Pneumatic and Hydraulic Applications - Fluid Power Principles and Technology by Ritter

Article published on February 24th 2012 | Technology

The industrial world was revolutionized with the introduction of fluid power technology. The discovery of hydraulic and pneumatic properties has streamlined the manufacturing and production industries. Both technologies generate a force stronger than a person ever could. This force,usually measured in psi (pounds per square inch) is then distributed through a system which converts it into movement. Pneumatic technology works by compressing air or other stable gases in a reservoir and then releasing it through a component called an actuator. The actuator contains pistons, cylinders and valves to properly transfer the force producing either a linear or rotary motion.

These components all work together to control the compressed air allowing a specific amount of force to escape. Pneumatic tools can still be used even when the electrical power supply is gone that is, until the reservoir is depleted. Most industrial pneumatic equipment is simple in its design and generally uses pressures of about 80 to 100 pounds per square inch, far less than hydraulic systems. These semantic factors results in increasing the operation life and safety of the pneumatics system. Some of the more common pneumatic air tools include wrenches, ratchets, jack hammers, drills, nail gun, brakes, sandblaster and paint sprayer. In modern times, pneumatic air brakes are commonly used on large trucks and buses, however when they were originally patented in 1872, by George Westinghouse, it was exclusively for railroad applications. The air braking system consists of an engine-driven air compressor and a compressed air storage tank. When the brake pedal is used, the compressor pushes around 100 psi of air into the brake chamber, causing the disc or drum to reduce wheel rotation speed. While pneumatics is beneficial to society, it still cannot produce the power similar to that of hydraulics.

Hydraulic systems can produce a much greater force anywhere from 1,000 to 10,000 psi. Hydraulics is based off the principle of discovered by Blaise Pascal back in the 1800â€™s. He discovered that liquids cannot be compressed. He discovered a law which states: Pressure applied on a confined fluid is transmitted in all directions with equal force on equal areas. Hydraulic technology works by transferring fluids, often petroleum based oil, through the use of hoses, cylinders, pump, valves, reservoir and an actuator. The displacement of the fluid through the system creates immense force that is capable of lifting thousands of depending on the size of the cylinders and hoses. Hydraulic technology is used in nearly all heavy duty equipment including drilling rigs, combines, harvesters, tractors, loaders, cement trucks, excavators, backhoes, rollers, dozers, forklifts, etc. Over the past few centuries,great strides have been made regarding pneumatic and hydraulic machinery. Custom fluid power systems can be engineered to meet different purposes.

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Article Keywords:
Hydraulic Cylinder Parts, Parker Fluid Power, Hydraulic Hose Repair, Parker Hydraulic Hoses,

Parker Hydraulic Fittings, Parker Hannifin Store

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