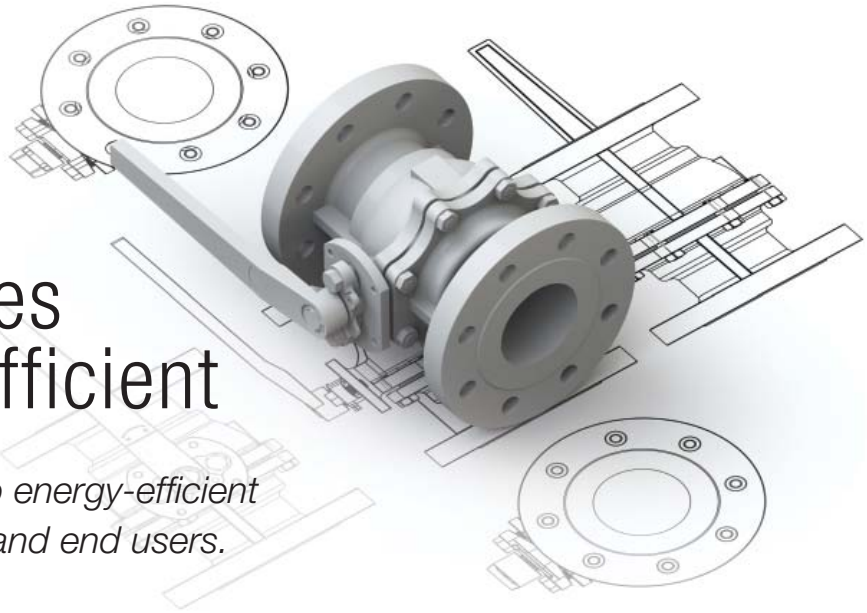

Designing Machines That Are Energy-Efficient

Seven principles help lead the way to energy-efficient machine design that benefits OEMs and end users.

Energy-efficient machine design is increasingly on the minds of original equipment manufacturers (OEMs). Machines that consume less energy and deliver maximum return on investment are critical to success.

Building this equipment requires machine builders to apply seven principles of energy-efficient machine design. Let's examine these foundations of leading-edge design.

1. Remove Nonessential Components

Simplified machine designs with fewer components use less energy because they run more efficiently and are less expensive to build.

Machine builders increasingly rely on sophisticated performance and simulation software to help eliminate many unnecessary components, including line shafts and costly pneumatics and hydraulics. With these mechatronic tools, engineers can analyse energy usage, build virtual prototypes and select the best mechanical design to maximise machine performance, resulting in lower energy consumption and maintenance costs as well as improved uptime and reliability.

2. Minimise Mass

Minimising the mass of a machine's essential components allows designers to evaluate alternative materials that are lighter and more energy-efficient than steel. This task is made easier with analytical, modeling and development tools.

3. Use Electric Actuation

As users increasingly seek to improve their plants' energy efficiency, new high-performance electric cylinders offer an alternative. An opportunity to deploy electrical actuation also will help users avoid energy losses associated with pneumatic air leaks.

4. Use Integrated Safety Systems

New safe-speed control solutions provide an example of effective control integration. They help improve flexibility because operators can perform maintenance and other tasks while a machine is in motion. Safe-speed control helps decrease energy costs and increase uptime because a machine doesn't need to be completely shut down and then restarted.

5. Get Closer to the Point of Use

While some control components traditionally were located on the machine, technology advancements make it possible to house entire control systems more closely to the application point. For end users, the compact nature of on-machine controls can provide significant plant-floor space savings, helping to reduce overhead.

Standard automation components – including controllers, motor starters, drives, sensors, contactors, network media, distribution boxes, I/O and HMI devices – now are designed for on-machine applications. Some machine builders have seen their total machine tear down and reinstallation time decrease more than 50 percent.

6. Use Diagnostics More Effectively

Machines designed with EtherNet/IP™ connectivity allow remote troubleshooting, providing users with improved diagnostics. Remote monitoring helps reduce fuel usage and related emissions in addition to associated travel time and costs of maintenance personnel who otherwise would go to the machine's location.

With the ability to embed intelligence-gathering devices into machines without redesign or retooling, machine builders provide customers with self-diagnostic equipment that can predict and guard against failures. This boosts productivity and reduces repair costs. In addition, this technology relays the machine condition information back to the machine builder for value-added monitoring and analysis services without compromising the end user's existing resources or hindering profitability.

7. Add IT Connectivity

Building information-enabled machines that can connect to an end user's IT infrastructure provides users with critical operational insight, including energy efficiency and overall equipment effectiveness (OEE) calculations. This insight, in turn, helps plant managers reduce waste and optimise productivity.

Applying the Principles

Advancements in technology and best practices can help machine builders design more energy-efficient machines. By following core design principles and leveraging the best of today's advanced technologies, machine builders can create more cost-effective equipment with excellent reliability. AT

on the web

For more information on building energy-efficient machines, visit: *http://www.rockwellautomation.com/solutions/sustainability/energy.html*