



The pump industry's drive for energy efficiency

Last year, the European Commission (EC) announced its commitment to delivering on its energy efficiency and carbon reduction objectives through its new Green Deal proposition. With pumping systems consuming up to 15% of all energy in Europe, Europump, of which BPMA is a member, looks at the significant contribution the sector has already made to energy savings.

Across Europe, water pumps have the potential to save 50TWh of electricity every year. This is equivalent to the output of five large coal-fired power plants.

Even though the pump industry's contribution to gross domestic product is smaller than other sectors, by comparison, the energy consumption of pumping systems is much higher. It ranges from 10-15% of the overall annual electricity production throughout Europe and that is why the energy-saving potential of pumping systems is extremely high and why pump manufacturers place a great deal of importance upon it. Energy efficiency is, and always has been, a major part of the business model adopted by pump manufacturers. So, it is no wonder that the EU Commission, in its efforts to reduce energy consumption, considered regulating pumps at an early stage in the process.

However, to help avoid any misunderstanding around how these reductions can be achieved, the following should be noted: it is not the pump itself that uses the high levels of energy, it is the system in which the pump is operating. Without the right match of pump operation to a system's overall requirements (or duty), even single component efficiency gains can result in increased losses across a system. A pump with a high stated efficiency, but which is too large for the system (a common occurrence across the industry), consumes far more energy than the peak efficiency levels promise. At the opposite end of the spectrum, if an existing fixed-speed motor that drives a pump is replaced by a motor with higher efficiency (but without adding a speed control), it results in higher energy consumption, because the pump's output into the system is higher than the system's demand.

ACTIVITY TO DATE

Let us look at the activity timeline of the European pump industry in relation to improved energy efficiency in pumping systems. The main activities of the sector are dominated by the approaches marked in green, which offer potentially high levels of saving. But why is that? Well, since pump manufacturers deliver their products into a wide variety of applications, such as general manufacturing, water/wastewater, food & beverage production, energy generation, building services, mining, and so on, they know very well how their pumps are installed, operated and serviced. They, therefore, know where the big savings can be found and perhaps more importantly, achieved.

In simple terms, if a pump's operation continuously and accurately matches the requirements of its overall system, and all purchase, installation and operational costs are considered (the life cycle costs), the highest savings will be achieved, and this is regarded as the system approach. By contrast, if the efficiency of just the pump is being considered, which is known as the product approach, the pump would no doubt save energy if continuously operated at its best efficiency point. However, this is rarely the case, either because the pump is oversized or because the demand typically changes during its operation.

As a minimum requirement, it should be possible to adjust the speed of a pump according to the flow rate changes in a variable flow application or to match the duty point in a constant flow scenario. This can be achieved by defining a new product category which is called the Extended Product. This new classification describes a 'pumping' product as consisting of a pump + motor + drive, together with a harmonised load profile for the special product application.

Because this knowledge inherently exists amongst pump manufacturers, our industry has been pushing the 'system approach' for the best part of 25 years.

Indeed, the Extended Product Approach (EPA) was introduced by the pump industry when the EC was struggling with some of the definitions being used in its Eco-Design Directive. The Directive referenced pumps as stand-alone products, much the same as light bulbs and other domestic appliances, which of course they never are. As we have demonstrated, pumps are always embedded into systems, with their overall energy efficiency being subject to the operational parameters of that system. So, to overcome this problem, Europump developed the EPA. This important initiative was undertaken in close and fruitful cooperation with the European motor and drive industry and supported by leading universities.

Since before the turn of the century the pump industry has pushed for energy-saving measures with distinct initiatives, campaigns, conferences, guidelines, and publications (especially on life cycle costing, system efficiency and variable speed pumping). In 2005, all these activities were brought together in Europump's Ecopump Initiative and the associated Europump Joint Working Group on energy-using equipment. Since 2006 this working group has supported the EC and has undertaken a great deal of standards-based work to help push energy savings in pumping systems.

The work that has gone into the creation of the Ecopump Initiative, designed to push both the 'system approach' and the 'extended product approach', has collectively cost Europump members over €4 million. And this is on top of all the additional work necessary for manufacturers to fulfil their obligations under many other laws and regulations, such as the

Machinery Directive, ATEX, REACH, RoHS etc. The pump industry is highly regulated, due to its product delivery into such a wide variety of applications and in all regions of the world, which of course carry their own specific regulations. For a small sector of industry this is a huge burden, and so it deserves to harvest the fruits of its labour on the EPA in the short-term. As such, the revised Eco-Design Directive for Water Pumps must be introduced as soon as possible.

For more than 25 years, the European pump industry has been pushing energy-efficient solutions.

With a look into the digital future, the pump industry again proves to be a pioneer. For the past two years a group within VDMA, the European network of mechanical engineering businesses, has been working hard on an OPC UA companion specification for use in the industrial internet. It sets a standard that allows pumps to be plugged into systems like a mouse into a computer, ready to play an integral role in an industrial system.

One basis for digitalisation in our sector is again the EPA, i.e. pumps equipped with variable speed drives, which allow the adjustment of pumps to the system needs. Based on pump manufacturers knowledge of the correct matching of pumps to duty, the manufacturers have already developed algorithms and cloud-based digital solutions, which allow energy-efficient matching of pumps to various systems, and this approach can deliver maximum energy savings.

SUMMARY For more than 25 years, the European pump industry (through its representative body, Europump) has been pushing energy-efficient solutions and energy savings in fluid movement. During this time, it has always pioneered technical solutions, supported the EC, and developed appropriate Standards.

Unfortunately, it seems that the pump industry has for some time been ahead of the game in its energy-saving recommendations, but it is hoped that the high saving potential of its various initiatives, do not suffer further delays.

It is now quite clear that pumps with variable or adjustable speed drives can play a significant role in reducing energy usage going forward. Specifically, we should urgently act upon the proven energy-saving potential of pump sets in water applications, and in doing so, remove five large coal-fired power plants from our annual power generation output.

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