

# FABRICATION OF AUTOMATIC HYDRAULIC BENDING AND BEND REMOVING MACHINE

Mr. Harshad Khairkar<sup>1</sup>, Mr. Dhananjay Kopre<sup>2</sup>, Mr. Saurabh Kalkar<sup>3</sup>,

Ms. Dipali Kambe<sup>4</sup>, Prof. Sarang Gulhane<sup>5</sup>

<sup>1</sup>Final Year Student, Mechanical Engineering, DES'sCOET Dhamangaon (Rly), Maharashtra, India

<sup>2</sup>Final Year Student, Mechanical Engineering, DES'sCOET Dhamangaon (Rly), Maharashtra, India

<sup>3</sup>Final Year Student, Mechanical Engineering, DES'sCOET Dhamangaon (Rly), Maharashtra, India

<sup>4</sup>Final Year Student, Mechanical Engineering, DES'sCOET Dhamangaon (Rly), Maharashtra, India

<sup>5</sup>Assistant Professor, Mechanical Engineering, DES'sCOET Dhamangaon (Rly), Maharashtra, India

\*\*\*

**Abstract** - The foremost aim of our project is to fabricate a hydraulic operated jack for the purpose of pipe bending and bend removing machine. Hydraulic operated equipment's are used in different fields. In an Automobile hydraulic jack is raised for greasing job. Stepping on the brake pedal creates the hydraulic power, which stops the rotation of the four wheelers or two wheelers to stop. In order to remove the bend of pipes, rods and bars hydraulic bend removing machine is the most suitable equipment. To remove bends from pipe or rod to be supported between the die holders and jack is actuated on pipe. It exerts force on the pipe and bends it to the suitable angle depending on the dies used. Hydraulic bending machine consists of hydraulic jack, die holder, pulley, slider, wiper motor, and spring. Actuation of hydraulic jack is simple and reliable to maintain. In industries, Hydraulic bending and bend removing machine is portable, it is a flexible and less expensive. Hence it is better to replace conventional machines by hydraulic pipe bending and bend remove machine automatic operated bending machine requires no maintenance and power utilization. During mass production it can be converted into automated or electrically operated jack so that the rate of production can be increased. Applications of bending machines are found to be in production industries, workshop automobile etc. now a day focusing into automation. This project is aimed to bending pipe operation of by using automatically with help of wiper motor.

**Key Words:** Hydraulic jack, Wiper motor, Automation Pipe Bends, remove bends, Actuation, Pipe Bending, Power utilization

## 1. INTRODUCTION

The History of Fabrication of Automatic Hydraulic Bending and Bend Removing Machine are given below:

### 1.1 History:

Bottle type mechanical jacks were very common for jeeps and trucks of World War II vintage. For example, the World War II jeeps (Wills MB and Ford GPW) were issued the "Jack, Automobile, bottle type, Capacity 10 ton". This jacks, and similar jacks for trucks, were activated by using the lug wrench as a handle for the jack's ratchet action to of the jack. The jack was carried in the jeep's tool compartment. bottle type jack's continued in use for small capacity requirements due to low cost of production raise or lower it. A control tab is marked up/down and its position determines the direction of movement and almost no maintenance.

The virtues of using a screw as a machine, essentially an inclined plane wound round a cylinder, was first demonstrated by Archimedes in 200BC with his device used for pumping water. There is evidence of the use of screws in the Ancient Roman world but it was the great Leonardo da Vinci, in the late 1400s, who first demonstrated the use of a screw jack for lifting loads.

The aim of this chapter is provide all the basic information about project background. This project include theoretical and technical framework necessary for understanding the work during objective of study, scope of study and benefits of study.

### 1.1 Objective Of Study

- The main objective of the devices used for bend the hollow pipe of any material.
- Similarly removing the bend of already existing bends efficiently.
- Removing of bends of rod or pipe without affecting the material of pipe or rod.
- All the operation of bending and removing bends are fully automated.

### 1.2 Scope of Study

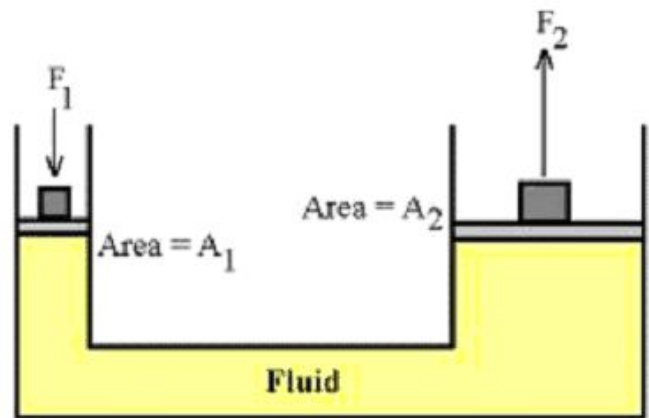
- The most basic consideration when choosing hydraulic bending and bend removing machine is that the formation of bends.
- That's why we can develop hydraulic bending and bend removing machine which most can bend up to 1inch diameter of the rod or pipe.
- Hydraulic bending and bend removing machine provide most economical dependable and versatile method of bending rod or pipe.
- Hydraulic bending and bend removing machine have few moving parts are well lubricated and provide many year trouble free operation.

### 1.3 Benefits Of Study

We found some of the benefits of hydraulic bending and bend removing machine are as follows:-

- Simplicity in operation for bending and removal of bends.
- On single machine both bending and bend removing operation takes place.
- Capable of bend formation up to 1inch diag. of pipe or rod.
- It is also very useful for formation of continuous bends one after other or consequent bends.

## 2. WORKING PRINCIPLE



**Fig -1:** Principle of Pascal law

Hydraulic cylinder works on the principle given by the French mathematician and physicist Blasé Pascal in 1653 and states that,

"The intensity of pressure at any point in a fluid at the rest is same in all direction."

## 3. COMPONENTS OF HYDRAULIC LADDER



**Fig -2:** Constructional Diagram

Components in Hydraulic Ladder:-

1. Hydraulic Jack
2. pulley
3. Die holder
4. Remove holder
5. Wiper motor
6. D.C battery
7. Spring

### 3.1 Hydraulic jack

A hydraulic jack is a mechanical device used as a lifting device to lift heavy load or more force. Hydraulic jack get their power from pressurized hydraulic fluid which is typically oil. Hydraulic jack is placed on slider and for better operation the base of the hydraulic jack is welded. Hydraulic jack capacity is 10000 kg.



**Fig -3:** Hydraulic jack

### 3.2 Pulley



**Fig -4:** Pulley

Pulley is a wheel on axle or shaft designed to support movement. Top c-channel having holes for changing position pulley as per requirement. pulley diameter is 15 cm.

### 3.3 Die Holder



**Fig -5:** Die Holder

There are specially design to Dies. Circular die and another is Rectangular Die. Circular Die are used for the Bending purpose and Rectangular Die are used for the removing Bend. The Die are made up of Mild Steel.

### 3.4 Wiper motor



**Fig -5:** Wiper Motor

A wiper motor is device.it is consist of a metal arm, pivoting at one end. Wiper motor is welded lower side of slider and it gives the uniform linear motion on lever. generally wiper motor used in 150rpm.

### 3.5 Battery

A battery is a electrochemical cells that transform chemical energy into electricity .wiper motor is connected to battery

and battery has given supply of electric power. hence battery is used in 12 volt



Fig -6: battery

### 3.6. Spring



Fig -7: spring

We choose spring for function of which is connected to the ram of hydraulic jack. to bring it down to its original position by using stiffness of spring coil .spring is made of steel and it is length for 15 cm.

### 4. WORKING

For Bending :- Firstly take a pipe and fit in the die holder. In the die holder screw is fitted for adjustment purpose of rod as fitted in die holder.

Hydraulic jack is connected to wiper motor and it connected to D.C supply when D.C supply is given to wiper motor, now motor start running and ram push in up word direction , where pulley is fitted at top.as the ram goes up word then rod also taken to top by the force of hydraulic jack and pipe get bend

By this we can bend the rod in V and L and shapes.

For Removing Bend: This Bend we have to change the die of instinct of Circular Die. We have to used Rectangular Die. In order to remove bend or pipe or removed the rod.

### 5. ADVANTAGES

- Safety device for emergency power off. When the electricity is failure, the hydraulic bending and bend removing machine can using by manual .
- It is a portable and simple construction
- The length of stroke can be varied even within small ranges.
- It is not occur in noise and vibration.
- Inertia losses are not more.
- Skilled personnel are not require.
- Maintenance cost is law

### 6. DISADVANTAGE

- It is require more time.
- Initial cost is more.
- Intensive care should be taken while working.

### 7. APPLICATION

- It is use in workshop
- It is very useful in all small scale industries.
- It is used in automobile industry.

### 8. CONCLUSIONS

This work has provided an excellent opportunity and experience to use limited knowledge. The Hydraulic Pipe Bending Machine is working with adequate condition. This Hydraulic Pipe Bending Machine is used for Bending and also Bend is removed by satisfactory condition.

Therefore in the Future, we can design and manufacture a large scale Hydraulic Bending Machine.

### ACKNOWLEDGEMENT

I take this opportunity to express my gratitude and indebtedness to my guide Mr. H. J. Gulhane, Assistant Professor, Mechanical Engineering department, who has

been constant source of guide and inspiration in preparing this paper.

I also thanks to Mr. Dhananjay Kopae helped me in completing this Paper work successfully.

I also thankful to Everyone who helped me to completing the paper work and those who have directly or indirectly helped for completion of this Report.

## REFERENCES

- [1] C. S. Park, A Research and Analysis about “*Development of Hydraulic Circuit System of Hydrostatic Tire Roller*” Master’s Thesis, Kookmin University, Seoul, Korea, 2001.
- [2] Mohan Krishna S.A “*Experimental design and fabrication of portable hydraulic pipe bending machine*” Vol.4, 12, PP, 2684, Issue December 2014. ISSN: 2230-9926
- [3] G. U. Asonye, “*Design And Fabrication Of A Remote Controlled System For A Hydraulic Jack*”, International Research Journal Of Engineering And Technology (Irjet) E-Issn: 2395-0056 Volume: 02 Issue: 07 | Oct-2015 Wwww.Irjet.Net P-Issn: 2395-0072.
- [4] Muchnik, “*Design And Fabrication Of A Remote Controlled System For A Hydraulic Jack*” International Research Journal Of Engineering And Technology (Irjet) E-Issn: 2395-0056 Volume: 02 Issue: 07 | Oct-2015 Wwww.Irjet.Net P-Issn: 2395-0072.
- [5] Neha gaikwad “*Automated tube bending machine*” IJSRD-vol. 4, Issue 04,2016 and ISSN 2321-0613.

## Textbooks:-

- [6] Dr. R. K. Bansal –“*Fluid mechanics and hydraulic machines*” page no. 36 & 37.

## Websites:-

- [7] <http://en.m.wikipedia.org/wiki/Rivet>.

## BIOGRAPHIES



### Mr. Harshad Khairkar

He was born in Daryapur, Maharashtra, India in 1994. He completed his Diploma with First Class Division in Mechanical Engineering in Government Polytechnic, Arvi and pursuing B.E Degree in Mechanical Engineering from Sant Gadge Baba Amravati University (SGBAU), Amravati, India, in 2014-2017.

### Mr. Dhananjay Kopre

He was born in 1995 in Zada, Maharashtra, India. Now he is pursuing B.E. in Mechanical Engineering from Sant Gadge Baba Amravati University (SGBAU), Amravati, India, in 2014-2017.



### Prof. Sarang Gulhane

He is Assistant Professor in DES'sCOET Dhamangao Railway, Maharashtra

