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REVIEW ON DESIGN AND PNEUMATICALLY OPERATED ELECTROMAGNETIC PICK AND PLACER

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ABSTRACT

With the coming of the industrial revolution and the development of more complicated machines of farming, Which of them is harrow, a harrow is a piece of farm equipment consisting of a row of blades fixed to a heavy frame,when it is pulled over ploughed land, the blades break up large lumps of soil.

The rotor disc manufactured from sheet metal are cut in circular shape to place it on the roller line with rack of 60-70 rollers ,the rotor disc is placed on the roller assembly by two persons before implementing this pick &placer concept. This conventional method of placing the disc on roller conveyer assembly is replaced by pneumatically operated cylindrical and electromagnet with frame arrangement due to use of conventional manual method of placing the disc on the conveyer man power and time required is more. Now we implementing this pick & place arrangement to reduce efforts, which will result in time saving & improve the economy of the production.

Keyword: Electromagnet, Metal plate, Photo sensor, Pneumatic cylinder, Proxy sensor.

I. INTRODUCTION

In materials handling and assembly there are many ways to move an item from one location to another. Conveyors can only move objects in a fixed path, limiting their use in many manufacturing applications. When more precision is required than a conveyor can deliver, such as when the part orientation or alignment needs to be changed, a pick-and-place system is often used.

Pick-and-place technology is also typically used for packaging applications in which items are placed in containers or stacked. The most common pick-and-place systems employ either pneumatics or electromechanical systems. With hybrid electric-pneumatic systems also an option in some applications. The question then becomes what system is the best for each application, taking into consideration multiple factors including cost, complexity, performance, and maintenance. The amount of movement that must be performed, the required accuracy of the placement, the weight of the objects to be lifted, the shape of the parts, the distance they must travel, and other such considerations will determine the system best suited for the application, In general, jobs with complicated movements requiring a high level of accuracy need more expensive electromechanical pick-and-place systems.

If the application has a fixed travel path and doesn't need repositioning or multiple positioning, a pneumatic pick-and-place system is often the best choice. This article will cover the basic design considerations as well as the best commissioning techniques for simple pick-and-place pneumatic devices. When pneumatics are better Although initial cost is often the driving force for using pneumatic pick-and-place systems instead of electromechanical solutions, Pneumatic devices have a greater force density than many electromechanical solutions, which enables them to be a smaller and lighter, lowering space needs and energy costs.

They can be also installed without requiring complex software programming of controllers, as their operation is simpler with a single path of travel. In applications with contaminates, such as possible splashes, electromechanical systems pose more danger and are more likely to fail. Pneumatic systems are not only safer in wet or corrosive environments main controller is often a good method to control the speed.

II. HISTORY

In the early decades of 20th century, Industrial Engineering was primarily applied to manufacturing industries for improving the methods of production, developing work standards, formulating production control and establishing wage policies. After the World War II, Industrial engineering concept were been also applied to non-manufacturing sectors such as health services transportation and construction Government and military operation, Farm and Public utilities and Airline operations. From last country, many research / Engineers had contributed by developing different techniques of productivity improvement. Following is the brief review of history and contribution in the field of Industrial Engineering. For over two countries use Industrial Engineering technique has been recognized as an important factor in a country economics growth. The traditional view of manufacturing management began in eighteenth country. Adam Smith recognized the economic benefits of specialization of labour. He recommended breaking of jobs down into subtasks and recognizes workers into specialized tasks in which they would become highly skilled and efficient. 1776, Adam Smith through his book wealth of nations laid foundations of scientific manufacturing. He organized division of labour concept, Based upon skill development time saving and the specialized machines.

He influenced the industrial scenario in grate deal and contributed to achieve mass production in larger extent. His work was carried forward by Charles Babbage, an English mathematician. Fredrick W. Taylor (1859-1915) was a mechanical engineer, who implemented Smith's theories and developed scientific management. From then till 1930, many techniques were developed prevailing the traditional view. Initiated investigations of better work method and developed integrated theory of management principles and methodologies. Henry L. Gantt (1913) was an engineering contemporary of Taylor, had a profound impact on the development of management thinking and he worked in the field of motivation, developed tasks and bonus, incentive planes. He advocated measurement of management result by using Gantt Charts and proposed training of workers by management. Frank Gilbert suggested motion study (1917) as the science eliminating wastefulness resulting from unnecessary, ill directed and inefficient motions, he evolved principles of motion economy .gilbert therbligs (the fundamental motions involved in doing an activity).he also developed micro motions study and SIMO analysis to office procedures and applied motion study assemble and dissemble the weapons during his service in U.S. army.

III. LITERATURE REVIEW

Machine set-up and precision are critical to the efficiency of the high speed pick-and-place machines' operation. It requires the evaluation and control of many parameters koepp et al, 2008). Proper machine set-up requires highly experienced technicians or engineers. There are various designs to achieve precise pick-and place .Table 1 summarizes the various methods proposed by different researchers to achieve high speed pick and-place (Chuaet al, 2012).

Vision Inspection system is one of the commonly used tool in industry (Patrick, 1996; Ronald et al, 1999; Brian, 2001; Leigh, 2003; Christine, 2003 & 2009, Piccinini et al, 2012). It consists of a camera, light source, frame grabber, computer and the image processing algorithm. Vision systems require high reliability in order to find out the defects of inspected units. In the actual application, the vision system is a sub-module mounted on the IC test handler. More than 20,000 Units per Hour (UPH) passes through the vision systems and the ICs are constantly being moved from one inspection station to another.

Consumer demand for electronic products like smart phones and tablet computers have been steadily increasing, it makes extremely heavy demands in the electronics manufacturing industry. High speed vision systems are required to inspect integrated circuit (IC) packages as small as 2mm × 2mm. Current commercial IC test handlers which include IC inspection have reached speeds in excess of 20,000 units per hour (UPH) and its vision systems require the support of reliableSoftware (Chuaet al, 2012).

Researcher (year)	Researcher (year)	Results
Ayob et al. (2004)	Developed nozzle selection heuristic to optimize hybrid Pick and place machine. Machine with on-the-fly component alignment mechanism	Throughput of machine increased by 2.07% from 2995CPH to 3057CPH
Nab atet al. (2005)	Four degree of freedom (DOF) parallel robot	Achieved high speeds of up to 13G acceleration and Cycle time of 0.28s.
Geodeet al. (2007)	Innovative shuttle concept to reduce travel time of pick up arm	Successful pick and place cycles however accuracy Needs to be improved.
Paul ideset al. (2008)	Contactless pick and place robot aimed at eliminating wear due to friction and cables on single axis	Successful prototype however had twice more movingmasses which resulted in 50% larger acceleration thanPrevious prototype.

Table 3.1: Methods to achieve high speed component pick-and-place.

IV. DESIGN OF COMPONENTS

4.1 Conveyor & Pick And Place Assembly (As per KAIZEN'S - 5S Technique)

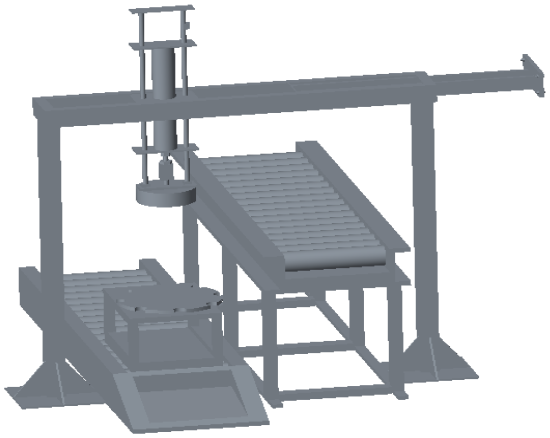

Fig. 4.1.1:-Pick &placer machine.

4.2 Specification

4.2.1 Conveyor:-

Our specialized chains and attachments are built to Union specifications to handle maximum production and high shock loads. We keep your lines running longer under tough conditions reducing your downtime and increasing your bottom line.

4.2.2 Pneumatic cylinder:-

Pneumatic cylinder uses air as compressible material. For this require less maintenance during its operation. Because air is inflammable, require less space for its storage, easy availability etc.

Sr.no.	Description	Quantity
1	Pneumatic cylinder piston 1200 mm stroke length with cousioning	1
2	Pneumatic cylinder piston 700 mm stroke length with cousioning	1
3	PU 8 mm pipe	25 mtr
4	PU 8 mm Flow Control Valve	6
5	PU 8 mm Direction Control Valve 2*2	2

4.2.3 Electromagnet: -

Electromagnets have several advantages for handling ferrous parts over conventional imp-active also it is a quick in action. It uses electric supply for its proper working also it uses electric supply and creates electromagnetic field for holding the ferrous plates. Electromagnet size is directly dependent on required pretension force; residual magnetism in the part when handled when using DC supplies requires the additional

of a demagnetizing operation to the manufacturing process.There are using circular electromagnet of load carrying capacity is 12-38 kg.Withsupplying voltage of 12/24 VDC.

4.2.4 Sensor:-

There are two type of sensor are use mainly a) proxy sensor, b) photo sensor,

a) proxy sensor- There are five PNP type proxy sensor are used
b) Photo sensor-There are three PNP type photo sensor 10-30 VDC supply voltage.

4.2.5 Frl unit:-

FRL unit is a device consisting of Air Filter, Air Regulator and Air Lubricator. It is also called air servicing unit, because it does the function of cleaning, pressure adjustment and lubricating the compressed air.

Function of FRL unit

- Air filter: It separates solid contaminants from compressed air and provides clean air to the pneumatic system.
- Air regulator: It is a pressure reducing valve. It maintains constant reduce pressure in the pneumatic system.
- Air lubricator: It adds lubricating oil to the flowing compressed air in the form of mist or fog.

The compressor creates 40 HP pressure but pneumatic cylinder required pressure 5 Kg/cm^2 will provide with help of FRL unit.

4.2.5Electric motor:-

The electric motor used is induction type motor (3 Phase AC), having motor rating as follows:

- Power- 0.75KW
- RPM-1385
- Frequency-50 Hz
- Voltage-115-240 Volt

These type of motor has high starting torque and used to drive the conveyor, the motion and speed is control with the help of reduction gear box.

V. CONCLUSION

The manufacturing of pneumatically operated electromagnetic pick and placer machine will reduce the human effort of loading and unloading the disk on the roller conveyor. By using this machine new designed rate of production will be increase and reduce the operator requirement the whole system are controls by Relay logic System.

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