

Direct-drive motor simplifies servo applications

Eliminates gearboxes, pulleys, belts, and other power transmission components

Charles J. Murray, Senior Regional Editor

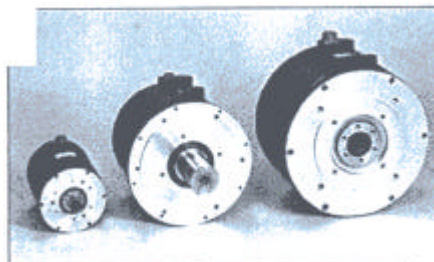
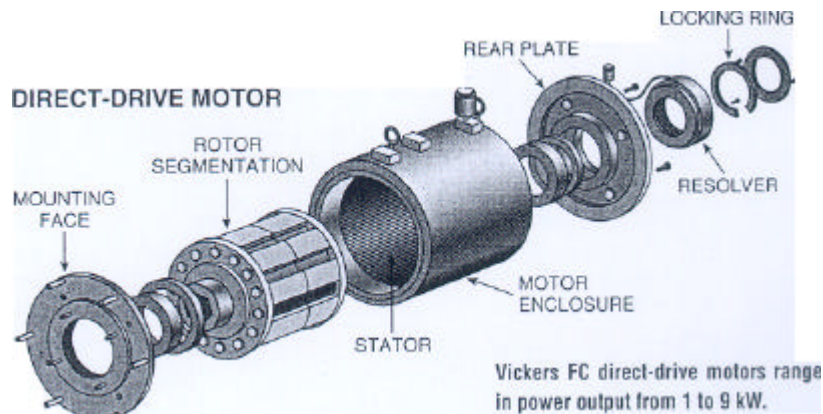
Lebanon, OH--Most servo systems are complex. They typically contain motors, drives, gearboxes, belts, pulleys, sensors, and power-transmission shafts, often with right angle turns in them.

Not all applications require such complexity, however. To simplify servo system, Vickers Electronic Systems (VES) now offers a direct-drive solution. With it, control engineers can eliminate gearboxes, belts, pulleys, and right angle shafts. The resulting servo systems are therefore simpler to install and maintain. They also generate less noise, are more compact, and cost less.

Key to the direct drive solution is a line of new permanent magnet brushless servo motors. Originally created for tire manufacturing applications in Europe, the motors are designed for the specific needs of direct drive applications. They supply sufficient torque and precise rotation at relatively low speeds, overcome potential problems due to torque harmonics, ensure accurate positioning, and avoid mechanical resonances.

To accomplish all that, engineers incorporated several unique features in the new design, known as VES FC High Torque Low Speed Motor line. One of the keys is their use of magnetics: They employed economical ferrite magnets, then oriented them in such a way as to provide high flux density. The rotor is also constructed in segments, which helps to simplify manufacturing and reduce cost. Equally important, the motor's designers incorporated a high number of poles and armature slots, which enabled them to reduce torque harmonics at slow speeds.

Engineers also paid special attention to thermal and mechanical issues. The motor's armature is totally encapsulated in thermally conductive material, thus



The rotor of the FC direct-drive motor is constructed in segments, which helps to simplify manufacturing and reduce cost.

enabling engineers to reduce its volume. A special anti-resonance filter, with adjustable frequency and amplitude, enables it to deal with any potential mechanical resonance problems.

Although the new motor line was just recently introduced to the U.S. market, engineers from VES say the technology has had a wide variety of applications. The tire industry used it for direct driving of variable diameter drums for tire molding. The glass industry has employed it for direct drive of spindle motors for making hollow glass items. It has also seen use on bending machines, particularly for bending of muffler components. Other applications include plastic injection molding, printing machines, and motion simulators.

Some advantages of the motor were unexpected, notes Monte C. Swinford, a VES engineer. "Machines that use the direct drive tend to be quieter, because the motors operate at 600 to 1,000 rpm, instead of 3,000 rpm," he says. The elimination of gearboxes also significantly reduces noise, he says.

Although Swinford recommends that users stick with gearboxes for high bandwidth (above 400 Hz) applications, he says that the direct drive concept offers far greater simplicity for those applications where it best fits. "If engineers are creative in their use of this concept, they can eliminate ball screws, gearboxes, couplings, and all kinds of other components," Swinford says. "this way, they can build a much more compact machine than they could before"

Additional details...Contact Monte Swinford, Vickers Electronic Systems, 1151 W. Mason-Morrow Road, Lebanon, OH 45036, 513-494-5654

other Applications

*Printing machinery
Robotic assembly
Textile manufacturer*