

Pneumatic Multi Axis Welding Machine

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Abstract - The main aim of project is to fabricate the pneumatic operated welding robot. Welding is a fabrication process that joins materials, usually metals or thermoplastics. This is often done by melting the work pieces and adding a filler material to form a pool of molten material that cools to become a strong joint, with pressure sometimes used in conjunction with heat, or by itself, to produce the weld.

The pneumatic operation consists of pneumatic cylinder, compressor, control unit, solenoid valve etc... which are used to actuate the piston rod. The compressor is used to compress the air and it is passed to the solenoid valve. This solenoid valve controls the direction of flow of air to the cylinder. This pressurized air is actuating the piston rod to forward and return position. At the of piston rod the welding rod is fixed. This welding rod makes forward motion and reverse motion in order to make or weld the two different plates. The welding rod is otherwise known as electrode which is connected to the power supply terminals. The work piece also connected to the power supply. This setup requires a heavy electrical arrangement to make the welding.

INTRODUCTION

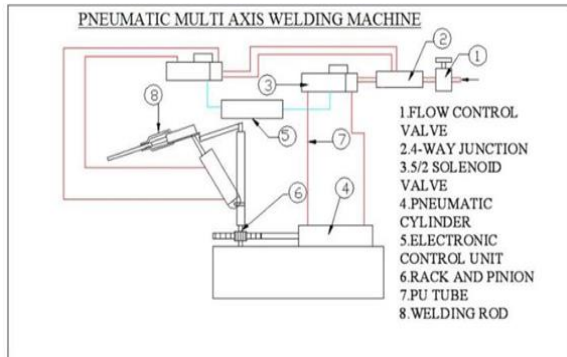
In the present age of mass production, it is often required to automate the manufacturing process that was conventionally done manually. The process of joining in many applications is welding. The welding may be of Electric arc welding, Co2 Welding, or TIG welding. The process of Electric arc welding or Co2 welding is normally done manually. In electric arc welding after striking the arc the electrode is moved in the direction of welding maintaining an effective arc gap, similar type of process is done in Co2 welding. Moving the electrode along the welding line is a skill full work and especially for circular components become much more difficult. Manual operation though done by an expert works man will require the work piece to be rotated about a fixed axis for good profile and homogeneous welding. Normally this process is done manually but the rate of rotation is not ensured, hence the quality of weld is affected. Hence the need

of a special device which can rotate the job at a fixed rate to assist the welding process for circular components and ensure good profile and homogeneous welding. Welding is a fabrication or sculptural process that joins materials, usually metals or thermoplastics, by causing coalescence. This is often done by melting the work pieces and adding a filler material to form a pool of molten material (the weld pool) that cools to become a strong joint, with pressure sometimes used in conjunction with heat, or by itself, to pinion gear to rotate in the certain required angle

WORKING PRINCIPLE

The multi axis pneumatic welding machine consists of the pneumatic cylinder setup which is used for the actuation of the axis movement of the machine. The pneumatic cylinder fixed in the frame base is connected to the rack of the rack and the pinion arrangement. The pinion gear is fixed to the base part of the frame with the help of the bearing which is useful in the free rotational movement of the shaft attached with pinion gear. The shaft which is attached to the pinion gear consist of the parallel pneumatic cylinder which actuates the other frame which is fixed with the vertical shaft attached to the pinion gear and is made to move free on the other side. Now these cylinders are connected to the solenoid valve which is actuated by the control unit. The compressor is used to supply the compressed air to the pneumatic cylinder through the solenoid valve. When the solenoid valve is actuated by the control unit, the compressed air passes through the solenoid valve connected through hoses and actuates the pneumatic cylinder. We in this project use the double acting pneumatic cylinder, for the double acting pneumatic cylinder the compressed air must be passed on the to the side of the cylinder on that side the actuation of the cylinder piston is required to move. When the pneumatic cylinder is actuated on

the one side of the cylinder, the piston in the cylinder moves and makes the arm attached to it to move in the direction of the actuation. The electrode is attached at the end of the arm and it can be used for the welding purpose. There is pneumatic cylinder which is fixed on the base is connected to the rack and pinion arrangement, when this cylinder is actuated, the rack moves in the forward or the reverse direction making the produce the weld.



PRODUCT DESCRIPTION

PNEUMATIC CYLINDER

SIZE: DIA - 45MM

STROCK LENGTH: 100MM

MATERIAL: ALUMINIUM / M.S

PRESSURE: 10 BAR MAX.

SOLENOID VALVE

VOLT: 12V/24V D.C

TYPE: 1 INLET, 1 OUTLET, 1 EXHAUST

PRESSURE: MAX 10 BAR

THREAD SIZE: 1/4"

The term 'mild steel' is also applied commercially to carbon steels not covered by standard specifications. Carbon content of this steel may vary from quite low levels up to approximately 0.3%. Generally, commercial 'mild steel' can be expected to be readily weldable and have reasonable cold bending properties but to specify 'mild steel' is technically inappropriate and should not be used as a term in engineering. Mild steel is the most widely used steel which is not brittle and cheap in price. Mild steel is not readily tempered or hardened but possesses enough strength.

Mild steel Composition

- Mild steel contains -C45

- Carbon 0.35 to 0.45 % (maximum 0.5% is allowable)
- Manganese 0.60 to 0.90 %
- Silicon maximum 0.40%
- Sulfur maximum 0.04%
- Phosphorous maximum 0.04%
- Mildest grade of carbon steel or mild steel contains a very low amount of carbon - 0.05 to 0.26%
- Tensile strength – 63-71 kgf/mm²
- Yield stress -36 kgf/mm²
- Izod impact valve min -4.1 kgf m
- Brinell hardness (HB) – 229