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What is an ECM Pump? - Part 1

Monday Morning Minutes | by Norm Hall, October 16, 2017

ECM pumps and Smart pumps are marketing terms being thrown around to indicate a highly efficient variable speed pump that saves more money than you can possibly imagine! The reality is that this technology is highly efficient as long as you are using the right features of the pump. This week, the R L Deppmann Monday Morning Minutes starts to explain the advantage of ECM pumps by defining ECM.



Let's start by explaining that there are no such thing as an ECM pump. There are centrifugal pumps using ECM motors. Pump efficiency is not improved by adding an ECM motor to it. It's the ECM motor that is more efficient. Just like other pumping applications, if you can reduce the speed, you reduce the pumping head or GPM or both and the results are less amp draw which saves energy.

What is an ECM Motor?

ECM is the acronym of; Electronically Commutated Motor. I'll try to explain why these are more efficient without using electrical terms. I know some electrical engineers will cringe at my explanation but I am an electrical engineer and this description will get the point across.

Remember back in grade school when you played with magnets. You could move a magnet and have a piece of metal chase it. You could dazzle your friends by making a paper clip stand on end. You could even get one magnet to run away from another magnet. Magnets can make things move.

Fast forward and think of adventure action movies. Watch enough of them and you will undoubtedly see a huge round magnet dropping down on a car and lifting it up into a crushing machine, with our hero barely conscience in the driver's seat while the music

blares in the background of the movie. Oh sorry, back to this article. What makes the big round metal piece a magnet? Electricity.



Standard motors work the same way. Electricity is used to generate magnetic fields on and off. When one goes off, the next one comes on and the core on the shaft follows the field just like the paperclip. The speed is based on the number of magnets we use and how fast we turn them on and off. In addition, we may have starting circuits involving capacitors or other devices.

Here's the point. All of that takes electricity in the standard motor, which is not being used to create work or pump liquid. Instead we are using electricity to make a magnet, charge a capacitor, and unfortunately generate heat and noise from friction. An ECM motor is also sometimes called a permanent magnet motor or PM motor. It does not have to create a magnetic field so it is more efficient.

When a standard motor creates the magnetic field there is a little time lag and so the speed of the shaft is slower than the speed of the magnetic field. This is called slip and it causes a reduction in efficiency. That is why we may refer to a pump selection as 1800 RPM but the motor reads 1780 RPM. The ECM Motors do not have slip.

This ECM motor also needs an electronic circuit to start. It takes the AC power and converts to DC for the motor. Hey, isn't that what a VFD or variable frequency drive does? That's right. This ECM motor has circuitry that can vary the speed of the shaft.

So an ECM motor has permanent magnets. An ECM motor has an electronic starting circuit, and no slip, less heat, and less friction. All this improves the efficiency of the motor and we haven't even varied the speed yet. We also need to discuss the pump that the motor is driving and its efficiency. Let's save that discussion for upcoming R L Deppmann Monday Morning Minutes the next few weeks.