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Hydraulic Pipe Bending Machine

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***Abstract:** The process of pipe bending finds its importance in many industries, instruments, fluids transportation etc. The aim of this research is to design and fabricate a hydraulic jack-based pipe bending machine which has ability to bend pipes used at gas supply industry, while keeping in mind the requirements of a good pipe bending machine to provide high quality bends without defects but at the cost lesser than the existing pipe bending machines available in the marketplace. The fabricated pipe bending machine works on the principle of press bending method to perform the bending operation. The design of the proposed pipe bending machine is based on essential parameters of bending process such as radius and angle of the bend, diameter and thickness of the pipe. The single acting hydraulic jack of 16000 KG load capacity is used to apply the required pressing force to bend a circular pipe having the outer diameter ranging from ½ inch to 2 inches.*

I. INTRODUCTION

The key requirements of the bend and the material of the work piece undergoing the deformation determines the selection of bending processes and equipment to be used to fabricate a suitable pipe bending machine. There are various bending methods used each having different sets of advantages and disadvantages like bending of cold tubes using mechanical force or the bending performed for heated tubes. The most preferred methods are as follow:

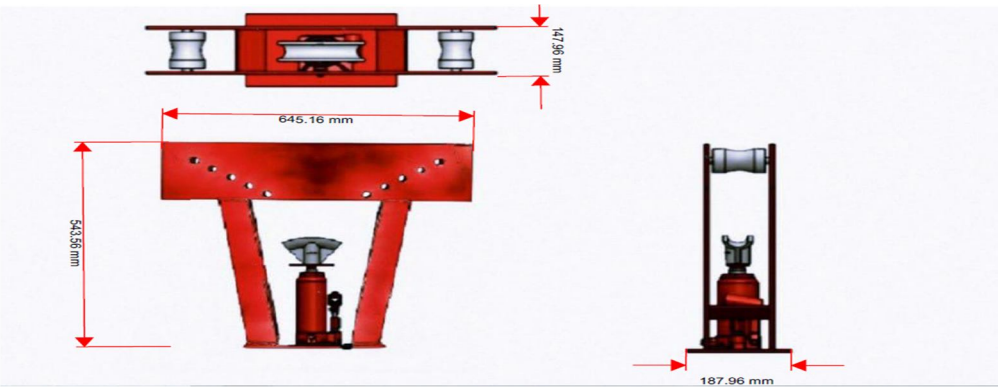
A. Press Bending

There are many methods available to choose from to bend a pipe but the one which is the simplest and cheapest for bending cold pipe and tube is Press Bending Methods. The work piece (pipe) is placed in position over the bend die after which the die presses the pipe to form a bend. Also, to ensure the stability during bend operation work piece can be restrained using bobbins. The press bending process sometimes produces defects such as ovality, wrinkling and wall thinning and thickening considering the material properties and physical characteristics of used work piece. Hence, this process of pipe bending can be used where the key requirement is not a consistent cross section of work piece

B. Basic Components Of Machine

HYDRAULIC BOTTLE JACK	BASE PLATE
LEFT HAND PILLAR	RIGHT HAND PILLAR
ROLLER	BOBBIN
HANDLE	RETURN SPRING

C. Sketch



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II. DESIGN

Design consists of application of scientific principles, technical information and imagination for development of new or improvised machine or mechanism to perform a specific function with maximum economy & efficiency.

It consists of two parts

A. System Design

In system design we mainly concentrated on the following parameters

1) System Selection Based on Physical Constraints
2) Arrangement of Various Components
3) Components of System
4) Man Machine Interaction
5) Chances of Failure
6) Servicing Facility
7) Scope of Future Improvement
8) Weight of Machine

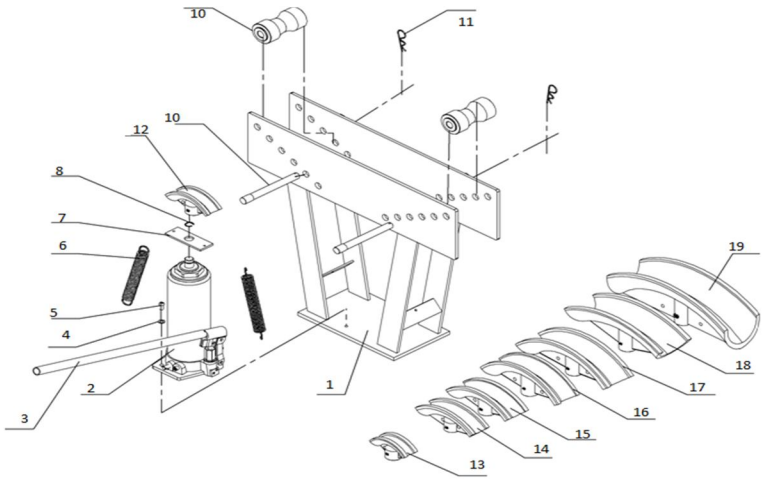
B. Mechanical Design

1) Design Parts

a) For design parts a detailed design is done & designation thus obtain are compared to the next highest dimension which is ready available in market
b) Parts To Be Purchased the parts to be purchased directly are selected from various catalogues & specification so that any body can purchase the same from the retail shop with the given specifications.

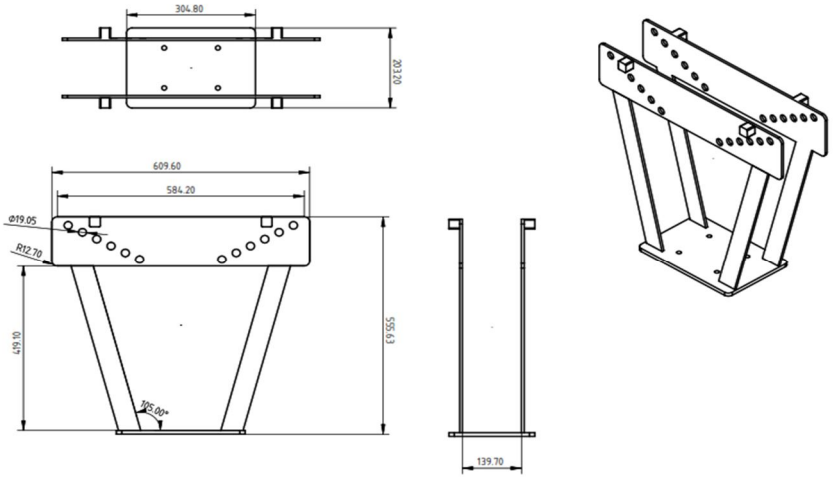
2) Parts Lists And Assembly Diagram

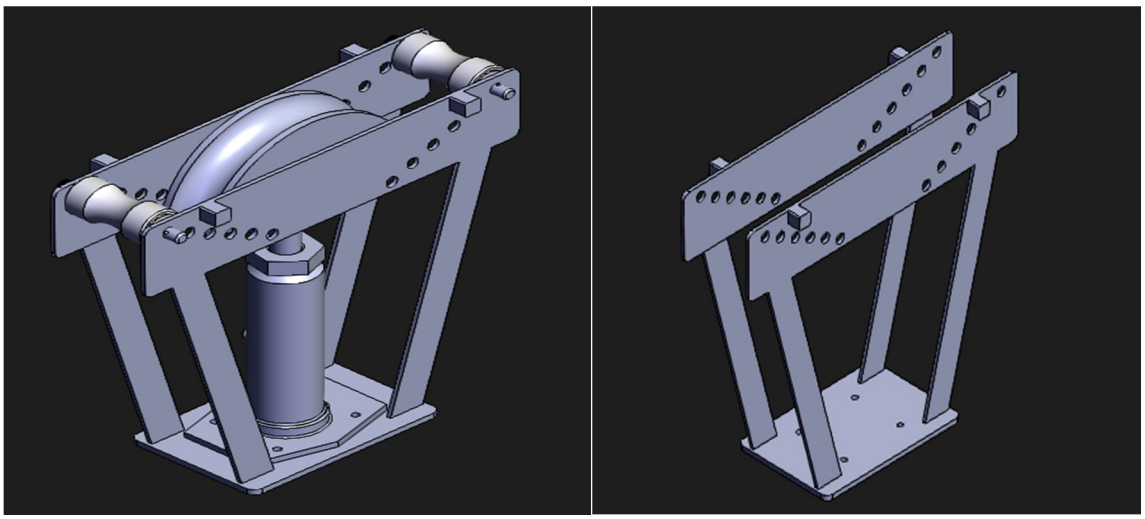
Part no	Description	QTY	Part no	Description	QTY
1	FRAME	1	9	COTTER PIN	2
2	RAM	1	10	ROLLER	2
3	RAM HANDLE	1	11	R-PIN	2
4	WAHSER	2	12	½” BENDIND DIE	1
5	BOLT	2	13	¾” BENDING DIE	1
6	SPRING	2	14	1” BENDING DIE	1
7	SPRING BASE	1	15	1.1/4” BENDING DIE	1
8	CIRCLIP	1	16	1.1/2” BENDING DIE	1

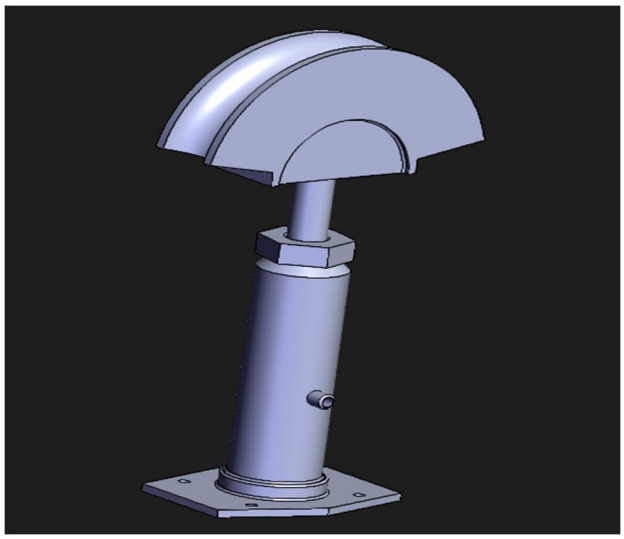


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3) Drawing & CAD MODEL

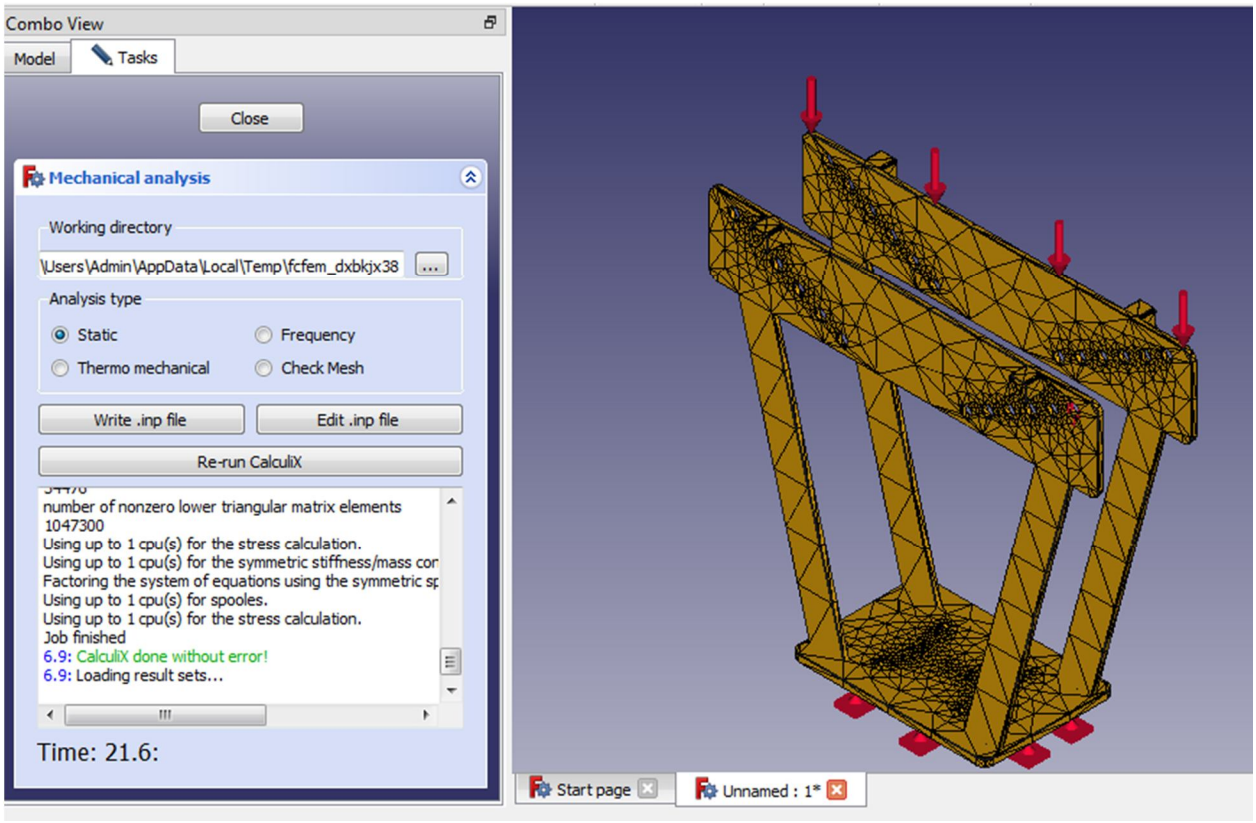


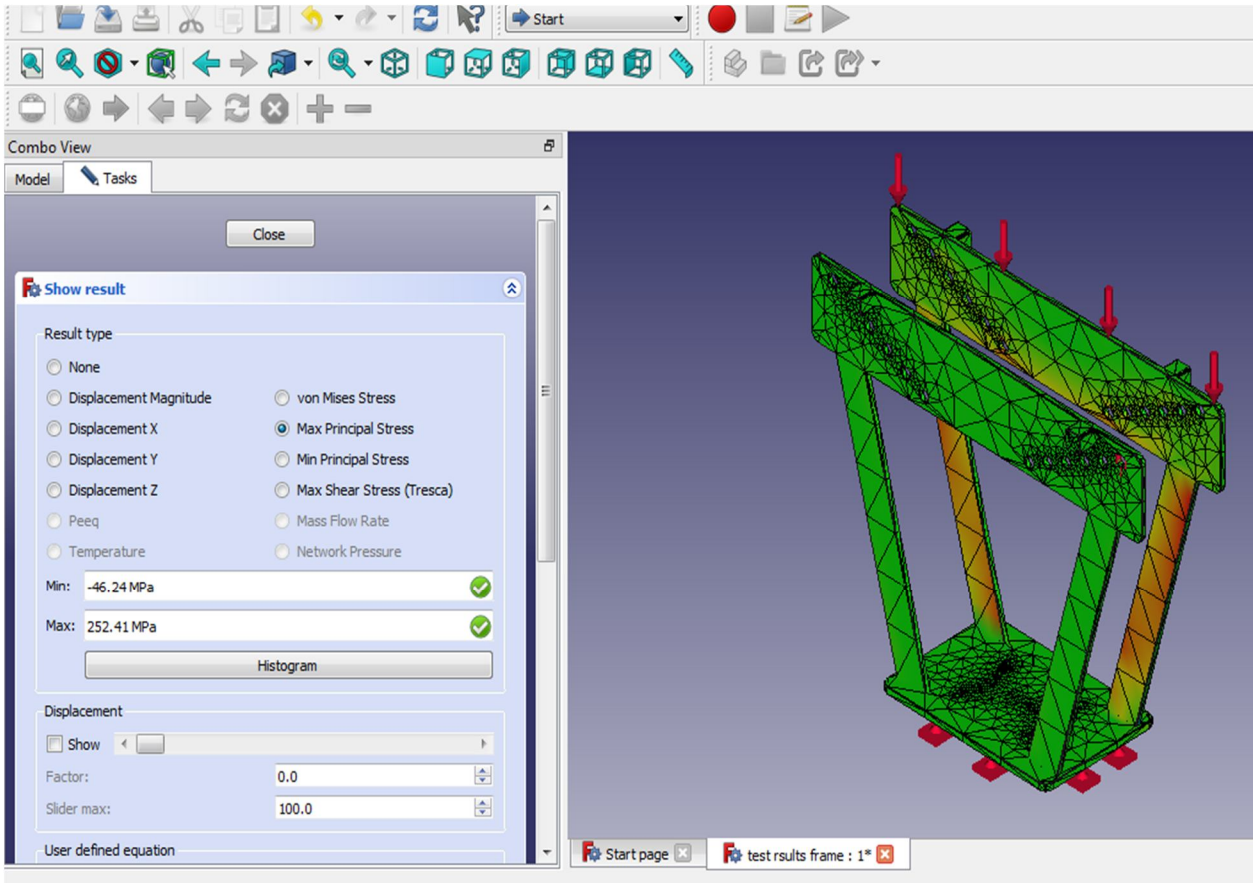




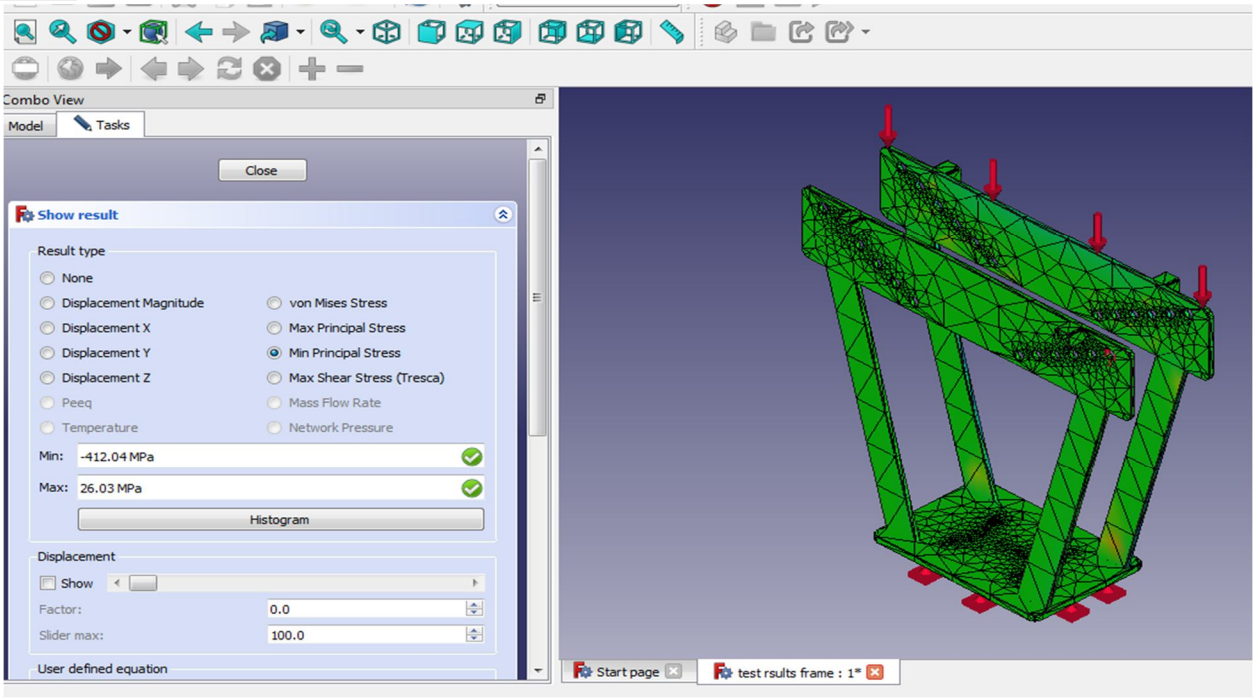
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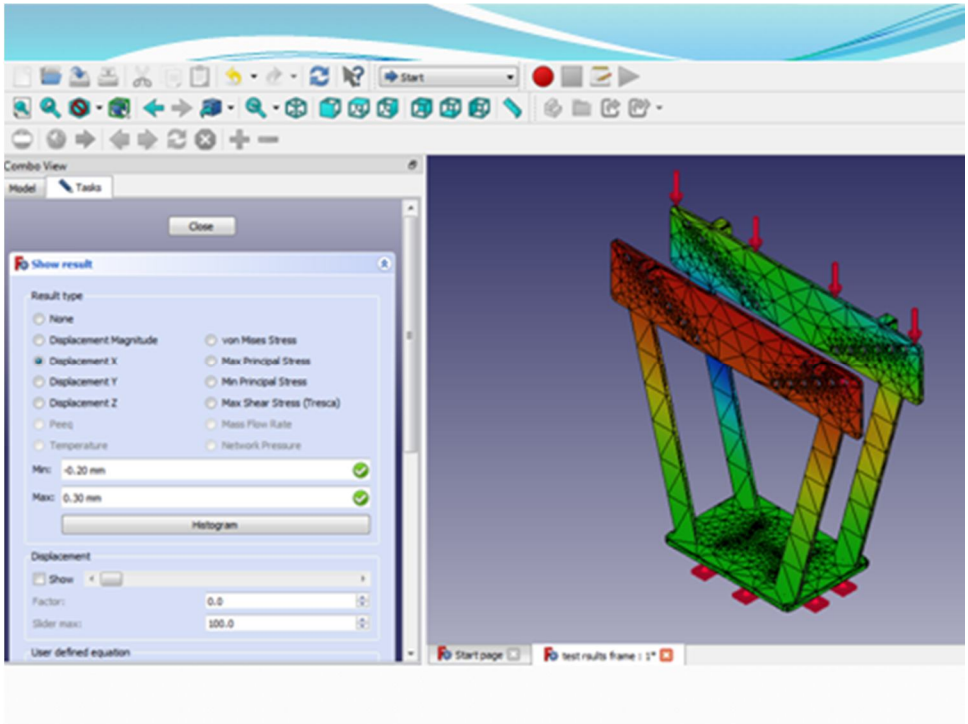
III. TESTING AND ANALYSIS





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IV. COST ESTIMATE

1) Labour Cost

Lathe, drilling, welding, grinding, power hacksaw, gas cutting cost

Total Labour Cost = 1500 RS

2) Material Cost

Jack , Steel Plate , Roller

Total Cost = 7000 RS

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3) Overghead Charges

The overhead charges are arrived by "manufacturing cost"
Manufacturing Cost= Material Cost + Labour Cost
8500 = 7000+1500
Overhead Charges = 20%of the manufacturing cost
= 1700 RS

4) Total Cost

Total cost = Material Cost +Labour Cost +Overhead Charges
10200 = = 7000+1500+1700

A. Advantages

1) Ease of operation
2) Hydraulic ram force reduces human effort in operation
3) No skill required unskilled operator can use easily
4) Compact size (small spaces used easily)
5) Low maintenance cost
6) Manufacturing cost is less

B. Disadvantages

1) Leakage of oil affects the working efficiency.
2) Operation is slow.
3) Limited pressure application

C. Other Applications

1) Automobile industry
2) Fabrication of piping rigs
3) Process equipment pining.
4) Furniture manufacture
5) Agriculture piping and poly-house erecting

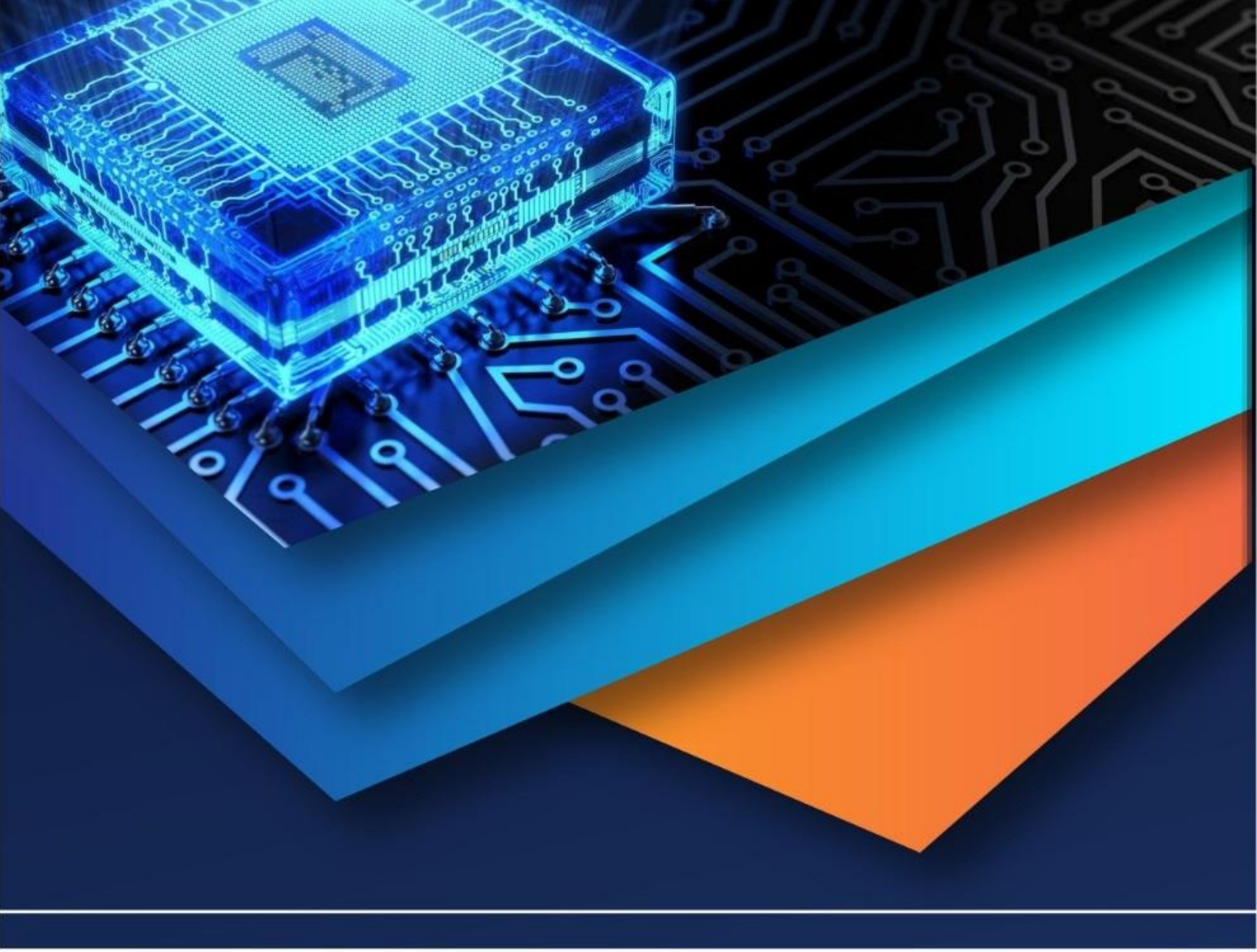
V. CONCLUSION

This project is made with pre planning, that it provides flexibility in operation. This innovation has made the more desirable and economical. This project "HYDRAULIC BENDING MACHINE" is designed with the hope that it is very much economical and help full to complete desirable output in less time and efforts.
This project helped us to know the periodic steps in completing a project work. Thus we have completed the project successfully.

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