



## The science behind the report:

# Boost productivity with an HP ZBook Power G11 A Mobile Workstation PC

This document describes what we tested, how we tested, and what we found. To learn how these facts translate into real-world benefits, read the report [Boost productivity with an HP ZBook Power G11 A Mobile Workstation PC](#).

We concluded our hands-on testing on August 14, 2024. 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 October 24, 2024 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

## Our results

To learn more about how we have calculated the wins in this report, go to <http://facts.pt/calculating-and-highlighting-wins>. Unless we state otherwise, we have followed the rules and principles we outline in that document.

Table 1: Results of our hands-on benchmark, AI tool, and battery life testing. Higher benchmark scores, longer battery life, and lower times to complete tasks are better.

	HP ZBook Power G11 A Mobile Workstation PC	Dell™ Precision® 3591 Mobile Workstation	Lenovo® ThinkPad® P16v Gen 2 Mobile Workstation
PassMark Performance Test 11.0 benchmark (higher is better)			
<b>Overall rating</b>	<b>10,694</b>	<b>9,043</b>	<b>10,767</b>
CPU Mark score	31,872	31,736	32,935
2D Graphics Mark score	538	540	504
3D Graphics Mark score	16,059	13,634	17,073
Memory Mark score	3,379	2,680	3,323
Disk Mark score	47,758	34,064	45,978
SPECworkstation® 3.1 benchmark (higher is better)			
Media and Entertainment overall score	3.27	3.13	3.32
Financial Services overall score	3.79	3.07	3.29
Blender Benchmark (higher is better)			
Classroom workload score	49.66	40.35	49.58
Junk Shop workload score	69.71	62.51	70.14

	HP ZBook Power G11 A Mobile Workstation PC	Dell™ Precision® 3591 Mobile Workstation	Lenovo® ThinkPad® P16v Gen 2 Mobile Workstation
SPECapc® for Creo 9 benchmark (higher is better)			
CPU composite score	2.04	1.78	1.98
Geekbench AI (higher is better)			
Single Precision score	15,398	12,114	15,503
Half Precision score	26,637	21,897	15,024
LM Studio (less time and more tokens per second are better)			
Time to first token (seconds)	0.06	0.33	0.39
Tokens per second	32.68	25.15	35.82
Battery power efficiency (minutes per WHr, higher is better)			
Procyon Battery Life Benchmark	9.7	8.6	9.4
MobileMark 30	7.2	6.4	6.3
Microsoft Teams meeting	4.4	3.9	4.2
Battery life (h:mm, more time is better)			
Procyon Battery Life Benchmark (Office Productivity, Best power efficiency power mode)	13:21	13:55	14:02
MobileMark 30 v1.0.0.17 (Best power efficiency power mode)	9:56	10:16	9:29
Microsoft Teams 3x3 video conference (Best power efficiency power mode)	6:06	6:21	6:19
Noise levels under load (higher scores and lower noise are better)			
Cinebench 2024 overall score	923	823	980
Average dBA	24.0	34.2	39.7

# System configuration information

Table 2: Detailed information on the systems we tested.

	HP ZBook Power G11 A Mobile Workstation PC	Dell Precision 3591 Mobile Workstation	Lenovo ThinkPad P16v Gen 2 Mobile Workstation
<b>Processor</b>			
Vendor	AMD®	Intel®	Intel
Model number	Ryzen™ 9 PRO 8945HS	Intel vPro® with Intel Core™ Ultra 9 185H	Intel vPro with Intel Core Ultra 9 185H
Core frequency (GHz)	4.0 – 5.2	2.3 – 5.1	2.3 – 5.1
Number of cores	8	16	16
Logical Processors	16	22	22
Cache (MB)	16	24	24
AI Technology	Integrated Ryzen AI NPU	Integrated Intel AI Boost NPU	Integrated Intel AI Boost NPU
<b>Memory</b>			
Amount (GB)	64 (2 x 32)	64 (2 x 32)	64 (2 x 32)
Type	DDR-5600	DDR-5600	DDR-5600
<b>Integrated graphics</b>			
Vendor	AMD	Intel	Intel
Model number	Radeon™ 780M Graphics	Intel Arc™ Graphics	Intel Arc Graphics
<b>Discrete graphics</b>			
Vendor	NVIDIA®	NVIDIA	NVIDIA
Model number	RTX™ 3000 Ada generation	RTX 2000 Ada generation	RTX 3000 Ada generation
Driver	NVIDIA v32.0.15.6076	NVIDIA v32.0.15.6076	NVIDIA v32.0.15.6076
<b>Storage</b>			
Model	Samsung MZVL21T0HCLR-00BH1	SK Hynix PVC10	SK Hynix HFS001TEJ9X162N
Amount (TB)	1	1	1
Type (SSD)	PCIe® Gen4 x4 NVMe M.2 2280	PCIe Gen4 x4 NVMe M.2 2280	PCIe Gen4 x4 NVMe M.2 2280
<b>Display</b>			
Specifications	16" WUXGA 1,920 x 1,200 resolution, 400 nits, non-touch	15.6" FHD 1,920 x 1,080 resolution, 400 nits, non-touch	16" WUXGA 1,920 x 1,200 resolution, 400 nits, non-touch
<b>Connectivity/expansion</b>			
Wired internet	Realtek PCIe GbE	Intel Ethernet Connection I219-LM	Intel Ethernet Connection I219-LM
Wireless internet	MediaTek Wi-Fi 6E MT7922 (RZ616)	Intel Wi-Fi 6E AX211	Intel Wi-Fi 6E AX211
Bluetooth	5.3	5.3	5.3
# of USB Type A	2	2	1

	HP ZBook Power G11 A Mobile Workstation PC	Dell Precision 3591 Mobile Workstation	Lenovo ThinkPad P16v Gen 2 Mobile Workstation
# of USB Type C	2	2	1
Video outputs	1 x HDMI®	1 x HDMI	1 x HDMI
OS			
Vendor	Microsoft	Microsoft	Microsoft
Name	Windows 11 Pro	Windows 11 Pro	Windows 11 Pro
Build number or version	10.0.22631.4037 (23H2)	10.0.22631.4037 (23H2)	10.0.22631.4037 (23H2)
BIOS			
BIOS name and version	HP W85 Ver. 01.02.01 (06/19/2024)	Dell 1.5.0 (06/07/2024)	Lenovo 1.09 (04/23/2024)
Battery			
Number of cells	6	6	4
Capacity (WHr)	83	97	90
Dimensions			
Height (in.)	0.90	0.89 – 0.97	0.97
Width (in.)	14.15	14.09	14.37
Depth (in.)	9.21	9.19	10.32
Weight (lbs.)	4.66	4.44	5.12

# How we tested

## Setting up the systems

When running the tests, we used a factory-provided image. To prevent software from corrupting the test image, we reset the system image between tests.

### Setting up and updating the OEM image

1. Boot the system.
2. To complete installation, follow the on-screen instructions, using the default selections when appropriate.
3. Set the Windows Power Plan to Best Performance.
4. Set Screen and Sleep options to Never:
  - a. Right-click the desktop, and select Display settings.
  - b. From the left-hand column, select System.
  - c. Click Power.
  - d. For all power options listed under Screen and Sleep, select Never.
5. Disable User Account Control notifications:
  - a. Select Windows Start, type `UAC`, and press Enter.
  - b. Move the slider control to Never notify, and click OK.
6. Run Windows Update, and install all updates available.
7. Launch each vendor proprietary utility app installed on each system, and update any drivers or BIOS files:
  - For Dell, run the Dell Command | Update utility.
  - For Lenovo, run the Lenovo Commercial Vantage application. Run all Critical and Recommended Updates.
  - For HP, check for updates using HP PC Hardware Diagnostics Windows. To run the HP Support Assistant Application, use a guest login, and run updates. After running updates, in application settings, disable automatic updates.
8. For systems with NVIDIA graphics cards, update the NVIDIA graphics card drivers at <https://www.nvidia.com/en-us/drivers/>.
9. Verify the date and time are correct, and synchronize the system clock with the time server.
10. Pause Automatic Windows Updates:
  - a. Click Windows Start.
  - b. Type `Windows Update settings`, and press Enter.
  - c. From the Pause updates drop-down menu, select Pause for 5 weeks.

### Capturing an image

1. Connect an external HDD to the system.
2. Click Windows Menu button, in the search bar, type `Control Panel`, and click Control Panel→System and Security→Backup and Restore (Windows 7)→Create a system image.
3. Verify that the external HDD is selected as the save drive, and click Next.
4. Verify that all drives are selected to back up, and click Next.
5. Click Start backup.
6. At Do you want to create a system repair disc, select No, and close the dialogs.

### Restoring an image

1. Connect an external HDD to the system.
2. While restarting the system, press and hold Shift.
3. Select Troubleshoot.
4. Select Advanced options.
5. Select See more recovery options.
6. Select System image recovery.
7. Select the User account.
8. Enter the system password, and click Continue.

9. At the Restore system files and settings screen, select Next.
10. Verify that the external HDD is selected, and click Next.
11. Once the recovery has completed, click Finish.

### Running process idle tasks

Once every 24-hour period, before testing, we reboot the system and run the ProcessIdleTasks command which forces idle processes to complete. This minimizes the chance of background tasks affecting test runs.

1. Boot the system.
2. Select Windows Start.
3. Type `cmd`, and press Ctrl+Shift+Enter.
4. Type `Rundll32.exe advapi32.dll, ProcessIdleTasks`. Do not interact with the system until the command completes.
5. After the command completes, wait 5 minutes before running the test.

## Measuring performance with benchmarks and AI tools

### Blender Benchmark testing

#### Setting up the test

1. Download the Blender Benchmark from <https://opendata.blender.org/>.

#### Running the test

1. Launch the Blender Benchmark.
2. At the Welcome screen, click Next.
3. Select Blender version 4.2.0, and click Next.
4. At the Benchmark Scenes screen, click Next.
5. At the Benchmark Device screen, select either the CPU or GPU option, and click Start Benchmark.
6. Record the results.
7. Wait 15 minutes before performing the next run.
8. Repeat steps 1 through 7 two more times.
9. Record the median result.

### Geekbench AI testing

#### Setting up the test

1. Purchase and download a Geekbench AI Pro license from <https://www.geekbench.com/ai/download/>.
2. Run the installer and install using all defaults.

#### Running the test

1. Launch Geekbench AI.
2. Enter the license key.
3. In Geekbench AI, select ONNX and DirectML.
4. For Inference Device select the GPU, if the device has a discrete GPU.
5. Click Run AI Benchmark.
6. Wait 5 minutes and repeat steps 3 through 5 two more times.
7. Record the median result.

### LM Studio testing

#### Setting up the test

1. Download LM Studio from <https://lmstudio.ai>
2. Run the installer and install using all defaults.
3. Launch LM Studio.
4. In the Select a model to load field, download the Llama 3.1 8B model.

## Running the test

1. Launch LM Studio.
2. Select Load a mode, and choose the Meta-Llama-3.1-8B-Instruct-Q4\_K\_M model.
3. When the model is fully loaded, type the question How can AMD Ryzen Processors in HP ZBooks help enterprise customers deliver better user experience, productivity performance and ROI? into the message field, and click Send.
4. When the test is complete, record the results.
5. Eject the model.
6. Delete the Chat messages.
7. Open a new chat by clicking the "+" icon and reload the same model.
8. Wait 5 minutes, and open a new chat window.
9. Repeat steps 2 through 8 two more times.
10. Report the median result.

## PassMark PerformanceTest 11 testing

### Setting up the test

1. Install PassMark PerformanceTEST.
2. Download PassMark PerformanceTest from <https://www.passmark.com/products/performance-test/download.php>.
3. To begin the installation, press Install.
4. To accept the license agreement, select Accept, and press Next.
5. After the installation is complete, deselect Launch Performance Test, and press Finish.

### Running the test

1. To launch PassMark PerformanceTest, press the PassMark PerformanceTest icon.
2. To start the benchmark, press Run Benchmark.
3. When the test completes, record the results.
4. Repeat steps 1 through 3 two more times.
5. Record the median result.

## SPECapc for Creo 9 testing

### Setting up the test

1. Purchase a license for Creo 9.
2. To log into your PTC account, use the Welcome email, and designate a site administrator.
3. Download the Win64 Creo 9.0 installer from here <https://support.ptc.com/appserver/auth/it/esd/product.jsp?prodFamily=ENG>. We download Creo 9.0.9.0.
4. Extract the Creo 9.0.9.0 zip file.
5. Inside the extracted file, copy the install\_license\_server.exe onto a separate Windows system.
6. On a separate Windows system, run install\_license\_server.exe.
7. In the Creo Installation Assistant – Creo 9.0.9.0 Window, select Install License Server, and click Next.
8. Accept the Software License Agreement, and click Next.
9. On the License Identification screen, select Simple license entry, and click Next.
10. Next to License Generation for Server Install, expand the drop-down menu, and select Simple License entry.
11. Enter the sales order number located on your purchase order, and click Install License.
12. In the new window, login to PTC.com with your credentials.
13. Click Finish.
14. To verify that the license server is running, browse to the server IP and port 8090 or [server\_ip]:8090.
15. Login with the default credentials, admin/admin, enter a new Password, and verify that the license server is running with available licenses.
16. On the system under test, copy the Creo Installation folder above to the target system.
17. Run Setup.exe.
18. At the Introduction screen, click Next.
19. At the Software License Agreement screen, accept the agreement, export the agreement, and click Next.
20. Add the license server using 7788@[ip\_of\_license\_server], select the License server, and click Next.
21. At the Application Selection screen, accept the Defaults, and click Next.
22. At the Customize Application screen, confirm that Creo Render Studio is selected, and click Install.

23. Once the installation completes, click Finish.
24. Launch Creo Parametric, and close any prompts.
25. Download SPECapc for Creo 9 from <https://gwpwg.spec.org/benchmarks/benchmark/specapc-ptc-creo-9/>.
26. To extract and complete the installation, use all default options.

## Running the test

1. Open SPECapc for Creo 9
2. Click Run.
3. Repeat steps 1 and 2 two more times.
4. Record the median result.

## SPECworkstation 3.1 testing

### Setting up the test

1. Go to <https://www.spec.org/gwpwg/wpc.static/workstation3-info.html>, and purchase and download the vendor license of the benchmark.
2. Unzip the SPECworkstation\_304.zip file to C:\.
3. To install, navigate to the extracted SPECworkstation\_304 directory, and click SPECworkstation\_304.exe.
4. Turn off Windows Defender Firewall.
5. Click Windows Menu button, and, in the search bar, type `Firewall`.
6. Select Windows Defender Firewall.
7. In the left-hand column, select Turn Windows Defender Firewall on or off.
8. Under both Private and Public network settings, choose Turn off Windows Defender Firewall, and click OK.

### Running the test

1. Launch SPECworkstation.
2. Next to Official Run, check the box.
3. Click the OpenCL Configuration button, and select the discrete graphics card option.
4. Click Run Benchmark.
5. When the test is complete, record the results
6. Repeat steps 1 through 5 two more times.
7. Record the median result.

## Measuring Battery life

### MobileMark 30 testing

This test requires an X-Rite - i1Display Plus colorimeter.

### Avoiding antivirus software conflicts

MobileMark 30 is not compatible with any virus-scanning software, so we uninstalled any such software present on the notebook PCs before we installed the benchmark.

### Avoiding pre-installed software conflicts

MobileMark 30 installs the following applications, which its test scripts employ:

#### Productivity

- Corel WinZip 26.0 Enterprise
- Microsoft Excel 2021 Professional Plus
- Microsoft Outlook 2021 Professional Plus
- Microsoft PowerPoint 2021 Professional Plus
- Microsoft Word 2021 Professional Plus

#### Creativity

- Adobe® Photoshop® CC

If any of these applications already exist on the system under test, they could cause problems with the benchmark due to software conflicts. To avoid any such issues, we uninstalled all conflicting pre-installed software applications—including different versions of any of the programs MobileMark 30 uses—before we installed the benchmark.



## Using the MobileMark built-in configuration tool

This tool supports three levels of configuration:

1. Only makes changes that are REQUIRED for the benchmark to run.
2. Additionally, makes changes that are RECOMMENDED for repeatable results.
3. Additionally, makes OPTIONAL changes that help ensure best results.

The configuration tool makes the following configuration changes at each of the three levels:

### Level 1 - Required

- Disables User Account Control (UAC)
- Set DPI Scaling to 100%
- Disables Low Battery Actions
- Disables Network Proxies
- Disables System Sleep and Hibernate
- Disables Windows Update
- Enables Windows Search
- Disables WinSAT

### Level 2 - Recommended

- Create BAPCo power scheme
- Set Power Plan Type to Balanced
- Set CPU Adaptive Mode
- Disables Battery Saver Dimming
- Verifies Battery Saver Threshold
- Disables Disk Defrag
- Disables Windows Error Reporting
- Disables Windows Lock Screen
- Disables Screen Saver and Monitor Timeout
- Set Font Smoothing

### Level 3 - Optional

- Disables Battery Saver
- Disables Hard Disk Timeout
- Disables System Restore
- Ignores Laptop Lid Close
- Enables Dark Mode

For Balanced runs, we choose the official BAPCo “Run Benchmark” default as outlined in the BAPCo MobileMark30 User Guide ([https://bapco.com/wp-content/uploads/2024/04/BAPCo-MobileMark30\\_User-Guide-v1.0.pdf](https://bapco.com/wp-content/uploads/2024/04/BAPCo-MobileMark30_User-Guide-v1.0.pdf)), which runs the benchmark using the Required and Recommended options. For these Best power efficiency runs, we disabled the recommended options for “Set Power Plan Type to balanced” and “Verify Battery Saver Threshold” options.

## Setting up the performance-qualified battery life test

1. On a separate PC install the i1Profiler software from <https://www.xrite.com/categories/formulation-and-quality-assurance-software/i1profiler> and connect the X-Rite - i1Display Plus colorimeter to that PC.
2. On the system under test, verify that the wireless adapter is disabled.
3. For the Best power efficiency battery life runs:
  - a. Select Windows Start, type `Power`, `sleep`, and `battery settings`, and press Enter.
  - b. From the Power mode drop-down menu select Best power efficiency.
  - c. Select Windows Start, type `Battery saver`, and press Enter.
  - d. From the Battery saver drop-down menu, select Turns on at Always (100%), and click the down arrow. Next to Lower screen brightness when using battery saver, toggle the button to Off.
4. On the system under test, verify that the volume is set to 50%.

5. On systems with AMD processors, disable Vari-Bright. This will prevent the screen from dynamically changing the screen brightness based on content:
  - a. Launch AMD Software.
  - b. Click the Settings gear icon.
  - c. Select the Display tab, and disable Vari-Bright.
6. On systems with Intel processors, disable Intel DPST. This will prevent the screen from dynamically changing the screen brightness based on content:
  - a. Open the Intel Graphics Command Center, press on the keyboard Windows key, and type `Intel`, choose Intel Graphics Command Center.
  - b. Select System→Power.
  - c. In On Battery, set Display Power Savings to Off.
7. Verify the system is no less than 250 nits.
8. On the system under test, install MobileMark 30 with the default options.

### Running the performance-qualified battery life test

1. Boot the system.
2. Launch MobileMark 30.
3. Click Run Benchmark.
4. Click the Brightness Profiler button:
  - a. Allow the white screen to warm up for 30 minutes. After 30 minutes click Skip.
  - b. At the Panel Dark Luminance pop-up select Yes, to use the value that is queried from the display.
  - c. Place the X-Rite - i1Display Plus colorimeter in the outlined spot on the screen.
  - d. On the test PC, toggle the F1 button to turn off the test overlay.
  - e. On the colorimeter PC, start i1Profiler program and select Advanced.
  - f. Click Display and then Profiling.
  - g. Next to Luminance, click the drop-down menu and select Measure.
  - h. In the drop-down menu that appears below, select Paper in booth.
  - i. In the box with the image that says Place your paper in the light booth, scroll down so that you can click the Measure button.
  - j. On the test PC, adjust the slider until the Target White luminance is met on the colorimeter PC.
  - k. Once the correct Target White luminance is met on the test PC, click Done.
5. The test will begin immediately. When prompted, unplug the AC power adapter.

The benchmark is complete when the system has fully depleted its battery and is no longer operational when running on battery power.

We executed the MobileMark 30 benchmark three times on the system and took the median battery life score run as the representative performance score result for that test.

## Procyon Office Productivity Battery Life Benchmark testing

### Setting up the test

1. Boot the system.
2. Verify the following display and power settings:
  - a. Right-click the desktop, and select Display settings.
  - b. Next to Change brightness automatically when lighting changes, if available, uncheck the box.
  - c. Next to Change brightness based on content, if available, uncheck the box.
  - d. In the Scale drop-down menu, select 100%.
  - e. From the left-hand pane, select System.
  - f. Click Power & Battery.
  - g. For all power options listed under Screen and Sleep, select Never.
  - h. Set Power mode while unplugged to the desired setting (i.e.- Best power efficiency).

3. On systems with AMD processors, disable Vari-Bright. This will prevent the screen from dynamically changing the screen brightness based on content:
  - a. Launch AMD Software.
  - b. Click the Settings gear icon.
  - c. Select the Display tab, and disable Vari-Bright.
4. On systems with Intel processors, disable Intel DPST. This will prevent the screen from dynamically changing the screen brightness based on content:
  - a. Open the Intel Graphics Command Center. Press the keyboard Windows key, and type `Intel`, choose Intel Graphics Command Center.
  - b. Select System→Power.
  - c. In On Battery, set the Display Power Savings to Off.
5. To bring up a white screen, open a web browser, and, in the address bar, type `about:blank`.
6. Unplug the system.
7. Using a nit meter, adjust the screen brightness to as close to 250 nits as possible.
8. Plug in the system.
9. Download and install Procyon.
10. Open Procyon.
11. Click Battery Life Office Productivity Benchmark.
12. Click Register.
13. Enter the license key for the Office Productivity Battery Life Benchmark, and click Register.
14. Close Procyon.
15. Before running the benchmark, make sure to install a licensed version of Microsoft 365, open Word, Excel, PowerPoint, and Outlook applications, and disable tips when possible.

### Running the test

1. Boot the system.
2. Ensure the system is fully charged.
3. Launch Procyon.
4. Select the Procyon Battery Life option.
5. Under the Office Productivity tab, click Run.
6. When prompted, unplug the system.
7. When the benchmark completes, plug in the system and power up the system.
8. Record the results.
9. Repeat steps 2 through 8 two more times.
10. Report the median result.

### Microsoft Teams meeting testing

This test requires the following:

- Nine non-testing systems as permanent meeting attendees; one of these with a licensed account to host.
- Microsoft Teams
- PT Internal battery life logger

### Setting up the test

1. Boot the systems under test.
2. Verify the following display and power settings:
  - a. Right-click the desktop, and select Display settings.
  - b. Next to Change brightness automatically when lighting changes, if available, uncheck the box.
  - c. Next to Change brightness based on content, if available, uncheck the box.
  - d. In the Scale drop-down menu, select 100%.
  - e. From the left-hand pane, select System.
  - f. Click Power & Battery.
  - g. For all power options listed under Screen and Sleep, select Never.
  - h. Set Power mode while unplugged to the desired setting.

3. On systems with AMD processors, disable Vari-Bright. This will prevent the screen from dynamically changing the screen brightness based on content:
  - a. Launch AMD Software.
  - b. Click the Settings gear icon.
  - c. Select the Display tab, and disable Vari-Bright.
4. On systems with Intel processors, disable Intel DPST. This will prevent the screen from dynamically changing the screen brightness based on content:
  - a. Open the Intel Graphics Command Center. Press the keyboard Windows key, and type `Intel`, choose Intel Graphics Command Center.
  - b. Select System→Power.
  - c. In On Battery, set the Display Power Savings to Off.
5. To bring up a white screen, open a web browser, and, in the address bar, type `about:blank`.
6. Unplug the system.
7. Using a nit meter, adjust the screen brightness to as close to 250 nits as possible.
8. Plug in the system.
9. Open Settings, and click Bluetooth & Devices.
10. Click Cameras, and click the built-in connected camera.
11. Under Windows Studio Effects, turn on all settings.
12. Copy the battery life logger to each system under test.
13. As administrator, open PowerShell, and run `Set-ExecutionPolicy Unrestricted`
14. On one of the non-testing systems, launch Teams, and log into a licensed Microsoft account.
15. In the left-hand pane, click Calendar
16. Click Meet Now, then Start Meeting.
17. Ensure the camera is turned on, and click Join now.
18. In the top toolbar, click More, and Meeting Info.
19. Note the Meeting ID and Passcode.
20. On the remaining eight non-testing systems, launch Teams, and click Join a meeting.
21. Enter the Meeting ID and Passcode, and click Join meeting.
22. Ensure the camera is turned on, and click Join now.

### Running the test

1. Verify that the system's battery is fully charged.
2. Launch Teams, and click Join a meeting.
3. Enter the Meeting ID and Passcode, and click Join meeting.
4. Ensure the camera and audio are turned on, and click Join now.
5. In the top toolbar, click View.
6. Ensure Gallery View is selected, and set the Max Gallery Size to 9 people.
7. As administrator, open PowerShell, and navigate to the directory containing the battery life logger script.
8. To run the script, type `.\<battery_script_name>.ps1`, and press Enter.
9. When prompted, unplug the system, and switch back to the Teams meeting.
10. When the system has shut down, plug in the system, and restart it.
11. In Explorer, navigate to `C:\ProgramData\ptbat\`.
12. From `batresults_minutes.txt`, open the folder corresponding with the date and time of the test, and record the results.
13. Repeat steps 1 through 12 two more times.
14. Report the median result.

## Measuring system acoustics under load

### Measuring acoustics while running Cinebench 2024

These tests require the following items:

- Extech SDL600 Sound Level Meter/Datalogger with SD card
- Cinebench 2024

#### Setting up the test

1. Place the system under test in a sound-proofed professional sound booth.
2. Set the Extech SDL600 on a tripod so that it is 2 feet in front of, and 1 foot above the bottom of the system under test.
3. Download and install Cinebench 2024 from <https://www.maxon.net/en/downloads/cinebench-2024-downloads>.
4. Launch Cinebench 2024.
5. Select File→Advanced benchmark.
6. Select File→Preferences, and change the Custom Minimum Test Duration to 90 minutes, and click OK.
7. Exit Cinebench and shut down the system.

#### Running the test

1. Boot the system.
2. Launch Cinebench 2024.
3. In the Minimum Test Duration field, select Custom (90 minutes).
4. Start the Extech SDL600 Sound Level Meter/Datalogger.
5. Click the Cinebench 2024 CPU (Multi Core) Start button.
6. At the end of the 90-minute Cinebench 2024 run, stop the Extech SDL600, and record the average sound level (dB) while running Cinebench 2024, during the last 30 minutes of the test.
7. Shut down the system for 60 minutes, and let it return to room temperature.
8. Repeat steps 1 through 7 two more times.
9. Record the median result.

Read the report at <https://facts.pt/XLI8yja>



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