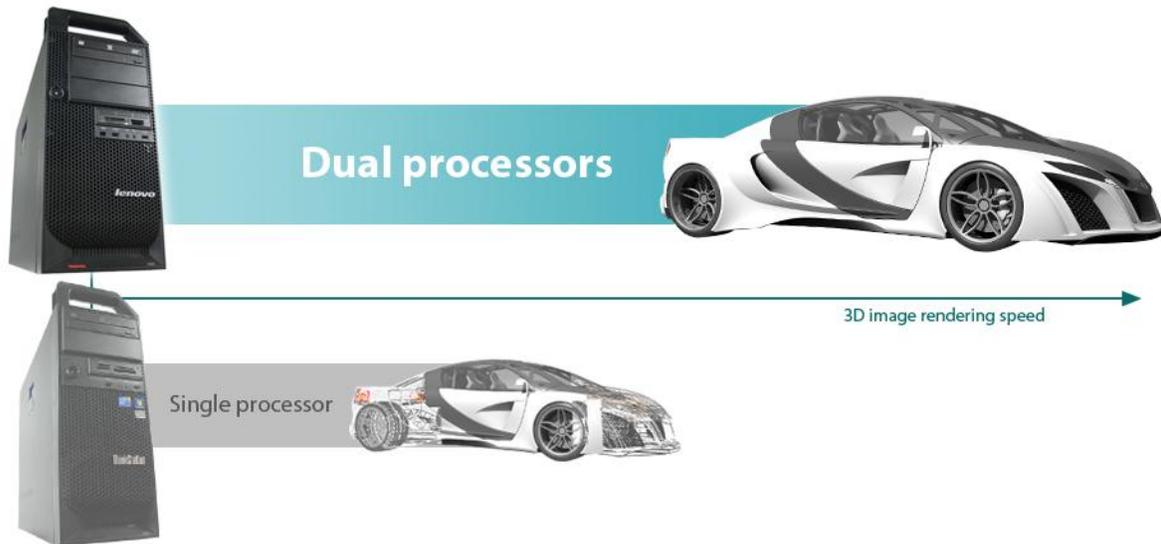


# Lenovo® ThinkStation® D20

Rendered up to twice as fast as a single-processor workstation



A high-performing workstation can boost productivity in the workplace. How do you decide which new system to purchase? While upgrading to a newer workstation with a single powerful processor will deliver performance benefits, investing in one with two processors will deliver even more. But just how much more productive would that dual-processor workstation let you be? And what return on your investment does the dual-processor workstation provide? To answer these questions, we tested the performance of two systems running CAD software CATIA V6. Because CATIA V6 is a powerful tool, and rendering images in CATIA can be very time-consuming, this activity puts a workstation's capability to the test.

We tested the Lenovo ThinkStation S20, powered by a single Intel® Xeon® processor X5677, and the Lenovo ThinkStation D20, powered by two of the same processors. While both workstations successfully handled the heavy workloads, the two-socket Lenovo ThinkStation D20 completed the 3D image rendering tasks in almost half the time it took the single-processor based workstation. In our tests, two processors delivered nearly twice the performance of one, which translates directly to productivity and an excellent return on your investment.

## DUAL PROCESSORS DRAMATICALLY REDUCE WAIT TIME

For those who handle heavy workloads on a daily basis, selecting the right workstation is vital. Older systems need so much time to complete the tasks that you can spend a good portion of your workday waiting instead of working. Upgrading to a new system with a single powerful processor, such as the Intel Xeon processor X5677, which adjusts performance according to application demand to maximize performance, can reduce your wait time and boost your productivity. For a larger investment, a new system with two of these processors can save you even more time.

We had our two test systems render five images that varied considerably in size and complexity. Figure 1 shows the amount of time each system needed to complete the task. While the amount of time ranged widely depending on the size and complexity of the image, the two-socket Lenovo ThinkStation D20 consistently rendered each image far more quickly than the one-socket Lenovo ThinkStation S20, showing that a dual-processor based system can nearly double the performance of a single-processor based system.

As Figure 2 shows, the time savings ranged from 37.5 percent to 48.5 percent.

Figure 1: The dual-processor Lenovo ThinkStation D20 was up to 48.5% faster at rendering images than a workstation with a single processor.

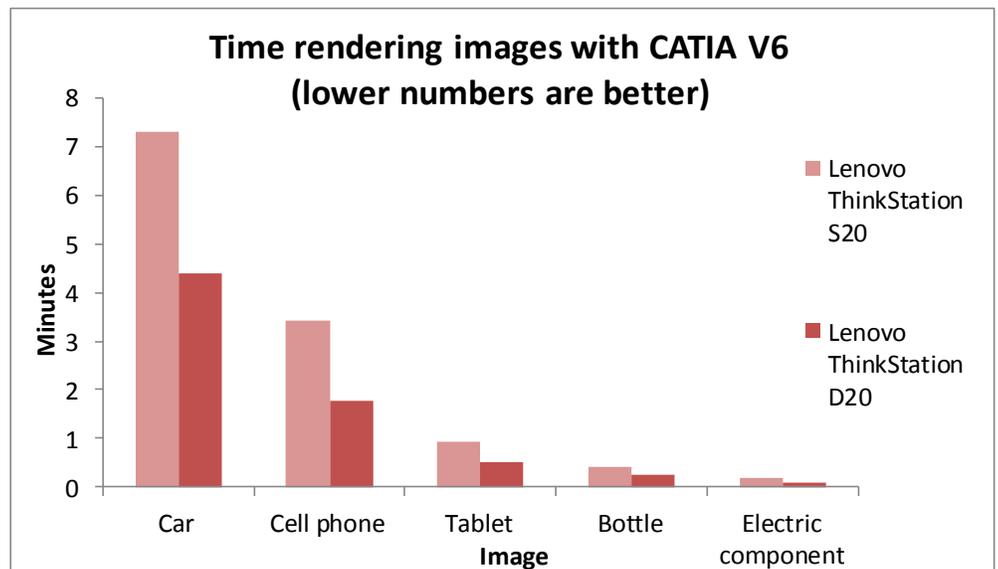


Image	Lenovo ThinkStation S20	Lenovo ThinkStation D20	Time saved with Lenovo ThinkStation D20 (minutes:seconds)	Time saved with Lenovo ThinkStation D20 (percentage)
Car	07:18	04:23	02:55	40.0%
Cell phone	03:26	01:46	01:40	48.5%
Tablet	00:56	00:30	00:26	46.4%
Bottle	00:24	00:15	00:09	37.5%
Electric component	00:10	00:06	00:04	40.0%
<b>Total</b>	<b>12:14</b>	<b>07:00</b>	<b>05:14</b>	<b>42.8%</b>

Figure 2: Median times, in minutes:seconds, it took the systems to render each image.

## INCREASED RETURN ON INVESTMENT

The savings that this dramatic increase in productivity can bring to your business are substantial, and more than make up for the higher price of a dual-processor system. When purchasing new workstations for your company, considering how increased performance translates into saving money is crucial. While a dual-processor workstation requires a larger initial investment, the greater productivity it makes possible can add up to a net savings for your company.

## HOW WE TESTED

As we mention above, we used five models of varying size and complexity to test rendering performance on both machines. To do so, we began by launching CATIA V6, importing the model to be rendered, and then allowing the machine to sit idle for 5 minutes. The images we used were courtesy of <http://www.grabcad.com>.

We then selected a scene from the CATIA scene library, staged the model, and adjusted rendering settings (we set the rendering settings to high quality, realistic lighting, and 300 PPI [pixels per inch]). We simultaneously started the stopwatch and started execution of the rendering. When the rendering was complete, we stopped the stopwatch and recorded the time. We then restarted the machine under test and performed the other runs. For detailed information on our testing process, see [Appendix B](#).

Figure 3 presents information on the images the systems rendered, from most to least complex. Across all images, the dual-processor Lenovo ThinkStation D20 rendered an average of 42.8 percent faster than the single-processor system.

Size and complexity of the images					
	Car	Cell phone	Tablet	Bottle	Electric component
Number of parts	336	117	7	1	6
Size (KB)	247,814	43,638	14,469	15,264	147

Figure 3: File size and number of parts for each image the workstations rendered.

Figure 4 shows the model CATIA V6 used to begin rendering the image of a bottle, and Figure 5 shows the fully rendered image of the bottle in front of a pre-selected background. Rendering blends aspects from the scene and the model to produce a photo-realistic image. For the final renderings of the other images we tested, see [Appendix C](#).

Figure 4: The model of a bottle used for rendering.



Figure 5: The complete rendered image of a bottle, in front of a pre-selected background.



## WHAT THIS MEANS FOR YOU

When you use taxing workloads such as image rendering, you need a powerful system that can execute your tasks quickly, minimizing the time you spend waiting. As our testing shows, choosing a workstation with two processors instead of one can increase your productivity dramatically.

Lenovo offers multiple options to meet your needs. The single-processor Lenovo ThinkStation S20 gives you the power to handle the tough workloads. The dual-processor Lenovo ThinkStation D20 provides even more power, letting you complete tasks up to 48.5 percent faster than with the single-processor system. Investing in a dual-processor based Lenovo ThinkStation D20 may cost more initially, but the time savings it brings to your employees can translate directly into long-term savings for your business.

## APPENDIX A – SYSTEM CONFIGURATION INFORMATION

Figure 6 provides detailed configuration information for the test systems.

System	Lenovo ThinkStation S20	Lenovo ThinkStation D20
<b>General</b>		
Number of processor packages	1	2
Number of cores per processor	4	4
Number of hardware threads per core	8	8
System dimensions (height x width x depth)	16.5" x 6.8" x 17.7"	16.9" x 8.2" x 22.5"
System weight	33.06 lbs.	55.11 lbs.
<b>CPU</b>		
Vendor	Intel	Intel
Name	Xeon X5677	Xeon X5677
Stepping	B0	B0
Socket type and number of pins	Socket 1366 LGA	Socket 1366 LGA
Core frequency (GHz)	3.46	3.46
L1 cache	32 KB + 32 KB (per core)	32 KB + 32 KB (per core)
L2 cache	1 MB (256 KB per core)	1 MB (256 KB per core)
L3 cache	12 MB	12 MB
<b>Platform</b>		
Vendor	Lenovo	Lenovo
Motherboard chipset	Intel X58	Intel 5520
BIOS name and version	Lenovo 60KT41AUS (01/04/2011)	Lenovo 61KT36AUS (03/24/2010)
<b>Memory module(s)</b>		
Total RAM in system (MB)	8,192	8,192
Vendor and model number	Hynix HMT125U7TFR8C-H9	Kingston KVR1333D3E9S/4G
Type	PC3-10600E	PC3-10600E
Speed (MHz)	1,063	1,333
Speed running in the system (MHz)	1,063	1,333
Timing/Latency (tCL-tRCD-tRP-tRASmin)	7-7-7-20	9-9-9-24
Size (MB)	2,048	4,096
Number of memory module(s)	4 x 2,048 MB	2 x 4,096 MB
Chip organization (single-sided/double-sided)	Double	Double
<b>Hard disk</b>		
Vendor and model number	Seagate ST3500418AS	Hitachi HPD725050GLA380
Number of disks in system	1	1
Size (GB)	500	500
Buffer size (MB)	16	16
RPM	7,200	7,200
Type	SATA 3.0 Gb/s	SATA 3.0 Gb/s
Controller	Intel 82801JR (ICH10R)	Intel 82801JR (ICH10R)
<b>Operating system</b>		
Name	Windows® 7 Professional	Windows 7 Professional
Build number	7601	7601

System	Lenovo ThinkStation S20	Lenovo ThinkStation D20
Service Pack	SP1	SP1
File system	NTFS	NTFS
Kernel	ACPI x64 – based PC	ACPI x64 – based PC
Language	English	English
Microsoft DirectX® version	DirectX 11	DirectX 11
<b>Graphics card</b>		
Vendor and model number	NVIDIA® Quadro® 4000	NVIDIA Quadro 4000
Type	Discrete	Discrete
Chipset	Quadro 4000	Quadro 4000
BIOS version	70.00.37.00.03	70.00.37.00.03
Dedicated video memory (MB)	2,048	2,048
Resolution	1,920 x 1,200	1,920 x 1,200
Driver	NVIDIA 8.17.12.6866 (05/19/2011)	NVIDIA 8.17.12.6866 (05/19/2011)
<b>Audio</b>		
Vendor and model number	SoundMAX Integrated Digital High Definition Audio	SoundMAX Integrated Digital High Definition Audio
Driver	Analog Devices 6.10.2.6635 (05/11/2010)	Analog Devices 6.10.2.6635 (05/11/2010)
<b>Network card</b>		
Vendor and model number	Broadcom® NetXtreme® 57xx Gigabit	Broadcom NetXtreme 57xx Gigabit
Driver	Broadcom 12.2.2.1 (08/06/2009)	Broadcom 12.2.2.1 (08/06/2009)
<b>Optical drive</b>		
Vendor and model number	Samsung TS-H653J	LiteOn GSA-H30N
Type	CD/DVD-RW	CD/DVD-RW
<b>USB ports</b>		
Number	8	8
Type	2.0	2.0
Other	eSATA	eSATA, 1394
<b>Monitor</b>		
LCD type	ThinkVision® L2440p	ThinkVision L2440p
Screen size (inches)	24	24
Refresh rate (Hz)	60	60

Figure 6: Configuration information for the two workstations we tested.

## APPENDIX B – DETAILED TEST METHODOLOGY

### Setting up the workstations and ENOVIA server

#### Installing Windows 7 Professional X64 SP1

1. Insert the Microsoft Windows 7 disk into the DVD drive, and reboot the system.
2. Boot from the DVD drive.
3. Enter your language preferences, and click Next.
4. Click Install.
5. Accept the license terms, and click Next.
6. Select Custom, and select the drive that will contain the OS.
7. Click Install, and the setup will begin.
8. Type `user` for the username, and provide a name for the computer, click Next.
9. Enter no password, and click Next.
10. Select Use recommended settings, and click Next.
11. Enter your time zone, and click Next.
12. Select the appropriate Network setting, and click Next.
13. Click Start→Control Panel→System and Security→Windows Firewall and turn off Windows Firewall.

#### Installing system updates in Windows 7

We used the Windows Update feature to install the following updates:

- Cumulative Security Update for ActiveX Killbits for Windows 7 (KB2508272)
- Cumulative Security Update for Internet Explorer 8 for Windows 7 (KB2559049)
- Definition Update for Windows Defender - KB915597 (Definition 1.113.1136.0)
- Definition Update for Windows Defender - KB915597 (Definition 1.113.1394.0)
- NVIDIA - Display, Other hardware - NVIDIA Quadro 4000
- Security Update for .NET Framework 3.5.1 on Windows 7 SP1 (KB2518869)
- Security Update for Internet Explorer 8 for Windows 7 (KB2544521)
- Security Update for Microsoft .NET Framework 3.5.1 on Windows 7 SP1 (KB2539635)
- Security Update for Microsoft .NET Framework 4 on Windows 7 (KB2478663)
- Security Update for Microsoft .NET Framework 4 on Windows 7 (KB2518870)
- Security Update for Microsoft .NET Framework 4 on Windows 7 (KB2539636)
- Security Update for Windows 7 (KB2425227)
- Security Update for Windows 7 (KB2476490)
- Security Update for Windows 7 (KB2479943)
- Security Update for Windows 7 (KB2491683)
- Security Update for Windows 7 (KB2503665)
- Security Update for Windows 7 (KB2506212)
- Security Update for Windows 7 (KB2507618)
- Security Update for Windows 7 (KB2509553)
- Security Update for Windows 7 (KB2510531)
- Security Update for Windows 7 (KB2511455)
- Security Update for Windows 7 (KB2532531)
- Security Update for Windows 7 (KB2536276)
- Security Update for Windows 7 (KB2544893)
- Security Update for Windows 7 (KB2555917)
- Security Update for Windows 7 (KB2556532)

- Security Update for Windows 7 (KB2560656)
- Security Update for Windows 7 (KB2563894)
- Security Update for Windows 7 (KB2567680)
- Security Update for Windows 7 (KB2570947)
- Update for Microsoft .NET Framework 4 on Windows 7 (KB2468871)
- Update for Microsoft .NET Framework 4 on Windows 7 (KB2533523)
- Update for Windows 7 (KB2484033)
- Update for Windows 7 (KB2488113)
- Update for Windows 7 (KB2492386)
- Update for Windows 7 (KB2505438)
- Update for Windows 7 (KB2506014)
- Update for Windows 7 (KB2506928)
- Update for Windows 7 (KB2511250)
- Update for Windows 7 (KB2515325)
- Update for Windows 7 (KB2522422)
- Update for Windows 7 (KB2529073)
- Update for Windows 7 (KB2533552)
- Update for Windows 7 (KB2541014)
- Update for Windows 7 (KB2545698)
- Update for Windows 7 (KB2547666)
- Update for Windows 7 (KB2552343)
- Update for Windows 7 (KB2563227)
- Update for Windows 7 (KB2570791)
- Update for Windows 7 (KB2616676)
- Update for Windows 7 (KB971033)
- Update for Windows 7 (KB982018)
- Update Rollup for ActiveX Killbits for Windows 7 (KB2562937)
- Windows Internet Explorer 9 for Windows 7
- Windows Malicious Software Removal Tool x64 - September 2011 (KB890830)

### **Installing V62012 ENOVIA DVD documentation**

1. Insert documentation media, and double-click Setup.exe.
2. Select the destination folder, and click Next.
3. On the Select Documentation screen, click Next.
4. Click Install to start copying the documentation files.
5. Click Close to exit setup.
6. To open the documentation, navigate to C:\Program Files\Dassault Systemes\B211doc\DShomepage\_English.

### **Installing the Dassault Systèmes License Server on all systems**

1. Log on as an administrator, and execute SetupDSLmsi.exe.
2. At the Welcome screen, click Next.
3. Select a destination, and click Next.
4. At the Select installation type screen, choose Install License Server and Administration Tool, select Install Server from scratch, and click Next.
5. Click OK on the warning prompt, click Next, and click Install.
6. Click Finish when the installation completes. The Administration Tool launches automatically.
7. Select Servers→New, enter the name of your server in the License Server name field, and click OK.

8. Under the Server Definitions tab, right-click the server name, and select Connect.
9. Double-click the computer name, and select Apply and OK to validate the default licensing port.
10. Select the computer name, and click the Enroll Licenses icon.
11. Select all the licenses you wish to enroll, and click Open.
12. Click Start→Control Panel→Appearance and Personalization→Show hidden files and folders; under Advance settings select Show hidden files, folders, and drives; and click OK.
13. Create the directory C:\ProgramData\DassaultSystems\Licenses.
14. Go to the directory, create a file named DSLicSrv, and save it as a text document.
15. Edit the file to declare the license servers to which the client can connect. The syntax of the declaration is servername:portnumber (For example: enoviaserver:4085).

## Installing PML Express

### Installing and configuring SQL Server 2008 R2 on ENOVIA server

1. Insert the DVD into the DVD drive.
2. Click Run SETUP.EXE on the AutoPlay menu.
3. If the application prompts you to install the .NET Framework, click OK.
4. Select the Accept radio button, and click Install.
5. When the installation finishes, click Exit.
6. Click Installation.
7. Click New SQL Server stand-alone installation.
8. On the Setup support rules screen, click OK.
9. Specify the Enterprise Evaluation free edition, and click Next.
10. Click the checkbox to accept the license terms, and click Next.
11. Click Install to install the setup support files.
12. On the Feature Selection screen, select Database Engine Services, Full-Text Search, Client Tools Connectivity, Client Tools Backward Compatibility, Management Tools–Basic, and Management Tools–Complete. Click Next.
13. On the Instance configuration screen, leave the default selection of default instance, and click Next.
14. On the Disk space requirements screen, click Next.
15. On the Server configuration screen, choose NT AUTHORITY\SYSTEM for SQL Server Agent, and choose NT AUTHORITY\SYSTEM for SQL Server Database Engine. Click Next.
16. On the Database Engine Configuration screen, select Mixed Mode.
17. Enter a password for the system administrator account.
18. Click Add Current user.
19. Click Next.
20. On the Error and usage-reporting screen, click Next.
21. On the Installation rules screen, click Next.
22. On the Ready to Install screen, click Next.
23. Upon Completion, close all windows and restart the server.

### Installing and configuring ENOVIA PML Express Server on ENOVIA server

1. Insert the installation media, and double-click Setup.exe.
2. At the Destination Location screen, accept the default location, and click Next.
3. Click Select all to install all available products, and click Next.
4. At the Server Data directory, accept the default location, and click Next.
5. At the Server Database selection, choose SQL Server, and click Next.
6. Enter SQL Server connection parameters, select the checkbox to create a new database, and click Next.
7. Enter a new password for the PLM Administrator (PMLADM), and click Next.

8. Click Install.
9. After the installation is complete, click Close, and enter the following path into your Web browser:  
<http://localhost:8070/enovia/emxLogin.jsp>
10. Type PLMADM as the username, enter the password you previously selected, and click Login.
11. Click Tools→Configure my ENOVIA.
12. Click Search at the bottom of the screen.
13. Click PLMADM, and assign and select all available licenses.
14. Under ProgramManagement and ProgramResource, check Creator, Project Administrator and Project Leader.
15. Click Update.
16. Close all windows.

### Installing Java on the workstations

1. Go to <http://www.java.com/en> and download Java.
2. Double-click the executable.
3. At the Welcome screen, click Install.
4. At the Complete screen, click Close.

### Installing CATIA PLM Express V6R2012 on the workstations

1. Insert the installation media, and double-click Setup.exe.
2. At the Welcome screen, click Next.
3. Accept the destination folder's default location, and click Next.
4. Click Yes to confirm creation of the directory.
5. On the Environment Directory screen, click Next.
6. Click Yes to confirm creation of the directory.
7. Select Complete as the type of setup, and click Next.
8. Check to install the DS MJPEG codec package, and click Next.
9. Check Set up communication ports, and accept the defaults. Click Next.
10. Click Browse, set the Java Home Path, and click Next.
11. At the Startup icon creation screen, accept defaults, and click Next.
12. Review the installation settings, and click Install.
13. Click Yes to install the Microsoft Windows Media Video 9 VCM CODEC.
14. Click Yes on the License Agreement screen.
15. Click OK on installation destination, and click OK again to confirm installation.
16. Click Finish and launch CATIA V62012.
17. On the Discovery screen, click the Add Connection icon.
18. Provide a connection alias, select ENOVIA V6 as the connection type, and click Next.
19. Select http as the protocol, and complete the fields as follows:  
    Hostname: enovia  
    Port: 8070  
    Root URI: enovia
20. Click Finish, and click OK.
21. Enter the username (PLMADM) and password, and click OK.
22. For Security Context, select VPLMAdmin.Company Name.Deafault.
23. Click Done.

## APPENDIX C – RENDERED IMAGES

Figures 7 through 11 show the images the workstations rendered for our productivity testing.



Figure 7: The finished image of the car<sup>1</sup> that the workstations rendered.

---

<sup>1</sup> The rendering of the car courtesy of Stelu Harsan, <http://grabcad.com/stelu.harsan>.



Figure 8: The finished image of the cell phone that the workstations rendered.



Figure 9: The finished image of the tablet that the workstations rendered.



Figure 10: The finished image of the bottle that the workstations rendered.

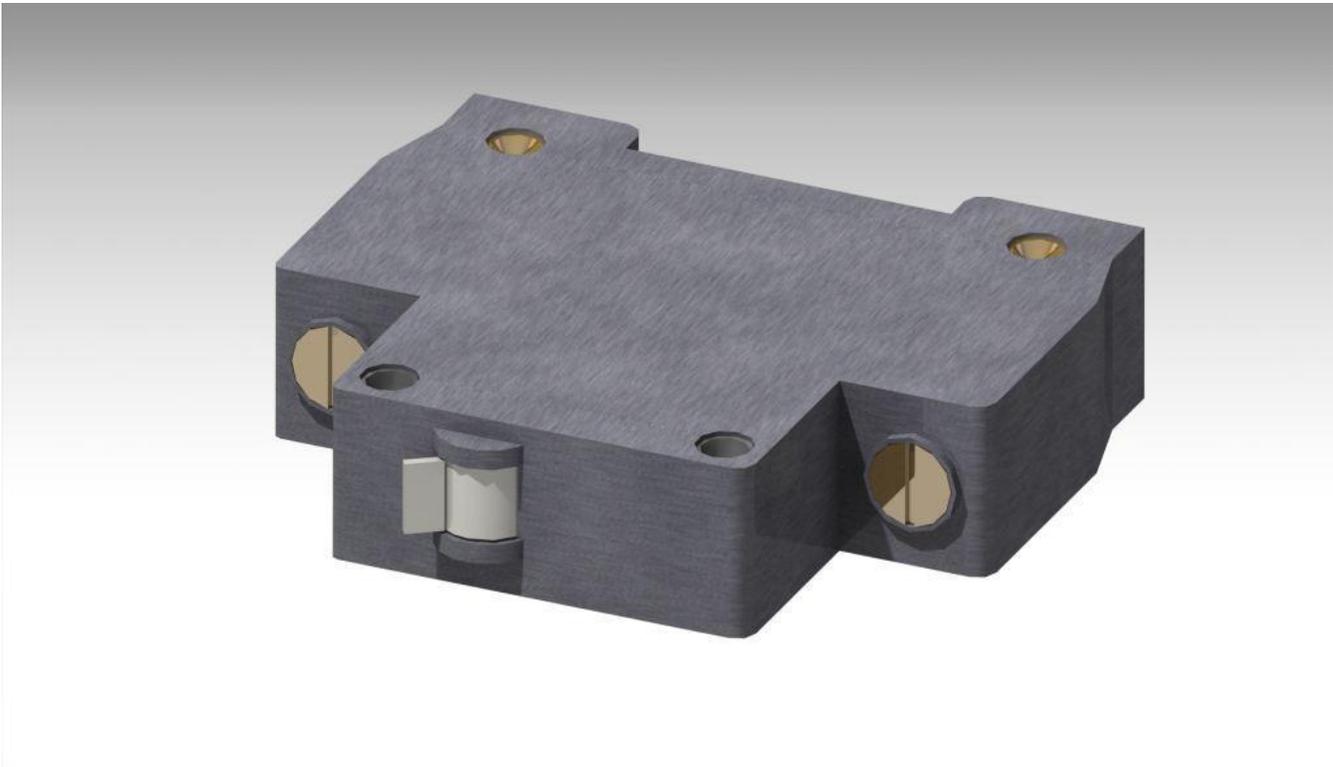


Figure 11: The finished image of the electric component that the workstations rendered.

## ABOUT PRINCIPLED TECHNOLOGIES



Principled Technologies, Inc.  
1007 Slater Road, Suite 300  
Durham, NC, 27703  
[www.principledtechnologies.com](http://www.principledtechnologies.com)

We provide industry-leading technology assessment and fact-based marketing services. We bring to every assignment extensive experience with and expertise in all aspects of technology testing and analysis, from researching new technologies, to developing new methodologies, to testing with existing and new tools.

When the assessment is complete, we know how to present the results to a broad range of target audiences. We provide our clients with the materials they need, from market-focused data to use in their own collateral to custom sales aids, such as test reports, performance assessments, and white papers. Every document reflects the results of our trusted independent analysis.

We provide customized services that focus on our clients' individual requirements. Whether the technology involves hardware, software, Web sites, or services, we offer the experience, expertise, and tools to help our clients assess how it will fare against its competition, its performance, its market readiness, and its quality and reliability.

Our founders, Mark L. Van Name and Bill Catchings, have worked together in technology assessment for over 20 years. As journalists, they published over a thousand articles on a wide array of technology subjects. They created and led the Ziff-Davis Benchmark Operation, which developed such industry-standard benchmarks as Ziff Davis Media's Winstone and WebBench. They founded and led eTesting Labs, and after the acquisition of that company by Lionbridge Technologies were the head and CTO of VeriTest.

---

Principled Technologies is a registered trademark of Principled Technologies, Inc.  
All other product names are the trademarks of their respective owners.

---

**Disclaimer of Warranties; Limitation of Liability:**

PRINCIPLED TECHNOLOGIES, INC. HAS MADE REASONABLE EFFORTS TO ENSURE THE ACCURACY AND VALIDITY OF ITS TESTING, HOWEVER, PRINCIPLED TECHNOLOGIES, INC. SPECIFICALLY DISCLAIMS ANY WARRANTY, EXPRESSED OR IMPLIED, RELATING TO THE TEST RESULTS AND ANALYSIS, THEIR ACCURACY, COMPLETENESS OR QUALITY, INCLUDING ANY IMPLIED WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE. ALL PERSONS OR ENTITIES RELYING ON THE RESULTS OF ANY TESTING DO SO AT THEIR OWN RISK, AND AGREE THAT PRINCIPLED TECHNOLOGIES, INC., ITS EMPLOYEES AND ITS SUBCONTRACTORS SHALL HAVE NO LIABILITY WHATSOEVER FROM ANY CLAIM OF LOSS OR DAMAGE ON ACCOUNT OF ANY ALLEGED ERROR OR DEFECT IN ANY TESTING PROCEDURE OR RESULT.

IN NO EVENT SHALL PRINCIPLED TECHNOLOGIES, INC. BE LIABLE FOR INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH ITS TESTING, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL PRINCIPLED TECHNOLOGIES, INC.'S LIABILITY, INCLUDING FOR DIRECT DAMAGES, EXCEED THE AMOUNTS PAID IN CONNECTION WITH PRINCIPLED TECHNOLOGIES, INC.'S TESTING. CUSTOMER'S SOLE AND EXCLUSIVE REMEDIES ARE AS SET FORTH HEREIN.

---