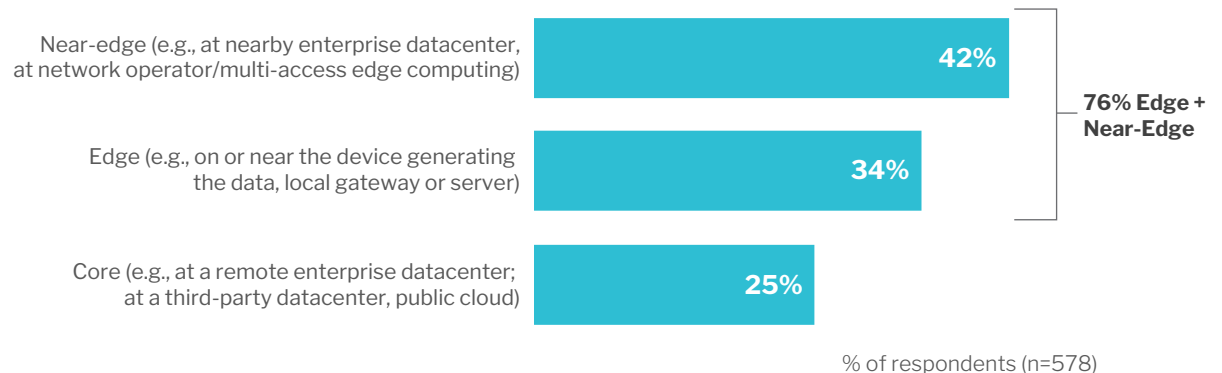# Powering Industry at the OT/IT Edge

The 451 Take

For OEM builders of industrial machines and operational technology (OT) solutions, a new reality is taking hold. While manufacturers and other asset-heavy firms today more than ever require purpose-built applications suited to their unique industrial needs, they also want to run those apps and capture and analyze the data they generate using industry-standard hardware and software, via modern IT techniques like virtualization, big data and AI-based analytics and DevOps methodologies. And they increasingly want to run mission-critical workloads not in the cloud, but at the industrial edge, close to the machines and data. To speed product design and deliver products ready to be deployed in such environments, industrial OEMs must heed the requirements of this growing OT/IT industrial edge.

These trends sit at the center of the industrial sector's latest transformation – dubbed Industry 4.0 – fueled by increasingly autonomous, data-driven computerization and automation. It is driven by the integration and optimization of two technology spheres: OT, enabling manufacturing and industrial machines and processes, and IT, with dynamic and increasingly powerful compute, storage, analytics and IoT connectivity. The industrial firms undergoing this digital transformation are leveraging the data flowing from their machines, which is then processed and analyzed on that IT infrastructure to gain actionable insights that can drastically improve their operations – and ultimately their competitiveness.

Speed-to-decision, data management, security, performance/latency and cost concerns are increasingly placing that industrial intelligence at the edge, requiring a new class of more powerful, industrial-strength edge compute hardware, application software and AI analytics capable of enabling this mission-critical work. Today, according to 451 Research's Voice of the Enterprise IoT – Operational Technologies Perspective survey of OT professionals, 76% of manufacturers say they initially analyze machine and operational data at an 'edge' or 'near-edge' location.

Industrial Firms Process More Than Three-Quarters of Machine Data at the Edge/Near-Edge

Source: 451 Research's Voice of the Enterprise IoT – Operational Technologies Perspective

Near-edge (e.g., at nearby enterprise datacenter, at network operator/multi-access edge computing): **42%**

Edge (e.g., on or near the device generating the data, local gateway or server): **34%**

76% Edge + Near-Edge

Core (e.g., at a remote enterprise datacenter; at a third-party datacenter, public cloud): **25%**

% of respondents (n=578)

intel®

Business Impact

This industrial edge presents unique requirements, and is enabled by an array of hardware and software. It encompasses brownfield machines empowered with edge capabilities via adjacent appliances and gateways to altogether new industrial systems with significant amounts of embedded storage and compute. Typically ruggedized and industrial-grade, these solutions are likely custom-built by specialty OEM vendors specifically for the industries they serve – from manufacturing to oil/gas to energy and utilities. No two manufacturing environments are the same, and neither are the industrial machines, data and use cases that drive them.

Yet for all its uniqueness, the industrial OT/IT edge is also evolving to require a common set of more powerful, IT industry-standard infrastructure, including increased storage to locally capture and house massive amounts of machine and sensor data, and growing levels of compute to drive complex local processing and sophisticated edge analytics, including increasing amounts of artificial intelligence (AI) and machine learning (ML) training and inference. As it turns out, driving execution exclusively to the cloud was a shortsighted move made by far too many early industrial IoT adopters. Although it was suitable for initial PoCs, this approach often ran into problems at production scale. Delivering edge processing via underpowered, underperforming and vendor-proprietary infrastructure is the follow-on error that industrial firms – and their OEM system vendors – can't afford to make.

INDUSTRIAL AUTOMATION: UNIQUE ENDPOINTS AND USE CASES. Industrial operations represent a unique execution environment – heavy in sector-specific equipment and characterized by ruggedized, at times remote and disconnected locales. Industrial data endpoints are also unique, with Supervisory Control and Data Acquisition (SCADA), Distributed Control Systems (DCS) and Manufacturing Execution Systems (MES) throwing off mission-critical data, often in massive amounts. Retaining and analyzing data can yield critical near-term and historical insights, enabling next-generation industrial use cases such as manufacturing and supply chain optimization, predictive machine maintenance and augmented worker interfaces – requiring significantly increased levels of edge storage, compute and analytics. Consider, for example, a piece of complex manufacturing equipment. Sensors can be added to track its temperature and identify leaks, while a camera captures audio-visual signals to identify faulty electrical equipment or unlubricated bearings. Changes over time can be analyzed to not only detect, but anticipate, outages and downtime, with augmented reality goggles delivering to repair techs virtual representations of the system failure and digital manuals to guide their work.

OT/IT INDUSTRIAL EDGE: MISSION-CRITICAL EXECUTION ENVIRONMENT. Industrial firms have unique operational needs that increasingly require Industry 4.0 and manufacturing analytics to occur closer to where machine and sensor data is generated. Control systems must respond in rapid fashion, demanding a low-latency execution environment. Security and data sovereignty are paramount, requiring the bulk of machine data to remain on-premises. The sheer volumes of data are staggering – as are associated wide area transport and cloud storage/compute costs – calling for higher levels of local data processing, including the use of AI/ML algorithms. Factory floor AI is particularly powerful, for example, coupling high-resolution cameras and ML algorithms in 'computer vision' systems that proactively detect product defects, or continuously collecting and analyzing manufacturing line productivity and output data to improve efficiency and limit waste.

Looking Ahead

Manufacturers and other industrial firms will increasingly compete and differentiate themselves based on their ability to execute on Industry 4.0 and industrial OT/IT edge concepts. While the infrastructure to support these requirements will necessarily span from edge to cloud, industrial firms are already executing the bulk of their workloads at the edge or near-edge, close to where their endpoint data is generated. That trend will not only grow, but so will the volumes of data collected, and the local processing and analytics power required to yield actionable insights. Looking ahead, vendors providing industrial IoT solutions must build and deliver them on infrastructure capable of enabling a fully powered, fully intelligent OT/IT industrial edge or they risk themselves and their customers being left behind.

DELL Technologies

Innovate faster with Dell Technologies and Intel. Build your solution on top of industry leading technology that we can modify, configure, test and optimize to fit your exact workload, scaled and deployment requirements.

Learn more at Dell Technologies.