Wall Painting Robot

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Abstract— The aim of the project is to creation and developed also the appliance Automatic Wall Painting Robot. Which helps of remote operated and which helps to low cost painting machine. it is despite the advances in machineries and its wide spreading applications, interior wall painting has shared little in research activities. The equipment remote is either connected as wire or wireless technology. The disadvantages as like the painting chemicals can cause hazards to the human painters such as eye and respiratory system problems. Also the nature of painting procedure that requires repeated works and hand rising makes it's boring, more time and also the more effort consuming. When the constructions workers and also the machines are properly integrated in building tasks. The whole constructions process can be better managed and savings in human labour and timing are obtained as a consequence. In addition, it would offer the opportunity to reduce or eliminate human exposure to difficult and hazardous environments, which would solve most of the problems connected with safety when many activities occur at the same time. These factors motivate the development of an automated machining painting system.

Key words: Frame Stand, Wheels, DC Motor, Control Unit System, Spray Gun

I. INTRODUCTION

The powder coating are the operation as widely use in industries to performing painting operation on the different section as per the customer demands. The powder coating is by far the youngest of the surface finishing techniques in common use today. Powder coating is the technique of applying dry paint to a part. The final cured coating is the same as a wet paint. In the normal moist painting such as a house painting, the solids are in stay in liquid carrier, they are must be evaporate previous to the solid paint coating is produced. The coating operations are performed in spray booth by manually or using automation. As the global economy becomes more competitive, industrial production requires more automation along with process optimization and increasing of plant availability. But the initial cost of the automation is high. Work study is performed on the existing line for improve the sequence of the processes and increasing the production rate by making suitable changes in existing setup with small investment. The main objective of this project is to present the cost model and compare the performance of work study and RTA with respect to cost savings. Costs are included, cost of parts, holding cost of parts, line setup cost for each article, holding cost of finished goods, penalty cost for late delivery of finished goods. The second objective is to keep the constant consumption of each part in the line. Next one is Work measurement is the application of techniques designed to established the time for a qualified worker to carry out a specified job at a defined level of performance. This type machine are improve safety, enhance perception of workspace and furthermore, ensure quality environment in the construction industry has grown rapidly. Despite the advances in the machine and its wide spreading applications, painting is also considered to be the difficult process as it also has to paint the whole building. To make this work easier and safer and also to reduce the number of labours automation in painting was introduced. The locomotive for paint the external wall in buildings and other has been moved. Above all these the interior wall painting has shared little in research activities. The painting chemicals can cause hazards to the painters such as eye and respiratory system problems. The ethos of painting procedure that lack repeated working and hand enlargement to structure it boring, time and endeavour consuming. These factors motivate the development of an automated machine painting system. This project aims to develop the interior wall painting machine. This automatic wall painting machine is not designed using complicated components. This machine is simple and portable. The machine is designed using few steels, conveyor shaft, spray gun and a controller unit to control the entire operation of the machine. This machine is compact because of high speed and pressure capabilities they have. They also have a very small weight to power output ratio and predictable performance i.e. losses are minimum due to less number of moving parts and so gives expected performance. Due to elegant and simple control systems it can control noise vibration and does silent operation and no vibration is produced. It has longer life, flexibility and it is efficient and dependable, and the installation is simple and the maintenance is also easy. Some of the conditions that have to be considered while using this machine is that the system is operates in pneumatics, so it needs air tank or compressor and the electric shock is always there, which makes the machines ugly and dust and dirt are adhering to them. The life of the parts like seals, packing and gaskets etc., are very short but, they are essential to prevent leakage so that the system becomes costlier.

II. LITERATURE SURVEY

1) The Jitendra N. Shelar and Prof. N. R. Gilke (May 2013)they found out that for a low complexity and low cost, the support system chosen must have simple configuration, a scalable work area and requires less complex control system. Development of the support important part of automated wall painting. A suitable support system must be selected from various alternatives for suspension kinematics mechanism, path planning and motion tracking. The path traversed by the paint head is distorted and needs improvements in velocity control. This paper designed a wall climbing robot for painting the hull surface. The robot walked

with caterpillar, permanent adsorption and driven by AC servo motor, the paint system was controlled by solenoid valve and pressure pump. This paper gives idea of painting a wall by using spray which will move horizontally and vertically. For robot movement this thesis uses magnetic plate. This is costly item in the fixture. In book "A Text Book of Machine Design (2003)", detail procedure for power screw design is mentioned. It includes the entire basic concept which helps in designing the tool easily. This book also gives some important standard values related to lead screw design. "Design Data Book of Engineers 1968"compiled by Faculty of Mechanical Engineering PSG college of Engineering include all the design formulae related lead screw design. After it they found Fixture model is simple in construction and will work efficiently. With this fixture it will possible to avoid the risk of painting tall building at elevated height. It will reduce the cost and time of painting considerably as compare to manual painting. Analysis shows that lead screw is adequate to use in fixture.

2) In 2011Mohamed Sorour (University de Montpellier), Mohamed Abdellatif (Future University in Egypt) and Ahmed Ramadan (Tanta University, Egypt-Japan),have done "Development of Roller-Based Interior Wall" In this work, a full scale robot is described consisting of a 2 DOF robotic painting arm and a 3 DOF mobile platform. It is using the roller base of spray reduces the value significantly since spray gun and its auxiliary equipment are lavish. Light weight is achieved here by using a light weight two link robotic arm with new joint actuation mechanism. the mechanisms is inspired from the actuation of hydraulic cylinder in heavy machinery and it has reduces the weight of overall robot. It has the advantage of strong and accurate actuation due to the use of ball screw-nut. It is also providing a four wheel mobile platform and new imaginary wheel attachment provided for easier in control.

3) In march 2015 Selvamarilakshmi D*, Gajendran S, Muralidharan G introduced, a novel method of wall painting robot. The aim of this robot is to facilitate wall painting, which is a time-consuming and cumbersome activity. The robot comprises of a set of heavy load capacity wheels moving along a railing and a pulley mechanism. The design involves using a spray gun painting mechanism that moves vertically with the help of a lead screw from a platform mounted on a horizontal railing. Painting is achieved by the horizontal movement of the platform coordinated with the vertical movement of the lead screw attached with the spray gun, thus covering the plane of the wall in a zigzag manner. The first method uses a robotic arm which carries a roller. This method is used to paint interior walls of buildings. The roller keeps contact with the wall and is fed with painting liquid. The control system of the robot enables the robotic arm to cover the whole plane of the wall through both vertical and horizontal movements. It also enables the robot to maneuverer itself and adjust its position appropriately.

The illustration of the robot has been given below. This system has been tested to work fine for indoor painting. However, there is much scope for system improvement in the future to increase the painting rate and simplify the system design. This system has been tested to work fine for indoor painting. However, there is much scope for system improvement in the future to increase the painting rate and simplify the system design.

Fig. 1: Existing Mobile Robot

III. PROBLEM DEFINITION

1) Wall painting, conventionally, has been carried out by human hands on scaffolds or ladders provisionally built around a subject wall.

2) Moreover, painting of wall involves other manual tasks such as carrying, pushing, pulling and lifting of painting equipment. Carrying a spray gun, roller or even paint brush a long time can lead to repetitive stress injuries due to strenuous use of the same part of the body.

3) Paint rollers and paint brushes are used by putting a cover on a handle and rolling it up and down a wall. The painter has to fill a paint tray with paint and roll the roller or put the brush end into it to get it wet with paint before using it on the wall. The painter has then to lift the roller which is loaded with paint and roll it on the wall or perform to and fro with the paint brush on the wall. These repetitive actions of pushing, pulling or lifting of heavy loads such as rollers, ladders or even paint tray may lead to back ache.

4) 4.Moreover, when loading the roller or paint brush with paint, the amount of paint absorbed is often difficult to control and thus, the brush or roller is often overloaded. This causes paint to be wasted by either dripping or splattering. Further to that, if much force is not applied on the brush or roller, paint is wasted due to the absorption of paint in the paint brush or roller nap.

5) Most paint contains chemicals and compounds that are harmful to the environment and potentially harmful to painters. During painting process, painters may inhale those hazardous substances which can cause severe complications if exposed too much.

IV. OBJECTIVES

Wall painting, conventionally, has been carried out be wall. This, however, not only is a kind of work performed on dangerous elevated spots and in unclean environment but also requires extra work to take down the scaffolds, thus often making it difficult to shorten a construction term or

to reduce cost. There were some robots available on the markets which were, however, able to perform painting in a single colour. The aim of the to developing the wall painting robot to solve the situation, set as following:

1) To improve safety by eliminating works on scaffolds.
2) To make machine structure simple to enable easy mounting.
3) To perform painting is not in single colour but also paints in multiple colours.
4) It is not only use for external walls but also used in different places the walls of civil structures.

V. COMPONENTS

A. Frame Stand

The frame stand is used to helps supporting the lead screws and also spray gun.

B. Wheel

A wheel is a device which is attached at the bottom of any heavy object for its easy moment here and there carry the setup.

C. DC Motor

The dc motor square Super Heavy Duty DC geared motor is a very high torque motor which should be used to make big robots or robotized platform. Drive shaft is supported from both sides with metal bushes.

Fig. 2: DC Motor

D. Control Unit

The control unit is use as Microcontroller. It is consist of electronic circuit that can be programmed to carry out a big range of tasks. It is control the programmed line. They are found in most electronic devices.

Fig. 3: Control Unit is Microcontroller

E. Spray gun

This is the most important part of our project. It is made of stainless steel which is highly corrosion resistance. Spray gun mount Sprocket Spray gun Transformer Chain Bearing.

Fig. 4: Spray Gun

VI. WORKING

In the Remote Operated Spray Painting Machine, to start the system switch ON the power supply with the help of 230V charger which connected to the dc machines to drive the machine. When the machine is stared, system gets initialize. Now the system can move in x-axis with the help of basement wheel mechanism system. After performing this operation, spray gun can move in y-axis easily with the help of next steel frame and steel threaded rods. When system is in x and y axis 70% surface can be cover. In this way, the whole operation can perform easily and safely.

VII. ADVANTAGES

1) The mechanism has very low error.
2) The size of project made by is more suitable for wall painting system.
3) The cost of machine is less.
4) It is easy to make.
5) It has low maintenance.
6) Skilled operator required
7) Size of machine is small therefore it is easy to installation.
8) Weight of machine is low.

VIII. DISADVANTAGES

1) Being automatic we cannot neglect power supply system.

IX. APPLICATIONS

1) Use in all types of painting wall / car.
2) In industries purpose.
3) Can be used in engineering Workshop.
4) Use in domestic purpose.

X. CONCLUSION

1) The technique of remote operated spray painting machine is presented here. The cost of the project is effective. It is advantage to eliminates the hazards producing due to chemical paint to the human painter eye and also the human respiratory system problems. The future, we would like to expand features & application of the painting machine by using image processing in order to scan the objects and obstruction that are present in the wall so that the painting can be completed in graceful manner.

2) Till now all the wall painting devices made are Robots and Robotic arms but in this project we made a model which is not Robot nor Robotic arm, but it is a very simple concept in which two lead screws are used for the working purpose. In this project we can colour the wall in multiple colour, and it is very easy to change the painting colour just by changing the spray gun colour. This new model is robust in design and easy to mount and carry anywhere.

3) The cost of this project is low as compared to the automatic wall painting robots and robotic arms. As this project is of low cost and robust in design, we hope that it will be used maximum in low scale industries and by painters also, this model is used for safety of painters in hazardous environment.

4) The spray gun is mounted on the lead screw. In this project we can easily change the colour of painting as the spray gun is separately mounted. We can easily change the colour in it. One more plus point is that we can easily pressurize the spray according to our wish by using the knob provided below the spray gun. If we need more area covered while painting, we can place the frame at some distance from the wall and pressurize the flow of spray by doing this more area will be painted in single movement of spray gun.

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