

Automatic Painting Gun for Solar Storage Tank with Arduino UNO Microcontroller

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Abstract-During the manufacturing of solar water heater, the industry faces a problem of painting the internal portion of the water storage tank. So far this task of painting the tank internally is carried out manually by individual and a lot of time is taken to complete it satisfactorily for the consumers.

In this project we are decide make a automatic painting system to paint the internal part of the Solar water heater storage tank by automation with the gear drive driven by the application of stepper motor drive with control by the Arduino uno controller.

Keyword- Arduino Uno, Stepper motor, gear drive etc

1. INTRODUCTION

In Solar water heater companies, they manufacture solar tank .But during manufacturing inner part of tank coloring is necessary for corrosion resistance. Now at present the painting is done manually, but they required automatic painting process. So we are going to design automatic painting gun.

So during design of the painting gun the length of the tank and size is we have to consider. As the painting gun requires linear motion so we use the rack and pinion type of gear system. To run the gear drive stepper motor is required with proper time control circuit. As length of gun is large so proper support is done. By doing this assembly we done the linear movement of painting gun for paint the inner part of the solar water tank.

2. LITERATURE VIEW

In Solar water heater solar industry they manufacture the solar water heater and the tank is need to be paint by inner side of tank . As they do the paint manually so we are going to design the painting gun of linear movement. As they do painting manually so accuracy is less and time require is more.

As per economic consideration this manual process is costly now our proposal is that an automatic painting with application of the electric motor and painting gun is driven by the gear drive. So automatic painting gun is use to paint the tank.

3. METHODOLOGY

In design of the Automatic painting gun the main constructive work is divided into 3 stages:

I] Linear movable rod is made with rack arrangement.

II] Support for gear drive and painting gun.

III] Selection and Control circuit for the motor.

Now for designing the whole assembly the Rack and pinion arrangement is done and then it is placed on a proper support.

Now by achieving the proper assembly of gear drive with support, it is connected with the motor for the linear movement.

Since the motor is attached to the gear drive rod, the specific motor used here is stepper motor. The stepper motor is connected appropriately along with the timer circuit . this timer circuit is for the same purpose as incase the cartridges of the

paint gun gets over with ,it suddenly stops the motor and also puts a hold to the back and fro moment of the machine .

The supports mentioned are attached to the whole components with a installation articles like the bushings. The bushings are attached vertically to the support which gives a strong base to the whole setup. A weight is connected to the backside of the paint rod to maintain the balance of the paint gun when it inserts the solar tank

4. Hardware Description

The hardware description of the whole setup of painting gun has the main component of the working of the painting job is the paint gun. This gun is a 8 ft long metallic rod which is built in a way such that there are mini holes or pores. When this rod is inserted in the solar tank which is 10 ft long, the rod having the spores on the tip end as it gradually enters the tank it starts spraying.

When this, the spraying is in action there is a tremendous vibrating movement which creates treble in the setup.

Thus to have a strong support to this whole functional act, there are metallic supports which are the firm base to the rod and the tank. The bushings given are, for the rod which has a complete hold on the moment of the painting.

A balance has to be maintained for the rod which has the controlled motion support to the paint job.

The stepper motor which is on the line for the paint rod, is connected with the gear motor timer of the motor to have a exact, safe and appropriate functioning of the painting job.



Fig 2 : Mechanical Assembly

5. BLOCK DIAGRAM

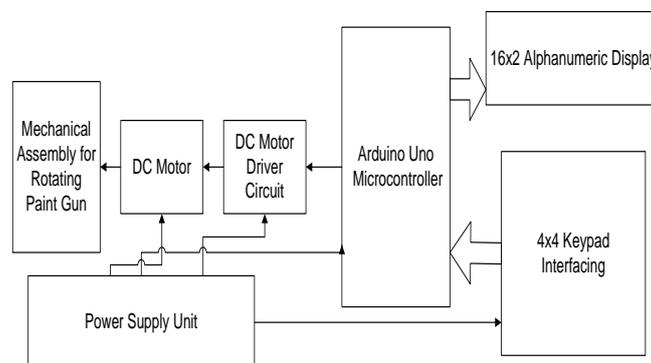


Fig 1: Block Diagram

6. SIMULATION

In the working we prepare the simulation of assembly of the project. The movement control of the stepper motor and the sprayer assembly is assembled with the Arduino Uno microcontroller. The LCD display in the simulation will give the exact location of the sprayer inside the solar water heater storage tank. The motor and sprayer will move inside the tank when the input is given with the keyboard which is interfaced with the Arduino Uno. The whole Assembly of simulation is provided in document below.

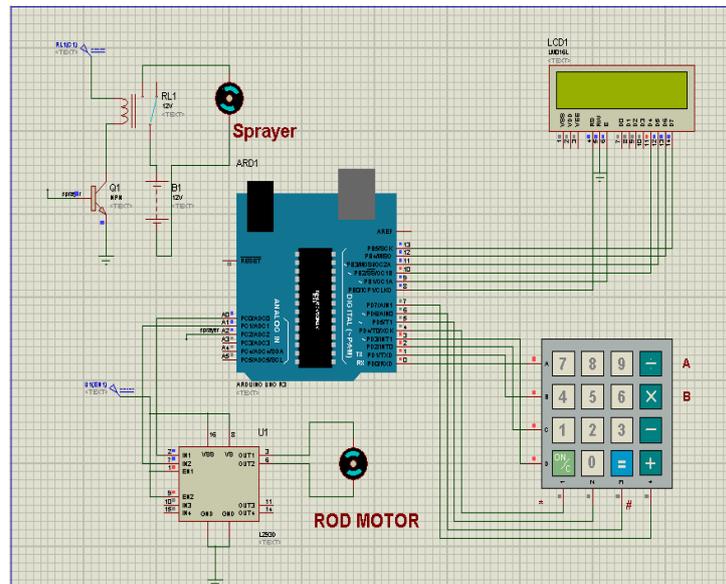


Fig.3: Simulation Of Assembly

Result of Simulation:

- I. When the input is given as A then output will display as the motor and sprayer will run for 8 feet painting work
- II. When the input is given as B then the output will display the motor and sprayer will run for 10 feet painting Work
- III. The x input will perform the manual forward movement of sprayer and motor.
- IV. The # input will perform the manual Reverse movement of the sprayer and motor.

7. Process of Working:

In a actual working of the project the paint of the inner part of the storage tank the sprayer wants to move forward and backward uniformly. The movement of the motor is controlled with the Arduino Uno controller with keyboard input with automatic and manual movement of the sprayer assembly. The paint work is done with the uniform movement of the whole assembly.

8. Project View:

In Laxmi solar industry, the internal portion of storage tank of solar water heater storage tank is manually painted. Our project aims to reduce the man power by introducing automatic painting system using mechanical gear drive system driven by electrical stepper motor with microcontroller with Arduino Uno interfacing.

9. SCOPE OF THE PROJECT:

This product is very effective in terms of the production and it's also the most enhanced method of the solar painting.

The future scope of this procedural act is very keen to acknowledge and also very useful for the motion for success in the same field.

Now here we have depicted the automated machine works, of the functioning of paint job of the solar Tank. It can be more simplified by the versatile methods of using hydraulic based, oil based, etc. processes of the painting of the same.

We therefore hope that our belief in the future about these small yet effective changes in the field of the solar tank painting should be prime priority for an undisputed and settled way of tech in this painting world.

Though it's a paint job not related to any art form but the benefits of the project can be the use and art of succeeding in the field of technology and science.

Conclusion:

The whole concept of this project was based on the enhancement of the solar tank paint job.

This is to emphasize that the LAXMI SOLAR PVT. LTD., can be enacted with our more advanced and technical support. This will make the product build a proper and systematic paint layer on the job. The value of production will also seem to lower.

Thus the quality obtained by the procedure is more superior and elegant, along with a compact and handy method which can be suitable to work on , by any inexperienced person to do the job.

The conclusion for our project and observation is that there is very small revolutionary change which "can be" a difference to the field of solar painting

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