ABACUS INSTITUTE OF ENGINEERING & MANAGEMENT

(Affiliated to Maulana Abul Kalam Azad University of Technology)

GEARLESS TRANSMISSION SYSTEM

Submitted by

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Under the supervision of

Mr. BIKASH BANERJEE
Head of Department

Abacus Institute of Engineering and Management

A report submitted in partial fulfilment of the requirements for the degree of Bachelor of Technology in Mechanical Engineering

Abacus Institute of Engineering and Management

Under the Maulana Abul Kalam Azad University of Technology
(Formerly known as West Bengal University of Technology)

Hooghly, West Bengal
June 2024

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Declaration

I hereby declare that the project report entitled "**GEARLESS TRANSMISSION SYSTEM"** submitted to the **Maulana Abul Kalam Azad University of Technology** (MAKAUT) in partial fulfilment of the requirements for the award of the degree of **Bachelor of Technology** in Mechanical Engineering is a recorder of original dissertation work done by me, under the guidance and supervision of **Mr. BIKASH BANERJEE,** Head Of Department**, Department of Mechanical Engineering, Abacus Institute of Engineering and Management, Mogra** and it has not formed basis for the award of any Degree/Diploma/Associateship/Fellowship or other similar title to any candidate to any University.

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Place :

Date :

--------DEFINATION OF PROJECT--------

P- Planning before carrying out the work

R- row material required for the work

O- Organization of the work

J- joint effort put in to the work

E- estimation of material required in the work

C- Costing of the work

T- techniques used in performing

INDEX

1. INTRODUCTION

1.1

Todays' world requires speed on each and every field. Hence rapidness and quick working is the most important. Now a day for achieving rapidness, various machines and equipment are manufactured by man. Engineer is constantly conformed to the challenges of bringing ideas and design in to reality.

1.2

New machine and techniques are being developed continuously to manufacture various products at cheaper rates and high quality. The project "GEARLESS TRANSMISSION" being compact and portable equipment, which is skilful and is having something practise in the transmitting power at right angle without any gears being manufactured. Most of the material is made available by our college. The parts can be easily made in our college-shop its price is also less. this project gives us knowledge, experience, skill and new ideas of the manufacturing. It is a working project and having guarantee of the success. This project is the equipment useful to improve the quality of the gear being manufactured and can be made in less time, hence we have selected this project el-bow mechanism is an ingenious link mechanism of slider and kinematic chain principle. This is also called as "gearless transmission mechanism"

1.3

This mechanism is very useful for transmitting motion at right angles. However, in certain industrial application "gearless transmission at right angle" can also work at obtuse or accurate angle plane can be compared to worm and worm gear or bevel and pinion gear which are invariably used in the industry for numerous application. The main feature for mechanism comparatively high efficiency between the input and the output power shafts with regards to the gear efficiencies.

1.4

It has elaborately discussed in detail in the entire books o engineering that the gear drives have very low mechanical efficiencies. Since Factor relating to under frictional Forces between the mating gear teeth, the erratic hunting of the gears, the back lash between the teeth cannot be overcome and hence the efficiency cannot be more than 55% Of recent gears of warm bevel

type are being manufactured in poly propylene and epoxy material where the Frictional Forces are comparatively eliminated. Even though such gears are used for relatively small applications the efficiencies not more than 42%.

1.5

The El-bow Mechanism transmits the I/P power towards the O/P side such away that the angular Forces produced in the slacks are simply transmitted with the help of pins which takes up the I/P power and the right angle drive is transferred towards the O/P slack and pin assembly. Hence very little friction plays while the power is being transmitted; the Hunting and back lash one absent. Therefore, it is appreciated that efficiency as high as90-92% are possible in gear less transmission mechanism.

1.6

Here we are going to show two applications of El-bow mechanism. How it will become work, which we are showing by cutting the wood by attaching the wood cutter at the output shaft as well as we are also making it as compressor. It will such the air from atmosphere, compressor it & delivers it at high pressure. As we were calculating the result obtained is we can get the compressed air at pressure 2 bar.

1.7

The first application of this mechanism was made use of the "Big Ben Clock" having four dials on the tower of London. This clock was installed some Time between 1630 to 1635 AD. And still it is functioning in good condition.

2. WORKING PRINCIPLE

Here is a wonderful mechanism that carries force through a 90-degreebend. Translating rotational motion around an axis usually involves gears, which can quickly become complicated, inflexible and clumsy-looking, often ugly. So, instead of using gears, this technology elegantly converts rotational motion using a set of cylindrical bars, bent to 90o, in a clever, simple and smooth process that translates strong rotational force even in restricted spaces.

A gearless transmission is provided for transmitting rotational velocity from an input connected to the bent links. Both the input shaft and the housing have rotational axes. The rotational axis of the input shaft is disposed at an angle of 90 degrees with respect to the

rotational axis of the housing. As a result, rotation of the input shaft results in a processional motion of the axis of the bent link. The rotary and reciprocating motion of bent link transmit rotation of prime mover to 90 degrees without any gear system to an output shaft without gears. The transmission includes an input shaft.

With this rotation we can generate Power like **Wind Energy** from the system.

The Gearless transmission or El-bow mechanism is a device for transmitting Motions at any fixed angle between the driving and driven shaft.

The synthesis of this mechanism would reveal that it comprises of a number of pins would be between 3 to 8 the more the pins the smoother the operation. These pins slide inside hollow cylinders thus formatting a sliding pair.

Our mechanism has 4 such sliding pairs. These cylinders are placed in a Hollow pipe and are fastened at 120 Degree to each other. This whole assembly is mounted on brackets wooden table. Power is supplied by an electric motor.

The working of the mechanism is understood by the diagram. An unused form of transmission of power on shaft located at an angle.

Motion is transmitted from driving to the driven shaft through the roads which are bent to conform to the angles between the shafts. These roads are located at in the holes equally spaced around a circle and they are free to slide in & out as the shaft revolves. This type of drive is especially suitable where quite operation at high speed is essential but only recommended for high duty.

The operation of this transmission will be apparent by the action of one rod. During a revolution. If we assume that driving shaft “A” is revolving as indicated by arrow the driven shaft B will rotate counter clockwise. As shaft A turns through half revolution C shown in the inner and most effective driving position slides out of both shafts A & B.

The first half revolution and rod “C” then will be at the top then during The remaining half this rod “C” slide in wards until it again reaches to inner most position shown in Fig. in the meanwhile the other roads have of course passed through the same cycle of movements all rods are successively sliding inwards and outwards.

Although this transmission is an old one many mechanics are sceptical about its operation, however it is not only practicable but has proved satisfactory for various applications when the drive is for shafts which are permanently located at given angle. Although this illustration shows a right angle transmission this drive can be applied also to shafts located at intermediate angle between 0º and

90º. In making this transmission, it is essential to have the holes for a given rod located accurately in the same holes must be equally spaced in radial and circumferential directions, be parallel to each rod should be bent to at angle at which the shaft is to be located. If the holes drilled in the ends of the shafts have “blind” or closed ends, there ought to be a small vent at the bottom of each
rod hole for the escape of air compressed by the pumping action of the rods.
These holes are useful for oiling to avoid blind holes shafts may have enlarged port or shoulder. This transmission may be provided centrally and in line with the axis of each shaft and provided with a circular groove at each rod or a cross-pin to permit rotation of the shaft about the rod simply active as a retaining device for shipping and handling purposed.
As mentioned in first chapter that we are showing two applications of This mechanism at a time.

2.1 As a wood cutting machine The cutter is attached on the output shaft.

2.2 when motion is transmitted through mechanism to output shaft the shaft will start to rotate at adjusted speed. The speed is adjusted by means of pulley (i.e.RPM). The cutters will also start to rotate along with the shaft the because of cutter is 250mm.the through slot introduces in the table for free rotation of cutter
edges in table. Now the feed given to wooden rods or plywood to cut in desire shape and size. The speed is adjusted by means of pulley (i.e.RPM). The cutters will also start to rotate along with the shaft the because of cutter is 250mm. the through slot is introduced in the table. Now feed given to wooden rods or plywood to cut in desired shape and size.

2.3 Mechanical seal is defined as a devise which seals by virtue of axial contact pressure between two relatively flat surfaces in a plane right angle to the axis of the shaft. The seal used in EL-BOW m/c compressor is stationary type. It is place between cylinder and cylinder head.

2.4 Now the End point will transmit the Power which will drive the Blade for generation wind energy form the total mechanism.

3. CONCEPT DRAWING OF MACHINE

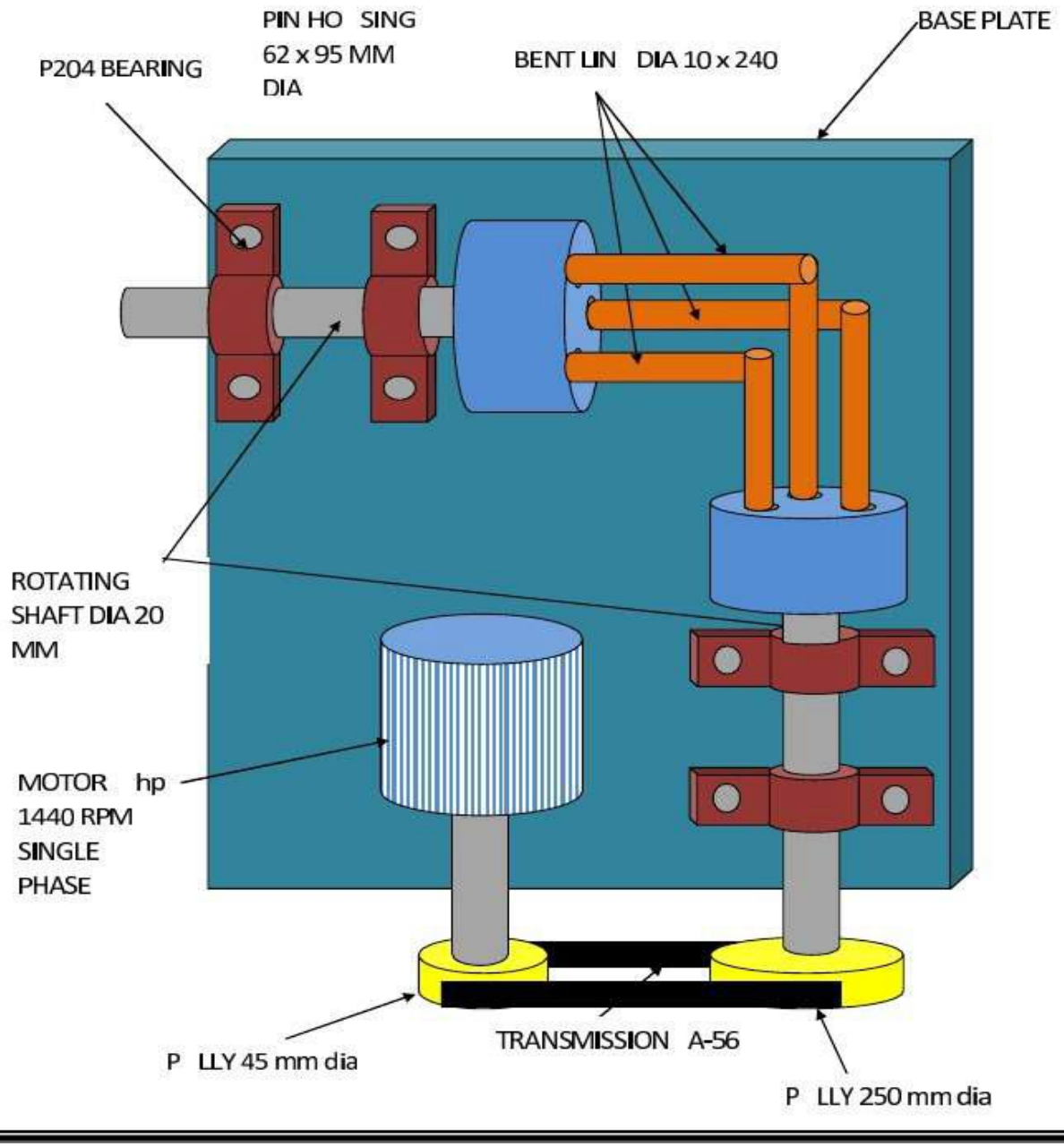

Fig.1 (Basic Drawing of Gearless Transmission System)

3D Drawing for Gear Less Power Transmission

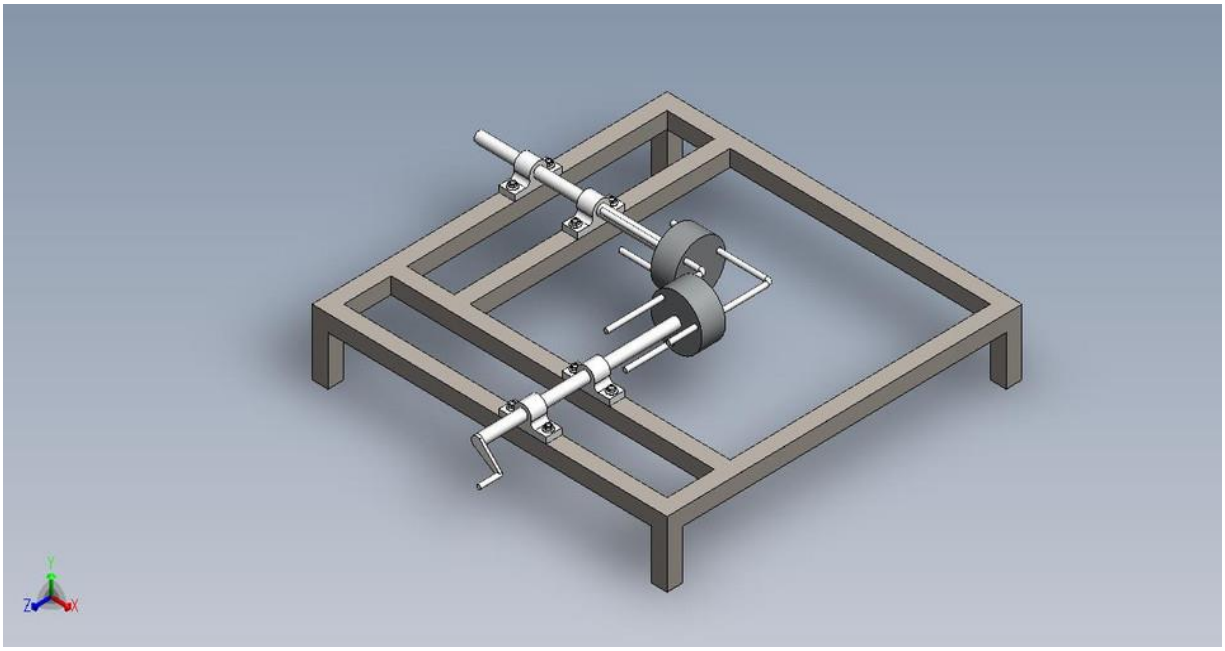

Fig.2 (3D Drawing for Gearless Power Transmission)

4. APPLICATION

The featured product has its widest application as an extension for a socket wrench. Here the design makes it easy to reach fasteners in the automotive and other mechanical industries, where direct access to bolts and screws is often limited.
However, the possible applications for this technology extend into numerous fields. Just think of the possibilities for power transmission in push bikes, toys and hand-cranked equipment, or for movement transmission in store and outdoor signage.

4.1. Driving for all kinds four faced tower clocks. The elbow mechanism was first use in the year 1685 for the famous London tower clock named Big-ben.

4.2. The mechanism is invariable used for multiple spindle drilling operation called the gang drilling.

4.3. Used for angular drilling between 0 to 90 degree position.

4.4. Lubrication pump for C.N.C. lathe machines.

4.5. The mechanism is very useful for a reaching a drive at a clumsylocation.

4.6. Air blower for electronic and computer machine.

4.7. The mechanism has found a very usefully use in electronic and computer technology for multiple.

4.8. The elbow mechanism is used for movement of periscope in submarines.

4.9. the year 1685 for the famous London tower clock.

4.10. Use for Generate energy like Wind, Light.

5. COMPRATION

COMPARISON OF GEARED DRIVE WITH GEARLESS DRIVE

The gearless drive is capable of transmitting motion at any fixed angle between 0º to 90º. This desired effect is also possible with help of bevel gearless differ to a great extent not only in their manufacturing method or working principle but also in other aspects etc. the aspects have been discussed below:

5.1MANUFACTURING METHODS

Bevel gears, which are straight teeth or spiral teeth are manufactured on special purposes machines like Gearless machines´. These required large amount of calculation and every pair or set of gear are made together and there is no
interchangeability. The gearless drive has this advantage that it can be machined and manufactured on conventional machines and it provides complete freedom of interchangeability.

5.2 WORKING PRINCIPLE :-

A gear comprises of a frustum of a cone with teeth out on its periphery. The driving gear mounted on the input shaft meshes with the driven gear and thus provides motion at right angle to the input shaft. The working of the gearless drive has been explained in the earlier chapter and it obviously very different from the above-

5.3 CAUSE OF FAILURE :-

Starting with the principle that failure id the result of the stress i.e. condition more severe than the material can with stand. The various type of failures such as pitting, corrosion, erosion, fatigue etc. Cause the wearing of the gear tooth resulting in the tooth leads to the replacement of the entire gear set, which is very expensive.
The effect of pitting, erosion, corrosion etc. will be present in the gearless drive also but the effect of these will be not be as severe as in the case of geared drive, failure will take place in the pi s ton e.g. Either bending or crack. Of the pins, but the main advantage is that only particular pin will have to be replaced instead of case of failure.

5.4 MATERIAL :-

The material chosen for any component must

(a) be easily available

(b) be capable of being processed in the desired examinations and

(c) have the necessary physical properties. The gears generally fail due to bending, fatigue and impact and the gears are also responsible for the failure of the components in the gears have to very carefully determined since it may lead to pitting.

5.5 LUBRICATION AND COOLING :-

A few open gears drives are lubricated by grease but gear units are usually totally enclosed and oil lubricated. The arrangement for lubrication is simple and easy since it requires only a leak proof housing in which the gears are placed and oil is filled. This lubricating also acts as cooling medium. The heat generated and it then spreads to other areas. In the gearless drive lubrication and cooling plays a very major role.
The efficiency of the mechanism is affected by lubrication. Although the system of lubrication and cooling complex as discussed in the next chapter but gives good result. Due to sliding contract, between pins and cylinders, heat generated is more and thus effective cooling is a must.

5.6 TORQUE TRANSMITTUNG CAPACITY :-

The gear drive is capable of transmitting very high torque as compared to the gearless drive which is meant only for low torque applications.

5.7 LIFE AND EFFICIENCY :-

Designed life represents the total period of operation, regardless of any variations of torque or speed, which may occur during that the time industrial The geared drive is capable of giving an efficiency of about 40% and certain errors like backlash, hunting etc. cannot be eliminated.
In the gearless drive, although the life has not been calculated but it is assumed that its life will be in comparison to that of geared drive but its efficiency could be as high as 85 % to 92%with proper lubrication and cooling.

Comparison of this drive with gear drive infinite no of speed can be available which can not to easily possible in gearbox.

Optimum machining is important which require exact machining speed for particular operation which is very difficult to gain for gear drive but can easily available by this drives increase the following.

1)Tool life
2)Productively
3)Energy saving.

The different speed at eight angle (0 to 90) is possible which is not easily possible in gear drive

Efficiency can be increased by increasing no of pins, by precise machining, selecting suitable material and proper lubrication.

6. SELECTION OF MATERIAL

The proper selection of material for the different part of a machine is the main objective in the fabrication of machine. For a design engineer it is must that he be familiar with the effect, which the manufacturing process and heat treatment have on the properties of materials. The Choice of material for engineering purposes depend upon the following factors:

6.1.Availability of the materials.

6.2. Suitability of materials for the working condition in service.

6.3.The cost of materials.

6.4.Physical and chemical properties of material.

6.5.Mechanical properties of material.

The mechanical properties of the metals are those, which are associated with the ability of the material to resist mechanical forces and load. We shall now discuss these properties as follows:

6.1.1.Strength: It is the ability of a material to resist the externally applied forces

6.1.2.Stress: Without breaking or yielding. The internal resistance offered by apart to an externally applied force is called stress.

6.1.3.Stiffness: It is the ability of material to resist deformation under stresses. The modules of elasticity of the measure of stiffness.

6.1.4.Elasticity: It is the property of a material to regain its original shape after deformation when the external forces are removed. This property is desirable for material used in tools and machines. It may be noted that steel is more elastic than rubber.

6.1.5.Plasticity: It is the property of a material, which retain the deformation produced under load permanently. This property of

material is necessary for forging, in stamping images on coins and in ornamental work.

6.1.6 Ductility: It is the property of a material enabling it to be drawn into wire with the application of a tensile force. A ductile material must be both strong and plastic. The ductility is usually measured by the terms, percentage elongation and percent reduction in area. The ductile materials commonly used in engineering practice are mild steel, copper, aluminium, nickel, zinc, tin and lead.

6.1.7.Brittleness: It is the property of material opposite to ductile. It is the property of breaking of a material with little permanent distortion. Brittle materials when subjected to tensile loads snap off without giving any sensible elongation. Cast iron is a brittle material.

6.1.8.Malleability: It is a special case of ductility, which permits material to be rolled or hammered into thin sheets, a malleable material should be plastic but it is not essential to be so strong. The malleable materials commonly used in engineering practice are lead, soft steel, wrought iron, copper and aluminium.

6.1.9. Toughness: It is the property of a material to resist the fracture due to high impact loads like hammer blows. The toughness of the material decreases when it is heated. It is measured by the amount of absorbed after being.

6.1.10.stressed up to the point of fracture. This property is desirable in parts subjected to shock an impact loads.

6.1.11.Resilience: It is the property of a material to absorb energy and to resist rock and impact loads. It is measured by amount of energy absorbed per unit volume with in elastic limit. This property is essential for spring material.

6.1.12.Creep: When a part is subjected to a constant stress at high temperature for long period of time, it will undergo a slow and permanent deformation called creep. This property is considered in designing internal combustion engines, boilers and turbines.

6.1.13.Hardness: It is a very important property of the metals and has a wide verity of meanings. It embraces many different properties such as resistance to wear scratching, deformation and Mach inability etc. It also means the ability of the metal to cut another metal. The hardness is usually expressed in numbers, which
are dependent on the method of making the test. The hardness of a metal may be determined by the following test

a) Brinell hardness test
b) Rockwell hardness test
c) Vickers hardness (also called diamond pyramid) test
d) Share scalero scope.

The science of the metal is a specialized and although it over flows in to real Ms of knowledge it tends to shut away from the general reader. The knowledge of materials and their properties is of great significance for a design engineer. The machine elements should be made of such a material which has properties suitable for the conditions of operations. In addition to this a design engineer must be familiar with the manufacturing processes and the heat treatment shave on the properties of the materials. In designing the various part of the machine it is necessary to know how the material will function in service.

For this certain characteristics or mechanical properties mostly used in mechanical engineering practice are commonly determined from standard tensile tests. In engineering practice, the machine parts are subjected to various forces, which may be due to either one or more of the following.

- Energy transmitted
- Weight of machine
- Frictional resistance
- Inertia of reciprocating parts
- Change of temperature
- Lack of balance of moving parts

The selection of the materials depends upon the various types of stresses that are set up during operation. The material selected should with stand it.

Another criterion for selection of metal depend upon the type of load because a Machine part resist load more easily than a live load and live load more easily than a shock load.

Selection of the material depends upon factor of safety, which in turn Depends upon the following factors.

- Reliabilities of properties
- Reliability of applied load
- The certainty as to exact mode of failure
- The extent of simplifying assumptions
- The extent of localized
- The extent of initial stresses set up during manufacturing

The extent loss of life if failure occurs

8.The extent of loss of property if failure occurs Materials selected in m/c Base plate, motor support, sleeve and shaft Material used Mild steel

Reasons:

- Mild steel is readily available in market
- It is economical to use
- It is available in standard sizes
- It has good mechanical properties i.e. it is easily Machin-able
- It has moderate factor of safety, because factor of safety results in unnecessary wastage of material and heavy selection. Low factor of safety results in unnecessary risk of failure
- It has high tensile strength
- Low co-efficient of thermal expansion

Properties of Mild Steel:

M.S. has a carbon content from 0.15 % to 0.30%. They are easily wieldable thus can be hardened only. They are similar to wrought iron in properties. Both ultimate tensile and compressive strength of these steel increases with increasing carbon content. They can be easily gas welded or electric or arc welded. With increase in the carbon percentage weld ability decreases.
Mild steel serves the purpose and was hence was selected because of the above purpose.

BRIGHT MATERIAL:

It is a machine dawned. The main basic difference between mild steel and bright metal is that mild steel plates and bars are forged in the forging machine by means is not forged. But the materials are drawn from the dies in the plastic state. Therefore, the material has good surface finish than mild steel and has no carbon deposits on its surface for extrusion and formation of engineering materials thus giving them a good surface finish and though retaining their metallic properties.

7. RAW MATERIAL AND STANDARD MATERIAL

SR NO	PART NAME	MAT	QTY	DECREPTION
1	FRAME	MS	1	MS Plate
2	SHAFT	MS	2	----------
3	HOUSING	MS	2	----------
4	BENT LINK	MS	8	----------
5	PEDESTAL BEARING	CI	4	----------
6	ANGEL	MS	1	----------

7	NUT BOLT WASHER	MS	10	----------
8	WELDING ROD	-	-	14 Pks. Of 6013 grade.
9	COLOUR	-	-	Red oxidise

Table 1 (Material Details)

8. MACHINE DESIGN

The subject of MACHINE DESIGN deals with the art of designing machine of structure. A machine is a combination of resistance bodies with successfully constrained relative motions which is used for transforming other forms of energy into mechanical energy or transmitting and modifying available design is to create new and better machines or structures and improving the existing ones such that it will convert and control motions either with or without transmitting power. It is the practical application of machinery to the design and construction of machine and structure. In order to design simple component satisfactorily, a sound knowledge of applied science is essential. In addition, strength and properties of materials including some metrological are of prime importance.
knowledge of theory of machine and other branch of applied mechanics is also required in order to know the velocity. Acceleration and inertia force of the various links in motion, mechanics of machinery involve the design.

9. CONCEPT IN M.D.P.

Consideration in Machine Design When a machine is to be designed the following points to be considered: -
i)Types of load and stresses caused by the load.
ii)Motion of the parts and kinematics of machine.
iii) type of motion i.e. reciprocating. Rotary and oscillatory.
iv) Selection of material & factors like strength, durability, weight, corrosion
resistant, weld ability, machine ability is considered.
v) Form and size of the components.
vi) Frictional resistances and ease of lubrication.
vii) Convince and economical in operation.
viii) use of standard parts.
ix) Facilities available for manufacturing.
x) Cost of making the machine.
xi) Number of machine or product are manufactured

9.1 GENERAL PROCEDURE IN MACHINE DESIGN

The general steps to be followed in designing the machine are as followed.

i)Preparation of a statement of the problem indicating the
ii) purpose of the machine.
iii) Selection of groups of mechanism for the desire motion.
iv) Calculation of the force and energy on each machine member.
v) Selection of material.
vi) Determining the size of component drawing and sending for manufacture.
vii) Preparation of component drawing and sending for manufacture.
viii) Manufacturing and assembling the machine and Testing of the machine for functioning.

9.2 DESIGNING OF SHAFT BENDING:

The material forces that are developed on any cross section of the shaft give rise to stresses at every point. The internal or resisting moment gives rise to so called bending stresses.

9.3 TORSION:

When the shaft is twisted by the couple such that the axis of the shaft and the axis of the couple coincides, the shaft is subjected to pure torsion and the stresses at any point of cross section is torsion or shear stresses.

9.4 COMBINED BENDING AND TORSION:

In practice the shaft in general are subjected to combination of the above Two types of stresses. The bending stresses may be due to following :

1.Weight of belt
2.Pull of belts
3.Eccentric Mounting
4.Misalignment The torsional movement on the other hand may be due to direct or indirect twisting. Thus any cross-section of the shaft is subjected simultaneously of both bending stresses and torsional stresses.

Following stresses are normally adopted in shaft design

Max tensile stress = 60 N/mm²
Maxm shear stress = 40 N/mm²

Shaft design on basic of study Considering 25 % overload

Tmax= 1238 x 1.25= 1.525 x 10 3N-mm

The shaft is subject to pure torsional stress

We know
T= 3. 14/16 x fs x d3
15250 = 3. 14/ 16 x 70x d3
D =10.20mm
Taking factor of safety = 2
D = 10 x 2 = 20mm
Same torque is transmitted to bent link shaft So torque on each shaft = T /3 = 15250 /3 = 5083 N mm
T= 3. 14/16 x fs x d3
5083 = 3. 14/ 16 x 70x d3
D = 7.17 mm
Taking factor of safety =1.4
D = 7 x 1 .4 = 9.8 =10mm

9.5 DESIGN OF C-SECTION

Material: - M.S.
The vertical column channel is subjected to bending stress
Stress given by => M/I = f b / y
In above equation first we will find the moment of inertia about x and y Axis and take the minimum moment of inertia considering the channel of ISLC 75 x 40 size.
We know the channel is subject to axial compressive load In column section the maximum bending moment occurs at channel of section

M = Ra x L/2
M = 750 x 1500/2
M = 562500 N-mm
We know

F b = M/Z
Z = t (l x b + (b2/6))
Z = 5 (40x 65 + (652/6))
Z = 3304 mm3

Now check bending stress induced in C Section

F b induced = M/Z
F b induced = 562500 /3304 = 170.25 N / mm2
As induced stress value is less than allowable stress value design is safe.
F b = Permissible bending stress = 320 N / mm2
F b induced < f b allowable
Hence our design is safe.

9.6 DESIGN OF WELDED JOINT OF CHANNEL:
The welded joint is subjected to pure bending moment. so it should be design for bending stress. We know minimum area of weld or throat area
A = 0.707 x s x l
Where s = size of weld
l = length of weld

A = 0.707 x 5 x (75 + 40 + 35 + 58 +35)
A = 0.707 x 5 x 243
A = 859 mm2
Bending strength of parallel fillet weld P = A x f b
F b = 80 N / mm2
As load applied at the end of lever is 250 N. So moment generated at the welded joint is
M =P x L= 250x 450= 112500 N – mm
we know f b = M /Z

$$Z= \frac{BH3-bh3}{6H}$$

$$Z= \frac{40*753-35*583}{6*75}$$

Z = 209824

Calculating induce stress developed in welded joint
F b induced = 112500 / 209824= 0.536 N /mm2
As induce stress is less then allowable stress the design is safe.

9.7 DESIGN FOR WELDED JOINTS:

Diameter of shaft = D = 20 mm.
Size of weld = s = 4 mm

F s = load/shear area
=600/π .D x t
=600/π x 20 x t

now,
t = s.cos 45 = 0.707 s
f s = 9.55/0.707×4 N/mm2
f s = 3.37 N/mm2
As induced stress value is less than allowable value, which is 56 N/mm2

So design is safe.

10. COST ESTIMATION

Cost estimation may be defined as the process of forecasting the expenses that must be incurred to manufacture a product. These expenses take into a consideration all expenditure involved in a design and manufacturing with all related services facilities such as pattern making, tool, making as well as a portion of the general administrative and selling costs.

10.1 PURPOSE OFCOST ESTIMATING:

10.1.1.To determine the selling price of a product for a quotation or contract so as to ensure a reasonable profit to the company.
10.1.2.Check the quotation supplied by vendors.
10.1.3.Determine the most economical process or material to manufacture the product.
10.1.4. To determine standards of production performance that may be used to control the cost.

10.2 THE BUDGET ESTIMATION IS OF TWO TYRES:

10.2.1.material cost
10.2.2. Machining cost

10.3 MATERIALCOST ESTIMATION:

Material cost estimation gives the total amount required to collect the raw material which has to be processed or fabricated to desired size and functioning of the components.
These materials are divided into two categories.

10.3.1.Material for fabrication:
In this the material in obtained in raw condition and is manufactured or processed to finished size for proper functioning of the component.
10.3.2. Standard purchased parts:
This includes the parts which was readily available in the market like Allen screws etc. A list is forecast by the estimation stating the quality, size and standard parts, the weight of raw material and cost per kg. For the fabricated parts.

10.4 MACHINING COST ESTIMATION:

This cost estimation is an attempt to forecast the total expenses that may include to manufacture apart from material cost. Cost estimation of manufactured parts can be considered as judgment on and after careful consideration which includes labour, material and factory services required to produce the required part.

10.5 PROCEDURE FOR CALCULATION OF MATERIAL COST:

The general procedure for calculation of material cost estimation is
10.5.1.After designing a project a bill of material is prepared which is divided into two categories.

a. Fabricated components
b. Standard purchased components

10.5.2.The rates of all standard items are taken and added up.

10.5.3. Cost of raw material purchased taken and added up.

10.6 LABOUR COST:

It is the cost of remuneration (wages, salaries, commission, bonus etc.) of The employees of a concern or enterprise.

Labour cost is classifies as:
10.6.1) Direct labour cost
10.6.2) Indirect labour cost

10.7 DIRECT LABOUR COST:

The direct labour cost is the cost of labour that can be identified directly with the manufacture of the product and allocated to cost centres or cost units. The direct labour is one who counters the direct material into sale able product; the wages etc. of such employees constitute direct labour cost. Direct labour cost may be apportioned

to the unit cost of job or either on the basis of time spend by a worker on the job or as a price for some physical measurement of product.

10.8 INDIRECT LABOUR COST:

It is that labour cost which cannot be allocated but which can be apportioned to or absorbed by cost centres or cost units. This is the cost of labour that does not
alters the construction, confirmation, composition or condition of direct material but is necessary for the progressive movement and handling of product to the point of dispatch e.g. maintenance, men, helpers, machine setters, supervisors and foremen etc.
The total labour cost is calculated on the basis of wages paid to the labour for 8 hours per day.
Cost estimation is done as under
Cost of project = (A) material cost + (B) Machining cost + (C) lab our cost
(A) Material cost is calculated as under: -

1)Raw material cost
2) Finished product cost

10.9. RAW MATERIAL COST:

It includes the material in the form of the Material supplied by the
3 Steel authority of India limited´ and Indian aluminium co., as the round, bars, angles, square rods, plates along with the strip material form. We have to search for the suitable available material as per the requirement of designed safe values. We have searched the material as follows:-

11.SPECIFICATION & MANUFACTURING OF PARTS

11.1 MANUFACTURING PROCESS :

The following are the various manufacturing process used in mechanical engineering.

11.2 PRIMARY SHAPING PROCESS :

The process used for the preliminary shaping of the machine component is known as primary shaping process.

11.3 MACHINE PROCESS :

The process used for giving final shape to the machine component, according to planned dimensions is known as machining process. The common operation drilling, boring etc.

11.4 SURFACE FINISHING PROCESS :

The process used to provide a good shape surface finish for the Machine components are known as surface finishing processes. The common operation used for the process are polishing, buffing, lapping etc.

11.5 JOINING PROCESS :

The process used for joining machine components are known as joining process.The common operation used for this process are soldering, brazing, welding etc.

11.6 PROCESS AFFECTING CHANGE IN PROPERTIES:

These are intended to import specific properties to material e.g. heat treatment, hot working, cold rolling etc.

11.7 WELDED JOINTS:

► **DEFINITION**: A welded joint is a permanent joint, which is obtained by the fusion of the edges of the two parts, to be joined together, with or without the application of pressure and a filler material. Welding is intensively used in fabrication as an alternative method for casting or forging and as a replacement for bolted and reverted joints. It is also used as a repair medium.

11.8 ADNANTAGES:

i. The welded structures are usually lighter than riveted structures.
ii. The welded joints provide maximum efficiency which to impossible innervated joints
iii. Alteration and addition can be easily made.
iv. As the welded structure is smooth in appearance, it is good looking
v. In welded structures, tension members are not weakened.
vi. In a welded joint has high strength often more than parent metal.

11.9 DISADVANTAGES:

i. Since there is uneven heating and cooling during fabrication therefore the members may get distorted as additional stresses may develop.
ii. It requires a highly skilled labour and supervision.

iii. No provision for expansion and contraction in the frame, therefore there is possibility of cracks.

iv. The inspection of welding work is difficult than riveting work.

11.10 COMPONENT: FRAME CHANNEL

MATERIAL:- M.S. CHANNEL

MATERIAL SPECIFICATION:-

SR NO	DISCRIPTION OF OPERATION	MACHINE USED	CUTTING	MEASUREMENT	TIME
1	Cutting the channel in to length of 1000 mm long	Gas cutting machine	Gas cutter	Steel rule	15 min.
2	Cutting the channel in to length of 480 mm long	Gas cutting machine	Gas cutter	Steel rule	15 min.
3	Filling operation can be performed on cutting side and bring it in perpendicular c.s.	Bench vice	File	Try square	15 min.
4	Weld the channels to the required size as per the drawing	Electric arc welding machine	.....	Try square	20 min
5	Drilling the frame at required points as per the drawing	Radial drill machine	Twist drill	Vernier calliper	10 min

Table 2 (Frame Details)

Name of part: pin

11.11 Material : bright steel

Quantity: 4

Sr. no.	Detail operation	m/c used	Tool used	accs	Mea.inst
1	Marking on shaft	----------	----------	----------	SCALE
2	Cutting as per drg	POWER HACKSAW	HACKSAW BLADE	JIG & FIXTURE	SCALE
3	Facing both side of shaft	LATHE MACHINE	SINGLE POINT CUTTING TOOL	CHUCK	VERNIER CALIPER
4	Turning as per drg size	-	-	-	-
5	Bending	-	-	-	-

6	Filling on both end	FLAT FILE		VICE	-

Table 3 (Pin Details)

11.12 Name of part: housing

Material : bright steel

Quantity: 2

Sr. No.	Detail Operation	M/C Used	Tool Used	Accs	Mea.inst.
1	Marking on shaft	-	-	-	Scale
2	Cutting as per drg	Power hack saw	Hack saw blade	Jig & fixtures	Scale
3	Facing both side of shaft	Lathe machine	Single point cutting tool	chuck	Vernier caliper
4	Turning as per drg size	-	-	-	-
5	Drilling hole	Drilling machine	Drill	-	Vernier caliper
6	Filling on both end	Flate file	-	Vice	-

Table 4 (Housing Details)

12. POSSIBLE IMPROVEMENTS AND ADVANCES

The project designed and manufactured by us although is only model and has not undergone any extensive research or study but we are quite confident that it is possible to improve it's efficiency to a considerable extent by improving the manufacturing techniques and also by corporative certain modifications. This device can also be used for various other applications besides just transmitting motion at desired angle those applications have discussed in detailing the following: -

12.1 METHOD OF IMPROVING EFFICIENCY: -

Manufacturing of improving efficiency: -

The main motion is transmitted with the help of a sliding pair which formed between pin & the cylinder. These pins have to be lapped and cleaned and it should be capable of providing complete interchangeability similarly with the cylinder, they too have to be hone or lapped so a to provide smooth surface finish. This will result in less frictional loss and loss heat generation.

12.2 LIBRICATION AND COOLING METHODS: -

Lubrication and cooling are a must in sliding members. One of the simple techniques applied for lubrication can be to drill oil holes in the cylinder body for fill than up with oil. But this technique will not be very effective since the weight and use of cylinders will increase.

12.3 MODIFICATION: -

One of the methods by which efficiency or performance can be enhanced is by increasing the number of pins. From the working of the mechanism we know that the pin at the inner most position is the drawing pin the pins the mechanism. Thus if the no. required for the next pin to attain the inner most position is considerable reduced and thus the performance of the mechanism &its life increases.

12.4 POSSIBLE ADVANCE:

We can also use this transmission system as
1.As lubricating pump while transmitting power.
2.Steam engine (eliminating the crank of shaft & complicated valve system).

12.5 LUBRICATING PUMP :

The small change which have to incorporate for this purpose is to place stationary disc at the rear and it so fits with the cylinder that it avoids leak ages.

12.6 WORKING:

The slot position and length is so that adjusted that when pin is at inner most position cylinder meshes with the suction port & suction of oil is started the slater mains open till pin given maximum outward stroke, after that cylinder end is closed by the dics. Now the pin starts moving inwards and thus compression stroke commences. The delivery slot location is so adjusted that after the completion of 80 to 85% of compression stroke, the cylinder meshes with the delivery stroke & thus the compressed fluid is discharged at high pressure. The delivery slot length was such adjusted that remains in mesh with cylinder for 15to 20% of compression for complete delivery of the compressed fluid. The suction slot length is adjusted for complete outward stroke of pin.

12.7 ADVANTAGES:-

Due to such an in built pump we do not require any external pump
As soon as mechanism is started lubrication system automatically starts. The pump is of the displacement type.
Necessity for lubrication of the mechanism is eliminated.

As a steam engine Modification for the steam engine is same as that for the pump. The only difference is in position & the size.

12.8 WORKING: -

Here, the inlet slot position the cylinder just meshes with the inlet slot & high pressure steam is admitted in the cylinder & thus does work on pin & pushes the pin toward s the outer most position.

When the pin is at the outer most position, the cylinder meshes with the delivery slot & thus delivery stroke starts & steam is driven out. After the pin is reached the inner most position again suction stroke starts.

12.9 ADVANTAGES: -

1)Mechanism is very simply due to elimination of value mechanisms.
2)Mechanism is small & compact.
3)No crank & crank shaft are necessary.
4)Lesser vibration because the reciprocating force are perfectly balanced.
5)Smooth & high speed operation can be easily obtained by cause of elimination of the value setting linkage.

12.10 DISADVANTAGES: -

1)It is only useful for small power generation.
2)It requires at least six cylinder piston pair.
3)Priming is always necessary for starting the engine.

13.CONCLUSION

Some successful mechanical devices function smoothly however poor fly they are made while other does this only by virtue of a accurate construction & fitting of their moving parts.

This projects which looks very simple & easy to construct was actually Very difficult to conceive & imagine without seeing an actual one in practice. It is an event a fact in the creative mental process nit the forces, which predominate among the schemes of the active tinkers. Motions demands to be studied first &we have done that very thing.

So that while acceptable analysis for existing mechanism can often be made quite easily cannot without insight & imagination make effective synthesis of new mechanism hence we are mould to present this project gear less transmission at 90° (El-bow mechanism) which have managed to successfully device after long & hard input in conceiving its working principle.

The model works correctly as per the design. With the help of this system, we can efficiently reduce the cost in power transmission.

Further advancement in this technology can be made. For future enhancements, Analysis of the mechanism with higher no of elbow rods is recommended. Torque capacity can be increase. Flexible bent links can be used. Has a bright future in automation and robotics. Can be used in automobile industry in near future.

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A gearless transmission system, also known as a continuously variable transmission (CVT), operates without the use of traditional gears. Instead, it utilizes a belt and pulley system to provide an infinite number of gear ratios within a range. This allows the engine to run at its most efficient RPM for various driving conditions, improving fuel efficiency and performance. CVTs are commonly used in automobiles, scooters, and other machinery requiring variable speeds. Their main advantages include smoother acceleration, better fuel economy, and reduced mechanical complexity and wear compared to conventional geared transmissions.