AI-Driven Process Optimization: How Tersa Achieved 35% Steam Savings with AG Solution

The gap between theoretical AI concepts and scalable, practical implementation continues to challenge operations leaders in today's process manufacturing landscape. For waste-to-energy facilities facing growing environmental pressures and efficiency demands, bridging this gap can mean the difference between stagnation and sustainable growth.

Barcelona's waste valorization company, Tersa, partnered with AG Solution, industrial digitalization experts, to address this challenge. They delivered a real-world AI implementation that transformed their steam management operations and significantly boosted energy production capacity.

The Challenge: Inefficient Steam Usage in Waste Valorization

Tersa operates a waste-to-energy plant that processes municipal waste from the Barcelona metropolitan area. The facility's core process involves incinerating waste to generate electricity.

A critical maintenance challenge emerged in the plant's third duct, where impurities carried by the gas would build up over time, requiring periodic cleaning through steam soot blowing. The traditional approach was simple but inefficient: clean the ducts every 12 hours regardless of actual conditions.

"We were looking for ways to implement AI in our facility, but needed a practical application that would align with our efficiency and sustainability goals," explains Alex Sas, Maintenance Manager at Tersa.

Each cleaning operation consumed significant steam resources and reduced the flow rate to the turbine, directly impacting electricity output. The key challenge was determining precisely when cleaning was necessary—too frequently, valuable steam would be wasted; too infrequently, efficiency would drop due to impurity buildup.

The Solution: From Data Silos to AI-Driven Operations

AG Solution's comprehensive approach transformed Tersa's maintenance operations from time-based to condition-based, leveraging real-time data and advanced AI algorithms.

The solution architecture followed a strategic data roadmap:

1. **Data Acquisition & Integration:** Real-time process data from the plant's systems was collected and integrated into a centralized digital database.

2. **AI Model Development:** Historical process data was used to train an artificial neural network algorithm that could accurately predict when cleaning was truly necessary.

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3. **Validation & Testing:** The model underwent rigorous testing to validate its predictive capabilities before deployment.

4. **System Integration:** The algorithm was connected to the plant's central Data Hub to receive system parameters in real time, and the results were fed back to the plant's Hub, which was connected to the Distributed Control System (DCS).

5. **Autonomous Operation:** The intelligent system now triggers cleaning operations only when necessary, without requiring human intervention.

"This project exemplifies what happens when the right data foundation is in place", explains Ricard Torralba, Artificial Intelligence Leader at AG Solution. "Real-time process data is structured through a central Data Hub, contextualized for AI consumption, and fed into optimization algorithms. The resulting insights are looped back into operations via the plant's Distributed Control System, enabling autonomous decision-making and real-time performance gains."

What makes the case unique isn't just the AI model; it's the architecture behind it. This is not about solving a one-off problem. It is about building a solution that can be reused, scaled, and monitored—not just at TERSA but in any plant that shares the same data strategy.

The Results: Measurable Impact on Operations, Costs, and Sustainability

Two years after the implementation, the AI-driven solution delivered remarkable results:

- **40% reduction in steam consumption** for cleaning operations
- **500 MWh increase in annual electricity production**, equivalent to powering 625 homes
- **Approximately 325 tons of CO2 emissions reduced annually**
- **Complete automation** of a previously manual monitoring and decision process

"After almost two years of implementing this project across our production lines, we observed a theoretical ROI materialize with more than 40% steam savings, allowing us to generate additional megawatts of electricity," confirms Alex Saas.

Beyond the immediate operational benefits, the project yielded unexpected knowledge gains. Xavier Morera, Online Diagnostics Technician at Tersa, notes: "This AI project involved taking a neglected part of our process and using AI techniques to optimize and improve it. The knowledge we've gained about our process has been invaluable."

Marc Gardella, Diagnostics Manager at Tersa, adds: "The real environmental impact is that we're improving the energy cycle, increasing efficiency, and thus being able to produce more energy and valorize more waste."

Discover More at IoT World Congress 2025

Interested in learning how similar data-driven strategies could transform your operations? Join AG Solution's session **"From Data Silos to AI-Driven Growth: The Data Strategy for Turning Raw Data into Business Value"** on May 15, 2025, at 11:00 in the IOT Room. Ricard Torralba and Manuel Santiago will share insights on how IoT solutions and the Unified Namespace can break down data barriers and enable manufacturers to extract real business value.

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Visit AG Solution at **booth E17** to experience their complete end-to-end manufacturing industry 4.0 solutions and discuss how they can address your specific operational challenges. Their team of experts will be available to share insights on digital transformation strategy, operational efficiency, and technological innovation across process manufacturing.