Final Working of Rolling Pipe Bending Machine

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Abstract
The main purpose of the research paper is to explain the design and developed automatic pipe bending machine. It is used for Automobiles & Industrial. It's time consumption process. It reduces human effort and also required low less skill to operate this machine. We are designing automatic pipe bending machine with use of pulley, motor, gear& support (frame).

Keywords
Pulley, Motor, Gears, Sprocket, Big Screw, Shaft, C-panel

I. Introduction

The development of nation depends on the achievement in science & technology. So, innovate a machine which is easy to use and that cannot tolerate with their accuracy. Without affecting the prize of the machine . All over the world the resources of energy is reduced for that we can find new sources of energy. For that machine is both manually and power operated. In India, there is many industries which are engaged in production of manually pipe bending machine. Presently, the pipe bending machine is power and manually both operated. Therefore, our objective is to increase accuracy at low prize without affecting the pipe bending productivity.But, the manually operated pipe bending machine has less accuracy at high prize.

Bending data can be defined as:

- Degree of bend sometimes called "angle"
- Distance between bends sometimes called "length", "feed", "position"
- Plane of bend, sometimes called "twist", "rotation", "orientation"

YANG Hea,*, LI Henga, ZHANG Zhiyonga, ZHAN Meia, LIU Jinga, LI Guangjunb[1]. As one kind of key components with enormous quantities and diversities, the bent tube parts satisfy the increasing needs for lightweight and high-strength product from both materials and structure aspects. The bent tubes have been widely used in many high-end industries such as aviation, aerospace, shipbuilding, automobile, energy and health care. The tube bending has become one of the key manufacturing technologies for lightweight product forming. Via the analysis of bending characteristics and multiple defects, advances on exploring the common issues in tube bending are summarized regarding wrinkling instability at the intrados, wall thinning (cracking) at the extrados, springback phenomenon, cross-section deformation, forming limit and process/tooling design/ optimization. Some currently developed bending techniques are reviewed in terms of their advantages and limitations.Finally, in view of the urgent requirements of high-performance complex bent tube components with difficult-todeform and lightweight materials in aviation and aerospace fields, the development trends and corresponding challenges are presented for realizing the precise and high-efficiency tube bending deformation.

Hiroyuki GOTO*, Ken ICHIRYU, Hidenobu SAITO**, Yuu ISHIKURA**,and Yutaka TANAKA**[2].** This research presents a new flexible bending machine and its practical applications. The proposed machine uses a new method. When tubes are fed into the fixed and mobile dies, they are bent by shifting the relative position of the mobile die. The bending radius is controlled by the relative distance and orientation between the mobile die and the tube.
The bending angle is controlled by the length of the fed tube. This forming process has a big advantage. A change of the expected bending shape will need no change in the tooling system but only a new definition of the motion of the active die and the length of the fed tube. The active die movements are controlled by a 6-DOF Parallel Kinematics Mechanism (PKM) with hydraulic servo drive. Making use of the PKM serves not only to achieve a complete motion along six axes but also to obtain a high dynamic motion of the bending machine. Application examples show that the bending machine can be applied to designer's interiors, universal designed products, and automotive parts. Until now these processes have been difficult to achieve using a conventional bending machine.

H.A.Hussain[3]. A bicycle integrated pipe bending mechanism has been designed and developed. The machine consists of a chain drive, compound gear train, that is utilized for bending steel pipe of outside diameter 25mm and having 2mm thickness. The kinematic synthesis of bending mechanism is carried out. The dimensional analysis is done. Relation deduced predicts the performance of bicycle integrated pipe bending mechanism and all the parameter needs to be optimized to get the best performance of the machine. Bent pipes finds its application in frames for furniture, handle of bicycle, barricade etc. or as passage for carrying fluids or gases like hydraulic lines, fuel lines, exhaust pipes, water lines, etc. Industries using bent pipes are boiler, air conditioning, ship building, furniture, power generation, recreational vehicle, railroad, automotive, off-road and farm equipment, aircraft etc.

II. Detail Description

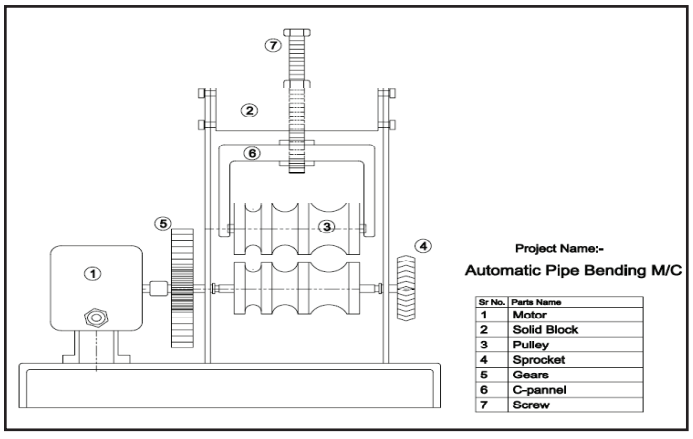

Fig. 1: The Detail Assembly of Pipe Bending Machine

The Fig. 1 itself signifies the labelling of various object used to make a component. List of the object labelled are:

- Motor
- Solid block
- Pulley
- Sprocket

- Gears
- C-Panel
- Screw

This are object are properly assembly so that finished part can be obtained and no wrinkle and wear. Accuracy and its material reliability makes the component highly precision.

III. Working of Pipe Bending Machine are as Follow:

3.1 Step: 1

This fig. 2 representThe current supply from the AC main supply, motor rotate small gear which connect with motor shaft. The small gear connect with big gear which run the pulley.

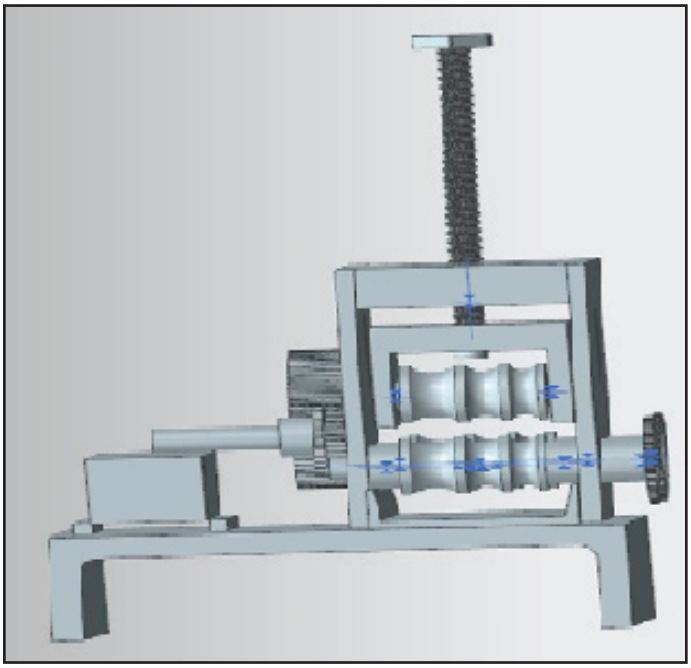

Fig. 2: Machine in Idle Condition

3.2 Step :2

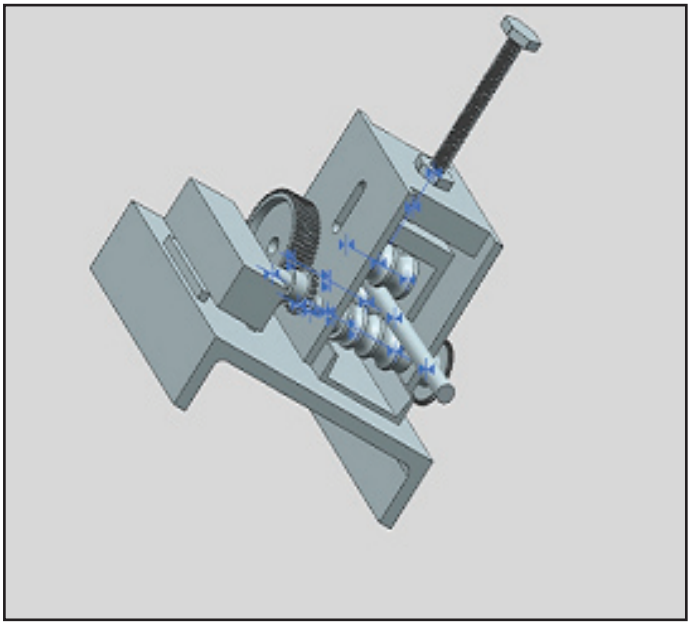

Fig. 2: Inserting of M.S. Steel Pipe

This fig. 3. Represents the simply inserting the pipe filled with sand(wet) between pulleys. Afterwards applying load on upper pulley which is connected with C-panel the help of screw.

3.3 Step: 3

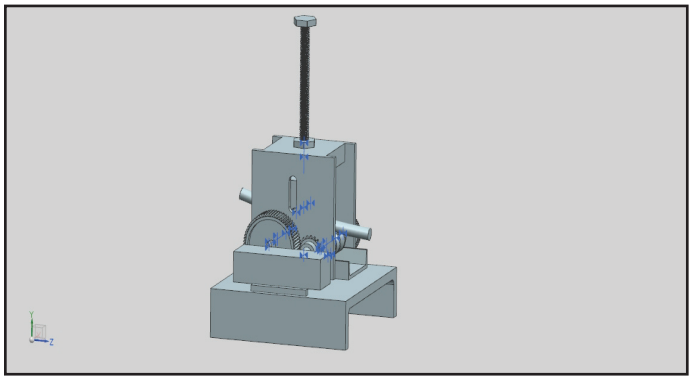

Fig. 3: Appling Load on Pulley

As much we applying load on pipe so, pipe will start bending without wrinkling. Due to using sprocket it distribute equal load on both lower pulleys.

3.4 Step: 4

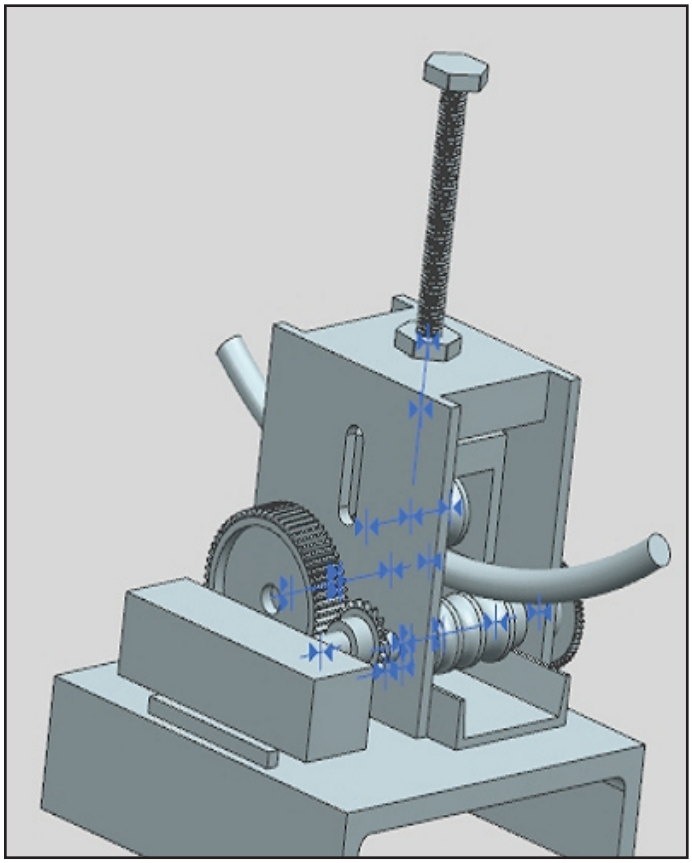

Fig. 5: Applying more load

As we applying more load on upper pulley with the help of big screw, so pipe will bend more than previous step. While using forward reward switch pipe will bend at particular distance. So the bending process take approximately 3 to 4 minute.

IV. Conclusion

The Current machine design has the followingfeatures:-

A. Accuracy of Operations

This pipe design provides the precise location of the work piece, thereby increasing the accuracy of the operations Provisions are also made so as to reduce the Vibrations and eliminate damage to the work piece. Via the analysis of bending characteristics

and multiple defects, advances on exploring the common issues in tube bending are summarized regarding wrinkling instability at the intrados, wall thinning (cracking) at the extrados, spring back phenomenon, cross-section deformation, forming limit and process/tooling design/optimization.

B. Cost & Strength

The material used for the components of the machine is mild steel, which is of considerable strength as well as of low cost.

V. Acknowledgement

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