DAIRY

Pump optimization — how to save energy in any Dairy

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Of all the equipment located in the average dairy plant, research has shown that nearly 25% of a plant's motorized energy costs are attributed to pumps.

In fact, a recent system audit at a major European dairy not only backed this data, but resulted in significant energy and emissions saving – i.e. $48,000 in annual energy usage and reduced carbon emissions by 220,500 pounds – what's more, the new pump installation paid for itself in less than a year!

Pump optimization was the key to reducing energy consumption in this European dairy, and can be used to save energy in any dairy. Furthermore, a dairy's energy consumption can range from 90 kWh/h to 6500 kWh/h, depending on final product produced and amount of pumps used and installed[1].

In some cases, by optimizing pump selection, energy consumption can be reduced even more, with savings of up to 50%[2].

While not a new idea, pump optimization is seeing a revival in today's competitive business climate. With the right pumps, total cost of ownership can also be reduced, as well as raising system performance and enhancing a plant's environmental profile.

Effect of energy consumption on price

Although considered a minor capital investment compared to the other massive equipment found in most dairies, consider the effect of reducing the required motor power on the following:

- *Installation costs:* The pump motor size will influence all the electrical components, including cables, circuit breakers, frequency inverters etc.
- *Processing and resulting energy costs:* Energy consumption can be minimized by selecting the correct pump type and designing it for Best Efficiency Point (BEP).

  The energy used by pumps is converted into heat, resulting in more unseen resources spent. How is this possible? Some of the heat generated emits into the surrounding plant air, but the majority can actually impact milk! Unless this happens at a heat treatment stage, that heat will have to be removed through cooling – and that requires even more processing energy and resources. So first dairies will pay to add it, and then pay to remove it!
- *Effect on milk product quality:* A low efficiency pump adds shear rate and stress to the end product. In fact, these added shear rates and process equipment vibrations are the major reasons for the low efficiency. Adding excessive energy to milk prior to pasteurization will also increase the risk of free fat. In yogurt, this shear rate and stress can have a negative impact on the desired end product viscosity.

Choose the Best Efficiency Point

The Best Efficiency Point (BEP) is the point at which a pump operates at the optimal head and flow rate to deliver the highest possible efficiency for a particular duty. The closer the BEP is to the duty point required, the higher the pump efficiency.

Saving pump energy, how?

The principles of efficient pump operation apply to both new and existing systems. Because systems change over time and even minor changes impact efficiency, it is important to evaluate and modify systems continuously.

By auditing existing systems, it is possible to adjust pump operation and restore efficiency.

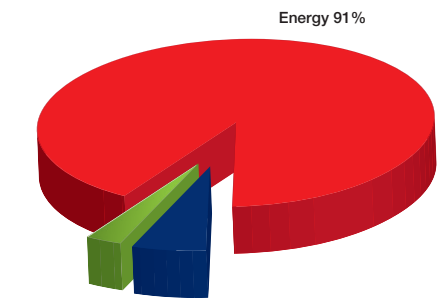
- Change your pump so it operates at the BEP
- Add a variable frequency drive, which will reduce energy costs
- Change the diameter of the pump impeller
- Change of pipe layout

To learn more: www.alfalaval.com/pumps

1 European Dairy Association (2002). "Consumption and emission data", EDA, personal communication

2 British Pump Manufacturing Association (BPMA), 2009 study, www.bpma.org.uk.

Typical Centrifugal Pump LIfe Cycle* Cost



*Based upon Alfa Laval's Solid C-3 pump (11 kW) over 10 years.

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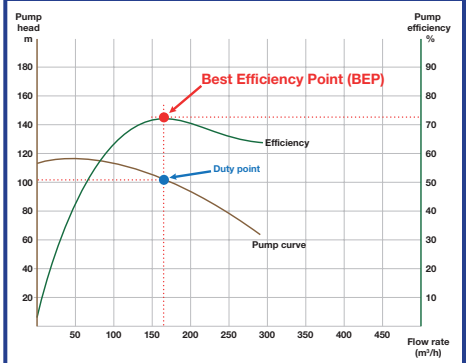

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Alfa Laval LKH Centrifugal Pump