FABRICATION OF CEMENT WALL PLASTERING MACHINE

[1]Mr. V. Suneel Kumar, [2]Sk. Mujaheer, [3]I. Dinesh, [4]C. Bhanu Prasad, [5]K. Srinivasulu
[1] Assistant Professor, Department of ME, Narayana Engineering College, Gudur, AP, 524101
[2,3,4,5]UG Student, Department of ME, Narayana Engineering College, Gudur, AP, 524101

Abstract: B*uilding construction is one of the oldest and largest economic sectors. The project aims to fabricate the plastering machine. Plastering is the plasterwork which is known as ornamentation done by plasterers on walls. Building construction is divided into two large groups: commercial infrastructure and residential building. Both areas are needed plastering work for increasing the quality of construction. The plastering machine can plaster the walls automatically and very smoothly. The quality of work is mostly depending on the skill of the labor work in manual plastering process. The plasterwork needs more effort of humans and also consumes more time in manual processes. The building construction is a time-consuming sector because a lot of work is a labour based there is too much shortage of skilled labor, an increase in labor cost and technological advances are forcing rapid change in the construction of the building. The solution to these problems is just to automate the process so that there will be a saving of period and cost and getting good plaster finishing to the walls. Due to which the process will fast and there will be saving of cost and time this will helps to reduce the total cost, total time. The model is fabricated by considering the normal constructed brick wall.*

Keyword: *Plastering Machine, Construction, Gears, Remote controlled operation*

1. INTRODUCTION

The Construction sector is a unique sector that required more time and money, having a very slow and stepwise process. Presently in the construction sector near about, all the processes are manual which required more time for their completion necessary to automate the processes in the construction work and improve the efficiency of it. Plastering is also essential to give specified strength to the walls; it protects the walls from moisture from both sides. Wall plastering also gives a good look at the walls and ultimately creates the best residential condition in a particular room. The development of buildings, apartments, complex, shops, homes is the necessities of the creature. But in present days wall plastering is being done manually in most of the parts of the world i.e. the procedure of wall plastering is being done with the assist of labors. Due to which the process is lengthy. Plastering is that the rendering work that is understood as ornamentation done by plasterers on walls by manually. The process of creating plastering is called as plastering or rendering. It works with conventional cement mortar which brings it to a smooth, flat finish with variable and adjustable thickness to suit each application. It can plaster the wall automatically by moving up and down in a vertical direction. It can be plastered by one-time in a vertical direction.

2. MOTIVATION AND OBJECTIVES

2.1. Motivation

The thickness of the plastering can be adjusted. It has a special design for adjusting the thickness of the plastering /cement mix. It has two rails for rising and moving automatically, therefore it can be used for different height and width of the wall. It has a large capacity hopper and we can put the cement mix in it one-time. It is easy to operate. One or two-person can be

easily operated. Easy to move, without removing any parts of the machine and there are wheels under the machine for easy movement. In the manual plastering technique, the crucial factor is skilled labor because of which plastering has been done on the walls, but presently there is a lack of skilled laborers due to which it is very inconvenient to complete this process. Labor requires more time to finish the process which increases their wages and hence the total plastering or labor cost increases.

2.2. Objectives

Plastering conceals defective workmen ship and covers up unsound and cheap quality material. Plastering on external walls is done with the object of improving the resistance of the surface to rainwater penetration and other atmospheric influences. Plastering protects surfaces against vermin. The objectives for the present project work is listed below:

- To reduce labor work.
- To be simple to control.
- To do good plastering may be obtained.
- To move horizontally from one place to another place easily.
- To assist to save labor costs.
- To avoid wastages of the mortar.
- To reduce machine costs will be less than existing machines.
- To be controlled with the help of the remote controller.

3. LITERATURE REVIEW

Plastering is construction or ornamentation work done with plasters or cement mortar over the walls. Failing to allow the plastering to fully cure can lead to excess shrinkage and cracking after the walls have been plastered. The various types of surface finish are Smooth finish, which can be obtained by using a wooden float, rather than a steel trowel. roughcast finish is for rural or coastal areas, and is splashed on to the surface as a wet mix and left rough. The maximum size of sand and crushed stone or gravel may vary approximately from 10 mm to 6 mm, Pebbledash finish is the most durable of all finishes and is generally free from effects. It gives a rough texture to the wall and is obtained employing small pebbles or crushed stone, graded from 12 mm to 8 mm being splashed on to a fresh coat of and left exposed. Textured finishes of different designs are now becoming very popular and can be obtained in a variety of ways. Special effects can be obtained by scraping the surface of the rendering with a straight edge hacksaw blade or with the edge of a steel trowel. Apart from this, commercial wall plastering machines are also available. But these machines do not have the self-alignment capability, which is essential for flat and smooth plastering of the wall. Also, these types of wall plastering machines are used to plaster the entire wall and cannot be used to re-plaster patches and damaged plastered walls. their research paper has discussed the design of an automatic wall plastering machine. The Automatic plastering machine is one type of unique machine that will be used in the construction industry. It helps to save time and money. It works with cement mortar which is a conventional one due to which no replacement of the material required. The machine is more productive than the conventional plastering technique. Higher quality of plaster can be obtained with this machine. The thickness of the plaster will be constant over the wall which is generally varying 0.5 to 0.75 inches at different conditions of the wall surface. It reduces the wastage of mortar up to 60% and hence required fewer raw materials. Due to

saving in time, labor cost, raw material, the overall cost of construction is less hence the machine is economically efficient than the conventional plastering technique [1]. It Increases productivity by 10-15 times and we can Get professional-quality finishing in less time, reduce project cost, manufacture wall machines at low cost [2]. The development trade in most countries amounts to 10–20% of the total nationwide product, creating it the biggest economic using sector. It's still labor insists and jointly the majority of the work concerned is cyclic. The expansion of any country depends on the development trade therefore it's of prime economic significance to several industrial sectors [3]. Overview of productivity in construction, covering technique, including work and crew effectiveness, work sampling, five-minute rating, foreman delay survey, craftsman questionnaire, the Method Productivity Delay Model, charting techniques, and simulation modeling and analysis [4]. The construction industry has a long Turn Around Time (TAT) due to a human-based work environment. Further, lack of skilled labor, increase in labor cost, and technological advances are forcing rapid changes in building construction, which mainly consists of commercial infrastructure and residential building, where plastering work is must [5]. Environmental sustainability and energy efficiency factors are key factors for the better utilization of the resources [6]. All these problems can be solved out with automation in a constructive technique. The plastering, which is extremely slow & costly when doing manually. They use necessary components like a steel frame, sheet metal, metal bars, power screw, AC/DC motors, different wheels nut & bolts to assemble it. Through trails, it is noted that the machine is more productive compare to labor concerning the plastering work [7]. The quality of plastering mainly depends upon the skill of labor. Hence plaster surface may or may not be smooth and even. The solution for the same is automating the plastering technique so that the cost of construction can be saved and the plaster surface will be smooth [8]. One factor that subtly influences a project's outcome is novelty--the quality of a project's innovativeness, as perceived by the project's team. This paper examines the way a project's novelty influences a project team's performance [9]. The methods of painting and intends to enlighten readers and artists alike with knowledge of modern art techniques as well as forgotten techniques of the painting technology. By using the automatic painting machine it is clear that the human efforts are reduced as well as the cost of labor also reduces [10]. Novelty may be the shared experience of a new cultural phenomenon or the subjective perception of an individual [11]. Novelty may be the shared experience of a new cultural phenomenon or the subjective perception of an individual [12]. The construction of buildings, apartments, complex, shops, and homes are basic requirements of the human being. In this construction area, plastering is necessary for decorating the wall. It is still labor dependent and most of the work involved is repetitive. Intense competition, shortage of skilled labor, and technological advances are forcing rapid changes in the construction industry.

4. MATERIALS AND METHODS

The construction revolution of today has made the contractors equip their construction to perform the highest output with minimum construction cost. To have the highest output, parameters like accuracy, precision, quality, and cycle time have to be optimized. This is possible either by having skilled manpower or by automating the system. Plastering work or plastering refers to the construction or ornamentation done with plaster such as a layer of plaster on an interior wall or plaster decorative moldings on ceilings or walls. The tools and materials for this include trowels, floats, hammers, screeds, a hawk, scratching tools, utility knives, lime, sand, a variety of types of cement.

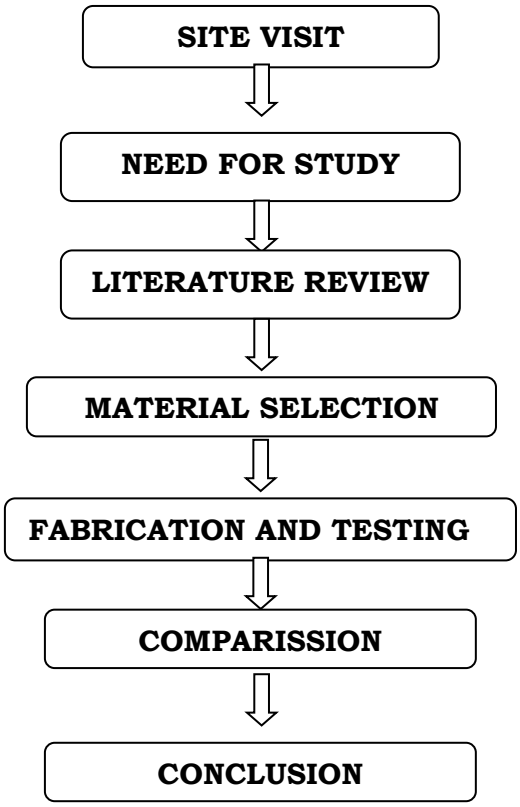

Fig. 1. The Process flow of the suggested Design

4.1. Fabricated Components

The structures are fabricated by using required necessary components like a steel frame, sheet metal, metal bars, chain drive, AC/DC motors, different wheels nut, and bolts. All these are well assembled as for the requirement. This will be controlled by remote control components.

4.2. Control Components

4.2.1. Transmitter (Encoder)

When a button on the keyboard is pressed two tones corresponding to that key are generated. The tones corresponding to that key is generated. The tones generated are fed to IC UM9121 5B which is an encoder, it converts the messages into electrical signals and feeds them to the FM transmitter. The FM transmitter thereafter transmits the signal with atmosphere as the medium (or) channel, via a telescopic antenna which provides point to point links. The range of operation of the circuit depends on the range of operation of the FM transmitter employed in the circuit. Thus the signal is transmitted from the keyboard corresponding to the relay to be triggered. Therefore, transmission can be done in an efficient manner using this circuit.

4..2.2. Receiver (Decoder)

The transmitted signals are received by an FM receiver which receives all incoming signals within a particular bandwidth. The reception is also done with the help of telescopic antennas. The signal obtained is fed to IC 8870P which is a decoder. This IC converts the signal to its original form. It gives binary output corresponding to the signal received from the

transmitter. This 4-bit binary number is fed to IC4067, which is a 4 to 16 line decoder IC. Depending on the binary input, one of the outputs of IC4067 will go high and the corresponding relay will be activated. This mode has to be held until another deactivating signal is passed, to hold this mode a flip flop IC – CD4013 is connected to IC 4067. IC – CD4013 holds this mode until another deactivating signal is fed to the system. Therefore, the ON & OFF operation of all relays can be controlled by using this logic. The whole system can be reset by pressing the button in the transmitter part of the circuit.

5. RESULTS AND DISCUSSION

Initially, the machine has to be located near the wall which has going to plaster. The machine should be perfectly leveled. Then the mortar is poured into the hopper of the tray. The machine is raised and will be a lock-in in some instances. The exciting force is given by the chain drive and machine mechanism which is driven by DC motor. In that way, the plastering is done automatically to the wall by an automatic plastering machine. The machine works with conventional cement Mortar, it can plaster the wall mechanically by stirring up and down in straight-up direction. It has two rails for rising and moving automatically, therefore it can be used for different height and width of the wall. The thickness of the mortar into the wall achieved by the labor was varying from 0.5 inches to 0.75 inches at different wall conditions. But the machine is achieving any thickness constantly and uniformly. It is observed that the wastage is reduced by 0%. Whereas mortar thickness at the wall is increased wastage is also increased by the labor and it also depends on the skill of labor.

6. CONCLUSION

The automated plastering machine is unique and perhaps one kind of automated plastering machinery ideally suitable for the construction industry. Through the trials, it is noted that the machine is more productive compare to the labor concerning the plastering work, and also the quality achieved is almost equivalent to the labor. It takes very less amount for fabrication. This time and the money-saving machine keeps up with the ever-changing world of building automation.

- Automated plastering machine works with conventional cement mortar which brings it to a smooth, flat finish with variable and adjustable thickness to suit each application.
- Automated plastering machine makes rendering easier, faster, and effortless as compared to manual application.
- The present work includes applying the mortar into the wall and also pressuring mortar with a making surface level.
- The model has been developed and tested successfully. With this development the two major problem construction industries currently facing can be reduced. They are skilled labor shortage and Quality in the construction process with less wastage.

The present model is semi-automatic and it does not have an automatic loading of mortar. The automation of loading mortar has needed to be carried out. The machine is developed to do plastering work for a straight wall, hence it is suitable only for commercial buildings like apartments that have large and not for the construction of a curved wall as it does not have to make a curved blade. Hence upgrading is required by making some changes to use the machine for any size and the corners and joining of two walls. But these machines do not have the self-alignment capability, which is essential for flat and smooth plastering of the wall.

Also, these types of wall plastering machines are used to plaster the entire wall and cannot be used to re-plaster patches and damaged plastered walls.

7. REFERENCES

[1]. Askar, A. N., & Raut, L. P. (2017). Design of automatic wall plastering machine. *International journal of engineering sciences & research technology*, *6*(3), 543-555.

[2]. Al-Hamad, A., Khraishi, R., & Yonis, S. (2016). Plastering Wall Machine.

[3]. Biradar, A., Shejwal, V., Barate, A., & Barate, S. (2016). Automatic Wall Plastering Machine. *International Journal of Engineering and Technical Research (IJETR)*, *4*(1), 22-32.

[4]. Viswanth, V. S., Ramanujam, R., & Rajyalakshmi, G. (2020). Performance study of eco-friendly dielectric in EDM of AISI 2507 super duplex steel using the Taguchi-fuzzy TOPSIS approach. *International Journal of Productivity and Quality Management*, *29*(4), 518-541.

[5]. Odesola, I. A. (2015). Construction labor productivity as a correlate of project performance: An empirical evidence for wall plastering activity. *Civil Engineering Dimension*, *17*(1), 1-10.

[6]. Viswanth, V. S., Ramanujam, R., & Rajyalakshmi, G. (2018). A review of research scope on sustainable and eco-friendly electrical discharge machining (E-EDM). *Materials Today: Proceedings*, *5*(5), 12525-12533.

[7]. Mahesha, P. K., & Rajendra, S. (2014). Design and fabrication of an automatic wall plastering machine prototype. *IOSR Journal of mechanical and civil engineering*, *11*(4), 01-06.

[8]. Kumar, M., Sharma, C. S., Mujhahid, S., & Alim, A. (2019). Development and Fabrication of Semi-Automated Wall Plastering Machine. *Abhilash and Sharma, Chandra Sekhar and Mujahid, S and Alim, Akbar, Development, and Fabrication of Semi-Automated Wall Plastering Machine (May 17, 2019)*.

[9]. Viswanth, V. S., Ramanujam, R., & Rajyalakshmi, G. (2018). A Novel MCDM Approach for Process Parameters Optimization in Eco-Friendly EDM of AISI 2507 Super Duplex Stainless Steel. *Journal of Advanced Research in Dynamical and Control Systems*, *10*(7), 54-64.

[10]. Tatikonda, M. V., & Rosenthal, S. R. (2000). Technology novelty, project complexity, and product development project execution success: a deeper look at task uncertainty in product innovation. *IEEE Transactions on engineering management*, *47*(1), 74-87.

[11]. Gann, D. M., & Salter, A. J. (2000). Innovation in project-based, service-enhanced firms: the construction of complex products and systems. *Research Policy*, *29*(7-8), 955-972.

[12]. Dao, B., Kermanshachi, S., Shane, J., Anderson, S., & Hare, E. (2017). Exploring and assessing project complexity. *Journal of construction engineering and management*, *143*(5), 04016126.