

Drives on the turn

Variable speed drives have been a mainstay of plant engineering for many years, but the latest generation is changing the art of the possible. Brian Wall reports

Pointers

- Savvy plant engineers are extolling drives' potential
- Drives are not just about variable speed control
- Key attributes include energy saving, plant problem solving and factory flexibility
- Drives can now be synchronised in software
- Remote programming and control via Ethernet is the likely way forward
- Built-in 'soft PLCs' are enabling customisation by industry, but also application
- As the barrier of harmonic distortion is resolved, drives are entering a new era

Senior plant engineers probably remember when drives were not reliable enough for critical plant. The technology has long since matured to the point where many now acknowledge drives as energy-saving devices that can seriously cut carbon emissions. However, that's fast becoming just the tip of drives' iceberg, as increasing intelligence enables new possibilities.

That's certainly the view of Dr Dave Blood, who heads up Parker SSD Drives' R&D team. He says that drives engineering is "very real-world" – pointing to the fact that his engineering team is constantly either on-site with clients, looking at issues affecting production, or troubleshooting with the applications teams. "The buzz words they come back with are efficiency, cost reduction and communications... At plant floor level, it's about doing more for less."

That, he says, continues to force the pace of development. "There's a generational shift going on," says Blood. "Traditionally, drives were thought to be dumb devices. You could parameterise them to do clever things, but there was no intelligence that allowed the drive to change its working pattern in response to changing needs or conditions."

He argues that drives were always more capable than this – with, for example, function block programming and the ability to link them with PLCs or other controllers. "But it is only now that plant engineers are exploiting these," he suggests.

However, there is more to it. Increasing acceptance of Ethernet at the plant level, for example, is making real-time communications more attractive. That means multiple drives can be synchronised in software, so they all react at

precisely the same time, in exactly the same way.

"Previously, this could only be done with a mechanical connection, such as a drive shaft. Now, the same can be achieved by sending signals down a wire. So machines don't have to line up across the plant floor. They can be sited where they're needed, giving greater flexibility," explains Blood.

Of the many flavours of Ethernet, three are emerging for plant control – EtherCat, PowerLink and Profinet – all developed for automation, with fast cycle times, low jitter and low hardware costs. "Drives used to be programmed from a PC, via an RS232 port, but, in recent years, there has been a move to USBs. Now we are seeing the beginnings of a trend away from USB to Ethernet. Similarly, drives used to communicate with PLCs via an electrically isolated RS485 port; but, over the last 10 years, fieldbuses have taken on this duty. Soon these will give way to Ethernet fieldbuses."

Remote control

And there have been similar developments, in terms of remote monitoring of drives for troubleshooting. But the big deal now involves drives increasingly being built with on-board 'soft PLCs', or similar capabilities, based on the IEC 6-1131 standard. That makes it technically and economically viable to customise drives, not only for whole market segments, but also for an application.

"This has been fairly common for general applications, such as pumps, fans, hoists and conveyors, for some years," agrees Blood. "But it is now moving to a whole new level. For instance, we can now customise our AC690+ drive for a single application, controlling banks of compressors for commercial refrigeration. The drive keeps each compressor within its safe envelope, shares the load and duty around the bank, optimises energy consumption and improves temperature control."

Clearly, drives are now in a different league. And, as technology to protect against harmonic distortion becomes commonplace, even the occasional problems for electrical distribution will disappear. Add to that the machine safety standards – as in the EN ISO 13849-1 PL-e and EN 62061 SIL 3 (Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems) – demanding, for example, Torque Off functions, and intelligent drives will become part of plant engineers' standard armoury at all levels. 

