

The rise of smart factories: AI and data analytics are driving the future of manufacturing

By [Tony Bartlett](#)

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The application of data in manufacturing is causing a significant transformation. The utilisation of cutting-edge technologies such as edge computing, artificial intelligence/machine learning, and streaming analytics, along with the availability of real-time data, is facilitating the emergence of innovative solutions and enabling factories to become smarter.



Tony Bartlett, director data centre compute solutions, Dell Technologies SA | image supplied

According to a [report](#) from Fortune Business Insights, global big data in the manufacturing industry was \$3.22bn in 2018 and is projected to reach \$9.11bn by 2026, with a CAGR of 14.0% during the forecast period.

The Africa region is projected to grow at a steady CAGR rate during the forecast period on the back of rising government initiatives. Today, forward-leaning enterprises are pairing operational technology (OT) with edge and AI to enable use cases that deliver remarkable benefits.

The evolution of smart manufacturing

In manufacturing, 'the edge' is the production environment, where cameras, sensors, machines and assembly lines generate data. Using edge computing technology, enterprises collect and translate data from these sources or from automation control systems connected to these sources. The data is analysed using technologies such as streaming data analytics and AI to enable immediate insights for rapid decision-making and instantaneous action.

At the same time, the vast influx of data at the edge can paradoxically become a barrier to transformation. Expanding data sets, including new data types across new edge locations, can overwhelm edge technology with its sheer volume — even as user expectations for real-time insights increase.

Despite these challenges, manufacturers and other industrial firms continue to innovate at the edge, differentiating themselves based on their ability to derive value from edge data. Today, that means making use of AI and ML to process massive data sets and return insights in near real-time at the point of data creation and consumption.

The benefits of AI in action at the edge are numerous and incredibly impactful – they include:

Lower number of defects - AI can track parts coming into and moving through the factory. Computer vision helps speed and automate the work in progress throughout the entire production cycle. Defects can be identified, flagged and tracked back to individual processes or components in real time for immediate remediation as opposed to after a defective product is discovered.

Minimal breakdowns - AI-driven predictive maintenance systems use data from sensors and IoT data to pinpoint the exact location of maintenance requirements, saving technicians significant amounts of time in diagnoses and allowing the organisation to proactively predict and prevent future equipment failures. Proactively keeping equipment and processes up and running at an optimal level of performance helps protect workers, avoid disruptions and reduce maintenance costs.

Addresses knowledge gaps - Augmented reality (AR)–based AI systems allow offsite specialists to visit the factory virtually, using the AR interface to directly evaluate a situation and guide or train onsite workers. The AI can also understand situational context and load standard processes for recommended action, with each step clearly demonstrated in AR, allowing untrained workers to perform complex tasks in cases where specialists are unavailable.

Use edge AI to generate more value

Moving AI to the manufacturing edge promises a lot of tantalising benefits, but it also poses some unique challenges that need to be overcome for manufacturing edge AI deployments to be successful.

Organisations need to set up a strong foundation of back-end infrastructure and consulting services to fully understand the entire journey from ingesting edge data to getting the desired business outcome from beginning to end.

To further simplify deployment, integration, security and management, configured systems built by manufacturing AI experts can accelerate time to value with solutions designed especially for smart manufacturing use cases.

Choosing an engineering-validated solution for AI can help businesses overcome barriers to adoption, including a lack of onsite AI expertise. Validated designs are tested and proven configurations are designed from the start to dynamically fit needs based on specific use cases. These integrated solutions have been stringently tested and documented to help speed and simplify deployment.

Outcome-driven use cases

The use cases behind today's success stories are as varied as manufacturing subsectors, but themes are emerging: Connected worker, overall equipment effectiveness, predictive maintenance, production quality, yield optimisation,

enhanced logistics, production optimisation and digital twins are among the most common manufacturing edge use cases.



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Edge computing with AI and streaming data analytics is increasingly deployed for use cases such as predictive maintenance, computer vision, production quality and digital twins, all of which require analysing vast volumes of multi-dimensional data such as images, audio and sensor readings from connected devices and equipment as well as other assets.

Certain use cases, such as those that enable the connected worker to be more productive and safer, rely on high-speed and ultra-low latency connectivity, such as Wi-Fi and cellular, to deliver just-in-time productivity and safety information.

Other emerging use cases, such as augmented reality and mixed reality for maintenance and training applications, will require the flexibility and cost-effectiveness of 5G networks to solve age-old connectivity and Wi-Fi data throughput issues.

Together, these technologies and use cases can help manufacturers give their customers what they want when they want it: innovative, high-quality products at competitive prices while meeting increasingly stringent profitability, sustainability and safety goals.

By drawing on the power of AI at the edge, smart manufacturers are realising the very tangible and measurable business benefits that come with better, faster insights at the point of need. This intelligent approach to manufacturing gives them the ability to differentiate and compete in a competitive global marketplace.

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