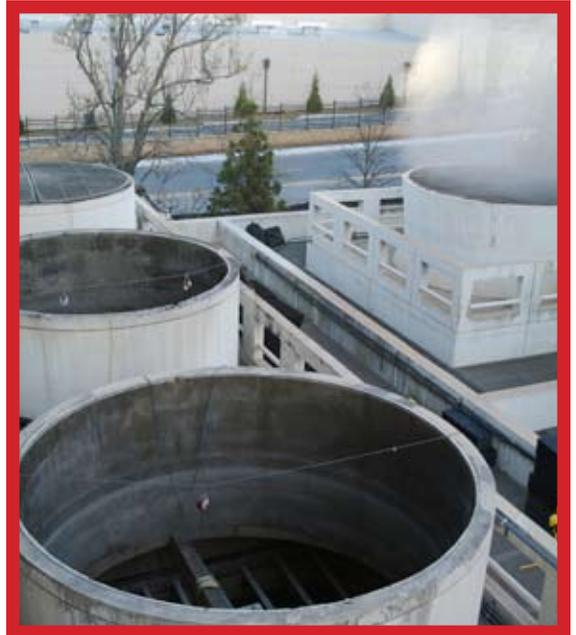


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## Baldor is Redefining the Future of Cooling Tower Fan Designs with Innovative “Green” Motor and Drive Technology

For the past 20 years, Rod Applegate, the owner and president of Tower Engineering, Inc., has been searching for a better method of driving fans in cooling towers. He says he has finally found what he’s been looking for in Baldor’s new RPM AC® Cooling Tower Direct Drive Motor controlled by a Baldor VS1 Cooling Tower Drive.

Since 1986, Applegate’s company has been designing and installing high-quality cooling towers for the large institutional market, including hospitals, universities and airports. They all use an air conditioning system that requires a cooling tower to exchange heat and return cooled water back to the chiller. These towers use large high inertia fans to pull air over a water soaked media to cool the water as part of the process. The most common method for driving the fan in modern cooling towers has been a right angle gear reducer, drive shaft, and disc coupling arrangement, along with a standard foot mounted AC motor.



*Typical motor, shaft and gearbox fan drive.*

“I have always wanted to get rid of these gearboxes and all of the other moving parts,” says Applegate. “Misalignment, excessive vibration and noise are all inherent problems with this system. With the high speeds, the gearboxes generate too much heat and the seals and bearings can have very short lives. There are just too many things that can go wrong.”

There is also a significant maintenance issue for the owner. “Keeping up with regular oil changes of the gearbox and inspections of the flexible elements are critical,” says Applegate. “Ignoring either of these two can, and has, resulted in the catastrophic failure of equipment.”

Gearboxes are also prone to oil leakage around the high-speed input shaft, contaminating the tower cooling water.

## Turning an Idea into New Technology

A couple of years ago when a Dodge® engineer called on Tower Engineering to discuss gearboxes, Applegate explained, in no uncertain terms, that he didn't need another gearbox, what he needed was a direct drive fan motor.

"To his everlasting credit, this engineer took the message back to the company, where it was determined that this was a project they would take on," says Applegate. "In subsequent meetings at Baldor's Research and Development lab, I was able to share with a group of engineers all the things that the cooling tower industry was looking for in a product. Once all the parameters were set, they went to work."

In the meantime, Applegate had a patent pending on a cooling tower motor of his own, but he soon recognized that his design was not the way to go. "I am not a motor manufacturer, and frankly I could see that the Baldor design was going to be far superior. So, now I have a nice patent on display in my office, and that's exactly where it's going to stay."



The result of the research and development is the Baldor•Reliance RPM AC Cooling Tower Direct Drive Motor, which features a power dense, laminated steel, finned-frame construction. A proprietary Permanent Magnet Rotor (PMR) design using high-flux magnets allows the motor to be manufactured in a compact form, similar to the gearbox it replaces.



RPM AC® Direct Drive motor installation.

The combination of these innovative technologies has allowed the company to build a high torque, low profile motor, with the fan mounted directly on the motor shaft. It's a synchronous machine that runs at precise speeds without slip in combination with a Baldor Permanent Magnet Cooling Tower drive.

With Baldor's release of the new cooling tower motor, Applegate says he finally has the solution he has long been searching for. He describes it as a product that neatly side steps all of the issues of a traditional system. "If you don't mind the phrase, I think it's a simple and elegant solution," says Applegate. "It's elegant in the sense that you have traded all of the components for one moving part."

### A Greener Technology

Eliminating the troublesome gearbox maintenance issues with a simplified direct-drive motor is just the beginning. The Permanent Magnet motor and drive package provides high system efficiency. The variable speed control allows the tower to operate at optimum performance, which results in a considerable amount of energy being saved.

The energy efficiency story of the Baldor package is one that Applegate is eager to tell. "This is an important discussion to have in a time when everyone is concerned about reducing the amount of energy they consume," says Applegate. "When gearboxes run at these high speeds they generate a lot of heat and that's energy being lost. Based on the test data, we anticipate that the Baldor solution is 13% more efficient than a conventional drive train."

The motors also run quieter and the reduction in noise level is important, especially in towers that are located near "people dense" buildings. In addition, by replacing the gearbox, the potential of environmental contamination is eliminated.

## The Solution for the 21<sup>st</sup> Century



Applegate describes the Baldor•Reliance Cooling Tower motor as a revolutionary product, but predicts that five years from now this solution will be the norm. His company is already installing these motors in new cooling tower construction. He also believes this is an ideal solution for existing cooling towers.

"We will be doing as many retro-fits as we can because they're just so darn easy," says Applegate. "The Baldor engineers were smart enough to create a low profile motor design that fits in the same space and mounting footprint as the gearbox. It's so simple; it's almost just a drop-in replacement."

Over the past 20 years, Applegate has seen potential cooling tower fan drive solutions come and go, with none working any better than the gearbox drive train design. But this time he's convinced he's found a superior performing, user friendly and green solution.

"I am confident that this is a real and permanent solution for the industry," says Applegate. "My confidence was strengthened after meeting and getting to know the engineers who designed and worked on the project. I was constantly blown away by their intelligence. I've also visited the plant and watched the product being manufactured. This is a company that will stand behind the product, that's why I know it will be a success."



These new and innovative products are being built in Baldor's Gainesville, Georgia, motor plant and Fort Smith, Arkansas, drives center. Baldor expects this new technology to transform the traditional cooling tower fan motor and gearbox design to this new high-efficiency "green" direct-drive motor and control solution in the near future.

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