Review Paper Component of Pneumatic Systems

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Abstract- *This chapter sets the scene for understanding and design of pneumatic conveying systems. Pneumatic conveying is broken down into its component parts indicating the further details will be given in the following chapters. The basic state diagram is presented and the various flow conditions are related to this diagram. Some of the recent comprehensive discussions on pneumatic conveying are cited.*

Keywords- Pneumatic conveying Dilute Phase Dense Phase Advantages Disadvantages Positive Pressure Systems Negative Pressure Systems State Diagrams Flow Patterns Bend Flow Stepped Piping Systems

I. INTRODUCTION

Most of the earlier pneumatic control systems were used in the process control industries, where the low pressure air of the order 7-bar was easily obtainable and give sufficiently fast response. Pneumatic system are extensively used in the automation of production machinery and in the field of automatic controllers. For instance, pneumatic circuits that convert the energy of compressed air into mechanical energy enjoy wide usage, and various types of pneumatic controllers are found in industry. Certain performance characteristics such as fuel consumption, dynamic response and output stiffness can be compared for general types ofpneumatic actuators, such as piston-cylinder and rotary types. Figure (1a) and (b) show the two types of pneumatic actuators (Sorli*et al.*, 1999). The final decision on the best type and design configuration for pneumatic actuator can be made only in relation to the requirements of a particular application. The pneumaticactuator has most often been of the piston cylinder type because of its low cost and simplicity (Tablin*et al.*,1963). The pneumatic power is converted to straight line reciprocating and rotary motions by pneumatic cylinders and pneumatic motors. The pneumatic position servo systems are used in numerous applications because of their ability to position loads with high dynamic response and to augment the force required moving the loads. Pneumatic systems are also very reliable (Clements and Len, 1985).The open literature surveyed showed a wide spectrum of new applications of pneumatic servos such as milling machines, robotics, and advanced train suspension.

Therefore, the surveyed literature reported is subdivided into three main groups. The first group is concerned with various applications of pneumaticactuators. The second group includes the theoretical, experimental approaches for modeling the pneumaticactuator. The third group is related with the control strategies applied to pneumatic actuators.

Pneumatic Systems Attributes:

Pneumatic systems have many attributes that make them attractive for use in difficult environments: gases are not subjected to the temperature limitations of hydraulic fluids; the actuator exhaust gases need not be collected, so fluid return lines are unnecessary and long term storage is not a problem because pneumatic systems are virtually dry and no organic materials need be used. In addition, the pneumatic actuator has a lower specific weight and a higher power rate (torque-squred to inertia ratio) than an equivalent electromechanical actuator. In some cases, a pneumatic system may provide a significant weight advantage. In short duration missile applications, the weight of a self-contained solid propellant pneumatic servo may be half that of an equivalent self contained hydraulic system. Also the pneumatic actuators have many merits such as easy maintenance and handling, relatively simple technology and low cost, clean, safe and easy to installed.

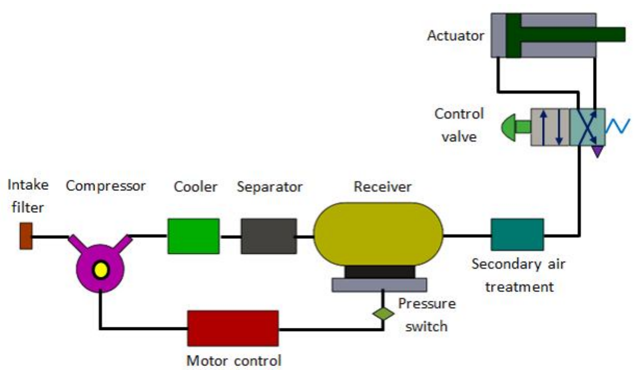

Fig.01 Schematic Diagram of pneumatic systems

II. PRINCIPLE OF PNEUMATIC SYSTEMS

Pneumatics is basically a method to turn electricity into mechanical motion using compressed gasses instead of motors or electromagnets. For many applications, this is much more efficient and practical. Systems typically include an air compressor, which stores compressed air in a cylinder and release it under electric control. The compressed gas is almost always ordinary air because it is free and non- toxic. Often the air is slightly modified by taking out some of the water vapor and adding a small amount of atomized oil to make the gas more machine friendly.

Applications:

- Automation equipment
- Packaging machinery
- Food and beverage industries
- Metal-cutting and forming machine tools
- Car washes
- Test systems
- Medical equipment
- Plastics machinery
- Petroleum markets
- Entertainment
- Chemical handling
- Assembly systems
- Coolant systems
- Process industries
- Pharmaceuticals
- Material handling
- Special machinery

Limitations:

Requires installation of air-producing equipment.

Compressed air should be well prepared to meet the requirements. Meet certain criteria, such as dry, clean, and contain the necessary lubricant for pneumatic equipment. Therefore require installation of pneumatic systems are relatively expensive equipment, such as compressors, air filter, lube tube, dryer, regulators, etc.

- **Easy to leak**

One of the properties of pressurized air is like to always occupy the empty space and the air pressure is maintained in hard work. Therefore we need a seal so that air does not leak. Seal leakage can cause energy loss. Pneumatic equipment should be equipped with airtight equipment that compressed air leaks in the system can be minimized.

- **Potential noise**

Pneumatic using open system, meaning that the air that has been used will be thrown out of the system, the air comes out pretty loud and noisy so will cause noise, especially on the exhaust tract. The fix is to put a silencer on each dump line.

- **Easy condenses**

Pressurized air is easily condensed, so before entering the system must be processed first in order to meet certain requirements, such as dry, have enough pressure, and contains a small amount of lubricant to reduce friction in the valves and actuators.

III. CONCLUSION

Our conclusion is we can know how to construct accurately and can arrange the component of pneumatic circuit systematically. Then we can know how to report and explain briefly the operation of pneumatic experiment in group. Next we can learn to find out the correct component and equipment. For our recommendation there are components that have been damaged mixed with the component that can work.

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