

Designing with Electric Cylinders

by Richard Haus

Rod-type electric cylinders evolved from hydraulic and pneumatic cylinders that have been in use for many years. Advertising and product literature tends to focus on the differences between fluid and electric cylinders, but they also share many useful characteristics. Knowledge of several key features will enhance your ability to decide whether or not a cylinder is right for your application. Today's electric cylinder designs are the result of decades of engineering development and allow designers flexibility, simplicity, and unique approaches to solving rigid or pivoting linear motion applications.

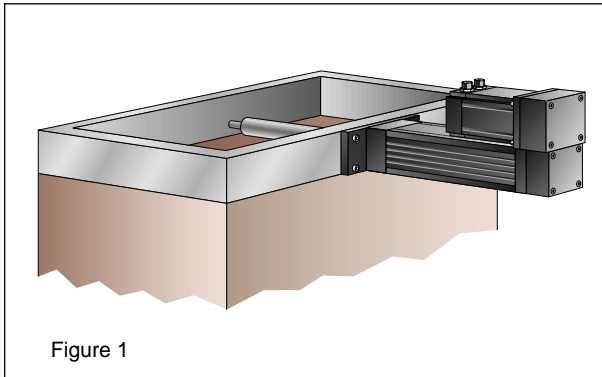


Figure 1

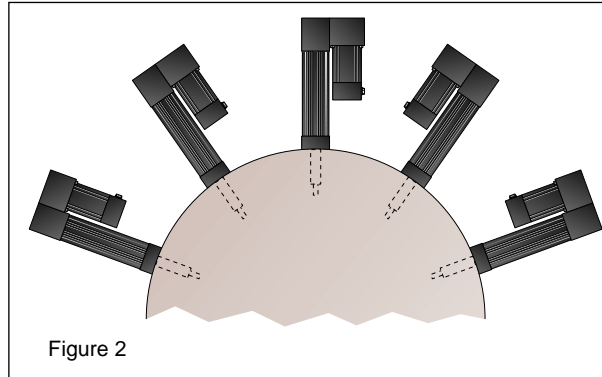


Figure 2

Non-Intrusive: Thrust rod stays out of the way.

A primary advantage of both fluid and electromechanical rod-type cylinders is the ability to extend into a work area during an operation and then retract to clear the area for subsequent operations (Figures 1 and 2). Rodless actuators, precision tables, or linear motors do not share this ability. Another benefit of the rod-type design is that the motor and main body of the electric cylinder can be isolated from the work area. This is very useful when dealing with such hostile environments as vacuum, high temperature, or wash down applications.

Mounting Ideas: Have you seen it done this way?

As in most aspects of design, a little creativity goes a long way when attaching a cylinder to a machine. Two general types of mounting styles are available, rigid and pivoting. Rigid mounting options (Figures 3 and 4) include side-tapped holes, front and rear flanges, side lugs and side angle brackets. These typically restrict motion to straight-line travel paths. Pivoting mounts (Figures 5 through 8) such as the clevis or trunnion allow the cylinder to move as a link in a dynamic assembly. There are many applications for this “arc-motion” — conveyor diverter gates, pivoting rollers, lid lifters for chemical chambers, “scissor clamps” and so on.

Rigid Mounting

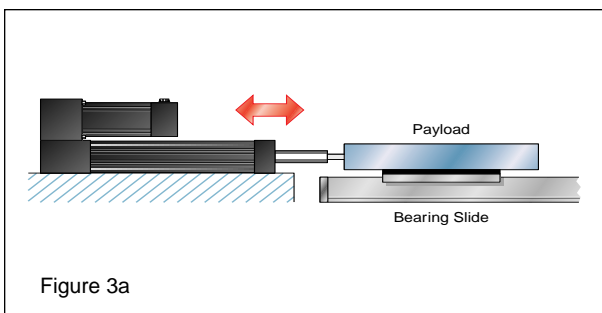


Figure 3a

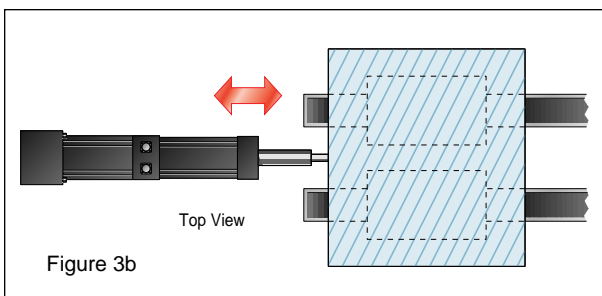


Figure 3b

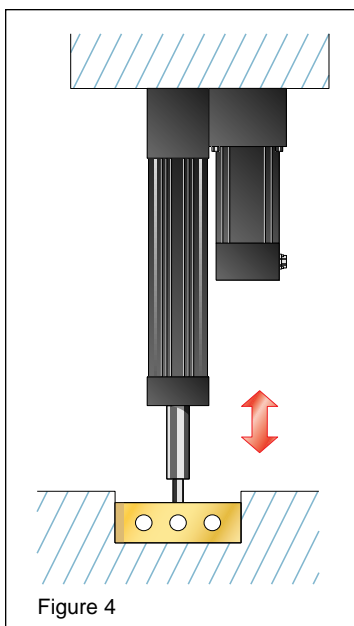
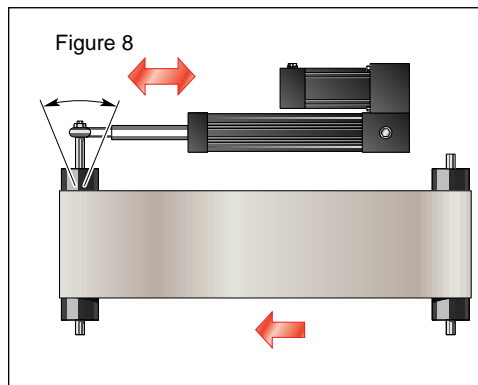
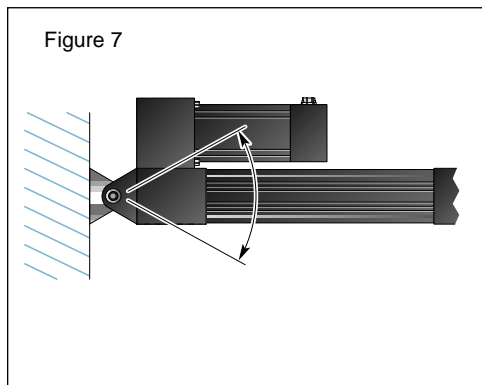
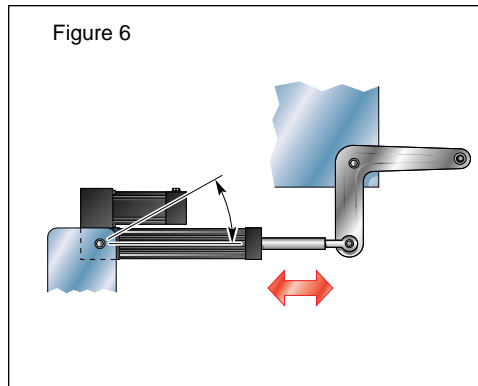
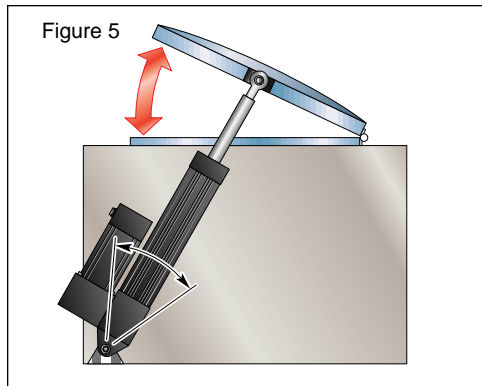


Figure 4

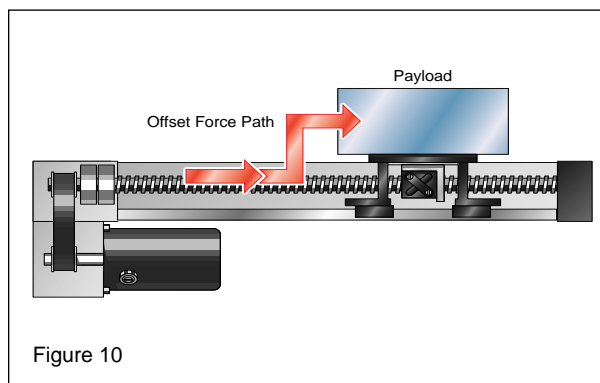
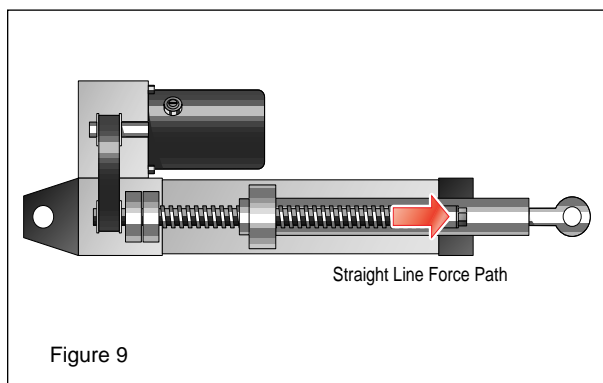
Continued on next page

Pivoting Mounting



**Straight-Line Thrust Transmission:
Uses all available power.**

When high thrust is required, rod-type cylinders have the advantage over rodless actuators and tables because all the thrust-transmitting components are in-line. This provides the simplest and most efficient means of transmitting thrust to the load (Figure 9). In rodless cylinders the load is offset from the leadscrew or piston (Figure 10). Many designs are limited to less than 50% of the available thrust due to the mechanical limitations of the components between the load and the screw or piston.



Electrically Powered, Maintenance Free

Today nearly all machines incorporate panel switches, sensors, lights, displays, PLCs or even complete PCs. Electric power is nearly always available on the machine. Compressed air or hydraulic pumps are not always available or desirable. Electric cylinders are available with DC, stepper, or brushless servo motors, so why not simplify the machine by using the same control for all the axes of motion? A multi-axis programmable motor control can give you command of both rotary and linear motion. Lastly, the maintenance-free design of electric cylinders provides another strong reason to consider them in your next application.

**New Electric Cylinders
from IDC offer High
Accuracy, Long Life, Low
Maintenance**

IDC's new EC Electric Cylinders are designed to virtually eliminate routine maintenance activities. Utilizing the highest-grade screws available in industrial quality electric cylinders, EC Electric Cylinders offer high accuracy, quiet operation, and long life. The ruggedness and quality of the EC Series feature precision rolled ball screws making them ideal for high-speed and high-duty cycle applications.

IDC offers three models of EC Electric Cylinders: EC2 - designed for lighter loads to 3600 N (810 lb.), EC3 - for moderate to heavy thrust loads to 7200 N (1620 lb.), and EC5 - the highest thrust cylinder at 25,000 N (5620 lb.). Each model offers maximum respective travel lengths of 600 mm (23.6 in), 800 mm (31.5 in), and 1500 mm (59.1 in) standard.