



Efficient use of vacuum pumps

The basics

The vacuum pump accounts for about 25% of energy use for a normal dairy farm. It's clearly a necessary part of the milking system therefore its use cannot be avoided. However, by using better control and more efficient equipment, it's possible to cut running costs considerably.

In practice

The key to lower costs is delivering the correct amount of vacuum at all times. With the most common systems, vacuum is controlled by a relief valve which allows air into the system when the vacuum demand falls. Pressure relief valves need to be well maintained and adjusted to ensure that they do not constantly leak and that they give the appropriate vacuum.

Nevertheless, even a pressure relief valve operating effectively is an inefficient solution. It is only set to give one vacuum level and so, in the face of varying demand, can only work by effectively removing the vacuum produced by the pump and thus it wastes the energy that has been used to produce it.



Variable speed drive

CASE STUDY



Carreg Y Llech farm, Mold installed a Variable Speed Drive to control their vacuum demand in October 2012, at a cost of around £3000. The single vacuum pump is a 9kW GEA Westfalia Surge vane pump which runs for four hours per day.

Running costs and payback was calculated to be over 50% and around five years respectively, as the pump did not need replacing. Lower running speeds would also reduce wear and tear on the pump meaning less maintenance and extending it's working life.

Mr Morgan said: "When we realised that our vane pump could be controlled by a VSD we took the decision to have one installed.

"I have been very impressed and we are already seeing the benefits. The VSD allows the pump to run as low as 180rpm, which means it's quieter as well as using significantly less power."



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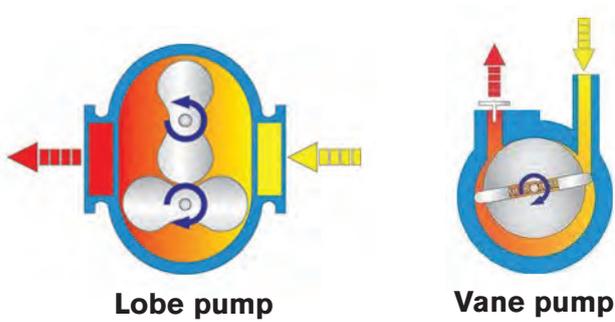
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On the other hand, a Variable Speed Drive (VSD) system controlled by a pressure transducer can deliver different levels of vacuum with no waste.



Lobe pump

Vane pump



Vane pump

Variable speed drives work best with a lobe pump (Roots blower) rather than the more common oil ring or vane pumps. This should be checked with your engineer or supplier as some vane pumps are able to operate normally when controlled using a VSD.

A pressure transducer is used with the variable speed drive to follow the vacuum demand. This varies quite dramatically between standby, milking and cleaning loads.

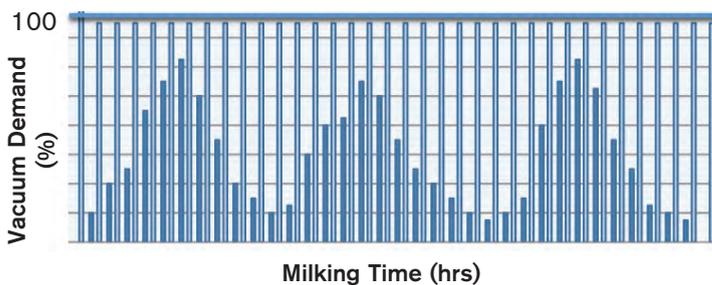
Potential savings

Surveys have shown energy savings of between 40% and 70% using variable speed control with a lobe pump. Capital costs can however, be quite high. Also, in most cases you need to consider the availability of three phase electricity, as variable speed drives usually require this type of supply. However, single phase VSD's are slowly becoming more available as are single to three phase conversion equipment.



Lobe pump (Roots blower)

Vacuum on Demand Curve



Energy saved using VSD



Vacuum required during milking

For more information on the efficient use of vacuum pumps please contact:

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