



Reel Power relies on advanced PMSM technology from Bauer Gear Motor

One of the constants of urbanisation, expanding energy infrastructure and increased communications is a high global demand for cables and wires. Consequently, suppliers strive to reduce lead times by streamlining processes. Spooling is one of these key processes, carried out by specialist machines designed to efficiently collect wires and cables in reels.

To ensure its latest reel and coiling solution could deliver efficient performance within a compact footprint, Reel Power Industrial selected permanent magnet synchronous geared motors from expert, Bauer Gear Motor, a leading brand of Altra Industrial Motion Corp.

A key segment of the market is copper wire. Utilised in electrical, communications and power infrastructure - demand from contractors across all sectors is high. This pressure is directly transmitted to copper wire suppliers, who desire solutions that spool wire onto smaller reels reliably and efficiently, ready for delivery. Additionally, a compact machine is preferred. This allows suppliers to maximise space efficiency, consequently enabling more machines to be installed in limited floorspace and productivity to increase. Businesses such as Reel Power Industrial specialise in providing reel and coiling machines that unlock these benefits.

The benefits of PMSM technology

For the new machine variant called the RD10, Reel Power Industrial desired to redesign the roller drive system to deliver improved efficiency within a reduced footprint. To achieve these dual aims, it was necessary to replace the in-line motor with a right-angled gear motor that delivered increased power density. Assessing geared motors from various manufacturers, Reel Power Industrial selected a Bauer BK Series helical bevel geared motor featuring permanent magnet synchronous motor (PMSM) technology.

The compact BK40 gearbox utilises an integrated motor with PMSM technology to maintain consistent torque from 0 hz to 120 hz – ideal for spooling applications. Rotor heat losses are reduced by 100% and total losses by approximately 25% - which ensures that the motor does not overheat at lower power. Additionally, the technology increases total efficiency by 10% or more. This results in lower total cost of ownership (TCO) through energy savings, as well as reduced carbon emissions.

The RD unit also requires a variable speed control to allow operators to control the rewind process. *"Older RD models accomplished this via mechanical variable speed drives with adjustable pulleys. Newer models utilised VFD controls with inverter-duty induction motors,"* Crosley said. *"However, switching to PMSM is not always a simple adjustment. After thoroughly testing many VFD controls, we found some drive manufacturers do not have adequate algorithms for PMSM control."*



The BK40 was therefore matched with a suitable VFD to provide the desired functionality. To test performance, an RD10 was loaded with a 4,500+ kg reel and operated for several hours, with periodic stop starts. This would ensure that the BK40 could handle the load. Engineering teams from both Bauer Gear Motor and Reel Power Industrial collaborated closely to fine tune the motor to meet performance expectations.

The RD10

Reel Power Industrial's RD line is one of its most popular solutions. The RD line is typically used by wire and cable distribution facilities where large spools of copper wire are transferred down to smaller reels for contractor use. The new RD10 rim drive shaftless take-up is a recent addition to the range, the next stage in a development cycle that has run for decades.

"Manufactured for over 30 years, the RD line has been periodically updated to take advantage of innovative technology as it becomes available," said Joe Crosley, Senior Electrical Engineer at Reel Power Industrial. "Initially, RD Series take-offs were offered with a 20 hp mechanical variable drive system that provided high-torque but was cumbersome and expensive to maintain. Then, as variable frequency drives (VFD) and controls became available, we upgraded but had to increase horsepower to maintain low-end torque."

RD10 reels are 'rim driven' allowing for quick change out and loading of large wire and cable spools. The machine uses a geared motor to drive a roller which rotates the cable reel as it coils. The output shaft of the geared motor is coupled, via chain and sprocket, to the drive roller. A smaller motor with gearbox drives two threaded rods which, in turn, move the ejection roller up and down the frame. Maintaining a consistent winding torque through all speed ranges is critical to ensure proper spooling.

Compact performance

Along with being an efficient solution for the RD10, the size-to-power ratio of the BK40 was a key factor in its selection.

"Aside from the inherent superior efficiency provided by the Bauer PMSM technology, due to its power-dense design, we were able to move from a 20 hp motor to a 15 hp motor which saved on initial cost as well as operating costs," Crosley explained. "The implementation of the Bauer BK right angle, helical bevel geared motor package also allowed us to reduce the width of the machine from approximately 3.5 metres to 2.6 metres – which is a huge win for our customers."

This sizable space saving ensured that end users could maximise their available floorspace effectively.

The new RD10 units provide smoother acceleration and deceleration with no 'cable popping', reducing the risk of damaging strands. A footswitch and central operator controls with handheld speed pendant allow the operator to wind material onto a reel or onto a coiling head. The footswitch can be "jogged" without tripping the drive – allowing for easy packaging of the spooled material. Dynamic reel braking reduces 'over spin'. RD10 units generate lower ambient noise compared to mechanically driven units too.

A Boston Gear 700 Series speed reducer is utilised on the machine's smaller ejection drive. The 700 Series is the industry standard for modular worm gear construction. Units feature a rugged fine-grained cast-iron housing for maximum strength and durability.

"The BK40 performed well in both our in-house testing and testing at our customer's facility. Bauer is a great company to team up with. They were very supportive and worked well with our staff," according to Crosley. "We are looking at other applications that may maximise the inherent features of Bauer PMSM geared motors."

Captions:

Picture 1: For its new RD10 reel and coiling machine, Reel Power Industrial selected a Bauer BK Series helical bevel geared motor featuring PMSM technology.

Picture 2: The compact BK40 fitted offers smooth deceleration and acceleration, high efficiency as well as an impressive size-to-power ratio.

Picture 3: Reel Power Industrial's RD line is used by wire and cable distribution facilities to transfer large spools of copper wire down to smaller reels for contractor use.

Picture 4: The compact BK series utilises an integrated motor with PMSM technology to maintain consistent torque– ideal for spooling applications.

Picture 5: A Boston Gear 700 Series speed reducer was fitted on the machine's smaller ejection drive.

About Bauer Gear Motor GmbH

Bauer Gear Motor has been a provider of solutions within geared motors for more than three quarters of a century. We provide products of the highest quality with focus on flexible solutions, reliability and customer understanding. Bauer Gear Motor has a strong foothold especially within food & beverage, alternative energies, waste water, steel industry and material handling.

Bauer Gear Motor has production facilities in Germany and Slovakia, together with sales offices and assembly facilities around the world.



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