

“AUTOMATIC PNEUMATIC VULCANIZING MACHINE”

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ABSTRACT

The In the process of Vulcanizing the natural rubber is converted into more durable rubber by adding sulphur or any other equivalent additives. Vulcanizing is mainly a part of the rubber industries however; it is also practised in some other small scale industries.

In conventional vulcanizing machine the process is mainly hand operated and liberation of gas in the process is too muc

So in order to reduce the hazards faced by the conventional vulcanizing machine we have decided to create a vulcanizing machine which works on the principle of hydraulic system. In this process the piston is connected with the vulcanizing die and this die is used for the heating between two rubber materials.

Keyword: Hydraulic Power, Heating, Rubber Vulcanizing .

1. INTRODUCTION:

The technology of pneumatic's has gained tremendous importance in the field of workplace rationalization and automation from old-fashioned timber works and coal mines to modern machine shops and space robots. It is therefore important that technicians and engineers should have a good knowledge of pneumatic system, air operated valves and accessories. The air is compressed in an air compressor and from the compressor plant the flow medium is transmitted to the pneumatic cylinder through a well laid pipe line system. To maintain optimum efficiency of pneumatic system, it is of vital importance that pressure drop between generation and consumption of compressed air is kept very low.

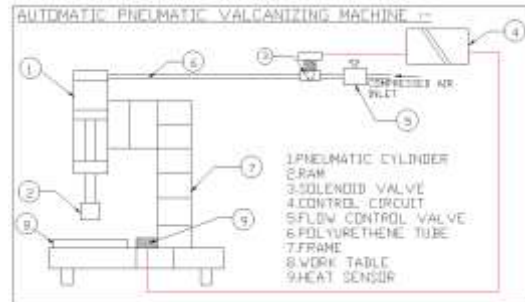


Figure: Vulcanizing Machine

1.1 What is Vulcanizing:-

Vulcanization, chemical process by which the physical properties of natural or synthetic rubber are improved; finished rubber has higher tensile strength and resistance to swelling and abrasion, and is elastic over a greater range of temperatures. In its simplest form, vulcanization is brought about by heating rubber with sulfur.

A variety of methods exist for vulcanization. The economically most important method (vulcanization of tires) uses high pressure and temperature after the curative has been added to the rubber. A typical vulcanization temperature for a passenger tire is 10 minutes at 170 °C. This process employs the technique known as compression molding, where the rubber article is intended to adopt the shape of the mold. Other methods, for instance to make door profiles for cars, use hot air vulcanization or microwave heated vulcanization (both continuous processes).

1.2 Advantages:-

It has Compact size and is portable. They are Easy to move from one place to another place . Its Operating principle is simple. Non-skilled person can also operate this machine and so it is user friendly and so you can have an unskilled labour for the work and also it is an easy process to perform. Time conception is very less when compare to the manual machine and is a bit similar to electrically working vulcanizing rubber. Automatic thermostat is used to maintain the particular temperature The force required to operate this system is low

1.3 disadvantages:-

May be the chances of overheating and damage the tube take care when operating because of heating used. May be the choice of air leakage problems. We need the compressed air.

May be the chance of over heating the tube.

1.4 Application:-

1. Automobile Applications-tyres
2. Shoe Soles, Hoses, and Conveyor belts are made by Vulcanized rubber.

2. METHODOLOGY:

This machine consists of heating element that converts Pneumatic or Kinetic energy into heat energy, a thermostat is used to control the power to the machine at a pre-determined period of time. This device is constructed as a heat consumer and is fitted with an automatic temperature regulator connected to a heating element. These are attached to the upper plate of the machine. The necessary pressure on the vulcanizing patch of the tyre tube will be assigned through a pressure fastened to a reciprocating motion of a rod by means of gear mechanism controlled by the lever

3. EXPERIMENTATION:

3.1. Analysis of heating element:

Wires of circular cross section of rectangular conducting ribbons are used as heating elements. Under steady state conduction, a heating dissipates as much heat from its surface it receives the power from the pneumatic arrangements. Diameter of the heating element $d = 10\text{mm}$; Length of heating element $l = 300\text{mm}$; Voltage $v = 240\text{V}$; Current $I = 6.7\text{A}$. ; Resistance $R = 36\Omega$ (Cartridge and Insertion Heaters)

$$P = V \cdot I / R \dots\dots (1)$$

$$R = \rho l / A \dots (2)$$

$$A = 3.14(d \cdot d) / 4 = 17.66\text{m}^2$$

$$R = 4\rho l / 3.14d^2 \dots\dots (3)$$

3.2. Calculations

Dry temperature up to 40 C has little effect on rubber, but at a temperature of 181 C to 240 C, rubber begins to melt and becomes sticky. It becomes completely carbonized at high temperature.

The minimum and maximum vulcanizing temperatures for tyre are 130C to 150C.

In selecting the heating element for electric vulcanizing machine, the above temperature limits were considered.

The element with the least operating temperature is constantan and it has an operating temperature of 400C. But the maximum vulcanizing temperature required is 150 C, and in order to regulate the temperature a thermostat is connected to the connection and adjusted up to 150C.

Element	Composition	Operating Temperature
Constantan	45% Nickel, and 55% Copper	400 C

Nichrome	50% Nickel, 20% Chromium and 30% Copper	1150 C
Kautha	70% Iron, 25% Chromium, and 5% Aluminium	1200 C
Silicon carbide		1450 C

25mm*25mm- base plate

30mm*7.5mm*4mm (Channel) – part 1 2m*7.5mm*4mm
(Channel)- Part 2 Heating Plate

13mm*13mm- 2 Plates

Heating Coil (2 Total Coil)

220U, 50 Hz

3.3. Costing & Weights of the machine.

Total Iron Used= 5 kg (17Rs pr Kg)

Fabrication-1500Rs

Wire, Plug (Copper Wire) =200Rs

Hydraulic Jack= 2000Rs

Heating Coil =1500Rs

4. CONCLUSIONS:

In this study will mainly be dependent on the present working of this machine. Still it has been the motive to develop some new technique which may also be profitable by this project.

Also there can be work done on improving the mechanism of this project and also to remove the effects of

its disadvantages.

Small Scale industries in the country can be encouraged by it and replacing the conventional method by it due to its advantages and accuracy of work.

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“Optimism Is The Faith That Leads To Achievement. Nothing Can Be Done Without Hope and Confidence - Helen Keller”

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