

Study of Flexible Lift Mechanism for Press Shop

Mr. Sarang Khedkar¹, Prof. B. D. Deshmukh², Prof. G. V. Thakre³,
Mr. Y. V. Mahantare

¹(Department of Production Engg, Y. C. C. E, Nagpur/ RTMNU, Nagpur, India)

²(Department of Production Engg, Y. C. C. E, Nagpur/ RTMNU, Nagpur, India)

ABSTRACT: The industrial sector is one of the important sectors of the Indian economy. The Small Scale Industries (SSI) sector is one of the most vital sectors of the Indian Economy in terms of employment generation, the strong entrepreneurial base it helps to create and its share in production.

The study offers in SSI the press shop, hands-on approach to workplace where material handling table can work effectively considering the space constraint, time constraints, and availability of workers and different postures of workers. It includes the considerations for effective working of the material handling table, layout of the plant with different sections where different operations are performed. Discusses the different stations of press shop where different process such as handling of raw material, cutting of raw material to finished components. Analyses the different problems related to handling of table with their solutions that shows the limitations of presently available material handling table and with objectives. It illustrates the observations carried out for a week showing the loss of time and money. Stimulates new thinking about problems brought about by technological advancements.

Keywords: Down time, Layout, Lifting Mechanism, Machine, Material handling, productivity.

I. INTRODUCTION

Economic development of any nation is totally depends on industries. Industries play an important role in the Indian Economy. A growing industrial sector is crucial to greater economic development and takes in a number of areas as a country develops. Small-scale sector comprises predominantly manufacturing activities. The Small Scale Industries (SSI) sector is one of the most vital sectors of the Indian Economy in terms of employment generation, entrepreneurial base and to increase the production.

II. SELECTIONS OF INDUSTRY

Among all types of industries we selected M/S Asha Industries as it is a small scale industry related with the agriculture equipment which full fills the need of farmers and rural areas.

2.1 M/S ASHA INDUSTRIES PVT. LTD- The products manufactured at Asha Industry are Two-farrow plough, Three-farrow plough, Four-farrow plough, Land Leveler, Medium Duty Cultivator, and Thresher.

2.1.1 PLANT LAYOUT- Plant layout is a systematic and functional arrangement of different departments, machines, equipment, tool and services in an industry to achieve the most efficient utilization of men, machines and materials.

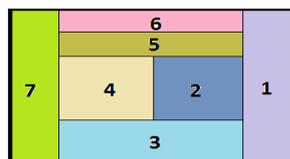


Fig.1 Plant layout

1. Raw material storage section 2. Press shop. 3. Gas profile machine section 4. Drilling machine section 5. Welding and assembly section 6. Painting shop 7.Scrap

2.1.2 PRESS SHOP- The Press shop at a glance

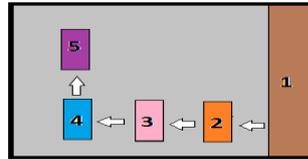


Fig. 2 Press shop

1. Raw Material Storage Section. 2. Material Handling Table. 3. Shearing Machine 4. Finish Product.
5. Bending section

1. Raw Material Storage Section - Raw materials of different sizes are stored in storage section are:

- M.S flat plate, Length: 15 ft Thickness:3mm,4mm,5mm,6mm,8mm,12mm Width: 0.5", 1", 1.5", 2", 4" & 6"
- M.S Round bar size Length: 20 ft. & 30mm diameter
- Angle sizes Length: 18ft. Thickness: 4mm, 6mm Width: 40×40and 30×30

2. Material Handling Table - Material handling table supports the raw material by rolling over it and which can be adjusted vertically as per the requirement of dies which helps to feed the raw material inside shearing machines. Material handling table height is adjusted manually and usually 4 workers are required for it.

3. Shearing Machine - After the raw material placed on table it is feed inside the dies of shearing machine to cut the material in a required length and dies of shearing machine are available in three steps to cut the round bar, flat plate, angle into required length for this operation 2 workers are required.

4. Finish Product - After the shearing operation we get the material in required length. These materials are transfer for further operations in to the different section.

- M.S Flat plate-lengths: 6'', 8'', 10'' & 1ft.
- M.S Round bar-length: 6''.
- Angle length: 5'', 7'', 9'' & 12''.

5. Bending section -The finish products obtained from shearing machine is to be check for alignment and it is to be done on bending machine

2.1.3 VARIATION IN PRODUCTS- As different products are manufactured, they required cut pieces of different sizes of the angle, round bar and flat plate. Raw material are cut into pieces as per the requirement of different section in the layout At what movement which raw material they required, for assembly and different machining process depends on the pieces of raw material which is to be cut on shearing machine. That creates variation in product.

2.2 PROBLEM IDENTIFICATION- Due to the variation in process that causes the problem such as time loss during table adjustment, cutting dies position, Handling of heavy load of table, Uncomfortable posture, Fatigue developed in workers during heavy material handling.



Fig- 3 Cut sees of table

2.3 OBJECTIVES- The objective is to configure all the problems by Developing Flexible Lift Mechanism for Press shop reduces the time loss for changing the height table, Reduce fatigue in workers, increased the production rate, Reduced chances of accident, Reduce the Repeatedly performing tasks downtime to increase the Productivity of Press Machine ultimately to increase the production of organization.

III. LITERATURE REVIEW

Many researchers directly or indirectly have contributed to the area of identified problem. Their work done has been critically studied in literature review and categorizes as down time, Ergonomics, Plant layout, Lifting mechanism, Productivity

Svante Bjorklund, Lennart Ljung (2009) has explained the promising method for estimation of the time-delay in continuous-time linear dynamical systems uses the phase of the all-pass part of a discrete-time model of the system.

Ergonomics is the scientific study of the relationship among the man, the machine and the environment in which he works. According to G.A. Mirka et al. / International Journal of Industrial Ergonomics (2002) The research and design team employed an iterative prototyping process, wherein each ergonomic intervention prototype was subjectively evaluated in the lab by the research team and in the field by furniture workers and the results of these assessments were used to improve on the design of the intervention. Haw S. Jung (2005), he has explained that the study was conducted to develop a prototype of an adjustable table and an adjustable chair for educational institutions, to evaluate its adoptability in accordance with international standards, and to validate the prototype chair by conducting subjective trials. BinShu, ChangshengXu, Dingfang Cheng (2008) in the traditional design process, the design method no effective dynamic technique. It also offers of port machines mainly adopts the static design and has certain value for reference for the dynamic. XiaoliangZheng, Zhongjin Li, Zhengyan Zhang, Taotao Li, Dingfang Chen(2010)-has introduces the way to optimize the rocker-slider mechanism for lifting plat form based on genetic algorithm of excessive objects, aimed at the minimum compression height, the maximum lifting height and the largest cylinder' s axial force. And combined with MATLAB's graph management and interface development function, he has produced a motion simulation for the rocker-slider mechanism for lifting platform.

Productivity is the efficiency in production. V.K. Menon has told that Productivity is the development of an attitude of mind and a constant urge to find better, cheaper, quicker and safe ways of doing a job which may be manufacturing an article or providing a service. Productivity is the balance between all the factors of production that will give the greatest output for smallest efforts.

IV. EXPERIMENTATION/OBSERVATIONS

V. Study to determine the loss due to the problem identified for a weak is summarized in the table. From the observation we calculate the loss in terms of wages and cutting pieces of the component.

Days	Total number of pieces	Actual time (min)	Time loss (min)
1	270	295	125
2	310	340	80
3	279	305	115
4	297	325	95
5	310	340	80
6	279	305	115
Total	1745	1910	610
Average	291	318	102

VI. Table 1- Average loss in pieces and time

Table calculation specifies that firm is investing extra Rs 38700 for the three workers due to the height adjustment of table.

VII. DESIGN & MODELING OF EXISTING LIFTING TABLE

In case of existing work table when the workers are required to adjust the height of work table, they used to call the workers from other workstations to adjust the height of table according to dies position. This method used to disturb the working of other work stations as those workers are engaged in adjustment of table. After the adjustment the row material is brought at work table from raw material storage and kept on table. That

raw material is fed to the shearing machine and pieces are cut that are stored in store bins. Then these finish component are sent to different sections. Weight of table is nearly 78 kg.

Parts of table are Horizontal stripes, Vertical strips, Roller Bars, Nuts& Bolts assembly.

The model of the table is made with the help of Pro-E software.

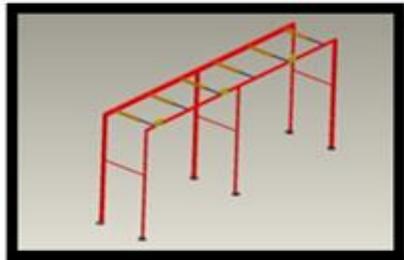
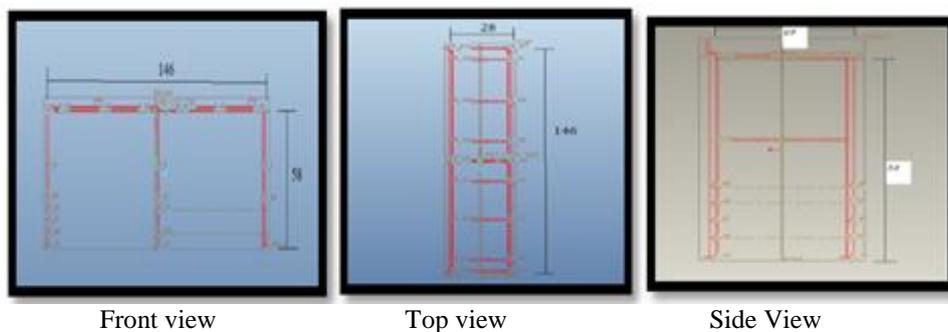


Fig 4 - 3D model of an Existing table.



Front view

Top view

Side View

Fig.19 Model of table (All dimensions are in inches)

VIII. CONCLUSION

Study of project in Industries in press shop carried out where we found that there is certain time and other losses occurring in the functioning of work table and its adjustment it creates the different problems in the process. So study deals with the modification of existing work table to overcome the losses to increase the production rate.

The way, this study gives the overall concept for reduction of losses occurring in the industry to improve the productivity of the industry. The design and modeling of the modified lifting mechanism will be dealing to overcome the existing problem with the help of advancement in the software.

REFERENCES

- [1]. SvanteBjorklund, LennartLjung (2009) an improved phase method for time-delay estimation journal homepage: www.elsevier.com/locate/automatica.
- [2]. S .K. Garg (2009), workshop technology pp. 1-12.
- [3]. G.A. Mirka et al. (2002) Ergonomic interventions for the furniture manufacturing industry. Part-I lift assist devices. International Journal of Industrial Ergonomics 29 (2002) pp 263-273.
- [4]. Hwa S. Jung (2005) A prototype of an adjustable table and adjustable chair for school International Journal of Industrial Ergonomics 35 (2005) pp 955-969.
- [5]. Taho Yang a, Brett A. Peters b, MinganTu (2005) Layout design for flexible manufacturing systems considering single-loop directional flow patternsEuropean Journal of Operational Research 164 (2005) PP 440-455.
- [6]. Bin Shu, ChangshengXu, Dingfang Cheng (2008) Design of the Lifting Mechanism with Virtual Prototyping Technology (2008) pp 384-387.
- [7]. Shubo Xu, Jie Liu, Keke Sun, Peng Liu, Yuanbin Zhang (2010) Study on Modeling Simulation of Long-span Gantry NC Machining CenterStructure,International Conference on Digital Manufacturing & Automation (2010).