Fabrication of Material Inspection Robot

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Abstract:

*In our project "**MATERIAL DIMENSION ALALYSING ROBOT**" beings with an introduction to material Inspection, it's 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.*

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

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.

NON-CONTACT SENSING

Non-contact sensing can provide significant information about the material composition of objects. Indeed, this is an area of intensive research in physics-based vision. The work of exemplifies this field. They developed methods to analyze the magnitudes of the polarization components of reflected light, which permitted them to segment material surfaces according to varying levels of relative electrical conductivity, and in particular to distinguish dielectrics from metals developed analytical techniques operating on thermal images to produce estimates of material grain size sufficient to distinguish between dust, sand, and rock. The remote sensing literature cites many other techniques, such asa back-scattering and impulse radar. Non-contact methods suffer from two fundamental deficiencies: they are superficial and indeterminate. They are superficial to the extent that they are sensitive only to the surface of the object.

FABRICATION OF PARTS DETAILS:

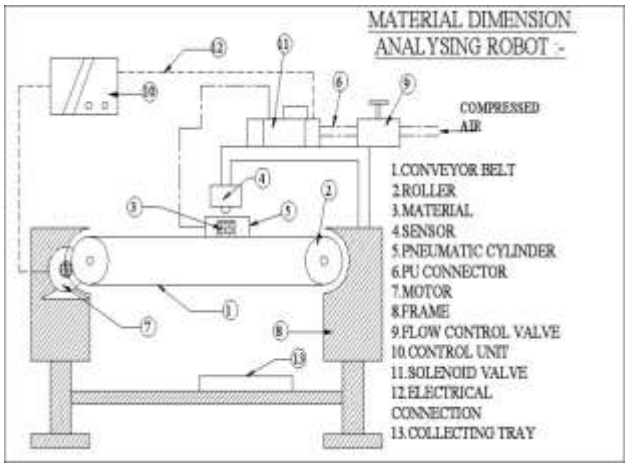


Fig 1.1 material dimension analysing robot

Bed

It is made up of mild steel material. The base of machine is holed centrally and its attached with compound rest of lathe. The motor is engaged with base plate. All the parts for milling attachment are mounted on base plate or bed.

Pulley

A pulley is a wheel on an axle or shaft that is designed to support movement and change of direction of a taut cable or belt, or transfer of power between the shaft and cable or belt. In the case of a pulley supported by a frame or shell which does not transfer power to a shaft, but is used to guide the cable or exert a force, the supporting shell is called a block, and the pulley may be called a sheave.A pulley may have a groove or grooves between flanges around its circumference to locate the cable or belt. The drive element of a pulley system can be a rope, cable, belt, or chain.

Proximity Sensor

A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact .A proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field or return signal. The object being sensed is often referred to as the proximity sensor's target. Different proximity sensor targets demand different sensors**.**

Fig 1.2 proximity sensor

Pneumatic Cylinder

Pneumatic cylinder (sometimes known as air cylinders) are mechanical devices which use the power of compressed gas to produce a force in a reciprocating.

Fig 1.3 pneumatic cylinder

Conveyor

A conveyor belt is the carrying medium of a belt conveyor system (often shortened to belt conveyor). A belt conveyor system is one of many types of conveyor systems. A belt conveyor system consists of two or more pulleys (sometimes referred to as drums), with an endless loop of carrying medium 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 pulley**.**

PU Connector

Features:

- Specially designed for pneumatic systems
- Grips before it seals
- Quick disconnection
- Re-usable
- Superior flow characteristics
- Collet cover prevents accidental disconnection
- O-ring design for superior seal
- Variety of sizes and configurations
- Regulate the optimal air flow rate for precise motion control
- Are ideal for high temperature and wash down applications

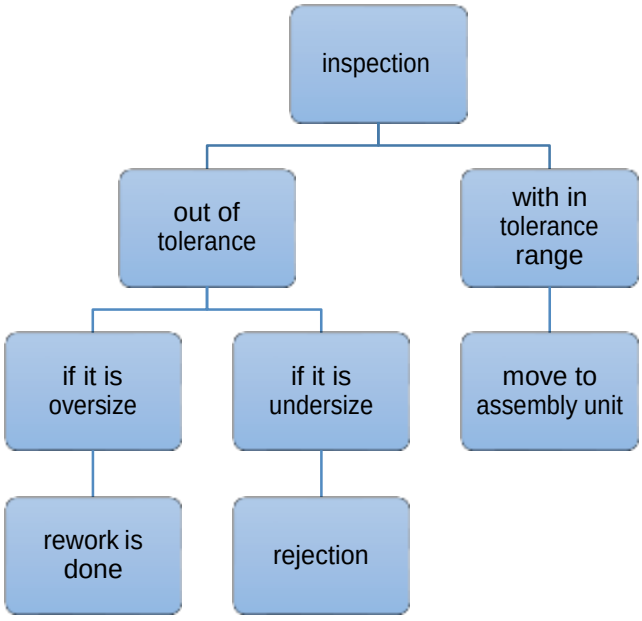
Dc Motor

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow.

DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles and hoists for steel rolling mills.

Fig 1.4 DC motor

PROCESS OF INSPECTION



Process of Inspection

- The component which is to be inspect is move through the conveyor.
- Then all the tolerance to the specification is checked.
- If the workpiece is within the tolerance limit the workpiece is move to the assembly unit.
- If the component which undersize is move to the rejection tray
- If the component with the oversize is move for the rework and then after it is again move for the inspection through the conveyor for the inspection.
- If the size is correct it is move to the assembly unit if it is undersize it is move to the rejection tray.

SPECIFICATION OF THE MATERIAL TO BE INSPECTED

Length - 6 tolerance (-0.5 to +0.5)

Width - 4 tolerance (-0.5 to +0.5)

SI.No	Material to be Inspect	Dimension	Approved/ Defective
1	Mild steel	Length-5.48 Width-3.20	defective
2	Mild steel	Length-6.38 Width-4.24	approved

Advantages

- The Inspection Conveyor is more efficient in the technical field
- Quick response is achieved
- Simple in construction
- Easy to maintain and repair
- Cost of the unit is less when compared to other
- No fire hazard problem due to over loading
- Comparatively the operation cost is less
- Continuous operation is possible without stopping

Limitations

- While working, the compressed air (For Punching Operation) produces noise therefore a silencer may be used.

Applications

Discharge of work piece:-

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.

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

- 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.
- 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.
- If the work piece is defective, the pneumatic cylinder placed next to the sensor will be actuated to remove the defective work piece .And this robot successfully dispatch the defective workpiece.

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