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SPACE UTILISATION BY USING AUTOMATIC STORAGE AND RETRIVAL SYSTEM

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ABSTRACT

This Project deals with the applicability of as/rs system are maximum quantity of product store in the system that are used for the storage and retrieval of product in both distribution and production environments. As/Rs system are composed of motor, chains, working table that are attached on a shuttle carrier, shelves, programmable logical controller based control system and storage racks. As/Rs system Increase the throughput capacity of the product as compared to conventional storage system. This system has very benefit such as saving in labor cost ,improved material flow ,increase productivity better space utilization, safety and ergonomic ,optimized load balancing ,maintenance cost also low. By using this system in the company then production rate is increases.

Key words: As/Rs system, Increase throughput capacity of product, saving in labor cost, Increase production Rate.

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I. INTRODUCTION

In this scenario industry need higher production rate so to minimize the some drawback like larger floor space ,picking rate of product, time required for assembly then this new concept are introduced known as vertical stacking system. The large floor space is occupied in the company, then the new concept invented in 1898 by Sir. James Henry Rand was designed steel cabin to store index card make them easier to sort an access. He founded the American kardex company in 1915. This company made the kardex shuttle system also known as vertical stacking system. It is the type of automated storage and retrieval system .This system is defined as the storage system that uses fixed path storage and retrieval machine running on one or more rails between fixed arrays of storage racks.

It is used for distribution and production environment and ware house system to store and retrieve unit loads without interference of an operator. Today's world of rapidly changing customer demands , small internet order ,tight delivery schedules , high competition and high service level requirements then that condition are satisfied so this new system is introduced .The main advantages of vertical stacking system are saving in labor cost and floor space, increased production rate. To meet this demand in throughput capacity and constraint with regards to delivery times in storage system are developed in automated material handling industry. In general compact storage system are popular for storing product with relatively low unit load demand and characterized by high space efficiency.

Atlas Copco is a Swedish company founded in the year 1873. It mainly involved its manufacturing of machines that goes underground. Machines used for drilling and mining are the main interests of the company. Almost 100 years later after forming the company in the year 1972, production of water well rigs started. This was mostly used for drilling gas along with CBM wells.

The concept adopted for this project is the Kardex shuttle concept, which is generally used for inventory management. It can be defined as modular structured computer managed robotic vertical lift, storing along with the recovery system. Every part works with its own computer and electronically managed extractor which moves and provides the required tray or bucket to the small entrance of the location allocated for its storage in a very small duration of time. All the materials are stored on the plates or trays on the forward facing and backward facing side of the tower. This kardex shuttle extractor does the

work of getting the required material from their storage location to the trays and placing the material back to its previous location after use. This extractor is given the motion with the help of belts of two toothed type, which is also the latest technique and is noiseless working characteristics.

The process of drilling. In many parts of the developing countries of the world, there are still areas where people do not receive water regularly and so are still backward. To overcome this issue, requirement of the lightweight, portable drills are required which can be carried to these smaller and remote areas, and are able to work in the harsh environments. The areas that are badly affected by the draught require the water supply sooner and efficiently. Water well rigs as shown in figure 1, have been manufactured to fulfill similar requirements and help the society.

II. EXPERIMENTAL PROCEDURE WITH REQUIRED EQUIPMENT

In every company the main issue faced is space management on the shop floor. The area available is to be utilized for material storing as well as the production of the machine, both are required to be on the same floor so that this system is installed in the company. This system requires less floor space area then time requirement for moving the material to required site is less and production rate is higher.

After the floor area was studied, the next task was to find out the Kanban quantity. This was done to make sure, the flow of material is right in time and the production should not get affected due to any kind of delay in the availability of the material. For deciding the Kanban system, the two bin system is followed. The quantity of material in each bin is to be calculated and accordingly the order is needed to be placed. For calculating the quantity, the parameters required are lead time, monthly production, the daily requirement of the material.

There were various machines and companies that provide this kind of machines. It is made to the requirement of the company, the height, width, placing on the shop floor. This concept makes the storing of material having different sizes possible. The material can vary from smaller parts to the material on the trays in one entire single unit. It benefits to improve the working techniques in the storerooms or warehouses.

With the help of good motor, the initiating and stopping of the extractor and trays becomes very smooth and jerk free. Addition of the speed controller feature make starting and stopping routine more reliable and smooth by managing and transporting speed and also change the situation of the changing load strain. This is ensured the time required for transporting also reduced.

Microcontroller ATmega328

Operating Voltage 5V

Input Voltage (recommended) 7-12V.

Input Voltage (limits) 6-20V

Digital I/O Pins 14 (of which 6 provide PWM output)

Analog Input Pins 6

DC Current per I/O Pin 40 mA

DC Current for 3.3V Pin 50 mA

Flash Memory 32 KB (ATmega328) of which 0.5 KB used by bootloader

SRAM 2 KB (ATmega328)

EEPROM 1 KB (ATmega328)

Clock Speed 16 MHz

- **VIN.**

The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.

- **5V.**

This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it.

- **V3.**

A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.

- **GND.** Ground pins.

RFID Reader Module

This is a low frequency (125Khz) RFID reader with serial output with at range of 8 to 12cm. It is a compact units with built in antenna and can be directly connected to the PC using RS232 protocol.

Fig no.1

SPECIFICATIONS

Parameter	Value
Operating Voltage	5v
Current	<50mA
Read distance	10cm
Operating frequency	125khz

Pin	Name	Details
1	gnd	Power supply gnd
2	rx	receiver
3	tx	transmitter

4x4 Matrix Membrane Keypad (#27899)

This 16-button keypad provides a useful human interface component for microcontroller projects. Convenient adhesive backing provides a simple way to mount the keypad in a variety of applications.

Features
- Ultra-thin design
- Adhesive backing
- Excellent price/performance ratio
- Easy interface to any microcontroller
- Example programs provided for the BASIC Stamp 2 and Propeller P8X32A microcontrollers

Key Specifications
- Maximum Rating: 24 VDC, 30 mA
- Interface: 8-pin access to 4x4 matrix
- Operating temperature: 32 to 122 °F (0 to 50°C)
- Dimensions: Keypad, 2.7 x 3.0 in (6.9 x 7.6 cm) Cable: 0.78 x 3.5 in (2.0 x 8.8 cm)

Application Ideas
- Security systems
- Menu selection
- Data entry for embedded systems

Fig no.2

How it Works

Matrix keypads use a combination of four rows and four columns to provide button states to the host device, typically a microcontroller. Underneath each key is a pushbutton, with one end connected to one row, and the other end connected to one column. These connections are shown in Figure 1.

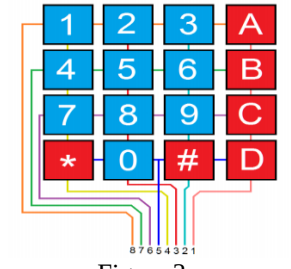


Fig no.3

In order for the microcontroller to determine which button is pressed, it first needs to pull each of the four columns (pins 1-4) either low or high one at a time, and then poll the states of the four rows (pins 5-8). Depending on the states of the columns, the microcontroller can tell which button is pressed. For example, say your program pulls all four columns low and then pulls the first row high. It then reads the input states of each column, and reads pin 1 high. This means that a contact has been made between column 4 and row 1, so button 'A' has been pressed.

For use with the BASIC Stamp example program listed below.

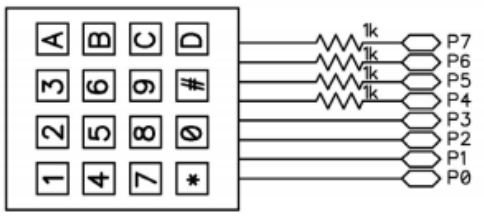


Fig no.4

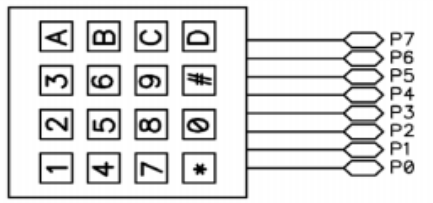
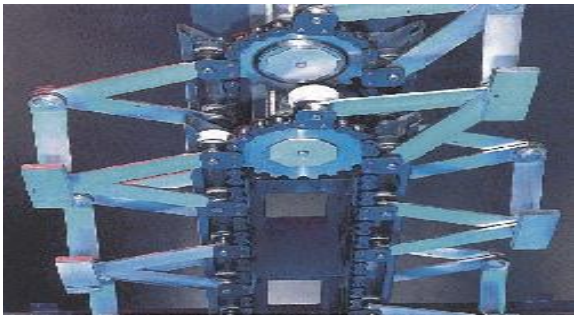


Fig no.5

Driving and driven member

Motor shaft rotate the driving gear .Driving gear are connected to driven gear with the help of chain drive and driven gear are connected as axle shaft of rotating member of chain bucket mechanism. Chain bucket mechanism is attached with Shelves or racks. The linear upward and downward movement of shelf is done by use of chain bucket mechanism which is show in below figure.



Advantages
- Optimize the load balancing.
- Maximum weight of product is stored.
- Better Space Utilization.
- All available vertical height is utilized, reducing floor space requirements.
- Product Pick Rate is higher.

- Better Environmental Control- For example, product inside a vertical stacking system will be protected from dust or other contaminants.
- Increase productivity Rate Materials are delivered directly to operator, minimizing walking, climbing, bending or reaching for heavy objects.
- Space Utilization All available vertical height is utilized, reducing floor space requirements.
- Work place ergonomics enhancements.
- Accurate inventory control.
- Expandable storage options.

III. CONCLUSION

In this project it is observed that the area required of vertical stacking system is less as compare to conventional storage system, so improving the space efficiency of any company. Vertical stacking system has very high throughput capacity or maximum amount of material store in this system. Also the maximum weight capacity of material is used in this system. As per calculations and result by using this system company production rate are increases at desired level. Also picking rate of product and faster delivery is done in this system. The vertical stacking system is a great improvement for the materials handling systems.

It increase customer delivery yields and to grow overall as a company. It was opportunity for growth and chose the right system, which aligned with the corporate goals of the company. When the Vertical Stacking system was introduced, with some amount of investments, it was possible for the company to increase their production rate of company. This is also help to increase their sales accordingly. This system increases the throughput capacity of the system.

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