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Pneumatic Bench Vice

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ABSTRACT-
Pneumaticsystemsaresaferthanelectromotivesystem sbecausetheycanworkininflammableenvironmentwi thoutcausingfireorexplosion.Apartfrom that,overloadingin pneumaticsystemwillonlyleadtoslidingorcessationo foperation.Unlikeelectromotivecomponents,pneum atic components do not burn or get overheatedwhen overloaded.The operation of pneumatic systemsdoesnotproduce pollutants.The air released isalsoprocessedinspecialways.Therefore,pneumatic systems can work in environments thatdemand highlevelofcleanliness.Oneexampleistheproductionl inesofintegratedcircuits.

Key Words: Pneumatic vice, Air compressor, Clamper,Directioncontrolvalve,Silencers,Connecto rs,etc.

I. INTRODUCTION

Anincrediblerangeofmanufacturingsystem s use the force and power of fluidssuch as water, oil and air. Poweredclampsopenandclosewiththeforceofpressur ized air or oil, large pressesshapeand form metal with hydraulic pressure,andassemblytorquetoolsfastencomponents with pressurized air. In eachexample, fluid powerprovides the energynecessary to exert significant mechanicalforces.Systemsthatuseairarecalledpneu maticsystems while systems thatuseliquidslikeoilorwaterarecalledhydraulicsyste m.Thepneumaticsystemswillbethesubjectof the first three sessions in thecoursestartingfromthissession.Pneumatics is all about using compressedairtomakeaprocesshappens.Compressed air is simply the air we breathesqueezedintoasmallspaceunderpressure.

1.1 Workingprinciple

Aregulator and apressure gaugeisfittedattheentryoftheairfromthecompressor. Thisisregulated to the required workingpressure.

1.2 Maincomponentsinbenchvice

(A) Fig.Compressor

Fig.Directioncontrol valve

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Fig.Benchvice

1.3 WorkpeiceClampingPosition

WhenthehandleverinthevalveisintheONposition,theairfromthecompressorentersintothemaininletofthevalve.Atthisposition,thegrooveinthevalverodconnectsthemaininletandtherightsideinletportinthevalvethroughthisairentersintothecylinder.Theair under pressure pushes the piston from right handside to left hand side. This is turn moves the movablejaw of the vice. The movable jaw moves and holds thejobinthevicerigidly.

1.4 WORKPIECERELEASINGPOSITION

WhenthehandleverispushedtotheOFFposition,theair from the compressor enters into the main inlet ofthevalve.Atthisposition,thegrooveontheleftsideofthe valve rod connects the main inlet and the left sideinlet port of the valve. The air enters into the cylinderon the left side of the piston. This in turn pushes thepiston from left to right side. The movable jaw movesbackto its position.Unclamping At the same time thegroove on the right of the valverod connects the rightside inlet port and the right side exhaust port of thevalve,sotheairintherightsideofthepistonescapesto theatmospherethroughthispassage.Thehandleveriso peratedfortightenigandlooseningofthejob.

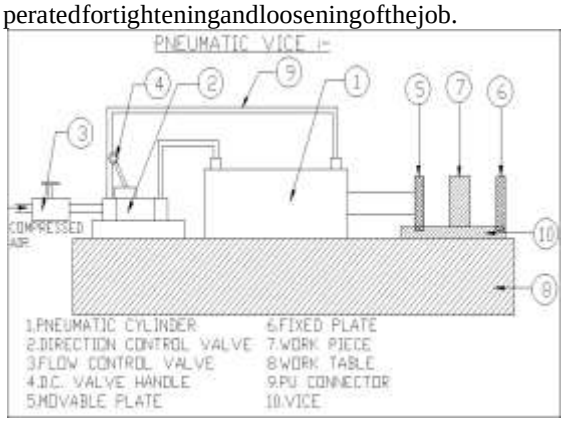

Fig.PneumaticVice

II. ADVANTAGESOFPNEUMATICSYSTEM

Pneumaticcontrolsystems are widelyused in oursociety,especiallyinthe industrialsectors for thedrivingofautomaticmachines.Pneumaticsystems havealotofadvantages.

- **Higheffectiveness**

Many factories have equipped their production lineswithcompressedairsuppliesandmovablecompressors.Thereisanunlimitedsupplyofairinouratmosphere toproducecompressedair.Moreover,theuseofcompressedairisnotrestrictedbydistance,asitcaneasilybe transported through pipes. After use,compressedaircanbereleaseddirectlyintotheatmospherewithouttheneedofprocessing

- **Highdurabilityandreliability**

Pneumatic components are extremelydurableandcannotbedamagedeasily.Compared to electromotivecomponents, pneumatic componentsaremoredurableandreliable.

- **Simpledesign**

The designs of pneumatic components are relativelysimple. They are thus more suitable for use in simpleautomaticcontrolsystems.

- **Safety**

Pneumatic systems are safer than electromotivesystems because they can work in inflammableenvironment without causing fire or explosion. Apartfrom that, overloading in pneumatic system will onlylead to sliding or cessation of operation. Unlikeelectromotive components,pneumatic componentsdonotburnorgetoverheatedwhenoverloaded.

III. DISADVANTAGES OF PNEUMATICSYSTEM

Althoughpneumaticsystemspossessalotofadvantages,they arealsosubjecttomanylimitations.

- **Relativelylowaccuracy**

Aspneumaticsystemsarepoweredbytheforceprovideddbycompressedair,theiroperationissubjectto the volume of the compressed air. As the volume ofairmaychangewhencompressedorheated,thesupplyof airto the system may not be accurate, causing adecreaseintheoverallaccuracyofthesystem.

- **Lowloading**

Asthecylindersofpneumaticcomponentsarenotveryl arge, a pneumatic system cannot drive loads that

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aretooheavy.

 Processingrequiredbeforeuse

Compressedairmustbeprocessedbeforeusetoensuret heabsenceofwatervapourordust.Otherwise,the moving parts of the pneumatic components maywearoutquickly duetofriction.

 Uneven movingspeed

Asaircaneasilybecompressed,themovingspeedsofth epistonsarerelatively uneven.

IV. SAFETY MEASURES WHILE USING PNEUMATIC CONTROLSYSTEM

- Compressed air can cause serious damage tothehumanbodyiftheyenterthebodythroughduc ts liketheoralcavity orears.
- Never spraycompressed air ontoanyone.
- Under high temperature,compressedair canpassthroughhumanskin.
- Compressedairreleasedfromtheexhaust contains particles andoil droplets,whichcancausedamagetoeyes
- Even though the pressure of compressed airin pipes and reservoirs is relatively low,when the container loses its entirety, fierceexplosionsmaystilloccur.
- Before switching on acompressed air supplyunit, oneshouldthoroughlyinspectthewhole circuit to see if there are any looseparts,abnormal pressureordamagedpipes.
- A loose pipe may shake violently due to thehigh pressure built up inside it. Therefore,each time before the system pressure isincreased,thoroughinspectionoftheentirecircu itisrequiredtopreventaccidents.
- As the force produced bypneumatic cylinders is relatively large, andthe action is usually very fast, you may sufferseriousinjuriesifyougethitbyacylinder.
- Switches should be installed on thecompressed air supplyunit to allow easy andspeedycontrolofairflow.
- Incaseofaleakage,thecompressedairsupplyunits houldbe turnedoffimmediately.
- Thecompressedairsupplyunitmustbeturnedoffb eforechangescanbemadetothesystem.
- Stay clear of the moving parts of the system.Never try to move the driving parts in themechanicaloperationvalvewithyourhand

V. CONCLUSION

Theprojectthusgivesasystem thatcaneasilyfixed the work piece & work on it. Thepneumatic vice provideextremely highclamping force & High accuracy andrepeatability. Pneumatic system can get highproduction rate. Whencompressed air isreleased from the pneumatic componentsthen noise can produced. The operation ofpneumatic systems does not producepollutants.

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