

Geneva Conveyor Technology with Pneumatic Pin Punch

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Abstract: The purpose of the project is to fabricate a pin punching machine where the conveyor is controlled with the Geneva mechanism. Geneva drive is a gear mechanism that converts the continuous rotation to intermittent rotary motion. The rotating drive wheel has a pin it reaches into a driven wheel slot and is advancing by one step. The drive wheel also has a raised circular block disc that locks the driven wheel in position between steps. This is fully automated such as the work piece is automatically moved in the Geneva conveyor and the punching is done pneumatically.

Keywords: Geneva wheel, Gear mechanism, Battery, Circular block disc, conveyor belt, Pneumatic cylinder.

1. Introduction

The pneumatic system is employed to transmit and manage the power of the controlled gases. pneumatic systems typically used air as a fluid medium, as a result of air may be a safe, low cost and readily available fluid. It is safe for environment where an electrical spark may ignite leaks from the system components. There are various reasons for considering the use of a pneumatic system instead of a hydraulic system. Liquid exhibits greater inertia than gases. Therefore, in the hydraulic system, the weight of the oil is a potential problem. To design and develop a material handling system for automation or semi-automation of industries by using a pneumatic control system, which is used for low-cost automation.

The Geneva is one of the earliest of all intermittent motion mechanisms and when input is in the form of continuous rotation, still these mechanisms are used in today's scenario. Geneva is available on an off-the-shelf basis from several manufacturers with various sizes depending on requirements.

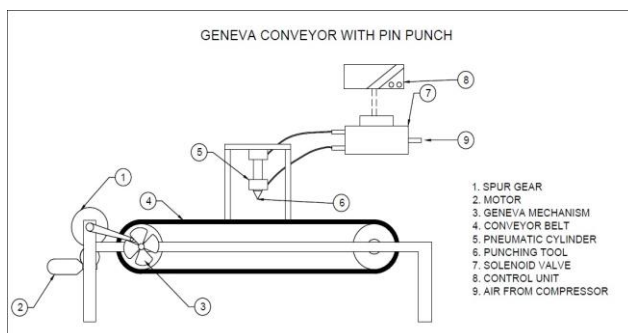


Fig. 1. 2D drawings

This is a simple 2D sketch of a Geneva mechanism with the Pneumatic pin punch. This diagram represents the components used for assembling purposes. The components contents are briefly described in this paper.

2. Components and Description

Pneumatic cylinder: Pneumatics is an attractive medium for lower- cost mechanisms, particularly for sequential or repetitive operations. which is capable of providing both the power as well as energy requirements and the control system. The major advantage of an all- pneumatic system is economy, simplicity and reduced maintenance to a low level.

Solenoid valve: The directional valve is a most important part of a pneumatic system. valves are used to control the direction of airflow in the pneumatic system. This valve was selected for speedy operation as well as the reduction of manual effort and also to modify the machine into automatic machines.

Control unit is a term for an embedded system that controls one or additional electrical systems /subsystems in a motor vehicle. The control unit is used to control the DC motor that activates or deactivates the vehicle braking system. It is simple in construction, when the brake lock system is activated from the remote, the control unit switches on the motor. This method is deactivated by the remote, then the control unit reverses the motor direction.

Geneva mechanism: Is a gear mechanism that interprets a rotation converts to rotary motion. The rotary drive wheel features a pin, so it reaches into a slot of the driven wheel by a step. The drive wheel has raised the circular block disc that locks the driven wheel in position between steps.

The driven wheel has four spokes. Geneva mechanism will be ready to withstand up to substantial mechanical stress; these mechanisms are frequently used in watches.

The driven wheel has four slots and thus advances by one step of 90 degrees for each rotation of the drive wheel. The driven wheel has n slots and is advanced by $360^\circ/n$ per full revolution of the drive wheel.

Motor: An electric motor is a machine that changes the electrical energy to mechanical energy. Its action is based on the principle when a current-carrying conductor is placed in a magnetic field, it produces a magnetic force.

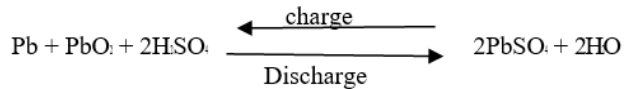
Battery: Batteries are used for storage of excess solar energy

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converted into electrical energy.

Lead-acid battery: The lead-acid cell is most commonly used. The electrolyte is a dilute solution of sulfuric acid (H₂SO₄). The lead acid cell type is a secondary cell or storage cell, which can be recharged.

The chemical equation for the lead-acid cell,



Current ratings: Lead-acid batteries are typically rated in terms of how much discharge currents they will provide for a specified period of time; the output voltage should be maintained higher than a minimal level, and it ranges from 1.5 to 1.8V per cell. A common rating is ampere-hours (A.h.) based on a selected discharge time, that is commonly 8h. Typical values for automobile batteries are a hundred to three hundred A.h.

3. Manufacturing Process

Metal cutting or machining is the process of removing the miscellaneous parts of material from the block of metal in the form of chips. Cutting process work by caused fracture of the materials. However, the portion that was fractured in a small sized piece, called chips. Common cutting processes such as sawing, shaping (or planning), broaching, drilling, grinding, turning and milling. The machines tools and processes for cutting purposes.

Sawing Cold saws build use of a circular saw blade to chop through various kinds of metal, together with sheet metal. The naming for saw depends on the action is performs during the cutting process. It uses a toothed blade to transfer the heat generated due to which it manages to keep both the metal and the blade from becoming too hot.

Welding is a process for connecting similar metals. Welding joins the metals by melting and fusing, the base metals joined using filler metal. Welding employs pinpointed, localized heat input. Although welding involves ferrous-based metals like steel and stainless steel. Weld joint's rigid structure than the base metals. To create permanent joints Welding is done. The automobile manufacturers used in bodies, aircraft frames, railway wagons, machine frames, structural works, tanks, furniture, boilers, general repair work and ship building.

Drilling is a cutting process that uses a drill bit to enlarge a hole of circular cross-section in a solid component. The drill bit is a rotating cut tool, and also has multipoint. The bit is pressed against the workpiece and rotated at rates from 100 to 1000 of rotations per minute. The drilling processes the cutting edge against the workpiece, removes the chips from the drilled hole.

4. Working Principle

Two concepts are combined in this project for the effective working of this pin punching machine. One is the pneumatic systems and the other is the Geneva mechanism. The conveyor belt in which the workpiece is fed manually is driven by a motor through the Geneva mechanism. This mechanism helps to convert the continuous rotary motion of the motor to the intermittent motion of the conveyor belt. This intermittent motion provides time for the pin to punch in the workpiece. The pin punch is actuated with the help of the pneumatic system. The sensor senses the workpiece and if any detected it sends signals to the control unit and the control unit actuates the piston through the solenoid valve and the pin is punched.

5. Conclusion

The "Geneva Conveyor Technology with Pneumatic Pin Punch" system is working with satisfactory conditions. Thus, we understood the difficulties faced in the project by maintaining the tolerances and also the quality. We have done to our potential with the available facilities.

This project helps to achieve the time reduction in punching operation using the Geneva mechanism and the pneumatic concepts.

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