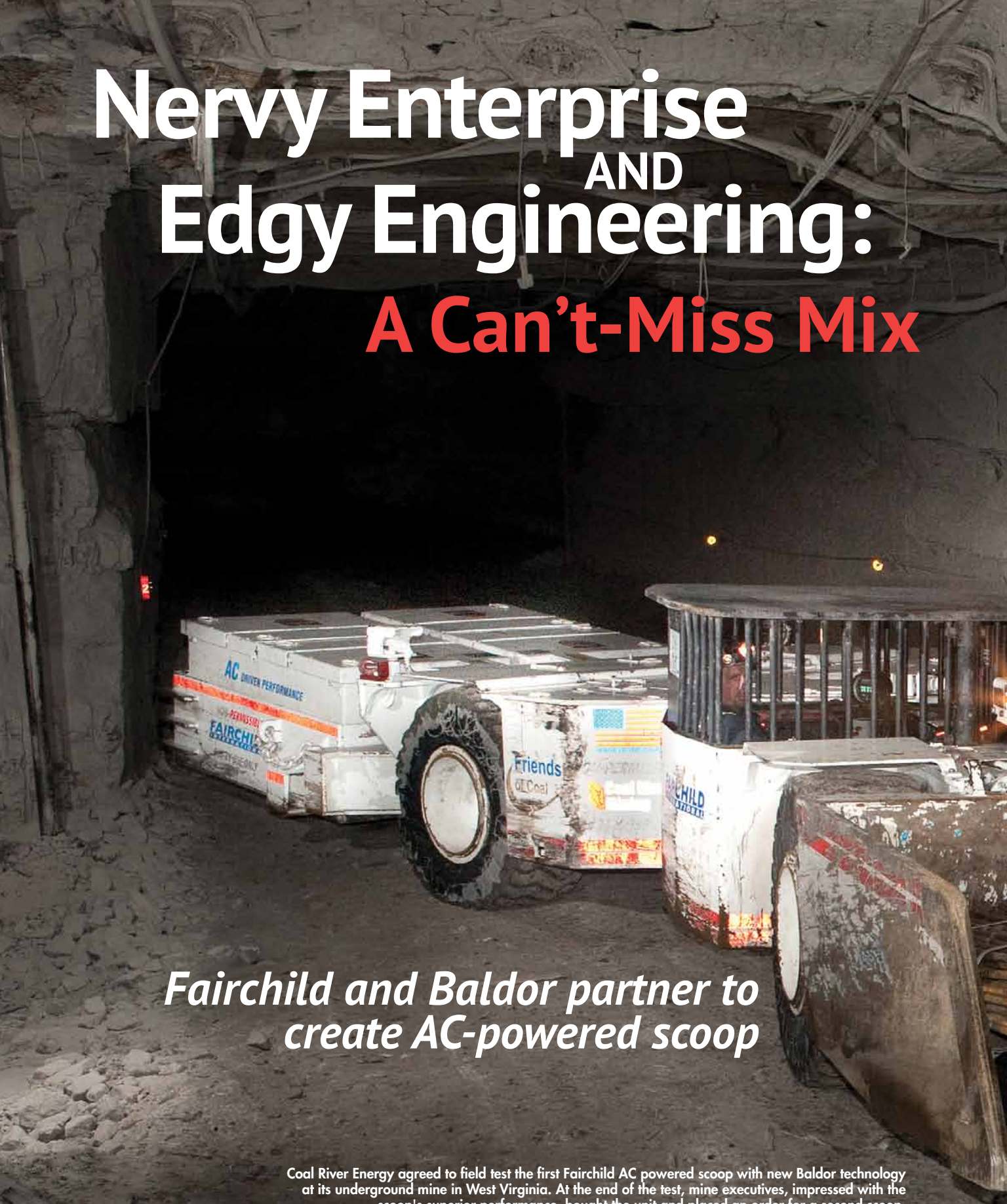
Nervy Enterprise AND Edgy Engineering: A Can't-Miss Mix



Fairchild and Baldor partner to create AC-powered scoop

Coal River Energy agreed to field test the first Fairchild AC powered scoop with new Baldor technology at its underground mine in West Virginia. At the end of the test, mine executives, impressed with the scoop's superior performance, bought the unit and placed an order for a second scoop.

Fairchild International, a U.S.-based manufacturer of underground mining equipment, has produced battery-powered DC scoops since the early 1980s. With 17 different models available, Fairchild offers a size to fit any coal mining operation, making it the leader in the industry.

Maintaining that leadership position led Jack Fairchild, Jr., the company's vice president of sales, to the decision in 2011 that it was time to move from DC technology to AC technology. Making the change would require a major investment for the company, but Fairchild was determined to be the first to launch an AC-battery-powered scoop.

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"In this industry, if you want to remain successful, you have to stay ahead of the game," explains Fairchild. "We also felt strongly that AC technology provides so many advantages that making the investment would be worth the risk. This is the technology for the future and is the best way for us to take our product line to the next level."

Fairchild believed that the key to the project's success was to build the right team. At the beginning of the project in 2008, Fairchild brought together his employees to discuss who they should partner with. They wanted to work with companies that had engineering and technical knowledge, good communications skills and the willingness to be a member of a team. As a result, Fairchild chose EnerSys for the battery, Magnatec for the drive and Baldor for the motors and gearbox.

Engineering New Products

Baldor engineers Nick Marsh (strategic account executive for the mining industry) and John Clark (senior customer order engineer for specialty gearing) led the design team effort for product development. With Baldor's history in the mining industry and experience in moving from DC to AC technology in other projects, both engineers were confident they were up to the technical challenge. However, according to Marsh, the hardest and most critical part of the project comes at the very beginning.

"It's our job to take the time to ask all the right questions up front so we can get detailed specifications," explains Marsh. "In this case, we helped the Fairchild team think through the machine and the application so we could address all of the possible issues and requirements. It's critical to get a clear understanding of their requirements and expectations so we can design and build the exact product they need."

From a motor perspective, that means detailing the exact torque and speed requirements. And because the motor would be controlled with a variable frequency drive (VFD), the Baldor team worked closely with the drive manufacturer to optimize performance. According to Marsh the traction motor developed for Fairchild is based on the Baldor-Reliance RPM AC motor design—with a good many enhancements.

"We optimized the pole design to meet the torque and speed requirements," explains Marsh. "This motor is MSHA explosion-proof-approved, and we added a robust sealing system so it can more than handle the underground environment. And, as requested by the customer, we also added a feedback device for better speed control."

With motor specifications in hand, the gearing team began its design work by starting with an existing gearbox base and then building from there. Engineers created a new gear ratio to meet Fairchild's exact needs for torque and speed, building a box with new gears and bearings strong enough to handle the force. For Clark, the bigger design challenges came from some special requests by Fairchild.

"The company wanted us to design the gearbox so it could be used on either side of its dual-tram scoop," explains Clark. "This universal design means they only need to stock one gearbox because it is interchangeable. A box that can be flipped gives them the flexibility they need to manage their inventory."

One other feature Fairchild wanted was a self-contained brake, mounted directly on the gearbox. In the past, Clark explains, brakes were mounted with brackets hanging off the side of the box, thus taking up a great deal of space.

"To accommodate this request, we created new patterns and new castings for the top of the gearbox," says Clark. "This was

a great idea because now that the brake is a part of the gearbox, it's more secure and provides much better performance."

Because this was a new design, the project team attached special instrumentation on the box to capture data, while Fairchild ran the completed unit under test at its facility. Clark says the data was critical for him to understand what the gearbox was doing and how it performed under test.

However, Clark was not content with just collecting and studying data.

"I visited Fairchild after the test was finished and tore the gearbox down so I could examine and evaluate it myself," says Clark. "I looked at the gear patterns to make sure there were no issues, and I did the same thing with the bearings, making sure there was no unusual wear. What I found was that everything looked great."

Achieving Results

While the AC-powered scoop performed beyond expectations at the Fairchild location, Ken Mosley, Fairchild vice president of customer service, was eager to get some running time on the scoop at an actual mine site. Coal River Energy agreed to take a unit and use it at one of its coal mines and provide feedback on what it thought of the new technology.

"I was fairly confident that it would run successfully at the mine, but then again you never know what might happen," says Mosley. "It turned out to be a manufacturer's dream because they started running the scoop and it never quit. After three months of testing we met with them to get their feedback, and to our surprise, they asked to purchase the unit. It was even more exciting when they quickly ordered a second unit plus put in an order for one of their DC scoops to be converted to AC. We couldn't have scripted a better introduction of a new product."

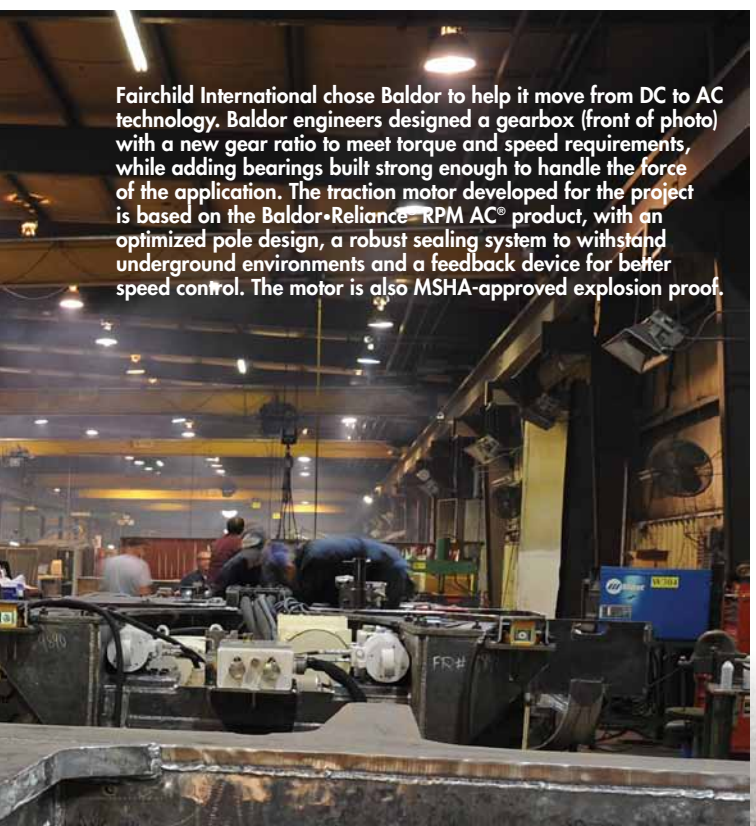
A commitment to craftsmanship and quality has made Fairchild International a leading manufacturer of underground mining equipment.

Mosley says the reasons Coal River Energy was so quick to adopt the new technology come down to performance, durability and longevity. He describes the new AC scoop as a workhorse, ideally suited for slope-graded mines and with machine torque greater than any other scoop on the market. He says that everything he wanted this scoop to do, it does.

"This new scoop goes faster and maintains a constant speed—even going uphill," explains Mosley. "This AC unit runs cooler, and less heat means all of the other equipment lasts longer and reduces the amount of maintenance required. But most importantly, the battery life in our new unit is now twice the life of DC units."

Fairchild achieved his goal of being the first to introduce AC technology to battery-powered scoops. He says he never doubted the team could pull it off because he involved all the right people. So, what comes next?

"This is the technology of the future," claims Fairchild. "Right now, we are ahead of the game, and that's exactly where I want to stay. We will continue to improve the technology, perfecting it for our complete line of equipment. Who knows what the future will bring?"



Fairchild International chose Baldor to help it move from DC to AC technology. Baldor engineers designed a gearbox (front of photo) with a new gear ratio to meet torque and speed requirements, while adding bearings built strong enough to handle the force of the application. The traction motor developed for the project is based on the Baldor•Reliance RPM AC® product, with an optimized pole design, a robust sealing system to withstand underground environments and a feedback device for better speed control. The motor is also MSHA-approved explosion proof.

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