

1. Hydraulic power is nearly always generated from mechanical power. Example: A hydraulic pump driven by an engine crankshaft.
2. Hydraulic power output is nearly always achieved by converting back to mechanical energy. Example: A cylinder, which raises a heavy object.
3. There are three types of hydraulic energy:
  - a) potential or pressure energy
  - b) kinetic energy, the energy of moving liquids
  - c) heat energy, the energy of resistance to flow, or friction
4. Hydraulic energy is "neither" created nor destroyed, only converted to another form.
5. All energy put into a hydraulic system must come out either as work (gain) or as heat (loss).
6. When a moving liquid is restricted, heat is created and there is a loss of potential energy (pressure) for doing work. Example: A tube or hose that is too small or is restricted. Orifices and relief valves are also restriction but are purposely designed into the system.
7. Flow through an orifice or restriction causes a pressure **drop**.
8. Oil must be confined to create pressure for work. A tightly sealed system is a must in hydraulics.
9. Oil takes the course of least resistance.
10. Oil is normally **pushed** into a pump, not drawn into it. (Atmospheric pressure supplies this push). For this reason, an air vent is needed in the top of the reservoir.
11. A pump does not pump pressure; it creates flow. Pressure is caused by **resistance** to flow.
12. Two hydraulic systems may produce the same power output, one at high pressure and low flow, and the other at low pressure and high flow.
13. A basic system must include four components: a reservoir to store the oil; a pump to push the oil through the system; valves to control pressure and flow; and a cylinder (or motor) to convert the movement into work.
14. Compare the two major hydraulic systems:
  - a) Open centre system = pressure is varied but flow is constant.
  - b) Closed centre system = flow is varied but pressure is constant.
15. There are two basic types of hydraulics:
  - a) Hydrodynamics is the use of fluid at high speeds "on impact" to supply power. Example: a torque converter.
  - b) Hydrostatics