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DESIGN AND FABRICATION OF MATERIAL HANDLING ROBOT FOR MULTI STATION

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ABSTRACT

In our project we have designed material handling robot for multi stations. Material handling robot for multi stations is a mobile robot used in industrial applications to move materials around a manufacturing area or a warehouse. Proximity Sensor, DC Motor, Wheel and Material handling vehicle are the main blocks in this project. Here we use proximity sensor to handle a material and to replace it at a particular place in for our requirement. For this purpose we use visitor guided vehicle. A motor is attached with the vehicle wheel for moving purpose. The motor gets power through control unit. The proximity sensor detects the positioning plate and gives the output signal to the control unit and it activates the relay. The motor runs when the relay is on. When the vehicle reaches a particular place the reader detects and alarm is activated.

Key words: Proximity sensor, DC Motor, wheel, material handling vehicle, ANSYS.

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1. INTRODUCTION

Material handling is the essence of industrial robotics with most robotic applications falling within this category. End-users deploy robots to improve throughput, quality, flexibility and

consistency while decreasing ergonomic hazards for workers, scrap and the need for additional conveyance systems in manufacturing and warehouse distribution centers. Robots are increasingly called on to handle material ranging from blood samples to entire vehicles during the manufacturing process. “Consumers are more cautious about consistency and quality. Market demands change daily and the ability to adapt to changes in products and packaging is essential,” says Shishir Rege, Packaged Goods Product Marketing Manager at the Motoman Robotics Division of Yaskawa America Inc. (Miamisburg, Ohio). “Manufacturers need adaptability for mass customization so they invest in robotics to become more efficient. Robotics help in quick changeovers from one product to the next can handle a high mix of products and adjust to throughput demands.”Material handling is a series of methodologies that we employ to control the transfer of materials or components from process to process. It can also be adapted to be a process, such as a walking beam, that locates and transfers with high precision, such that a process may be superimposed on single or multiple stations. A traditional dial table would fall into this category.

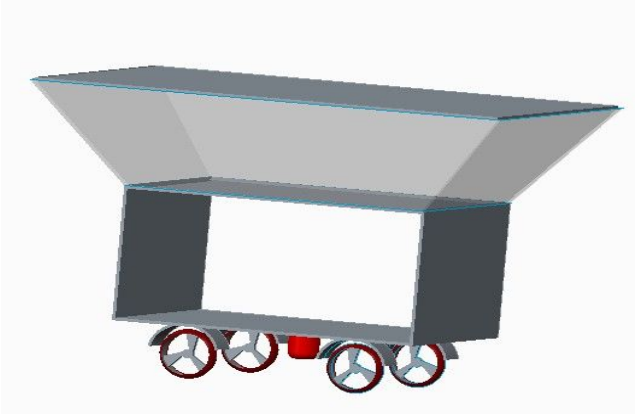


Figure 1 3d Design for Material Handling Robot for Multi Station

2. ABBREVIATION AND ACRONYMS

N = Speed
V = Voltage
I = Loading current
P = Power
E = Motor Efficiency
P_{in} = Input power
P_{out} = output power

3. UNITS

Nm = Newton meters
rad/s = radians per second
rpm = revolutions per minute
kgcm =kilogram centimeter

4. DC MOTOR CALCULATION

Specification

Speed N = 30 RPM

Voltage V = 12 Volt
Loading Current I = 300 mA
No Load Current I = 60 mA
Power P =V x I=12x0.3 = 3.6 WATT
P= 0.0048 HP
Motor Efficiency E = 36%
Motor shaft diameter = 6 mm

Figure 2 DC Motor

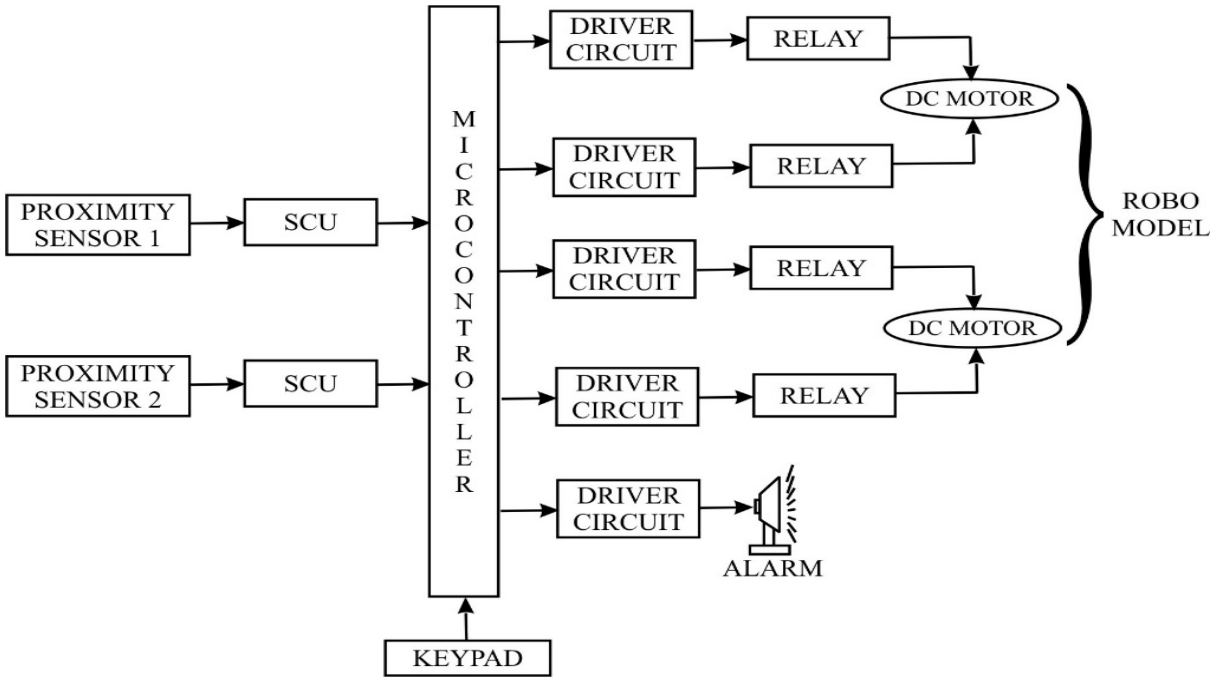
Torque of the Motor

The formula for calculating torque will be

T = (I * V * E *60) / (N * 2π)

Speed N = 30 RPM
Voltage V = 12 Volt
Loading Current I = 300 mA
= (0.3x12x0.36x60)/30x2π
Torque = 0.412 Nm
Torque (T) = 4.2kgcm

5. BLOCK DIAGRAM



6. DRAWING FOR MATERIAL HANDLING ROBOT FOR MULTI STATIONS

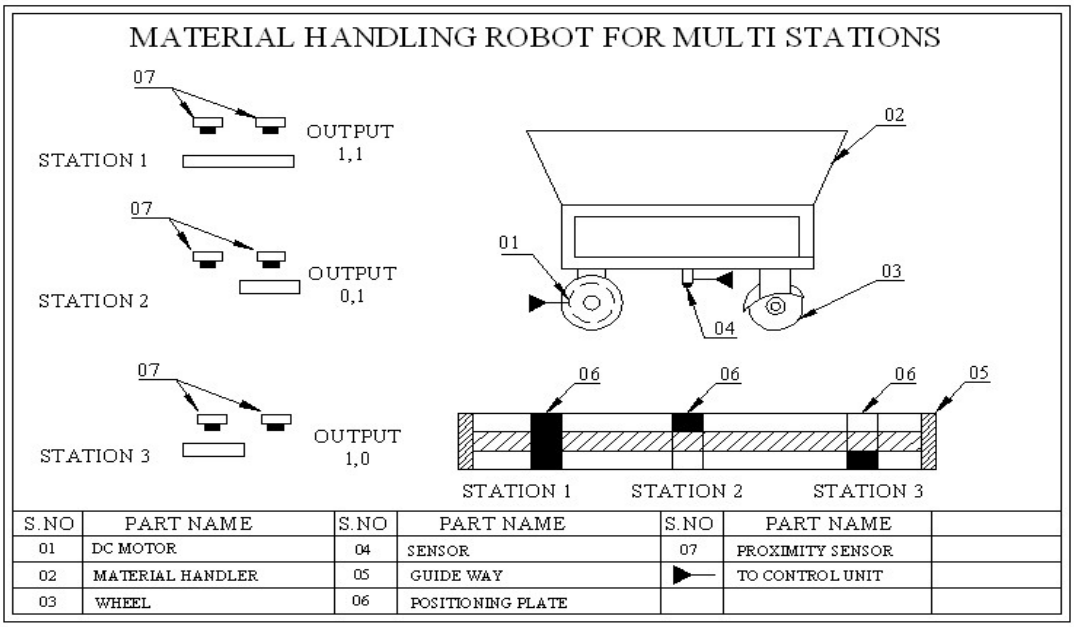


Figure 3

7. ANSYS RESULTS

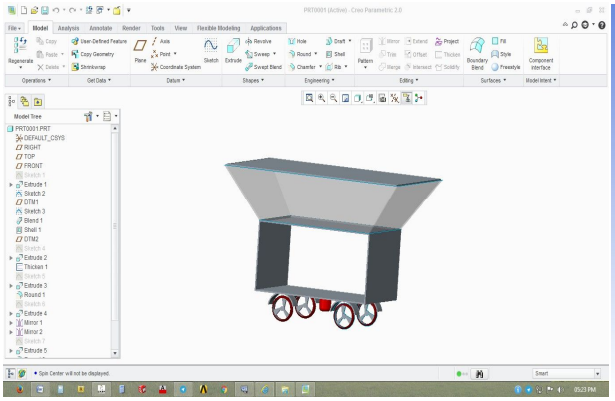


Figure 4 Using ANSYS Software

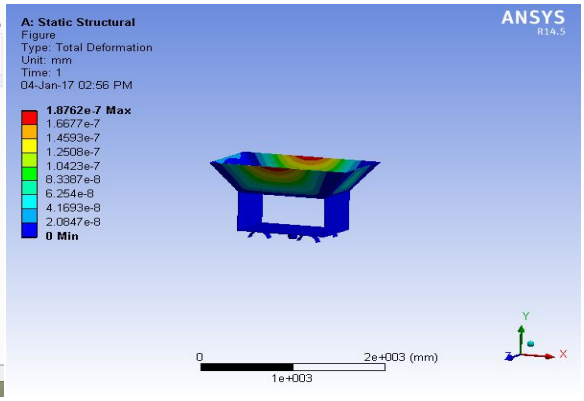


Figure 5 Total Deformation

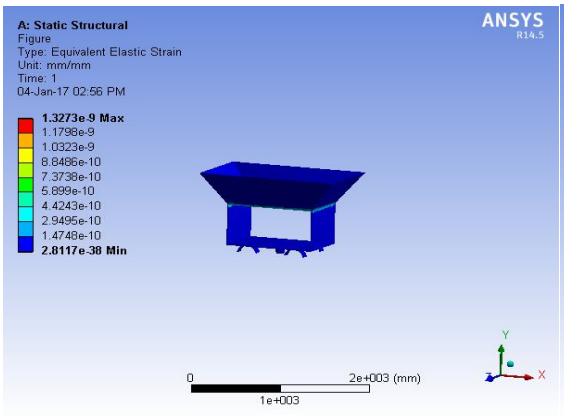


Figure 6 Equivalent strain

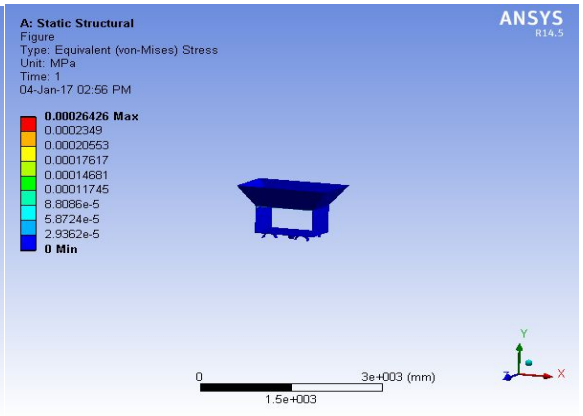


Figure 7 Equivalent stress

- In this project we have to design and optimizations of material handling robot for multi station.
- Initially we are creating a 3d model for robot then importing things file to ansys. And applying the suitable material (good with standing capacity) like composites, ceramics, Kevlar.
- Those three materials have good mechanical properties, and we have to find which material having low deformation, and stress, strain values.

8. FABRICATION OF MATERIAL HANDLING ROBOT FOR MULTI STATION

Figure 8

Figure 9

Figure 10

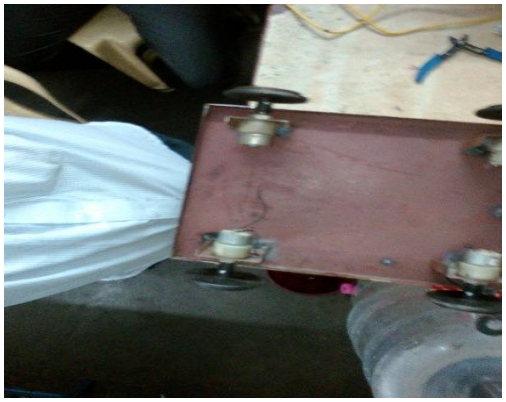


Figure 11

Figure 12 Fabrication of Material Handling

Figure 13 Robot for Multi Station

9. CONCLUSION

This project is made with pre planning, that it provides flexibility in operation. This innovation has made the more desirable and Economical. This project "DESIGN AND FABRICATION OF MATERIAL HANDLING ROBOT FOR MULTI STATIONS" is designed with the hope that it is very much economical and help full to many industries for material handling. This project helped us to know the periodic steps in completing a project work. Thus we have completed the project successfully.

REFERENCES

[1] In 1946 Leon Theremin invented an espionage tool for the Soviet Union which retransmitted incident radio waves with audio information. Sound waves vibrated a diaphragm which slightly altered the shape of the resonator, which modulated the reflected radio frequency. Even though this device was a covert listening device, not an identification tag, it is considered to be a predecessor of RFID technology, because it was likewise passive, being energized and activated by electromagnetic waves from an outside source.

[2] Similar technology, such as the IFF transponder invented in the United Kingdom in 1939, was routinely used by the allies in World War II to identify aircraft as friend or foe. Transponders are still used by most powered aircraft to this day.

[3] Another early work exploring RFID is the landmark 1948 paper by Harry Stockman, titled "Communication by Means of Reflected Power" (Proceedings of the IRE, pp 119Stockman predicted that ". considerable research and development work has to be done before the remaining basic problems in reflected-power communication are solved, and before the field of useful applications is explored."6–1204, October 1948).

[4] Mario Cardullo's U.S. Patent 3,713,148 in 1973 was the first true ancestor of modern RFID; a passive radio transponder with memory. The initial device was passive, powered by the interrogating signal, and was demonstrated in 1971 to the New York Port Authority and other potential users and consisted of a transponder with 16 bit memory for use as a toll device.

[5] The basic Cardullo patent covers the use of RF, sound and light as transmission media. The original business plan presented to investors in 1969 showed uses in transportation, banking, security, medical.

[6] A very early demonstration of reflected power (modulated backscatter) RFID tags, both passive and semi-passive, was performed by Steven Depp, Alfred Koelle, and Robert Freyman at the Los Alamos National Laboratory in 1973. The portable system operated at 915 MHz and used 12-bit tags. This technique is used by the majority of today's UHFID and microwave RFID tags.

[7] The first patent to be associated with the abbreviation RFID was granted to Charles Walton in 1983 U.S. Patent 4,384,288.

[8] Retailers want more market-friendly displays," says Earl Wohlrab, Robotic Integration Manager of Intelligrated Systems Inc. (St. Louis, Missouri).

[9] "This trend has created a more fragile marketing environment for integrators. For years we saw 'Big Box' stores, such as Wal-Mart and Costco, forcing suppliers to go from 24 counts to 32 counts to 48 counts of packaged product."

[10] The trend towards a greater variation of packaging is also on the mind of John Schwan, Director of Sales and Marketing with QComp Technologies Inc. (Greenville, Wisconsin).

[11] In the past a robot would require a heavy duty manipulator," says Mark Riekert, Project Management Manager with Rimrock Corp. (Columbus, Ohio). "As parts get bigger and

bigger, grippers must get bigger too. Grippers have become correspondingly bigger", Riekert says.

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