While the building automation industry has embraced the intelligent pumps trend strongly, accounting for almost 50% of all intelligent pumping revenues, many other industries are leading the way—such as water/wastewater, mining and minerals and pulp and paper:

» While many companies focus on areas such as HVAC systems and motor retrofits, pump system upgrades provide the largest energy savings potential.

» The potential in energy savings with intelligent pumping can add as much as 20% to the bottom line according to the U.S. Department of Energy.

» Other key drivers include OEM initiatives, such as OEM personalization—OEMs can customize software to either match pumping systems to application needs and/or pre-load pump data to greatly simplify start up and commissioning requirements.

» To date, APC reports good growth in intelligent pumping system sales, forecasting 4% annual growth well into the future.
Intelligent Pumps in the Oil & Gas Industry

One industry where there is particular excitement about intelligent pumping solutions is oil and gas, specifically in the opportunities to improve the output of mature oil fields. Most mature, onshore oil wells are not big producers, with many producing less than 10 barrels of oil per day. Pump jack systems, progressive cavity pumps (PCP) and electrical submersible pumps (ESP) work hard to bring oil to the surface, and more operators are deploying carbon dioxide injection and other enhanced recovery techniques to boost production rates and extend field life. Many operators deploy conventional time-on/time-off pump controls to prevent a pumped off condition from occurring. These controllers stop the pump jack for a predetermined period to ensure that fluid is available before restarting the lift. Although simple to operate and adjust, they do not ensure that maximum production recovery is achieved and only work as a safety mechanism to prevent damages caused by pumping a dry well. Process efficiency is most improved with an intelligent pumping solution that employs a variable frequency drive to provide pump off control by varying the speed of the well and maintaining an effective fill level. Efficiency can be further improved by using information about the condition of the well to optimize the pump speed. The ultimate, intelligent pumping solution is one that takes advantage of this information in real-time and constantly optimizes the pump speed. In some more shallow wells, this can be done by using the motor load information in the drive as the primary data point. This represents the ultimate solution with the greatest optimization and return on investment. The elements of such a system include a variable frequency drive to control the pump motor speed; instrumentation to detect well conditions; and an embedded controller to operate the well, read the instrumentation, calculate an optimized speed command for the drive and provide host communications. A fully optimized pump jack is not only more productive but also has a higher availability and longer equipment life. Most of the wear and maintenance issues associated with pump jack operation are reduced as the optimized system automatically reduces operating conditions that cause undue wear (i.e., fluid pound, gas compression). Optimized wells also require much less human intervention because the optimization adapts to changing conditions in the well automatically. Cases have occurred where the maintenance related downtime for a pump jack system has been reduced by as much as 80%. While that may not be typical, it shows how some of these systems running open loop are hurting the equipment. Beyond individual pump jack systems, the oil field as a whole can be further optimized by making an enterprise of the entire field. A so-called “digital oil field” is based on a suite of interactive and complementary technologies that allow operators to gather and analyze information from wells to more strategically manage a lease. Such a system employs a scalable, modular and collaborative architecture that leverages intelligent pumping solutions and the capabilities of modern information technology to deliver actionable information directly from a well to the field’s central control station. This real-time data can prompt better and timelier decisions that improve production and ultimately shift the paradigm from merely operating a lease to managing it to its fullest potential. Implementing the digital oil field starts with extending remote communications to the oil field assets. This includes the pump jack systems as well as other pump system types (PCP, ESP, Injection, etc.) and ancillary equipment such as tank level and flow monitoring applications. Radio and cellular telemetry options are a must for intelligent pumping applications in oil fields. Telemetry can provide remote monitoring and secure control of oil field assets. This can be in the form of remote individual operators or more sophisticated central, control station operating rooms connected to intelligent pump systems. This connectivity along with the intelligence of the individual pumping processes means fewer interventions in the field to address pump system issues and optimize well performance. Some owners and operators of small-to medium-sized oil fields are less motivated to make large capital investments in new oil wells. In such an environment, a mark of success is keeping wells consistently pumping and doing so at an optimum level rather than just creating new wells. In addition to injection methods, intelligent pumping solutions can represent a more scalable investment to maintain and improve oil field production. Also, the network connectivity provided by telemetry equipment can provide data for personnel to conduct operational assessments, including costs and payouts, to extend and maximize oil field performance.

References and graphs can be found at newark.com/digital-oil.pdf

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