

AUTOMATIC OCCUPANCY BASED SPRAY PAINTING MACHINE

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ABSTRACT

Now a days automatic painting machine industry is growing industry. Automatic Painting machines are very expensive and also very big in size. Small & medium level industries cannot purchase these machines. So, there is a need to make a painting machine for small and medium level industries. In these projects, 'Design and Manufacturing of Semi-Automatic Painting Machine for Flat Doors and Sheets. 'Design is based on lead screw mechanism which is coupled which is coupled with motor. When lead screw will rotate, the guide on lead screw moves linearly and nozzle on guide will spray paint according to given path. Using these mechanism flat surfaces like sheets, doors and cement walls can be painted. Design will give force analysis on parts of machine and by using these data, manufacturing can be done. Motors will be used to rotate helical rod. Controllers will control speed of rotors. This system will result in painting of many flat surfaces & side wall also.

Keyword: Front & Side wall , painting machine, flat surfaces ,motors, lead screws, nozzle.

1. INTRODUCTION

This invention relates to a machine adapted to affect automatically the painting of a ceiling or wall surface of a room or other enclosure Day by day system get improve and it overcome the human effort by using robotic machine. So, we think to participate in technical environment by making a project that helps in both station like industrial(factories) and domestic(home). We design a machine that use for painting various component like door, cement wall and sheet metal. Chemicals can seriously impair the vision, respiratory system and general health of the human painter, requires exhaustive physical efforts and involves exposure to dangerous chemicals. The machine is designed by using few steels, steel rods, spray gun, electric motor and a controller unit to handle the entire operation of the machine, It has longer life, flexibility, efficient and trustworthy. The installation and maintenance are easy.

1.1. PROBLEM STATEMENT:

Manual painting of doors & sheet metals consumes more effort, time & not having that much accuracy in work. Automatic spray painting of wall, door and sheets are available but costly in a market. In this project we will design and manufacture a prototype of semi-automatic spray-painting machine which will paint door sheets and cement walls which will be cost efficient and easy to operate. The statement of project is **“Design & Development of semi-automatic spray-painting machine for doors & flat sheets.”** which done the paint spraying work for industrial field as per requirements.

1.2. OBJECTIVE:

The project objective is to provide commercial capabilities for usage of machines for industrial painting tasks. As a matter of fact, economic realization hinders the application of the currently used conventional automation

technology (off-line programming and/or manual teach-in) used for high volume production. The actual targets for development of the semi-automatic wall painting machine, in order to solve the problems as follows:

- 1) To make machine structure simple to enable easy mounting as well as for safety.
- 2) To perform only painting in a single colour.
- 3) To avoid hazard effect of paint on human body.
- 4) Being a prototype design & manufacturing, the painting section is limited in height.
- 5) To make a machine for accurate and smooth painting at side walls also.

1.3. SCOPE:

The study of design & development of semi-automatic spray-painting machine for doors & flat sheets. which will the paint spraying work have scope for selection of nozzles, micro controllers, painting techniques & manufacturing techniques for industrial field requirement.

2. DESIGN

This project work will first introduce the background of the study. Present the Design constraints that influence on the use, efficiency and benefit their impacts on machine. After that machine part design all different existing machine assembly units will done to make a probable machine model.

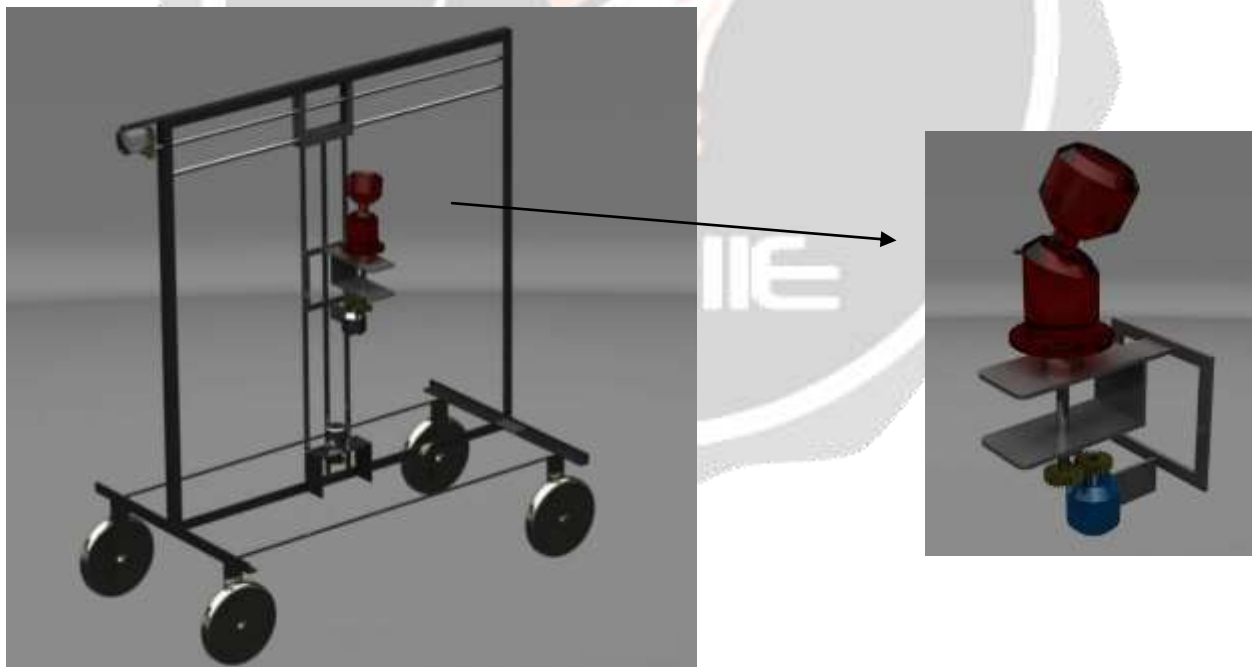


Figure 2.1 Semi-Automatic Occupancy Based Spray Painting Machine

2.1. COST

TABLE-1. TOTAL COST OF RAW MATERIAL:

SR NO.	DESCRIPTION	QTY	RATE/U NIT	TOTAL COST
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Part Name	Material	Wt in kg	Rate / kg	Total Rate
Shaft	M.S	4	80	320
Supporting frame (Angle)	M.S	12	50	600
Plate	M.S	1	40	40
TOTAL				960/-

TOTAL COST OF MATERIAL = 960/-

TABLE-2. COST OF MACHINING & STANDARD PARTS:

Machine Name	Using Time (min)	Rate /hr	Total Rate Rs/-
Cutting	70	400	450
Welding	85	500	700
Grinding	30	300	150
Drilling	35	300	180
TOTAL			1,480/-

TOTAL COST OF MACHINING = 1,480/-

1	IR SENSOR	1	900	900
2	2/2 SOLINOID D.C.V	1	850	850
3	RELAY SWITCH	1	800	800
4	PNEUMATIC FITTINGS	5	40	200
5	PNEUMATIC PIPE	5 Mtr.	30	150
6	AIR BLOW GUN	1	850	850
7	12 VOLT 2Amp CHARGER	1	250	250
8	12 VOLT DC MOTOR	2	550	1100
9	NYLON SPUR GEAR	6	50	300
10	WASHER	5	5	25
11	POWER SCREW	2	350	700
12	WIRE	2 Mtr.	10	20
13	DPDT SWITCH	2	40	80
14	DPDT SWITCH BOX	1	30	30
15	GEAR MOTOR	1	150	150
16	WHEEL	4	125	500
TOTAL				6,905/-

COST OF STANDARD PARTS = 6,905/-

2.1.1 COST OF TRANSPORTATION & OVERHEAD = 1000 / -**2.1.2 COST OF PROJECT =**

Cost of material + Cost of machining + Cost of STD part + Cost of transportation & overhead

= 960+ 1480 + 6905 + 1000

= 10,345 /-Rs.

3. PROCESS OF WORKING

This project consists of semi-automatic pneumatic spray-painting machine which is mounted on end side of movable square platform on M.S. frame stand. The sprayer nozzle holder is operated by power screw & DC motors. The gear drives are provided to move sprayer nozzle holder X-Y direction using motion of DPDT switches. A compressed air is supply through compressor using 2/2 solenoid direction control valve DCV from remote air tank and sprayer nozzle with the application of sensor operation when it senses the occupancy at that time sprayer nozzle is spray the paint. When we required operating the painting nozzle, we can operate the solenoid direction control valve DCV automatically with the application of sensor by 12 Volt supply. so that the air from DCV is passes through nozzle which spray highly pressurized air & paint mixture on wall. This system will advances and will be paint to side walls also by rotating of nozzle assembly.

3.1 ADVANTAGES

1. It is multipurpose machine for spraying paint, rusty spray & chemicals as well as water.
2. Machine is easy to fabrication & assemble.
3. Machine is easy to operate.
4. It is profitable machine for spraying paint & chemicals.
5. Cost of machine is very cheap one.
6. Maintenances cost of machine is low.

3.2 APPLICATIONS:

For spraying paint, primer & chemicals on walls, sheet metals & plywood's.

4. CONCLUSION

While concluding this report, we feel quite fulfill in having completed the project assignment well on time, we had enormous practical experience on fulfillment of the manufacturing schedules of the working project model. We are therefore, happy to state that the in calculation of mechanical aptitude proved to be a very useful purpose.

Although the design criterions imposed challenging problems which, however were overcome by us due to availability of good reference books. The selection of choice raw materials helped us in machining of the various components to very close tolerance and thereby minimizing the level of balancing problem. Needless to emphasize here that we had lift no stone unturned in our potential efforts during machining, fabrication and assembly work of the project model to our entire satisfaction to solve the problem in industrial field for social welfare.

The painting system has achieved optimum benefits with regard to reliability, safety appearance, and ease of use. All the objectives set up for this system have been achieved successfully. In terms of mechanical design, the X-axis, the Y-axis, the Z-axis module and the end-effectors module were designed and fabricated properly. All motor

mountings and couplings were properly adjusted. In 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.

5. REFERENCES

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