

PNEUMATIC BASED ASSEMBLY LINE

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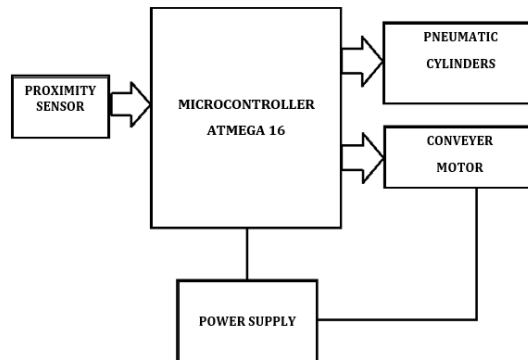
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Abstract-*We have designed a pneumatic based assembly line.A microcontroller is used in this project since its function is to start or stop any process once the microcontroller has been programmed according to the requirement of the programmer. Therefore any mechanical part can be assembled at a faster rate on this assembly line. Also the use of a pneumatic supply is efficient since it requires a low running and maintenance cost.*

INTRODUCTION

Pneumatic systems form the most primitive and distinct class of mechanical control engineering. Pneumatic systems are well suited for the automation of a simple repetitive task. Since the industry is required to produce goods at a faster rate because of the competitiveness and also the ever increasing demands of the people. Hence assembly line which does the assembling of the manufactured parts should be done at a faster rate. Therefore pneumatic based assembly line is used.Improvement in science and technology has reduced the human efforts so here also, a microcontroller is used which when programmed according to the need of the programmer, automatically STARTS and STOPS the assembly line.

BLOCK DIAGRAM



COMPONENTS

- SENSOR
- Proximity Sensor
- ELECTRICAL COMPONENTS
- DC Motor
- Relay
- Solenoid Valve
- Push button
- MECHANICAL COMPONENTS-
- Conveyor Belt
- Pneumatic Cylinders
- CONTROLLER
- Microcontroller ATMEGA 16

COMPONENT DESCRIPTION

1. INDUCTIVE PROXIMITY SENSOR

An inductive proximity sensor has four components; The coil, oscillator, detection circuit and output circuit. The oscillator generates a fluctuating magnetic field the shape of a doughnut around the winding of the coil that locates in the devices sensing face. When a metal object moves into the inductive proximity sensors field of detection, Eddy currents build up in the metallic object, magnetically push back, and finally reduce the Inductive sensors own oscillation field. The sensors detection circuit monitors the oscillators strength and triggers an output from the output circuitry when the oscillator becomes reduced to a sufficient level.

2. DC MOTOR

A DC motor is a mechanically commutated electric motor powered from direct current (DC). The stator is stationary in space by definition and therefore the current in the rotor is switched by the commutator to also be stationary in space. This is how the relative angle between the stator and rotor magnetic flux is maintained near 90 degrees, which generates the maximum torque. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current carrying conductor and an external magnetic field to generate rotational motion. The speed of a DC motor can be controlled by changing the voltage applied to the armature or by changing the field current.

3. RELAY

A relay is an electrically operated switch. It is used to switch high voltage and high current circuits ,control a large amount of current or voltage with small electrical signal.

4. SOLENOID VALVE

A Solenoid valve is an electromechanical valve. A solenoid valve has two main parts: the solenoid and the valve. The solenoid converts electrical energy into mechanical energy which in turn, opens or closes the valve mechanically. It is mainly use with liquid or gas.

Solenoid valves are the most frequently used control elements in fluidics. Their tasks are to shut off, release, dose, distribute or mix fluids. They are found in many application areas. Solenoids offer fast and safe switching, high reliability, long service life, good medium compatibility of the material used, low control power and compact design.

5. CONVEYER BELT

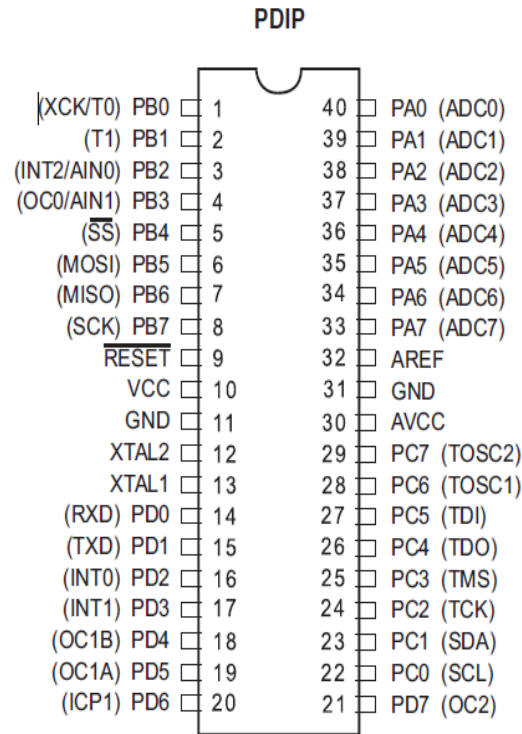
A conveyor belt consists of two or more pulleys, with a continuous loop of material - the conveyor belt - that rotates about them. One or both of the pulleys are powered, moving the belt and the material on the belt forward. The powered pulley is called the drive pulley while the unpowered pulley is called the idler. Conveyor belts are also called transporters. They basically used to carry objects from one place to another. There are two main industrial classes of belt conveyors; Those in general material handling such as those moving boxes along inside a factory and bulk material handling such as those used to transport industrial and agricultural materials, such as grain, coal, ores, fines, and lumps material.

6. PNEUMATIC CYLINDERS

Pneumatic cylinders are mechanical devices which use the power of compressed gas to produce a force in a reciprocating linear motion. The piston is a disc or cylinder, and the piston rod transfers the force it develops to the object to be moved. They are quieter, cleaner, and do not require large amounts of space for fluid storage.

7. MICROCONTROLLER ATMEGA 16

The ATmega16 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega16 achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed. The ATmega16 provides the following features: 16 Kbytes of In-System Programmable Flash Program memory with Read-While-Write capabilities, 512 bytes EEPROM, 1 Kbyte SRAM, 32 general purpose I/O lines, 32 general purpose working registers, a JTAG interface for Boundaryscan, On-chip Debugging support and programming, three flexible Timer/Counters with compare modes, Internal and External Interrupts, a serial programmable USART, a byte oriented Two-wire Serial Interface, an 8-channel, 10-bit ADC with optional differential input stage with programmable gain (TQFP package only), a programmable Watchdog Timer with Internal Oscillator, an SPI serial port, and six software selectable power saving modes.



WORKING

1. Two Or More Manufactured Parts That Are To Be Assembled Are Placed On The Conveyer Belt.
2. A Push Button Is Pressed Which Starts The Motor Which Is Supplied A DC Voltage Power Supply.The Motor Starts Rotating And The Conveyer Belt Mounted On Top Of It Also Rotates.
3. The Parts Or The Object Also Move Along The Length Of The Belt.When The Object Comes In The Range Of The Proximity Sensor,The Sensor Senses This.
4. Thus An Electrical Signal Is Given By The Sensor To The Microcontroller.A DC Power Supply Supplies The Voltage To The Microcontroller.
5. The Controller Then Stops The Motor After A Certain Time Delay.The Time Delay Is Calculated According To The Speed Of The Motor And The Distance Between Sensor And The Cylinders.Such That When The Conveyer Stops,The Object Is Perpendicular To The Cylinder's Axis.
6. After That,The Controller Gives Signal To The Relay Circuit Which In Turn Gives The Electrical Signal To The Solenoid Valve.
7. Upon Getting The Signal The Valve Opens,When The Valve Opens The Compressed Air From The Compressor Is Supplied To The Double Acting Cylinders Whose Pistons Come Out And Assemble The Male And Female Parts Of The Object Together.
7. Once The Parts Are Assembled The Controller Again Gives A Signal To The Relay,Which Gives The Signal To The Solenoid Valve And Then To The Cylinders,But This Time The Signal Is Given To The Cylinders To Retract Their Positons Back.
8. When Its Done The Controller Starts The Motor Again I.E. The Conveyer Starts Again.
9. The Assembled Part Is Then Passed Through The Belt Which Falls Comfortably Into A Tray.

RESULT AND CONCLUSION

We Have Designed System To Make An Understanding Of Pneumatically Based Assembly Line And To Find Them Solution And Our System Is Working Successfully As Per Our Design.The Sensor Is Sensing The Object And Giving Signal To Microcontroller Which Is Taking The Desired Actions Accordingly.Also The Cylinders And The Motor Are Performing Their Task Effectively.HenceWe Conclude That We Have Successfully Built A Pneumatic Based Assembly Line.

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