



Design And Manufacturing Of Automatic Wall Painting Machine

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Abstract:

In today's world, robots are used in various applications such as military, medical, automobile industries etc. But if construction industries are considered then in that industries robots are not used. The robots are used to increase the efficiency and reduce the time in all the fields. It can also be used to do hazardous and dangerous jobs in any field. Nowadays, the wall painting is done manually. This process can be simplified by using robot. It is very difficult to paint the wall in upright direction which is at a very long distance from earth. Painting in an upright position is also very dangerous for the eyes. So, to overcome this difficulty we are manufacturing Wall Painting robot. The components of our project are decided. The 3D model will be drawn with the help of CATIA software. All the components are manufactured and then assembled together. The experimental testing will be carried out after the final assembly will be done. The result and conclusion will be drawn after the experimental testing. 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 work and hand rising makes it boring, time and effort consuming. When construction workers and robots are properly integrated in building tasks, the whole construction process can be better managed and savings in human labour and timing are obtained as a consequence.

Keywords: 3D model, CATIA software, Painting chemicals, Painting robots, Industry robots

Introduction

Despite the advances in the robotics 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. 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. Also, the nature of painting procedure that requires repeated work and hand rising

makes it boring, time and effort consuming. These factors motivate the development of an automated robotic painting system. This project aims to develop the interior wall painting robot. This automatic wall painting robot is not designed using complicated components. This robot is simple and portable. The robot is designed using few steels, conveyor shaft, spray gun and a controller unit to control the entire operation of the robot. This robot 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 a smaller number of moving parts and so gives expected performance.

OBJECTIVE:

- To improve safety by eliminating workers efforts.
- To make machine structure simple to enable easy mounting.
- To perform not only painting in a single colour but also drawing in multiple colours.
- To be usable not only on external walls of structures but also in various other places such as on-walls of civil structures.
- Being A Prototype Design, The Painting Section Is Limited In Height.

PROBLEM STATEMENT:

Painting in an upright position is also very dangerous for the eyes. It is very difficult to paint the wall in upright direction which is at a very long distance from earth. So, to overcome this difficulty wall painting robot is designed. The conditions during the painting is very hazardous for workers when they have to work at high height

SCOPE

1. With the higher supporting column, robot can be used for painting an even larger section of wall.
2. Adjustment of color density can be done.
3. Arm can be provided for more flexibility.\
4. Voice indication or display can be interfaced for the level of paint in the container

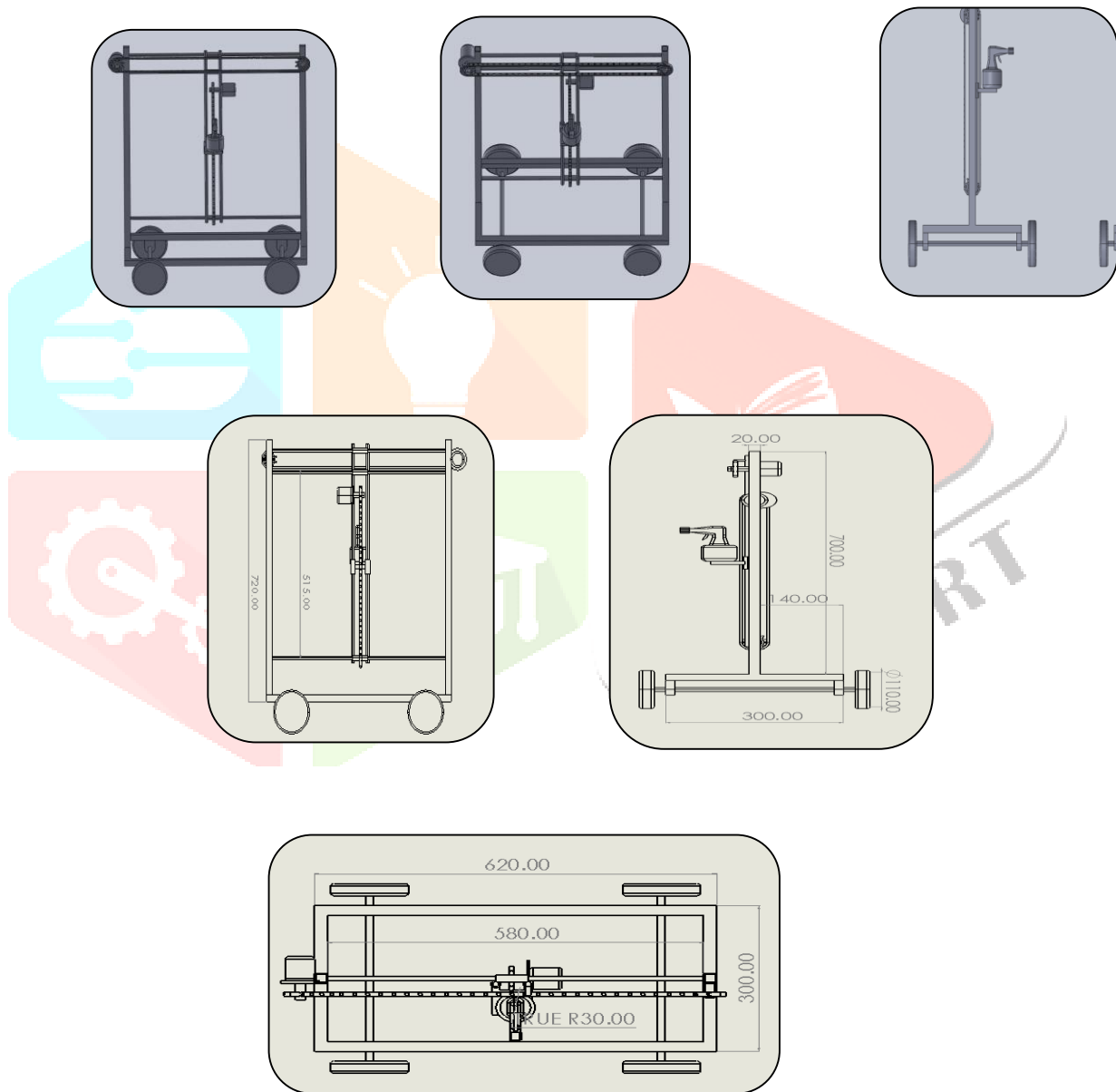
METHODOLOGY:

1. We have started the work of our project with literature review. After referring several papers, we got many ideas. From these ideas we got the topic Wall Spray Painting.
2. After that the components which are required for our project are decided.
3. After doing rough design we will start calculation of different parts. Once the calculation is completed, we have drawn a 3D model in Auto CAD.
4. By referring this 3D model we will buy the standard component required for the projects. After this we will start manufacturing work in workshop. By taking proper dimensions we will manufacture components one by one. Along with this electronics part will also be done. In electronics we will have to build controller circuit to get signal from pressure and make to make solenoid valve work. After this, assembly of different components will be done. Later testing will be started for getting various results. Simultaneously rough draft of report will be prepared. After completing testing work fair report will be done and submitted.

Working

The system is composed of lead screw, three motors and rack and pinion as the most important components. In this system one motor is placed at the bottom side which is used to move the system. Another motor is attached to the lead screw for the purpose of transferring rotational motion to it. When this motor with high torque started moving accordingly the platform attach to the screw starts moving in upward and downward direction. At the upper side a motor is attached so that the it can transfer its motion to the rack and pinion and the upper spray will move accordingly. At last according to the requirement the motor connected to the lead screw can move in both directions to move the spray in upward and downward direction

Model & Design



CALCULATION**1.MOTOR:**

Voltage = 12V, Current = 5Amp, Speed = 60 RPM

We know that,

$$P = V \cdot I = 12 \cdot 5 = 60W$$

$$P = 2 \cdot \pi \cdot N \cdot T / 60$$

$$60 = 2 \cdot \pi \cdot 60 \cdot T / 60$$

$$T = 9.55Nm$$

2.WIPERMOTOR:

Voltage = 12V, Current = 5Amp, Speed = 10 RPM

We know that,

$$P = V \cdot I = 12 \cdot 5 = 60W$$

$$P = 2 \cdot \pi \cdot N \cdot T / 60$$

$$60 = 2 \cdot \pi \cdot 10 \cdot T / 60$$

$$T = 57.3 Nm$$

Conclusion:

In this Concept we have successfully designed the automatic wall painting machine. Where two rollers are used for two different directional colouring. For the development of machine CATIA V5 R20 software is used and accordingly calculations are done and material selection has been done

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