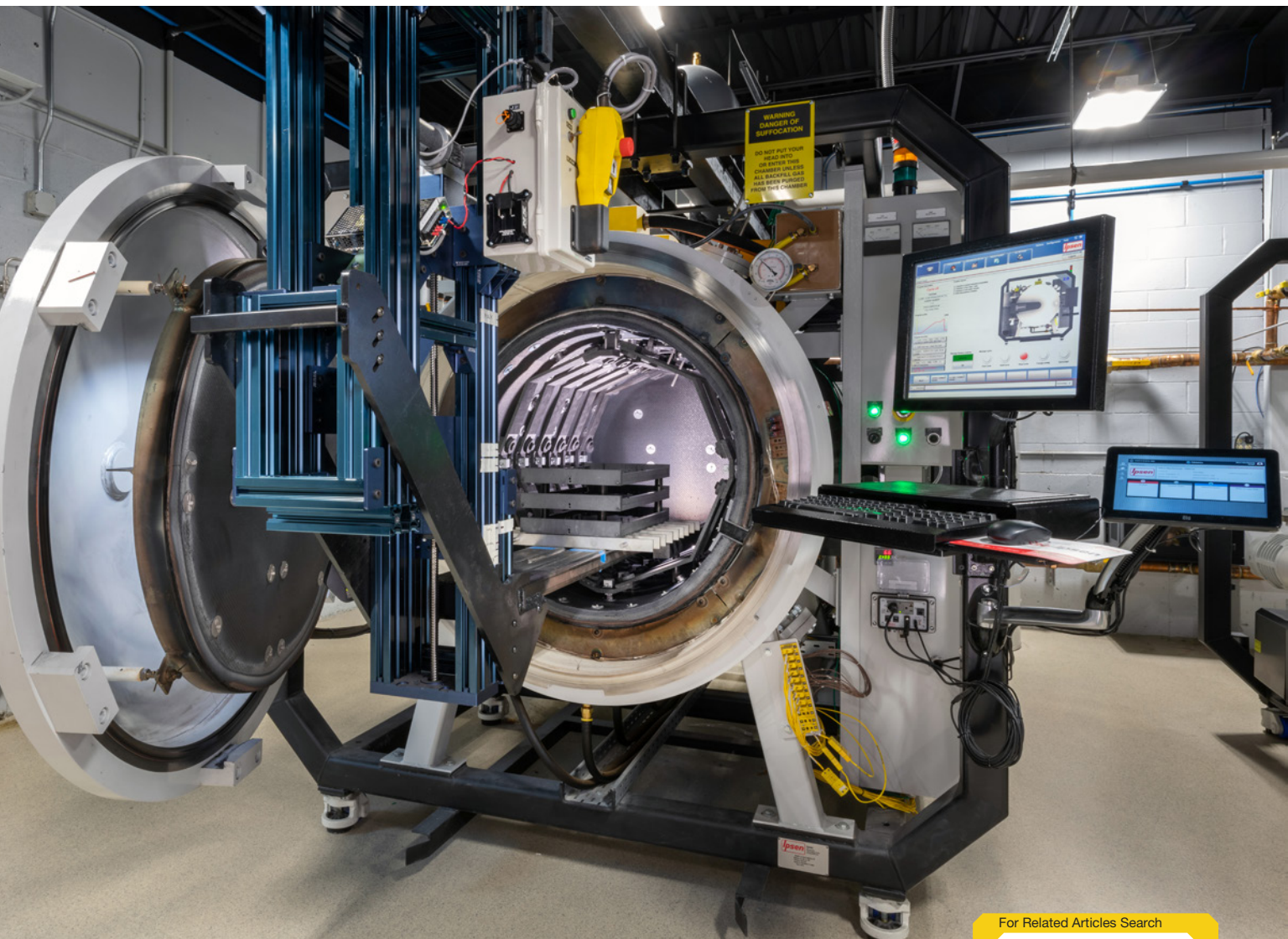# The Digital Ecosystem with Ipsen

IIoT, AI and automation integration leads to enhanced heat treat capabilities

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By understanding customers' manufacturing and heat-treatment processes, Ipsen identifies pain points and develops IIoT and AI-driven solutions that improve operational efficiency.

"One of the biggest challenges in heat treating is unplanned furnace downtime, which leads to production delays and increased costs," said Aymeric Goldsteinas, Ipsen's vice president of digital technologies. "To address this, we are developing the next generation of PdMetrics, an AI-enhanced predictive maintenance system that uses sensors, machine learning, and anomaly detection to monitor furnace health in real-time. This allows customers to schedule maintenance before equipment failure occurs, minimizing disruptions and improving Overall Equipment Effectiveness (OEE)."

Additionally, digital transformation enhances the customer experience through self-service solutions. A key initiative in this journey at Ipsen is the online customer portal, Ipsen Connect, which serves as a one-stop hub for customers to manage equipment, service needs, and operational efficiency, all within an intuitive digital ecosystem.

"By integrating AI, IIoT, and automation, digital transformation helps customers minimize downtime, optimize spare parts management, enhance maintenance planning and improve workforce efficiency," Goldsteinas said.

Several areas within heat treating can significantly benefit from IIoT and AI-driven solutions:

- Predictive maintenance, such as Ipsen's *PdMetrics*, provides real-time health monitoring, notifying customers before failures occur allowing proactive maintenance scheduling.
- Spare parts management through tools like Ipsen Connect, which syncs with a CRM, allows customers to request quotes, reorder parts, and track shipping to ensure customers always have access to critical components.
- A centralized knowledge hub can utilize AI chatbots and advanced search engines to organize resources like troubleshooting guides, training videos, and best-practice articles. This approach allows users to quickly access relevant information, reducing reliance on external support and improving operational efficiency.

These solutions allow customers to maintain operational excellence with minimal disruptions.

In addition, digital transformation can drive significant improvements in resource efficiency for more sustainable manufacturing practices. Predictive maintenance for resource efficiency, for example, helps extend the lifespan of equipment by addressing issues before they lead to failures. This not only reduces unplanned downtime but also minimizes unnecessary material waste by optimizing the use of equipment and resources.

Energy optimization is captured using digital solutions such as real-time monitoring and adjustments which allow for more efficient energy use in heat-treatment processes, reducing overall energy consumption and lowering carbon footprints.

By providing insights into process improvements, digital solutions can reduce defects and rework, ultimately minimizing material waste. Optimizing production workflows also enhances overall productivity, which contributes to fewer resources being used per unit produced.

"As heat-treating facilities become more connected through IIoT and cloud-based solutions, cybersecurity and data protection will be critical for ensuring safe, uninterrupted operations. Key considerations include secure data management and remote access security," Goldsteinas said.

This includes using encryption and controlled access to prevent unauthorized access. As remote furnace monitoring and control become more prevalent, security protocols such as multi-factor authentication and VPNs are essential.

"Ensuring robust connectivity and cybersecurity measures will be vital for the future of smart manufacturing in heat treating," Goldsteinas added.

Smarter Technologies

Automation is revolutionizing heat treating by enhancing process accuracy, minimizing manual intervention, and increasing repeatability.

According to Goldsteinas, a smart furnace is defined by real-time data monitoring, AI-driven decision-making, and automated service management. Ipsen's next-generation digital solutions are shaping the future of smart furnaces with the following capabilities:

- IIoT-connected sensors: Measure temperature, pressure, and gas flow in real time.
- AI-powered predictive maintenance: Monitors equipment health status and detects potential failures.
- Automated parts and service management: Allows customers to track service history, request repairs, and order parts with a single click.
- Remote monitoring and control: Enables customers to access and adjust furnace parameters from any location.

The Future of Heat Treating

In general, smart furnaces offering AI/machine learning will provide better data, easier operation and the ability to stay ahead—and prevent—failures. This investment in data collection will provide long-term benefits if companies aren't scared away by initial costs and training expenses. As parts become more complex in the future, heat treaters will need additional resources to stay ahead of the competition.

Goldsteinas noted several areas where smart furnaces will continue to evolve from an IIoT and digital manufacturing perspective.

"Self-optimizing AI-driven operations is one," Goldsteinas said. "AI will automatically adjust heat-treatment cycles, optimizing energy use and part quality. Another is digital twin technology where virtual furnace models will simulate heat-treatment scenarios, allowing customers to test process adjustments before implementation."

Two more focal points in heat treating will be using the blockchain for traceability and AI for advanced troubleshooting.

"Heat-treated parts will have tamper-proof digital records, ensuring full process transparency and compliance," Goldsteinas said. "Using augmented reality (AR) for remote diagnostics will also reduce the need for on-site service interventions."

Ipsen is committed to continuously developing solutions that will make heat treating more autonomous, efficient, and sustainable now and in the future.

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