

CASE STUDY

REMOTE MONITORING, RELIABILITY IMPROVEMENTS & ENERGY EFFICIENCY FOR A US-BASED DETERGENTS MANUFACTURING FACILITY

ECOPLANT: SMARTER COMPRESSED AIR MANAGEMENT FOR A MORE SUSTAINABLE INDUSTRY

Compressed air is a critical resource in industrial operations, but traditional systems are often inefficient, leading to high energy costs and unnecessary CO₂ emissions. That's where Ecoplant comes in.

Ecoplant is revolutionizing the way industries manage compressed air by using advanced IoT technology and AI-driven analytics. Its smart system continuously monitors the performance of compressors, detects inefficiencies, and automatically adjusts operations in real time to ensure optimal performance. Instead of running compressors at fixed settings or relying on manual adjustments, Ecoplant dynamically adapts to actual demand, reducing energy waste and operational costs.

The benefits go beyond just savings. By improving efficiency, companies can extend the lifespan of their equipment, reduce maintenance needs, and minimize unplanned downtime. Additionally, lower energy consumption means a smaller carbon footprint, helping businesses achieve their sustainability targets.

With a growing network of industrial partners worldwide, Ecoplant is setting new standards for intelligent compressed air management—making factories and production facilities more efficient, reliable, and environmentally friendly.

OVERVIEW

TYPE: Detergents

MAIN CHALLENGES:

High leak rates, inefficient compressed air system, high risk for production downtimes.

“Implementing the Ecoplant control system allows us to recognize problems before they cause damage, optimize our energy consumption, and improve our sustainability strategy.”

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A major North American detergent manufacturer approached the Ecoplant team to improve the energy efficiency of their compressed air system and increase system reliability to maintain production at their busy site.

The Ecoplant team visited the site and identified the required system sensors in preparation for installation. Ecoplant then analyzed the compressed air system and provided an initial estimate of the site's overall energy savings potential.

The Ecoplant system was launched, and began continuous monitoring of the air system (see full P&ID below):



Figure 1: Compressed air system live P&ID dashboard

After installation, the Ecoplant system monitored and analyzed the site's air system over the following three weeks to identify inefficiencies and measure the baseline condition of the system.

Within this short period of time, we were able to identify some key issues that were negatively impacting the reliability and energy efficiency of the system: leakage detection: as shown in Figure 2, the system averaged 860 cfm (flow) and 268 kW (energy). We estimated that approximately 400 cfm of this volume was due to leakage. A continuous flow of 400 cfm equates to approximately 100 kW of continuous wasted energy (or the equivalent of \$52,000 in wasted energy per year).

Efficiently maximize your uptime by reducing the periods of time your compressed air systems aren't operating at their most efficient.

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After the leaks were fixed, a system was set up to continuously monitor and measure the flow to detect future leaks in the air system. The analysis team also found that the specific power of the system during the shutdown was 31.2 kW per 100 cfm, which was well above the optimized value of under 20 kW per cfm and indicated potential savings if the compressors were better controlled.



Figure 2: Non-productive air flow measured during plant shutdown

COMPRESSOR PRODUCTION EFFICIENCY

After further analysis, the Ecoplant system identified that the compressed air system is more efficient when it produces high air volumes (1400-1800 cfm). During low air volumes (900 – 1400 cfm) the system is 25% less efficient. This characteristic is typical of poorly controlled air compressors. The average system specific power of this system is 25 kW per 100 cfm produced, but an optimized system with good compressor control would be expected to run at under 20 kW per 100 cfm.

Ecoplant's dynamic engine can be used to improve the operation of the system by better matching the compressors to the plant air demand. By using the engine, we expect to achieve a 25% continuous improvement in efficiency during low air demand— or about 17% efficiency improvement overall.

Equipment providers and users have been able to prevent costly downtime through faster responses to problems.

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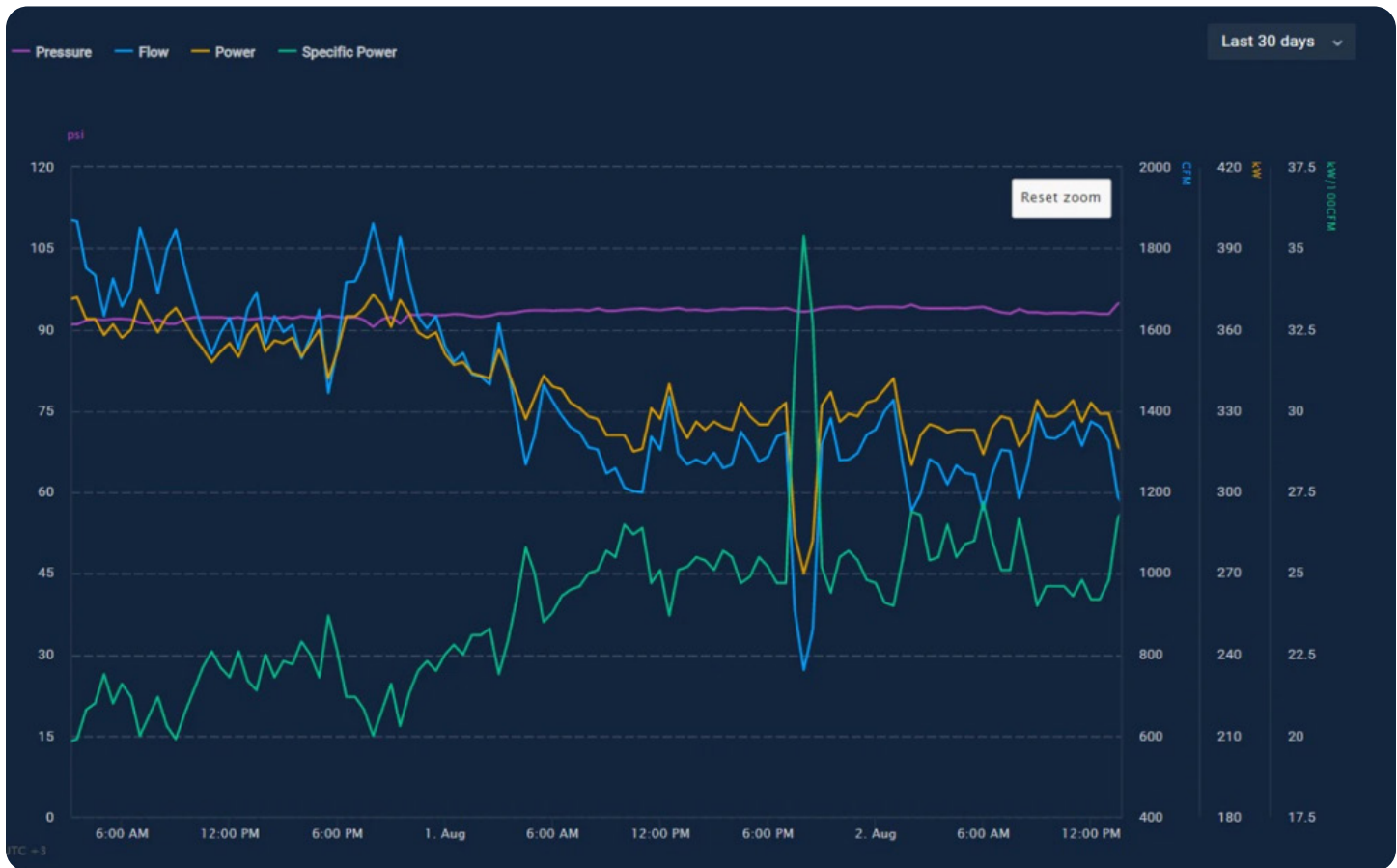


Figure 3: Compressed air system efficiency for low & high air volumes

The Ecoplant system continuously monitors system parameters; generating automatic system level and compressor level alerts if any value is detected within out-of-bounds range. The system also generates alerts based on compressor internal PLC alarms, since it is continuously communicating with each compressor controller. In this example (Figure 4 - Aug 8th) the system detected a pressure drop caused by compressor #3 overheating. This automatic alerting system alerts key operating personnel and helps to reduce the length of pressure drops and production downtimes.

Intelligent air compressor control and monitoring platform improves your system reliability, prevents downtime, and saves you up to 50% on your energy costs.

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Figure 4: Automatic generated alerts in the system

Following the baseline period, Ecoplant started the proactive optimization phase of the project. During this proactive optimization phase, our advanced AI algorithms dynamically control and optimize compressor operations in order to provide just enough air to meet the changing production air requirements. The advanced dash board and automatic alerting system help the customer monitor their air system from anywhere in the world, while allowing remote manual controls if necessary. The customer also receives automated alerts related to compressor maintenance and can take early action to avoid major breakdowns and the resulting costs. In the case of this client site, Ecoplant's key value is the ability to prevent sudden pressure drops in the system by automatically starting backup compressor capacity. This process reduces unplanned downtimes to a minimum and prevents pressure-related production outages.

Equipment providers and users have been able to prevent costly downtime through faster responses to problems.