**LAP 9 Pneumatic Speed Control Circuits**

**Objectives**

1. Describe the main function of a pneumatic needle valve and give an application
2. Describe the operation of a needle valve and give its schematic symbol
3. Define flow rate and give its units of measurement
4. Describe the function of a flow meter and give an application
5. Describe the operation of a rotameter and give its schematic symbol
6. Describe the function of a pneumatic check valve and give an application
7. Describe the operation of two types of pneumatic check valves and give their schematic symbols
8. Describe the function of a flow control valve and give an application
9. Describe the operation of a flow control valve and give its schematic symbol
10. Describe the effect of actuator load changes on flow control operation
11. Describe the operation of a meter-in flow control circuit and give an application
12. Describe the operation of a meter-out flow control circuit and give an application
13. Define independent speed control and give an application
14. Define independent speed control and give an application

**Skills**

1. Connect and operate a needle valve to control actuator speed
2. Convert air volumes at pressures to free air volumes
3. Connect and read a flow meter
4. Connect and operate a check valve
5. Connect and adjust a flow control valve to control the speed of an actuator
6. Connect and operate a meter-in flow control circuit
7. Connect and operate a meter-out flow control circuit
8. Design an independent speed control circuit