

Automatic Pneumatically Operated Lemon Cutting Machine

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Abstract - Robotization was the fury of the designing scene. The examination on the current Lemon cutting machine audits the accompanying disadvantages, for example, high speculation cost, the defilement, extra labor and time utilization brought about by manual preparing. The setup includes a container plan and the weight square is incited by a pneumatic barrel, and has a responding movement along the vertical length of packaging, while the cutting framework stays fixed. The air supply to the barrel is constrained by a solenoid incited DCV, which is constrained by a Timing circuit. The passage of Lemon into the framework device is controlled utilizing a pneumatic barrel alongside a Double bar component. The essential destinations, whereupon, the present work is based are giving an option in contrast to the current mechanized framework basically, focusing on the underlying speculation factor, and to control a household item utilizing pneumatics, in this manner taking out the related challenges of manual vegetable cutting.

The Lemon is encouraged by means of slanted cylinder. A plate is set at the base of the mechanical assembly to gather the Lemon pieces subsequent to preparing. Variable weight setting for cutting diverse Lemon is completed by the Timing circuit. The multifaceted design required with such a framework is the kind of Lemon it can process. The framework is beneficial in the way that current mechanization is high in expense, and the power utilization is high. The proposed work is profited by pneumatic power, which is copious.

Key Words: *Pneumatic cylinder, Direction Control Valve, Timing circuit, Double bar mechanism, Pneumatic power.*

1. INTRODUCTION

The imaginative machine can be viably utilized by any sustenance handling industry, for example, pickles or masala producers. Huge amounts of lemon to the required shape and size can be act in a constant design, better nature of cuts delivered. Cuts of delivered are of uniform nature and are flawlessly and advantageously recalled and recouped. Pickles fabricating is exceptionally work concentrated industry. The significant reasons ascribed to this could be an overall little scales and the procedure readiness of pickles, which is an accumulation of little, particular undertakings.

A pneumatic framework can be isolated into number of levels, speaking to equipment and flag stream. The different dimensions from a control way for flag stream from the flag input side to the work yield side. The components in the framework are spoken to by images which demonstrate the capacity of the component the control component controls the activity of the actuator in the wake of accepting signs sent by the processor components.

2. Description of Parts

2.1 Frame

Frame is a building technique with a "skeleton frame" of vertical steel columns and horizontal I-beams, constructed in a rectangular grid to support the floors, roof and walls of a building which are all attached to the frame. The development of this technique made the construction of the skyscraper possible. The rolled steel "profile" or cross section of steel columns takes the shape of the letter "I". The two wide flanges of a column are thicker and wider than the flanges on a beam, to better withstand compressive stress in the structure. Square and round tubular sections of steel can also be used, often filled with concrete. Steel beams are connected to the columns with bolts and threaded fasteners, and historically connected by rivets. The central "web" of the steel I-beams is often wider than a column web to resist the higher bending moments that occur in beams.

Wide sheets of steel deck can be used to cover the top of the steel frame as a "form" or corrugated mold, below a thick layer of concrete and steel reinforcing bars. Another popular alternative is a floor of precast concrete flooring units with some form of concrete topping. Often in office buildings, the final floor surface is provided by some form of raised flooring system with the void between the walking surface and the structural floor being used for cables and air handling ducts.

2.2 Pneumatic Cylinder

Pneumatic chamber now and then known as air barrels are mechanical gadgets which utilize the intensity of packed gas to deliver a power in a responding direct movement. Like pressure driven barrels, something powers a cylinder to move in the ideal bearing. The cylinder is a circle or barrel, and the cylinder bar exchanges the power it creates to the item to be moved. Designers here and there want to

utilize pneumatics since they are calmer, cleaner, and don't require a lot of room for liquid stockpiling. Since the working liquid is a gas, spillage from a pneumatic barrel won't dribble out and debase the environment, making pneumatics increasingly attractive where tidiness is a prerequisite.

3. SOLENOID VALVE



Fig -1: Solenoid valve

A solenoid valve is an electromechanically worked valve. The valve is constrained by an electric flow through a solenoid: on account of a two-port valve the stream is turned on or off; on account of a three-port valve, the surge is exchanged between the two outlet ports. Various solenoid valves can be put together on a complex. Solenoid valves are the most habitually utilized control components in fluidics. Their undertakings are to stop, discharge, portion, appropriate or blend liquids. They are found in numerous application territories. Solenoids offer quick and safe exchanging, high unwavering quality, long administration life, great medium similarity of the materials utilized, low control power and minimal plan. Other than the plunger-type actuator which is utilized most as often as possible, turned armature actuators and rocker actuators are likewise utilized.

There are numerous valve plan varieties. Common valves can have numerous ports and liquid ways. A 2-path valve, for instance, has 2 ports; on the off chance that the valve is open, at that point the two ports are associated and liquid may stream between the ports; on the off chance that the valve is shut, at that point ports are separated. On the off chance that the valve is open when the solenoid isn't invigorated, at that point the valve is named ordinarily open (N.O.). So also, on the off chance that the valve is shut when the solenoid isn't empowered, at that point the valve is named regularly shut. There are likewise 3-way and increasingly confused structures. A 3-way valve has 3 ports; it associates one port to both of the two different ports commonly a supply port and a fumes port.

Solenoid valves are likewise portrayed by how they work. A little solenoid can produce a constrained power. On the off chance that that compel is adequate to open and close the valve, at that point an immediate acting solenoid valve is conceivable. The solenoid valve (little black box at the highest point of the photograph) with information aircraft (little green cylinder) used to incite a bigger rack and pinion actuator (dark box) which controls the water pipe valve.

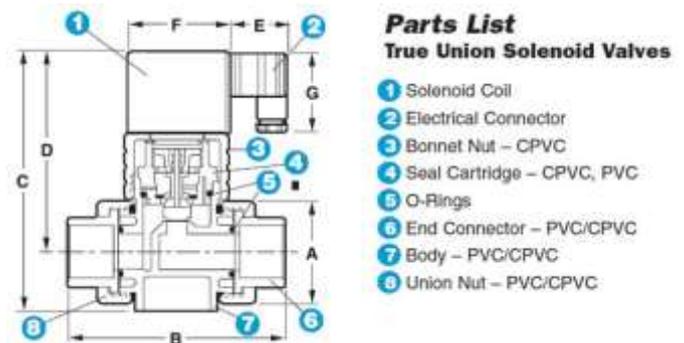


Fig -2: Piloted solenoid [1]

At the point when high weights and vast openings are experienced, at that point high powers are required. To create those powers, an inside steered solenoid valve configuration might be conceivable. In such a structure, the line weight is utilized to create the high valve powers; a little solenoid controls how the line weight is utilized. Inside guided valves are utilized in dishwashers and water system frameworks where the liquid is water, the weight may be 80 pounds for each square inch (550 kPa) and the hole width may be 3/4 in (19 mm).

In some solenoid valves the solenoid demonstrations straightforwardly on the principle valve. Others utilize a little, total solenoid valve, known as a pilot, to impel a bigger valve. While the second kind is really a solenoid valve joined with a pneumatically incited valve, they are sold and bundled as a solitary unit alluded to as a solenoid valve. Directed valves require significantly less capacity to control, yet they are detectably slower. Steered solenoids for the most part need full power consistently to open and remain open, where an immediate acting solenoid may just need full power for a brief timeframe to open it, and just low capacity to hold it. An immediate acting solenoid valve commonly works in 5 to 10 milliseconds. The task time of a guided valve relies upon its size; normal qualities are 15 to 150 milliseconds.

4. AIR COMPRESSOR

An air compressor is a gadget that changes over power utilizing an electric engine, diesel or gas motor, and so forth. Into potential vitality put away in pressurized air i.e., compacted air. By one of a few techniques, an air blower powers increasingly more air into a capacity tank,

expanding the weight. At the point when tank weight achieves its maximum farthest point the air blower close off. The compacted air, at that point, is held in the tank until called into utilization. The vitality contained in the compacted air can be utilized for an assortment of uses, using the dynamic vitality of the air as it is discharged and the tank depressurizes. At the point when tank weight achieves its lower limit, the air blower turns on again and re-pressurizes the tank.

There are various strategies for air pressure, isolated into either positive-dislodging or negative-relocation types.

As per the weight conveyed:

- ❖ Low-weight air compressor(LPACs), which have a release weight of 150 psi or less
- ❖ Medium-weight compressor, which have a release weight of 151 psi to 1,000 psi
- ❖ High-weight air compressor, (HPACs), which have a release weight over 1,000 psi

5. WORKING PRINCIPLE

This creation identifies with a gadget for cutting organic products like lemons and other comparative natural products, which are cut by the machine into pieces persistently. In this lemon cutting machine the plate is mounted on the casing which has given a point. In this plate the lemons are put away and the plate is given a lifter which lifts one lemon at any given moment. The lemon experiences the guide courses in the shaper. As the lemon goes inside the upper chamber works and it presses the lemon and when the upper barrel is discharged the lower barrel works and after that the lemon is cut into pieces and are gathered in the container or plate. The above mechanical get together is worked in a specific grouping because of the utilization of electronic control hardware as the on and off time of both the chamber ought to be same.

The framework is constrained by utilizing a period based controlled framework. IC-555 is utilized in cyclic clock mode. The time can be balanced by utilizing a potentiometer. The beat produced by the clock is given to the successive counter that is CD4017. It produces the successive yield. After two yields third is given to reset so just the two yields having level with time are given. The yield from the counter is given to the transfer driver that is ULN2003 which is having seven sweetheart combines in a solitary chip.

At the yield transfer curl is associated when the counter yield is high one of the hand-off is on which gives capacity to the pneumatic valve which is of 5/2 type and worked on 230 volt AC. It permits the pneumatic wind stream to the twofold acting barrel. The barrel is launched out upward

way which lifts a solitary lemon and channels it in a slanted metal part so it proceeds to rest in the pass on. The second task which is trailed by the first invigorates another hand-off curl through which another solenoid loop is on and permits the wind current to pass. The chamber launches descending way and cuts the lemon. It is cut into four pieces and collected in a descending plate. The above succession rehashes constantly. The controlled framework is worked on DC control supply which is given independently.

6. CONCLUSION

As interest of mechanization is expanding at each minute, it will demonstrate an incredible bone of the world, since it will spare part of timing just as necessity of laborers which are extraordinarily suggested for cutting of Lemons. This is the present genuine condition in some nourishment businesses. Once in a while mishaps are occur with specialist who is cutting Lemons by utilizing blade just as other cutting gadgets without utilizing hand gloves. To dispense with this sort of circumstance, we need to utilize an extreme path for slicing with no damage to the specialist and to build laborer's wellbeing.

We planned – "Automatic Pneumatically Operated Lemons Cutting Machine" for spare time; improve wellbeing, nonstop stream of material and so on. Our machine is taking a shot at pneumatic vitality so it requires air blower for working. Just as solenoid valve is likewise assumes an essential job in our machine. Solenoid valve devours power for working. So blower just as power is required for working of our venture.

REFERENCES

- [1] Hayward is a registered trademark and Profile2, QIC2, Stopcock and Tank-Tite are trademarks of Hayward Industries, Inc. © 2013 Hayward Industries, Inc.
- [2] Development of a lemon cutting machine, A. Hrishikesh Tavanandi & S. Deepak & K. Venkateshmurthy & K. S. M. S. Raghavarao, J Food Sci Technol, DOI 10.1007/s13197-012-0908-4.
- [3] Aaram Engineering Solution, Vasiljevski & Kekeljevic.
- [4] Automatic Pneumatic Operated Lemon Cutting Machine, Gunjal A.V., Shinde K.L., Sonawane R.V., Dike A.P., Prof. Gujrathi T.V., Prof. Bhane A.B., International Journal of Emerging Technology and Advanced Engineering (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 6, Issue 4, April 2016).