

Drive & Control profile

Rexroth CKK Compact Modules Help AMET Welding Solutions Raise Performance, Reduce Costs for Wind Turbine Builders



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CKK ball screw actuators provide rugged, reliable performance in demanding wind tower environments

Wind turbine technology, with its massive arrays of streamlined windmills blanketing hillsides, is an established sustainable, green technology. Many consider it a technology that will help define the energy future. But wind energy also depends, to a great extent, on more traditional manufacturing techniques, such

as welding—vitaly important for creating the massive towers.

One of the leaders in creating welding solutions for the energy industry—as well as many other applications—is Rexburg, ID-based machine builder AMET Inc. (www.ametinc.com). Since 1989, AMET has been an

Challenge

- Create custom wind turbine welding systems that provide dependable motion control while resisting particulates, hot sparks, and impacts
- Reduce the costs of labor, assembly, and materials associated with linear motion control
- Reduce building time
- Reduce need for end user maintenance and downtime

Rexroth Solution

- Rexroth CKK 20-145 sealed Compact Modules
- Rexroth aluminum guide rails

Benefits

- Durable, affordable welding systems with high performance and low downtime
- Stability for precise and reliable welds, even under heavy loads
- Reduction in machining, assembly and other labor costs during machine building process
- Reduced building time



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innovator in developing and integrating advanced welding solutions to meet a wide range of demanding needs. Recently, AMET called upon the Linear Motion and Assembly Technology specialists of Bosch Rexroth to help them create a new generation of custom welding systems for the increasingly important wind energy industry. That's because Rexroth linear motion systems have the capabilities to meet the unique welding needs of wind turbine builders.

The design of AMET welding equipment—and the role of linear motion technologies—is largely dictated by the techniques required to create massive wind turbine towers that can be around 90 meters high (close to 300 feet). Typically, a flat metal plate

is rolled into a cylindrical shape called a “can.” The can (the most common size is approximately 9 feet long by 8 to 15 feet in diameter), is then rotated, while the welding machine, staying more or less stationary, performs circumferential welding across the entire diameter. Longitudinal welds are also required. Wind tower welding systems generally operate both inside and outside of the can at different times; the welding equipment is usually suspended from a guide rail for outside welding. In each case, while the bulk of the welding equipment remains stationary during a weld, the weld head constantly moves small distances along at least 2 (sometimes 3) axes, both along and across the seam. A linear control actuator mounted at the end of a horizontal arm determines the motion of the weld head.

AMET's goal was to create a cost-effective, dependable welding system that could perform accurate longitudinal and circumferential submerged arc welding. The design, including the linear motion for weld head control, would ideally be straightforward and simple, so the welding system could enter an increasingly competitive market as quickly as possible.

One of the most important challenges, however, was to assure smooth and precise (within 1/100th of an inch) control of the weld head, to avoid improper welds that would need to be redone and ultimately result in wasted time and materials. And this precise control had to be maintained

within a very demanding environment. “The tremendous amount of particulates, especially flux dust, generated by this form of welding can really cause problems for this machine's finer controls, particularly with systems such as linear actuators,” said Craig Dees, AMET Engineering Manager. “We needed to be sure that the linear motion components would stand up to this harsh welding environment, especially inside the can.”

In addition to good protection against flux particulates—which can cut into uptime—AMET also wanted linear motion elements that offered good strength (dynamic loads in excess of 20,000 Newton) with light weight and compact size. Yet another challenge was to support smooth weld head acceleration of up to 3 meters per



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second squared (3m/s^2), for a travel speed of 1.5 meters per minute.

AMET's Source for Solutions

To meet these needs, AMET turned to a familiar source for linear motion: Northwest Motion, Inc. (www.nwmotion.com), a distributor of Rexroth linear motion products. AMET had already used CKK Compact Modules, along with other Rexroth products, in a number of other custom welding applications. Northwest Motion had been supplying Rexroth linear motion technologies to AMET for several years, so they were able to recommend the CKK line for the desired strength-to-weight ratio. In fact, Rexroth products had become AMET's standard platform for welding systems, and Rexroth precision-ground, hardened steel guide rails were to be specified for the guide rail that carries the suspended weld head for outside welding. With the CKK Compact

Modules, however, AMET put Rexroth linear motion systems in a particularly crucial role.

AMET generally specifies two (occasionally three, for even more precision) CKK 20-145 linear actuators for their custom welding systems, in 490 mm and 590 mm standard lengths; some systems use CKK 15-110 actuators. As Craig Dees points out, "One of the features that we noticed right away as a potential advantage for Rexroth actuators over other types is that their compact dual-rail system features a sealed rolling strip." That's important because many non-Rexroth linear systems use fabric or rubberized bellows to keep the rolling strip clean. The CKK's seal keeps the module protected from the pitting that's caused in other actuators by the particulates welding generates. The compact CKK design, light in weight but durable and strong, makes machine assembly

smoother and easier. "We knew that other linear motion solutions couldn't give us the reliability and protection against contamination and pitting that the CKK modules could," Dees says.

There's more. Between the dual carriage option and the dual rail design integrated into the rigid aluminum frame, this CKK module gives AMET's welding system a guideway with a dynamic load capacity of up to 61,000 Newton with excellent stability. The CKK resists impact and stress as well as sparks and contaminants, further increasing uptime.

Prepackaged Modules Make AMET's Task Easier

Another important feature leading to better and faster machine production is the fact that CKK 20-145 modules are complete, prepackaged systems, with dual ball rails and a ball screw drive integrated into the module. This simplifies design, saves space, and removes the costs and effort of machining, assembly, bearing alignment and other application engineering tasks. "The CKK modules are precision-machined at the factory by Bosch Rexroth, so we don't need to do any extra work ourselves," says Dees. "They're ready to run as soon we get them—we can just add them to the system." Dees also noted that Rexroth can be counted on to meet their delivery dates consistently. For AMET, all this means a savings of up to 2 weeks in building time for this system, which presently is about 12 weeks per machine. Controlled by proprietary AMET

systems, the CKK modules are helping AMET welding systems ensure dependable performance in many wind tower applications.

AMET, of course, gets considerable benefit from distributor Northwest Motion as well, including rapid delivery, superior parts availability and competitive pricing. “Getting quality linear motion for less cost allows us to pass the cost savings along to the customer, and give them the welding solution they want at an attractive price,” says Dees. The combination of superior performance and affordability of AMET systems is helping wind tower manufacturers make sustainable wind energy a reality—and Rexroth CKK 20-145 modules are playing a small but significant part in that.

End users get many other advantages from AMET welding systems using Rexroth’s linear modules. The modules contribute to more compact systems, with a high load rating and an overall strength that’s especially valuable if the weld head strikes the side of the can. By keeping out particulates,



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the sealed rolling strip maximizes reliability and uptime, while reducing maintenance. Wind turbine manufacturers also benefit from a welding system design that’s ideally suited to the most common tower section sizes, including the larger sizes needed to create wind turbine support towers more than 75 meters high. Finally, AMET custom welding systems make a good appearance—they look as reliable and dependable as they are. And their economical cost has proven to be attractive, too.

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