

Desktop OpEx Savings:

The Key to Cost-Justifying VDI

An in-depth analysis of the operational costs of image management, application delivery, and desktop support in physical PC and VDI environments shows how the OpEx savings offered by new desktop layering technology makes implementing virtual desktops the easy choice over buying more PCs.



Executive Summary

Server virtualization has been wildly successful because of the clear CapEx savings: fewer servers, improved utilization, less rack space, reduced power and cooling. Desktop virtualization, however, has been harder to cost-justify. While the security, compliance, mobility, and business agility advantages over PCs are inarguable, the higher costs of Virtual Desktop Infrastructure (VDI) and the increased implementation and management complexity have made it difficult for IT organizations to show compelling ROI.

This white paper takes an in-depth look at the costs of image management, application delivery, and desktop support in physical PC environments, traditional VDI environments, and VDI environments managed by new desktop layering technology from Unidesk. The findings show that physical PCs are very expensive to manage. Traditional VDI reduces operational costs, but not enough to offset the higher capital costs. Unidesk, however, gives VDI the clear advantage, with OpEx savings that makes it easy to justify Citrix® XenDesktop® and VMware Horizon View™ projects. The remainder of this white paper explains how the figures in the following table were calculated (your results will vary), and concludes with customer case studies on *State of Ohio Dept. of Developmental Disabilities*, *Kawasaki Motors Manufacturing USA*, and *Tennessee Tech University* that substantiate the findings.

	Physical PCs	Traditional VDI †	Unidesk-Managed VDI*†
100 desktops	\$42,388	\$38,080	\$13,120
500 desktops	\$187,940	\$118,400	\$22,880
2,000 desktops	\$535,760	\$363,200	\$56,480

* Unidesk offers the persistence required to support more desktop use cases than traditional VDI, which enables VDI infrastructure costs to be amortized across more users. The lower marginal infrastructure cost/user offered by Unidesk-managed VDI is not included in this model.

† Thin and zero clients consume significantly less energy than traditional PCs and laptops. The energy savings offered by traditional VDI and Unidesk-managed VDI are not included in this model.

Table 1: Annual Operational Costs of Desktop Management and Support

Introduction

In theory, Virtual Desktop Infrastructure (VDI) – also called Hosted Virtual Desktops (HVD) by Gartner and Centralized Virtual Desktops (CVD) by IDC – should be easier to manage than physical PCs. Instead of desktops scattered on the edge, VDI centralizes desktops on data center servers, where they are provisioned as virtual machines and accessed by thin/zero clients, PCs, tablets, and other endpoint devices using a remote desktop protocol. IT administrators should have a much easier time managing these centralized pools of virtual desktops, rather than having to physically visit individual PCs, or rely on agent-based PC configuration tools that notoriously don't work well.

In practice, however, VDI has not been much easier to manage than physical PCs. VDI's inability to show clear operational cost savings has been one of the biggest obstacles to its broad-scale success. This white paper explains how new desktop management software using layering technology designed specifically for VDI enables IT organizations to streamline desktop operations in three areas:

1. Operating system image management
2. Application delivery
3. Desktop support

The paper contrasts how these operations are carried out in the physical PC world, traditional VDI environments, and VDI environments that are managed by Unidesk virtual desktop management software. The tangible OpEx savings provided by Unidesk-managed VDI makes it easy for IT organizations to justify replacing more PCs with virtual desktops, and expand implementations of Citrix[®] XenDesktop[®], VMware Horizon View[™], and other VDI brokering platforms.

1. Operating System Image Management

Updating desktops with the latest Microsoft Windows service packs and hot fixes is one of the biggest time sinks in desktop management. There's even a name for it – Patch Tuesday. *“In order to reduce the costs related to the deployment of patches, Microsoft introduced "Patch Tuesday" in October 2003. In this system, security patches are accumulated over a period of one month and then dispatched all at once on the second Tuesday of the month, an event for which system administrators may prepare. Some speculate that Tuesday was selected so that post-patch problems could be discovered and resolved before the weekend, but, certainly, not every patch-induced problem may be cured in that time.”* (source: Wikipedia http://en.wikipedia.org/wiki/Patch_Tuesday).

Let's look at how the costs of image management compare between physical PCs, traditional VDI, and Unidesk-managed VDI.

1.1. Physical PCs

The term “gold image” refers to the master copy of Windows upon which all desktops are to be based. In reality, however, most organizations have tens or even hundreds of desktop gold images. The reasons for this image sprawl vary. Often it is due to differences in PC hardware configurations. Another reason is lack of a standardized image engineering methodology. Then there's internal politics – competing IT departments demand control over what gets deployed on their desktops. Whatever the cause, maintaining a massive library of desktop images is difficult, time-consuming and expensive.

Another reality of PC image management is that patches applied by agent-based PC configuration tools don't always work. Even when the patches do work, some percentage of the patched PCs will have problems. Why? Because almost all PCs are a little different. The customizations that IT administrators and end users make over time get stored in the same C: drive and Registry. When the latest Windows patches and hot fixes are applied on top of user configurations, DLL and Registry key conflicts are inevitable. This is why, after every Patch Tuesday, Level 2 and 3 administrators must spend time figuring out why some patches failed to “take,” and how to fix the desktops that “broke.”

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Calculating how much PC image management costs, then, is straightforward. Start with how long it takes to apply, configure, and test patches on one gold image. Multiply that by the number of gold images in your organization. Add the escalation costs required to diagnose the cause of patch failures and fix the desktop problems caused by patches. Then multiply that result by how many times you apply patches each year (if you subscribe to one Patch Tuesday a month, use 12). In **“How to Reduce the Cost of PC Support” (ID Number G00211079, Date 9 March 2011)**, Gartner estimates that the cost per support transaction for a Level 2 Technical Staff Resource ranges from \$35 to \$250. Using the median cost per transaction of \$142, the following formula can be used to calculate your yearly image management costs:

of Patch Tuesdays per Year X ((Time to Patch 1 Gold Image X # Gold Images X IT Level 2 Hourly Rate) + (# of Desktops X Patch Failure Rate % X \$142) + (# of Desktops X Desktop Break Rate % X \$142))

The following table applies this formula, based on industry averages (your numbers will vary).

Patch Tuesdays per Year: 12		
Fully Burdened Level 2 Desktop Administrator: \$80/hour		
Time to Install, Test, Package, and Distribute 1 Gold Image: 8 hours		
PC Patch Failure Rate: 4%		
Patch-Induced Desktop Break Rate: 2%		
100 Users 2 Gold Images	500 Users 10 Gold Images	2,000 Users 15 Gold Images
\$25,584 per year	\$127,920 per year	\$319,680 per year

Table 2: Annual OpEx of managing gold images in physical PCs

1.2. Traditional VDI

Ideally, VDI should eliminate the gold image proliferation, patch failures, and patch-induced desktop problems that plague physical PCs. Organizations trying to rid themselves of these unwanted costs often start implementing VDI using the mix of built-in tools that come with their brokers. In this traditional model, administrators create pools of identical desktops that are doled out to users as needed, then reverted back to a clean, pristine state after each use. Application virtualization technology may be used to deliver the different applications needed by each user. Profile management technology may be used to reapply user settings to maintain a custom user experience. Block-based image sharing technology may be used to reduce the storage footprint and provision all desktops from the same gold image. While this is generally successful at eliminating patch failures (all desktops are re-composed from the same blocks) and patch-induced PC problems (desktops are reverted back to their pristine state after every use), gold image proliferation is still the reality in VDI deployments lacking a holistic management approach.

The main reason for multiple gold images in this traditional model is that first-generation application virtualization technology cannot package many types of applications, such as those with a system service, kernel mode driver, or complicated installation procedure. Healthcare organizations, for example, often have scanners, imaging systems, and printers attached to many of their endpoints. Since the drivers needed by these devices cannot be virtualized, they must be embedded in the gold image. But every time the device driver changes, or a new device is installed, the entire gold image must be rebuilt, which affects every desktop. The same challenges occur with Electronic Health Record systems, many complicated applications found in university labs, antivirus software, and more. IT ends up creating multiple gold images to deal with these combinations of hard-to-virtualize apps.

Even when applications can be virtualized, IT staffs often default to installing them into the gold image because it's simpler. A prime example of how this creates more gold image sprawl in traditional VDI is departmental applications

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used by small numbers of users. IT doesn't have the resources to virtualize every departmental app. However, building them into one gold image creates licensing issues, since now every user will have access to them. Plus, every time a departmental app is updated, the gold image must be updated, too, which affects every desktop. So IT again reverts back to creating multiple gold images for the different combinations of departmental apps needed by different desktops.

The annual cost of gold image management in traditional VDI, then, can be calculated using this formula.

of Patch Tuesdays per Year X Time to Patch 1 Gold Image X # Gold Images X IT Level 2 Hourly Rate

The following table applies this formula:

Patch Tuesdays per Year: 12 Fully Burdened Level 2 Desktop Administrator: \$80/hour Time to Install, Test, Package, and Distribute 1 Gold Image: 8 hours		
100 Users 1 Gold Images	500 Users 5 Gold Images	2,000 Users 15 Gold Images
\$7,680 per year	\$38,400 per year	\$115,200 per year

Table 3: Annual OpEx of managing gold images in traditional VDI

1.3. Unidesk-Managed VDI

Like traditional VDI, patch failures don't occur with Unidesk-managed VDI because patches are applied once to a shared OS image (or, in Unidesk's term, layer). All desktops are then re-composed from that same common "slice" of storage.

Patch-induced desktop problems don't occur with Unidesk non-persistent desktops, either. Even with Unidesk persistent desktops, all customizations are maintained in separate Personalization layers that can be rolled back to an earlier version to instantly fix any problem, without any escalation to Level 2 or 3 administrators.

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Unlike traditional VDI, however, Unidesk-managed VDI also eliminates gold image proliferation. Unidesk can deliver all applications as independent layers, including applications that IT doesn't have the resources to virtualize with complex application virtualization technology. As a result, Unidesk customers are provisioning all desktops using a single thin, pristine layer of Windows, and radically reducing the cost of image management.

The annual cost of gold image management with Unidesk-managed VDI can be calculated using this simple formula.

*# of Patch Tuesdays per Year X Time to Patch 1 Gold Image X
IT Level 2 Hourly Rate*

The following table applies this formula:

Patch Tuesdays per Year: 12 Fully Burdened Level 2 Desktop Administrator: \$80/hour Time to Install, Test, Package, and Distribute 1 Gold Image: 8 hours		
100 Users 1 Gold Image	500 Users 1 Gold Image	2,000 Users 1 Gold Image
\$7,680 per year	\$7,680 per year	\$7,680 per year

Table 4: Annual OpEx of managing gold images in Unidesk-managed VDI

2. Application Delivery

Deploying new applications and application patches is another major cost component of desktop management. True, there will be a standard set of applications that everyone uses, and it may be acceptable to build some of these into the gold image (see previous section). However, most applications are job-specific, and are needed by only a handful of desktops. Let's look at how the costs of application delivery compare across physical PCs, traditional VDI, and VDI managed by Unidesk.

2.1. Physical PCs

The most common way to distribute software on physical PCs is through PC configuration management software, also called electronic software distribution. Anyone who has used Microsoft System Center Configuration Manager, Symantec Altiris, LANDesk, or another agent-based software distribution tool knows the drill:

- Install the application first on a test machine.
- Identify prerequisite updates for deployment.
- Create a software distribution package identifying source files, paths, icons, and distribution settings.
- Create a program to include in the package that will define the command line parameters to use when running Setup on each target desktop.
- Distribute the package to the desktops and schedule when it will run.
- Check the logs to determine how many installations completed.
- Diagnose and repair the desktops where installations failed (the median cost per Level 2 support transaction of \$142 derived from Gartner research again comes into play).

The following formula can be used to calculate how much this costs an IT organization annually, assuming each application is updated once a year.

(# of Apps X (Average Installation Time + Average Packaging Overhead) X IT Level 2 Hourly Rate) + (# of Desktops X Application Install Failure Rate X \$142)

The following table applies this formula.

Fully Burdened Level 2 Desktop Administrator: \$80/hour		
Average Installation Time for 1 Application: 1 hour		
Average Application Packaging Overhead: 1 hour		
Failure Rate for Automated Application Installs: 2%		
100 Users 50 Applications	500 Users 100 Applications	2,000 Users 250 Applications
\$8,284 per year	\$17,420 per year	\$45,680 per year

Table 5: Annual OpEx of application delivery in physical PCs

2.2. Traditional VDI

The default way to distribute software in traditional VDI environments is through application virtualization software. Anyone who has used VMware ThinApp, Microsoft App-V, and other such tools knows they are excellent technologies for isolating applications and minimizing conflicts. Unlike electronic software distribution, which re-runs the setup process over and over again on each target machine, virtualized applications are contained in their own “bubbles,” and only need to be installed and packaged once.

However, this central packaging process is very time-consuming if all you want to do is deliver an application. Virtualization typically requires the following steps:

- Consult business unit representatives to determine if the application needs to share information with other applications.
- Conduct pre-setup scan.
- Run application installation procedure.
- Run application setup procedures for all other applications that need to be included in the same virtualized package (bubble) so the applications can cross-communicate.
- Run post-setup scan.

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- Make package modifications as needed for application isolation.
- Make additional modifications as needed to ignore certain file locations or registry entries.
- Distribute the application (copy to a network file share for ThinApp, define policies in Microsoft App-V).

The following formula can be used to calculate how much this costs an IT organization annually, assuming each application is updated once a year.

$$\# \text{ of Apps} \times (\text{Average Installation Time} + \text{Average Virtualization Overhead}) \times \text{IT Level 2 Hourly Rate}$$

The following table applies this formula.

Fully Burdened Level 2 Desktop Administrator: \$80/hour Average Installation Time for 1 Application: 1 hour Average Application Virtualization Overhead: 5 hours Failure Rate for Successfully Virtualized Applications: 0%		
100 Users 50 Applications	500 Users 100 Applications	2,000 Users 250 Applications
\$24,000 per year	\$48,000 per year	\$120,000 per year

Table 6: Annual OpEx of application delivery in traditional VDI

2.3. Unidesk-Managed VDI

Unidesk's centralized layering approach is similar to application virtualization in its ability to package the application once. The software setup process never has to be run again on each virtual desktop as it does with legacy electronic software distribution tools.

However, virtualizing an application with Unidesk layering software is much faster and much simpler than isolating an application. Also, Unidesk layering technology doesn't have the limitations of application isolation that lead to gold image

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sprawl. Device drivers, system services, complex applications, and departmental apps can all be layered quickly, with existing IT staff. Here are the steps to layer an application with Unidesk in VDI:

- Run application installation procedure (setup).
- Assign the layer to one or more desktops and reboot.

The following formula can be used to calculate the annual cost of layering applications with Unidesk, assuming each application is updated once a year.

of Applications X Average Installation Time X IT Level 2 Hourly Rate

The following table applies this formula.

Fully Burdened Level 2 Desktop Administrator: \$80/hour Average Installation Time for 1 Application: 1 hour Average Unidesk Layering Overhead: 0 Failure Rate for Unidesk Layered Applications: 0%		
100 Users 50 Applications	500 Users 100 Applications	2,000 Users 250 Applications
\$4,000 per year	\$8,000 per year	\$20,000 per year

Table 7: Annual OpEx of application delivery in Unidesk-managed VDI

3. Desktop Support

The third major source of client computing OpEx is desktop support. When desktop customizations are permitted – a requirement in most organizations with knowledge workers – malware, viruses, DLL conflicts, broken applications, and desktops “running slow” are inevitable. The ability for the service desk to resolve these issues at first contact, without having to escalate to costlier Level 2 and 3 resources, is the key to reducing OpEx. Let’s look at how the costs of desktop support compare across physical PCs, traditional VDI, and VDI managed by Unidesk.

3.1. Physical PCs

With physical PCs, there are only two choices when it comes to repairing most desktop problems not caused by hardware failures:

- **Re-image the PC.** This is a worst case scenario for end users, because all of their customizations – desktop profile settings, OS and application security settings, user-installed applications, plug-ins, and local data – will be lost. Lost, too, will be hours of productivity as they try to return their PC to something resembling its previous state.
- **Repair the problem.** This is a worst case scenario for IT, because the service desk cannot resolve malware, viruses, DLL conflicts, broken applications, and desktops “running slow.” The open service ticket will be escalated to Level 2 and 3 IT resources, who will spend hours inside Windows Explorer, Windows Add or Remove Programs, and Microsoft Registry Editor (regedit) trying to delete offending files, applications, and Registry keys .

Assuming IT does not “blast them a new gold image” and tries to repair desktop problems, the following formula can be used to calculate the annual cost of desktop repair, again using \$142 as the median cost per incident derived from Gartner research.

Users X # of Desktop Support Calls per User X % of Calls Caused by Software Issues X % of Calls Requiring Escalation X \$142

The following table applies this formula.

Desktop Support Calls per User per Year: 8 % of Desktop Support Calls Requiring Escalation: 10% % of Desktop Support Calls Caused by Software Issues: 75% Median Cost per Escalation: \$142		
100 Users	500 Users	2,000 Users
\$8,520 per year	\$42,600 per year	\$170,400 per year

Table 8: Annual OpEx of desktop repair in physical PCs

3.2. Traditional VDI

By definition, non-persistent virtual desktops are reverted back to a pristine state and thrown back into a shared pool after every use. While this approach can eliminate desktop support call escalation (since the desktop is basically being “re-imaged”), it also significantly restricts the use cases and the number of users that are a fit for VDI. Most knowledge workers will not accept a desktop that does not keep their customizations – desktop profile settings, OS and application security settings, user-installed applications, plug-ins, and local data.

Furthermore, because user installed apps and one-off IT-installed apps will not “stick” in non-persistent VDI, additional burden is placed on IT to virtualize even the departmental applications that are needed by only small groups of users. Gartner cites these limitations in non-persistent VDI as impeding broader hosted virtual desktop (HVD) adoption.

“It’s not just about letting users install their own applications. It’s about all the one-off, non-standard applications that IT installs for users that make non-persistent HVD unrealistic for most users. Solutions that permit application personalization and that sustain other types of desktop customizations are essential if HVD projects are to succeed.”

- **Terry Cosgrove, Principal Research Analyst, Mobile and Client Computing, Gartner**

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To make non-persistent virtual desktops “act” more persistent, point tools such as profile managers can be used to restore some user customizations. However, profile managers add additional licensing cost and complexity to an already complicated VDI stack. They also re-introduce operational cost, since level 2 IT administrators are now required to install and configure the tool, and consciously manage the profiles. Even with this additional effort, common customizations such as OS and application security settings, user-installed applications, and user-installed plug-ins are not sustained because they don’t live inside profiles.

The result is that while non-persistent desktops don’t have to be repaired, IT is now forced to virtualize the many departmental and one-off applications that users cannot install on their own to make up for the lack of delegated administration. The operational impact can be calculated using the following formula. Note the Average Virtualization Overhead has been reduced from 5 hours for standard enterprise apps to 3 hours for departmental apps to reflect the reduced scope and impact.

(# of Departmental and One-Off Applications per User X # Users) X (Average Installation Time + Average Virtualization Overhead) X IT Level 2 Hourly Rate

The following table applies this formula.

# of Departmental and One-Off Applications per User per Year: 0.2 Fully Burdened Level 2 Desktop Administrator: \$80/hour Average Installation Time for 1 Application: 1 hour Average Application Virtualization Overhead: 3 hours		
100 Users	500 Users	2,000 Users
\$6,400 per year	\$32,000 per year	\$128,000 per year

Table 9: Annual OpEx of having to virtualize departmental and user-installed applications in traditional VDI

3.3. Unidesk-Managed VDI

Unidesk layering technology enables IT to create both non-persistent and persistent virtual desktops on the same tiny storage footprint. For both desktop types, Unidesk typically requires less storage than block-based cloning approaches, which only support non-persistent desktops.

With Unidesk persistent desktops, end users and IT administrators are free to install one-off and departmental applications. Unidesk captures the user-installed applications in personalization layers, and the departmental applications in either the user’s personalization layer or an IT-created application layer. Because all layers are periodically snapshotted, Level 1 service staff can revert back to earlier layer versions to instantly repair broken desktops, without having to escalate calls to higher cost IT resources.

In **“How to Reduce the Cost of PC Support” (ID Number G00211079, Date 9 March 2011)**, Gartner estimates that the cost per support transaction for a Level 1 Service Desk Analyst Resource ranges from \$10 to \$37. Using the median cost per transaction of \$24, the following formula can be used to calculate the annual cost of desktop repair with Unidesk.

Users X # of Desktop Support Calls per User X % of Calls Caused by Software Issues X % of Calls Requiring Escalation X \$24

The following table applies this formula.

Desktop Support Calls per User per Year: 8 % of Desktop Support Calls Requiring Escalation: 10% % of Desktop Support Calls Caused by Software Issues: 75% Median Cost per Escalation: \$24		
100 Users	500 Users	2,000 Users
\$1,440 per year	\$7,200 per year	\$28,000 per year

Table 10: Annual OpEx of desktop repair in Unidesk-managed VDI

4. Customer Proof Points

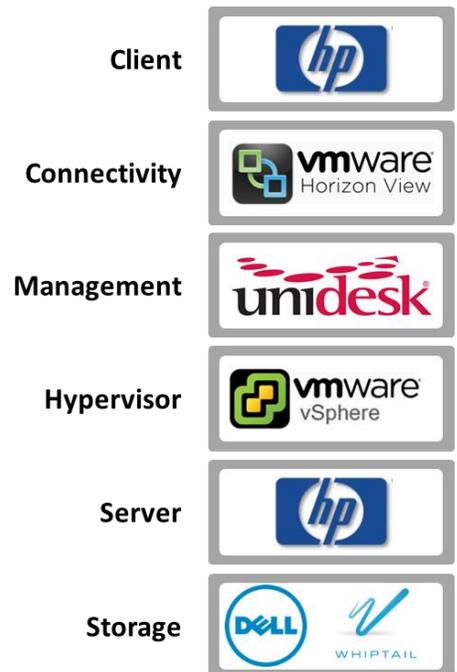
The following three customer profiles substantiate the operational cost savings made possible by Unidesk-managed VDI.

4.1. State of Ohio Department of Developmental Disabilities

“My biggest fears were that our applications could not be virtualized, and that our users wouldn’t accept a desktop that wasn’t customizable. But Unidesk was able to package and deliver all programs, capturing them in layers so we can easily assign them to users as needed. Its ability to offer a persistent user experience while keeping the O/S and applications stateless is just what we were looking for.”

- Bryant K. Young, CIO, State of Ohio Dept. of Developmental Disabilities

VDI Snapshot: Ohio.gov DODD	
Desktops	1,400 persistent and non-persistent desktops created and managed by Unidesk
Use Cases	Nurses, Safety Consultants, Business Analysts, Administrators, Office Staff, IT, Developers, and Executives
Gold Images	1 clean Windows 7 layer for all desktops
Applications	65 organization-wide and job-specific applications packaged as Unidesk layers
OpEx Savings from VDI	7 of 10 desktop support analysts reassigned to strategic IT projects; estimated 30% reduction in OpEx compared to physical PCs
Other VDI Benefits	Ubiquitous desktop access; lower power consumption; increased security



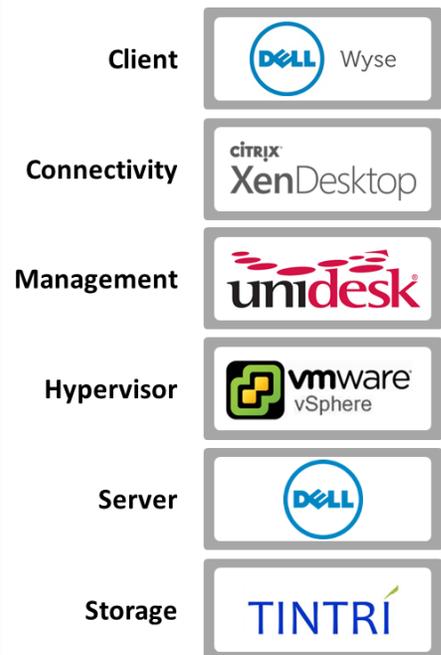
Full Case Study: <http://www.unidesk.com/customers/ohio-department-of-developmental-disabilities>

4.2. Kawasaki Motors Manufacturing USA, Lincoln, Nebraska

“After trying Unidesk, there was no going back. There’s nothing else like Unidesk layering. Most of our cost savings stems from how much more efficient Unidesk makes desktop management. As we get more virtual desktops deployed, the economies of scale take over and we’ll see even more savings.”

- Paul Kramer, IS Manager, Kawasaki Motors Manufacturing USA

VDI Snapshot: Kawasaki	
Virtual Desktops	300 persistent desktops deployed, more being added daily with a target of 800
Use Cases	Manufacturing, Office Automation, IT, Engineering
Gold Images	1 clean Windows 7 layer for all desktops
Applications	60+ organization-wide and departmental applications packaged as Unidesk layers
OpEx Savings from VDI	Dozens of gold images reduced to 1; application delivery and desktop provisioning reduced from half day to 1 hour; 10 minute break/fix
Other VDI Benefits	Anywhere/anytime desktop access; 300 desktops boot in less than 5 minutes; SAN capacity reduced from 30-40 GB per desktop to 8 GB



Case Study and On-Demand Deployment Webinar:

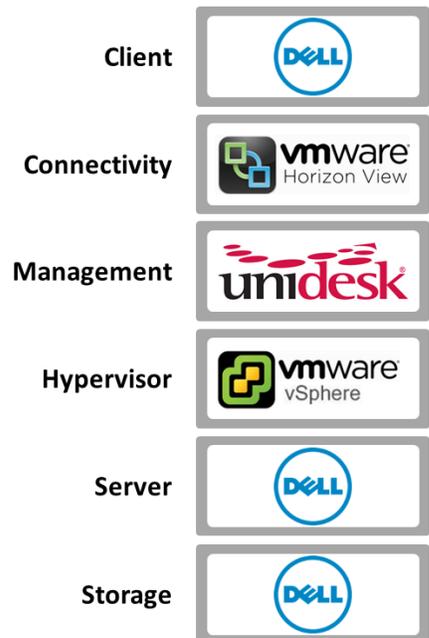
<http://www.unidesk.com/customers/vdi-success-story-kawasaki-motors-manufacturing-usa>

4.3. Tennessee Tech University

“Instead of having to build a custom image for a lab, Unidesk lets us concentrate on which applications we want to deliver. We can layer even complex apps like MATLAB, SPSS and Office in a few minutes, then pick which layers we want on each desktop. There are only two golden image layers of Microsoft Windows to patch for all desktops, which greatly simplifies administration, and our students now get the latest software updates every semester, which is a huge win.”

- Jeremy Ey, Systems Administrator, Tennessee Tech University

VDI Snapshot: 	
Virtual Desktops	530 non-persistent desktops
Use Cases	Labs, Engineering Classrooms, Chemistry Commons, Health Services Clinic
Gold Images	2 Windows 7 layers
Applications	120, including Microsoft Office, Maple, MATLAB, SPSS, SolidWorks, LabView, HyperChem, ChemDraw, Dragon
OpEx Savings from VDI	20+ gold images reduced to 2; update labs once a year to anytime; scale from 60 students in Chemical Engineering to supporting 300+ with same staff
Other VDI Benefits	Electric bills decreasing as zero clients replace PCs; students can now access software that used to only be on physical lab computers from anywhere



Deployment Webinar sponsored by Unidesk, VMware, and Dell (on-demand):
<http://www.unidesk.com/videos/customer-webinar-tennessee-tech>

Summary

The benefits of VDI are clear. But to date, the unclear ROI and lengthy payback period have made it hard for forward-thinking IT managers to justify the investment. Unidesk desktop management software for VDI is the solution that is enabling more organizations to expand their VMware Horizon View™ and Citrix® XenDesktop® implementations, and replace more PCs with virtual desktops. As this white paper shows, the operational costs savings offered by Unidesk makes the move to VDI a “no-brainer.”

About Unidesk Corporation

Unidesk Corporation, an [Elite VMware Technology Alliance partner](#) and [Citrix-Ready partner](#), is accelerating the movement of Microsoft Windows® desktops to the cloud. Unidesk’s patented desktop layering software is the only effortless way for IT organizations to deliver applications, manage images, sustain user customizations, and optimize storage for Microsoft Windows® desktops virtualized on VMware vSphere®. Nearly 600 Citrix XenDesktop® and VMware Horizon View™ customers use Unidesk to make VDI provisioning and Windows management elegantly simple. Unidesk is a privately held company headquartered in Marlborough, Mass. USA, with authorized solution partners around the world. Learn more about Unidesk Corporation by visiting www.unidesk.com