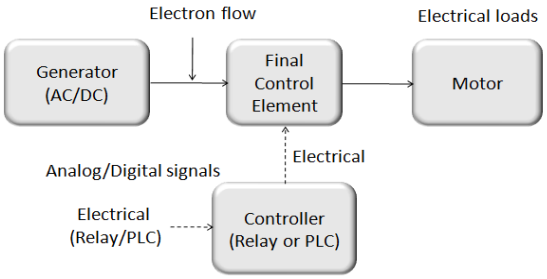
# Industrial Power Systems

Modern industrial production, mobile, aerospace, marine and mining systems are designed to carry out a wide variety of work operations. A prime mover provides the muscle power for driving a load in a production machine or any other application. The prime mover is an actuator that is part of a power transmission system consisting of a power source and a control system. The power must be conveyed to the machine's point of work through the power (or energy) transmission system in a controlled manner.

Power can be transmitted through electron or air or oil medium. Accordingly, there are three main types of power transmission systems: (1) Electrical systems, (2) Pneumatic systems, and (3) Hydraulic systems. Pneumatic and hydraulic power systems are commonly categorized under the heading 'fluid power systems'. A power transmission medium is, usually, modulated by a control system.

## Electrical Power System

In the electrical power system, energy in the form of electricity is transmitted through a conductor to an electric actuator (motor), where work is to be done.

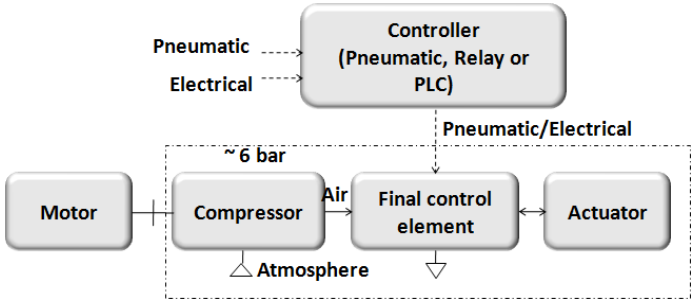



## Fluid Power Systems

In the fluid power system, energy in the form of the pressurized fluid is transmitted through piping to an actuator. Hydraulic systems are high pressure systems, whereas pneumatic systems are low pressure systems. Fluid power systems are suitable for systems that require high-speed linear motion or very smooth position control or holding of heavy loads.

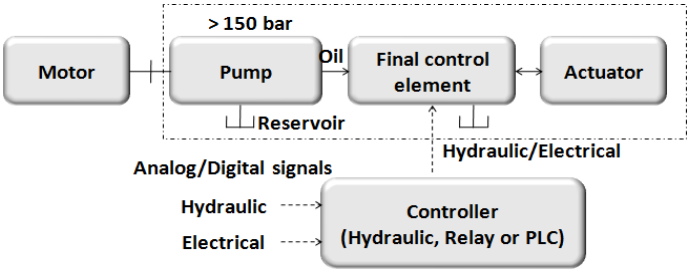
## Pneumatic Power System

In the pneumatic power system, energy in the form of compressed air is transmitted to an actuator. It is an engineering science pertaining to gaseous pressure and flow.



## Hydraulic Power System

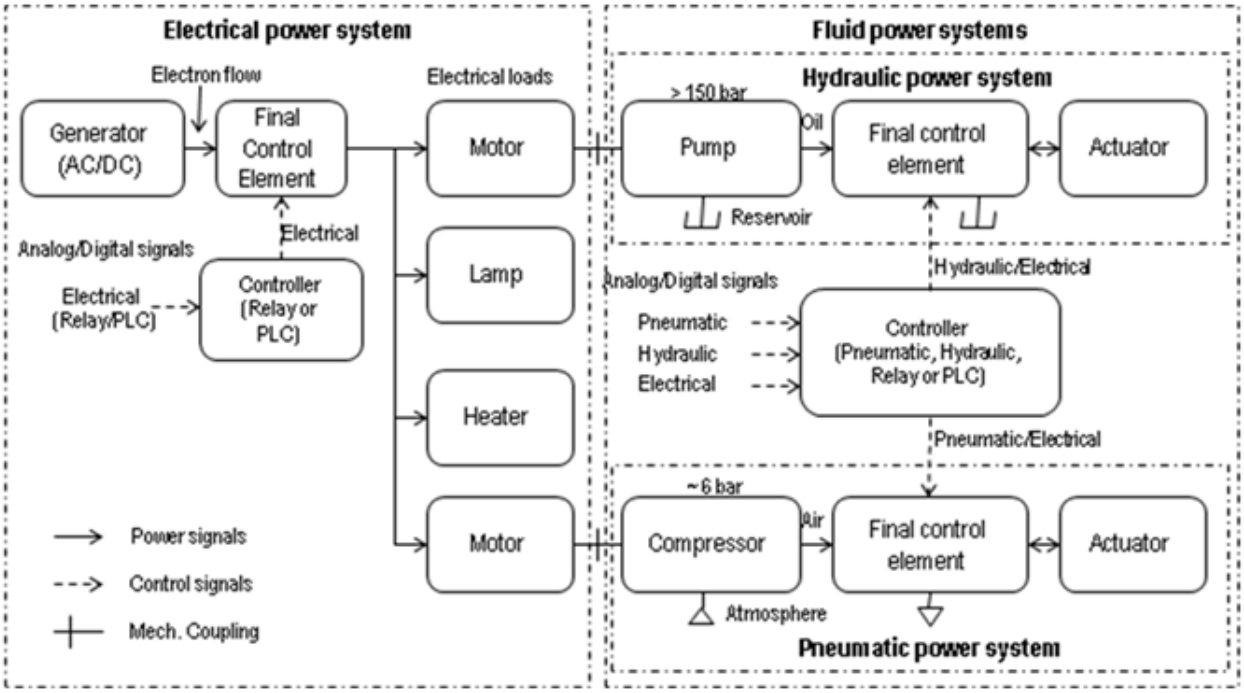
In the hydraulic power system, energy in the form of pressurised liquid (oil) is transmitted to an actuator, where work is to be done. It is an engineering science pertaining to liquid pressure and flow.




## Control System Functions

Control functions govern work processes through open-loop or closed-loop systems. The open-loop control is used in manual systems where an operator is always present to make decisions. In a closed-loop control, as used in automatic control, a process controls itself by the feedback of its condition.

## Combined representation




## Mechanisation and Automation

In mechanization, the mechanical work is taken over by a machine. In automation a machine is controlled automatically with limited or without human intervention. In semi-automation, a machine automatically carries out several recurring partial steps in the processing of a work-piece through its processor. In complete automation, a machine takes over the complete work-process automatically by means of programmed commands to its processor.

**Reference: JOJI PARAMBATH, Industrial Hydraulic Systems – Theory and Practice, Universal Publishers, Boca Raton, USA, 2016. Please visit: http://www.universal-publishers.com/book.php?method=ISBN&book=1627340580**