

vmware® intel®

# *Keep the world moving, no matter what*

How manufacturers  
can innovate and grow  
sustainably, with digitally  
transformed value chain



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## *Digitize your value chain,* **redesign your business model**

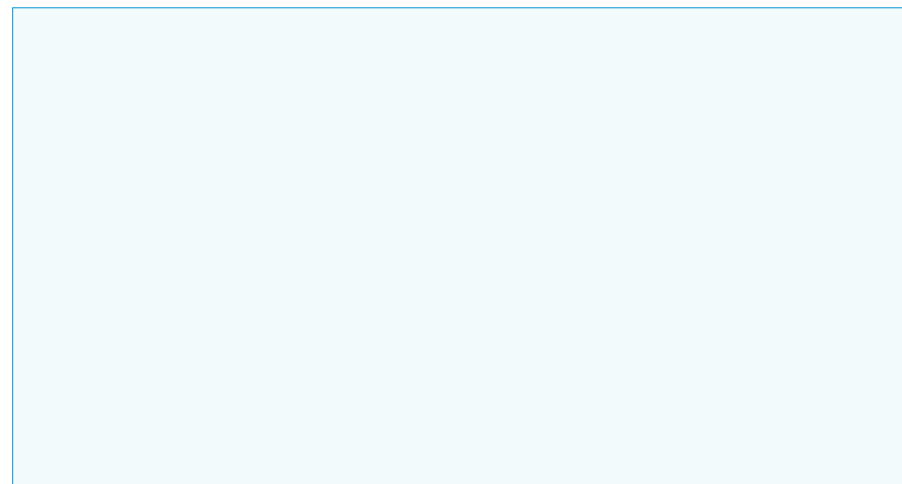
Manufacturing is the engine of everyday life, contributing directly to our wellbeing and evolution. But around the world, manufacturers face significant challenges as they look to innovate with new products and services as they also grow in new markets.

Supply chain instability, the need for increased flexibility and operational agility, carbon-neutrality goals and regulations, talent attraction and attrition, and calls to reassess business models and open new revenue streams – each of these factors impact the daily operations of manufacturing businesses.

Digital transformation enables you to meet these challenges head-on and drive long-term growth – all with sustainability, agility, and resilience built in at every stage.

From design and engineering to raw material sourcing and supply chains, to manufacturing and assembly, distribution, marketing, sales, and support services, digital technologies can fortify every part of your value chain and power non-stop productivity and innovation.

Together, VMware and Intel provide manufacturers with a path to digital transformation, delivering consistent infrastructure and operations across data centers and public clouds – accelerating application speed and creating agility for business innovation and growth.



## *Automate processes for speed, agility, and resilience*

Thanks to today's smart factories and connected products, it has never been easier for manufacturers to understand what's going on in their operations. And not just on the shop floor, but onward to the customer's home, vehicle, office, or premises.

Industry 4.0 technologies bring the promise of more intelligent, efficient processes, accelerated time-to-value from innovation, and happier customers. But how many Industry 4.0 initiatives stall at the pilot stage and never make it to a business-wide operating level?

Many manufacturers face challenges with brownfield environments, where complex and often fragmented legacy infrastructure and applications need to co-exist with modern Industry 4.0 technologies to allow for seamless integration and transition into connected,

intelligent and agile operations. To better address those challenges, manufacturers are hoping to bring the benefits of IT innovation to OT systems – virtualizing the OT environment, for example, to decrease dependency on manual intervention from technicians and engineers on the ground and becoming more flexible from a hardware perspective.

Bringing more compute capabilities into the OT environment also helps manufacturers accelerate automation and increase intelligence across the value chain by deploying artificial intelligence (AI) and machine learning (ML) technologies to bring speed, agility, and resilience to their operations.

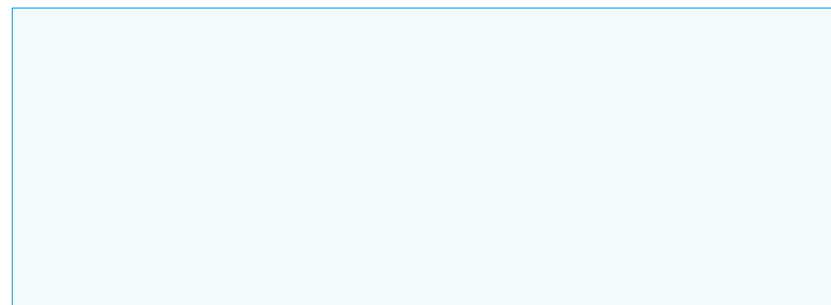


## How VMware and Intel help

VMware and Intel solutions help accelerate process automation, operational efficiencies and intelligence in several ways: In predictive maintenance, for example, ML modules can take real-time information from machine sensors and run it alongside historical data to predict failure and schedule maintenance. Intel's continued innovation in predictive maintenance is leading to exciting opportunities that help companies avoid lost time and forecast maintenance needs with unmatched precision. And in quality control, AI algorithms and robots can detect product faults with speed and accuracy far beyond human capability. Processes can then be automatically paused, defects fixed, and waste minimized.

What these two applications have in common is a shift from time-consuming, repetitive tasks for people, to machines doing the work faster and more accurately.

Speed and accuracy have a direct impact on the bottom line. Together, they improve decision-making, product quality, yield efficiency, and customer service – all fundamental to growth.



# Focus on: Mastering AI for enhanced performance

To demonstrate how VMware and Intel can support manufacturers to seamlessly integrate OT with IT systems and deliver greater efficiency, let's take the example of a robotic motion planning/control and perception workload that can be consolidated onto a single Intel Si platform.

By consolidating the workload in this way, a manufacturer can gain automated real-time control of a robot arm with a 2ms cycle time – enhancing its performance. AI inferencing enables object detection, pose detection and object classification, and this is supported by the ability to port the workload from a single IPC to a server or cloud with virtualization technologies. Two solutions are key here...

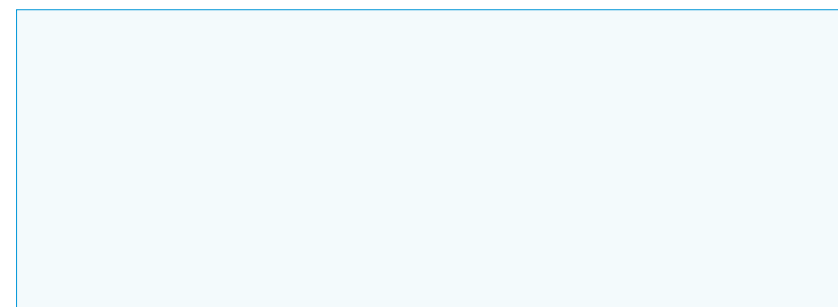
## Intel RealSense™ model D415 camera

With a field of view that covers the conveyors, the AI engine can make inferences from streamed 2D/3D camera images, using selected algorithms that have been optimized for best performance on Intel Si platforms.

## Real-time Motion Planning

The AI-inferred detection and pose of the objects is fed to the motion planning software, to enable the tracking of objects on the conveyor and the real-time update of the robotic arm travel plan toward them until the pick.

In this scenario, Intel technologies enable real-time in-line inspection, autonomous operation, a shortening of robot training and repurposing, and accelerated time-to-value from robotics solutions. VMware technologies enable the workload management and distribution to the edge or cloud – bringing the scalability, flexibility and manageability to ensure seamless integration of ground-breaking technologies into the smart connected factory.



## *Design sustainable products* for a circular economy

As people spend more time online, their expectations of products and services change. It is no longer enough to simply manufacture and sell a product – digital experience, corporate ethics and sustainability are now key factors in purchasing decisions.

Today's consumer expects a seamless online connection between buying (and using) a product and receiving related services. And they want this to be done in a sustainable way, by a business that aligns with their values and (ideally) ethically sources materials and recycles products or parts of it at the end of the life-cycle.

For manufacturers, this presents a unique challenge. Eliminating waste and reducing carbon footprint across an ecosystem that encompasses multiple complex sites, devices, vendors, technologies, compliance demands, and processes, is no mean feat.

### **The solution?**

Building a technology platform and service capabilities to help integration and automate the entire manufacturing value chain - from engineering, to sourcing, global factory and warehouse operations, distribution center and service location management to the connected product in the market and life-cycle track & trace.



## How VMware and Intel help

At VMware, we see virtualization technology as an accelerator for sustainable operations that comes with significant business benefits.

VMware's technology portfolio and multi-cloud offering help manufacturers reduce the environmental impact of data centers, infrastructure operations and data management, by bringing increasing transparency over IT operations and offering ways to increase IT and organizational productivity.

You can't manage what you can't see. VMware makes container and host energy visible, enabling benchmarks you can act on. VMware solutions are also designed to increase flexibility and compute power from edge to core to cloud. With this full visibility of operations across the connected estate, via a single unified platform, you can rapidly accelerate the launch of new products and services.





## How VMware and Intel help

**VMware Edge Stack** helps manufacturers reduce their infrastructure footprint to the minimum with a single platform that covers software-defined connectivity, application management, infrastructure and device management, and security governance all-in-one. This seamless approach enables you to build a sustainable manufacturing operation on a global scale and deliver exceptional digital customer experiences that set you apart.

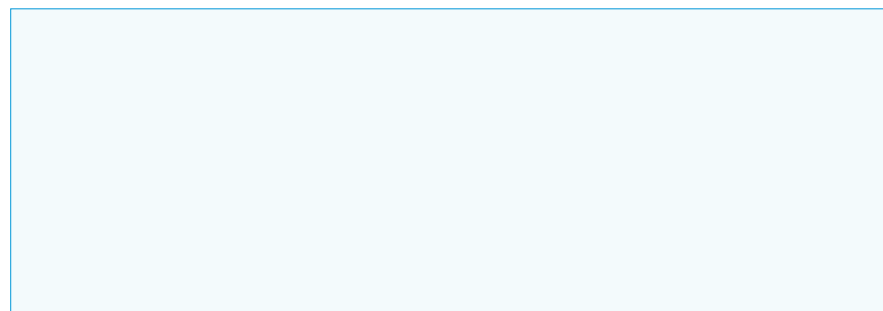
Intel is also helping businesses forge a path to sustainability by providing sustainable manufacturing solutions that enable them to capture, analyze, and act on operational data in near real-time. Leveraging more data with edge intelligence gives businesses the flexible controls and deeper perspectives they need to solve unique challenges and become sustainable leaders of factory ecosystems.



### *Mercedes-Benz drives innovation with a VMware-enabled virtual consumer experience*

Automotive giant Mercedes-Benz wanted consumer experience to drive its innovations. The consistent, personalized digital channel it created for all consumer touchpoints was built using the VMware Tanzu™ Application Service on Amazon Web Services (AWS). See how this channel has allowed them to transform their customer experience – and create an extraordinary online car buying journey.

[Read the success story >>>](#)



## Create digital workspaces for a hybrid workforce

Alongside questions over where and how work gets done, manufacturers struggle to find and retain the people they need. From high- to low-skill roles, a shortage of experienced people has created fierce competition for talent.

**Against this backdrop, how can manufacturers achieve joined-up, connected ways of working, attract and maintain talent?**

### **Provide fast, frictionless recruitment**

Automation in CV screening and candidate qualification checks via chatbots can create a fast and frictionless new starter experience. This can be a dealbreaker in a market where candidates have more choice and power than ever.

### **Offer flexible working options**

Whatever your approach to remote/hybrid working, digital solutions that ensure security and low latency are crucial to establishing ways of working that meet business objectives and employee expectations.

### **Invest in simpler security-enabled systems**

Are your people expending too much effort to get their jobs done remotely? Unifying disparate systems with one secure platform will create the seamless employee experience that's crucial for better collaboration, productivity, and retention.

### **Enable secure, reliable collaboration**

Do your users complain about data and app availability, and reliability? Connected products and services are the result of connected technologies that enable remote workers everywhere to solve problems together, in real-time.



## How VMware and Intel help

VMware increases your employee life-cycle experience from the very start; it turns traditional working environments into virtual desktop and application infrastructure, across any end user device, with simplicity and flexibility to allow for easy access to anything the employee may need during his/her daily activities on the job.

Using a cloud-based approach enables IT to securely manage identities and devices while delivering apps and desktops through a unified, zero trust platform. With the help of virtual and augmented reality, manufacturers will be able to drive better and faster R&D, improve engineering capabilities, create more jobs, and increase production efficiencies.

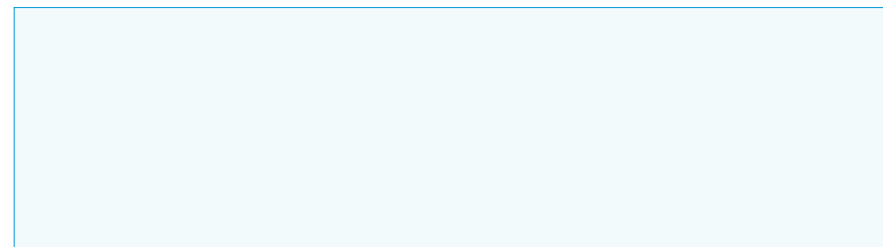
Whether you maintain remote working or adopt a hybrid arrangement, employee experience is crucial – it feeds directly into product innovation and customer satisfaction.

Distributed work introduces additional complexities for managing and securing PCs that are regularly offsite and out-of-network.

As business PC needs are evolving, the technology that manages them and supports employees must evolve as well.

The Intel® vPro® platform, a leading hardware-based manageability and security platform, and VMware Workspace ONE®, a leading solution for modern PC management, are being integrated to enable businesses to complete more IT tasks from a single pane of glass. Organizations can take advantage of chip-to-cloud PC management, where devices are managed and secured inside and outside the firewall and in-band and out-of-band, while improving employee experience and productivity.

In addition, Intel® Select Solutions for Virtual Desktop Infrastructure with VMware Horizon® enables a digital workspace with the efficient delivery of virtual desktops and apps that equip workers anywhere, anytime, and on any device.



## Converge IT and OT to increase business efficiency

The convergence of information technology (IT) and operational technology (OT) is one of the defining characteristics of the modern smart factory.

Bringing physical equipment into the digital sphere has allowed manufacturers to integrate disparate teams and technologies – and revolutionize the way they turn data into intelligence, increase agility and accelerate time to market of innovations.

And for those manufacturers that have yet adopt and operationalize IT/OT convergence, getting there promises to be truly transformative and a game changer for the entire organization.

With fewer silos, consistency in data and application management throughout the business and a software-defined infrastructure, manufacturers can reduce waste and costs, improve compliance, raise visibility of operations, and bring new products and services to market at record speeds.

However, the road to this digital promised land is not without its challenges. These include consistently and continuously managing real-time and non-real-time workloads, maintaining the security of systems, implementing robust governance processes around their use, establishing clear lines of responsibility, and ensuring teams have the skill-sets to carry out their roles.

### **So, how can you create a value chain in which your data, devices, and departments all connect and communicate in perfect harmony?**

As we've seen already in this guide, a single unified platform from edge to cloud makes it possible.

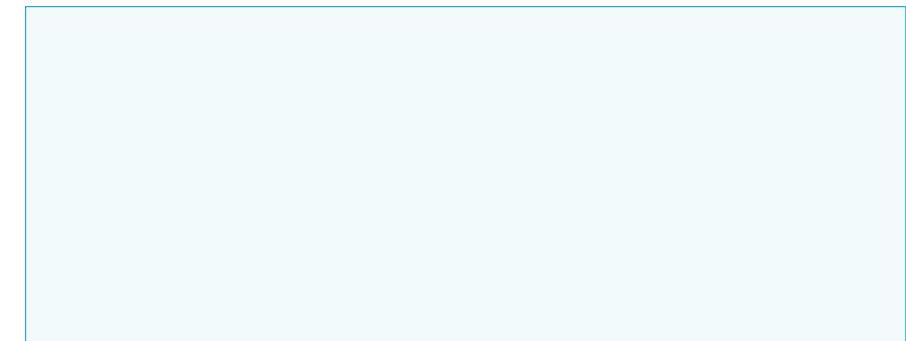


## How VMware and Intel help

VMware can help standardize and consolidate your digital foundation across IT and OT to enable advanced operations across your value chains, for smarter manufacturing processes and innovation breakthroughs.

Our solutions have been built to work alongside one another. No matter where you are on your digital transformation journey VMware can assist, from building up your IT infrastructure to helping assess your application portfolio, prioritize migration or transformation plans and provide expert resources to accelerate the path you are on.

Integrating VMware into your tech stack does not mean having to start from scratch. Our systems integrate seamlessly with many public cloud providers and deliver seamless platform capability to enable software-defined operations. Together with Intel, we enable IT organizations to realize a digital transformation and deliver IT infrastructure and application services with speed and agility – supporting business innovation and growth while optimizing TCO and improving resource utilization.



## *Strengthen your security* against cyberthreats

In a hyperconnected, always-on industry, security is paramount. The shift to remote and hybrid working forced many manufacturers to confront new security challenges, with new devices connecting to new networks and cybercriminals looking for new ways to take advantage.

**As IT and OT systems converge, and data is collected and processed in multiple cloud, edge and on-premises environments, strict control and governance processes are needed to keep a business and its customers safe – and to comply with ever-evolving regulatory obligations.**

Many manufacturers are still running legacy tech in parallel with the cloud, and still suffering from vulnerabilities in the gaps between their IT and OT systems. Different security solutions have often been bolted onto individual apps, creating silos that prevent the sharing of critical knowledge.

As many manufacturers already realized, reducing complexity and increasing insight are crucial: simplification is key to improving your security posture.

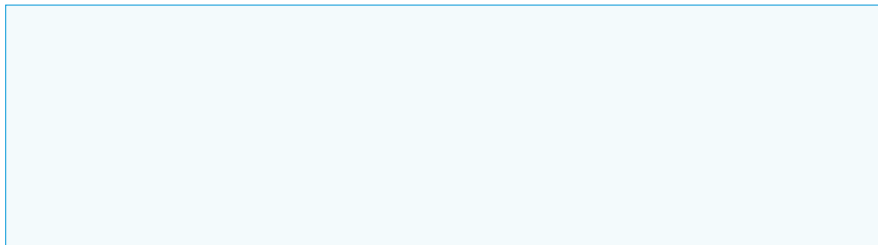
Moving to a single-platform, zero-trust approach across IT and OT will give manufacturers the means to secure their entire enterprise – assets, devices, data, from edge to cloud.



## How VMware and Intel help

VMware and Intel transform security by providing comprehensive measures in both software and hardware, across application infrastructure and endpoints. It is an approach that maximizes visibility, context, and control and secures the interactions between users, applications, and data.

Intrinsic security from VMware, for example, uses threat intelligence and infrastructure to protect apps and data across endpoints, workloads, networks, workspaces, and clouds while providing IT with visibility and control over policies that protect the business.



- **VMware Carbon Black** cloud-based protection technology analyzes endpoint activity, identifies threats, and automates your response to block cyberattacks in real time
- **VMware SASE Platform™** provides secure, reliable, and optimized access to traditional and new applications for mobile clients, branches, and campuses with a single, holistic solution
- **VMware SD-WAN** is a software-defined WAN overlay that ensures high-quality application performance and availability for end users while lowering networking costs

The benefits of an approach like this?

Reduced exposure to cyberattack via a zero trust system based on full visibility and control. This is how you can proactively manage cyber risk, strengthen the security of your data, apps, and devices, and achieve full regulatory compliance.



### *Nol-Tec Systems uses VMware to improve customer, IT, and employee experiences*

Nol-Tec Systems is a leader in engineering bulk material handling and air pollution control mitigation systems. See what happened when they chose VMware software-defined infrastructure and multi-cloud operations, micro-segmentation, automation, and secure digital workspace technology to deliver workforce agility without risking security.

[Read the success story >>>](#)







## *Gain real-time data insights:* **from the far edge to multi-cloud**

Lack of operational flexibility and agility are major barriers to innovation and growth. Being able to take new and better products and services to market relies on speed – fast data manipulation and analysis that is translated into intelligent and rapid action on the shop floor.

The challenge for many manufacturers is rooted in inflexible legacy applications, siloed initiatives and insufficiently flexible infrastructure to take advantage of real-time data insights and Industry 4.0 technologies.

Many have opted for a full shift to the cloud during the pandemic to ensure some level of flexibility and speed but realized later on that there were a few aspects that

still had to be addressed and are not going to be feasible in a cloud-only approach: low latency requirements for real-time insights at shopfloor level, zero-trust security across IT and OT apps and assets, integration of legacy and cloud-native apps on a single platform, and ultimately the cost dimension which many completely underestimated.

A hybrid approach from edge to cloud to manage real-time and non-real-time applications, software-defined networking capabilities, a holistic, zero-trust security approach through an agnostic platform has shown to be most successful way forward and providing the best choice for agile and smart operations.

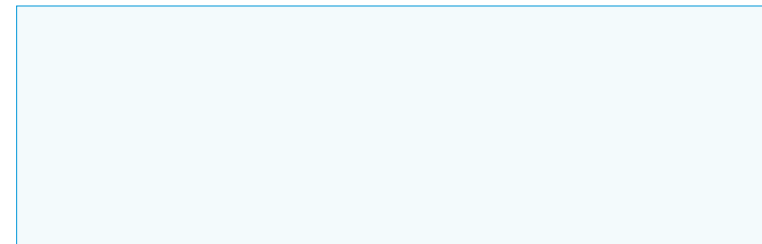
## How VMware and Intel help

Our multi-cloud manufacturers can: migrate to any cloud and between clouds without recoding their apps; modernize their infrastructure; and operate consistently across the data center, the edge, and any cloud environment through a single platform.

Leveraging the same compute, network, storage, and Kubernetes stack not only offers operational efficiencies but also reduces complexity and drives cost transparency and savings.

With this seamless connection from the edge to the cloud, manufacturers get the flexibility to ensure faster, more agile data analysis and operations, faster and more effective AI/ML model training and feedback loops – driving better customer experience and greater business value.

VMware and Intel deliver solutions that enable IT organizations to confidently integrate Edge and cloud to accelerate real-time data analytics and provide the necessary technology foundation for smart manufacturing, increased adoption and leverage of Industry 4.0 technologies and AI/ML-based operational intelligence.





## *Accelerate time-to-market* with cutting-edge technologies

Today, more than ever, growth in manufacturing comes from investing in innovative new business models, effective data strategies, and integrated product and service capabilities built with modern applications.

An efficient, sustainable, and agile value chain is key to providing exceptional employee and customer experiences – both of which are crucial for driving growth.

Our experience in your sector means we are perfectly placed to transform your value chain using our latest technologies and industry-specific solutions.



# Let's talk

VMware and Intel are so much more than IT providers. We are perfect partners to accelerate technology adoption and help strengthen your entire value chain – from creating new business or operating models to modernizing IT infrastructure – wherever you are in your digital transformation journey.

Our platform-agnostic solutions allow you to integrate existing legacy or cloud-based infrastructures, networks, and application ecosystems seamlessly and digitize your factories without reinventing your technology stacks.

Intel is an industry leader, creating world-changing technology that enables global progress and enriches lives. Inspired by Moore's Law, we continuously work to advance the design and manufacturing of semiconductors to help address our customers' greatest challenges. By embedding intelligence in the cloud, network, edge and every kind of computing device, we unleash the potential of data to transform business and society for the better.

## Get in touch to arrange a call:

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