"ADVANCED MATERIAL HANDELING SYSTEM"

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ABSTRACT

As per technical evolution and latest requirement and related trends taken into consideration here effectively created an advanced optimistic system which can be use as a lift with multiple movement and also work as a storage and retrieval system. This system works on rack and pinion technology with vertical movement, horizontal movement and to and fro movement. This complete system is power optimized and work on 12 v DC only with desired current rating according to motor used. This system uses rack and pinion mechanism for horizontal movement and to and fro movement. This system also used rope pulley mechanism for vertical movement. This complete system uses high torque and medium torque motor. This system having advantages i.e. Multilevel movement is possible using advance arrangement, Optimistic design with secured movement, Shock Resistant, Easy to setup anywhere according to design System able to lift any material, human being , machines and devices with the use of high toque motor and proper arrangement of system, This system can be work as a universal lifting system for any industry , factories, schools and colleges , hospitals and malls. This system can be applicable to 3-D movement of Lift,3 D movement of crane for material Loading and unloading of materials i.e. concrete,bricks at buildings and towers, 3 D movement of automated multilevel car parking system, Distribution of Books in library racks with multi layer movement, Multi Layer 3 D Movement with painting of walls, Multi Layer 3 D Movement plaster mechanism, Multilayer watering system with 3 D movement, Multilayer land Crushing system with 3 D movement, Multilayer crop cutting system with 3 D movement, Multi level concrete or tar road manufacturing mechanism.

Keywords: *Rack and Pinion , Rope and Pulley , 3D Movement.*

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1. INTRODUCTION

In industry most of productive time is consumed in material handling and storage, it is necessary to automate the material handling & storage. Automated storage & retrieval system (ASRS) is one of the technology used to store & retrieve material, tools, consumable products, etc. An automated storage and retrieval system is defined as a storage system that uses fixed-path storage and retrieval machines running on one or more rails between fixed arrays of storage racks. As per technical evolution and latest requirement and related trends taken into consideration here effectively created an advanced optimistic system which can be use as a lift with multiple movement and also work as a storage and retrieval system. This system works on rack and pinion technology with vertical movement, horizontal movement and to and fro movement. This complete system is power optimized and work on 12 v DC only with desired current rating according to motor used. This system uses rack and pinion mechanism for horizontal movement and to and fro movement. This system also used rope pulley mechanism for vertical movement. This complete system uses high torque and medium torque motor. This system having advantages i.e. Multilevel movement is possible using advance arrangement, Optimistic design with secured movement, Shock Resistant, Easy to setup anywhere according to design System able to lift any material, human being, machines and devices with the use of high toque motor and proper arrangement of system, This system can be work as a universal

lifting system for any industry, factories, schools and colleges, hospitals and malls. This system can be applicable to 3-D movement of Lift,3 D movement of crane for material Loading and unloading of materials i.e. concrete, bricks at buildings and towers, 3 D movement of automated multilevel car parking system, Distribution of Books in library racks with multi-layer movement, Multi-Layer 3 D Movement with painting of walls, Multi-layer 3 D Movement plaster mechanism, Multilayer watering system with 3 D movement, Multilayer land Crushing system with 3 D movement, Multilayer crop cutting system with 3 D movement, Multi-level concrete or tar road manufacturing mechanism.

2.LITERATURE SURVEY

2.1 Kreethika c. , Kalyanaraman, P. (A Review on Automated Storage/ Retrieval Systems and Shuttle Based Storage/Retrieval Systems)

In this technology, mostly two elevators lifting tables capable of vertical movement of loads (totes) share a single mast to transport totes from horizontally operating shuttle carriers to input/output locations and vice versa. Shuttle carriers are usually tier-captive, however some other designs with shuttle carriers traveling between tiers and aisles may also be considered. Shuttle-based compact storage systems can be viewed as an extension of the use of autonomous vehicles to compact storage systems. In comparison with wellknown automated storage and retrieval systems, shuttle based storage and retrieval systems can substantially increase the throughput capacity of the system. This study is exploit the benefits of shuttle based storage and retrieval systems system design for reducing the mean cycle time of transactions and consequently increasing the throughput capacity of the system. Performance comparison of the studied shuttle based storage and retrieval systems is contrasted with alternative storage rack configurations, velocity profiles of the shuttle carriers and velocity profiles of the elevators' lifting tables in the system. The results from the literature show that shuttle based storage and retrieval systems are effective in reducing the mean cycle time and also show large improvement by increasing throughput capacity**[1]**

2.2 Shrinivas .B.Patil, Shenavi Sourabh R., et al. (Design And Development Of Vertical Material Handling Lift For Reduce Cycle Time And Cost Optimization)

Material handling is important thing for the Industries .Material handling involves short-distance movement within the confines of a building or between a building and a transportation vehicle. It utilizes a wide range of manual, semi-automated, and automated equipment and includes consideration of the protection, storage, and control of materials throughout their manufacturing, warehousing, distribution, consumption, and disposal. Material handling can be used to create time and place utility through the handling, storage, and control of material, as distinct from manufacturing, which creates form utility by changing the shape, form, and makeup of material.

1.Reduces manufacturing cycle time.
2.Reduces delays, and damage ,
3.Promotes safety and improve working conditions,
4.Maintains or improves product quality **.[2]**

2.3 Mr. Sagar R. Wankhade , Prof. V.A.Kane, (A Review On Automated Storage & Retraival System (Asrs))

Automated storage & retrieval system (ASRS) is one of the technology used to store & retrieve material, tools, consumable products, etc. ASRS have many benefits including savings in productive time, labour costs, improved material flow and inventory control, improved throughput level, high floor-space utilization, increased safety and stock rotation. This paper summarizes the various components in an automated storage and retrieval system, listing also the benefits of automating a company's storage operation. Details of the various control strategies are included and a summary of the performance measures applied to such systems. This paper takes a review on improving throughput by analyzing storage, retrieval and dwell point strategies. This paper is specifically concentrate on both a mathematical and a physical model of ASRS based on an industrial locality. This facility will provide capability of

testing both mathematically and empirically a variety of ASRS control strategies including: dwell point, travel type, control, continuous or single operation, retrieval, and storage strategies. **[3]**

3. FORMULATION OF PRESENT WORK

3.1 PROBLEM DEFINITION

1. Old available system required 3 phase motor
2. System is costly
3. Chances of shock.
4. Chances of accidents
5. Only up and down movement is there.
6. Oil Leakage is there.
7. Maintenance is difficult and costly.
8.Chances of sparking and misalignment

3.2 FLOW CHART

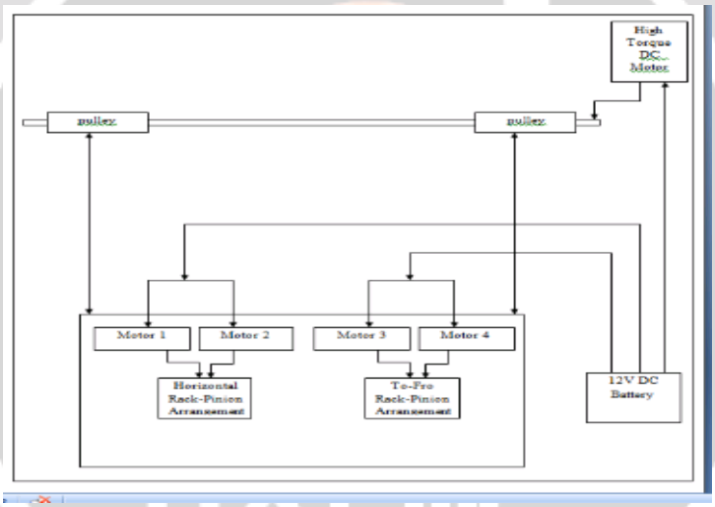


Fig -1 Flow chart of Advance Material Handling System

Table 1: Element Use In Flow Chart

Sr. No.	Name Of The Element
1.	Motor
2.	Rack And Pinion
3.	Horizontal Shaft
4.	Pulley
5.	Metal Thread Rope
6.	12V DC Battery

3.3 WORKING

This project uses 2 rack and 4 pinions for horizontal movement and to and fro movement. This 4 pinion is moving over 2 long racks. The control movement followed by switch board. In this horizontal rack and pinion movement uses 50 RPM high torque motor.For 2 and fro motion also uses rack and pinion. This to and fro motion is use to place a particular object on the floor. For this to and fro motion, here used another rack and pinion assembly followed by 50 rpm motor.The first rack and pinion assembly with lifting mechanism use to lift all above assembly. This lifting mechanism uses 2 pully , thick metal thread rope and high torque motor with 50 RPM rotation. In this project all above mechanism control by switch board.This project is based on 3D movement system using rack and pinion technology. This project uses vertical bars for aligned vertical lifting using rope pulley mechanism. This project uses following system

1. Rope pulley mechanism with motor drive for vertical lifting
2. Rack and Pinion Mechanism with motor drive for horizontal movement.
3. Rack and Pinion Mechanism with motor drive for to and fro movement.
4. Coupling Arrangement between motor and shaft.

3.3.1 ROPE AND PULLEY MECHANISM

Fig -2 Rope and pulley mechanism

This project uses Rope pulley mechanism to lift a particular lift. The pulley is basically made up of mils steel and this pulley is locked by grub. This pulley placed over the shaft having diameter is 20 mm so we have prepare a bore of 20mm on pulley. There is rope mechanism locked on pulley and rope here used is metallic stainless steel rope to avoid breaking and cutting. As this rope is made up of stainless steel with multiple turned wire so it is non rust able and high load baring capacity. As shown is picture there is grub made up of carbon steel grub with locking capability. This pulley is placed on 20 mm shaft which is mild steel bright rod.When motor starts rotates this pulley rotates simulteanuously and device start to lift.

3.3.2 RACK AND PINION ARRANGEMENT

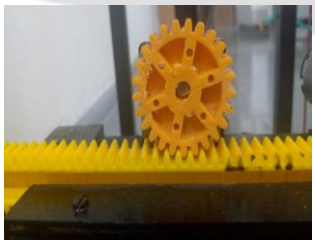
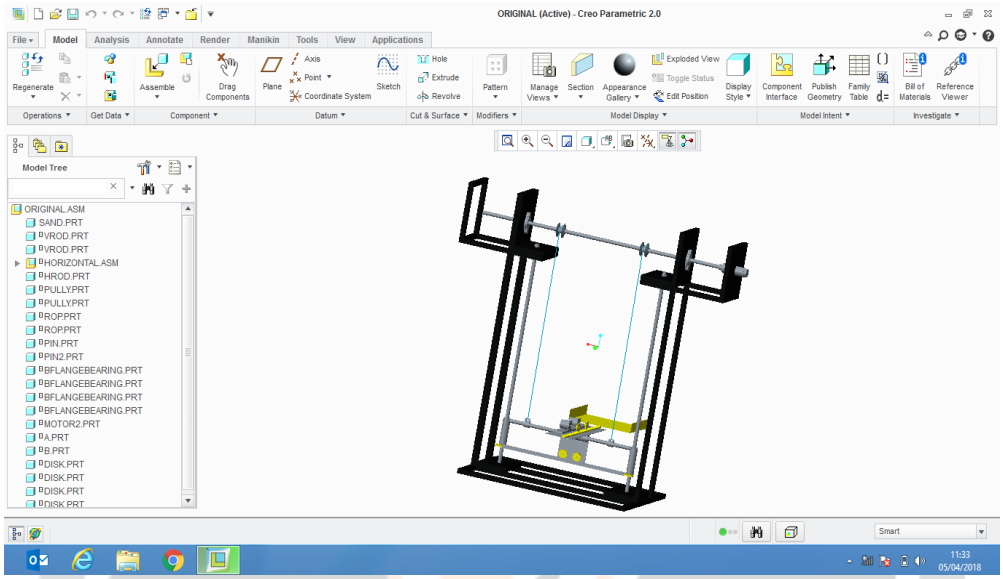


Fig -3 Rack and pinion arrangement

This system uses rack and pinion arrangement for horizontal movement And to and fro movement. To rotate pinion here used high torque DC 50 rpm motor. In addition to this if there is need to carry large or heavy load we can increase the capacity of motor and also we can use gear box for synchronous speed. This project uses 4 different

motor with 4 pinion arrangement so that system can able to maintain uniformity and able to carry and rotate large load.This system used following specification of pinion. Pinion used 50mm with 25 teeths. Here in this project uses 4 different pinions which is rotates over high torque motor.

3.4 CERO DIAGRAM



3.5 ACTUAL IMAGE

4. CONCLUSIONS

From this project we conclude that:

1. This project uses three different motions i.e. up and down, left and right, and to and fro motions is possible.
2. The complete three dimentional movment is possible with the help of single battery having 12v 8Amp.
3. This complete system can be able to lift with the use of high torque motor with maximum 50kg lifting capcity.
4. This complete system is power optimistic and easy to use.
5. With the use of rack and pinion technology horizontal and to and fro movement is possible.
6. This system is able to use everywhere according to load capcity and torque produce.

5. REFERENCES

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