DESIGN AND DEVELOPMENT OF MATERIAL SORAGE AND RETRIVAL SYSTEM

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ABSTRACT

This article proposes an highly developed fully automatic MSRS (Material storage and retrieval system). This main material management support system is generally used for storing and retrieving the unprocessed materials in the manufacturing unit. The necessities of MSRS are increasingly of a more dynamic nature for which new models will need to be developed to overcome the time consumption. MSRS consists of a range of controlled systems for automatically retrieving and storing loads from preferred storage spaces. It is usually used in applications where there is a very high quantity of loads being moved into and out of storage. This system is mainly used for storing and retrieving the unprocessed materials in a manufacturing unit. The main aim of this paper is to build up an automatic system from the present system. The original idea of the article is to help public those who work as operators by designing a system where it is capable of managing the drawer without interference of an operator. The performance of the present system is enhanced by using PLC integration where it coordinates the operation and control of MSRS.

Keywords: - *Material storage and retrieval system, ASRS, PLC & SCADA, Warehouse Management.*

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1. INTROD UCTION.

In a dynamic industrial location the collection of unprocessed materials or completed products is done by automated guided vehicles, which has an important role in the improvement of these competitive conditions. The control and speed of production storage delivery systems by means of a classic human operated forklifts and hence the stock data management are more difficult. Therefore a fully automated material storage and retrieval system (MSRS) is implemented in order to find the solutions for all these problems. Recent advances in this technology offer the possibility of drastically reducing the cost of the current system with accurate and fast positioning under a defined degree of automation.

The MSRS is an important key part of the rapid logistic system along with the consideration of limited space, high labour cost, requirement of quality, reliability, management control. It consists of mechanical equipment, automation control equipment using PLC integration, computer system and it operates under computerised control maintaining an inventory of the stored items for handling the materials which is at a height. Retrieval of items is accomplished by specifying the item type and quantity to be retrieved. The computer determines where in the storage area the item can be retrieved from and schedules the retrieval. It directs the proper automated storage and retrieval machine (SRM) to the location where the item is stored and directs the machine to deposit the item at a location where it is to be picked up. The MES takes loads into and out of the storage area and move them to the manufacturing floor or loading docks. To store items, the pallet is placed at an input station for the system, the information for inventory is entered into a computer terminal and the MS/RS system moves the load to the storage area, determines a suitable location for the item, and stores the load. This paper aims to develop the functionality of a manually controlled SRM using PLC integration.

2. PROPOSED SYSTEM.

In the proposed system the manual operators are not required either to store or retrieve.A Tri-axis Functional ECS is constructed to store and retrieve the materials to/from the storage chambers. The ECS can move in X, Y & Z axis to perform the functions of storage and retrieval as shown in Fig1.The storage chambers are designed in such a way that they can detect the presence or absence of materials and correspondin gly instruct the PLC. The ECS has a base plate to provide the base for the pallets where sensors are provided

3. BLOCK DIAGRAM

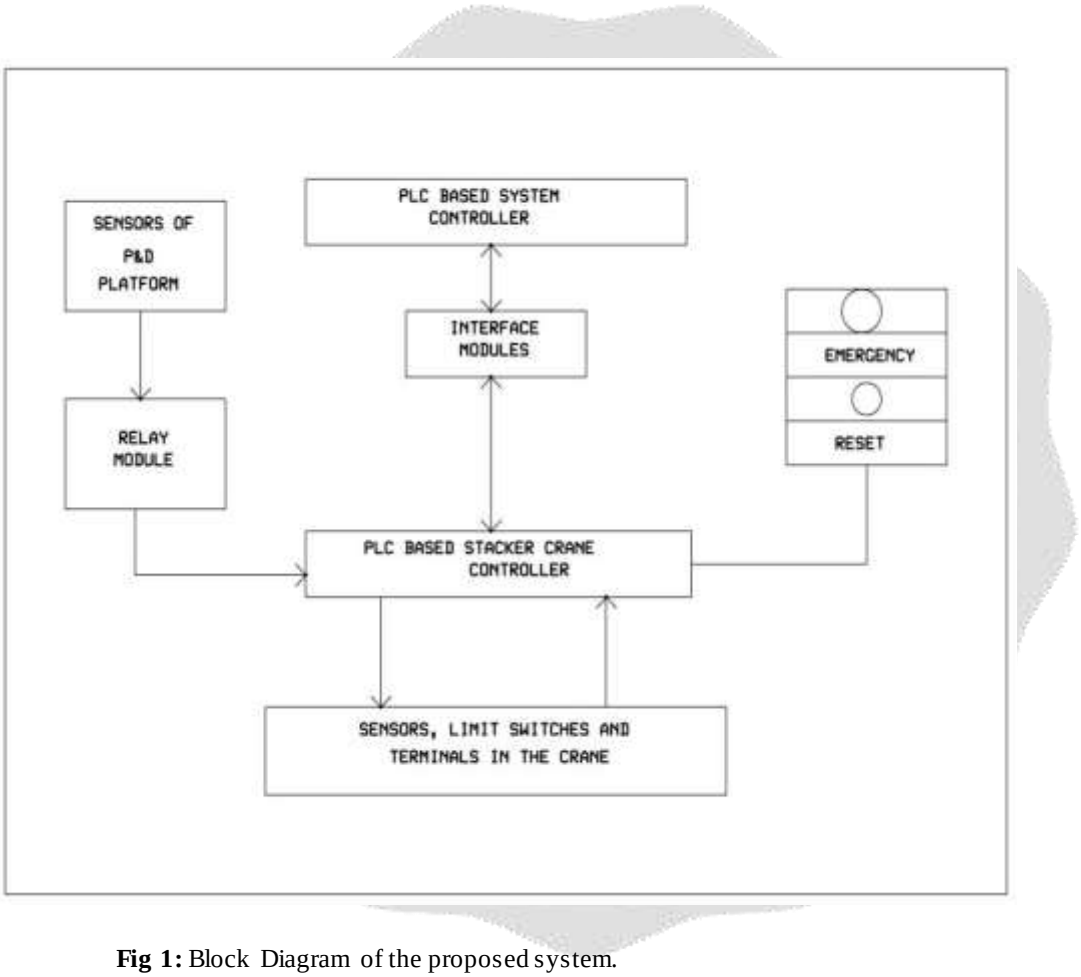

Fig 1: Block Diagram of the proposed system.

The basic block diagram of ASRS is given in Fig2. Here two controllers are used, that is, the PLC based system controller and the PLC based stacker crane controller. The PLC based system controller is interfaced with PLC based stacker crane controller through interface modules. These two controllers communicate through Profibus. Here Profibus is used so that all the inputs and outputs can be connected in single cable for easier and faster communication. The stacker crane controller is connected to several sensors, limit switches to get physical inputs.

The PLC based system controller is nothing but the HMI (Human Machine Interface) screen. Once when the sever enters the rack number for storing or retrieving operation the stacker crane controller senses the row and column to which it has to perform the operation. The end limits of travel in all the axes of movement are detected by heavy duty limit switches.The position of fork at centre is also detected

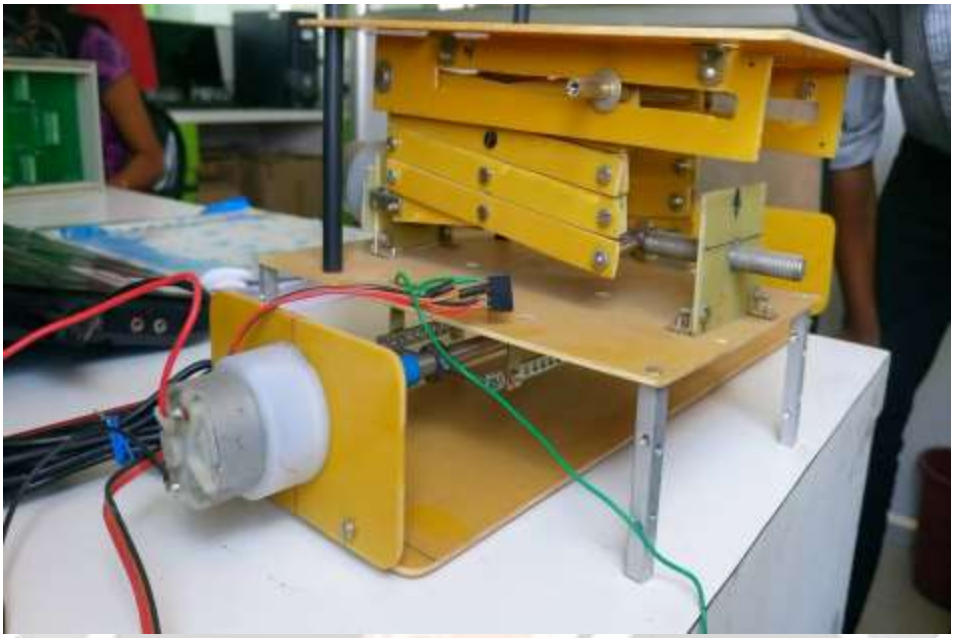

Fig 2: Elevator Conveyor System.

by limit switch. The digital inputs are given to PLC through relays. The sensors of P&D platform is used to sense the presence or absence of pallet. The emergency switch is provided for any emergency purpose like power failure and shuts down the whole system. The Reset option is used to stop the crane at any po sition and return to its homing position

4. CONCLUSION

Automated storage and retrieval system (MS/RS) is complex in design and fabrication which needs exclusive study of transmitting devices, motors to control movements of the various axes, positioning techniques and feedback control system, power circuitry. Automated storage and retrieval system development is divided in layers i.e. fabrication of the mechanical components and their assembly, the electrical circuitry, the electronic circuitry, programming and interfacing.

5. REFERENCES

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