Automatic Pneumatic Hammer Machine

A report submitted to the Department of Mechanical, Sonargaon University of Bangladesh in partial fulfillment of the requirements for the Award of Degree of Bachelor of Science in Mechanical Engineering.

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Letter of Transmittal

April, 2023

To

Md.Din Al Amin
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Department of Mechanical Engineering.

Sonargaon University of Bangladesh

Subject: Submission of Project Report.

Dear Sir,

We are pleased to submit the project report on "**Automatic Pneumatic Hammer Machine".** It was a great pleasure to work on such an important topic. This project has been done as per instruction of your supervision and according to the requirements of the Sonargaon University.

We expect that the project will be accepted by the concerned authority we will remain happy to further explanation that you may feel necessary in this regard.

Thank You

Sincerely yours,

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DECLARATION

We do hereby solemnly declare that, the work presented here in this project report has been carried out by us and has not been previously submitted to any University/ Organization for award of any degree or certificate

We hereby ensure that the works that has been prevented here does not breach any existing copyright.

We further undertake to indemnify the university against any loss or damage arising from breach of the foregoing obligation.

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ACKNOWLEDGEMENT

First we started in the name of almighty Allah. This thesis is accomplished under the supervision of Md.Din Al Amin, Assistant Professor, Department of Mechanical, Sonargaon University. It is a great pleasure to acknowledge our profound gratitude and respect to our supervisor for this consistent guidance, encouragement, helpful suggestion, constructive criticism and endless patience through the progress of this work. The successful completion of this thesis would not have been possible without his persistent motivation and continuous guidance.

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Abstract

In the present scenario due to the technologies advancement there are lots of demands of the products in the market for production of many components. This invention is relates to fabricate a simple power hammer machine having low cost, compact, easy to operate, and having less power requirement for a forging operation performed by blacksmiths. More particularly this invention is relates use of power hammer by small scale industries or workshops having less force requirement in forging than the other hammer machines available in the market to produce or manufacture a small parts like knives, medical equipment's, sockets, hooks, clips, dental equipment's, rings, manifolds, couplings, etc.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Hammering is very important process in our day to day life. As it's have been done on manually so it's a very time consuming process so we should've developed a process by which we can do the hammering job done fast. We know that hammering is almost used in all types of industry so if we use to develop the conventional hammering process then it will be a successful project. We know that the hammering process not only produced the desired shape it also improves the grain structure of the metal. Forging is one of the oldest known metalworking processes. Traditionally, forging was performed by a smith using hammer and anvil.Howard Terhune, Cleveland, Ohio, United States Patent office journals, Application – September 27, 1944, Serial no. 555977, Patented Oct. 28, 1947,[1] Published no. US2429780. From this paper It has been found that this invention relates to portable motor operated and manually controlled machine tools or implements, more specifically to an improved hammer tool and operating mechanisms of the reciprocating, rotary cam actuated type, and designed for using as a portable power operated hammer, wood chisel, scaling chisel, piercing punch, rock drill, and other similar power tools. The novel operating mechanism of the project is an attachment, is adapted for combination with and receives power from a motor, as an electric motor, Harold S. Sheldon, Tekoa,Washington DC, United States Patent office journals,Application – October 15, 1947, Serial no. 779931.

Patented – March 21, 1950, Published no. US2501542.[2] The invention herein disclosed relates to steam and air hammers of the pile driver type and in which, usually the motive fluid is just admitted to lift and then released to drop the ram to achieve a strong downward force to executing any hammering operations. The another objective of this invention is also taking less time and reducing the breaking probability of the load or other parts attached to the ram providing hammering action down the line. Ulrich Demuth, Erbach-Ernsbach; Winrich Habedank, Diez, both of Germany, United States Patent office journals, Application - November 20, 1996, Patented - August 29,2000, Patent no. 6109364, Published no. US006109364A.[3] It relates to a hammer with a tool holder and a hammer mechanism for the transmission of impact energy onto the drilling and/or chiseling bit in the tool holder has a switching device which with a single actuator makes it possible to switch between pure drilling operation, rotary hammering operation and pure hammering operation. The cam part is

provided at the section of the actuator projecting inwardly over the slide part. The object of the invention is to develop a rotary Forging is the one type of mechanical process in which metal is heated and hammered by blacksmith, but in the present scenario the forging operation done by means of hammer machine tool. Whole operation is replaced from manual to automatic. The machine requires power source to perform the forging operation. Power hammer is one type of machine tool which is used in forging operation. This machine use power source for up-down the hammer to being hammered any parts or components. They have been used by blacksmiths since 1880s, by replacing trip hammers. Generally power hammer consists of Ram, Frame, Anvil, Hammer head, Dies, Connecting Rod, Leaf Spring and power source like electric motor. Simply, power hammer is the machine tool which uses the electric power source to run the motor and this rotary motion of the motor is utilize to reciprocate the ram by attaching the leaf spring between ram and connecting rod. In this invention we have been modeling the machine in the software and made a simple and compact layout of the machine as per requirement of forging operations.

1.2 Proposed Method / System

In the time of speedy running technology the automation is gone to a higher level development. In this project the system is proposed to develop a pneumatic hammer machine which can able to work automatically system. The working of this project is easy to use and less costly. This project is developed for industrial metal destroy or blacksmith work. Where mainly use air compressor, solenoid valve, actuator and hammer.

1.3 Objective:

The objectives of this project are:

- To study about automatic pneumatic hammer machine system.
- To design and construct a pneumatic hammer machine system.
- To test the performance of the automatic pneumatic hammer machine system.
- To modelling and fabricates a simple power hammer having low cost, compact in size, less power requirement, easily move from one place to another place.
- To decrease the cost of machine by application of simple mechanism.

CHAPTER 2

LITURATURE REVIEW

2.1 Introduction

In this section topics related to Automatic Pneumatic Hammer Machine are included. These provide a sampling of problems appropriate for application of a Automatic Pneumatic Hammer Machine. The references are summarized below.

2.2 Literature review:

John Byron Henry, et.al. Invention relates to power hammers, and particularly to steam forge hammers including a supporting frame, a hammer operating power cylinder provided with a piston and piston rod carrying a ram or hammer attached.[1] [2]. Richard W. Hall, et.al, invention is to double acting forging hammers and, more particularly, to forging hammers actuated by pressurized gas and/or hydraulic fluid. Accordingly, there is a need for double-acting forging hammer which utilizes pneumatic and/or hydraulic hammer driving systems, yet does not have the energy losses associated with pneumatic systems or the complex and sophisticated of hydraulic systems. [3]. Howard Terhune, et.al, invented this project is simply is an improvement of forging hammers used for industrial purposes. As we aware that in forging operation the temperature of the metal is so high that manual hammering operation is quite difficult for this purpose. So in this project they provided control valves which directing the ram up or down by the steam power. [4].

Invention relates generally to portable motor-operated and manually controlled machine tools or implements, and more specifically to an improved hammer tool and operating mechanism of the reciprocating, rotary cam actuated type, and designed for interchangeable us as a portable power- operated hammer, wood chisel, scaling chisel, piercing punch, rock drill, and other similar power tools. [5]. John I. Kupta et.al, invention herein disclosed relates to steam and air hammers of the pile driver type and in which, usually, the motive fluid is just admitted to lift and then released to drop the ram. ‘Operating in this manner such hammers naturally are inetiicient the use of steam or air and since gravity is the force relied on for the striking blow, the ram and other parts have had to be heavy and bulky. [6]. David A. Giardino, et.al, invention relates to the art of rotary impact wrenches of a type in which a rotating member is periodically reciprocated into and out of rotary impacting relation with an anvil portion of torque output

shaft. From the detailed literature review it can be observed that there was not any simple and compact machine designed. All the research was heavy and complex machine related. So, we have been trying to modelling a simple power hammer machine to perform forging operation easily.With the evolution of technology and the advancements made in the industry, automation has become an important resource for industrial operations. Hammering is a very common process in the industries of mechanical engineering. Most of the industries that involve the fabrication and machining of metal components use hammering. Moreover, hammering is extensively used in the wood industry. This project aims at designing and fabricating an automated hammering machine that can perform hammering operations efficiently. Moreover, the hammering operation is manually performed that results in different types of injuries to the operators. Adding more to it, the efficiency and accuracy required in hammering operations are not achieved through manual hammering operations.

Therefore, this project is selected that aims at designing and fabricating an automated hammering machine.It is a simple device but it will be helpful in many operations. The industry now requires accuracy and there are very small limitations of allowed tolerances. An important aspect of this project is the improvement of the operations and the safety of the operators. For instance, consider the hammering operation being done on a large metal piece. If this device will be used, there will be small risks of injuries for the operators but manual operations can bring a lot of harm. Moreover, this device will help in gaining the required level of accuracy. If this automated hammering machine is developed on a commercial basis and it is provided to different industries, it can bring a lot of revolution in the industries.

2.3 Summary

This literature is help us to a brief concept of Automatic Pneumatic Hammer Machine. Many people are trying to make this project. We also try this project. We are added four different sources which will be very helpful for user.

CHAPTER 3

STRUCTURE

3.1History

This automatic pneumatic hammer machine system is so effective and safe process. It is mainly used in factory and industrial area. After it used we reduce the manpower and time. That's way we get good efficiency. Where very difficult to do this hammer work , but using this machine this work make so easy. This machine is very easy to use and it works very effectively. A relevant picture is added below –

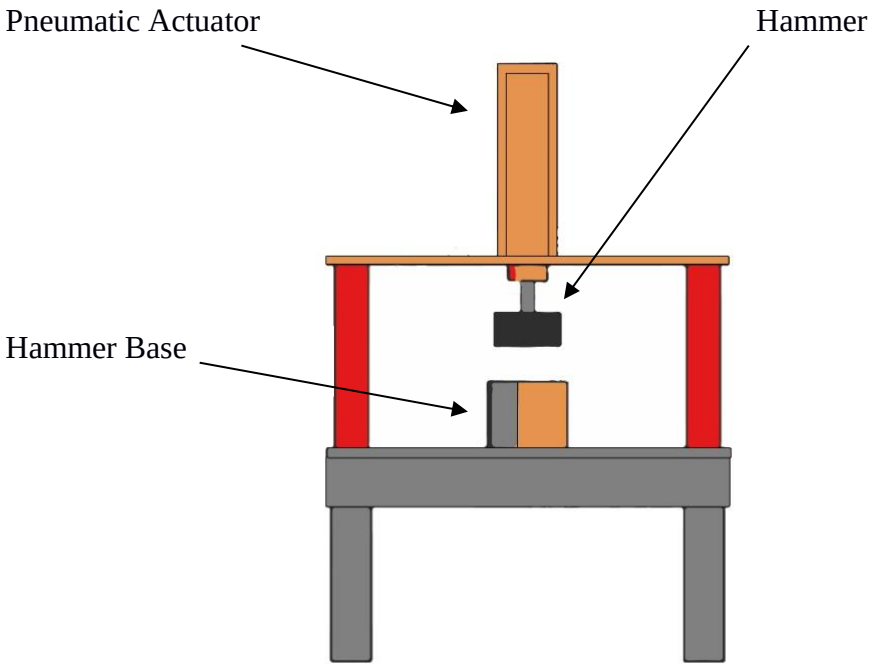

Fig: 3.1: Automatic Pneumatic Hammer Machine.

3.2 Block Diagram:

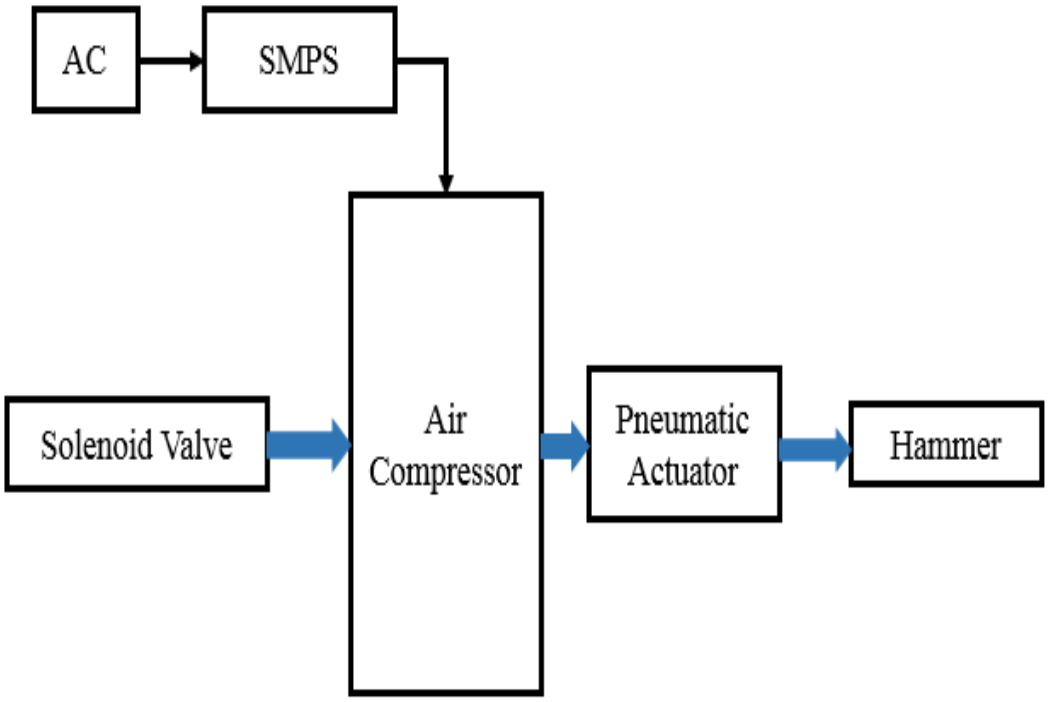

Figure 3.2: Block Diagram of Automatic Pneumatic Hammer Machine.

3.3 Components List:

1. Air Compressor
2. Solenoid Valve
3. Pneumatic Actuator
4. Pneumatic Pipe
5. Hammer Base
6. SMPS

CHAPTER 4

HARDWARE ANALYSIS

4.1 Switch Mode Power Supply (SMPS):

A switched-mode power supply (switching-mode power supply, switch-mode power supply, switched power supply, SMPS, or switcher) is an electronic power supply that incorporates a switching regulator to convert electrical power efficiently. Like other power supplies, an SMPS transfers power from a DC or AC source (often mains power) to DC loads, such as a personal computer, while converting voltage and current characteristics. Unlike a linear power supply, the pass transistor of a switching-mode supply continually switches between low-dissipation, full-on and full-off states, and spends very little time in the high dissipation transitions, which minimizes wasted energy. A hypothetical ideal switched-mode power supply dissipates no power. Voltage regulation is achieved by varying the ratio of on-to-off time (also known as duty cycles). In contrast, a linear power supply regulates the output voltage by continually dissipating power in the pass transistor. This higher power conversion efficiency is an important advantage of a switched-mode power supply. Switched-mode power supplies may also be substantially smaller and lighter than a linear supply due to the smaller transformer size and weight.

Fig 4.1 : SMPS

Switching regulators are used as replacements for linear regulators when higher efficiency, smaller size or lighter weight are required. They are, however, more complicated; their

switching currents can cause electrical noise problems if not carefully suppressed, and simple designs may have a poor power factor.

12V 5A Industrial SMPS Power Supply – 60W – DC Metal Power Supply – Good Quality – Non Waterproof with Aluminium casing.

- Input Voltage: AC 100 – 264V 50 / 60Hz
- Output Voltage: 12V DC, 0-5A
- Output voltage: Adjustment Range: ±20%
- Protections: Overload / Over Voltage / Short Circuit
- Auto-Recovery After Protection
- Universal AC input / Full range
- 100% Full Load Burn-in Test
- Cooling by Free Air Convection
- High Quality and High Performance
- LED power supply with a metal body for hidden installation for LED lighting
- Design with Built-in EMI Filter, improve signal precision.
- Certifications: CE & RoHs
- No Minimum Load.
- Compact Size Light Weight.
- High Efficiency, Reliabiltiy & low energy consumption
- Category – Switch Mode Power Adaptor (SMPS)

Switched-mode power supplies are classified according to the type of input and output voltages. The four major categories are:

- AC to DC
- DC to DC
- DC to AC
- AC to AC

A basic isolated AC to DC switched-mode power supply consists of:

- Input rectifier and filter
- Inverter consisting of switching devices such as MOSFETs
- Transformer
- Output rectifier and filter
- Feedback and control circuit

The input DC supply from a rectifier or battery is fed to the inverter where it is turned on and off at high frequencies of between 20 KHz and 200 KHz by the switching MOSFET or power transistors. The high-frequency voltage pulses from the inverter are fed to the transformer primary winding, and the secondary AC output is rectified and smoothed to produce the required DC voltages. A feedback circuit monitors the output voltage and instructs the control circuit to adjust the duty cycle to maintain the output at the desired level.

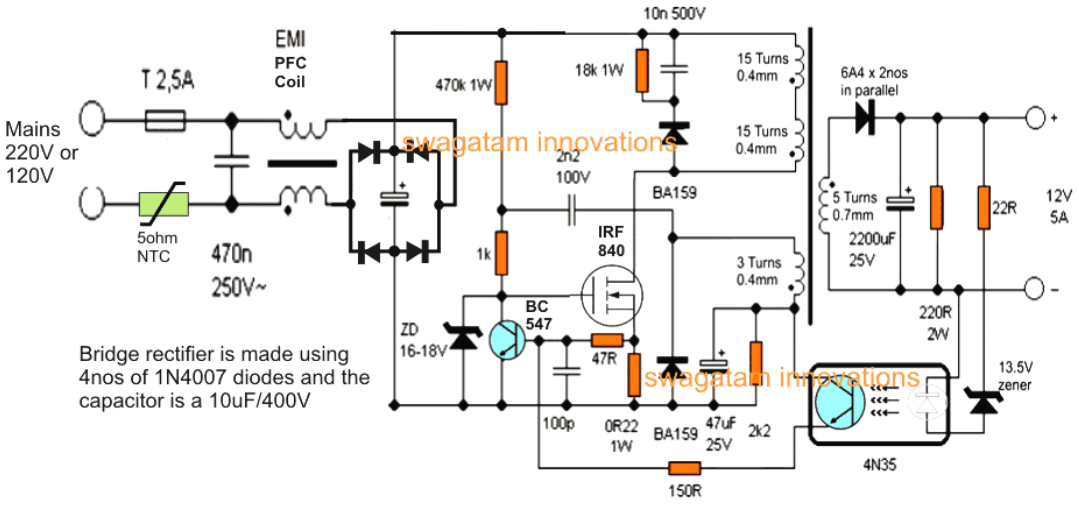

Fig 4.2 : SMPS Circuit Design Basic working concept of an SMPS

A switching regulator does the regulation in the SMPS. A series switching element turns the current supply to a smoothing capacitor on and off. The voltage on the capacitor controls the time the series element is turned. The continuous switching of the capacitor maintains the voltage at the required level.

Design basics

AC power first passes through fuses and a line filter. Then it is rectified by a full-wave bridge rectifier. The rectified voltage is next applied to the power factor correction (PFC) pre-regulator followed by the downstream DC-DC converter(s). Most computers and small appliances use the International Electro technical Commission (IEC) style input connector. As for output connectors and pin outs, except for some industries, such as PC and compact PCI, in general, they are not standardized and are left up to the manufacturer.

There are different circuit configurations known as topologies, each having unique characteristics, advantages and modes of operation, which determines how the input power is transferred to the output. Most of the commonly used topologies such as fly back, push-pull, half bridge and full bridge, consist of a transformer to provide isolation, voltage scaling, and multiple output voltages. The non-isolated configurations do not have a transformer and the power conversion is provided by the inductive energy transfer.

Advantages of switched-mode power supplies:

- Higher efficiency of 68% to 90%
- Regulated and reliable outputs regardless of variations in input supply voltage
- Small size and lighter
- Flexible technology
- High power density

Disadvantages:

- Generates electromagnetic interference
- Complex circuit design
- Expensive compared to linear supplies

Switched-mode power supplies are used to power a wide variety of equipment such as computers, sensitive electronics, battery-operated devices and other equipment requiring high efficiency.

Switch Mode Power Supply

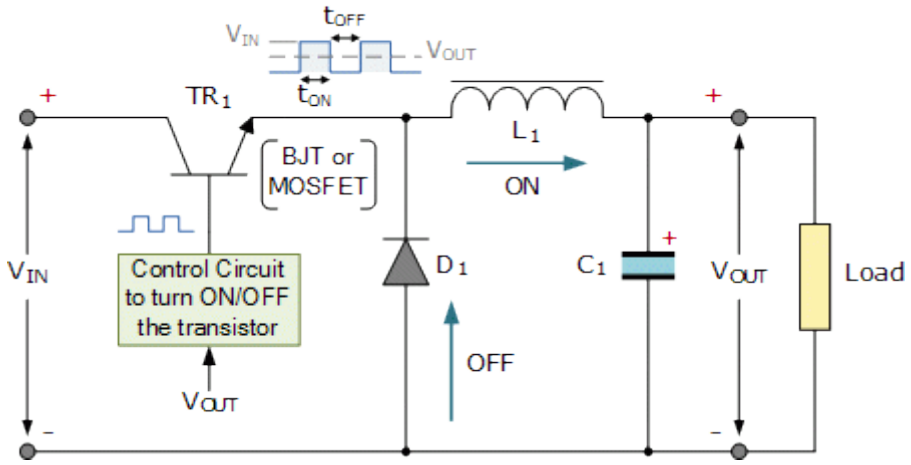

Fig 4.3 : Power Supply Connection

Linear voltage IC regulators have been the basis of power supply designs for many years as they are very good at supplying a continuous fixed voltage output.

Linear voltage regulators are generally much more efficient and easier to use than equivalent voltage regulator circuits made from discrete components such a zener diode and a resistor, or transistors and even op-amps.The most popular linear and fixed output voltage regulator types are by far the 78… positive output voltage series, and the 79… negative output voltage series. These two types of complementary voltage regulators produce a precise and stable voltage output ranging from about 5 volts up to about 24 volts for use in many electronic circuits.
There is a wide range of these three-terminal fixed voltage regulators available each with its own built-in voltage regulation and current limiting circuits. This allows us to create a whole host of different power supply rails and outputs, either single or dual supply, suitable for most electronic circuits and applications. There are even variable voltage linear regulators available as well providing an output voltage which is continually variable from just above zero to a few volts below its maximum voltage output.Most d.c. power supplies comprise of a large and heavy step-down mains transformer, diode rectification, either full-wave or half-wave, a filter circuit to remove any ripple content from the rectified d.c. producing a suitably smooth d.c. voltage, and some form of voltage regulator or stabilizer circuit, either linear or switching to ensure the correct regulation of the power supplies output voltage under varying load conditions. Then a typical d.c. power supply would look something like this:

Typical DC Power Supply

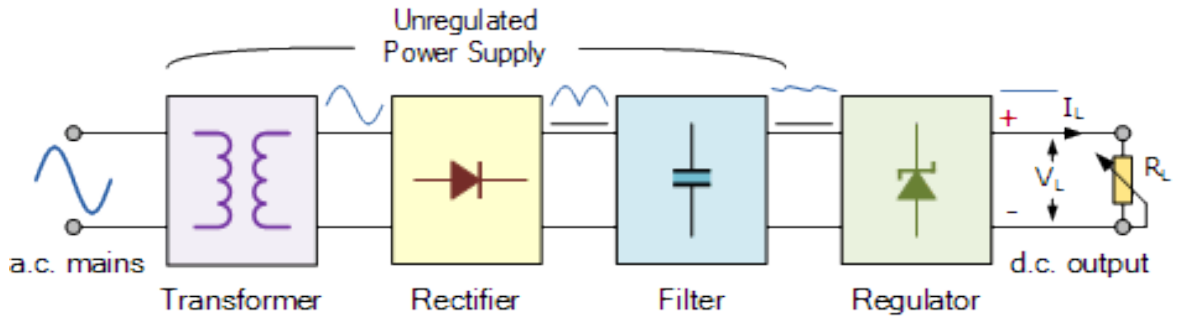

Fig 4.4 : DC Power Supply Step

These typical power supply designs contain a large mains transformer (which also provides isolation between the input and output) and a dissipative series regulator circuit. The regulator circuit could consist of a single zener diode or a three-terminal linear series regulator to produce the required output voltage. The advantage of a linear regulator is that the power supply circuit only needs an input capacitor, output capacitor and some feedback resistors to set the output voltage.

4.2Solenoid Valve

They are widely used in the pneumaticindustry. These valves make use of electromechanical solenoids for sliding of the spool. Because simple application of electrical power provides control, these valves are used extensively. However, electrical solenoids cannot generate large forces unless supplied with large amounts of electrical power. Heat generation poses a threat to extended use of these valves when energized over time. Many have a limited duty cycle. This makes their direct acting use commonly limited to low actuating forces.

Often, a low power solenoid valve is used to operate a small pneumatic valve (called the pilot) that starts a flow of fluid that drives a larger pneumatic valve that requires more force.

A bi-stable pneumatic valve is typically a pilot valve that is a 3 ported 2 position detented valve. The valve retains its position during loss of power, hence the bi-stable name.

Bi-stability can be accomplished with a mechanical detent and 2 opposing solenoids or a "magna-latch" magnetic latch with a polarity sensitive coil. Positive opens and negative closes or vice versa. The coil is held in position magnetically when actuated.

Type of spool

Spool is of two types namely sliding and rotary. Sliding spool is cylindrical in cross section, and the lands and grooves are also cylindrical. Rotary valves have sphere-like lands and grooves in the form of holes drilled through them.

Figure 4.5: Solenoid 5 way, 2 position Valve

Specification:

Model	4H210-08
Type	5 port 2 postion hand lever valve
Valve type	2 postion
Material	Aluminum
Media	Air
Operating	Direct acting
Orifice size	16mm²(Cv=1.67)
Port size	In= Out=PT1/4"
Exhausl	1/8"
Pressure range	1.5~8Kgf/cm²
Temp Range	-5~60℃
Lubrication	Not required
Operating angle	+-15%
Code	200 series
Dimension	76.7 * 35 * 22mm

Table 3.1.2: Specification Solenoid Valve

When the reciprocating air compressor reaches the cut out pressure setting the power supply to the compressor motor stops, and as a result, the compressor pump stops. The compressor pump stops, regardless of where the piston in the cylinder is located, and that often means that there is compressed air trapped over the piston when the pump stops on cut out.

On other pages on this site we talk about how marginal a 120 volt air compressor motor really is, and the steps the motor manufacturers must take to ensure that, even with all compressor components working at their best, even being able to start.

If air is trapped over the piston on the air compressor, that adds load to the start circuit. Your 120 volt power supply hasn't got enough oomph to start the motor without help from a start capacitor anyway, and that additional load on the compressor motor is typically sufficient to prevent the air compressor from starting.

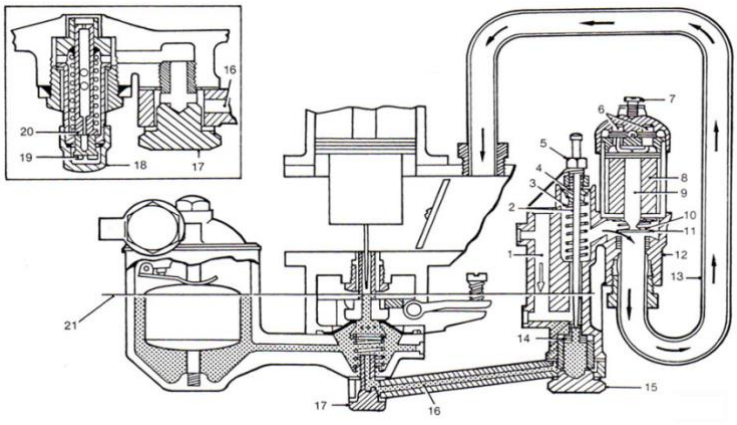

Figure 4.6 : Schematic Diagram of Solenoid Valve

4.3 Air Compressor:

An **air compressor** is a pneumatic 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 the tank's pressure reaches its engineered upper limit, the air compressor shuts off. The compressed air, then, is held in the tank until called into use. 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.

They can also be classified according to the design and principle of operation:

1. Single-stage reciprocating compressor
2. Two-stage reciprocating compressor
3. Compound compressor[*clarification needed*]
4. Rotary-screw compressor
5. Rotary vane pump
6. Scroll compressor
7. Turbo compressor
8. Centrifugal compressor

Function of Air Compressor:

An air compressor is a pneumatic 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.

Product Specification

Horse Power	0.080 HP
Brand	ESYEXPRESS ELECTRIC AIR PUMP
Maximum Flow Rate	0-20 cfm
Power Source	Electric DC
Voltage	12V
Minimum Order Quantity	1 Piece

Product Description

Your Brand Electric Portable DC12V Tire Inflator Mini Car Compressor Pump

Description:

- This portable air compressor has a small electric motor that compresses the air in a small attached tank.
- It can be plugged into a 12V car system for on-the-go repairs or inflation.
- It's ideal for car and bicycle tyres, sports balls etc.
- It can be powered through a cigarette lighter in your vehicle and is very versatile.
- With the tyre shape the cord and cigarette cord fit into it for compact design.

Specification:

- Maximum Pressure - 300 PSI
- Brand new and high quality
- Material: ABS
- Color: Black
- Compact and portable,
- easy to use
- Provide pressure gauge and 3 nozzle adapters
- Ideal for inflating tires, balls, rubber floater, hovercraft and so on
- Can also inflate Bicycle/Scooter/Moped tyres and also allows inflation of many other inflatable
- leisure items using Flow rate: 35 L /Min
- Voltage: DC 12 V.

Fig : 4.7 : Air Compressor .

4.4 Pneumatic Actuator

Pneumatic actuators enable considerable forces to be produced from relatively small pressure changes. Pneumatic energy is desirable for main engine controls because it can quickly respond in starting and stopping as the power source does not need to be stored in reserve for operation. Moreover, pneumatic actuators are cheaper, and often more powerful than other actuators. These forces are often used with valves to move diaphragms to affect the flow of air through the valve.

The advantage of pneumatic actuators consists exactly in the high level of force available in a relatively small volume. While the main drawback of the technology consists in the need for a compressed air network composed of several components such as compressors, reservoirs, filters, dryers, air treatment subsystems, valves, tubes, etc. which makes the technology energy inefficient with energy losses that can sum up to 95% .

Fig 4.8 : Pneumatic Actuator

Specifications:

- Manufacturer: Festo
- Model: DNU-20-50-PPV-A
- Type of Operation: Double Acting
- Piston Diameter: 20mm
- Stroke: 50mm
- Pneumatic Connection: G3/8
- Operating Pressure Range (Bar) 0-12

Pneumatic System Work:

A **Pneumatic actuator** mainly consists of a piston or a diaphragm which develops the motive power. It keeps the air in the upper portion of the cylinder, allowing air pressure to force the diaphragm or piston to move the valve stem or rotate the valve control element.

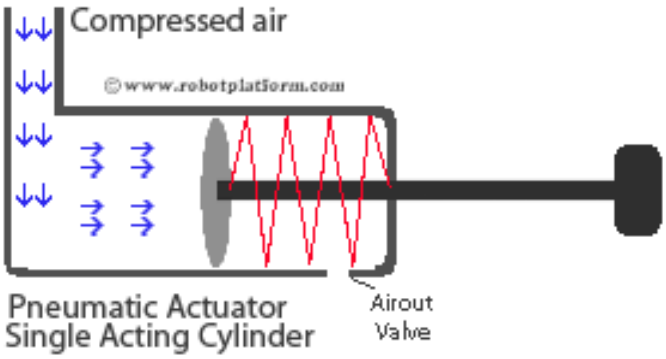

Fig 4.9 : Pneomatic working System

4.5 Pneumatic Pipe:

In common usage the words *pipe* and *tube* are usually interchangeable, but in industry and engineering, the terms are uniquely defined. Depending on the applicable standard to which it is manufactured, pipe is generally specified by a nominal diameter with a constant outside diameter (OD) and a schedule that defines the thickness. Tube is most often specified by the OD and wall thickness, but may be specified by any two of OD, inside diameter (ID), and wall thickness. Pipe is generally manufactured to one of several international and national industrial standards. While similar standards exist for specific industry application tubing, tube is often made to custom sizes and a broader range of diameters and tolerances. Many industrial and government standards exist for the production of pipe and tubing. The term "tube" is also commonly applied to non-cylindrical sections, i.e., square or rectangular tubing.

Description:

PVC Water Hose Pipe Dia 6mm

Productdetails:

Material	PVC
Application	Water
Resistant to Chemicals	Acids and Alkalis

Available Length	0- 50 m
Working Temperature	Up to 70 Degree C

Fig 4.10 : Pneumatic Pipe

CHAPTER 5
METHODOLOGY

5.1 Methodology

- Creating an idea for Design and construction of an automatic pneumatic hammer machine.
- And drawing and listed of components/materials to know which components/materials need to construct it.
- Collecting the all components/materials for construct the system.
- Finally, we constructed this system & checked it finally that working very well.

5.2 Complete Project Prototype Image

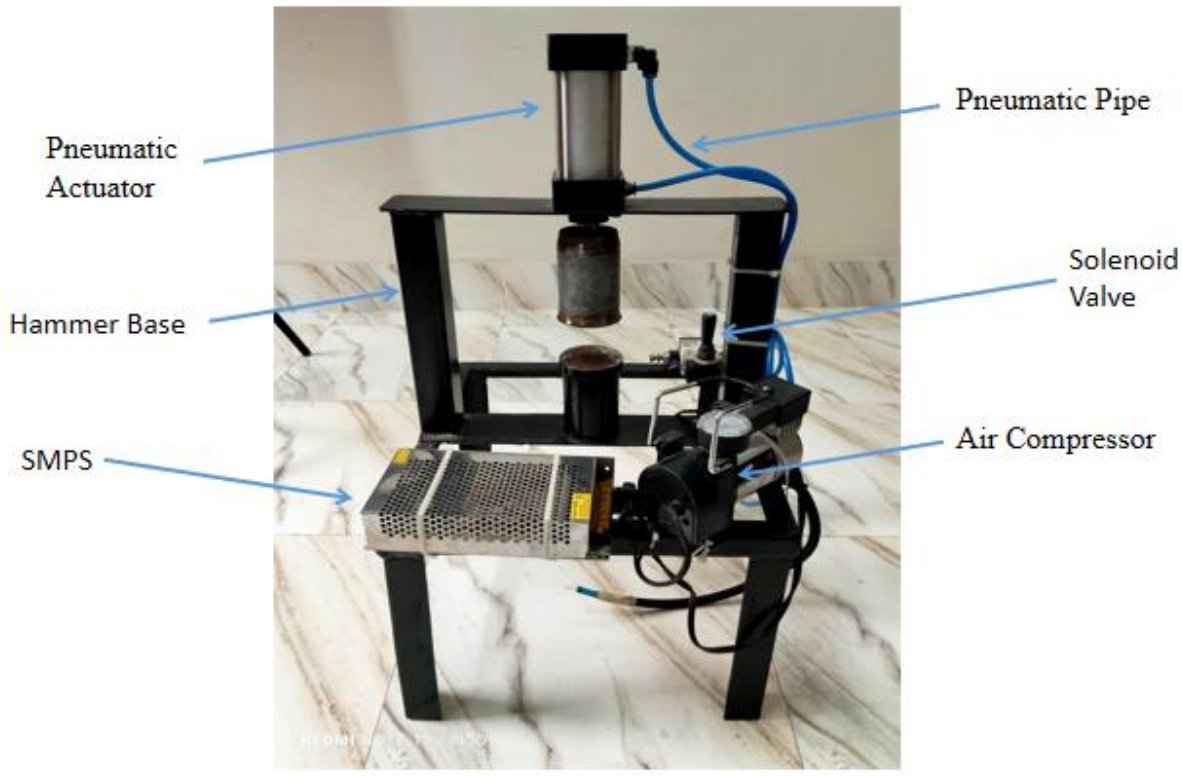

Figure 5.1 : Complete Project Picture

5.3 Working Principle

The main driving force of our project is the air compressor. The main task of our project is to use Hummer's machine by using air pressure. In our project, Mine Power will come from the AC line to Direct Air Compressor via SMPS. Solenoid valves have been used to control the air compressor. The work has been done to control the air pressure with the solenoid valve and to give the name and cap to the Hummer machine. The pressure of the air from the air compressor passes the pneumonia pipe and through the actuator the hummer's piston will rise and forcefully apply a cap on an object which is capable of breaking an object. This is how our project works.

5.4 Cost Analysis:

No	Product Name	Specification	Qty.	Unit Price	Total Price	Market Price
01.	Air Compressor	12V	1	2500	2500	
02.	SMPS		1	850	850	
03.	Solenoid Valve		1	1850	1850	
05.	Pneumatic Actuator		1	1850	1850	
06	Hammer Base		1	3500	3500	
06.	Others			1200	1200	
			Total		11,750/=	15,000/=

Table :1 : Cost Analysis

CHAPTER 6

RESULT AND DISCUSSION

6.1 Result

After followed all objectives and plan to build our project. We finally establish our project. In this project first we create our project circuit with sufficient equipment. After that our pneumatic hammer machine assembles with all equipment. After making all the structure then we test our project. All the setup is working well with our hammer machine implementation and plan.

6.2 Calculation

Hammer Weight = 0.6Kg

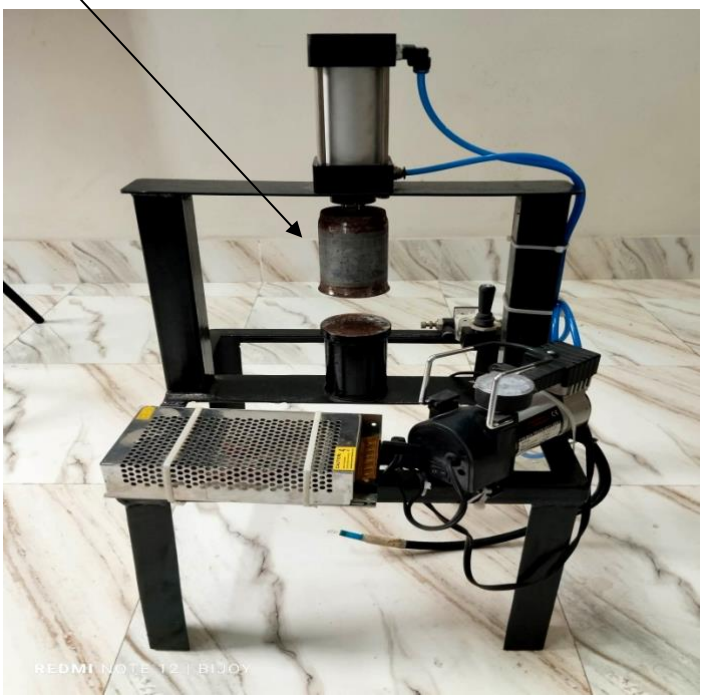

Figure 5.1 : Automatic Pneumatic Hammer Machine .

- Project Weight Total = 9.62 kg
- Weight of hammer = 0.6 kg

• Length of hammer = 90 mm

• Position stroke L/H = 50 mm

Classification of The Motor:

motor rating,

Data:

N = 0-450 RPM

I = 5A

V = 12V

Motor power transmission:

$P = V \times I = 12 \times 5$

P = 60W

Torque by the motor:

Max. Torque (Nm) = 57

The torque by 30 rpm:

$P = 2\pi NT / 60$

$60 = 2\pi \times 30 \times T / 60$

T = 0.052 N.m

Hammer's Calculations:

Force:

F = m.a m= 0.6 kg

F = 0.6×9.81 a= 9.81 m/s2

F = 5.88 N

Torque:

T = F.d d = 0.02 m

T = 5.88×0.02 F= 5.88 N

T = 0.117 N.m

Velocity:

V = h/T T = 2 sec

= 0.05/2 h = 0.05 m

V = 0.025 m/s

The moment:

M = F.d F = 5.88 N

= 5.88× 0.02 d = 0.02 m

M = 0.117 N.m

Potential Energy:

PE = mgh m = 0.6 Kg

= 0.6×9.81×0.05 g = 9.81 m/s2

PE = 0.29 J h = 0.05 m

Kinetic Energy:

KE = (½)m.v2 m = 0.6 Kg

= (½)(0.6)(0.025)2 v = 0.025 m/s

KE = 1.87×10^{-4} J

Impact Force:

W = KE = Fd =(½)mv2 m = 0.6 kg

F = [(½)mv2]/d d = 0.02 m

= [(½)0.6×0.025^2]/0.02 v = 0.025 m/s

F = 0.0093 N

6.3 Hammer Machine Some Explanation

This machine has a furnace for heating the metal, then cooling equipment for cooling the metal after the completion of the operations and a press that is used for hammering. From this 12 literature, we have gained an idea about the required components for the automated hammering machine. For the second work, the work done by A.A. Dyakonov will be discussed. In this work, the author has worked on developing an automated processing machine for testing the vibrations of the components. It is a mega form of our project. This project also involves an automated hammering machine but a separate automated hammering machine is not developed yet. In this work, the authors have also developed a software module for controlling the vibrational press. This software module is a new innovation and it will be very helpful if we integrate a software module in our project for the calculated hammering strokes per minute.

6.4 Discussion

The Automatic Pneumatic Hammer Machine works effectively and makes pneumatic hammer process easy, more precise and reliable and is more advantageous than the conventional methods reducing manual efforts, errors and being much efficient. The proposed prototype allows achieving an economical and a low-cost automation. The pneumatic hammer action can be made flexible according to the industrial needs. In case of any breakdown, the system can be easily restored and commissioned upon diagnosis.

6.5 Advantage

- Good accuracy to destroy object.
- Time saving machine for industrial work.
- Reduce energy waste.
- No Oil consumption.
- Less skill technicians is sufficient to operate.
- Installation is simplified very much.
- Less time and more profit.
- Simple construction
- Reduced weight of the system.
- Ease of operation.

6.6 Application

The project has a major application in the

- It can be used for Industrial work.
- It can be used in factories for compress the object.

6.7 Limitation

It is a demo project so we found some limitation. In future we will work for reduce this kind of limitation. These limitations are –

- It is a demo project so its accuracy is 85%.
- Our project may delay in work.
- This project has some air leakage because of demo project.

CHAPTER 7

CONCLUSION

7.1 Conclusion:

The paper describes a procedure of product (re)design of pneumatic hammer. The procedure is very similar to the procedures, which are being used in reality, only that we have put some more weight on process of product design, deliberately keeping in background computer modelling of our product. The realization of project, gives a very good insight into the development process in general. It is very interesting how several small facts describe the properties of some product.

7.2 Future Scope

The model can be improved by making some changes in the program and components. Some suggestions are given below-

- We can add a pressure meter and pressure controller .
- We will increase its working accuracy level.
- We will add an air reserve tank.
- In Future we will add automatic timer solenoid valve.

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