

COMPARING PNEUMATIC AND HYDRAULIC SYSTEMS

Hydraulic Systems

Hydraulic positioner systems circulate the same fluid repeatedly from a fixed reservoir of a prime mover. The fluid is non-compressible liquid, so the positioners can be controlled very accurately and position is rigid.

Hydraulic system leaks, if they occur, are immediately recognized and can be repaired which prevents long term expensive fluid loss which typically occurs with air leaks.

With proper plumbing procedures, correct materials, and preventive maintenance, hydraulic leaks can be virtually eliminated. Many hydraulic systems use mineral oil for the operating media but other flame proof fluids such as water, ethylene glycol, or synthetic types are not uncommon.

Hydraulic systems can have a dedicated power unit for each positioner or a central power unit with piping to and from several positioners so noise levels at the positioners is greatly reduced, and availability of backup pumps to take over if a working pump fails; less total horsepower and flow, and increased uptime of all machines.

Hydraulic-powered systems operate at higher pressure than pneumatic -- typically 1500 to 3000 psi. so higher pressure generates more force from smaller, lighter, less expensive actuators.

Pneumatic Systems

Pneumatic systems have low initial cost (without addition of the proportional cost of the compressor) is less than a hydraulic system circuit but operating cost can be five to ten times higher because compressing atmospheric air to a nominal working pressure requires a lot of horsepower, particularly when the compressed air is only exhausted to atmosphere...

Conventional electropneumatic positioners have continuous air bleed, typically as much as 0.25 scfm at 60Psi or 130,000 SCF/ year plus additional losses to adjust actuator position. Total losses for multiple positioners easily equate to thousands of \$'s/year.

Pneumatic systems are quieter than their hydraulic counterparts only because the air compressor is remote from the positioners. However multiple unit hydraulic systems can also use a remote source.

Air is compressible, which means an air-driven actuator cannot hold a load rigidly in place in the face of changing dynamics in flowing fluid like a hydraulic actuator does. Air-operated systems can be cleaner than hydraulic systems. While leaks in an air circuit do not cause housekeeping problems, they can be very expensive and difficult to discover