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Design and Analysis of M.S Roller in Sheet Metal Rolling Machine

Pramod Vishwakarma[1], Vaibhav Bankar[2]
M Tech Student, Department of Mechanical Engineeering ,VIT ,Nagpur.
Assist.Prof, Department of Mechanical Engineeering, VIT Nagpur.
pramodvishwakarma201@gmail.com

vhbankar@gmail.com

Abstract-Sheet metal rolling machine is a process of turning the flat sheet metal of appropriate length into a desired curvature as the manufacturer wants or into a complete hollow cylinder.This metal rolling machine is used largely in industry of pharmaceutical machine manufacturing company.Rolling machine has an application in manufacturing of heat exchanger , pressure vessel,octagonal blender etc.The metal sheet is feed continuously between upper lower and two lower roller.The lower roller revolve freely in the circular hole at the both support end.The upper roller is a adjustable roller which slide upward and downward direction normal to the roller. In this project, the objective is to analyse the contact stress analysis on the end support of the rolling machine and the lifting force on handle of the rolling machine which result in slip due to the crushing stress.

Keyword - Contact stress, Crushing stress ,Metal Rolling,Support end, Improved Strength,Reduce maintenance cost.

1. INTRODUCTION

Three roller sheet metal rolling machine is a process of converting metal sheet of varying thickness into curve sheet at required circumference or into complete hollow cylinder at required radius. The factors on which the sheet metal rolling machine is designed includes maximum thickness of sheet to be used ,minimum and maximum diameter of hollow sheet cylinder which the company want from rolling machine,

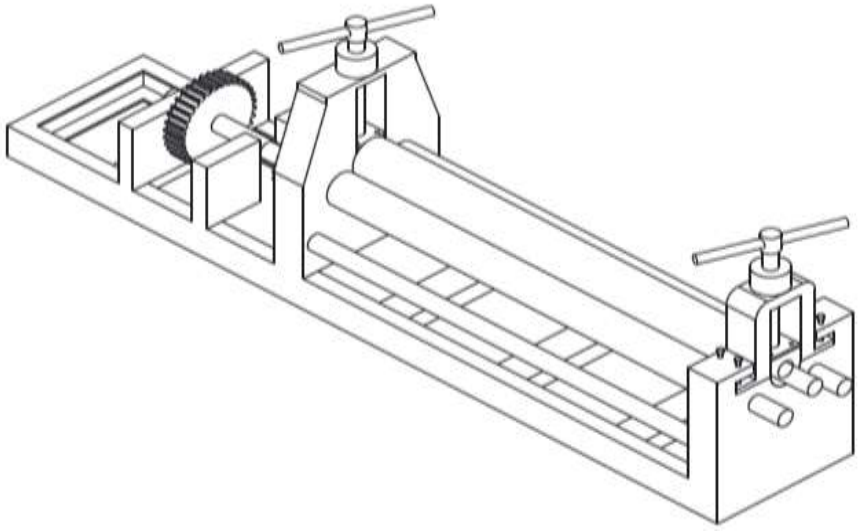
The sheet metal rolling machine include several component:-

Base- The base on the sheet metal rolling machine is formed by used standard channel of 80X100 on which the entire weight of the metal rolling machine is acted.

Roller:-The metal rolling machine has two lower roller and one upper roller between which the sheet metal is feeded.The material of the roller used in mild steel

Support end:-The rolling has two a support end on both side of the roller.One support has a single complete assembly and the other end can be splited into two.The upper half support end can be removed completely so that the after the end of metal rolling process the hollow cylindrical sheet can be removed.The material of the support end is mild steel.

Manually operated handle:- The handle of the roller carries the upper roller such that its can be moved up and down normal to the roller so that sheet feeding between upper and lower lower roller can be done.V- threaded handle is used.



when the metal sheet is feed into the roller this causes vertical upward force acting on upward roller. This load causes a crushing stress in the teeth of the v-threaded handle. The upper and lower rollers have a support at both the ends, when the sheet passes between the rollers the support of rollers causes a frictional wear. Wear in friction material result in eccentric motion of in rolling shaft. The more the wear, the lead to dissatisfaction and disturbance in the company manufacturing process who need to send the machine for maintenance.

2. LITERATURE REVIEW

Ahmed Ktari:-In his paper he has done Modeling and computation of the three-roller bending process of steel sheets.This experiment consists of two-dimensional finite element model of this process was built under the Abaqus /Explicit environment based on the solution of several key techniques, such as contact boundary condition treatment,material property definition, meshing technique, and so on.

Jong GyeShin:-In their paper he has done the experiment on Mechanics-Based Determination of the Center Roller Displacement in Three-Roll Bending for Smoothly Curved Rectangular Plates. The objective of this paper is to develop a logical procedure to determine the center roller displacement, in the three-roll bending process, which is required in the fabrication of curved rectangular plates with a desired curvature.

M K Chudasama:-In their paper he has done the experiment on Analytical Model for Prediction of Force during 3-RollerMulti-pass Conica Bending. In this paper, the total deflection of the top roller required is divided in steps to get the multi pass bending

M. B. Bassett, and W. Johnson :-In their paper**,** The bending of plate using a three rollpyramid type plate bending machine, J. strain Analysis Processmanual, maintenance manual, machine capacity chart and technical specification of rollingmachine, M/s Larsen& Toubro ltd,Hazira, Surat, India.

Dr. C. C. Handaet. al :-This paper gives a review and Discussed about the productivity analysis of manually and power operated sheet bending machine considering time required to complete one pipe, total expenditure required to manufacture one pipe, number of operators and labors required during both operations, etc. Limitations of the manually operated sheet bending process over power operated sheet bending machine is also discussed.

P.G. Mehar:- In his M. Tech Thesis studied the manually operated and power operated sheet bending machine. Experimentations were conducted on sheet in order to measure actual no. of passes, time required to complete bending process etc. Also, productivity of sheet bending process is analyzed in depth. Design of various components of power operated sheet bending machine considering various theories of failure in elastic region and values for bending force, power required, spring back radius etc. for different diameters, thicknesses and width of sheet metal has been determined.

3. IDENTIFIED GAPS IN THE LITERATURE

Normal practice of the roller bending still heavily depends upon the experience and skill of the operator, so the aim of this project, the objective is to analyses the frictional wear on the end support of the roller and the lifting force on handle of the rolling machine which result in slip due to bending force.

4. PROBLEM FORMULATION

- To study & simulate the frictional wear on the support of rolling shaft and thread of handle.
- To compare static contact stress on various conditions.
- To suggest the new material and change of thread design to overcome existing problem.
- Fabrication of the change in design with minimum costing.

5. CONCLUSION

The new change in the design will reduce the crushing stress in the handle of the rolling machine on which the upper roller is mounted .The addition in the change of material will reduce the contact stress in the support end where the roller rolls which result in frictional wear.Thus,the rolling machine will have a less maintenance which will directly in reduce the maintenance cost.

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