

SUCCESS STORY | TOYOTA MOTOR CORPORATION

# ACCELERATING THE DESIGN AND DEVELOPMENT PROCESS

Toyota's ZEV B&D Lab Leads the Way in Workstyle Reform



Image courtesy of Toyota Motor Corporation



# NVIDIA Virtual GPU Technology Enables Advanced Workstyle Reform

## Introduction

Toyota Motor Corporation, founded in 1937, is one of the world’s leading automakers, boasting the largest number of vehicles sold in 2020. To prepare for the future, this traditional Japanese company reformed their workstyle using Microsoft Office applications in 2016. The next step for them was to modernize their workstyle for CAD-driven design and development work. To do so, Toyota’s DX Promotion Division led a full-scale introduction of NVIDIA virtual GPU technology, creating a CAD virtual desktop infrastructure (VDI) environment. This project was led by the Zero Emission Vehicle (ZEV) B&D Lab at the Toyota ZEV Factory. Now they’ve fully implemented CAD VDI, making it possible for many CAD engineers to use it in various locations.

To encourage the workstyle reform through a digital transformation, Toyota needed to convert design work using high-end CAD to VDI, but there was a performance problem related to using high-end CAD with ordinary VDI. To address this, they began to explore the feasibility of CAD VDI and focused on NVIDIA virtual GPU (vGPU) technology, including NVIDIA® RTX™ Virtual Workstation (vWS) software paired with NVIDIA data center GPUs. The initial implementation of the CAD VDI environment using the NVIDIA vGPU solution began in 2018. Based on repeated feedback from users and improvements to system operations, the full-scale implementation of CAD VDI moved forward in February of 2020. At present, more than 50 percent of CAD users are now using NVIDIA RTX Virtual Workstations, and engineers involved in design work can work from anywhere without being restricted by location, greatly improving work efficiency, accelerating the design and development process, and leading to improvements in work-life balance.

## CUSTOMER PROFILE

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	<b>Organization:</b> Toyota Motor Corporation	<b>Industry:</b> Automobile Manufacturing and Sales	<b>Location:</b> 1 Toyota-Cho, Toyota City, Aichi Prefecture 471-8571, Japan	<b>Size:</b> 74,132/359,542 (consolidated) (as of March 31, 2020)	<b>Website:</b> <a href="https://global.toyota/en/">https://global.toyota/en/</a>
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Pictured above (L-R): Masanobu Takahisa, Koichi Ikawa, and Tomohiro Inagaki

## Identifying Remote Work Bottlenecks

Toyota expanded their remote work system to include approximately 13,000 employees in 2016. However, the adoption of this new workstyle varied by department. The DX Promotion Division played a central role in the introduction of CAD VDI. Masanobu Takahisa, project general manager of the DX Promotion Division, which promotes digital transformation, recounts the situation at that time, “Since 3D CAD is used in the Design and Development Department, use of the physical workstation installed at a desk was essential. There were also issues of performance when working remotely, and this was a bottleneck in the spread of remote work.”

## Streamlining Remote Workstyle Reform

Toyota began to consider the feasibility of using NVIDIA RTX vWS for CAD VDI. Koichi Ikawa, assistant manager of the DX Promotion Division, explained the process, “We had been discussing workstyle reform with NVIDIA for a long time. At the time, we thought it would be difficult to implement CAD VDI due to the cost. However, when NVIDIA and VMware introduced us to a technology that could virtualize GPUs, we thought we might be able to surmount this problem, and we sped up our efforts towards making this happen.”

From the early stages of their investigation into this issue, Toyota worked together with users to test and tune the image quality, response, and network environment. This resulted in making primary use possible. “The NVIDIA vGPU solution solved the challenges we faced and allowed us to implement the system,” says Tsuyoshi Oishi, DX Promotion Division.

### SOFTWARE

- > **Hypervisor:** VMware Horizon and vSphere
- > **Graphics Acceleration:** NVIDIA RTX Virtual Workstation
- > **Key Applications:** Dassault Systèmes CATIA DELMIA

### HARDWARE

- > **Server:** Dell Technologies and Lenovo
- > **GPU:** NVIDIA RTX 8000, T4, P40



Pictured above (L-R): Tsuyoshi Oishi, Momoko Nonoyama, Kazutaka Shimizu, and Yumiko Aoyama

Now, Toyota uses NVIDIA RTX vWS for a variety of tasks, such as management, design, modeling, experiments/analysis, and production preparation. “If we look at the introduction of CAD VDI alone, we have now achieved about 50 percent of our goal. However, there are some tasks that require conventional physical workstations to meet the performance requirements, so we are not able to expand the use of CAD VDI all at once,” says Momoko Nonoyama, DX Promotion Division.

### **Enabling Employees to Choose When, Where, and How They Work**

The department that has been particularly active in the implementation of CAD VDI, a company-wide project, and has served as a model case within the company, is the ZEV B&D Lab, a new department in the Toyota ZEV Factory. ZEV refers to environmentally-friendly vehicles, such as electric vehicles and fuel cell vehicles. The ZEV B&D Lab is a relatively new department within Toyota Motor Corporation, and is taking the lead in reforming the way people work. In the past, physical workstations were placed on desks, but this cramped the workspace, and the heat generated by the terminals increased the temperature of the entire office, making the work environment worse in many ways. Moreover, when terminals needed to be relocated due to floor renovations or location changes, a lot of time and money was required to design where they would be installed, prepare and carry out their relocation, and set them up. Additionally, there was a risk of damage or loss of the equipment that necessitated individualized care.

“The CAD VDI project is an initiative to replace the standard CAD physical workstations in the company with virtualized CAD VDI, which can be used with laptops from the office, allowing designers to work anywhere. This is meant for all departments that use CAD, including the Design Department, the Engineering Department, as well as factories.”

— Tomohiro Inagaki, Group Manager, DX Promotion Division

The current office of ZEV B&D Lab was completed in January 2021, and was initially designed for the use of RTX vWS-powered CAD VDI, with free seating, to take advantage of the mobility of CAD VDI.

Akira Yamada, project manager of ZEV B&D Lab, responsible for CAD management, explains the distinctive features of ZEV B&D Lab, “This department is characterized by the fact that the entire process from business and vehicle planning to design and production is contained within a single department, and this allows for a variety of different workstyles.”

The ZEV B&D Lab created this office to be a place where people can freely choose when, where, and how they wish to work. Akira Yamada explains, “NVIDIA RTX vWS was introduced to us by the DX Promotion Division and we have progressed with its use. Since it allows us to achieve this ‘Anytime, Anywhere’ concept, RTX vWS has played an important role and has been adopted as an indispensable component in the ZEV B&D Lab.”

Kazutaka Shimizu, assistant manager of ZEV B&D Lab, as well as an actual user, states that the performance of CAD VDI using NVIDIA RTX Virtual Workstations is quite satisfactory, “I can work without stress, and the best part is that I can carry CAD with me. When we work with other departments, we used to have to set up a meeting and prepare briefing materials, but with RTX vWS, we can visit our colleagues and engage in a conversation while showing them the CAD. Communication has become easier and more frequent, which has increased net design time and reduced lead time.”

In addition, RTX vWS has enabled telecommuting, which has been beneficial in terms of both work-life balance and motivation. Shimizu continues, “We had a telecommuting system in place, but CAD work could not be done without coming into the office, so designers were unable to use it. With the introduction of RTX vWS, we are no longer restricted to coming into work, and are able to schedule our day more freely. For example, I finish my CAD work early in the morning when it is quiet and I can concentrate, then I can



Akira Yamada, Project Manager, ZEV B&D Lab, Toyota ZEV Factory

“To establish awareness of the use of CAD VDI, we repeatedly explained in the ZEV B&D Lab that, in the future, physical workstations will be replaced by CAD VDI powered by NVIDIA RTX vWS, so let’s move to using CAD VDI. The awareness of our staff has changed towards the use of VDI being standard for CAD, and its use is now firmly established. The functions and use of CAD VDI will become easier through the efforts at improvement by the staff involved, and this will accelerate our digital transformation. I am looking forward to promoting this system throughout the company.”

— Akira Yamada, Project Manager, ZEV B&D Lab, Toyota ZEV Factory

have a leisurely breakfast with my family, and later on I can go into work as required. Also, I have the flexibility to change my work location for other reasons, such as taking graduate school lectures on weekday evenings or to adjust to how my family is feeling. I can choose where to work while I am at the office, which allows me to have a change of pace, and I feel that RTX vWS has enhanced my personal and professional life.”



**Rear row, from left to right:**

Tomohiro Inagaki, Group Manager, DX Promotion Div.  
Tsuyoshi Oishi, DX Promotion Div.  
Koichi Ikawa, Assistant Manager, DX Promotion Div.  
Momoko Nonoyama, DX Promotion Div.  
Masanobu Takahisa, Project General Manager, DX Promotion Div.

**Front row, from left to right:**

Yumiko Aoyama, DX Promotion Div.  
Akira Yamada, Project Manager, ZEV B&D Lab  
Kazutaka Shimizu, Assistant Manager, ZEV B&D Lab

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For more information on NVIDIA RTX Virtual Workstations, visit [www.nvidia.com/virtual-workstation](http://www.nvidia.com/virtual-workstation)

