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Thursday, 01 February 2001 10:29

The versatility, operating efficiencies, and installation economies of general purpose adjustable frequency ac drives are making them increasingly popular as replacements for aging eddy current drives.

The combined simplicity of an ac drive and standard inverter duty motor provide maintenance advantages which are not available from standard eddy current drives. Mechanical complexity is reduced, as are preventive and corrective maintenance requirements. Additionally, ac drives permit use of standard inverter duty motors, which can be repaired or rebuilt at virtually any reliable motor shop.

Versatile, efficient

AC drives incorporate safeguard function indicators including motor overload, overheat, overcurrent, undercurrent, phase loss, and ground fault protection. Modern ac drives easily provide up to 150 percent starting torque without requiring the overload protection necessary in many eddy current operations. Additionally, flexible drive bypass options allow the motor to be switched to line power for drive maintenance or in pump or fan applications requiring uninterrupted operation.

AC drives reduce expensive downtime by permitting many adjustments to be made through software rather than hardware. They are simple to install and set up, and provide instant access to operating parameters through LED readouts. In contrast to less flexible eddy current drives, they offer digital inputs for simple, accurate entry of operational settings. Additionally, digital control provides zero drift for improved application consistency and repeatability throughout the speed range.

Digital repeatability facilitates accurate entry of parameter settings including jog, braking, momentary power loss override, remote speed reference inputs, overtorque detection, multi-step speed settings, and acceleration/deceleration time selection.

AC drives easily support serial communications along with features and modifications which are difficult or impossible to accomplish with an eddy current drive.

Punch press applications
High-performance adjustable frequency drive design offers significant improvements in press operation. Attributes providing increased productivity and lower production costs include:

- Digital selection and repeatability of optimum press speeds for reduced scrap, extended die life, and reduced maintenance
- Increased flexibility for reduced downtime on changeovers and ongoing press upgrades
- Precise digital coordination of feed speeds to integrate presses into a mechanized line

AC drives also provide easy modifications through software vs mechanical changes, which are comparatively expensive. Operating changes can be made and presses brought back on line quickly, reducing both setup time and downtime.

Drive replacement considerations
Press drive motors are generally selected for approximately a 3:1 speed range. This is necessary because while the press load may be essentially constant torque, the motor load may remain constant as press operating speed varies.

When replacing an eddy current drive with an ac adjustable frequency drive, consideration must be given to overload requirements of the particular press. As an example, consider replacing an eddy current drive with an ac adjustable frequency drive on a 350-ton press with an existing 40 hp eddy current drive, 1800 rpm, 460V-3/60 input, 50 FLA, using a NEMA B, squirrel cage induction motor, 200 percent starting torque, and 220 percent eddy current coupling peak torque.

A 40 hp inverter duty high efficiency squirrel cage induction motor suitable for belted output, packaged with a 50 hp drive, would be appropriate. This selection would provide accelerating torque comparable to the eddy current drive being replaced.

As a second example, consider converting a constant speed, NEMA D motor to an adjustable frequency drive on a 400-ton press with an existing 40 hp NEMA D main press motor, 8-13 percent slip, 460V, 52 FLA, and 1800 rpm.

When converting an existing constant speed main press motor to adjustable frequency, it is important to ensure that motor insulation is appropriate for inverter duty. Insulation Class F at a Service Factor of 1.15 is minimum; Class H at SF 1.25 is optimum.

Another factor to consider is motor frame construction. For example, U frame motors are typically capable of continuous operation at 120-125 percent rated torque. If the motor is required to operate above its 100 percent rating, it is recommended that a larger drive be selected.

Because of the high starting torque characteristics (approximately 300 percent of rated torque in this example), the time to accelerate the flywheel to rated speed will increase. This is due to the typical drive starting torque capacity of 150 percent of rated.

Switching to adjustable frequency drives offers increased equipment reliability in a number of ways including simple, accurate entry of operational settings and adjustments with software. Mechanical complexity is greatly reduced. Installation and setup are simple, and digital repeatability and control provide zero drift for improved efficiencies. And most modern general purpose ac drives are designed for highly dependable performance with standard inverter duty motors which can be repaired or rebuilt at most motor shops. **MT**

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