

INSPECTION CONVEYOR SYSTEM

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ABSTRACT

In our paper "INSPECTION CONVEYOR" begins with an introduction to material inspection, it has various applications. The sensors are used to measure the material dimensions and this signal is given to control Unit. The control unit gives the appropriate signal to the pneumatic cylinder. The pneumatic cylinder is used to collecting mechanism of the improper dimension materials. The inspection conveyor is very useful for material handling in modern engineering industries. The motor is used to drive the conveyor. The materials are transferred from one place to another place by using conveyor. In this top of the conveyor, sensors are used to measure the dimension. This system gives smooth operation and smooth movement of the belts to the jobs at required time. This is a very efficient instrument for checking the dimensions like length, breadth, height etc., to be used in modern engineering industries. The manual efforts can be completely avoided by using this modern equipment. It also reduces the inspection time and manual inspection errors. If the work piece is defective, the pneumatic cylinder placed next to the sensor will be actuated to remove the defective work piece.

Key words: Inspection conveyor, Sensors, Materials, Dimension, Control unit.

INTRODUCTION

This is an era of automation where it is broadly defined as replacement of manual effort by mechanical power in all degrees of automation. The operation remains an essential part of the system although with changing demands on

physical input as the degree of mechanization is increased.

Degrees of automation are of two types, viz.

- Full automation
- Semi automation

In semi automation a combination of manual effort and mechanical power is required whereas in full automation human participation is very negligible.

NEED FOR AUTOMATION

Automation can be achieved through computers, hydraulics, pneumatics, robotics, etc., of these sources, pneumatics form an attractive medium for low cost automation. The main advantages of all pneumatic systems are economy and simplicity. Automation plays an important role in mass production. For mass production of the product, the machining operations decide the sequence of machining. The machines designed for producing a particular product are called transfer machines. The components must be moved automatically from the bins to various machines sequentially and the final component can be placed separately for packaging. Materials can also be repeatedly transferred from the moving conveyors to the work place and vice versa. Quality Control and Inspection are the most important things in factory design. Automation plays a vital role in mass production of a product, the machining operations decides the sequence of machining. The machines designed for producing a particular product are called transfer machines. Conveyor Automation is a specialized activity for a modern manufacturing concern. It has been estimated that about 60-70% of the cost production is spent in material transferring activities.

LITERATURE REVIEW

Tsalidis et al. [1] describes in this paper that conveyor belt design is examined as an application of a proposed Design Parameters Space Search technique.

First, the main characteristics of the belt-conveyor design process are presented as they appear in the current literature. Furthermore, a proposed general knowledge-representation platform is described, and its ability to house the relevant conveyor design knowledge is also shown. The extended search technique of the design space is discussed, and an integrated example of a belt-conveyor design is presented, based on the proposed representation platform and the extended search technique.

Huang et al. [2] describes in this paper deals with the time-minimum trajectory planning of a 2-DOF translational parallel robot named the Diamond for rapid pick-and-place operations.

Kinematics and dynamics of the robot are formulated using a parametric function, allowing the representation of the input torque and velocity constraints to be converted to those in terms of the path length. A modified algorithm for achieving the minimized traversal time is proposed by taking into account the path jerk limit. Lithium-ion battery sorting using the Diamond robot is taken as an example to demonstrate the applicability of this approach.

Dogan Ibrahim et al [3] aim to show the special features of the C language when programming microcontrollers.

He says that the industry standard C51 optimizing C compiler is used throughout. This compiler has been developed by Keil Elektronik GmbH. C51 is available on both MS-DOS and Windows-based operating systems and the compiler implements the American National Standards Institute (ANSI) standard for the C language. There are many other high-level language compilers available for microcontrollers, including PASCAL, BASIC, and other C compilers. Some of these compilers are freely available as

shareware products and some can be obtained from the Internet with little cost. These compilers can be used for learning the features of a specific product and in some cases small projects can be developed with such compilers. The C51 compiler has been developed for the 8051 family of microcontrollers.

PNEUMATIC SYSTEM

The technology of pneumatics has gained tremendous importance in the field of work place rationalization and automation. From old fashioned timer works and coal mines to modern machine shops and space robots.

APPLICATION OF PNEUMATICS

The technology of pneumatics deals with study of behavior and application of compressed air. Today air operated tools and accessories are a common sight in each every industry, not only in the technologically advanced countries but even in countries where industrial activities are still at the stage of sheer infancy. With introduction of pneumatics in the manufacturing process, the industry is benefited automation which if judiciously used; many bring down the cost of production to a much lower level. Nowadays compressed air is used in every walk of industrial life, starting with pneumatic cranes to the use of air in the brake system of automobiles, railways coaches, wagons, printing presses, and what not.

The following features are notable for the reason

1. Wide availability of air
2. Compressibility of air
3. Easy transportability of compressed air in pressure vessels
4. Fire proof characteristics of the medium
5. Simple construction of pneumatics elements and easy handling
6. High degree of controllability of pressure, speed and force

7. Possibility of easy but reasonably reliable remote controlling
8. Easier maintenance
9. Explosion proof characteristics of the medium
10. Comparatively cheaper in cost than other system.

COMPONENTS OF PNEUMATIC SYSTEM

AIR COMPRESSOR

Though not directly connected to the pneumatic system, the air compressor plays a vital role in the overall system performance. Various types of air compressors are used in the industry. But positive displacement compressors are more popular. The air receiver is important equipment in the compressor family. For uninterrupted supply of compressed air, receiver with to optimum size is to be selected.

TYPES OF AIR COMPRESSORS

There are two basic types of compressor 1. Positive displacement compressor, 2. turbo compressor. Their main distinction lies in their method of energy pressure generation.

1. Positive displacement compressor works on the principle of increase the pressure of definite volume of air by reducing that volume in an enclosed chamber.

2. Dynamic compressor employs rotating vanes or impellers to import velocity and pressure to the flow of the air being handled. The pressure comes from the dynamic effect such as centrifugal force.

Positive displacement compressors are sub divided into two groups:

1. Reciprocating compressor,
2. Rotary type compressor the family tree of the compressor.

FRL UNIT

The FRL unit consists of the following separate components, filter, regulator and lubricator. They are packaged to supply the cleaned lubricated and regulated air to the actuator.

FILTER

Even very small particle containing in air may be produce wear by lapping action in the parts. Therefore the air is filtered to remove dirt, rest particles and other air borne matter in line. The air is filtered before entering the compressor. However, the passage of the air stream through the distributor system often contaminates it with oxidation deposits on the sides of the steel piping. Also the condensation on the inside of steel piping may result in water vapour.

REGULATOR

Independent pressure control is necessary for air distribution in pneumatic circuitry. Pneumatic circuitry uses an outlet side piloted pressure reducing valve to limit pressure only to desired circuit these specialized pneumatic pressure reducing valves are known as regulators.

LUBRICATOR

Pneumatic systems are not self lubricating. Pneumatic components need lubrication for its smooth functioning. Therefore a lubricator is used in the FRL unit to add a small amount of oil to the dry air.

PNEUMATIC ACTUATORS

Pneumatic cylinders offer a straight rectilinear motion to mechanical elements. Cylinders are classified as light, medium, heavy duty with respect to their application. Selection of materials for cylinder depends greatly on this factor. Functionally cylinders may be single or double acting. They may be further classified as diaphragm cylinder, duplex cylinder, through rod cylinder etc. end position cushioning of cylinder as certain times may be of almost important.

TYPES OF ACTUATORS

The pneumatic power is converted to straight line reciprocating motions by pneumatic cylinders. The various industrial applications for which air cylinders are used can be duty wise into three groups-Light duty, medium duty and heavy duty.

But according to the operating principle, the air cylinders are sub divided as

- 1) Single acting and
- 2) Double acting cylinders.

PNEUMATIC VALVES

The pneumatic energy is regulated and controlled by pneumatic valves. Functionally the valves are divided into four major groups, viz. directional control, flow control, pressure control, non return and special type valves. As per construction the valves are sub grouped as seat valves sliding or spool valves. Both these of constructions are frequently used in pneumatic valves.

However the spool valves are easier to manufacture. Directional control valves are classified functionally as 2/2, 3/2, 4/2, 5/2, 4/3, 5/3, etc. depending upon the number of port openings and valve positions.

Valves are actuated in various methods, viz. manually, mechanically, electrically, pneumatically and by various combined mode of actuation. Specially designed valves like quick exhaust time delay shuttle and twin pressure valves are used to impart various special functions to pneumatic circuits.

COMPONENTS:

1. Direction Control Valves
2. Basic Pneumatic Circuits
3. Hoses
4. Connectors
5. Electrical And Electronic Controls
6. Object Sensing Circuit
7. Pmdc Motor
8. Battery
9. Lcd Display
10. Pic Microcontroller Pic
Microcontroller (16f877a)
11. I/O Ports
12. Relay

FUTURE SCOPE OF THE PROJECT

By producing such system, the scope is in the field of

- Manufacturing
- Identification of suitable solution
- Evaluation
- Design the proposal
- Build the prototype

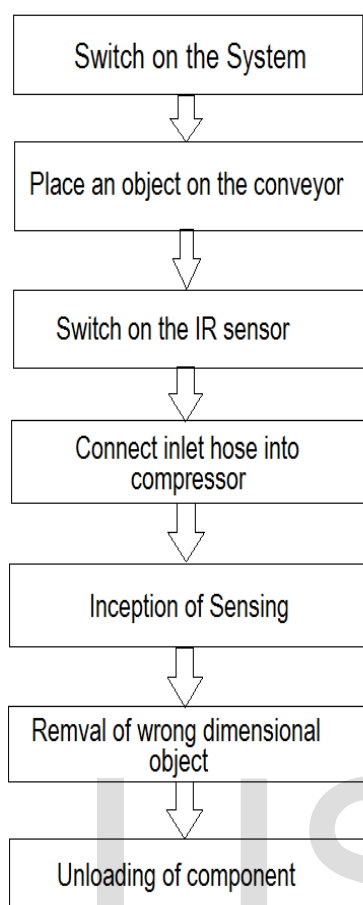
Also we can use such system with some modification for various types of inspection such as

- Inspection Parameter
- Diameter, hole diameter
- Height
- Thickness
- Surface defect
- Crack, burr
- Roundness
- Minor and major diameter
- Chamfer angle etc.

PRINCIPLE OF OPERATION

The 12 volt power supply is used to drive the permanent magnet D.C motor. The two conveyor roller is fixed to the two ends of the frame stand with the help of end bearing (6202) with bearing cap. The conveyor roller shaft is coupled to the D.C. permanent magnet motor with the help of spur gear mechanism. This total arrangement is used to transfer the material from one place to another place with the help of conveyor. The limit sensor switch is vertically fixed on the limit sensor frame stand by means of rack and pinion arrangement. This sensor is used to measuring the abnormal height variation of the material. The rack and pinion is used to adjust the limit switch up and down motion. This arrangement is used to set the height of the material. The IR transmitter and IR receiver circuit is used to sense the minute height variation of the material. It is fixed to the frame stand with a suitable arrangement. This mechanism is also adjustable with the help of bolt and nut. The pneumatic cylinder is fixed to the frame stand by right angles to the limit sensor frame stand. This cylinder arrangement is used to remove the dimensionless material from the conveyor. The pneumatic cylinder is controlled by the flow control valve, single acting solenoid valve and control unit. Pneumatic systems are not self lubricating. Pneumatic components need lubrication for its smooth functioning. Therefore a lubricator is used in the FRL unit to add a small amount of oil to the dry air.

BLOCK DIAGRAM:



APPLICATIONS:

DISCHARGE OF WORKPIECE

The Conveyor Feed has a wide application in low cost automation industries. It can be used in automated assembly lines to carry up the finished product from workstation and place them in bins. It can also be used to pick raw material and place them on the conveyor belts.

IMPROPER MATERIAL REMOVING OPERATION

This unit can also be used in improper material collected in a collecting box. The solenoid operated pneumatic cylinder is used for this mechanism.

CONCLUSION

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding,

planning, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between institution and industries. We are proud that we have completed the work with the limited time successfully. The **“Inspection Conveyor”** is working with satisfactory conditions. We are able to understand the difficulties in maintaining the tolerances and also quality. We have done to our ability and skill making maximum use of available facilities. In conclusion remarks of our project work, let us add a few more lines about our impression project work. Thus we have developed an inspection conveyor which helps to know how to achieve low cost automation with sensor arrangement. The operating procedure of this system is very simple, so any person can operate. By using more techniques, they can be modified and developed according to the applications.

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