To compare the HP Z2 workstation to the HP Z4 workstation, we completed two rendering tasks in Autodesk Fusion 360, a popular 3D CAD platform. The Fusion 360 workload we tested involved loading a sample scene titled 07_Utility Knife, which modeled a box cutter. We added a background image to the scene and performed two types of renders; an in-canvas render and a higher quality background render. We ran each set of tests three times and report the median of three runs.

As Figures 1 and 2 show, the HP Z4 completed an in-canvas render in 50 percent less time and a background render in 39 percent less time than the HP Z2 workstation, showing the time savings possible by choosing the HP Z4 with Intel Xeon W-2295 processor.

Fusion 360 testing – in-canvas render
(lower is better)

HP Z4	3 min 27 sec
HP Z2	6 min 55 sec

Figure 1: Autodesk Fusion 360 rendering time comparison for the HP Z2 vs. HP Z4 workstation. Lower is better. Source: Principled Technologies.

Fusion 360 testing – background render
(lower is better)

HP Z4	8 min 17 sec
HP Z2	13 min 38 sec

Figure 2: Autodesk Fusion 360 rendering time comparison for the HP Z2 vs. HP Z4 workstation. Lower is better. Source: Principled Technologies.

Figure 3: The HP Z4 workstation. Source: Principled Technologies.

To compare the HP ZBook 15 G6 to the HP ZBook Fury 15 G7 mobile workstation, we completed a rendering task in Autodesk Revit, a popular Building Information Modeling (BIM) platform used for designing, visualizing, analyzing, and preparing architectural and structural projects. The Revit workload we used rendered a high-quality image of an office building using the sample file that Autodesk provided. We ran each set of tests three times and report the median of three runs.

As Figures 3 and 4 show, the current-gen HP ZBook Fury 15 G7 completed a default-quality render just under a minute faster than the previous-gen HP ZBook 15 G6, and a best-quality render a whopping 22 minutes faster. This shows the potential time savings product developers could enjoy upgrading to the latest HP ZBook 15 G7 with Intel Xeon W-10885M processor.

Up to 22 minutes less time to complete a rendering task in Autodesk Revit with the latest-gen HP ZBook Fury 15 G7 vs. the previous-gen HP ZBook 15 G6

Revit testing – high (default) quality render
(lower is better)

|	
HP ZBook Fury 15 G7	7 min 47 sec
HP ZBook 15 G6	8 min 41 sec

Figure 4: Autodesk Revit high (default) quality rendering time comparison for the HP ZBook 15 G6 vs. HP ZBook Fury 15 G7. Lower is better. Source: Principled Technologies.

Revit testing – best (printer) quality render
(lower is better)

HP ZBook Fury 15 G7	2 hours 44 min 14 sec
HP ZBook 15 G6	3 hours 6 min 23 sec

Figure 5: Autodesk Revit best (printer) quality rendering time comparison for the HP ZBook 15 G6 vs. HP ZBook Fury 15 G7. Lower is better. Source: Principled Technologies.

Figure 6: The HP ZBook Fury 15 G7. Source: Principled Technologies.
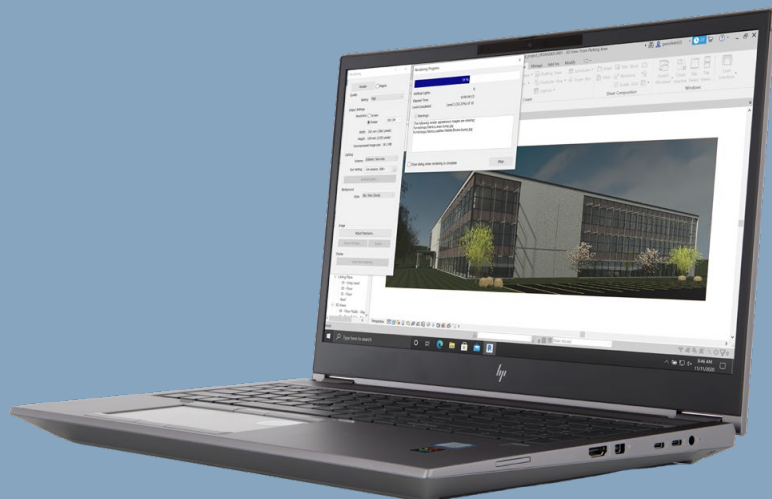
Conclusion

In our tests, upgrading from the entry-level HP Z2 workstation to the HP Z4 with Intel Xeon W-2295 processor, and from the previous-generation HP ZBook 15 G6 to the HP ZBook Fury 15 G7 with Intel Xeon W-10885M processor, reduced the time it took to complete sample AEC workloads.

We concluded our hands-on testing for the HP Z2 and HP Z4 on October 2, 2020 and concluded hands-on testing for the HP ZBook 15 G6 and HP ZBook Fury 15 G7 on November 9, 2020. During testing, we determined the appropriate hardware and software configurations and applied updates as they became available. The results in this report reflect configurations that we finalized on September 17, 2020 (HP Z2 and HP Z4) and November 3, 2020 (HP ZBook 15 G6 and HP ZBook Fury 15 G7) or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

Our results

We ran each test three times and report the median result of those three runs.

Table 1: Fusion 360 test results.

Fusion 360 testing	HP Z2	HP Z4	Percent faster	Time faster
In-canvas render (min:sec)	06:55	03:27	50.12%	03:28
Background render (min:sec)	13:38	08:17	39.24%	05:21

Table 2: Revit rest results.

Revit testing	HP ZBook 15 G6	HP ZBook Fury 15 G7	Percent faster	Time faster
High (default) quality render time (min:sec)	8:41	7:47	10.36%	0:54
Best (printer) quality render time (hour:min:sec)	3:06:23	2:44:14	11.88%	0:22:09

System configuration information

Table 3: Detailed information on the laptop systems we tested.

System	HP ZBook 15 G6	HP ZBook Fury 15 G7
Processor		
Vendor and model	Intel Xeon E 2286M	Intel Xeon W 10885M
Core count (per processor)	8	8
Core frequency (GHz)	2.40	2.40
Cache (MB)	16	16
Memory		
Amount (GB)	64	32
Type	PC4-19200	PC4-21300
Speed (MHz)	2,400	2,666
Graphics		
Vendor	NVIDIA	NVIDIA
Model number	Quadro RTX 3000	Quadro RTX 5000 Max-Q
Storage		
Amount	1TB	1TB
Type	M.2 PCIe NVMe SSD	M.2 PCIe NVMe SSD
Connectivity/expansion		
Wired internet	Intel Ethernet Connection I219-LM	Intel Ethernet Connection I219-LM
Wireless internet	Intel Dual Band Wi-Fi 6 AX200	Intel Dual Band Wi-Fi 6 AX201
Bluetooth	Bluetooth 5.0	Bluetooth 5.0
USB	2x USB Type C, 3x USB 3.1	2x USB Type C, 2x USB 3.1
Video	1x HDMI 1.4	1x mDP 1.4, 1x HDMI 2.0b
Battery		
Type	4 cell	8 cell
Rated capacity (Wh)	90	94
Display		
Size (in.)	15.6	15.6
Type	FHD UWVA	UHD IPS
Resolution	1920 x 1080	3840
Touchscreen	No	2160

System	HP ZBook 15 G6	HP ZBook Fury 15 G7
Operating system		
Vendor	Microsoft	Microsoft
Name	Windows 10 Pro for Workstations	Windows 10 Pro for Workstations
Build number or version	2004	2004
BIOS		
BIOS name and version	HP R92 Ver. 01.05.04	HP S92 Ver. 01.01.01
Dimensions		
Height (in)	1.0	1.02
Width (in)	14.8	14.06
Depth (in)	10.4	9.55
Weight (lbs.)	5.7	5.18

Table 4: Detailed information on the desktop systems we tested.

System	HP Z2 G4	HP Z4 G4
Processor		
Vendor	Intel	Intel
Name	Xeon E	Xeon W
Model number	2278G	2295
Core frequency (GHz)	3.40	3.00
Number of cores	8	18
Cache (MB)	16	24.75
Memory		
Amount (GB)	64	64
Type	PC4-21300	PC4-23400
Speed (MHz)	2,666	2,933
Graphics		
Vendor	NVIDIA	NVIDIA
Model number	Quadro RTX 4000	Quadro RTX 4000
Storage		
Vendor	Samsung	Samsung
Model number	MZVLB1T0HALR-000H2	MZVLB1T0HALR-000H2
Amount	1TB	1TB
Type	M.2 PCIe NVMe SSD	M.2 PCIe NVMe SSD

System	HP Z2 G4	HP Z4 G4
Connectivity/expansion		
Wired internet	Intel Ethernet Connection I219-LM	Intel Ethernet Connection I219-LM
Operating system		
Vendor	Microsoft	Microsoft
Name	Windows 10 Pro for Workstations	Windows 10 Pro for Workstations
Build number or version	2004	2004
BIOS		
BIOS name and version	HP Q50 Ver. 01.06.08	HP P61 Ver. 02.58

How we tested

Fusion 360

Installing Fusion 360 and setting up the render scene

1. Download and run the Fusion 360 installer from Autodesk.
2. Enter the Autodesk account email, and click Next.
3. Enter the associated Autodesk account password, and click Sign In.
4. In the left pane, double-click Basic Training, and double-click 07 - Rendering.
5. To load the sample rendering scene, double-click 07_Utility Knife.
6. In the top left, click Design, and select Render mode.
7. In the toolbar, under Setup, click Scene Settings.
8. Under the Background drop-down menu, select Environment.
9. Click the Environment Library tab, scroll down to the Plaza background, and click the download icon.
10. When the background has downloaded, select it, and click Close.
11. Adjust the camera angle as desired.
12. Click File→Save As, and save the scene as a new project.

Performing an in-canvas render

1. Launch Autodesk Fusion 360.
2. Enter Autodesk account email, and click Next.
3. Enter the associated Autodesk account password, and click Next.
4. In the left pane, double-click My Recent Data.
5. Double-click the version of 07_Utility Knife created previously to load the sample rendering scene.
6. In the top left, click Design, and select Render mode.
7. In the toolbar, click the In-Canvas Render icon.
8. In the bottom-right, click Pause, and adjust the quality slider to Final. The render will automatically resume.
9. Wait for the render to complete.
10. When the in-canvas render has completed, record the elapsed render time displayed in the bottom-right of the screen.

Performing a background render

1. Launch Autodesk Fusion 360.
2. Enter Autodesk account email, and click Next.
3. Enter the associated Autodesk account password, and click Next.
4. In the left pane, double-click My Recent Data.
5. Double-click the version of 07_Utility Knife created previously to load the sample rendering scene.
6. In the top left, click Design, and select Render mode.
7. In the toolbar, click the Render icon.
8. Under Custom, set the image size to 3840 pixels wide and 2160 pixels high.
9. Under Render With, select Local Renderer.
10. From the File Format drop-down, select TIFF.
11. Click the Advanced Settings toggle, and adjust the Render Quality slider to Excellent.
12. Simultaneously start a timer and click Render.
13. In the Rendering Gallery, click the render to view its progress.
14. When the render completes, stop the timer, and record the result.

Autodesk Revit

Installing Autodesk Revit

1. Download the free trial of Autodesk Revit from `autodesk.com/products/revit/free-trial`.
2. Open the Revit webinstall.
3. Click Yes to allow changes.
4. Click Install.
5. Select I Agree, and click Next.
6. Click Install.
7. After the installation is complete, click Launch Now.
8. Close Autodesk Revit.

Downloading the sample file

1. Open Autodesk.com in a web browser.
2. On the Autodesk website, click Menu➔Support & learning➔By product.
3. In the search field, type `revit sample project files`, and press enter.
4. Click Revit Sample Project Files.
5. Under Architecture, download rac_advanced_sample_project.rvt.

Running Autodesk Revit 2021

1. Open Autodesk Revit 2021.
2. Close the trial notification.
3. In the top left, click Back.
4. Click File➔Open➔Sample Files.
5. Browse to the downloaded sample file.
6. Once the project is opened, click View➔Render.
7. For High Screen render (default settings), leave Quality Setting on High.
8. For Best Screen render, change Quality Setting to Best.
9. Change Resolution to Printer, and 300 DPI.
10. Click Render.
11. Uncheck Close dialog when rendering is complete.
12. Record the rendering time from Elapsed Time.

This project was commissioned by HP.

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