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Bar Feeding Mechanism Using Automation

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Abstract:- In the past few decades. We have seen various automation techniques being introduced in manufacturing field so that the overall productivity of the industry increases. To achieve this we must have to develop or modify the existing system. In today's world of modernization, machines play a vital role in various industries and replaced labor needs. With the increased development in technology, industries are decreasing the manual work dependency. India is very well recognized for manufacturing of leading material handling equipments and industrial machinery. Therefore modernization of new technology and automation in the process of polishing machinery are also required. Therefore in this project we are going to develop a bar feeding mechanism for a polishing machine in order to increase the productivity & reduce the human efforts.

Keywords—component; Automatic bar,feeding of mechanism,Solidworks,Ansys.

I. INTRODUCTION

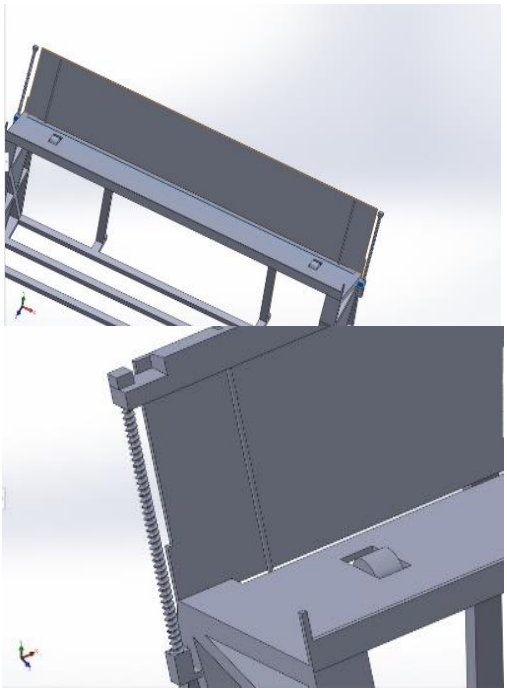
In Today's world, many industries are depending on automation which means manual efforts are replaced by means of some power in all aspects. The working operations are still an essential part of the system even with changing demands of physical inputs as the mechanization degrees are increased.

There are two types of degrees of automation. They are:
1. Full Automation
2. Semi Automation

Semi Automation is a combination of both manual powers as well as mechanical Power. But in Full Automation the human efforts are quite negligible. We all know that Mechanical Engineering field is meaningless without the production and manufacturing activities. Converting raw materials as inputs into final finished products as per the required specifications and dimensions by making use of modern technologies is called as production and manufacturing in Mechanical Engineering. The primary concern of our system is to carry out 3 operations i.e., Feeding, Clamping and Finishing. These operations must be carried out in a sequenced and précised manner The major work of our system is to carry out polishing activities of large number of jobs which are in the form of Rods in Batch Production manner. The rods which have to be worked on the polishing machine are made up of Mild Steel. With the help of this automated system the time required for finishing the surface of the rods will be less and the finishing accuracy is also increased the labors required for handling the system need not be skilled. Even semi-skilled labors can handle the work easily. We are making use of pneumatic sources to get an Auto Feed Mechanism to perform the machining operations.

II. DESIGN

The machine is designed using Solid works 2018 according to the specifications.



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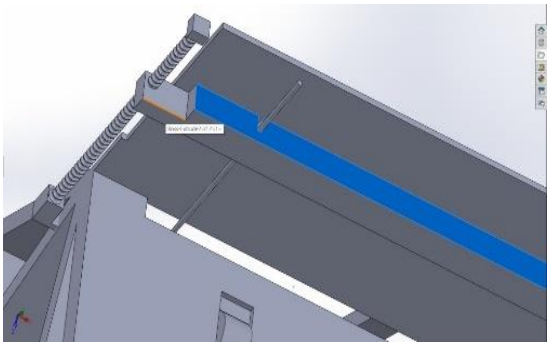

Fig 1: Solidworks Design of Feeding Machine

A. Ansys Analysis Reports

a)Maximum Principal Stress

For the Analysis of the design a Uniform Compressive load of 10KN was applied on the flat surface

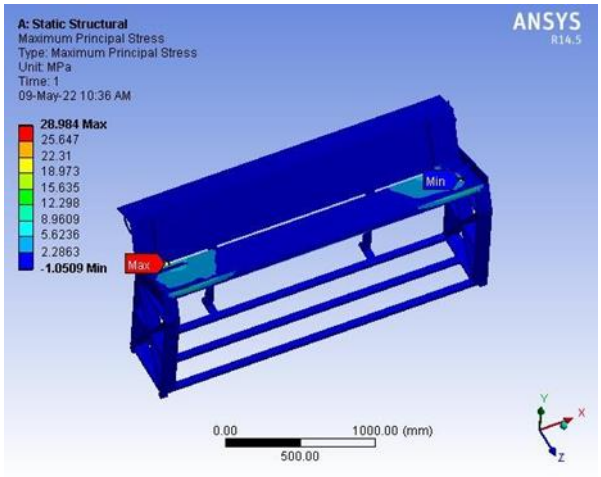

Fig 2: Maximum Principal Stress

b)Minimum Principal Strain

Results showing the Minimum Principal Strain

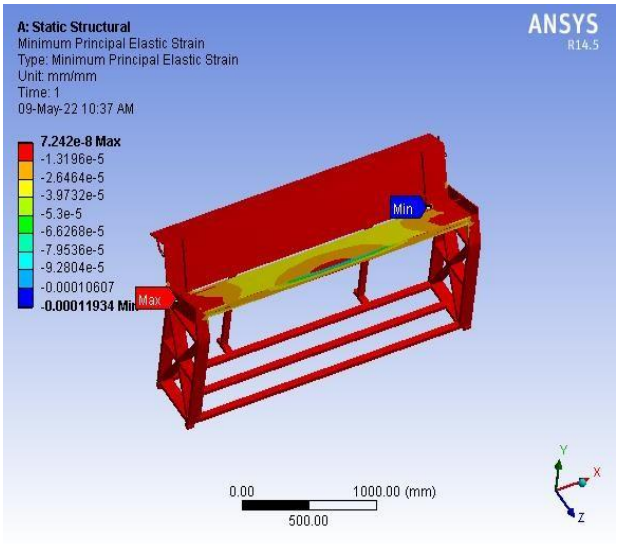

Fig 3: Minimum Principal Strain

c) Von-Mises Stress

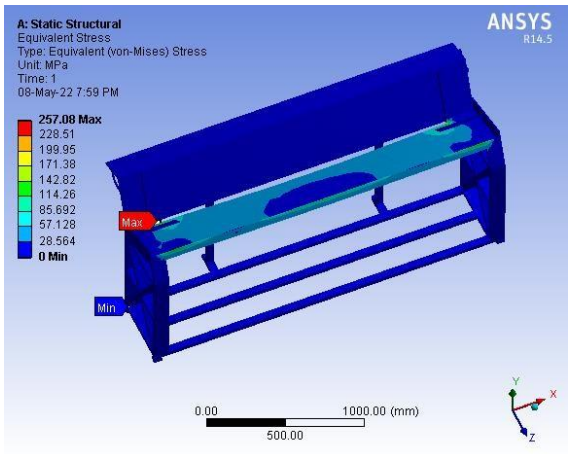

Fig 4: Von -Mises Stress

d) Von-Mises Strain

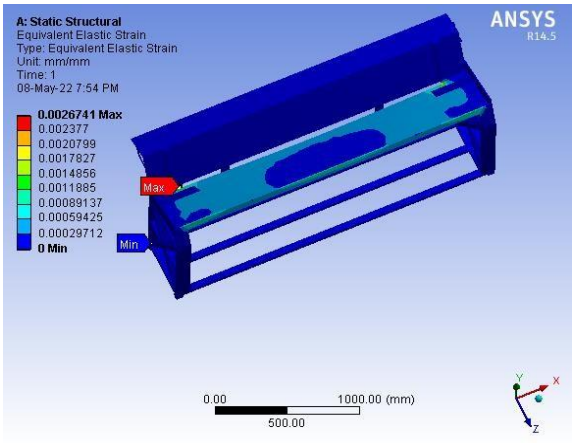

Fig 5: Von-Mises Strain

e) Total Deformation

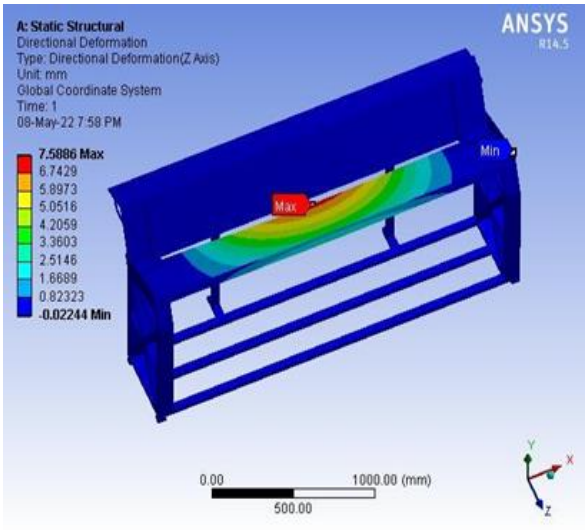

Fig 6: Total Deformation

f) Fracture Point

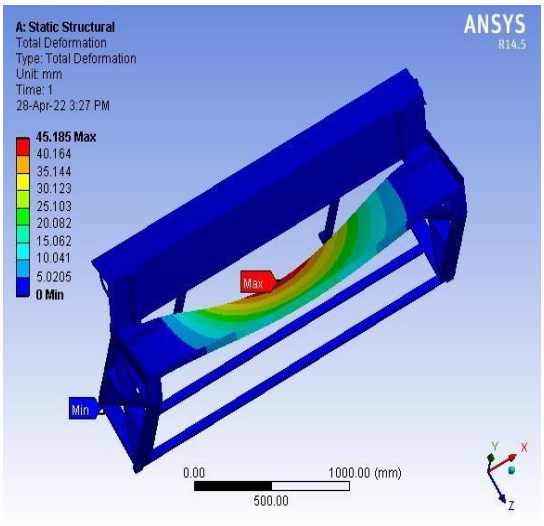

Fig 7:Fracture Point

The above results shows that the structure can withstand a load of maximum of 4000N i.e. 40KN. After this load the body starts deforming in a large proportion and hence can cause fracture.

B.Components

MS sheets (10 m thickness)
3mm MS hollow tube.
Nema 23 stepper motor.
Threaded rods (500mm) X2.
Soft iron rods (500mm) X2.
Ball screw nut (10mm ID).
Linear bearing (16mm ID).

C.Working Principle

Rods of diameter 2.5-5mm and length 1.79-2.4m are placed on an angular bed (base plate). Due to inclination, the rods roll towards the lifting slider frame. Vertical soft rods (threaded surface) are placed at either end of the auto feeder.

The linear lifting mechanism consists of pair of smooth and threaded rods. This linear mechanism is controlled with the help of NEMA stepper motors. The stepper motors are rated at a load of 10kg/cm with a speed of up to 60-2500rpm with 1.8°per step which gives the maximum accuracy.Rods of diameter 2.5-5mm and length 1.79-2.4 m are placed on a angular bed (base plate). Due to inclination, the rods roll towards the lifting slider frame. Vertical soft rods (threaded surface) are placed at either end of the auto feeder. The linear lifting mechanism consists of pair of smooth and threaded rods. This linear mechanism is controlled with the help of NEMA stepper motors.

After lifting mechanism of bars , these bars are rolled down to a v notch ,where the base of the v notch consists of rubber coated rotating rollers.

Due to the rotation of rollers the bars move in horizontal forward direction where the grinding machine is present.

III. ADVANTAGES

Reduces Machine Lead Time.
Minimum Labour requirements.
Increases the productivity of the industry.
To reduce the material handling.

IV. CONCLUSION

From the Ansys report it was observed that structure made of cast iron has higher intensity of stress induced, less bending and less deformation for high loads applied. There are some machines which have been already designed, but we have introduced some new components and we also have different design which increases the efficiency of the process.

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REFERENCES

[1]. P.B.Patole, N.V.Gawde, March 2018 "Automatic bar feeding and cutting machine", International journal of advanced Research in Science and Engineering, ISSN: 2311-8354 Volume No. 7 Issue-01.
[2]. Shital K Sharma., Waghmare, Ashish V., Wakhare, Pranit S., 2016, “Automatic Bar Feeding Mechanism for Pipe Cutting Machine”, 5th International Conference on Recent Trends in Engineering, Science and Management, Parvatibai Genba Moze College of Engineering, Wagholi, Pune, Maharashtra, India.
[3]. Design and Fabrication of Automated Hacksaw Machine by D.V.Sabariananda, V.Siddhartha, B.SushilKrishnana , T.Mohanraj, Second National Conference on Trends in Automotive Parts Systems and Applications (TAPSA-2014).

[4]. "Automatic stock bar feed mechanism for automatic screw machine", Petent No. US 2300457 A by MARIOTTE, Filed Sept. 24, 1940 2 Sheets-Sheet
[5]. Patented Nov. 3, 1942 UNITED STATESPATENT OFFICE AUTOMATIC STOCK BAR FEED MECHANISM FOR. AUTOMATIC SCREW MACHINES.
[6]. .R.S.Khurmi and J.K.Gupta, A Textbook of Machine Design, Euresia Publishing House (Pvt.) Ltd., pp.474-518, 2005.
[7]. Rushikesh Gadale, Mahendra Pisal, Sanchit Tayade, S.V. Kulkarni, March 2015 "PLC based automatic cutting machine" International journal of Engineering and technical Research ISSN: 2321-0869, Volume No. 3, Issue-3,.Pp.400-470.
[8]. Jadhav, N.A., Shinde, Shubham, Thorwat, Pradip, 2017, "Automatic Bar Feeding Mechanism for Power Hacksaw Machine", International Journal of Advanced Technology in Engineering and Science, 05(02), pg. 397-402.
[9]. Huang Xiaoqin. Huang Jiexian. Research on key technology of stepper Motor Driver [J]. Microcontroller & Embedded Systems Applications, 2008 (06).
[10]. Ding Weixiong, Yang Dingan, Song Xiaoguang. Progressing principle of stepper motor and its realization based on single chip micro-computer [J]. Coal Mine Machinery, 2011 (03).
[11]. Design and fabrication of automatic pvc pipe feed and cutting machine BY Mohan M, Sathish M, Dept of Mechanical Engineering, Bannari AmmanInstitute of Technology, Tamilnadu,India Publication International Research Journal of Engineering and Technology (IRJET) Volume: 06 Issue: 03, Mar 2019.
[12]. Analysis on thin sheet metal feeding characteristic by a servo roll feeder By Mohamad zulhisyam, Bin mohd razmi Universiti Malaysia Pahang. June 2013.
[13]. Rahul R. Gurpude, Study of mechanism used for automating the mechanical system, International Journal of Engineering Trends and Technology (IJETT) – Volume 26 Number 2- August 2015, ISSN: 2231-5381.
[14]. A.O. Hannure, Literature Review on Automatic Seed Feeder, International Journal of Engineering Trends and Technology (IJETT) – Volume 36 Number 7- June 2016.
[15]. Choudhary, S.K. Hajra, Choudhary, A.K. Hajra, 2010, Elements of Workshop Technology, M. P. Publications, India.
[16]. Artralarasan , Pravin Joseph Rajkumar.S , Sivanesh.M , Selva Arasan.D"DESIGN AND DEVELOPMENT OF AUTOMATIC BAR FEEDING MECHANISM".