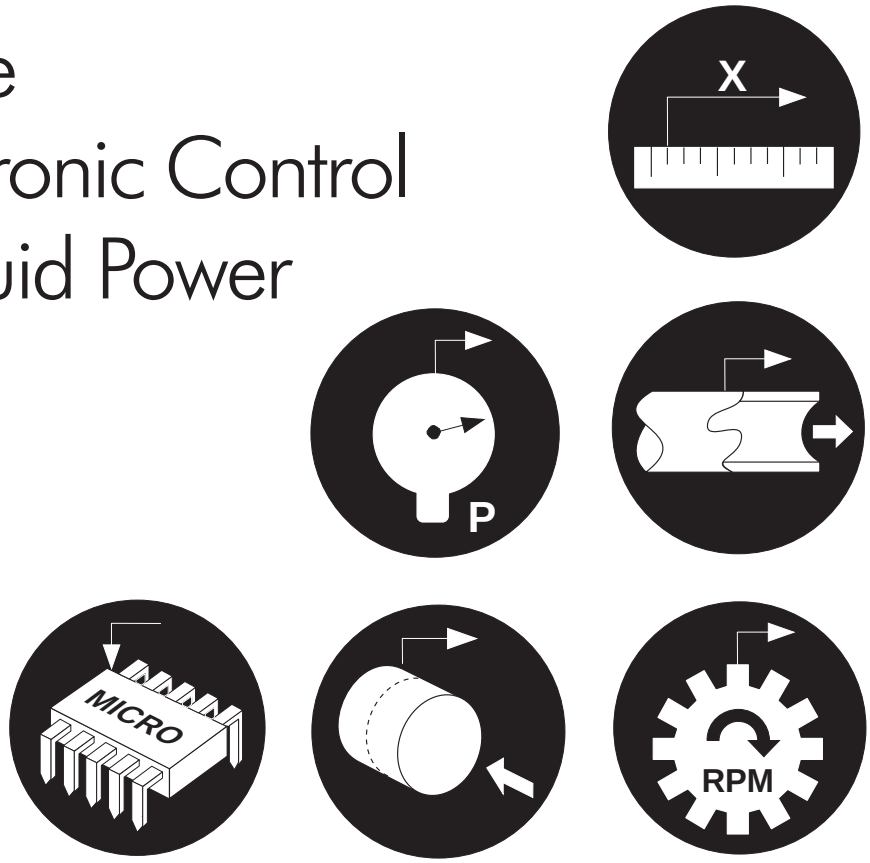
Your Guide to the Electronic Control of Fluid Power



The members of the National Fluid Power Association (NFPA) have prepared this application as an introduction to the electronic control of fluid power. The application and components described here are representative — electrohydraulics and electropneumatics can be effectively utilized in countless processes, and components are available in many different sizes and configurations.

NFPA's manufacturers invite you to contact them for additional information.

National FLUID POWER Association®

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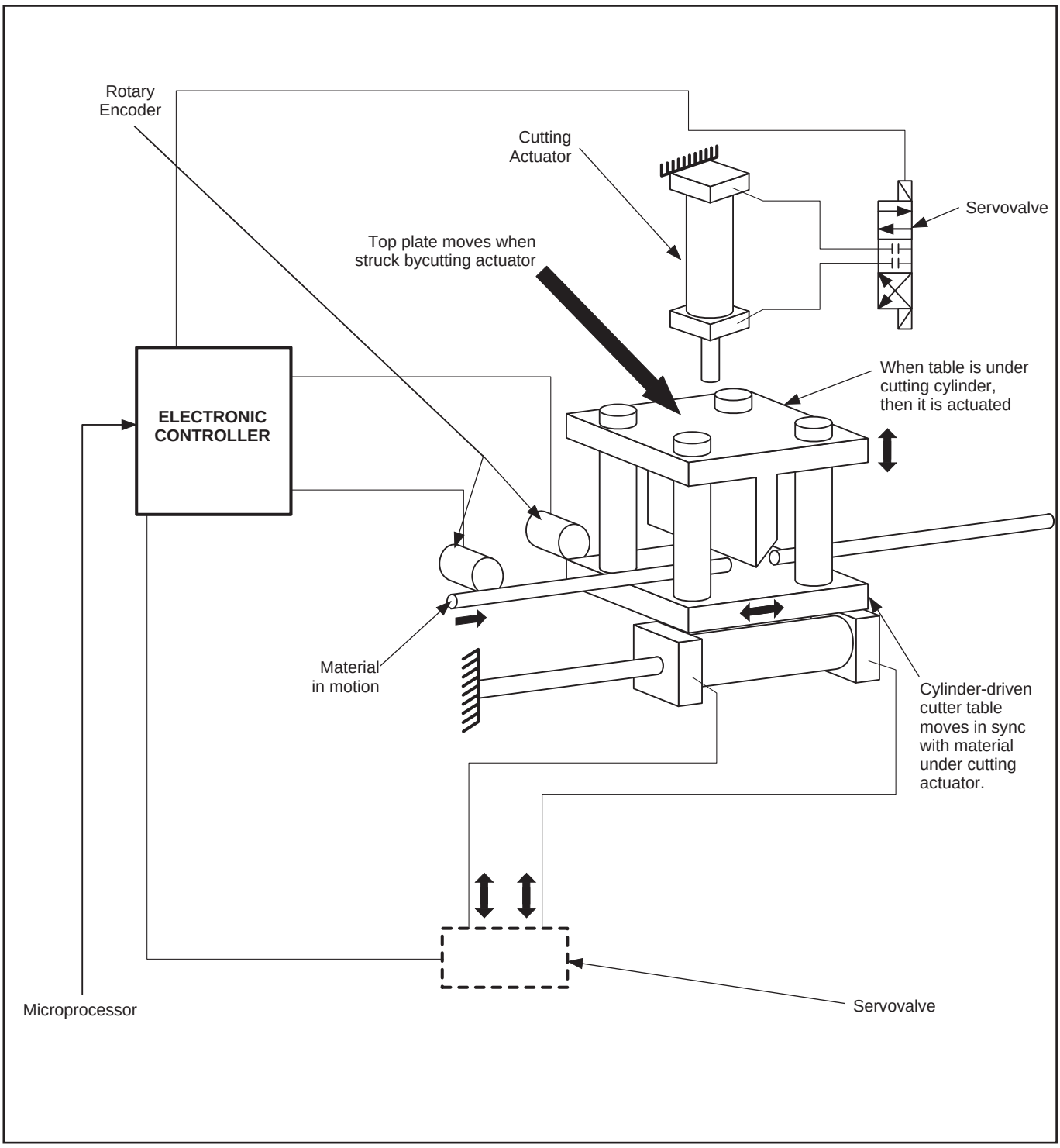
Electrohydraulics at Work

Flying Cutoff Shear



Acceleration, Velocity and Position Control

The Problem

Flying shears are among the most demanding of industrial motion control applications. Not only must the shear itself be accelerated up to the speed of the tubing, bar stock or other material running down the line, but it must match the velocity of the moving stock at the specific instant that both pass beneath the cutting actuator.

Then the actuator instantly rams down upon the top platen of the moving cutter table and makes the cut. Finally, the cutter table must rapidly return to its initial position, ready for the next operation.

Part of the problem is that the table weighs a quarter ton, and the whole cycle has to take place in less than one second. Another challenge is presented by line speeds that range from 50 to 100 inches per second, so the sensing and control of velocity have to be lightning fast. Finally, the point of synchronization has to occur when the cutting actuator is exactly at the center of the top platen. Off-center strikes are not allowed.

Its Solution

Designers were able to resolve all of these problems by coupling reliable hydraulic cylinders with high speed electronics. In the final design, electronic rotary tracking encoders are mounted to pick up the velocity and position of both the moving material and the accelerating cutter table. The encoder output signals are fed into an electronic controller where they are continuously compared.

An electrohydraulic servovalve is energized at the right time by the controller, and accelerates the horizontal piston until its velocity matches that of the moving material.

From then on, everything moves smoothly according to plan. The table's horizontal travel and the platen's vertical travel are guided on bearings, and the cuts are reliably made.

Related Applications

Electrohydraulic servoactuators can accelerate a load in any desired way and synchronize with any moving machine element. Other examples include paralleled actuators pushing in perfect synchronism against the same load or moving an assembly robot alongside a conveyor belt so that it can work on parts without stopping the conveyor.

How Electronics Improved This Application

- Speed
- Accuracy
- Automation

Components Used in Industrial Hydraulic Systems*

Accumulators
Controls (electronic) and Software
Cylinders
Filters
Fittings
Flanges
Fluids
Gauges
Heat Exchangers
Hose
Hydrostatic Drives
Manifolds
Motors
Power Units
Pumps
Pump Drives
Reservoirs
Rotary Actuators
Seals
Shaft Couplings
Shock Absorbers
Switches
Tubing
Valves

***Click here to access the NFPA Fluid Power Product Locator, which includes information about and links to NFPA member companies.**

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