

Motor efficiency points to Energy shortfall

WHILE A REFLECTIVE TONY BLAIR WAS TELLING THE LABOUR PARTY CONFERENCE THAT HE SHOULD HAVE GONE FURTHER ON MANY INITIATIVES, SOME EXHIBITORS AT THE PPMA SHOW IN SEPTEMBER WERE SPECIFIC ABOUT A SHORTFALL IN HIS ENERGY EFFICIENCY PROGRAMME. BOB DOBSON REPORTS ON TRENDS IN COMPONENTS AT THE SHOW.

Motor companies don't talk about energy very much. Their customers are not interested! Two or three years ago there was some interest in the subject, based on the Climate Change Levy and the introduction of Eff1 and Eff2 motor ratings. But that has all fizzled out now, with barely a legacy left to be seen.

"The trouble is, it is just a recommendation not a law," explains Nigel Evenett managing director of AEG Electric Motors. "In America, it was enshrined in the Environmental Protection Act so became compulsory."

So having come second to George Bush on energy efficiency, what are the big trends in industrial motors?

"ATEX, the hazardous area initiative, has proven far more durable; undoubtedly because it's a law not a recommendation," says Nigel Evenett. "Further, ATEX has made people realise that there is more than one type of motor, so they have become more specific in their requirements. This means we've seen increased interest in nearly all niche products, from explosion proof to washdown motors and non-standard sizes."

Geoff Spear at Lenze backs him up on energy. "Interest in efficiency remains low with machine builders. Their focus is on purchase price rather than running costs.

"We can prove that more efficient motors and drives rapidly pay back

their extra cost, but machine builders want the cheapest motors and drives they can get because they are screwed down on price by their customers. End users are somewhat more enlightened, but again most buyers are focussed on stretching out inadequate annual capital budgets rather than looking at total life costs."

Exclusion of other components

Geoff Spear says that when it comes to geared motors there is a different problem. "Here people do look at motor efficiency, but often to the exclusion of other drive components, such as the gearbox.

"A worm gear may be 70 per cent efficient so could be replaced with a helical unit in the mid-high 90s, saving much more energy than an Eff1 motor. In applications with variable loads, a variable speed drive could pay for itself in months."

Regarding variable speed motors, Lenze says it is now establishing itself in market niches such as large machinery where the savings in cabling and installation outweigh the extra costs.

Geoff Spear likens their acceptance to that of industrial PCs. "Users think 'PLCs do a great job; why change?' We've had to be able to demonstrate better performance, robustness and lower costs. And now, five years after introduction, sales are growing nicely as users take them to heart."

Drives specialist Control Techniques has been steadily moving towards a policy of completely open architecture and communications, combined with powerful drives with on-board intelligence.

"We have been involved in defining and refining the PLCopen standards for motion control, alongside other major vendors," says marketing manager Gareth Jones. "This considerably simplifies things when switching from one vendor to another. PLCopen puts in place a superb framework for motion control."

The company's Unidrive SP has an on-board basic level PLC included as standard and plug-in modules giving advanced PLC capabilities. "Users report reduced design and build costs, smaller cubicles, fewer connections, greater reliability, distributed control, greater flexibility, faster responses, better accuracies and better product quality," says Gareth Jones.

The current trend in motion control is clearly away from centralised motion controllers, towards intelligent networked drives with onboard motion controllers.

This gives the controller immediate access to drive parameters, encoder position and speed reference. In addition, the position loop can be accurately synchronised to the speed loop and the current loop to give the optimum performance.

Motion control designers have maximum flexibility with the possibility of using high resolution encoders such as SinCos or absolute



Integration: Festo HME linear positioning system is a complete ready-to-run package

encoders such as SSI, as well as standard encoders, helping to reduce non-productive time on machines. Ultra-high precision is achieved with high bandwidth current and speed loops and high-speed I/O gives fast position capture and triggering of critical events.

Integration of control functions

One of the characteristics of PCs is that they encourage integration of control functions on a machine and across a suite of machines. In truth, integration can be achieved with PLCs, but there seems to be a mindset amongst engineers that requires at least a couple of PCs in the architecture of any large scale system. But with a well integrated system in place, machinery and plant users can move to a whole new level of performance, as Festo's Steve Sands explains:

"Operators increasingly need to run their machines hard, often 24 hours a day with minimal downtime. For this you need good diagnostics constantly monitoring every part of the plant and alerting people to pending problems before they become big issues.

"We are making our contribution to this by launching intelligent field devices that can communicate via the control system to tell the operators precisely what is going on. Examples include newly launched intelligent FRLs (filter, regulator, lubricator) and a now well-established intelligent valve terminal."

Festo is on its second or third generation of intelligent valve terminals and says that it is increasingly becoming the norm for buyers.

"Valves directly control the productive operation of their host machine, so it was natural that users would want to try out the concept there," explains Steve Sands. "Our latest units are very sophisticated and can even offer full PLC or PC functionality if required. All the communication options are available: fieldbus, Ethernet, GSM, Internet, and so forth. But the most important thing is that the price is right and the reliability is bombproof."

With proof of concept accepted by the market Festo is now rolling out any number of intelligent components and says it is possible to assemble fully integrated machine control systems.

And for Festo integration also means 'mechanics' – the merging of mechanical and electronic functions into a single unit to provide a fit-and-forget multi-function component. This is most notable with its expanding range of electric linear actuators, which include drive



Motion control expertise: Quin Systems demonstrated this pick-and-place case-packer

elements, load bearing slides, sensors, cabling and so forth.

"We're doubling the number of electric axes we sell every year," claims Steve Sands, "and bringing out new versions regularly to satisfy specific technical needs."

Interestingly, having started with servo motor drives, it is now developing new stepper controlled units. The first one launched will be closed loop controlled so that they can be fully integrated into interlocked systems, but Mr Sands says he sees a market opportunity for open-loop variations too.

Different approach

Meanwhile competitor Parker Hannifin is taking a different approach to product developments, as the company's Brian Kay explains:

"As an \$8 billion organisation it would be very easy for us to lock a team of boffins in a laboratory and not let them out until they had developed something stunning. But that does not necessarily produce the best results for the customer. Instead we are very prosaic and ask users what they would like to see.

"We use focus groups, brainstorming sessions and other procedures to formalise the process and results. The idea is not to let development get too far ahead of users expectations or abilities."

So, for instance, Parker's latest filter regulator lubricator satisfies the user request to do away with all the fiddly little parts. Instead, a clever system of clips means it can be assembled and disassembled by hand without any tools, in fact using one hand only, particularly useful when an FRL can only be reached by ladder.

"Fitting and maintenance are simplified to the ultimate degree, something much appreciated by users. We've recognised that the invisible or soft costs of running production machinery can be significant, so are working to reduce them at every level," says Brian Kay.

Seeing poorly developed motion control systems has long been a frustration for specialist supplier Quin Systems, which has put its money where its mouth is and developed a range of packaging machines that exploit its highly developed expertise in motion engineering.

Managing director Mike Webb explains: "Multi-axis motion systems need to be optimised in terms of path co-ordinates, speed and acceleration profiles and several other factors. Many machinery designers are too busy to develop their expertise, and without all the relevant experience can end up with poorly performing, inefficient systems. Traditionally we have always sold our expertise alongside our motion products, requiring something of an open-ended commitment from the customers.

"But many of our projects are very similar, such as end-of-line packing operations. We are able to encapsulate our expertise by building standard, but highly flexible tray packers and so forth.

"Typically our machines can be at least twice as fast and better optimised than a system developed without such experience. Other parameters such as reliability can be equally improved." ■

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