Q & A With Rob Fenton and Steve Zumbusch

Representatives from Eaton's electric and hydraulic business units reflect on the respective advantages of both types of drive power

"Theoretically, anything you can do with hydraulics you can also do with an electric drive." **-Rob Fenton**

Rob Fenton *is currently the Product Line Manager for Open Drives and Crane Control at* Eaton Corporation *[1], based in Milwaukee, WI. He started his career with Eaton 15 years ago as a sales engineer in the Cincinnati Sales office where he sold drives and industrial control to Machinery OEMs and industrial users. He spent the next few years in Fayetteville, NC as a Product Manager for Custom OEM Panels and then as Product Manager for Motor Control Centers. His most recent assignment, before the move to the Drives product lines in July 2005, was Front End Operations Manager at Eaton's Fayetteville, NC Plant. Eaton's electrical business is a global leader in electrical control, power distribution, uninterruptible power supply and automation products and services. For more information, visit* www.eaton.com *[1].*

"Today, you see many machines

migrating back to hydraulics." **-Steve Zumbusch**

Steve Zumbusch *is currently working as Manager of Application and Commercial Engineering (ACE) for Eaton's* Hydraulics Operations *[2]. He earned his Bachelors of Mechanical Engineering from the University of Minnesota. After graduation, he joined Eaton as a product development engineer and over the last 28 years he has worked on a number of different product lines and applications. Steve's duties have included Engineering Manager for Eaton's Power Division and now, managing the newly formed ACE Group. Steve has received eight patents for a number of different innovations and has been inducted into the Eaton Society of Inventors. He serves on the NFPA Technical Advisory Group for Pumps and Motors and has been active with NFPA in promoting fluid power research at a number of universities. Eaton's Hydraulics Operations is a business segment of the Eaton Fluid Power Group. The business is a worldwide leader in the design, manufacture and marketing of a comprehensive line of reliable, high-efficiency hydraulic systems and components for use in mobile and industrial applications. For more information, visit* www.hydraulics.eaton.com *[2].*

Q: Eaton is a major player in both the hydraulic and electric drive markets. How do you see the competition between these two technologies being resolved?

FENTON: It's true that virtually anything you can do with hydraulics you can also do with an electric drive, but that doesn't mean they're simply interchangeable. For any given application one technology will provide an optimum solution over the other, depending on the specific requirements.

Q: Then how do you answer the "Future is Electric" crowd?

ZUMBUSCH: Obviously, the hydraulics crowd doesn't see it that way at all. The future is still going to require compact, powerful systems to perform myriad functions, and power density is where hydraulic drives have a clear advantage over electric drives, or any other kind for that matter. It's just tough to beat the power you can get out of hydraulics.

Q: Some might think this makes the technologies sound competitive. How would you respond to this perception?

FENTON: I think it's a lot more useful to look at the situation as one in which the two technologies are coming together in a symbiotic fashion, rather than a winner-take-all competition. In the end, the solution needs to be driven by what is right for our customers and their particular applications.

While it is true that you can achieve great power density with hydraulic systems, you can't beat the efficiency and simplicity of having an electrically driven control system utilizing variable frequency drives. The real game changer comes from blending the two systems together to take advantage of each technology's strengths.

We have variable frequency drives that we are marrying with hydraulic pumps to produce extremely efficient hydraulic power units. This is our IMP series and it gives end users the unchallenged power density of hydraulics along with the system efficiency of a sophisticated, variable speed electric drive.

Applications like that are a win-win situation, and they are going to become much more common in the future.

ZUMBUSCH: The kind of hybrid system Rob just described really is a big part of the future for both of our divisions, and there is a lot more involved than just motors. On-board electronics are now coupled with hydraulic components adding even more "smarts" to hydraulic power. Where today's advanced systems really shine is in their monitoring and complete control capabilities.

Where things start to get really interesting is when you combine the "brains" of an electrical system with the "muscle" of hydraulics to produce a hybrid electrohydraulic system that delivers the best qualities of both. Strong and smart is a very tough combination to beat.

Q: Can you give an example of a hybrid system in use today?

ZUMBUSCH: Plastic injection molding machines are a good example of what has been happening in the market. Many years ago they were all hydraulic because that was the only technology available that met their power and performance requirements. It was a pure muscle play.

As electric drives got better, they replaced hydraulics on some smaller machines, primarily because they were easily programmable using PLCs and similar technologies. That made the machines more flexible and more productive at the same time. But it also made them bulkier and more complex.

Today, you see many machines migrating back to hydraulics, but not the old kind of hydraulics. These new machines are using electrohydraulic technology to get the best of both worlds. These smarter systems cut cycle times and also make the machines much, much more energy efficient. All in a very compact package.

That's what the future looks like. It's not hydraulic, it's not electric, it's electrohydraulic.

FENTON: I said earlier that theoretically anything you can do with hydraulics you can also do with an electric drive. That's also true of controls. You can configure a hydraulic system to perform just about any function but it won't be as efficient a solution as one that incorporates electronic control.

With a hybrid like Steve just described, you combine the strengths of each technology into a single solution for the customer. When you put hydraulic pumps and electric drives together you can achieve unprecedented system efficiencies.

For example, some hydraulic systems run the pump at constant speed and then throttle flow to match load requirements. All of the fluid that gets dumped back in the reservoir is essentially wasted energy.

Put a variable speed electric drive on that pump and control it with electronic sensors and you can provide exactly the amount of flow required in real time so the system consumes only enough energy to accomplish the task. The great efficiency comes from the fact that as you reduce the flow linearly with the speed of the motor and pump the power used by the motor drops off as a cubed function, so even a small reduction in flow results in a large reduction in energy used. The implications of that kind of efficiency are simply too great to ignore.

Q: What advice would you offer readers who are faced with a drive decision?

ZUMBUSCH: I would tell them to approach the decision with an open mind because the chances are good that any preconceptions based on past experience are going to be wrong. And, I would tell them to consider the source as far as information from vendors is concerned.

There's a saying that "If the only tool you have is a hammer, pretty soon everything starts looking like a nail," and it's true. If all I have to sell is a hydraulic solution or an electric solution, I will work very hard to find a way to make the only solution I have fit the need. That's just human nature.

So, the obvious answer is to look for someone who can supply the best solution for your needs, whatever it may be. If they will do that, I'm willing to bet the solution will be an electrohydraulic hybrid more often than not.

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