

Sustaining and Automating Progress – From Goals to Real Gains



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The semiconductor industry is entering a new era of rapid expansion, driven by global demand for AI, advanced computing, electric vehicles, and digital infrastructure. As fabs scale up production and technological complexity, the challenge is no longer just increasing capacity—it is doing so sustainably and efficiently. Automation and sustainability must therefore evolve together, supported by a robust digital infrastructure that bridges Information Technology (IT) and Operational Technology (OT).

Traditionally, many critical operational systems within semiconductor facilities operate independently. Production equipment monitoring, facility management systems, environmental sensors, security platforms, and enterprise IT systems are often deployed in separate technology domains. While each system may perform well individually, fragmented infrastructure limits the industry's ability to automate operations and optimise sustainability outcomes at scale.

The next phase of digital transformation in semiconductor manufacturing lies in integrating IT and OT infrastructure into a connected operational ecosystem. At OneSystems Technologies, we approach this challenge through a framework built on Connectivity, Aggregation, and Automation.

First, connectivity enables diverse operational systems—including building management systems (BMS), environmental monitoring, energy metering, DCIM platforms, security systems, and factory operational networks—to communicate across a secure infrastructure backbone.

Second, data aggregation allows operational data from these systems to be centralised and contextualised. When facility data, equipment performance metrics, and environmental conditions are aggregated onto unified monitoring platforms such as command-and-control systems, operators gain holistic visibility across the entire facility environment.

Finally, automation transforms this data into actionable intelligence. Advanced analytics and AI-driven monitoring can enable predictive maintenance, optimise energy consumption, and automate responses to operational anomalies. For example, integrating facility monitoring with DCIM and environmental sensors can dynamically optimise cooling efficiency and power utilisation—two of the largest contributors to energy consumption in semiconductor facilities.

Beyond operational efficiency, integrated IT/OT infrastructure also strengthens resilience and cybersecurity. Unified monitoring platforms allow earlier detection of operational irregularities and faster response to system disruptions, helping fabs maintain the high reliability required for semiconductor manufacturing.

As the semiconductor industry continues to scale globally, the convergence of IT and OT infrastructure will be fundamental to sustaining progress. When digital infrastructure is designed as a unified platform rather than isolated systems, automation and sustainability move beyond theoretical objectives and become measurable operational gains.

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