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Design and Fabrication of Automatic Rocker ARM Feeding Mechanism using Compressed Air

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Abstract **- Nowadays there are many efforts being made for taking away the burden on the human. For this purpose there are many efforts going on for the Atomization of machines. This report taken up the fabrication of "Automatic rocker arm feeding mechanism using the compressed air" this machine automatically feeds its stock and performs the cutting operation. It involves simple mechanism. Here the main objective is the power input from the industrial exhaust gases, which is given to the engine. When the piston actuates inside the cylinder the reciprocating motion convert into rotary motion. These rotaries motion given as input to the feeding mechanism by using the belt. This mechanism is handy in making holes on metal sheets in industries, by changing tool various actions can be performed.**

Keywords – Cylinder, Piston, Belt, Metal sheets.

INTRODUCTION

Mechanical engineering without production and manufacturing is meaningless and inspirable. Production and manufacturing process deals with conversion of raw materials inputs to finished products as per required dimensions and efficiently using recent technology. Now a days machines are widely controlled by embedded system, to meet the need of exploding population economic and effective control of machines is necessary the main theme of our project is sed to feed the raw material automatically to the machine And make the holes simultaneously with a particular gap. A mechanism is considered to be more general. It is an isolated group of rigid bodies through the study of which we can understand the basic structure of any machine and can design machines that are not in existence. Whenever there is a need for motion accompanied with force, there is a mechanism

A system that consists of links & joints and converts one form of motion to another form is called as Mechanism. Mechanism is a combination of rigid bodies which are formed and connected together by links, so that they are moved to perform some functions, such as the crank connecting rod mechanism of the I.C. engines, mechanisms of automobiles etc. A mechanism is considered to be more general. It is an isolated group of rigid bodies through the study of which one can understand the basic structure of any machine and can design machines that are not in existence.

Whenever there is a need for motion accompanied with force, there is a mechanism. A group of rigid bodies connected to each other by rigid kinematic pairs (joints) to transmit force and motion. A machine consists of a number of parts or bodies, the mechanism of the various parts or bodies from which the machine is assembled. This is done by making one of the parts fixed, and the relative motion of other parts is determined with respect to the fixed part..

Kinematic Element:

Kinematic element is a part of a rigid body which is used to connect it to another rigid body such that the relative motion between the two rigid bodies can occur.

KINEMATIC PAIR:

Kinematic pairs the joining of two kinematic elements. The types of kinematic pairs and their distribution within the mechanism determine the main characteristics of a mechanism. The relative motion between the kinematic pair is completely or successfully constrained(i.e. in a definite direction).Links are rigid bodies each having hinged holes or slot to be connected together by some means to constitute a mechanism which able to transmit motion or forces to some another locations

PROBLEM IDENTIFICATION

Hand operated punching and feeding has many advantages and disadvantages , like hand feeding has accuracy and job availability but due to late work complete, accident and high cost, alternate source of operation started.Individual power is required to feed and puching, stamping etc…to overcome this exhaust air will be used to run the feeding mechanism

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A. OBJECTIVES:

- To save electricity
- Reuse the exhaust gases from the industries to mechanical work
- Simple feeding mechanism used for small scale industries
- Now a day, machines are widely controlled by embedded system. To meet the need of exploding population economic and effective control of machines is necessary.
- The main theme is used to feed the raw material automatically to the machine and make holes simultaneously with a particular gap.
- To decrease the mistakes made by human. To increase the accuracy

B. SPECIFICATION:

Diameter of the cylinder (d)= 25mm
Stroke length(L)= 80mm
Diffuser inlet diameter (d1)= 10mm
Diffuser outlet diameter (d2)= 25mm
Diameter of the piston(d*)= 23mm
Pressure (P)= 2 BAR= 2*10^5 N/M^2

Link 5

Length of the rocker arm = 150mm
Width of the rocker arm = 80
Thickness of the rocker arm = 5mm

Links (1,2,3)

Length= 250mm
Width = 50mm
Thickness = 5mm

Link 4

Length= 200mm
Width = 50mm
Thickness = 5mm
Base 300mm*600 mm(1feet*2feet)
Drill holes = 8mm,8mm,6mm
Nut & bolt = M8,M10,M6

C. FORMULA USED:

INDICATED POWER:

$$IP = \frac{P_m * l * A * N * K}{60}$$

Where,
P_m = Mean effective pressure(N/m^2)
L = Stroke length(m)
A = Area of cylinder(m^2)

Where,
A =/4 d^2
d= diameter of cylinder (m) N = Speed (rpm)
K = No of cylinder

BRAKE POWER:

$$BP = \frac{2\ NT}{60}$$

Where,
T= WxR
Where
W= Tangential force (or) force acting on the piston (N)
T= Twisting moment(NM)
R= Radial distance of wheel (m)

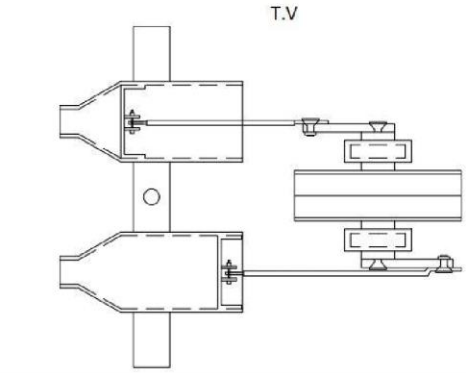
Where,
$W = Pxd^2 / 4$
where
P= Pressure inside cylinder (N/m^2) D = diameter of cylinder (m)

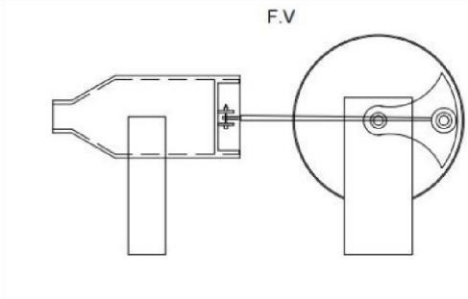
Efficiency

=IP/BP*100

II DESIGN LAYOUT

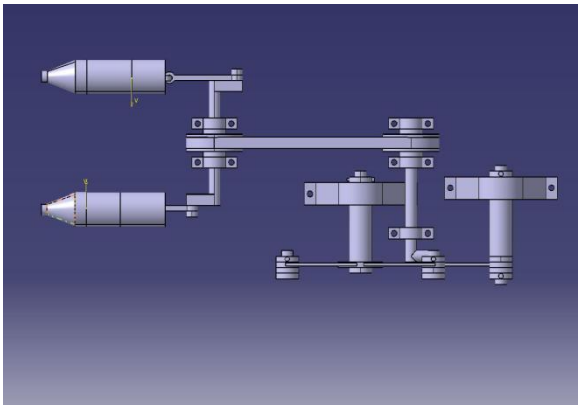
2D DESIGN LAYOUT





3D CATIA DESIGN MODEL

TOP VIEW



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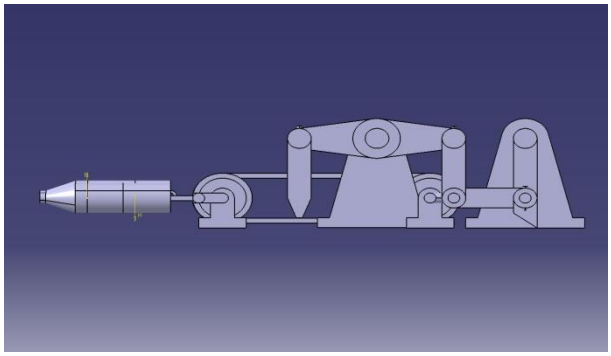
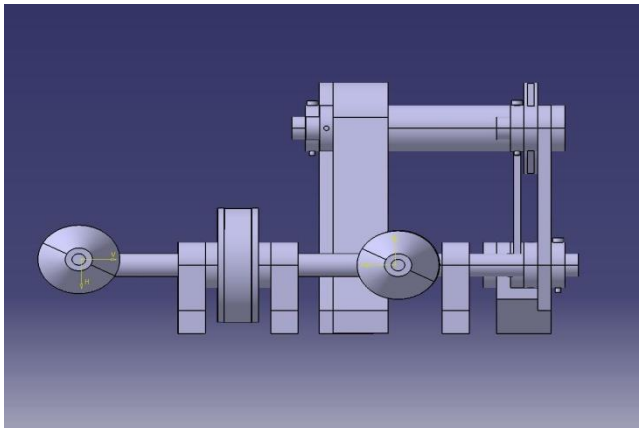
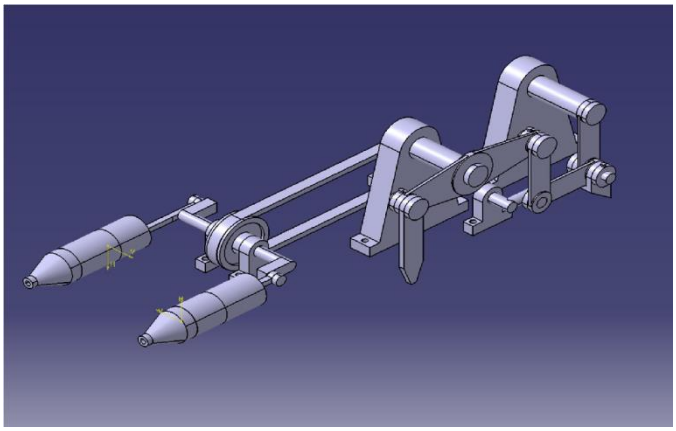
FRONT VIEW



SIDE VIEW



PROJECTIONAL VIEW



III DESIGN CALCULATION

INDICATED POWER :

$$IP = \frac{P_m * l * A * N * K}{60}$$

$P_m = 2 \times 10^5 \ (N/m^2)$
$L = 0.08 \ (m)$
$A = 4.908 \times 10^{-4} (m^2)$ $N = 100 \ (rpm)$
$K = 2$

$$IP = \frac{2x10^5 \times 0.08 \times 4.908x10^{-4} \times 100 \times 2}{60}$$

IP = 26.179 W

BRAKE POWER

$$BP = \frac{2 \ NT}{60}$$

Where

$T = WxR$

$W = 31.25 \ (N)$
$R = 0.06 \ (m)$
$T = 31.25 \times 0.06$

T=1.875

$$BP = = \frac{2 \times 100 \times 1.875}{60}$$

BP=19.634 W

EFFICIENCY

$_{mech}$ = BP/IP*100

$$\frac{19.634}{26.179}$$

0.7499 x 100

$_{mech}$ = 74 %

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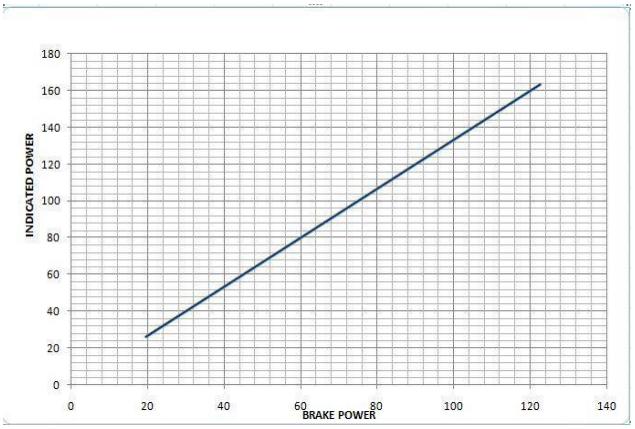
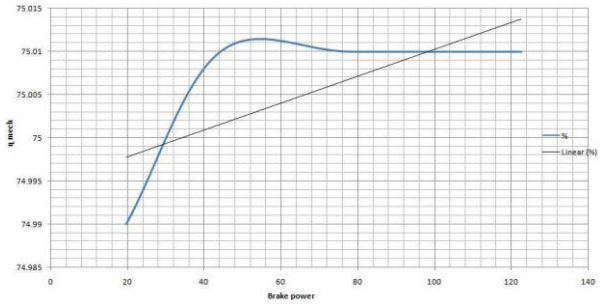
A. GRAPH: BRAKE POWER VS INDICATED POWER





IV MATERIAL SELECTION

A. AVAILABLITY AND COST:

To prepare any machine part, the type of material should be properly selected, considering design, safety and following points. The selection of material for engineering application is given by the following factors:-

1. Availability of materials
2. Suitability of the material for the required components.
3. Suitability of the material for the desired working conditions.
4. Cost of materials.

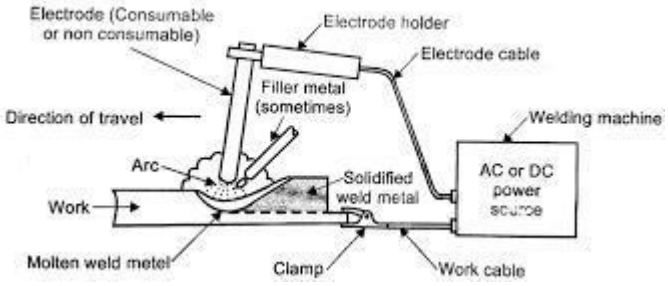
B. PROPERTIES

S. No	Mech. Properties	Symbol	Units	Mild steel
1.	Young's Modulus	E	Gpa	105.0
2.	Shear Modulus	G	Gpa	36.75
3.	Poisson Ratio	v	--------	0.23
4.	Density		Kg/m³	7209
5.	Yield Strength	Sy	Mpa	130
6.	Shear Strength	Ss	Mpa	169

V MANUFACTURING PROCESS

A. WELDING:

Arc welding is a welding process that is used to join metal to metal by using electricity to create enough heat to melt metal, and the melted metals when cool result in a binding of the metals. It is a type of welding that uses a welding power supply to create an electric arc between a metal stick ("electrode") and the base material to melt the metals at the point of contact. Arc welders can use either direct (DC) or alternating (AC) current, and consumable or non-consumable electrodes.



The welding area is usually protected by some type of shielding gas, vapor, or slag. Arc welding processes may be manual, semi-automatic, or fully automated. First developed in the late part of the 19th century, arc welding became commercially important in shipbuilding during the Second World War. Today it remains an important process for the fabrication of steel structures and vehicles.

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B. GAS CUTTING

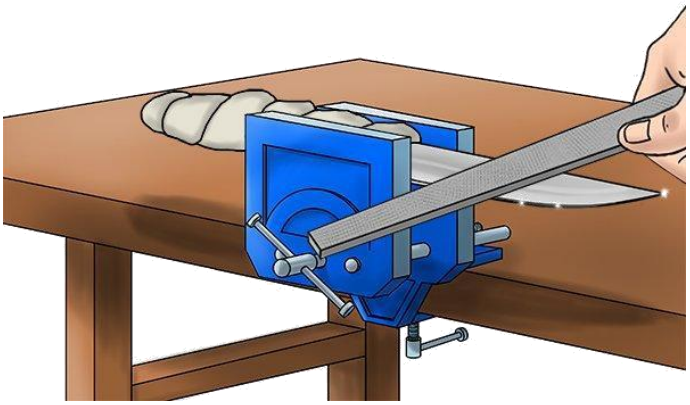
Oxy-fuel welding (commonly called oxyacetylene welding, oxy welding, or gas welding in the U.S.) and oxy-fuel cutting are processes that use fuel gases and oxygen to weld or cut metals. French engineers Edmond Fouché and Charles Picard became the first to develop oxygen-acetylene welding in 1903Pure oxygen, instead of air, is used to increase the flame temperature to allow localized melting of the workpiece material (e.g. steel) in a room environment. A common propane/air flame burns at about 2,250 K (1,980 °C; 3,590 °F), a propane/oxygen flame burns at about 2,526 K (2,253 °C; 4,087 °F), an oxyhydrogen flame burns at 3,073 K (2,800 °C; 5,072 °F) and an acetylene/oxygen flame burns at about 3,773 K (3,500 °C; 6,332 °F)

C. DRILLING:

Drilling is a cutting process that uses a drill bit to cut a hole of circular cross-section in solid materials. The drill bit is usually a rotary cutting tool, often multi-point. The bit is pressed against the work-piece and rotated at rates from hundreds to thousands of revolutions per minute. This forces the cutting edge against the work-piece, cutting off chips (swarf) from the hole as it is drilled.

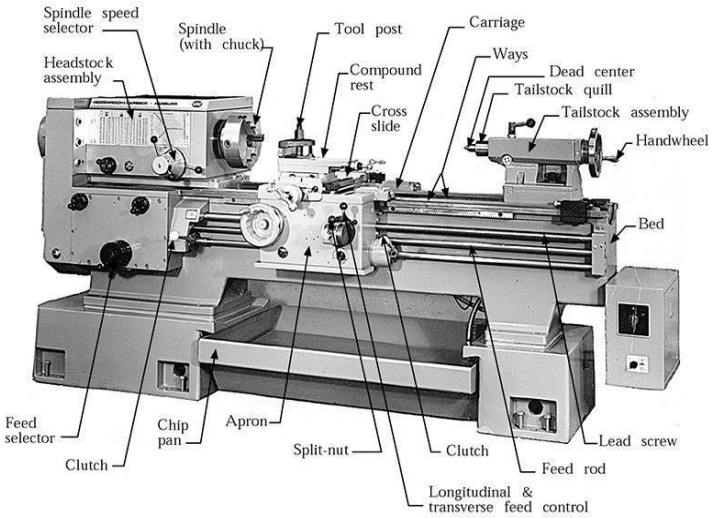
D.FILLING:

Remove burr from the metal is the process of gringding using file ,it gives smooth finishing



D.LATHE MACHINING:

A lathe is a machine that rotates a work piece about an axis of rotation to perform various operations such as cutting, sanding, knurling, drilling, deformation, facing, and turning, with tools that are applied to the work piece to create an object with symmetry about that axis



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VI. CONSTRUCTION

Our project "DESIGN AND FABRICATION OF AUTOMATIC ROCKER ARM FEEDING MECHANISM USING COMPRESSED AIR" need so many raw materials which are mentioned in above chapter for that materials first of all we purchased the raw materials based upon requirement and for that we've planned how to buy. After bought the materials we cut raw materials in required dimensions in precise manner by using cutting components and machine. After that for assembly purpose we went for welding and fixing using nut and bolts whenever we require rigid fixed joints

VII. WORKING

We are familiar with feeding mechanism, but do you know how the mechanism works? Now let me introduce the working principle Initially switch ON the unit the compressor runs, which delivers the air to the cylinder, the air pushes the piston inside the cylinder. The piston reciprocates inside the cylinder. These pistons connected with the crank shaft using the connecting rod
The reciprocating motion is converted into the rotary motion
Then these rotary motion conveyed into the rocker arm feeding mechanism by using pulley. Belt is used to Transmitting motion from one pulley to another The link 3 and 4 are connected to the pulley using shaft. The link-3 will make link-2 to rotate which helps in initial intake of the work piece. The link provided at the joint of the link 3 and 4 will help in further moving the work piece to the next link.
The link-4 will help link-5 to rotate which in turn result in rotation of link-6. The link-6 is having only upward and downward movement. The sharper pointer at the link-6 will help in punching the work piece. The work piece is inserted flatly in to the bottom of the first link, then the pulley rotates the work piece is send to the other end successfully

VIII. APPLICATION

- It can be used for punching holes on to thin sheet metals.
- It can be used for stitching thick gunny bags in industries.
- It can be used for cutting thin sheets at regular intervals
- To reduce the production cost
- To reduce the production time
- To reduce the material handling.

CONCLUSION

Fabrication of this project uses simple ideas and mechanism to achieve a simple set of actions and is intended to initiate the feeding\operator. However these mechanisms are expensive for small scale industries. Major problem encountered is the changing of the feed is not easy. It can produce 70 holes per minute

PHOTOGRAPHIC VIEW

REFERENCES

A. Anthony Esposito 'Fluid Power with applications', 6 th Edition, Pearson Education Inc. 2011
B. Muhammad Ali Mazidi, Janice Gillispie Mazidi, and Rolin D. McKinlay 'The 8051 Micro Controller and Embedded Systems', 2nd Edition, Pearson Education Inc. 2008
C. Pneumatic cylinder and solenoid DCV from product manual of Janatics ltd,
D. Standard blade sizes used in power hacksaw machines using the link http://www.planomillers.com/ - viewed on August 2, 2013
E. ULN2003 IC Pin configuration (used in relay circuit) using the link http://www.engineersgarage.com/-viewed on August 10, 2013
F. Theory of Machines by R. S. Khurmi, J.K. Gupta
G. Theory of mechanics by S.S Rattan
H. Workshop Technology by Hazra Chaudhary vol. I & vol. II

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1. M.Rethish ,S.Sujithbeno ,S.Ramkumar ,S.Sanjeev ,K.Chandrasekar "AUTOMATIC SUSPENSION USING ROCKER BOGIE MECHANISM", INTERNATIONAL JOURNAL FOR RESEARCH & DEVELOPMENT IN TECHNOLOGY Volume-7,Issue-4, (April-17).
2. Prof. Sabry A. El-Shakery, Dr. Khaled. M. Khader,"Optimal Synthesis of Crank-Rocker Mechanism with Unit Time Ratio and Desired Equal Deviation of Minimax Transmission Angle", International Journal of Advanced Engineering and Global Technology Vol-03, Issue-09, September 2015.
3. C.HChiang " Design of spherical and planar crank-rockers and double-rockers as function generators—IKonstrukton sphärischer und ebener kurbelschwingen und doppelschwingen als funktionsgetriebe–I. kurbelschwingen: Crank-Rockers", ELSEVIER Mechanism and Machine Theory Volume 21, Issue 4, 1986, Pages 287- 296.