



The KSL-HS and KPTB-HS high-speed drives by Transfluid are capable of input speeds of up to 3600 r/min.

## High-Speed Coupling

Hydrodynamic couplings used for variable-speed operation of centrifugal machines

Italian transmission specialist Transfluid has presented two new lines of variable, high-speed hydraulic couplings capable of input speeds of up to 3600 r/min for application in the power generation and petrochemical industries: the KSL-HS and the KPTB-HS. The couplings are mainly used for the operation of boiler feed pumps, fans, blowers, pumps and compressors.

In centrifugal machines such as pumps, compressors and fans, speed control plays a crucial role in energy savings. For example, Transfluid said that by decreasing the driving speed of a centrifugal machine to 50% of its normal operating speed, the current draw of the driving electric motor is reduced to 13% of its normal draw.

The variable-speed function can be accomplished by installing a variable-fill hydrodynamic coupling in the drivetrain, the company said. By con-

trolling the volume of oil circulating inside a variable-speed coupling, the output speed can be continuously changed to optimize the driven machine's performance.

Traditionally, oil volume control is accomplished via a scoop tube. However, Transfluid said it has pioneered a solution based upon the most current technology — flow control.

Flow-controlled, variable-speed hydrodynamic couplings are based on a very simple principle, Transfluid said. The power media (oil) is withdrawn from the tank by an electric feed pump and fed to the driving and driven impellers of the coupling circuit. The oil is then drained by centrifugal force through calibrated orifices on the perimeter of the circuit and then returned to the tank by sheer gravity. By varying the feed pump oil flow, the volume of oil between the driving

and driven impellers can be changed. The end result is accurate control of driven machine acceleration time and precise speed variation.

The company said its KSL and KPTB series couplings are already installed in hundreds of applications worldwide; the company said that from this experience it developed the new HS series of hydrodynamic couplings, which are dedicated to extreme operational conditions.

The KPTB-HS high-speed drive is used primarily in medium- to low-power applications and is available in sizes 15 and 17 (the numbers indicate the nominal diameter of the working circuit in inches). These units are also available in low temperature and explosion-proof versions. The coupling features Viton seals and all main maintenance components are externally mounted for an easy access, the company said.

The KSL-HS high-speed drive is used primarily in medium- to high-power applications and is available in sizes 21 and 24. These units are available with an optional auxiliary lubrication system that supplies oil to the motor and to the bearings of the driven machine. Low-temperature and explosion-proof versions are available as well, Transfluid said. These units feature labyrinth seals, steel piping, externally accessible maintenance components and horizontally split exterior housing that allows maintenance operations without disturbing the alignment.

Transfluid said its control flow system is self-adjusting, since the draining of oil from the calibrated orifices depends on the rotation speed of the outer impeller, which is directly connected to the driven machine. This allows the coupling to stabilize its speed in the presence of load variations without the need for corrective actions and a loop control.

The system eliminates the stationary element (the scoop) and hydrodynamic resistance in the working circuit and can operate in forward and reverse. It also has all key accessories mounted externally, allowing for sim-

ple and inexpensive maintenance, the company said.

The speed control of centrifugal machines provides significant economic advantages compared to the use of valves or dampers because, especially in applications requiring a broad speed range, valves and dampers drastically reduce the overall efficiency of the system, Transfluid said.

Besides hydrodynamic couplings, variable-speed control can be achieved with a frequency inverter. According to Transfluid, although inverter technology has made some significant progress lately, hydrodynamic couplings offer some key advantages — for example, the operation of the motor at its nominal speed, powered directly by the main electrical circuit. This means that less expensive standard motors can be used as opposed to special motors designed for use with inverters.

The company also said that hydrodynamic couplings dispense with a permanent mechanical connection between the motor and the driven machine, as is the case with an inverter-based driveline.

Hydrodynamic couplings are robust, reliable and less expensive than inverters, and service can be done by any qualified mechanic, Transfluid said. Also, a hydrodynamic coupling is installed directly in the driveline, while a frequency inverter requires a dedicated pressurized and air-conditioned room:

Transfluid said its HS couplings also offer advantages compared to the traditional scoop tube system. The scoop tube is a stationary element that is an obstacle to the oil in rotation, inducing a significant hydrodynamic resistance and lower efficiency. Also, a closed-loop feedback is required to control the linear position of the scoop as it relates to the output speed. Additionally, major components such as the scoop and oil pump are integrated inside the coupling housing, making repairs difficult and time consuming, the company said. ♡



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