

# Fabrication of Air Brake System Using Engine Exhaust Gas

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**Abstract-** The aim is to design and to develop an air brake system based on exhaust gas is called “fabrication of air brake system using engine exhaust gas”. The main aim of this project is to reduce the workloads of the engine drive to operate the air compressor, because here the compressor is not operated by the engine drive. Here we are placing a turbine in the path of exhaust from the engine. The turbine is connected to a dynamo by means of coupling, which is used to generate power. Depending upon the airflow the turbine will start rotating, and then the dynamo will also starts to rotate. A dynamo is a device which is used to convert the kinetic energy into electrical energy. The generated power can be stored in the battery and then this electric power has loaded to the D.C compressor. The air compressor compresses the atmospheric air and it stored in the air tank and the air tank has pressure relief valve to control the pressure in the tank. The air tank supplies the compressed pneumatic power to the pneumatic actuator through solenoid valve to apply brake. The pneumatic actuator is a double acting cylinder which converts hydraulic energy into linear motion.

**Keywords-** Dynamo, DC Compressor, and Pressure relief valve etc....

## I. INTRODUCTION

### 1.1 BRAKING SYSTEM

A brake is a mechanical device that inhibits motion by absorbing energy from a moving system. It is used for slowing or stopping a moving vehicle, wheel, axle, or to prevent its motion, most often accomplished by means of friction.

Most brakes commonly use friction between two surfaces pressed together to convert the kinetic energy of the moving object into heat, though other methods of energy conversion may be employed. For example, regenerative braking converts much of the energy to electrical energy, which may be stored for later use. Other methods convert kinetic energy into potential energy in such stored forms as pressurized air or pressurized oil. Eddy current brakes use magnetic fields to convert kinetic energy into

electric current in the brake disc, fin, or rail, which is converted into heat. Still other braking methods even transform kinetic energy into different forms, for example by transferring the energy to a rotating flywheel

## II. COMPONENTS USED AND ITS DESCRIPTION

### 2.1 PNEUMATIC CYLINDER

Pneumatic cylinder(s) (sometimes known as air cylinders) are mechanical devices which use the power of compressed gas to produce a force in a reciprocating linear motion.

Like hydraulic cylinders, something forces a piston to move in the desired direction. The piston is a disc or cylinder, and the piston rod transfers the force it develops to the object to be moved. Engineers sometimes prefer to use pneumatics because they are quieter, cleaner, and do not require large amounts of space for fluid storage.

Because the operating fluid is a gas, leakage from a pneumatic cylinder will not drip out and contaminate the surroundings, making pneumatics more desirable where cleanliness is a requirement.

### 2.2 PNEUMATIC PIPES

Pneumatic tubes (or capsule pipelines; also known as pneumatic tube transport or PTT) are systems that propel cylindrical containers through networks of tubes by compressed air or by partial vacuum. They are used for transporting solid objects, as opposed to conventional pipelines, which transport fluids. Pneumatic tube networks gained acceptance in the late 19th and early 20th centuries for offices that needed to transport small, urgent packages (such as mail, paperwork, or money) over relatively short distances (within a building, or at most, within a city). Some installations grew to great complexity, but were mostly superseded. In some settings, such as hospitals, they remain widespread and have been further extended and developed in the 21st century.

## 2.3 PNEUMATIC CONNECTORS

A hose coupling is a connector on the end of a hose to connect (or couple) it with another hose or with a tap or a hose appliance, such as an irrigation sprinkler. It is usually made of steel, brass, stainless steel, aluminium or plastic.

## 2.4 AIR COMPRESSOR

An air compressor is a device that converts power (using an electric motor, diesel or gasoline engine, etc.) into potential energy stored in pressurized air (i.e., compressed air). By one of several methods, an air compressor forces more and more air into a storage tank, increasing the pressure. When tank pressure reaches its engineered upper limit the air compressor shuts off. The compressed air, then, is held in the tank until called into use.[1] The energy contained in the compressed air can be used for a variety of applications, utilizing the kinetic energy of the air as it is released and the tank depressurizes. When tank pressure reaches its lower limit, the air compressor turns on again and re-pressurizes the tank.

## 2.5 BATTERY

A rechargeable battery, storage battery, secondary cell, or accumulator is a type of electrical battery which can be charged, discharged into a load, and recharged many times, as opposed to a disposable or primary battery, which is supplied fully charged and discarded after use. It is composed of one or more electrochemical cells. The term "accumulator" is used as it accumulates and stores energy through a reversible electrochemical reaction. Rechargeable batteries are produced in many different shapes and sizes, ranging from button cells to megawatt systems connected to stabilize an electrical distribution network. Several different combinations of electrode materials and electrolytes are used, including lead–acid, nickel–cadmium (NiCd), nickel–metal hydride (NiMH), lithium-ion (Li-ion), and lithium-ion polymer(Li-ion polymer).

Rechargeable batteries typically initially cost more than disposable batteries, but have a much lower total cost of ownership and environmental impact, as they can be recharged inexpensively many times before they need replacing. Some rechargeable battery types are available in the same sizes and voltages as disposable types, and can be used interchangeably with them.

## 2.6 SOLENOID VALVE

A solenoid valve is an electromechanically operated valve. The valve is controlled by an electric current through a solenoid: in the case of a two-port valve the flow is switched on or off; in the case of a three-port valve, the outflow is switched between the two outlet ports. Multiple solenoid valves can be placed together on a manifold.

## III. WORKING PRINCIPLE

Air from exhaust gas is forced to a turbine which acts as a dynamo, the turbine fan is light material which will rotate for even minimum force of air.

The turbine thus produces a milli-volts of charge which is shown using a led bulb. A diode is connected to the circuit of the dynamo which is connected to a battery since to have a one -way flow of current thus charge stored in a battery is used to run a 12v dc compressor which actuates flow of air through solenoid valve. the solenoid valve acts as switch for braking mechanism i.e air brake .thus braking facility is obtained by using pneumatic cylinder to a drum brake. Air brakes are very efficient since you only actuate the solenoid valve for braking you do not force your foot for braking continuously.

## IV. CONCLUSION

In this project we have obtained a revolutionary process in the field of mechanical and automobile. Here the pneumatic cylinder is actuated by using the compressor that is powered by the electrical power generated from the engine's exhaust gas. This project has also reduced the cost involved in the concern. It has been designed to perform the entire requirement task which has also been provided.