Application Areas of Motor Types

The following section gives some idea of the applications that are particularly appropriate for each motor type, together with certain applications that are best avoided. It should be stressed that there is a wide range of applications that can be equally well met by more than one motor type, and the choice will tend to be dictated by customer preference, previous experience or compatibility with existing equipment.

Cost-conscious applications will always be worth attempting with a stepper, as it will generally be hard to beat the stepper's price. This is particularly true when the dynamic requirements are not severe, such as "setting" type applications like positioning a guillotine back-stop or a print roller.

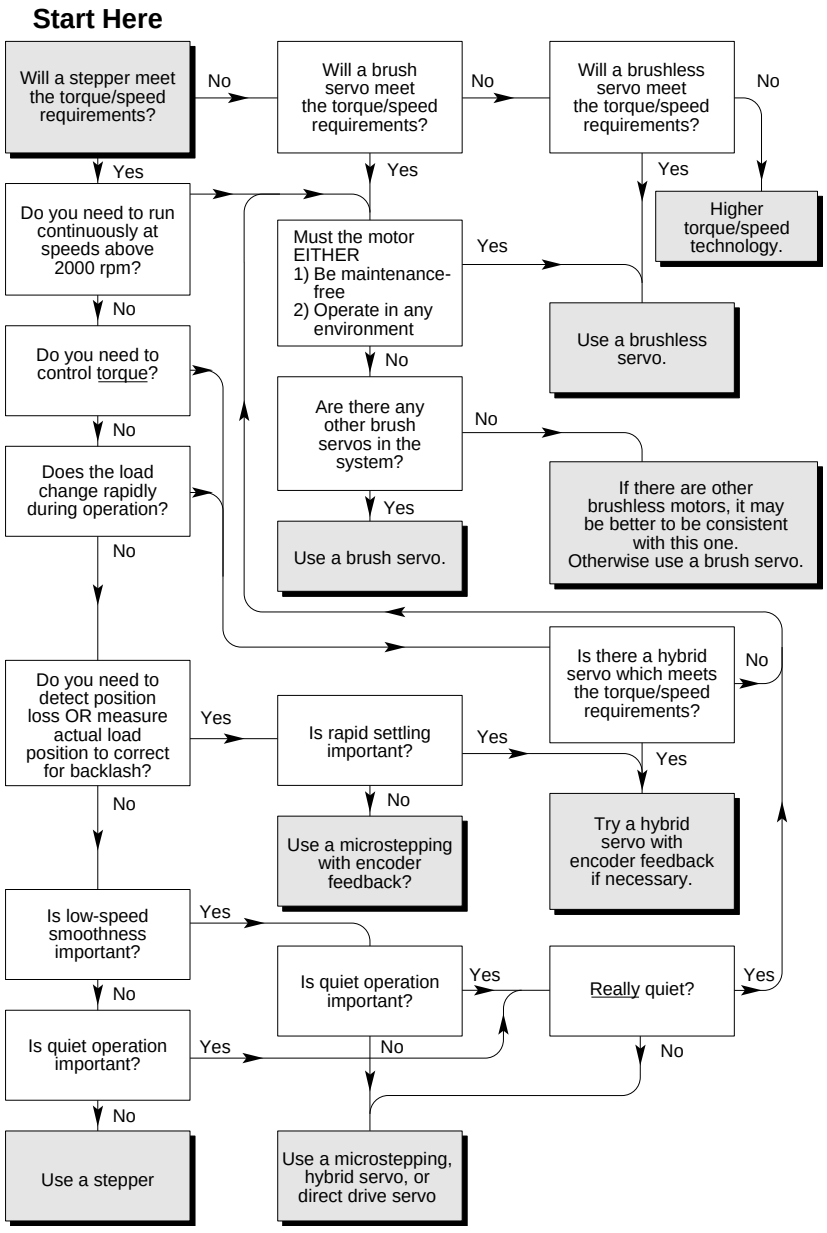
High-torque, low-speed, continuous-duty applications are also appropriate for step motors. At low speeds, it is very efficient in terms of torque output relative to both size and input power. Microstepping can improve low-speed applications such as a metering pump drive for very accurate flow control.

High-torque, high-speed, continuous-duty applications suit the servo motor, and in fact, a step motor should be avoided in such applications because the high-speed losses can cause excessive motor heating. A DC motor can deliver greater continuous shaft power at high speeds than a stepper of the same frame size.

Short, rapid, repetitive moves are the natural domain of steppers or hybrid servos due to their high torque at low speeds, good torque-to-inertia ratio and lack of commutation problems. The brushes of the DC motor can limit its potential for frequent starts, stops and direction changes.

Low-friction, mainly inertial loads can be efficiently handled by the DC servo provided the start/stop duty requirements are not excessive. This type of load requires a high ratio of peak to continuous torque and in this respect the servo motor excels.

Very arduous applications with a high dynamic duty cycle or requiring very high speeds may require a brushless motor. This solution may also be dictated when maintenance-free operation is necessary.

Low-speed, high-smoothness applications are appropriate for microstepping or direct drive servos.

Applications in hazardous environments or in a vacuum may not be able to use a brush motor. Either a stepper or a brushless motor is called for, depending on the demands of the load. Bear in mind that heat dissipation may be a problem in a vacuum when the loads are excessive.