"Planetary Mixer with Strainer"

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Abstract - The Planetary Mixer with Strainer is a multifunctional machine designed to perform efficient mixing and simultaneous filtration of materials in various industrial and domestic applications. Conventional mixing processes often require separate equipment for mixing and straining, which increases processing time, labor effort, and operational cost. This project aims to overcome these limitations by integrating both operations into a single compact system.The planetary mixing mechanism consists of a rotating mixing blade that moves in a planetary motion, ensuring uniform mixing of ingredients. This motion improves the consistency and quality of the mixture compared to conventional mixers. The system is driven by an electric motor coupled with a suitable gear arrangement to achieve the required speed and torque.A strainer unit is incorporated within the system to filter unwanted particles, lumps, or impurities during or after the mixing process. This enhances the final product quality and reduces the need for additional processing steps. The design focuses on ease of operation, efficiency, and reduced human effort.

This project finds applications in food processing industries (such as batter preparation, sauces), chemical industries, and small-scale manufacturing units. The developed system is economical, time-saving, and suitable for small to medium-scale operations. The project includes design, fabrication, and testing of the prototype to evaluate its performance in terms of mixing efficiency and filtration effectiveness.

Keywords: - *Planetary Mixer, Strainer Mechanism, Mixing Efficiency, Filtration Process*

1.INTRODUCTION

In case of process industries, process of mixing and stirring forms and integral and the important part of the total manufacturing process. Mixing is the process which determines uniformity and overall quality of product. Process industries like chemical plants, food processing plants, paint industry etc, largely employ mechanical mixers to carry out mixing of powders, semisolid jelly fluids etc. Mixing is a process where powder or jellies are mixed together through in the form of uniform mixture where stirring is the process to mix the fluid and powder to dissolve the powder thoroughly in given mixture and form a uniform product or output. In either of above cases thorough mixing of material is desirable to give and good and uniform quality output.

Mixing of powders of different material in order to form a uniform product or a powder mix is quiet easy but when it is desirable to mix powder in a fluid matter specially when the density of powder is high the problem occurs due to heavy weight of particles of powder has a tendency to settle down.

CASE STUDY

Let us study the following example **'PREPARATION OF IONIC PAINTS'.**

In this case it is required to mix the heavy density metal powder in the fluid mixture and pigment base together called as in vehicles. Vehicle is a low density evaporative fluid which when mixed with metal oxide powder thoroughly is applied by spray painting on to automobiles silencer to form an anticorrosion particle layer. In order to have good quality and uniform layer of paint on the job it is necessary that the oxide powder is thoroughly mixed with vehicles.

CONVENTIONAL METHOD

In conventional method of mixing the metal oxide powder and vehicle mixing is carried out on **'UNDIRECTIONAL STIRRING MACHINE'**

In this machine the motor is driven on reduction gear box through coupling the output shaft of gear box is coupled to stirrer shaft to which the blades are connected, when the motor rotates output shaft of gear box rotates at slow speed. There by driving the stirrer. The stirrer rotates in one direction to agitate the mixture to prepare paint.

THE PROBLEM

The stirrer of conventional machine rotates in one direction only which creates a particular flow pattern in the fluids hence the particles tend to stick to the walls of container owing to the centrifugal force rather than mixing thoroughly in mixture of paint, ultimately results into poor quality mixture of paints there by poor quality output of paint.

THE SOLUTION

In order to have a through mixing of metal oxide powder it would be appropriate to have a stirrer that rotates such that rotates about own axis as well revolves about another fixed axis which helps it reach all parts of the container. This ensures that turbulence required for thorough mixing is provided all over the container. It would be advantageous to change pattern of flow, which avoids vortex formation, ie motion of particles in a spiral path. Also if a wiper is added that brings the particles adhering to walls of container back into main flow or mixing area, good quality mixture will be ensured.

The planetary mixer with strainer is an ideal solution that has all the above mentioned features. This machine involves a rotating stirrer that revolves about the fixed container axis as well as incorporates an strainer that changes the flow pattern and also acts as a wiper. Machine has variable mixing speed feature at the same time delivers heavy torque to the stirrer for proper mixing.

2. CONSTRUCTION AND WORKING

2.1 CONSTRUCTION

The multi-spindle mixing machine consists of the following parts:

1.Motor-The motor is a single phase AC/DC motor, meaning that the speed is infinitely variable from 0-6000 rpm. The motor is mounted on the base plate and is connected to the worm shaft of the worm gear box by means of open belt drive.

2.Main Pulley-The main pulley is V-belt pulley mounted on the input worm shaft by means of a socket head grub screw.

3.Worm gear box- The worm gear box is 1:80 ratio gear box. The input worm is a right hand single start worm held in ball bearings at either ends, and carries the reduction pulley at one end. Worm gear is 1.5 module 80 teeth gear mounted on worm gear shaft held in ball bearings at either ends, and carries the muff coupling at one end by which it is coupled to the input shaft of machine.

4.Input shaft & stirrer bracket - The input shaft is held in ball bearing mounted in bearing housing which holds the fixed spur gear from the spur gear pair used for planetary motion of stirrer. The stirrer bracket is mounted on the lower end of input shaft carries the stirrer shaft at one end and the strainer shaft at other.

5. Spur gear pair for planetary motion- The spur gear is 1.5 module 44 teeth gear , one gear is fixed and is mounted on the input shaft bearing housing where as the other is mounted on the stirrer shaft.

6. Stirrer- The stirrer arrangement comprises of blade carriers mounted on stirrer shaft that hold blades for stirring purpose on their periphery. Two sets are mounted on the stirrer shaft

7. Strainer- The strainer arrangement comprises of a perforated sheet mounted on the strainer shaft and a wiper sheet bolted on the sheet.

8.Base plate- The base plate is the base member that supports the bearing housing.

9 . Container- The container is in the form of an cylindrical drum mounted below the base plate.

10 .Frame- Frame is an fabricated structure that supports the entire mixer assembly**.**

2.2 WORKING

When motor is started the motor pulley rotates the main pulley via the V-belt. The main pulley rotates the worm shaft or the gear box which in turn gives 1:80 ratio reduced speed at output shaft which is connected to the input shaft of the machine .The input shaft carries stirrer bracket which carries the spur gear-1 which is constant mesh with spur gear-2 mounted on the bearing housing. When the stirrer bracket rotates it makes the spur gear -1 to revolve around the input shaft as well as it rotates about its own axis. The spur gear -1 carries the mixer blade sets at its lower end. The other end of the stirrer bracket carries an strainer arrangement which helps break the raisins.

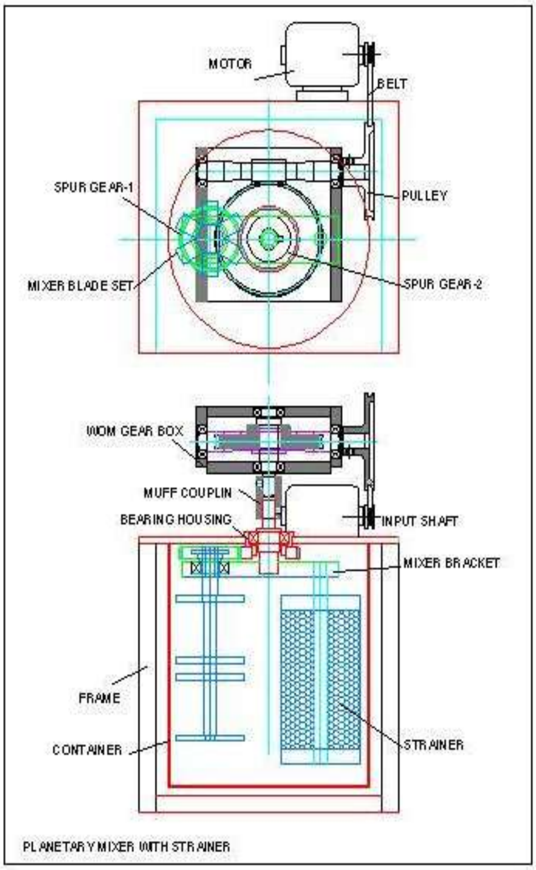

Fig-constructional detail of planetary mixer with strainer

3.METHODOLOGY

3.1 DESIGN OF PLANETARY MIXER MACHINE:

In our attempt to design a special purpose machine we have adopted a very a very careful approach, the total design work has been divided into two parts mainly;

- System design
- Mechanical design

System design mainly concerns with the various physical constraints and ergonomics, space requirements, arrangement of various components on the main frame of machine no of controls position of these controls ease of maintenance scope of further improvement; height of m/c from ground etc. In Mechanical design the components are categories in two parts.

- Design parts
- Parts to be purchased.

For design parts detail design is done and dimensions thus obtained are compared to next highest dimension which are readily available in market this simplifies the assembly as well as post production servicing work. The various tolerances on work pieces are specified in the manufacturing drawings. The process charts are prepared & passed on to the manufacturing stage .The parts are to be purchased directly are specified &selected from standard catalogues.

System Design:-

In system design we mainly concentrate on the following parameter

1. System selection based on physical constraints:-
While selecting any m/c it must be checked whether it is going to be used in large scale or small scale industry In our case it is to be used in small scale industry So space is a major constrain. The system is to be very compact. The mechanical design has direct norms with the system design hence the foremost job is to control the physical parameters.

2. Arrangement of various components:-
Keeping into view the space restriction the components should be laid such that their easy removal or servicing is possible moreover every component should be easily seen & none should be hidden every possible space is utilized in component arrangement.

3. Components of system:-
As already stated system should be compact enough so that it can be accommodated at a corner of a room. All the moving parts should be well closed & compact A compact system gives a better look & structure.
Following are some example of this section

- Design of machine height
- Energy expenditure in hand operation
- Lighting condition of m/c

4. Chances of failure:-
The losses incurred by owner in case of failure of a component are important criteria of design. Factor of safety while doing the mechanical design is kept high so that there are less chances of failure. Periodic maintenance is required to keep the m/c trouble free.

5. Servicing facility:-
The layout of components should be such that easy servicing is possible especially those components which required frequent servicing can be easily dismantled.

6. Height of m/c from ground:-

Fore ease and comfort of operator the height of m/c should be properly decided so that he may not get tired during operation .The m/c should be slightly higher than that the level also enough clearance be provided from ground for cleaning purpose.

7. Weight of machine:-

The total wt of m/c depends upon the selection of material components as well as dimension of components. A higher weighted m/c is difficult for transportation & in case of major break down it becomes difficult to repair.

Design of Multi-Spindle mixing machine

Input data (Ref. www.engineering toolbox.com)

1. Kinematic viscosity of Paint = 3.4 poise = 3.4/0.01 centipoise=340 centipoise

2. Specific gravity of paint = 1.89 kg/lit

In design of multi-spindle mixing machine the approach to design would be to calculate the torque required at the output shaft for stirring, and based on this torque selecting an appropriate motor ;after incorporating a suitable factor of safety.

The torque calculation will be based on two analogies namely; torque required to overcome the viscous force by virtue of the fluid viscosity and secondly the torque required to overcome the static total pressure on each blade owing to the stationary fluid ie, paint.

Total torque on Output shaft
=Torque owing to viscous force + Torque owing static pressure

A) Calculation of Torque owing to viscous force at periphery of blades :

In calculation of the viscous force we use the following analogy;The blade tip traces a loci of points which is a circle ; hence the motion of the bracket due to oscillation of the output shaft can be considered to be a cylinder (assuming blade angle $=0^0$), which is moving against another cylinder ie, the container both separated by a fluid film of thickness of 30 mm.We can put up the above problem as follows;

Problem : Find the force and power required to move a shaft of diameter 23cms against a journal of internal diameter 20cms , separated by a fluid of kinematic viscosity 3.4 poise . Shaft rotates at 20 rpm.

Solution : Given : μ = 3.4 poise = 1/10*3.4 = 0.34 Ns/m^2

Speed of shaft = 20 rpm

Tangential speed of shaft = u = πDN/80

= π x 0.23 x20/60 =0.24m/sec

Now,

$\tau = \mu$ du/dy

where ;

τ = Shear stress (N/m^2)

du = Change in speed = u-0 = 0.24 m/sec

dy = Distance between shaft and journal = 0.015m

τ = 0.24 x 0.24/0.015= 3.84 N/m^2

Area of the cylinder that is exposed to this shear intensity will be the circumferential area;(assuming width of blade = 80 mm)

A = c x D x w = π x 0.23 x 0.08 =0.058m^2

Shear force (F) = Shear stress x Shear area

= 3.84 x 0.058

= 0.23 N

Power = F x u =0.23 x 0.24 =0.06Watt

B) Calculation of Torque owing to viscous force at top and bottom ends of blades

In calculation of the viscous force we use the following analogy;

The blades along the length when rotated along with bracket will trace an annular ring at the either ends of the blade.

We can put up the above problem as follows;

Problem : Find the force and power required to move a plate of width 8cms and length 20cms against a stationary plate extending infinitely , separated by a fluid of kinematic viscosity 3.4 poise at a distance of 1.5 cms . Plate moves at 0.24 m/sec.

Solution : Given : μ = 3.4 poise = 1/10*3.4 = 0.34 Ns/m^2

Speed of plate = 0.24 m/sec

Now, $\tau = \mu$ du/dy

where ;

τ = Shear stress (N/m^2)

du = Change in speed = u-0 = 0.24 m/sec

dy = Distance between shaft and journal = 0.015m

τ = 0.24 x 0.24/0.015= 3.84 N/m^2

Area of the cylinder that is exposed to this shear intensity will be

A = L x B = 0.20 x 0.08 =0.016 m^2

Shear force (F) = Shear stress x Shear area

= 3.84 x 0.016

= 0.0615 N

Total shear force = 2 x F = 0.123 N

Power = 2F x u =0.123 x O.24 =0.2952 Watt

C) Calculation of Torque owing to Static total pressure acting on the blades by virtue of the stationary fluid

A) In calculation of torque due to static force exerted by the fluid on stirrer mechanism we use the following analogy;

Problem : Determine the total pressure on a flat plate of length 20cm and width 8cm which is placed vertically in such a way that the centroid of plate is at a distance of 15cm below the free surface of fluid of specific gravity 1.89kg/lit

Solution : Given : sp gr. =1.89 kg / lit=1.89*1000kg/m^3

Total pressure is given by ;

F = ρg A h

=1890 x 9.81 x0.2x0.08 x 0.15

=44.5

Thus the total force = 44.5 N

The torque that the pinion has to overcome to rotate about its own axis is given by;

T = 44.5 x 0.032=1.424 N-m

B) In calculation of torque due to static force exerted by the fluid on strainer mechanism we use the following analogy;

Problem : Determine the total pressure on a flat plate of length 20cm and width 9cm which is placed vertically in such a way that the centroid of plate is at a distance of 15cm below the free surface of fluid of specific gravity 1.89kg/lit

Solution : Given : sp gr. =1.89 kg / lit=1.89*1000kg/m^3

Total pressure is given by ;

F = ρg A h

=1890 x 9.81 x0.2x0.09 x 0.15

=50

Thus the total force = 50 N

The torque that the input shaft has to overcome to rotate about its own axis considering static pressure on strainer is given by;

T = 50 x 0.06

=3 N-m

Thus the torque required at the out put shaft to overcome the static resistance of fluid is ;

Ts = 1.424+3 = 4.424 N-m

Power required at the output shaft to overcome the static resistance of fluid is ,

Ps = 2πNTs/60

=2 x 3.142 x20 x4.424/60

=8.88Watt

Thus the net power required at the output shaft is the summation of the above three powers;

P_{net} = 0.06+0.2942 +8.88

=9.235 Watt

MOTOR SELECTION

Thus selecting a motor of the following specifications

- Single phase AC motor
- Commutator motor
- TEFC construction
- Power = 1/15hp=50 watt
- Speed= 0-6000 rpm (variable)

3.2 DESIGN OF WORM AND WORM WHEEL

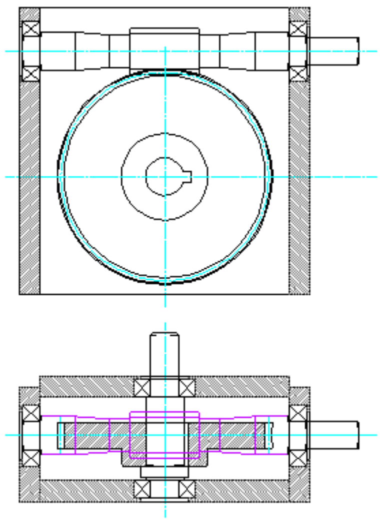

Fig- worm and worm wheel

The pair of worm and worm wheel used in the machine is designated as 1/80/10/1.5

The worm is made of case hardened steel 14C6 where as the worm wheel is made of Cast iron.

Z1 = 1

Z2 = 80

q= 10

M=1.5

I = z2/z1 =40

N = 1440 rpm

N2 = 1440/80 =80

D2 = m x z2 =1.5 x80 =120

tanU=z1/q = 5.71 ^{0}

F = 2m sq.rt (q+ 1) = 9.94

Da1 = m(q+2) =13.5

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C= 0.2mcosU = 0.3

Lr ={ da1+2c} sin-1[F/(da1+2c)]

Lr = 632

For case hardened steel Sb =28.2

For CI Sb =6.2

Xb1 = 0.25

Xb2 =0.48

$Mt_1 = 17.65\ Xb_1\ Sb_1 m\ lr\ d_2 \cos U$

$= 4.694 \times 10^6$ N-mm

$Mt_2 = 17.65\ Xb_2\ Sb_2 m\ lr\ d_2 \cos U$

$= 1.98 \times 10^6$ N-mm

The lower value of torque is on the wheel = 1.98×10^6 N-mm

Kw = 2Π n2 Mt/60 x 10^6

Kw =7.46 Kw

As the drive is capable of transmitting 7.46 Kw and we intend to transmit 0.05 Kw the drive is safe.

3.3 DESIGN OF WORM WHEEL SHAFT

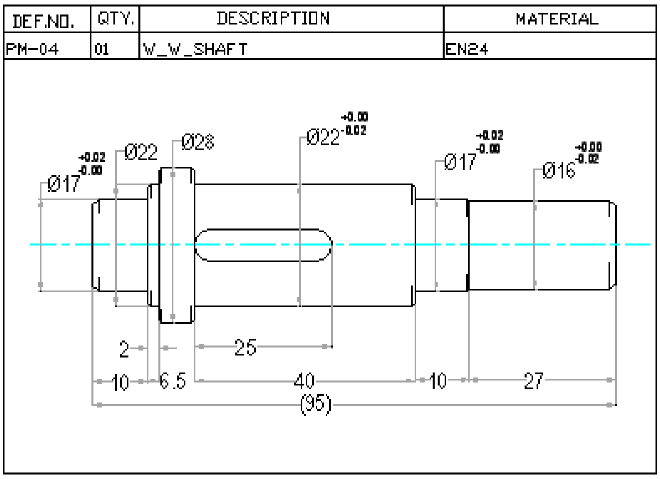

Fig- worm wheel shaft

MATERIAL SELECTION : -

Ref :- PSG (1.10 & 1.12) + (1.17)

Designation	Ultimate Tensile Strength N/Mm^2	Yield Strength N/Mm^2
EN 24	800	680

ASME CODE FOR DESIGN OF SHAFT.

Since the loads on most shafts in connected machinery are not constant, it is necessary to make proper allowance for the harmful effects of load fluctuations

According to ASME code permissible values of shear stress may be calculated form various relation.

= 0.18 x 800

= 144 N/mm^2 OR

fs_{max} = 0.3 fyt=0.3 x 680 =204 N/mm

considering minimum of the above values ;

$\Rightarrow fs_{max} = 144$ N/mm^2

Shaft is provided with key way; this will reduce its strength. Hence reducing above value of allowable stress by 25%

$\Rightarrow fs_{max} = 108$ N/mm^2

This is the allowable value of shear stress that can be induced in the shaft material for safe operation.

TO CALCULATE WORM WHEEL SHAFT TORQUE

$$POWER = \frac{2\,\Pi\, NT}{60}$$

Motor is 50 watt power, run at 6000 rpm, connected to worm shaft by belt pulley arrangement with reduction ratio 1:4

Hence input to worm gear box = 1500 rpm

The worm gear box is the reduction gear box with 1:80 ratio

Hence input speed at the input shaft = 1500/80 =18.75 =20 rpm (approx)

$$\Rightarrow T = \frac{60 \times P}{2 \times \Pi \times N}$$

$$= \frac{60 \times 50}{2 \times \Pi \times 20}$$

$\Rightarrow$ T = 23.87 N-m

$\Rightarrow$ T design = 24N-m

CHECK FOR TORSIONAL SHEAR FAILURE OF SHAFT.

Assuming minimum section diameter on input shaft = 16 mm

$\Rightarrow$ d = 16 mm

$Td = \Pi/16 \times fs_{act} \times d^3$

$$\Rightarrow fs_{act} = \frac{16 \times Td}{\Pi \times d^3}$$

$$= \frac{16 \times 24 \times 10^3}{\Pi \times (16)^3}$$

$\Rightarrow fs_{act} = 29.84$ N/mm^2

As $fs_{act} < fs_{all}$

$\Rightarrow$ I/P shaft is safe under torsional load

3.4 DESIGN OF KEY

Selecting parallel key from standard data book for given application

For Shaft Diameter	Above upto	17 22
Key cross section	Width Height	6 6

Material of key 'EN9'
Sult = 520 N/mm^2
Sylt = 340 N/mm^2
$\Rightarrow$ fs$_{all}$ = 85 N/mm^2
$\Rightarrow$ fs$_{all}$ = 170 N/mm^2
$\Rightarrow$ selecting parallel key;
6 x 6 x 30

- Check for direct shear failure of key:-

$T = L \times d/2 \times t/2 \times fs_{act}$

$\Rightarrow 24 \times 10^3 = 30 \times 6 \times 20 \times \frac{fs_{act}}{2}$

$\Rightarrow fs_{act} = \frac{24 \times 10^3 \times 2}{30 \times 6 \times 20}$

$\Rightarrow fs_{act} = 13.33$ N.mm^2

As $fs_{act} < fs_{all}$

$\Rightarrow$ Key is safe under shear load

Check for crushing failure of key

$T = Lx\ d/2 \times t/2 \times fs_{act}$

$7.66 \times 10^3 = 30 \times 20/2 \times 6/2 \times fs_{act}$

$\Rightarrow fs_{act} = \frac{24 \text{ X } 10^3 \text{X } 2 \text{ X } 2}{30 \text{ X } 20 \text{ X } 6}$

$\Rightarrow fs_{act} = 26.7$ N.mm^2

As $fs_{act} < fs_{all}$

$\Rightarrow$ Key is safe under crushing load

TO CALCULATE INPUT SHAFT TORQUE

$\text{POWER} = \frac{2\,\Pi\, NT}{60}$

Motor is 50 watt power, run at 6000 rpm, connected to worm shaft by belt pulley arrangement with reduction ratio 1:4

- Hence input to worm gear box = 1500 rpm
- The worm gear box is the reduction gear box with 1:80 ratio
- Hence input speed at the input shaft = 1500/80 =18.75 =20 rpm (approx)

$\Rightarrow T = \frac{60 \times P}{2 \times \Pi \times N}$

$= \frac{60 \text{ X } 50}{2 \text{ X } \Pi \text{ X } 20}$

$\Rightarrow$ T = 23.87 N-m

$\Rightarrow$ T design = 24N-m

CHECK FOR TORSIONAL SHEAR FAILURE OF SHAFT.

Assuming minimum section diameter on input shaft = 16 mm

$\Rightarrow$ d = 16 mm

$Td = \Pi/16 \times fs_{act} \times d^3$

$\Rightarrow fs_{act} = \frac{16 \times Td}{\Pi \times d^3}$

$= \frac{16 \times 24 \times 10^3}{\Pi \times (16)^3}$

$\Rightarrow fs_{act} = 29.84$ N/m

As $fs_{act} < fs_{al} \Rightarrow$ I/P shaft is safe under torsional load

3.5 DESIGN (SELECTION OF INPUT SHAFTBALL BRG)

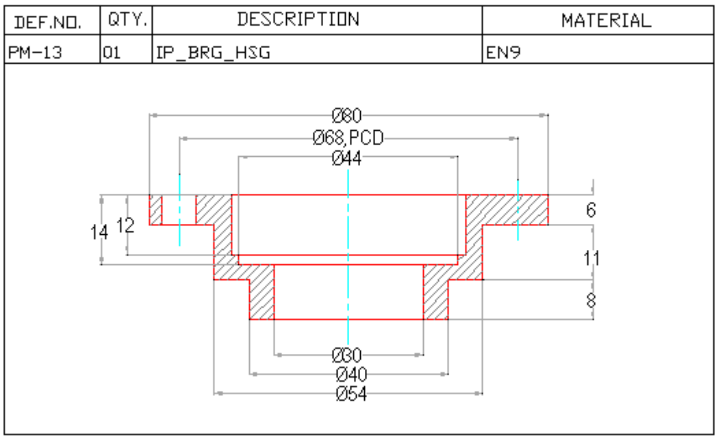

Fig- Input Shaft Bearing Housing

In selection of ball bearing the main governing factor is the system design of the drive ie; the size of the ball bearing is of major importance ; hence we shall first select an appropriate ball bearing first select an appropriate ball bearing first taking into consideration convinience of mounting the planetary pins and then we shall check for the actual life of ball bearing .

BALL BEARING SELECTION.

Series 62

ISI NO	Brg Basic Design No (SKF)	d	D1	D	D2	B	Basic capacity	
							C kgf	Co Kgf
25A C02	6005	25	28	47	44	14	7800	5200

P = X Fr + Yfa.

Where ;

P=Equivalent dynamic load ,(N)

X=Radial load constant

Fr= Radial load(H)

Y = Axial load contact

Fa = Axial load (N)

In our case;

Radial load F_R= 750N

$F_a = 0$

P= 1x 750 N

$\Rightarrow L = (C/p)^p$

Considering 4000 working hours

$$L = \frac{60\ n\ L\ h}{10^6} = 4.8 \text{ mrev}$$

$$\Rightarrow 4.8 = \left(\frac{C}{750}\right)^3$$

$\Rightarrow$ C = 1265.2 N

AS; required dynamic of bearing is less than the rated dynamic capacity of bearing ;

$\Rightarrow$ Bearing is safe.

3.6 DESIGN OF GEAR PAIR

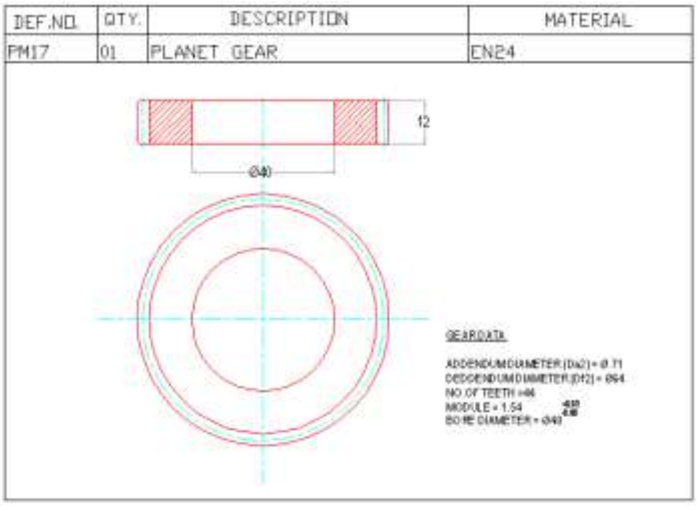

Fig -Planet Gear

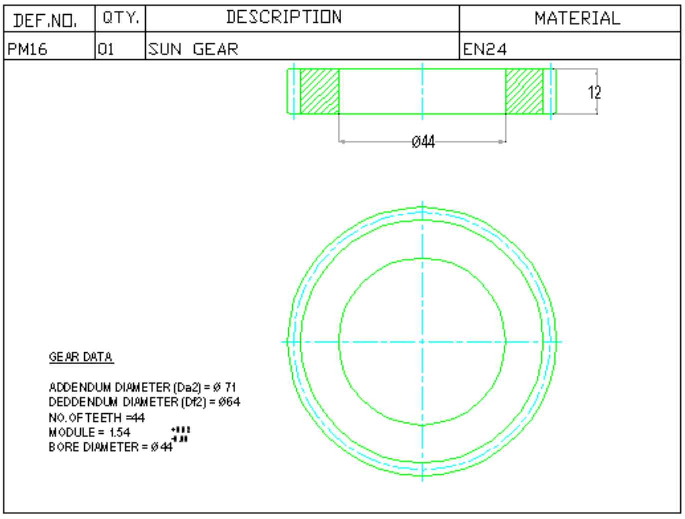

Fig-Sun Gear

Power = 01/15 HP = 50 watt

Speed = 20 rpm

b = 10 m

Tdesign = 24 N.m

Sult pinion = Sult gear = 600 N/mm^2

Service factor (Cs) = 1.5

dp = 32

$$\text{Now; } T = Pt \times \frac{dp}{2}$$

$\Rightarrow$Pt = 750 N.

GEAR DATA

- No. of teeth =44
- Module = 1.5 mm
- Addendum diameter = 69 m
- Deddendum diameter = 65.25mm

3.7 DESIGN (SELECTION OF STIRRER SHAFT BALL BRG)

In selection of ball bearing the main governing factor is the system design of the drive ie; the size of the ball bearing is of major importance ; hence we shall first select an appropriate ball bearing first select an appropriate ball bearing first taking into consideration convinience of mounting the planetary pins and then we shall check for the actual life of ball bearing .

BALL BEARING SELECTION.

Series 62

ISI NO	Brg Basic Design No (SKF)	d	D1	D	D2	B	Basic capacity	
							C kgf	Co Kgf
20A C02	6004	20	23	42	36	12	7350	4500

P = X Fr + Yfa.

Where ;

P=Equivalent dynamic load ,(N)

X=Radial load constant

Fr= Radial load(H)

Y = Axial load contact

Fa = Axial load (N)

In our case;

Radial load F_R= 750N

$F_a = 0$

P= 1x 750 N

$\Rightarrow L = (C/p)^p$

Considering 4000 working hours

$$L = \frac{60\ n\ L\ h}{10^6} = 4.8 \text{ mrev}$$

$$\Rightarrow 4.8 = \left(\frac{C}{750}\right)^3$$

$\Rightarrow$ C = 1265.2 N

AS; required dynamic of bearing is less than the rated dynamic capacity of bearing ;

$\Rightarrow$ Bearing is safe.

3.8 DESIGN OF MUFF COUPLING

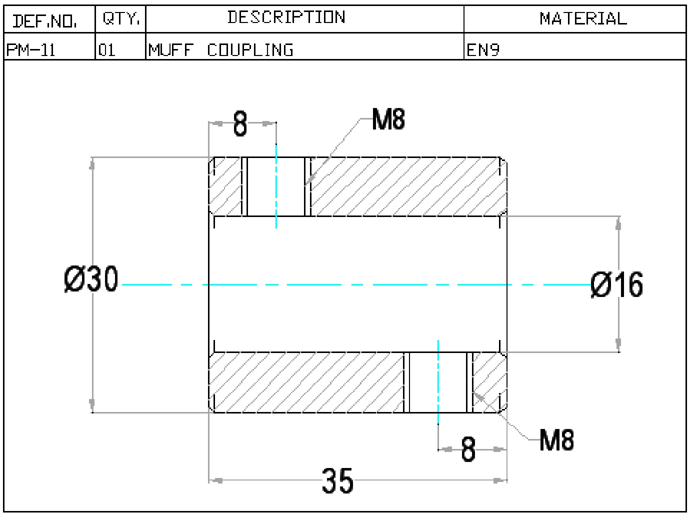

Fig-Muff Coupling

Muff Coupling can be considered to be a hollow shaft subjected to torsional load.

Material selection

.

Designation	Ultimate Tensile strength N/mm^2	Yield strength N/mm^2
EN 9	600	480

As Per ASME Code;

$\Rightarrow fs_{max} = 108 \text{ N/mm}^2$

Check for torsional shear failure:-

$$T = \Pi \times fs_{act} \times \left(Do^4 - Di^4 / Do \right)$$

$\Rightarrow fs_{act} = 4.926 \text{N/mm}^2$

As; $fs_{act} < fs_{all}$

$\Rightarrow$ Coupling is safe under torsional load.

4. ADVANTAGES & APPLICATIONS

4.1 ADVANTAGES

1. Strainer helps break the raisins effecting good quality mixture.
2. Strainer also acts as a wiper preventing depositions on wall of container
3. Quality of mixing is very high
4. Low cost of production because it does not require an gear box.
5. Fast production rate

4.2 APPLICATIONS

1. Mixing of multi color paint in paint industry .
2. Mixing of metallic powders in pigment in preparation of ionic paints.
3. Can be used as skimming machine.
4. Dairy applications with suitable change in stirrer material.
5. Mixing applications in pharmaceutical industry.

5.CONCLUSION

Mixing is a process where powder or jellies are mixed together through in the form of uniform mixture where stirring is the process to mix the fluid and powder to dissolve the powder thoroughly in given mixture and form a uniform product or out put. In either of above cases thorough mixing of material is desirable to give and good and uniform quality output.

Planetary mixer brings out both the results which makes it most advantageous mixing machine for the process industries, paint industries, pharmaceutical industries & dairy applications. It makes it valuable because of high quality of mixing, low cost of production & very fast production rate.

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