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Extending Clutch Brake Service Life for the Most Demanding Applications

Posidyne Clutch Brakes Have 5 Cooling Options for Extreme Conditions

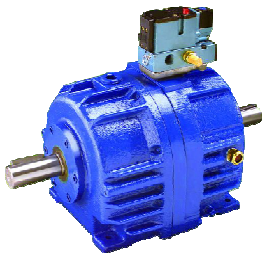
Clutch brakes and brakes can end up in extreme application environments. Dirty, dusty, wet, hot, cold, high inertia loads, high cycle rates, or all at the same application location. How can you ever get a clutch brake or brake to provide decent service? For this discussion let's just concentrate on 3 issues—high cycle rates, high inertia loads, hot temperatures. The common denominator for all three when relating to clutch or brake solutions is heat.

First it is important to understand that a clutch or brake converts rotating energy to heat. Therefor anytime the clutch or brake is engaged heat is created and must be removed from the friction surfaces. When engaging a clutch approximately 1/3 of the energy coming to the clutch is converted to rotating energy on the output, the balance is converted to heat. When braking 100% of the rotating energy coming into the brake is converted to heat. So, the more energy coming into the friction surfaces the more heat. Note that the Positorq products typically are partially engaged for long periods of time and generate high heat levels continuously.

Heat is one of the biggest enemy's of clutches and brakes causing friction disc wear, degradation, glazing, loss of torque, hanging or binding, and early failure. Dry friction clutches and brakes have difficulty removing heat from the friction surface causing the challenge of creating higher heat resistant materials, and minimal success by adding fan or water cooling.

Force Control Posidyne clutch brakes, Posistop brakes, MagnaShear brakes, and Positorq continuous slip brakes all feature Oil Shear Technology. Oil Shear Technology is a system of continuously circulating transmission fluid through the friction stack. A thin film of fluid between the friction disc and drive plate separates the parts reducing direct mechanical contact, while the transmission fluid squeezed between them transmits torque through a process known as oil shear technology or hydroviscous. Now we have most of the generated heat created within the fluid which can be cooled in several ways.

Force Control Industries has developed several ways to assure a continuous fluid film of cooled fluid in all of their clutch and brake products. They include;

Standard Radiation Through the Housing—In a standard clutch brake or brake a uniquely designed hub continuously provides circulation pulling the fluid into the center of the hub, centrifugal force pulls the fluid through the friction stack throwing it out to run down the housing walls to the bottom of the unit, where the trip repeats. Radiation through the housing walls pulls the heat from the fluid providing cooled fluid to re-enter the hub. the surrounding air temperature will affect the amount of cooling.	
Fan Cooling Enables Higher Radiation Cooling —By adding fan cooling to the unit the housing is continuously cooled enabling greater cooling to the fluid (as much as 4.5 times non fan cooling). Fan cooling works on applications when the input shaft rotates at high speed (1800 or 1200 RPM). At low speed there is not enough air flow to do much good. In addition the surrounding air temperature will affect the amount of cooling.	

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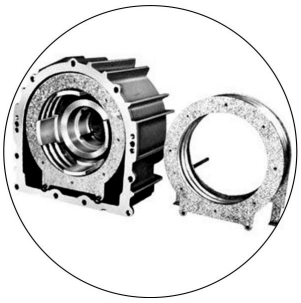
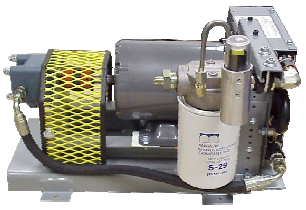
Water Cooling for High Thermal or hot Applications - Water cooling of the Posidyne clutch brakes is accomplished by adding a cooling coil around the input shaft and running water or other cooling liquid through the coil. This can add up to 15 times the cooling capability. Water cooling can be a big advantage when operating in high temperature surrounding air.	
External Cooling Packages—under severe conditions it may be wise to externally cool the unit fluid directly through an external cooling package. This package consists of a circulating pump and motor, small reservoir, oil-to-water or oil-to-air heat exchanger, and filter. In severe conditions the fluid can develop carbon particles from excessive heat at the friction surfaces. These particles are removed by the filter eliminating friction disc or drive plate excessive wear.	
Forced Lube Cooling— When the application is very severe a forced lube option is available. Applications could include those with high inertia or soft start where high thermal loads or long slip times are inherent. The forced lube option will include modified plates, friction discs, and direction fluid injection into the friction stack. It also requires and external Forced Lube Cooling Unit consisting of a reservoir with flow pumps, heat exchangers (oil-to-air or oil-to water), temperature control valves, filters, temperature switches, pressure switches, all mounted on a free standing reservoir.