

Drive & Control profile

Engine for growth: Drive upgrades for machine tools at Cummins



Replacing legacy drives with new DIAX03 DKR analog drives extends the life of newer grinders while keeping older machines operational until they are replaced.

No machine lasts forever, and every manufacturer recognizes that its production equipment has a finite lifecycle. Product lifecycle management and establishing a plan for retiring and replacing equipment is critical to sustaining the highest levels of productivity, uptime and product quality.

Cummins, Inc. (www.cummins.com), a global power leader that designs, manufactures, sells and services diesel engines and related technologies, recently determined that some Bosch Rexroth drive units used on machine tools at its Jamestown Engine Plant in Jamestown, N.Y., were reaching the end of their

product lifecycle. This determination was made in consultation with Bosch Rexroth (Hoffman Estates, IL www.boschrexroth-us.com), since both companies have worked together on a regular basis for servicing Rexroth products and equipment lifecycle planning for the Jamestown plant.

Challenge:

Extend service life of existing contour grinding machines with minimal operational downtime, helping customer control costs and maximize investment retention.

Rexroth Solution:

Replace existing legacy Rexroth drives with Rexroth DIAX03 DKR Analog drives, offering flexibility, combining AC Servo and Spindle drive performance into one compact package. Retrofit saved customer significant time and money.

Results:

- Four contour grinding machines have their operational lifespan expanded
- Rexroth custom solution extends life of newer grinders while keeping older machines operational until they are replaced
- New Rexroth drives are most cost-effective solution and are replaced with minimal downtime
- DKR drives fit into existing footprint with similar parameter sets; no need to rewire interfaces, change spindle motor or encoder
- Rexroth works closely with Cummins to plan longer-term migration and upgrade plan for drives and other technology on engine plant's production platform

Eight high-speed camshaft contour grinders utilize Rexroth RAC spindle drives on the machine tools' rotating axis. The contour grinders are 3-axis machines that grind parts based on a machine-generated path: the spindle rotates the part being ground at high speeds while the other two axes move around it to grind the required part.

With the support of Bosch Rexroth, Cummins has been able to keep these older Rexroth spindle drives in operation for more than 15 years by sending the equipment in for repair. However, the time had come when replacement components were no longer available and a more permanent solution was needed. Keeping the contour grinders operating was important for Cummins, so a solution that allowed for this was critical: "Everything we build here is already sold," said Plant Machine Electrician Michael McLaughlin. "We don't inventory engines, so we can't afford to have a grinding machine go down."

Plant management was also keenly interested in the most cost-effective and efficient migration path for replacing other legacy machine components like the Rexroth drives. The grinders were part of an installed base of 50 machine tools and other production systems that were identified as potentially needing component upgrades, retrofits or complete replacement over the next several years.

When Cummins contacted the original equipment manufacturer to inquire about replacement parts or upgrade options, the tool builder proposed an extensive solution that would replace

most of the machine, and take a year per machine to implement—an approach Cummins rejected.

Cummins turned to Bosch Rexroth which offered a solution that could sustain the performance of the machines quickly—without an extensive or expensive overhaul—and could interface with the existing third-party motor in each machine.

Bosch Rexroth has a multi-level program for assisting customers whose long-serving production machines contain dated Rexroth components. All the levels are designed to provide the most optimum, cost-effective solution for individual requirements to keep production systems delivering quality performance for as long as needed. The levels include:

- Reman Repairs—remanufacturing of Bosch Rexroth products—a premium repair service to extend the life of a product and maximize uptime
- Reman Plus—provides the same style of remanufactured repair, plus registering the remanufactured product with Bosch Rexroth. In addition, Bosch Rexroth commits to servicing the product beyond the scheduled end-of-service date, including having reserve component parts to support the repair
- Retrofit—Bosch Rexroth has cost-effective upgrade solutions with its latest product lines that are well-suited to replace legacy products.

Strategic retrofit

After careful consultation with Cummins, it was jointly determined that a retrofit program for the contour grinding machine RAC spindle drives was the right solution.



New Rexroth drives help extend the operational life of four contour grinding machines at Cummins.

Since the RAC drives were no longer supported, a plan for migrating to current technology to extend the life of machine tools inexpensively was already available and just needed to be tailored to meet Cummins' specific needs.

According to Cummins' McLaughlin, four of the eight contour grinders are older machines and are scheduled by Cummins to be replaced within the next five years. Rexroth came up with a custom solution that would extend the life of the newest grinders

while keeping the older machines in operation until their scheduled replacement.

“We decided to upgrade the four newer machines with the current Rexroth drive technology (the DKR), which would provide us four more spares of the obsolete RAC drive to keep the older grinders operating until their scheduled replacement,” McLaughlin said.

Integrating new drives into existing platforms

Naser Suleiman, the Bosch Rexroth applications engineer who worked with McLaughlin on the Jamestown plant retrofit, recommended the Rexroth DKR AC drive as the replacement for the legacy RAC drives. Part of the Rexroth DIAX03 family of drives and drive controllers, the DKR drive is a modular AC drive that flexibly combines AC servo and spindle drive performance into one compact package, particularly well-suited for machine tools, textile, printing and packaging machinery.

The DKR drive has a similar footprint to the RAC drives, enabling easy replacement. In addition, it features similar parameter sets and there is no need to change the spindle motor’s encoder, all features that save time and costs for the RAC-to-DKR upgrade. It also provides a power regeneration option—any excess power generated by the machine’s duty cycle is fed back into the contour grinder’s power bus, helping save energy.

The switch to the DKR drive provided a cost-effective and easy-to-install solution for upgrading the grinders. Using the Rexroth DKR drive meant there was no need to change either the motor or encoder on the axis; in addition, the DKR features an adapter cable that eliminates the need to rewire interfaces, saving time on installation. The drive was also similar in size to the RAC drive, so no special reconfiguration was necessary to mount it, and the machine’s footprint remained the same.

The final requirement from Cummins was that the Rexroth DKR drives interface with third party Reuland AC motors. Rexroth’s Suleiman was able to reach out to the motor manufacturer and obtain the required specifications to configure the new Rexroth drives for installation, helping save time and limiting any technical complications with the retrofit.

“Outstanding” tribute to Rexroth service

With the technical requirements satisfied, Rexroth service personnel set up a schedule to install the new DKR drives that would have minimal impact on Cummins’ operations. Instead of a year-long process that might have been required to upgrade an entire machine (what the machine tool OEM proposed), Rexroth’s retrofit installation took only two days per machine.

The four new DKR drives have been installed on the contour grinders, thereby extending their drive service life to 2019; Cummins can even choose to enter a program Rexroth offers that will extend that service life to 2024.

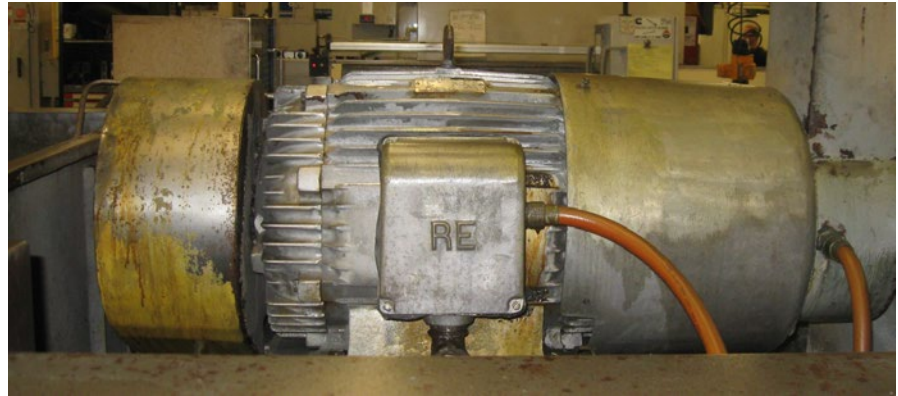


Although the grinding machines show a lot of wear, their product—diesel engine camshafts machined to ultra-tight tolerance specifications—are produced with the highest quality and precision.

Suleiman reaching out on his own to get the necessary motor specifications was just one more example of excellent support Rexroth delivered to Cummins, said McLaughlin. “Rexroth’s service and retrofit departments always do an outstanding job communicating to us when products are reaching end-of-service, and presenting us with options for drives and controls migration, whether it’s for retrofits, upgrades or remanufactured solutions,” he said. “They’re not just salespeople; they’re engineers who’ve been out in the field and really know their business.”

With the success of the retrofit project, the Rexroth team then addressed legacy technology in other machines at the Jamestown plant, laying out a complete program of options for other machine tools with Rexroth products projected to reach end-of-service status in the near future.

“I like being able to pick up the phone for support, or to schedule someone to come in and help us when our electrician staff can’t resolve the issue,” said McLaughlin. “And, by far, Bosch Rexroth is one of the best companies around that has that support, whenever you need it.”



Using the Rexroth DKR drive meant there was no need to change the motor or encoder on the axis, saving time and money.

 www.facebook.com/BoschRexrothUS

 twitter.com/BoschRexrothUS

 www.youtube.com/BoschRexrothGlobal

©2013 Bosch Rexroth Corporation
Subject to change without notice.
Printed in USA.
ALL RIGHTS RESERVED
FORM Cummins (0513)

The Drive & Control Company

Rexroth
Bosch Group

Bosch Rexroth Corporation
14001 South Lakes Drive
Charlotte, NC 28273-6791
Telephone (800) 739-7684
www.boschrexroth-us.com