International Journal of Innovative Research in Engineering
Volume 4, Issue 2 (March-April 2023), PP: 492-495.
www.theijire.com ***ISSN No: 2582-8746***

Design and Fabrication of Automatic Wall Rendering Machine

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How to cite this paper:
Abhijay Srivastava[1], Deepak Prakash Gupta[2], Supreem Singh[3], Shriya Tripathi[4], Ravi Pratap Singh[5], "Design and Fabrication of Automatic Wall Rendering Machine", IJIRE-V4I02-492-495.

Abstract: *Plasterers finish walls in the same way that hand plastering is done in most parts of the world. Manual plastering requires more work and takes more time. Since the manual process of plastering walls at a construction site is very labor intensive and labor cost is the reason construction or project work is more expensive. The quality of the work mainly depends on the skill of the labor involved in the hand plastering process. The solution to these problems is to automate the process, saving time and money and achieving a good plaster finish on the walls. The plastering machine can automatically plaster the walls very smoothly, thus reducing the total cost and the total time which is ultimately responsible for the growth and thus increasing the progress rate of a country.*

Key Word: *Automatic Wall Rendering Machine, Rope Wire, Pulley, Slider, Gear Motor.*

I.INTRODUCTION

Construction sector is responsible for the progress of any country as most of the growth of the nation is dependent upon industrialization, civilization, transportation, etc. which definitely has the initial stage of construction. Wall plastering is the main procedure among the processes followed in the building construction, which is used to plaster the walls of construction to get smooth and finished wall surfaces. Plastering is also essential to give some additional specified strength to the walls and also it protects the walls from moisture from both outside and inside. Wall plastering provides a better look on the walls and ultimately creates living conditions in the associated rooms. But now the plastering of the walls in most parts of the world is done by hands, i.e., the procedure of wall plastering is being done with the help of human labors or manually due to which the process is costlier and more time consuming. So, this is an initiative to automate the plaster work.

II.OBJECTIVE

Automation is one of many evolving disciplines in all technologies. Our aim is to render the plaster on the walls mechanically and automatically. This concept aims at reducing the work of a trained worker and save money spent on extra labors.

1. This machine will reduce the human workload.
2. It will be simple to control and straight forward in construction.
3. It can move horizontally so it will be portable.
4. It will help to save labor cost by reducing number of labors required.
5. It will avoid wastages of the mortar, thus it will save the cost.
6. The cost pf machine will be less than existing machines.

III.LITERATURE REVIEW

1. **Design and Fabrication of Automatic Wall Plastering Machine**
   Author Name: Mahesha P.K. and Sree Rajendra
   Journal Name: IOSR Journal of Mechanical and Technology
   Conclusion: This work includes applying mortar into the wall and additionally pressuring mortar with creating a surface level. The model was developed and tested successfully. With this development, two major downsides namely labor shortage and quality in the construction industries were reduced. During the trials, it was noted that the machine was more productive compared with labor in terms of rendering work.

2. **Automatic Plastering Machine**
   Author Name: Arivazhagan B.
   Journal Name: International Journal of Advanced analysis in Physics, Communication & Instrumentation Engineering and Development.
   Conclusion: Machine-driven rendering machine is latest and probably appropriate for the construction/building industry. A machine-driven filler works with cement mortar to give it an oscillating flat end with variable and adjustable thickness to suit a variety of applications. It makes rendering the wall faster and easier compared to manual rendering. This concept can

be further advanced by addition of interfacing liquid crystal display & computer keyboard for creating the method while no external feed is needed.

3. **Automation and Robotics in Construction: Opportunities and Challenges**
   Author Name: S.M.S. Elattar
   Journal Name: Emirates Journal for Engineering Analysis
   Conclusion: Machine-driven constructions are often developed to include: engineering, design and maintenance of planned and existing structures. The "Sense-and-Act" could become a reality with the development of advanced robotic systems specially in construction applications. All new concepts for automation or robotizing on the vacant lot need to be generated by a mix of new forms, recent designs and new materials that meet the requirements for construction. However, many of the problems in construction engineering cannot be particularly addressed only through improvement and computation.

4. **Automatic Wall Plastering Machine**
   Author Name: Arunkumar Biradar, Vaibhav Shejwal, Akshay Barate, Sameer Barate
   Conclusion: The development trade in most countries amounts to 10–20% of the total nationwide product and creating it the largest economy consuming sector. It is still labor intensive and jointly the majority of the work concerned is cyclic. The expansion of any country depends on it's development trade therefore it is of prime economic significance to several industrial sectors.

IV.FABRICATION OF WALL RENDERING MCHINE

The machine consists of a metal frame, sheet metal tray supported by M.S angles, guide ways, thickness adjuster, different wheels, nut and bolts and AC/DC motors according to the requirement. The lifting force is transferred to tray through rope wire mechanism which is driven by DC/AC motor. The two columns are bolted with base and can be unbolted when required hence making it detachable and portable.

Below are the operations that were involved in the fabrication of Wall Rendering Machine:

- Measuring
- Cutting
- Grinding
- Edge Preparation
- Welding
- Centering
- Facing
- Drilling
- Tapping
- Counter Drilling

Figure (1): Pulley

Figure (2): Slider

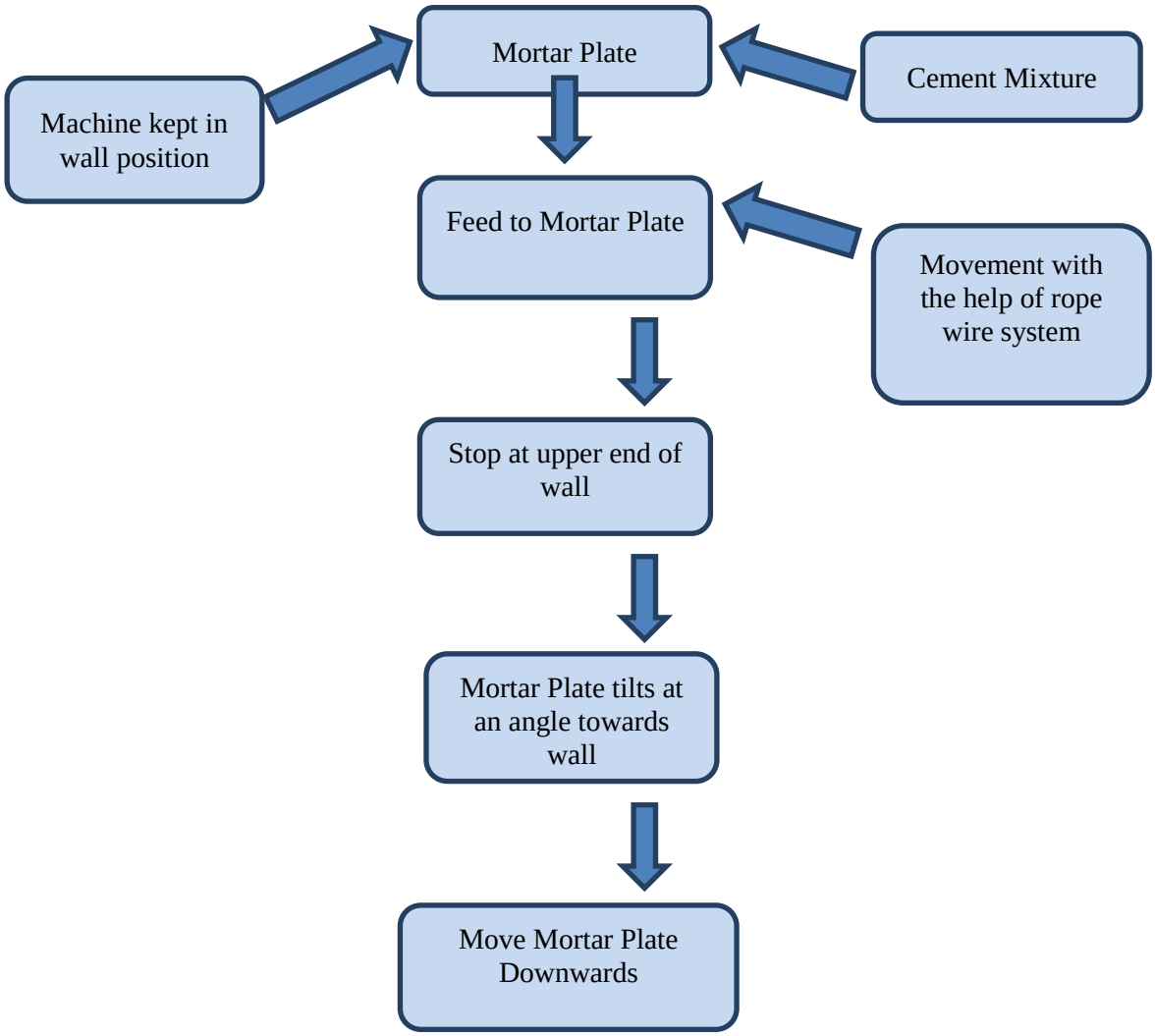
Figure (3): L-Section

Figure (4): Wheels welded on the base

Figure (5): Slider with guide

V.METHODOLOGY

Initially, the rendering machine must be placed close to the wall to be rendered. The machine should be perfectly leveled. If the machine is leveled and near the wall, then wheels should be locked and machine will not move.



VI.CONCLUSION

The model has been developed and tested successfully. With this development, two major problems faced by the construction industry can be reduced which are shortage of skilled labor and quality in the construction process and that to with less wastage of material. During the trials it was noted that the quality achieved is almost equivalent to that of manual labor and also the machine is more productive than labor regarding the plastering work.

By studying all the literature mentioned above and the work done, the following conclusions are drawn-

1. This automatic wall rendering machine can be easily used in construction industry.
2. As this machine works with the conventional cement mortar hence no replacement of material is required.
3. This machine is more efficient and productive than the conventional plastering technique.
4. Higher quality of plaster can be obtained with this machine.
5. The thickness of the plaster will be constant over the wall despite of different conditions of the plastering surface.
6. Due to the saving of time, labor and raw material costs, the overall construction cost of this machine is lower than that of traditional plastering techniques which use more labor work, more time and more raw materials. This machine is therefore economical.

VII.ACKNOWLEDGEMENT

We would like to express our sincere thanks and honour to our project guide **Mr. Ravi Pratap Singh, Assistant Professor, Department of Mechanical Engineering, ITM GIDA** for supervising and guiding us during our final year project entitled "Design and Fabrication of Automatic Wall Rendering Machine" as a partial fulfilment of Bachelor's Degree in Mechanical Engineering. Without his support, advice and guidance, this project would have been nearly impossible.

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