

INDUSTRY 4.0

Digital Twins

Digital Twins – Concept

The concept of Digital Twin Technology is one of the top 10 strategic use of technologies that will have a broad and deep impact on product and production systems over the next 5 years. The Digital Twin concept represents the convergence of the physical and the virtual world where every physical systems (industrial production systems, products) will get a dynamic digital representation. Throughout the product development life cycle, right from the design phase to the deployment phase, organizations can have a complete digital foot print of their products. These ‘connected digital things’ generate data in real time, and this helps businesses to better

analyse and predict the problems in advance or give early warnings, prevent downtime, develop new opportunities and even plan better products for the future at lower costs by using simulations. All these will have a greater impact on delivering a better customer experience. The Digital Twin is the convergence of Big Data, Artificial Intelligence (AI), Machine Learning (ML) and Internet of Things (IOT) which are key to Industry 4.0 and are predominantly used in the Industrial Internet of Things, engineering, and manufacturing business space. The widespread reach and usage of the Internet of Things have made Digital Twins more cost-effective and accessible for the business world.

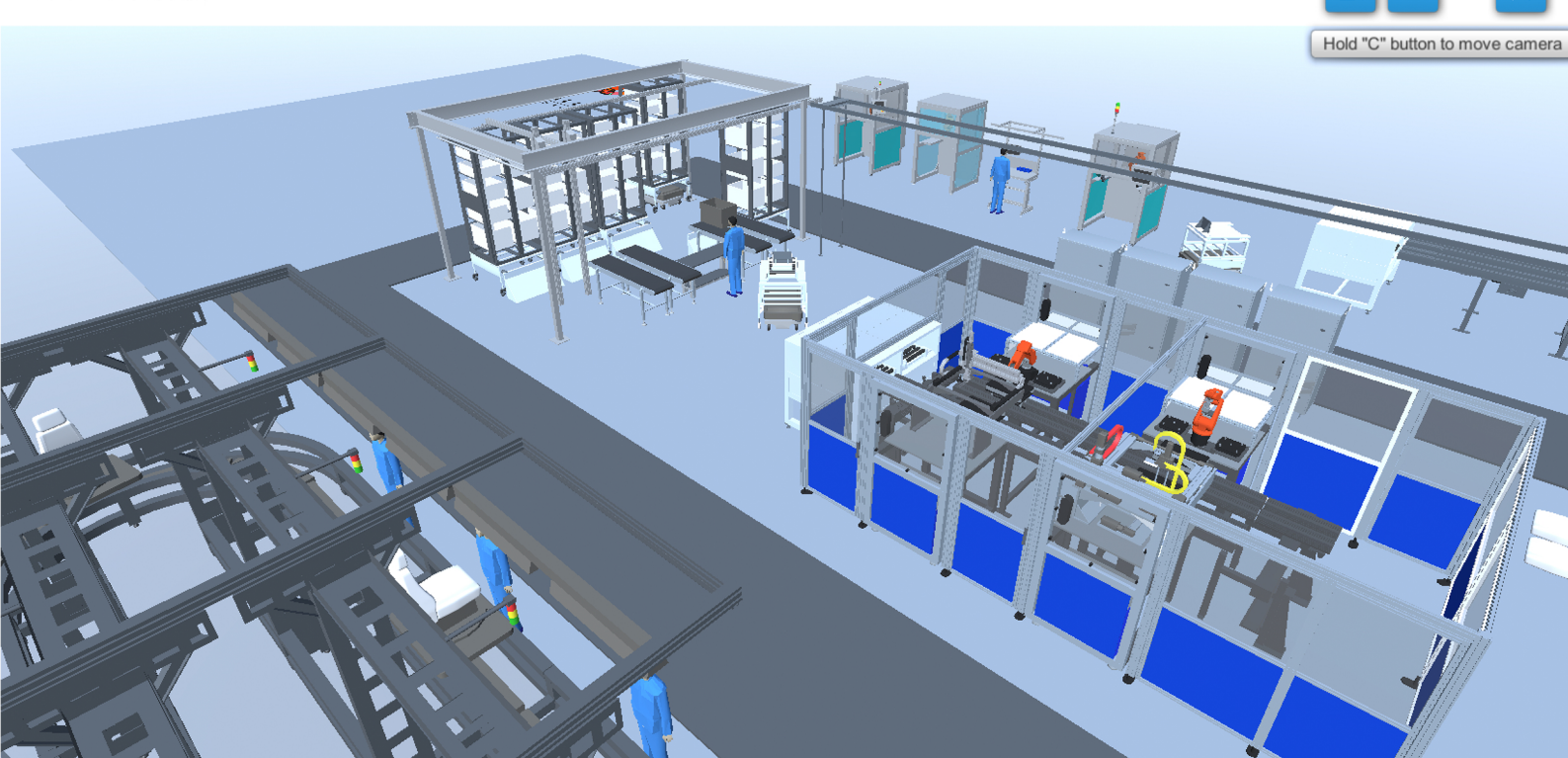


Digital Twins – How do they work?

Digital Twins, the virtual counterparts of the physical assets are created as digitalized duplicates of machines / equipment or physical sites using simulation models and data generated by sensors. These digital assets can be created even before an asset is built physically. To create a Digital Twin of any physical asset, the engineers collect and synthesize data from various sources including physical data, manufacturing data, operational data and insights from analytics software.

All this information along with AI algorithms is integrated into a physics-based virtual model and by applying Analytics into these models we get the relevant insights regarding the physical asset. The consistent flow of data helps in getting the best possible analysis and insights regarding the asset which helps in optimizing the business outcome. Thus the digital twin will act as a live model of the physical equipment.

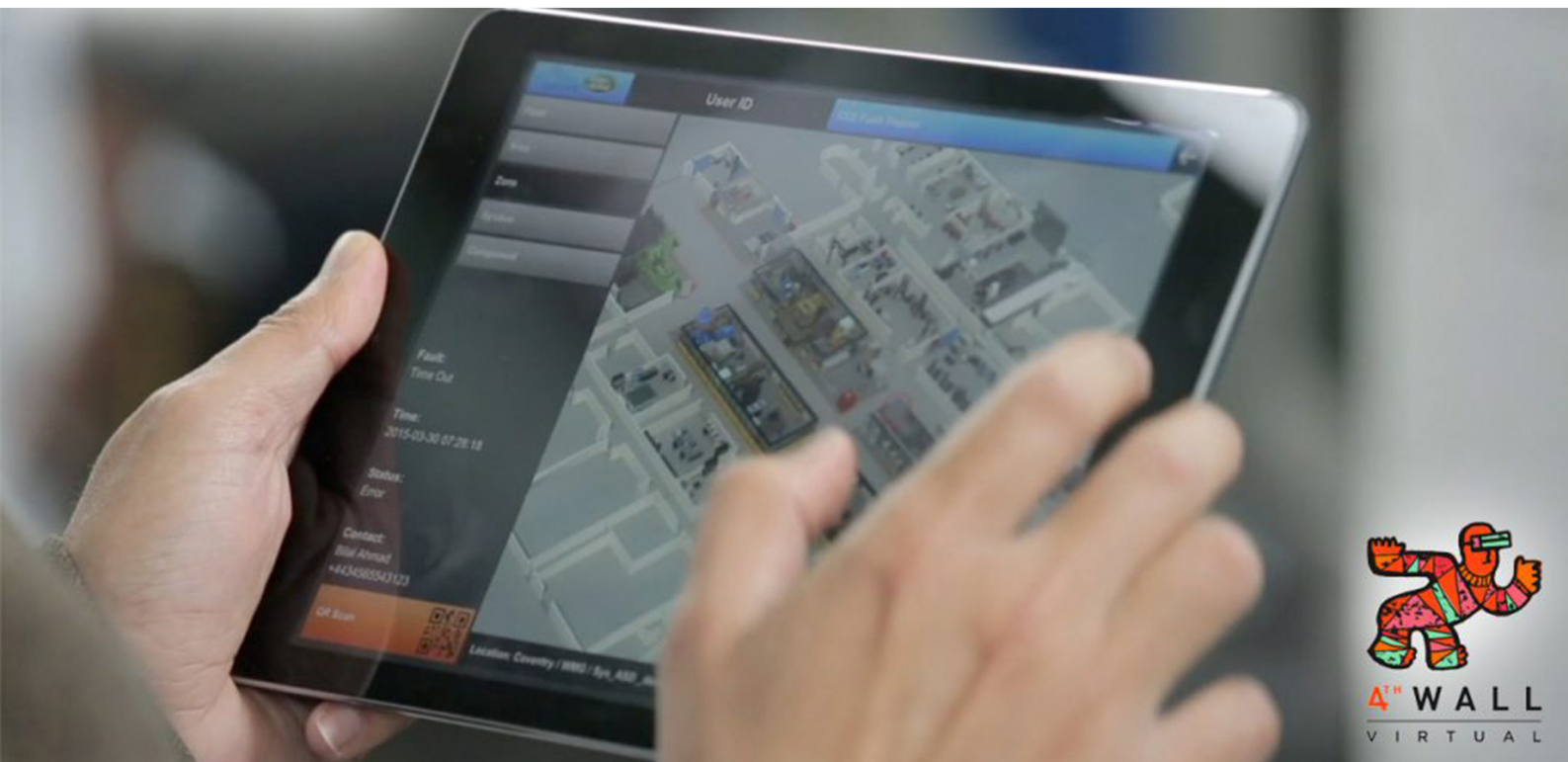
Micro-Warehouse



Digital Twins – Applications

The Digital Twin concept is the next big thing in many of the business sectors, which helps in accurately predicting the current state and future of physical assets by analysing their digital counter parts. By implementing Digital Twins,

organizations can gain better insights on product performance, improve customer service and make better operational and strategic decisions based on these insights. We have started seeing the major applications of Digital Twins in the following sectors.



Digital Twins – Applications

Manufacturing:

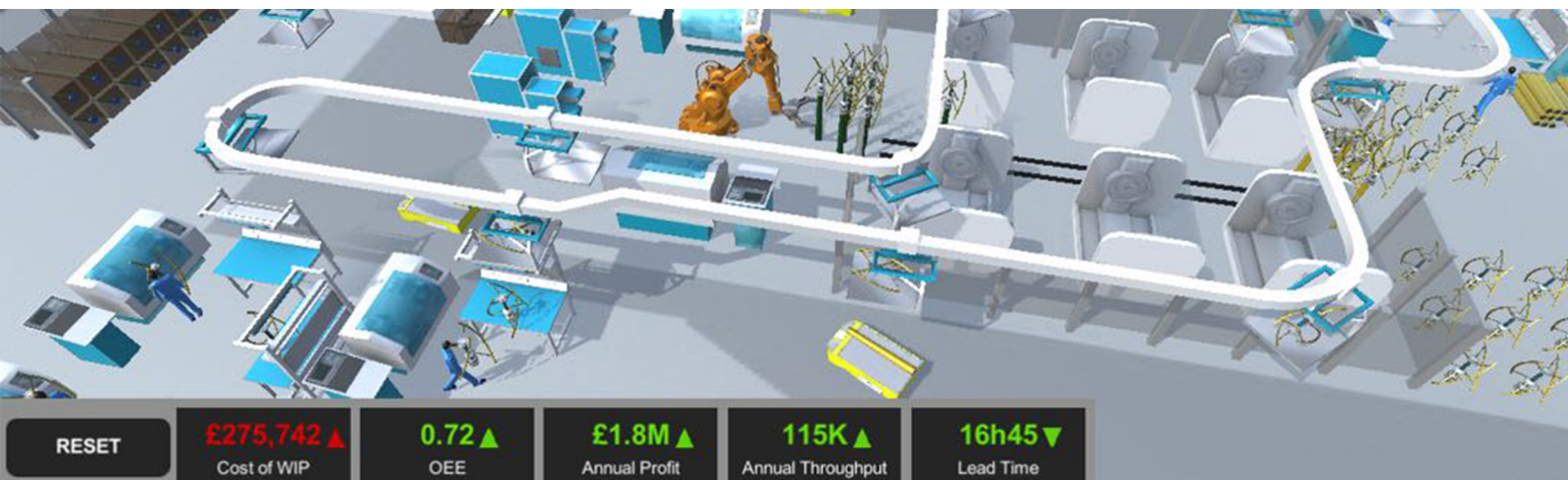
Digital Twins are poised to change the current face of the manufacturing sector. Digital Twins have a significant impact on the way products are designed manufactured and maintained. It makes manufacturing more efficient and optimized while reducing the throughput times.

Automobile:

Digital Twins can be used in the automobile sector for creating the virtual model of a connected vehicle. It captures the behavioural and operational data of the vehicle and helps in analysing the overall vehicle performance as well as the connected features. It also helps in delivering a truly personalized/ customized service for the customers.

Retail:

Appealing customer experience is key in the retail sector. Digital twin implementation can play a key role in augmenting the retail customer experience by creating virtual twins for customers and modeling fashions for them on it. Digital Twins also helps in better instore planning, security implementation and energy management in an optimized manner.



Digital Twins – Applications

Healthcare:

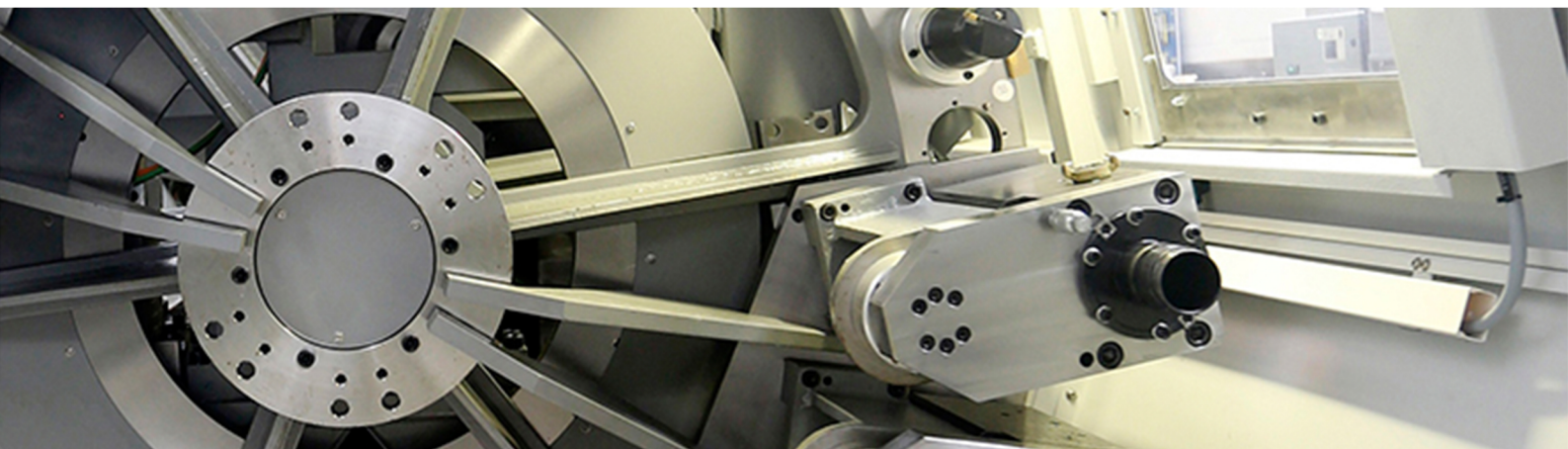
Digital Twins along with data from IOT can play a key role in the health care sector from cost savings to patient monitoring, preventative maintenance and providing personalized health care.

Smart Cities:

The smart city planning and implementation with Digital Twins and IOT data helps enhancing economic development, efficient management of resources, reduction of ecological foot print and increase the overall quality of a citizen's life. The digital twin model can help city planners and policymakers in the smart city planning by gaining the insights from various sensor networks and intelligent systems. The data from the digital twins help them in arriving at informed decisions regarding the future as well.

Industrial IoT:

Industrial firms with digital twin implementation can now monitor, track and control industrial systems digitally. Apart from the operational data, the digital twins capture environmental data such as location, configuration, financial models etc. which helps in predicting the future operations and anomalies



Digital Twins and Industry 4.0

The fourth industrial revolution or Industry 4.0 which embraces automation, data exchange and manufacturing technologies is a disruptive trend in the business world. The Digital Twin is at the core of this new industrial revolution bringing in unlimited possibilities. It changes the traditional approach of 'the first build and then tweak' in the industrial world and brings in a more virtual system based design process that brings in the much more efficient role out of any equipment or system by understanding its unique features, performance, and potential issues if any. With a Digital Twin, an operator can be trained on a virtual machine without the need for a dedicated trainer or simulator.

With the further evolution of Machine Learning and Artificial Intelligence, the future is not too far away for the machines to take autonomy to the next level. In such an autonomous world of industrial machines, the role of the Digital Twin will evolve and we can witness increasing self-awareness in the machines. Such machines will be capable of optimizing their performances, coordinating with other machines, doing self-diagnosis and self-repairing faults, with minimal intervention from a manual operator. No doubt, there is an exciting future ahead in the world of Manufacturing and Engineering and the Digital Twin is a significant step to it. Are you ready to unlock this potential?

