



CASE STUDY

Engineers + AI:
How we boosted a leading processing
plant's motor efficiency by 40% and
slashed power consumption by 50%

OVERVIEW

RIOT Industrial is a leading machine data company. Specializing in control systems, machine data capture, and AI based data analysis solutions, we cater to businesses across North America.

BACKGROUND



A prominent food processing plant faced persistent inefficiencies and excessive maintenance demands in one of its critical waste pump systems. The plant operated multiple 150 horse power motors rated to run at a minimum of 40 Hz. However, the facility's control narrative instructed the motor to start at 18 Hz for the first minute of each cycle. With about 250 cycles per day, this inefficient startup behavior resulted in significant energy losses and premature wear on motor components.

Despite the plant's efforts to address the issue, three separate engineering firms concluded that modifying the motor's control logic was infeasible due to the complexity of the system.

OUR INNOVATION



RIOT Industrial met with the processing plant to fully understand the desired outcomes. It became clear that leveraging RIOT's next-generation AI tools in combination with specialized engineering expertise would be required for the 2,500+ pages of PLC control logic.

In conjunction with the AI tools, RIOT Industrial's team developed and implemented a revised control narrative that optimized motor performance in less than 1 week.

TECHNICAL IMPLEMENTATION

RIOT INDUSTRIAL'S TECHNICAL TEAM EMPLOYED ADVANCED AI-DRIVEN CONTROL LOGIC MODELING TO IDENTIFY OPTIMAL MOTOR STARTUP CONDITIONS. THIS PROCESS INVOLVED:

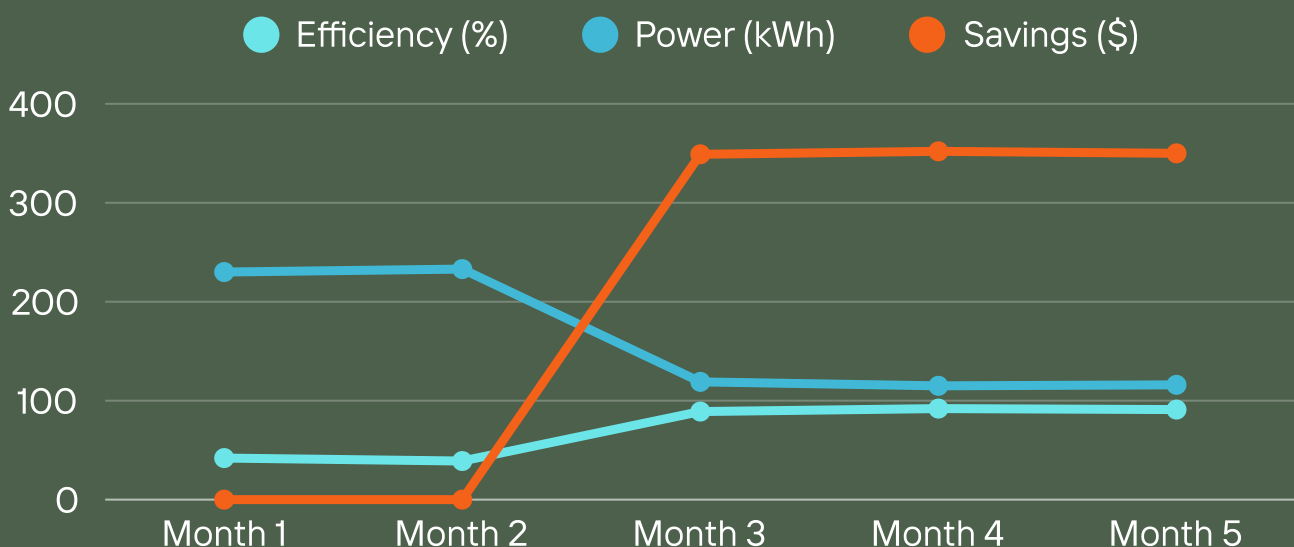
- **Data Analysis:** RIOT's AI platform (the Process Expert) analyzed historical performance data, PLC control logic, in-depth data tag analysis, and OEM manual specifications to reveal operational inefficiencies.
- **Dynamic Control Modeling:** The Process Expert tool simulated the control system behavior in multiple scenarios, allowing the team to develop a custom algorithm that seamlessly integrated with the existing infrastructure.
- **System Integration:** RIOT specialists implemented the updated logic without hardware overhauls or significant system downtime, demonstrating that precise software adjustments could bypass previously perceived limitations.

SOLUTIONS

Following the implementation of RIOT Industrial's revised control narrative, the food processing plant experienced significant improvements in energy efficiency and maintenance reduction.

ENERGY EFFICIENCY GAINS

- Operating at 18 Hz had previously resulted in an estimated efficiency of 50-60%, consuming ~233 kWh/day.
- With the new 45 Hz startup protocol, efficiency improved to approximately 85-90%, reducing energy consumption to 117 kWh/day.
- Energy Savings: ~116 kWh/day (~42,340kWh/year)
- Estimated Cost Savings: ~\$4,234/year per motor (\$16,936 for all four motors)



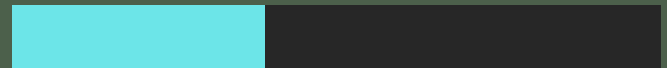
MAINTENANCE IMPACT

By reducing mechanical stress and improving cooling performance, unplanned downtime was reduced by an estimated 35%. This improvement significantly lowered emergency repair costs and increasing production uptime.

Original Downtime: 6%



New Downtime: 3.9%



Production Gain: 210 Hrs



- Less Torque Stress: Starting at 18 Hz places significant stress on motor windings and bearings because torque requirements increase at low speeds. Running closer to the motor's optimal speed reduces this strain.
- Improved Cooling: Operating at 45 Hz allows the motor's cooling fan to work more effectively, reducing heat buildup and extending the life of motor components.
- The reduced startup torque prevented excessive wear on the pump seals and impeller, extending their lifespan.

RESULTS

Our innovative approach paid off with a 40% increase in efficiency, a 50% decrease in energy costs, a 35% decrease in unplanned downtime, and a production gain of 210 hours per motor.

TAKE AWAY

RIOT Industrial's innovative approach, combining the Process Expert's AI-driven insights with specialized engineering expertise, enabled a breakthrough that three other engineering firms deemed impossible. By adjusting the motor's startup frequency from 18 Hz to 45 Hz, the plant achieved substantial cost savings, improved system longevity, and boosted operational efficiency.

This case study highlights the potential for Closed-Source AI-enhanced solutions to overcome entrenched operational inefficiencies and drive measurable improvements in industrial environments.

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RIOT INDUSTRIAL

RIOTINDUSTRIAL.COM

888-755-7573

LETSTALK@RIOTINDUSTRIAL.COM

