THE FUTURE OF WAREHOUSING

HOW DIGITALISATION IS SET TO CHANGE WAREHOUSING

statista

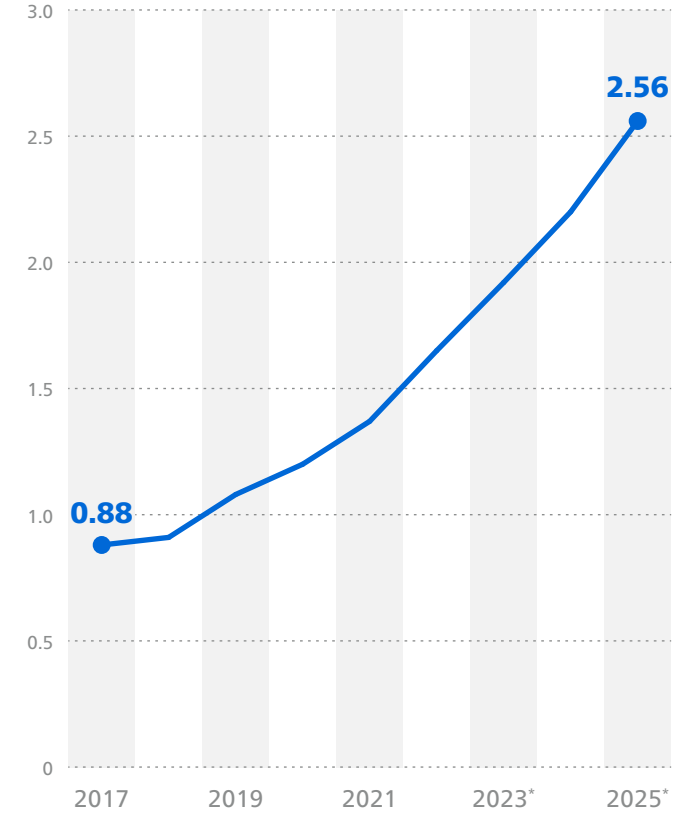
INHALT

Note: All monetary figures in this document have been converted from USD to EUR with exchange rates applicable on 7 March 2022.

DIGITAL TRANSFORMATION

Spending on digital transformation technologies and services has grown steadily in recent years and is set to skyrocket until 2025, where it will reach EUR 2.56 trillion globally.

SPENDING ON DIGITAL TRANSFORMATION TECHNOLOGIES AND SERVICES WORLDWIDE FROM 2017 TO 2025 IN EUR TRILLION[1]



* Forecast

The COVID-19 pandemic has of course been a significant driver of this growth, with an incredible 97% of enterprise decision-makers globally stating that it has sped up digital transformation in their organisation to some extent.[2]

In addition to this, we find ourselves in the fourth industrial revolution, which has accelerated ten-fold as a result of technological advancements. As these advancements are being made at a speed never witnessed before, it is expected that by implementing trending technology such as next-level process automation and virtualisation, 50% of today's work could be automated by as soon as 2025.[3]

In the more immediate term, however, 2023 is a key year for digital transformation, with 70% of companies intending to accelerate their use of digital technologies and 65% of global GDP expected to be digitised.[4] Blockchain, a particularly notable technology driving digital transformation, is also set to take the world by storm – 10% of global GDP could be associated with it in the next 5 years.[5]

One of the key industries in which digital transformation is making and will continue to make the most significant changes, however, is in warehousing. We take a look at what effects digital transformation will have on warehousing and what to expect from the future of the digital warehouse.

1 IDC/Statista (November 2021) https://www.statista.com/statistics/870924/worldwide-digital-transformation-market-size/ **2** Twilio (July 2020) https://www.statista.com/statistics/1200465/covid-digital-transformation-global/ **3** McKinsey (June 2021) https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/The%20top%20trends%20in%20tech%20final/Tech-Trends-Exec-Summary **4** IDC (October 2020) https://www.idc.com/getdoc.jsp?containerId=prUS46967420 **5** McKinsey (June 2021) https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/The%20top%20trends%20in%20tech%20final/Tech-Trends-Exec-Summary

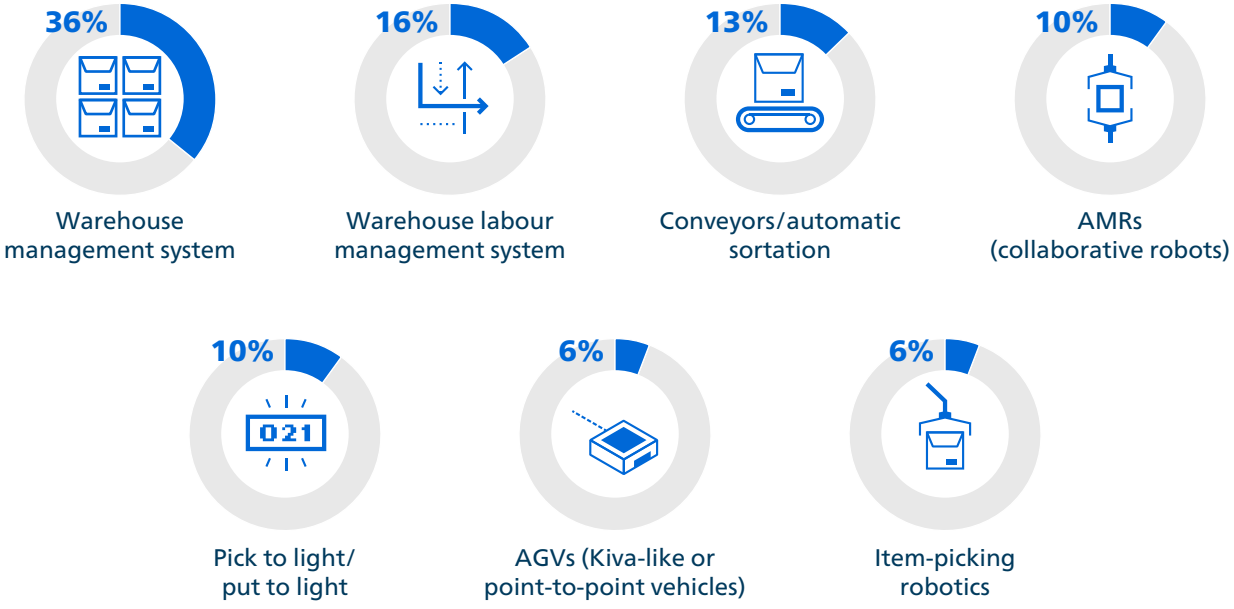
TRANSFORMING WAREHOUSING

Due to a higher level of demand for accelerated digital transformation in pandemic-related situations, the demand for warehouses and in turn the smooth operation thereof has also increased. With the requirement to social distance and avoid physical contacts, many consumers have turned to shopping online, meaning that e-commerce has undoubtedly placed significant strain on the need for efficient and rapid warehousing solutions during the pandemic. These requirements have also had major impacts within warehouses themselves and have highlighted the need for more automated processes that enable the warehouses to continue to run efficiently with the fewest staff members present.

Although many societies are now slowly returning to a new normal, the trend of increased online shopping is set to continue, with retail e-commerce sales expected to grow an incredible 50% in the coming years, reaching a total of EUR 6.77 trillion by 2025.[1] The number of warehouses worldwide is also set to increase rapidly, growing from an approximate 162,500 in 2022 to 179,500 by 2025.[2]

In order to keep up with continued demand and the pressures they face, it is now more important than ever that warehouses undergo digital transformation to improve their efficiency and visibility. Warehouse logistics professionals are therefore investing in a wide range of technology to support this. 82 logistics professionals were interviewed about their priorities with the following results:

WHICH OF THE FOLLOWING WAREHOUSE TECH INVESTMENTS ARE THE HIGHEST PRIORITY FOR YOUR ORGANISATION?[3]



To understand just how important these technologies are for the industry and how they can help to create the digital warehouse of the future, we take a look into the following areas:

- Unmanned warehousing
- Robotics
- Autonomous vehicles
- System integration and automation
- Voice technology
- Barcode readers
- Augmented and virtual reality
- Artificial intelligence

1 Statista/eMarketer (February 2022) https://www.statista.com/statistics/379046/worldwide-retail-e-commerce-sales/ **2** Statista (March 2021) https://www.statista.com/statistics/1223289/warehouses-worldwide-region/ **3** Statista/DC Velocity (June 2021) https://www.statista.com/statistics/1232299/warehouse-automation-tech-investments-priority/

DIGITAL TRENDS – UNMANNED WAREHOUSING, ROBOTICS, AUTONOMOUS VEHICLES, AND SYSTEM INTEGRATION AND AUTOMATION

For logistics professionals around the world, investing in unmanned warehousing, robotics and automation solutions are some of their highest priorities. The investments they make will contribute to the incredible successes expected by the automation and robotics markets: the warehouse automation market will experience particular success, rising from an estimated worth of EUR 14.26 billion in 2021 to EUR 27.59 billion by 2026[1] and the warehouse robotics market will also rise from EUR 5.67 billion to EUR 9.52 billion in the same period.[2]

But how can these technologies transform the digital warehouse?

Unmanned warehousing and robotics

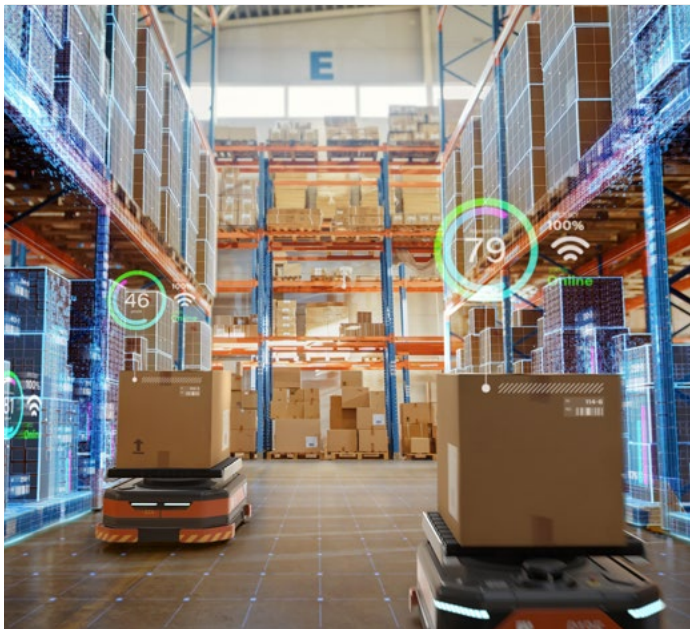
Robotics has become one of the most interesting topics since the start of the pandemic – so much so that the number of warehouse facilities with mobile robots is expected to rise by nearly 500% to 53,000 in 2025. This is because robots can be involved in automating supply chains where little critical thinking is required and used in numerous areas within a warehouse such as acting as pickers, packers, maintenance and even cleaners. Moreover, due to advancements in sensor, AI and machine vision technology, warehouse robots are continually being improved and adapted to the demands placed upon them.[3]

Autonomous vehicles

As part of the aim to boost warehouse efficiency, there is an increasing need to reduce product damage and improve equipment handling. One way to do this is through the use of autonomous vehicles such as automated guided vehicles (AGVs) and autonomous mobile robots (AMRs) that come in all different forms – as unit load vehicles, forklifts, and towing and tugging vehicles. They are a particularly attractive investment for warehouses since they can be operated 24/7 without a driver, thereby reducing labour costs, and are also easy and safe to implement, quickly boosting their return on investment.[4] As a result of this, the global AVG volume is expected to witness significant growth as more warehouses invest, reaching 272,720 units by 2025 – a huge increase from the 187,410 predicted for 2022.[5] AGV and AMR technology is also expected to hold a 15% share in the global warehouse automation market in 2025, further highlighting its level of priority in warehouse automation.[6]

System integration and automation

In 2021, over 80% of warehouses had no form of automation.[7] Although implementing automation can initially be quite costly, there are an incredible number of advantages that contribute significantly to return on investment such as increased productivity, minimised manual labour, optimised space and fewer errors.[8] Integrating automated storage and retrieval systems (ASRS) is one great example. Not only are they able to assist in solving labour challenges, they can also help to manage fluctuations in demands. Furthermore, in comparison to standard shelving, ASRS are able to recover up to 85% of existing floor space.[9] For those in grocery retail, ASRS can even help to boost return on investment by over 50% when compared with traditional picking systems.[10]



1 Statista (October 2020) https://www.statista.com/statistics/1094202/global-warehouse-automation-market-size/ **2** Statista/NMSC (January 2022) https://www.statista.com/statistics/1289797/warehouse-robotics-market-size-worldwide/ **3** TechTarget (December 2021) https://www.techtarget.com/searchenterpriseai/feature/How-warehouse-automation-robotics-transformed-the-supply-chain **4** DirectIndustry (2022) https://guide.directindustry.com/choosing-the-right-agv/ **5** Statista/BIS Research (February 2022) https://www.statista.com/statistics/882706/global-agv-market-value/ **6** Statista/Messe Frankfurt/LogisticsIQ (August 2019) https://www.statista.com/statistics/1147839/global-warehouse-automation-market-share-technology/ **7** BusinessWire (June 2021) https://www.businesswire.com/news/home/20210621005532/en/Global-Warehouse-Automation-Robots-Technologies-and-Solutions-Market-Report-2021-2030---ResearchAndMarkets.com **8** NetSuite (December 2020) https://www.netsuite.com/portal/resource/articles/inventory-management/warehouse-automation.shtml **9** Kardexremstar (February 2021) https://us.blog.kardex-remstar.com/15-ways-covid-changing-warehousing **10** Robotics247 (August 2021) https://www.robotics247.com/article/warehouse_robotics_revenues_surpass_51b_by_2030_finds_abi_research/applications

DIGITAL TRENDS – VOICE TECHNOLOGY AND BARCODE READERS

Voice technology

Voice picking will be one of the fastest growing trends in the coming years with the global voice picking solution market growing at a CAGR of 15.3% until 2025, reaching a value of EUR 2.65 billion.[1] The driver of this growth is the demand for voice-directed warehousing systems. Implementing such technology can help in a variety of areas such as multi-order picking, direct-to-customer order fulfilment and on-shelf availability improvement. Voice-directed solutions are also one of the most attractive technologies for warehouses to adopt since they are relatively easy to use and also fast to set up. In doing so, warehouses can train their staff quickly and benefit from improved speed and accuracy, reduced picking errors and a safer environment, which all contribute to enhanced productivity.[2] Warehouses that have implemented voice technology have even achieved accuracy metrics of 99.8%[3] – a crucial figure considering the average cost per error can reach up EUR 275.[4]

Barcode readers

As warehouse orders become more demanding and more complex, there is a real need for efficiency and accuracy in particular. Barcode readers are a key solution to boosting warehouse productivity in this respect – by installing barcode scanning and integrating a warehouse management system, workforce productivity can be increased by up to 30%.[5] Warehouses that use barcode technology for their inventory control processes also typically maintain a 99% accuracy rate – for every 300,000,000 characters, they make just one mistake on average. Compared with manual data input, which usually has one error per 300 key strokes, this highlights a significant advantage of deploying barcode technology.[6] Furthermore, with the benefits that barcode technology brings, warehouses can expect barcode systems to pay for themselves in as little as six months.[7] Since the supply-chain problems created by the COVID-19 pandemic are expected to have a knock-on effect in the coming years, implementing barcode technology is a key factor in maintaining warehouse efficiency, allowing the workforce to stay up-to-date on inventory in real time and prepare for any potential shortages in a timely manner.

1 NetSuite (April 2021) https://www.netsuite.com/portal/resource/articles/inventory-management/voice-picking.shtml **2** Grand View Research (September 2019) https://www.grandviewresearch.com/industry-analysis/voice-picking-solution-market **3** F. Curtis Barry & Company https://www.fcbco.com/blog/bid/156266/voice-technology-in-the-warehouse **4** NetSuite (April 2021) https://www.netsuite.com/portal/resource/articles/inventory-management/voice-picking.shtml **5** PeakLogix (November 2019) https://www.peaklogix.com/calculating-the-roi-of-warehouse-automation/ **6** DBK Concepts (October 2017) https://www.dbk.com/resources/barcodes-impact-warehouse-production.html **7** DBK Concepts (October 2017) https://www.dbk.com/resources/barcodes-impact-warehouse-production.html

DIGITAL TRENDS – ARTIFICIAL INTELLIGENCE AND AUGMENTED AND VIRTUAL REALITY

Augmented and virtual reality

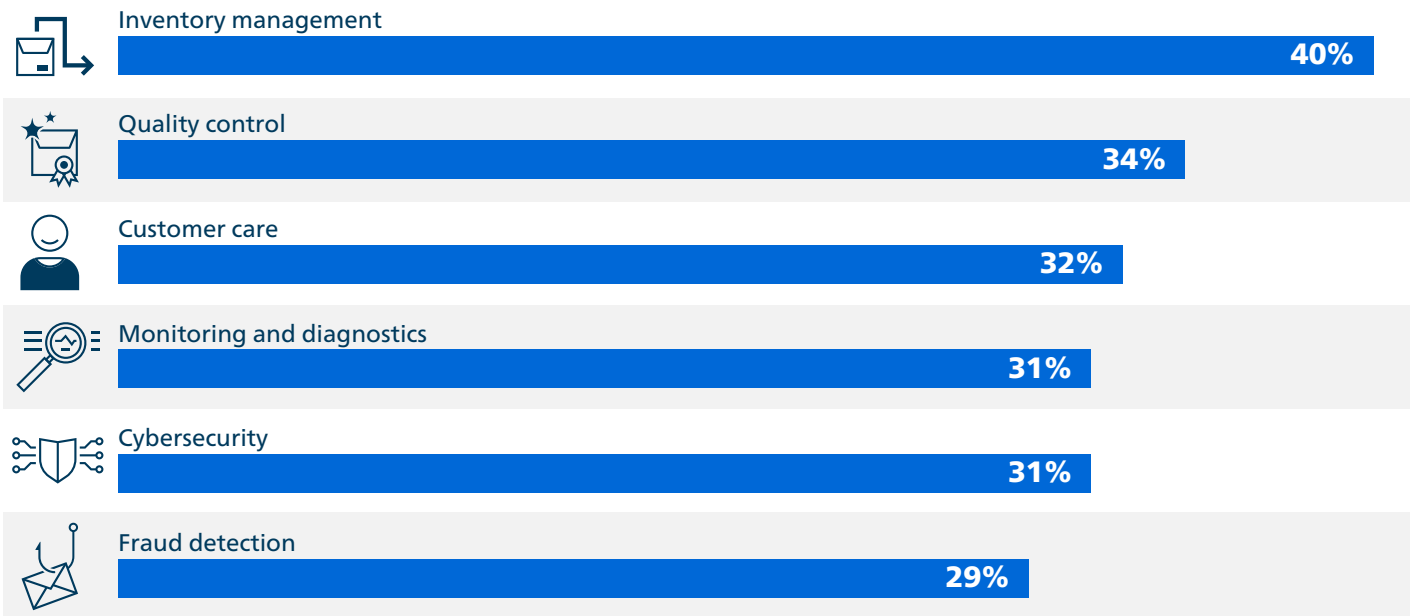
Augmented and virtual reality will be driving forces in the digital transformation and implementation of other solutions in warehouses. While just 8% of UK logistics companies were using some form of augmented or pick-by-vision technology in 2019, 3% were planning on deploying the innovation and a further 31% were looking into it as a possibility.[1] The augmented, virtual and mixed reality market is arguably one of the fastest growing markets in the technology segment – forecast to be worth EUR 53.88 billion in 2022, it is expected to rise by over 400% to an estimated total of EUR 272.51 billion just two years later in 2024.[2] There are a number of ways warehouses can deploy and take advantage of augmented and virtual reality: augmented reality applications come in the form of tablets, smartphones, head-mounted displays and even smartglasses, highlighting the flexibility of the technology.[3] Pick-by-vision solutions are a particularly interesting choice for warehouse employees – learning how to use them can take just 15 minutes, saving up to 60% in training time, and in practice they can improve efficiency by up to 30%.[4]

Artificial intelligence

In 2019, just 11% of warehouses globally were adopting artificial intelligence technology in their automation processes. This figure is expected to rise significantly to 75% by 2030.[5] This is key since artificial intelligence plays a key role in optimising advanced warehouses. There are five main ways in which artificial intelligence can be applied: it can be used for dynamic slotting, workforce planning, performance management, in-warehouse travel optimisation and intelligent automation of robots.[6] In 2020, those in logistics were mainly using artificial intelligence for inventory management but its use extends much further than this.

Artificial intelligence can be used in virtually all areas of warehouse operations as well as in tandem with other trending technologies to get the most out of the warehouse of the future, ensuring increased productivity, improved accuracy and increased safety.[7]

ARTIFICIAL INTELLIGENCE USE CASES IN THE TRANSPORT AND LOGISTICS INDUSTRY WORLDWIDE[8]



1 Statista (June 2019) https://www.statista.com/forecasts/1015587/implementation-of-augmented-reality-at-logistics-companies-in-the-uk **2** Statista/BCG (February 2021) https://www.statista.com/statistics/591181/global-augmented-virtual-reality-market-size/ **3** Jasoren (2022) https://jasoren.com/augmented-reality-warehouse/ **4** Robotics247 (August 2021) https://www.robotics247.com/article/warehouse_robotics_revenues_surpass_51b_by_2030_finds_abi_research/applications **5** Statista/Robotics Business Review/LogisticsIQ (September 2019) https://www.statista.com/statistics/1169394/global-warehouse-automation-technology-adoption/ **6** Supply Chain Dive (September 2021) https://www.supplychaindive.com/spons/5-applications-for-artificial-intelligence-in-the-warehouse-and-distributio/605942/ **7** Allerin (May 2020) https://www.allerin.com/blog/the-growing-role-of-ai-in-warehouse-automation
8 Statista/Amazon/Philips/Genesys/MIT Technology Review Insights (April 2020) https://www.statista.com/statistics/1197962/ai-transport-logistics-global/

INDUSTRY SUCCESSES

Many leading companies have already started the digital transformation of their warehouses – and have been highly successful in doing so. Whether they have used augmented reality, artificial intelligence or voice technology, they have all been able to improve their productivity and efficiency in various ways and also benefit from high levels of return on investment.

DHL

DHL has witnessed one of the biggest success digital transformation stories. They identified that around 60% of all their warehouse operations involved picking orders and saw the potential that augmented-reality smartglasses could offer them to make their picking more efficient. They were able to use the smartglasses as barcode scanners and in doing so were able to improve their picking efficiency by 25%, thereby boosting productivity and reducing errors. DHL was also able to make further improvements elsewhere through this technology such as reducing employee training and onboarding time by 50%.[1]

Amazon

Amazon has been able to transform its processes through robotics and has invested heavily in their use over the past few years. As of 2021, the company had around 350,000 mobile drive unit robots in operation in their warehouses – 75% more than it had in 2019.[2] In order to support this rapid development, Amazon has even introduced a programme to train employees in robotics in order to improve productivity even more.[3] Furthermore, the Amazon Robotics team has been able to use artificial intelligence and machine learning to create software and solutions that have achieved savings of approximately 50% on machine learning inferencing costs and 20% improvements in productivity with comparable savings.[4]

Kmart

In response to unprecedented levels of growth, Kmart has started to implement voice technology in its warehouses to improve worker productivity and reduce errors, accidents and training times.[5] With their voice solutions, they are expecting to benefit from the projected improvements in productivity that the technology has to offer, which can range from 30% to 50%.[6] Kmart has even worked together with their partner's software development team to improve the return on investment of their equipment and was even able to introduce the technology throughout the entirety of its operations within four weeks, highlighting just how quickly and easily voice technology can be implemented in warehouses.[7]

1 TTC Solutions (March 2021) https://ttc-solutions.com/augmented-reality-ar-in-logistics-business-how-logistics-companies-can-benefit-from-ar/ **2** GeekWire (June 2021) https://www.geekwire.com/2021/amazon-details-warehouse-robots-designed-help-humans-work-safely/ **3** Amazon (January 2021) https://www.aboutamazon.com/news/workplace/new-amazon-program-offers-free-career-training-in-robotics **4** Amazon (2021) https://aws.amazon.com/solutions/case-studies/amazon-robotics-case-study/?nc1=h_ls **5** Itnews (July 2020) **6** SmartCompany (July 2020) https://www.smartcompany.com.au/coronavirus/cohesio-robot-kmart-covid-19-e-commerce/ **7** Ragtrader (July 2020) https://www.ragtrader.com.au/news/what-is-android-voice-kmart-s-new-weapon-for-growth

CREATING YOUR DIGITAL WAREHOUSE

It's evident that warehouses are becoming more complex and more digital in their operations – whether that's to improve inventory tracking and management, monitor machines or carry out smart maintenance. As the fourth industrial revolution advances, so too will the key digitalisation trends in warehouses and as more companies start to implement these new technologies they will consequently boost their competitiveness, highlighting the need for others to act quickly and do the same.

One of the main solutions in helping to apply key digitalisation trends efficiently in warehouses are demountable rugged devices such as laptops and tablets. Rugged devices are particularly durable and robust in demanding environments such as in harsh warehousing conditions – since frontline workers lose over 70 minutes of productivity with each mobile device failure and IT departments spend 63 minutes addressing each of these,[1] it is imperative warehouses look to equip their workforce with these sorts of rugged devices in order to meet the rigors of logistics workflows.

Rugged devices are also highly versatile since they can be mounted in various places such as on forklifts, carts and truck dashboards.[2] They generally also have longer lifespans and battery lives than most commercial devices, which aren't designed to withstand these conditions that may make them susceptible to damage such strong vibrations, rough handling and drops – 43% of workers also say that the batteries in these devices need to be replaced after just 18 months.[3] Furthermore, the portability and demountability of rugged devices is key in allowing warehouses to adopt a variety of digital functions and in supporting their digital transformation.[4]

Getac, a leading manufacturer of rugged mobile computing solutions, has more than 30 years of experience in providing a range of markets around the world with the tools they need to work safely and efficiently. Their devices have both the computing power and ruggedness required for working

1 VDC Research Group (2021) https://www.vdcresearch.com/Coverage/emob/reports/20-Total-Cost-of-Ownership.html **2** Handheld Group (2022) https://www.handheldgroup.com/es/soluciones-robustas/mercados/rugged-computers-for-warehousing/ **3** VDC Research Group (2021) https://www.vdcresearch.com/Coverage/emob/reports/20-Total-Cost-of-Ownership.html **4** Conker (January 2021) https://www.weareconker.com/articles/the-role-of-rugged-devices-in-the-supply-chain/ **5** Forklift Certification (2022) https://www.forkliftcertification.com/how-to-avoid-forklift-accidents/

with ease, providing an ideal platform for inventory and warehouse management.

These solutions can link directly with warehouse management systems, further improving operational efficiency by optimising available labour resources and reducing perishable product waste. Getac also offers total solutions such as vehicle docks for forklifts and even driving safety software to reduce the frequency of accidents and damage. Since 70% of forklift truck accidents are preventable, the majority of which are caused by operator errors[5], software such as Getac Driving Safety Utility are essential for warehouses. Getac Driving Safety Utility, for example, reduces visual and manual distractions with its screen blanking function, helping forklift drivers to stay focused and to keep them safe.

Getac also offers multiple rugged tablets that bring the configurable options that professionals need for working in warehouses in a lightweight, rugged format. The digitiser pen and stylus, for example, help replace pen and paper when record-keeping, while the devices' cameras make data easier to preserve and transfer, helping to further digitise operations.

Since barcode scanners and RFID readers are often needed to identify assets and inventory, both for quality control and shipping accuracy purposes, the rugged devices also offer 1D and 2D barcode reader options to help make all warehouse operations smooth.

Furthermore, Getac ensures easy integration with devices that are compatible with the market's leading warehouse management systems, as well as with the mounts, docks and other accessories needed to create an excellent warehousing solution. From forklift mounts to hands-free carrying options, Getac solutions have what you need.

To find out how to accelerate your digital transformation and create your digital warehouse of the future, visit getac.com.

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