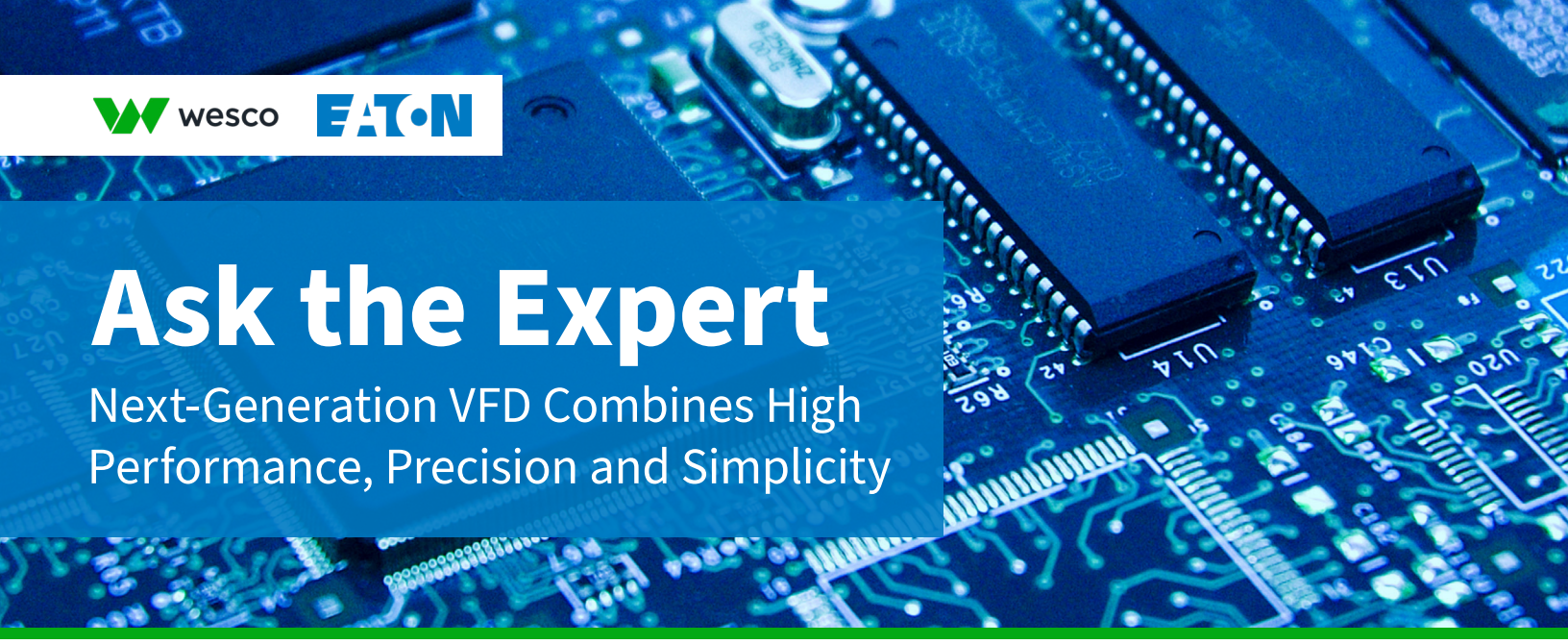

Ask the Expert

Next-Generation VFD Combines High Performance, Precision and Simplicity

ALFONSO LUCADO
Product Manager with Eaton

Precise, reliable, and safe motor control is a must in mission-critical applications across a range of industrial sectors. To better serve demanding applications that require the highest levels of accuracy, reliability and responsiveness, Eaton designed the PowerXL DX1 variable frequency drive (VFD) for precise speed and torque control, increased machine safety, and simplifying installation and commissioning.

Alfonso Lucado, product manager with Eaton, describes how precise speed and torque control can provide increased operations performance and the new innovative touchscreen interface enables quick installation and monitoring.

What advantages does closed-loop control bring to precision applications?

A: Closed-loop control enables the PowerXL DX1 to deliver precise speed and torque control for AC induction, permanent magnet, and high-efficiency motors. This is because closed-loop control allows the drive to receive encoder feedback signals and make real-time micro-adjustments to variations in load so that it is controlled as accurately as possible.

For example, in critical pulp and paper applications, the drive may be used to control paper winders where the loads are not static. Closed-loop control ensures that the speed of the new parent roll matches the discharge roll speed while maintaining the desired tension, allowing the process to continue with precision and reliability. Similarly, in the mining industry, the load on conveyors will vary throughout the process, but the closed-loop torque control automatically adjusts the output parameters so that the conveyor runs as smoothly as possible, resulting in less spillage and less downtime, maximizing the effectiveness of the operation. In the material handling industry, synchronizing multiple conveyors in a master-follower configuration is possible thanks to the ability to incorporate high-speed encoder feedback. In this application, one or multiple drives synchronize their speed with the master drive to ensure smooth material transportation.

In technical terms, the drive's closed-loop control system delivers speed accuracy of ≤ 0.01% of rated speed and a wide speed range of 1000:1 with full torque at 0 rpm.

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Can the PowerXL DX1 also serve in safety-critical applications?

A: Yes. The ability to provide full torque interaction at 0 rpm allows the drive to maintain static load, which is essential in industries and environments with critical safety demands, such as crane and hoist operations. As a matter of fact, the drive offers high levels of safety, backed by Cat.3 safe torque off (STO), safety integrity level (SIL) 2, and performance level (PL) d certifications.

How does the touchscreen make the user experience more efficient?

A: The touchscreen interface was a focus point during the development of the PowerXL DX1 because we wanted to provide users with a single stop for setting up the drive, commissioning their operation and making adjustments in their operation. The use of consolidated contextual menus simplifies navigation of parameters and provides a powerful time-saving tool for people in the field as it allows rapid setup and monitoring.

The touchscreen allows users to view data and parameters, such as torque, speed or frequency in real time so data can be graphically trended without the use of external devices, such as an oscilloscope. This information can be used for diagnostic purposes, to create maintenance routines, or to monitor the performance of the operation from the touchscreen. This improves reliability and uptime because data can be used to develop a predictive maintenance schedule, which is imperative when the drive is controlling essential operations.

Aside from trending data for maintenance, what makes the drive highly reliable?

A: These drives are also positioned for mission-critical applications where the motor is running 24/7 and downtime is the enemy of our customers. The drive has been through rigorous testing to ensure high performance and reliability in harsh environments for which it is rated ingress protection (IP) 54. The PowerXL DX1 is a complimentary offering to previous generation PowerXL drives, which have proven robust in the field. We took the most robust elements from those drives and implemented them in this next-generation drive for precision and safety applications. As a result, it shares the same robust design focus and offers high levels of functional safety, conformal coatings, and 100 kAIC short circuit ratings to protect the motor and drive in any circumstance.

Coincidentally, because the PowerXL DX1 also relies on the same parameter structure and fieldbus configuration as earlier PowerXL drives, it is easy for legacy users to adopt the latest generation drive into their high-performance applications.

As both technology and industry advance, is the drive equipped to keep pace?

A: Yes. The PowerXL DX1 includes an Industry 4.0 platform for the most up-to-date Internet of Things (IoT) specifications and ensures protection from hackers as it meets cybersecurity IEC/EN 62443-4-2 level-one requirements considering system, operation, and component security.

With multiple onboard protocols, the drive can be integrated using the most common industrial communication protocols, including Ethernet/IP, PROFINET, and Modbus TCP, which makes the drive an ideal choice for existing operations or new installations.

Further, four easily accessible option card slots allow users to tailor the drive to specific applications with augmentations such as different encoder cards or I/O expansion. This allows the drive to adapt to the most demanding applications and future proofs the drive because it has enough onboard expansion for any additional cards that we may develop to add value to this platform.

Are there different configurations of PowerXL Drives to choose from?

A: To meet the range of applications and requirements of our customers, we offer a full array of PowerXL drives, including low- and medium-voltage options, and some can be configured as enclosed drives with different enclosure rating types. Our global supply chain solutions partner, Wesco, can help customers analyze their equipment and objectives to determine the best PowerXL drive for their needs.

With over 100 specialists on staff, Wesco has the industry expertise and skill at connecting the enterprise to address issues in real time and anticipate new ones before they happen. Wesco's engaged and effective problem solvers immerse themselves from concept to execution, applying end-to-end product, service, and technology solutions to critical projects.

Eaton, with Wesco as its distribution and supply chain partner, designs VFDs for many applications.

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