

# A Research Paper on Contribution of Spray Plaster Technology to Achieve the Project Specification by Cost

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**Abstract:** *An important factor in improving the quality of work is the qualification of construction workers, who use new technologies. Without special training, workers cannot realize all the possibilities of modern materials and technology, and therefore will not be achieved economic effect. The process of mortar mechanical projection has been approved in terms of its performance, but industrial management knowledge should be applied to understand the economic viability of the system. The aim of this paper is to evaluate the productivity and logistics impact of the mechanized spraying process of rendering mortar on its global cost composition. On a worldwide scale, there are no studies that correlate logistics, productivity and costs for mortar rendering systems, indicating the originality of the research. A multiple case study was proposed. A comparison was made between the manual application and mechanical projection methods of internal wall plastering.*

**Keywords:** industrial, spraying, mortar, global cost

## 1. Introduction

Plastering is the term used to describe the material spread over the surface of irregular and coarse textured wall, column, and ceiling to provide a smooth, hard and leveled finish which can be painted for good appearance. In actual 'Plastering' is an art, truly recognized for constructing the base. It refers to the construction done with plaster which includes a layer of plaster on an interior wall or plaster decorative moldings done on ceilings or walls. The process of creating plasterwork is called 'Plastering'.

It's a unique skill to plaster the wall, level it and achieve a good and even finishing. Plasterboard is to form the sub-base for ceilings, partition walls. An adequate and rigid frame made up of timber battens is needed for it.

## 2. Literature Review

The literature review is searched from the authentic research papers and generalists from online matter based on Integral University Lucknow. Initially some common keywords like plastering with machine etc was used for gaining the research papers on spray plaster. The selection criteria of paper are identifying need of the topic or the purpose of this thesis.

1) **Gui Ponce de Leon et al (2011)** tells that Scheduling a project at the right level, at the right time, is an important consideration in project planning and scheduling. During management-level planning, when executive and senior management are involved, project-level schedules prevail. Schedules become detailed as the planning horizon switches from the whole of the project to project stages or phases; with assumptions tested and information firmed-up, management can engage in detailed planning.

- 2) **J. Kurz et al (2012)** his paper tells us about the plaster which is done in a commercial and residential building. He used the technology of mobile plastering robot at construction site which is operate by skilled operator. The machine do the plaster in a less time.
- 3) **Dr. Shiv K Sahu et al (2013)** states that the concept of text mining is nothing but the mechanism of extracting non-trivial and interesting data from the unstructured text dataset. Text mining is consisting of many computer science disciplines with highly oriented towards the artificial intelligence in general such as the applications like information retrieval, pattern recognition, machine learning, natural language processing, and neural networks. The main difference between the search and text mining is that, search needs users attentions means based users requirement search action will perform whereas text mining is the internal process which attempts to find out information in the pattern which is not known before.
- 4) **Mr. Dhiren K. Paghdar et al (2013)** states that Drywall (also known as Plasterboard, Wallboard, Gypsum board, Or Gyprock) is a panel made of gypsum plaster pressed between two thick sheets of paper. It is used to make interior walls and ceilings.
- 5) **Dionysios I. Kolaitisa et al (2013)** tells that Phase Change Materials (PCM) can be used for thermal energy storage, aiming to enhance building energy efficiency. Recently, gypsum plasterboards with incorporated paraffin-based PCM blends have become commercially available. In the high temperature environment developed during a fire, the paraffins, which exhibit relatively low boiling points, may evaporate and, escaping through the gypsum plaster board's porous structure, emerge to the fire region, where they may ignite
- 6) **Julkaisija et al (2013)** tells that the construction

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industry continues to be very conservative compared to manufacturing industry. In many cases when the new automatic products are not complementary to the old ones, they are scarcely implemented, and their use is kept to minimum. Moreover, if these products introduce inconveniences to the whole construction cycle, they are openly rejected. On the contrary, in the manufacturing industry the people and the environment respond very positively to technological innovation.

- 7) **Alexander Braun et al (2014)** states that on-site progress monitoring is essential for keeping track of the ongoing work on construction sites. Currently, this task is a manual, time-consuming activity. The research presented here, describes a concept for an automated comparison of the actual state of construction with the planned state for the early detection of deviations in the construction process.
- 8) **Okmen et al (2014)** states that The Critical Path Method (CPM), which is used to schedule construction activities that depend on one another through network relationships, is deterministic with regard to the duration assigned to the execution of the activities and the results produced in certain values. Unfortunately, construction activities are performed under uncertain conditions. Project risks cause variations in activity duration, and in turn the entire network is affected uncertainty.
- 9) **Akash S. Tambi et al (2014)** tells that the construction industry is labour intensive and construction work is conducted in risky and dangerous situations. The importance of construction automation has grown rapidly in developed countries. In developing countries like India, the construction industries need automation technologies such as new machineries, electronic devices etc. The infrastructure project requires more numbers of skilled labour, good quality of work, increases productivity etc. The problems associated with construction work such as decreasing quality of work, labour shortages, and safety of labour and working condition of projects.
- 10) **Daria Petrosova et al (2014)** study based on the risk management he tries to say that construction refers to a number of industrial processes with highly increased risk. There must be big amount of accidents occurs in doing the plaster work manually with large wooden shuttering. He wants to say that through spray plaster he can reduce the accidents.
- 11) **Olivier Buzzi et al (2014)** experimented the two methods to measure the bulk volume of soil specimen which are having irregular shapes. The methods are the wax method and the plastic bag method. He tells us about the new coating of hand spray plaster.
- 12) **Mahesha P.K. et al (2014)** he tells that in an economic sector, the business of building construction plays an important role. He tells that the building construction is divided into two groups commercial infrastructure and residential building. For doing manually plaster in both types of building contains a large amount of labour cost. So with the help of spray plaster we can reduce the cost of plastering.
- 13) **Nikolay Ivanovich et al (2014)** in his study we are able to know about the mechanized technology of application of dry building mixes is a separate highly

qualified branch in a field of finishing work. Application of dry mixtures is one of the most important factor in improving the quality of finishing works.

- 14) **Olga Gamayunova et al (2015)** refers that spray plaster technique can be applied mostly in large structures. Without special training workers cannot realized all the possibilities of modern materials and technology and therefore will not be achieved economic effect.

### 3. Discussions

The spray plaster is a technology to provide a level and smooth surface ready for further decoration. Spray plaster can be applied as a self finished white texture requiring no further decorating. Spray plaster is one of the technologies used for the protective and decorative coating of walls and for moulding of decorative elements. The benefit of spray plaster is to ensure the consistent uniform finish. The spray plaster technique can be applied mostly in large structures without special training workers cannot be realized all the possibilities of model materials and technology & therefore will not be achieved economic effect.

### 4. Methodology

Based on Literature Review following methodology has been formed

- 1) Identification of various cost component for manual plastering.
- 2) Identification of various cost component for machine plastering.
- 3) Comparison of different cost parameter for different plastering situation by collecting data in various sites.
- 4) Synthesis of selection criteria based on cost result.
- 5) Interviewing to the various P.M/ A. P. M /Site Engineer of various construction site.

#### 4.1 Data Collection

**Name of site: Veeta Day Factory UPSIDC Barabanki U.P**

Plastering in Staff Quarter Residential Building.

Plastering in Staff Quarter Residential Building Data Collection

Staff Quarter Multi storey Residential Building (G+4)

Building contains :

- Ground floor
- First floor
- Second floor
- Third floor
- Fourth floor

#### 4.2 Calculation

Total Area of Plot =  $130 \times 19 = 2470$  Sq. ft

Total Plastering area of Ground floor

Rough surface =  $[130+130+19+19] \times 10 = 2980$  sq. ft. Total

No. of Windows = 12

Size of One window =  $(6 \times 5) = 30$  sqft

Total No. of window size =  $30 \times 12 = 360$  sq.ft. No. of doors

= 2 (Main gate)

Size of 1 door =  $12 \times 19 = 108$  sq.ft.

Total size of both doors =  $108 \times 2 = 216$  sq.ft.

Total Deduction = Total area of doors + Total area of windows

=  $360 + 216$

=  $576$  sq.ft.

Total rough plastering area (outside) = Total Area - Total Deduction =  $2980 - 576 = 2404$  sq.ft. Thickness of Plaster at outside = 12 mm

Now, we have to calculate the inner plastering area : We have to give the description of whole floor

Total No. of Units : No. of Rooms = 6

Size of One Room =  $10 \times 8$

Plastering area of Room =  $(10+8+10+8) \times 10$  Height of Plastering = 10'

Plastering area = 360 sq.ft. Total No. of Rooms = 6

Total area of 6 Rooms =  $6 \times 360 = 2160$  sq.ft.

No. of halls = 4

Size of Hall's =  $16' \times 15'$

Area of Plastering of hall one

=  $16+15+16+15 = 62$  ft.

Height of Plastering = 10 ft

Total Area of Plastering of hall are =  $62 \times 10 = 620$  sq. ft.

Size of Hall two =  $15' \times 9'$

Area of Plastering with height 10'

=  $(15+15+9+9) \times 10' = 480$  sq.ft.



Size of Hall three =  $19' \times 28'$

Area of Plastering =  $(28+28+19+19) \times 10$

= 940 sq.ft.

Size of Hall four =  $15' \times 18'$

Area of Plastering =  $(15+15+18+18) \times 10$

=  $66 \times 10 = 660$  sq.ft.

No. of toilets at Ground floor = 5 Size of 1 toilet =  $3.6' \times 4'$

Area of Plastering of 1 toilet =  $4+4+3.6+3.6 = 152$  sq.ft.

Total No. of toilets = 5

Total Area of 5 toilets Plastering =  $5 \times 152 = 760$  sq.ft. No. of attached toilet bathrooms = 2

Size of one attached toilet bathrooms =  $10' \times 7'$

Plastering area of one toilet =  $[10+10+7+7] \times 10 = 340$  sq.ft.

Total area of both attached toilet bathroom =  $340 \times 2 = 680$  sq.ft.

**Model NO. N2 MPS55**

Cost- US DOLLAR 16000

IN INR 1136000

Vibrating Amplitude Trailer Concrete Pump with Electric or Diesel Power

Certification ISO9001: 2000, CE, BV

Condition New

Color Yellow

Container 1\*20'gp

Rubber Hose 16m

Main Oil Pumps German Hawe, Rexroth Series and Japanese Kawasaki

Lubricating System Fully Automatic Multi-Points Lubricating

After-Sales Service Provided Engineers Available to Service Machinery Overseas

Brand Saintyol Dawin Machinery

Key Word Mortar Spraying Machine

Power Electric, Diesel, or Generator

Trademark Saintyol DAWIN

Transport Package Standard Exporting Package

Specification CE, ISO

Origin Qingdao Shandong

HS Code 84134000

**Operation**

Keeping the air pump running for 2-5 minutes after turn on the machine (heating up the grease lubrication to make the air pump work normally), then add the mixture of water and cement into the hopper (to lubricate the hose), then add the normal material to start working. When finishing the work, the machine should be cleaned. Clean the material in the hopper with water out of the hose, until the clean water flow out. Then dismantle the hose, at last hang the hose

vertically, clean the sand in the inner surface of the hose with clean water.

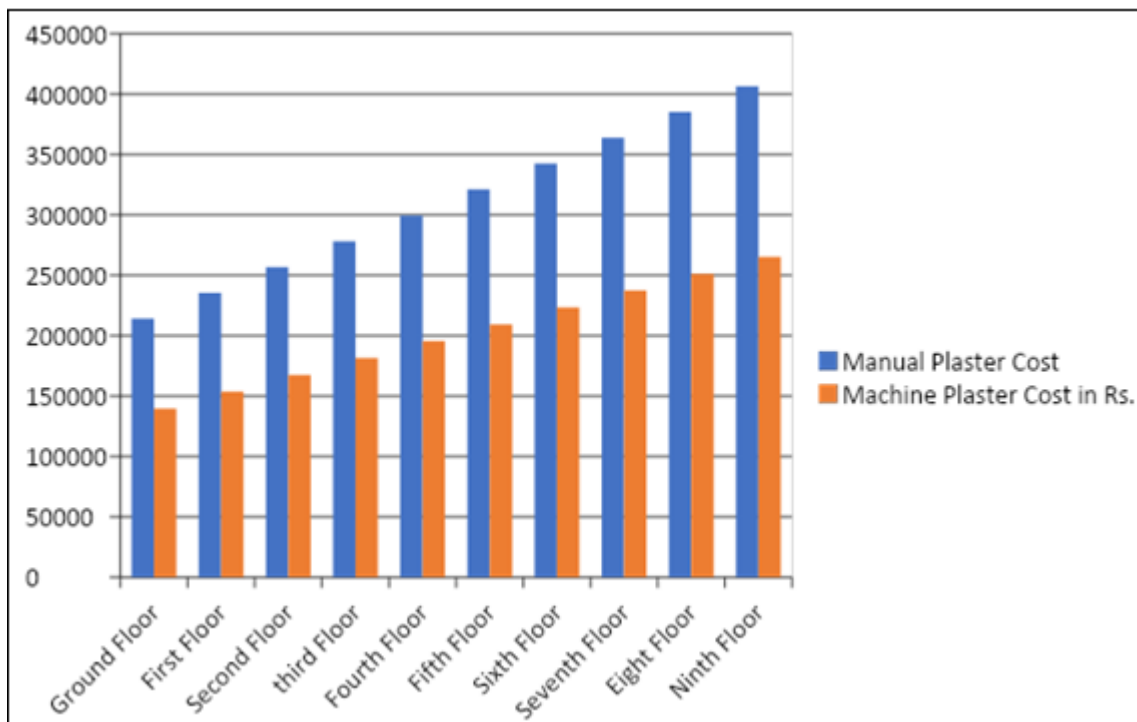
**Materials**

Normal mortars, insulation mortars, dry mortars, anti-crack mortar, interface agents, construction glues, bonding agents, anti-fire materials, epoxy coating, etc.



Comparison of Cost

Residential Multi story Building G+9	Manual Plaster Cost	Machine Plaster Cost in Rs.
Ground Floor	214015	139575
First Floor	235416.5	153532.5
Second Floor	256818	167490
third Floor	278219.5	181447.5
Fourth Floor	299621	195405
Fifth Floor	321022.5	209362.5
Sixth Floor	342424	223320
Seventh Floor	363825.5	237277.5
Eight Floor	385227	251235
Ninth Floor	406628.5	265192.5



5. Conclusion

- a) If we are going to buy a spray plaster machine of Model No. N2MPS55 whose cost in market is Rs.11, 36, 000. Then, we will obtained such observation,
- b) When we start plaster with this machine then we can take a data of our site STAFF QUARTER OF VEETADAY FACTORY.
- c) Then we have to add the area from ground floor to sixth floor:
  - Such calculation will occur,  
 $9305 + 9305 + 9305 + 9305 + 9305 + 9305 + 9305 = 65135$  sq.ft.  
 Or,  $6051 \text{ m}^2$ .
  - When we will do a plaster  $6051 \text{ m}^2$  with this machine. Then we will achieve the cost of machine.
  - When we will do the plaster after 6th floor then we will reach the profit of this machine in cost.
  - Mechanized plastering does have limitation where in method phases challenges.

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