

BOILER WATER SKID SYSTEM CASE STORY

Grundfos BoosterPaQ helps Pharmaceutical Company Achieve \$17K in Cost Savings & 32.6kWh in Energy Savings

INTRODUCTION

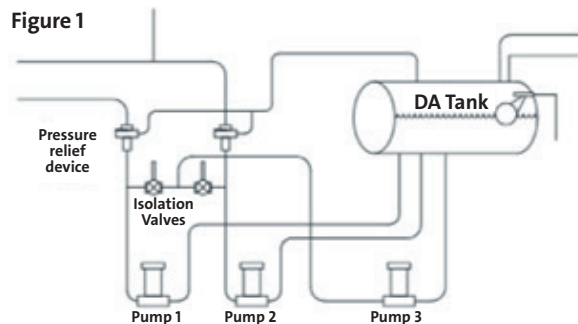
The pharmaceutical industry is often looking for ways to save money and find energy efficient solutions to ensure sustainable operations. A wide variety of products are on the market that help with moving fluids and because water is widely used in the pharmaceutical industry this is one area to look for cost and energy savings. Grundfos' pre-packaged but customizable solutions of centrifugal pumps provide opportunities for costs and energy savings. Learn how one Midwestern pharmaceutical company was able to leverage this technology and saved over \$17,000, reduced energy consumption by 32.6 kWh per year, and reduced CO2 emissions.

THE SITUATION

A Midwestern pharmaceutical company had been using Grundfos CR pumps for many years as feedwater pumps for multiple boilers within their facility. The configuration and mode of operation of these pumps within the system did not provide the energy efficiency or reliability needed and so they reached out to a Grundfos consultant for a solution to remedy the situation. At the time, their desire was to not only to fix the issues they were experiencing, but also increase production at the plant, which would result in additional demands placed on the boiler system. Due to the configuration and operation of the existing pumps we "were experiencing a high failure rate of pumps 1 or 2 causing loss of steam pressure until intervention from a maintenance worker to switch/repair pumps." The existing boiler system consisted of three standalone constant speed Grundfos CR pumps, with two pumps supplying the boiler feed water, and one pump functioning as a spare. Three 100 hp on/off operation boilers were being fed by one pump and a 350 hp

continuous run boiler was being fed by the second pump. Figure one below demonstrates this.

Figure 1



Pump 1 – Feeds 350 hp Cleaver Brooks boiler

Pump 2 – Feeds 3 Sellers 100 hp boilers

Pump 3 – Is a spare pump in case pump 1 or 2 fails
Control is either manual and either on or off

Quickly a conversation about a redesign of the boiler system ensued. The thought was with a more efficient pump arrangement they could eliminate the existing issues and ensure the pumps would be able to meet the flow & head needs of today while also preparing them for future needs taking into consideration the possible number and size of boilers. Because of their great relationship with Grundfos and appreciation for the quality of the Grundfos CR pumps, they worked directly with OTP Industrial Solutions, an independent distributor of Grundfos, and a Grundfos consultant, to select new pumps for the

system taking their time to ensure the best possible solution.

Over the course of two years multiple options were reviewed. At first the Midwest pharmaceutical company decided to maintain the existing boilers, with the potential to replace the three 100 hp on/off operation boilers with a second continuous run boiler down the road.

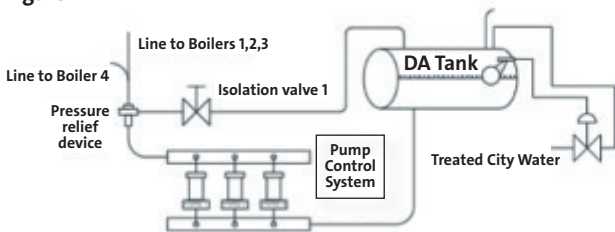
To ensure the Midwest Pharmaceutical company were provided with the best solution possible though Chad Bowen of OTP Industrial Solutions and Jeff Welch, Senior Sales Manager of Grundfos visited the customer with a trailer in tow from Charlotte, North Carolina to Kentucky, to showcase Grundfos' products, capabilities and solutions. The trailer included a working Hydro MPC-E BoosterpaQ which allowed for a hands-on demonstration of the product for several employees of the pharmaceutical company. One of the most notable features demonstrated was the VFD (Variable Frequency Drive) drive or "E" portion of the MPC-E which allows for variable speed capabilities of the BoosterpaQ and the ability to maintain constant flow or discharge pressure aligning with system demand. The VFD also controls the frequency of the electrical power supplied to pumps or fans, controlling the rotational speed of an alternating current electric motor. Significant power savings can be achieved when using a VFD pump. They also demonstrated other advanced capabilities and the ease of the Grundfos designed and manufactured CU 352 multiple pump controller that controls the BoosterpaQ. This demonstration had an impact, and the company began to work with Grundfos to craft a more robust and long-term solution.

SOLUTION:

Once the final flow & head requirements of the boiler system had been determined, Dave Hancock, of OPT Industrial Solutions, worked with the customer, and Grundfos, to size and select a Grundfos Hydro MPC-E 3 CRE 10-10 BoosterpaQ for the application. The BoosterpaQ supplies a constant discharge pressure (constant supply pressure to the boilers).

Because of the customer's desire for an efficient but "easy to install," "plug and play" pump system (skid) they selected a pre-engineered solution that could be customized to their needs. The plant where the system was to be installed runs continuously, so the time frame to change out the pumps was short. The "plug & play" aspect of the Grundfos BoosterpaQ allowed the customer to remove the existing pumps and replace them with a BoosterpaQ quickly, without an unplanned disruption to production. Figure 2 represents a simple schematic illustrating the Grundfos BoosterpaQ installation. Note, the pump discharge to DA tank recirculation lines have been removed from the system.

Figure 2



Features that the customer commented they really liked about the system included:

Three new pumps, feeds on all four boilers, IE5 efficiency rated motors (2 levels above NEMA Premium efficiency and available in 1-15 hp that can be specified for different pressures and flows), speed of pumps regulated to maintain pressure of 150 psi, a control system that turns on pumps only as needed for load instead of operating 24/7 reducing operating costs, pump system sized to allow for one pump to fail without compromising the system, pumps are easily removed and repaired, and skid controls allow manual control if needed.

RESULT:

As a result of installing the Grundfos BoosterpaQ skid, the Midwest Company saw significant cost savings, energy savings and had a fully autonomous (set-it and forget it) reliable system leveraging VFD capabilities.

The following are statistics recorded by the Midwest Pharmaceutical Company Plant Engineer

*The original two pumps operated at 20 hp and the pumps ran 24/7 at max pressure. The excess volume was sent out to the tank. The new skid used 10 hp variable speed pumps with magnetic rotors that operate with much less power.

*The original 2 pumps used 34.56 kWh on average; whereas the new pumps use approximately 1.96kWh (even at their low cost of electricity \$.07/kWh they saved \$19.8k per year).

*With two constant speed pumps in operation it used to cost them \$18,483.50/year. With the BoosterpaQ and pump stage and varied speed to meet the flow demand their energy costs were reduced to \$1047.21

*Estimated ROI (return on investment) – cost of skid to be paid off in two years since its installation date (Installation date: July 2019)

*CO2 Emissions Reduction – Reduction of 214 tons CO2 per year

*The Skid was installed in July 2019 and has operated without failure from that time

The customer was so pleased with the Grundfos BoosterpaQ that approximately one year after purchasing and installing the BoosterpaQ, the customer purchased a Grundfos GES (Grundfos Engineered Systems) for a compressor colling application that consists of two Grundfos LSCE, variable speed pumps, and two Grundfos plate and frame heat exchangers. The customer also plans to purchase a second Grundfos BoosterpaQ when they upgrade their plant water system.

"It was wonderful to connect with our customer on-site and showcase our solutions. This is exactly why we have the trailer. We can easily hop on the road and bring some of the products to them. Several people had an opportunity to interact directly with the products which gave them an opportunity to see our pumps in action. There is nothing better than that. As a result, we were able to address the customer's needs and provide them a solution. We appreciate these opportunities and look forward to working with other customers." – **Jeff Welch, Senior Sales Manager, Grundfos**

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