ARTICLE

Air-cooled heat exchangers (ACHE) in the chemical, oil & gas industry

BALDOR · RELIANCE

Increased reliability, reduced maintenance

Baldor-Reliance® cooling tower direct drive motors help ensure continuous availability of air-cooled heat exchangers. CTDD motors operate at low speeds with high torque outputs.

—
01 The ABB ACS880 variable speed drive utilizes our Matched Performance philosophy to ensure trouble-free operation with CTDD motors

An air-cooled heat exchanger, or ACHE, is used to cool and/or condense process streams with ambient air as the cooling medium rather than water. This pressure vessel cools a circulating fluid within finned tubes by forcing ambient air over the exterior of the tubes. In the chemical, oil and gas industry, ACHEs are used in upstream and downstream applications, as well as in midstream gas processing, to remove heat from the process. They are one of the most common cooling methods used for these applications.

Air cooled heat exchangers for process cooling are a challenging application. While the heat exchanger itself is a simple device, the requirement to maintain a high operational tempo with minimum downtime to support continuously operating industrial processes is often difficult to meet with conventional motor and power transmission technologies. Traditionally, the drive for the heat exchanger fan has been a vertically mounted AC motor, connected to the fan by a v-belt drive. Larger fans with higher horsepower requirements can be connected to a right-angle gearbox, with the fan shaft supported by mounted bearings. Whether using belts or gearboxes, conventional motors and power transmission equipment require regular maintenance several times a year. Belts must be periodically tightened or replaced, and gearboxes require monthly oil checks and semi-annual oil changes. Conventional high-speed motors also require relubrication every couple of months.

The direct drive solution is a synchronous permanent magnet motor that uses laminated finned frame construction to provide a power-dense package that also improves system efficiency. Not only are the losses from belts or gearboxes eliminated, the motor itself is very efficient. By utilizing a permanent magnet rotor, the direct drive motor eliminates rotor losses. Derived from one of the toughest motor platforms used in the most demanding industrial applications, the direct drive motor is built to wistand the ACHE's hot and humid environment.

Drain locations situated for vertical mounting, lifting provisions to make installation easier and a shaft slinger over the non-contact, rotating labyrinth seal ensure that moisture does not enter the motor during normal running or idle times. The drive-end bracket is designed so that water runs off the motor and does not accumulate in pockets on the surface. The bearings are designed to handle extreme loads and provide a minimum of 100,000 hours L10 life.

By partnering the motor with an ABB ACS880 variable speed drive, even greater efficiency levels can be achieved. With variable speed control, fans can be operated to optimize the process cooling. A small reduction in fan speed provides a corresponding energy savings that is a cube of the speed. For example, running the fans at 90 percent speed will reduce energy consumption by 27 percent.

Benefits of operating the Baldor-Reliance direct drive system include:

- Increased efficiency and power factor performance
- Operation at an optimal system efficiency point with variable speed control
- Increased system reliability with fewer mechanical parts
- Replaces high maintenance conventional gear and belt drive arrangements
- Longer intervals between bearing lubrications
- Quieter operation than conventional motor/ gearbox system
- Inherent condensation prevention
- Ability to eliminate wind-milling
- Easy reversing for maintenance or de-icing
- Simplified installation or retrofit with gearbox footprint
- Labyrinth non-contact shaft seal and slinger combination protects the motor from water ingress and contamination
- Easy-to-use drive control parameters
- Interfaces easily with automation control systems
- Five-year standard warranty

—
01

ABB Motors and Mechanical Inc.
5711 R.S. Boreham, Jr. Street
Fort Smith, AR 72901
Ph: 1.479.646.4711

new.abb.com/motors-generators

AR4 10.2022