

APPLICATION NOTE

Cooling Tower Applications

Food Processing Facilities



Cooling towers are used in food processing plants all over the world. Maintenance and failure of the gearbox, and associated components, is often problematic with traditional systems. The Baldor-Reliance® RPM AC direct drive cooling tower eliminates these problems by coupling the motor directly to the fan and controlling it with a unique drive.

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01 Cooling Tower application

Challenge

A food production facility using a traditional cooling tower system comprised of a motor, cardan drive shaft and gearbox combination was experiencing significant problems including: multiple gearbox failures, oil leaks, oil contamination, misaligned or failed drive shafts and excessive vibration.

The customer wanted a solution to improve energy savings and reliability in cooling towers at the plant.

Solution

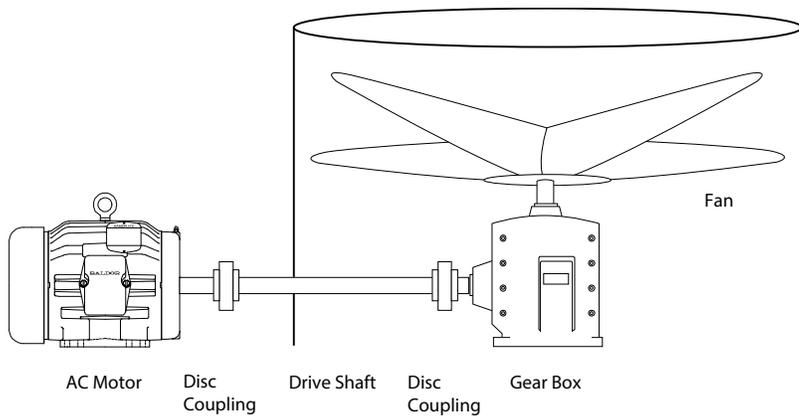
A Baldor-Reliance RPM AC PM direct drive cooling tower motor was installed on one of five fans of the cooling tower in May 2011. Energy consumption of normal AC induction motor and the RPM AC PM motor were compared over a five year span.

Baldor-Reliance RPM AC Cooling Tower Motor

The RPM AC cooling tower is a high torque direct drive motor for cooling tower applications with all the benefits of variable speed control, while eliminating the cost and maintenance required for traditional gearbox or belted solutions. The fan couples directly to the motor and is controlled by a unique AC drive to provide optimal speed and performance that runs quieter with reduced energy consumption.

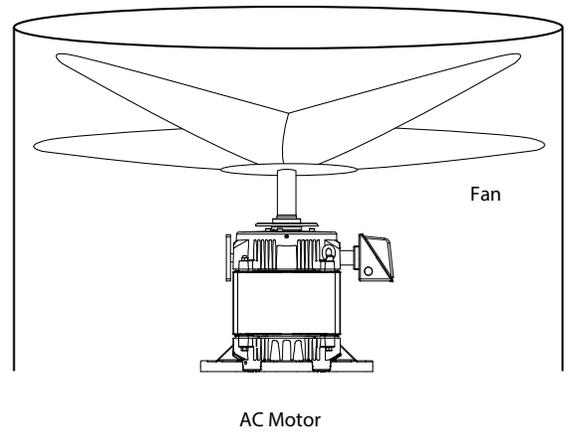
Benefits of Direct Drive Motor:

- Eliminates the need for a gearbox, and associated components, reducing maintenance time and cost
- Reduces energy consumption
- Longer life as motors have up to 5x the life expectancy of gearboxes
- Eliminates the alignment of mechanical components for quicker installation, reduced installation costs and increased system efficiency



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01 Layout of traditional cooling tower system



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02 Layout of Direct Drive Cooling Tower System

Installation data	Traditonal Tower Design	Direct Drive Tower Design
Motor	45 kW	16 kW
Motor Speed	1460 rpm	268 rpm
Fan Speed	268 rpm	268 rpm
Power Factor	0.55	0.53
Fan Blade Angle	15°	15°
Variable Speed Drive	Not installed	ABB ACS 880 Drive
Motor Power Consumption	18 kW (actual measured value)	15 kW (with drive, actual measured value)
Gearbox	Flender	Not required in direct drive system
Replacement (assumes 1 per year)*	\$30,000	\$0
Crane Rental (assumes 1 replacement)	\$3000	\$0
Shaft	Cardan Shaft	Not required in direct drive system
Replacement (assumes 1 per year)*	\$5000	\$0
Average Maintenance cost	\$38,000/ Yr	\$0 / Yr
Energy Savings	\$0	\$855 / Yr
Total Savings \$/Yr		\$38,855

*20 -50% of reducers fail each year; Average downtime per failure is 3 - 5 days

Conclusion

By combining the technologies of the field proven high performance (torque) RPM AC permanent magnet motor, and the matched performance of an adjustable speed drive, the Baldor-Reliance direct drive cooling tower design reduces energy consumption and maintenance required. The realization of these benefits offered a lower total cost of ownership and improved reliability for the plant.