Top 10 Technologies: Energy Efficiency â€” Beyond The Bulb

Operations engineers are now working with new technologies to help cut energy usage levels and associated costs. Without fail, it seems that the best solutions are also the most simple. So while there is a great deal of merit to some of the more elementary approaches to energy efficiency, such as lighting and automated controls, more processors are seeing value in the implementation of new advancements in heat capture and in changing attitudes towards equipment refurbishment.

The Little Things According to the DOE, 22 percent of electricity used in the U.S. powers lighting. Efficiency basically comes down to getting more from less, and one way that many processing plants are seeing energy efficiency improvements stems from updating internal lighting units. In a world with soaring energy prices based on the availability and control of fossil fuels, and with growing concern about sustainability, updating plant lighting may be a boon to the company's overall competitiveness. In many cases, this can translate into:

- Adding units that run cooler, thus reducing the need to offset the heat being created.
- Different bulb formats that, although more expensive, last longer and run more efficiently.
- Fewer lights that are better positioned to accentuate natural lighting.

In addition to investing in more efficient lamps or bulbs, plants can really reap energy conservation benefits by working to understand the factors driving consumption. For example, instead of just going with fewer lights, simple adjustments like adding windows in the right areas or moving equipment to better-lit locations can also help reduce utility bills. Another simple approach is the integration of supporting mechanisms that help reduce lighting needs, like an acid-washed floor that better reflects the light being emitted, creating a brighter working environment.

Additionally, by shutting lights off when no one is around, sensors can help facilities cut energy costs, so funds can be reallocated to more worthwhile operational causes.

Finally, simple machinery retrofits, in terms of newer control systems and motors that can meet more energy-efficient NEMA standards, not only help improve the speed and accuracy of operations, but also assist in reducing energy consumption

and negating the associated costs of the actual overhaul. As one plant manager cites, a lot of the benefits that he's seen stem from replacing and retrofitting equipment that wasn't necessarily bad, but simply not as efficient. More than any revolutionary technology, this has to do with altering one's mind-set towards equipment maintenance.

Bringing The Heat Regardless of the activity or end product, manufacturing and processing operations generate an exceptional amount of heat. In fact, recent Environmental Protection Agency (EPA) and DOE studies suggest that U.S. industries emit so much heat that, if captured, there would be enough energy to generate an electrical power equivalent to 20 percent of the industry's usage levels. This is also equal to the output of 400 coal-fired power plants.

This heat can be turned into electricity, especially when fossil fuels are the primary accomplice to heat generation. While this heat is usually emitted as waste, technology has advanced to help processors capture and utilize this production byproduct in improving a facility's overall energy efficiency.

Here are some of the leading technological examples:

- Steel mills in the U.S. are capturing the heat emitted above its ovens to create electricity that is sold back to local utilities. These types of operations also help reduce CO2 emissions.
- General Electric has devised a way to generate energy from the excess heat produced by its own gas turbines. Although this technology is nothing new, GE's system offers economic feasibility by substituting expensive organic working fluids with an evaporator for transferring the heat. The system captures waste heat from industrial gas turbines and returns it to the energy cycle without any additional emissions or water consumption. The DOE recently granted GE and Idaho National Laboratory $2 million to further develop the technology, which could potentially increase the efficiency of industrial engines by 20 percent. The technology is based on a process known as the organic Rankine cycle, which converts low-temperature heat to electricity.
- ECO-MAX adsorption chillers, which are made by Power Partners Inc., capture heat and use it in facility HVAC applications. These adsorption chillers are driven by hot water rather than large amounts of electricity. This hot water can come from any number of sources, including waste heat from industrial processes, or the heat exhaust of a piston engine or turbine. The heat extracted from the chilled water and the heat consumed from the hot water is directed into a cooling water system used to dissipate this energy. About the same amount of energy used by a handful of incandescent light bulbs powers the chiller. The electric power used drives the internal process computer, a PLC and the intermittent running of a fractional horsepower vacuum pump. Previous thermally driven chillers have been effective but burdened by maintenance needs, for example, a lithium bromide salt solution that corrodes its internal copper tubing and steel shell. Additionally, adsorption chillers produce hydrogen gas as a byproduct, thus they require

an expensive palladium cell to remove the hydrogen.

However, these types of units offer an option to less efficient compressors and refrigerant systems. Power Partners also states that its chillers can be integrated to use solar hot water collectors and concentrators to produce the source heat for the chiller. The energy to run the chillers is stored in a large tank for continuous use, yet is obtained by solar hot water collectors on the roof. Implementing a waste heat recovery system with on-site generation would further reduce CO2 emissions and provide fuel efficiency ratings of 85 to 95 percent. For more information, visit www.eco-maxchillers.com [1].

Links:
[1] http://www.eco-maxchillers.com