

Boosting productivity with the help of variable speed drives



Boosting productivity in a process means different things to different people within manufacturing plants.

Some goals include:

- enhance the quality of the end-product
- increase the throughput of production
- reduce the electricity consumed by the process, while at the same time meeting carbon dioxide emission limits that may be required
- maximise the process up-time, while at the same time minimising the costs associated with maintenance.

And while achieving all these things, the end user can ill afford to take their eye off the current legislation, regulations and directives.

The one simple product that can have an impact on all these productivity goals is the variable speed drive (VSD).

Throughout the food and beverage sector some 63 percent of all electricity consumed is by electric motors.

It starts with a motor

Motors are everywhere: in fans, pumps, conveyors, mixers, centrifuges - the list goes on. They are the workhorse of industrial automation and are a prime candidate for energy savings. For example, the high electrical costs of operating cold storages can be reduced by varying the motor's speed. However, only about five percent of motor-driven applications use a variable speed drive to regulate and control the speed or torque, the rest use fixed speed motors.

Then comes the variable speed drive

Applying a VSD to these applications is a good way to save energy. But, the benefits don't stop with energy savings. There are many other, just as compelling arguments as to why a VSD should be used to enhance the productivity goals described.

Enhancing quality

A VSD enables a process to achieve fast and accurate speed or torque control while maintaining the repeatability demanded by the production line. This optimal process control leads to a more consistent quality end-product, which means the best profit for the customer.

For example, some VSDs feature application macros, which are routines dedicated to say, pumps, conveyors or other uses.

A pump macro can maintain product consistency by telling the drive to start additional pumps in response to a pressure drop, should there be a surge in demand. In addition to dedicated pump control, the VSD provides a pre-pressurization for process start-ups.

Increasing throughput

Process equipment is usually designed to cater for future productivity increases. Changing constant-speed equipment to provide higher production volumes requires money and time.

With the VSD, speed increases of 5 to 20 percent are not a problem, and the production increase often can be achieved without any extra investment.

Energy saving

Given that power consumption savings of 50 percent can be made by reducing the motor speed by just 20 percent, and with payback times as short as six months, VSDs are arguably the one product that can have the maximum impact on a company's energy and carbon reduction policy.

Maximizing uptime

Variable speed drives have many internal functions which can provide better process control.

With inputs and outputs (I/Os), for example, different kinds of process information can be fed to the drive and it will control the motor accordingly. Alternatively, the load can be limited to prevent nuisance faults and to protect the working machine and the whole drive system.

Furthermore, VSDs provide fieldbus technology that enables process equipment to integrate with plant control systems. This improves the process control, as well as the knowledge and information that can be collected from the process.

Minimizing maintenance

Being able to vary the speed or torque of an electric motor means there is less wear and tear on the motor and the driven machine.

For example, the ability to bring a process up to speed slowly prevents the sudden shock loading that can damage a motor and the driven machine over time. To ensure the uptime of a VSD, many are equipped with temperature, load, under/overvoltage protection and warning features.

A real-time clock allows timed tracing of faults so users know what happened and when.

To help avoid any issues with VSDs, adopting a preventive maintenance program helps reduce the risk of failure and increases the lifetime of the VSD, thus lowering the overall operational costs. Preventive maintenance consists of annual inspections and component replacements according to the VSD specific maintenance schedules.

Regulations and directives

Safety functions are an essential feature of today's AC drives and can bring benefits throughout industry. They control human and machine safety, and stop, automatically or manually, the machine process when the machine operator's safety is an issue.

ABB's AC drives with built-in functional safety comply with the requirements of many European and international directives, many of which require a proven safety performance, as well as life cycle approach to safety.

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