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# "Design and Development of Automatic Shoe Polishing Machine"

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**Abstract:** The main aim of our project is to design automatic polishing machine. As all the employee want to wear a shoe which is clean. This machine help in reducing the difficulty of existing product available in the market at the same time increase the use of this product in offices, institution etc. The automatic shoe polishing machine has been designed considering all the requirement and need of users. It has a sensing device which sense the shoes depending on that it start working. It is portable and adjustable which makes a person to bring its best feet forward. The problem which arises in the manual operation has been reduced in this machine. Each and every person thinks that their shoe should be clean and shiny. Taking all these into account we have designed this product which reduces the burden of manual operation at the same time increases the use of modern techniques. This project is to provide an apparatus for shining shoes which overcome the problem encountered in the conventional one. It obtains a desired shoe shining effect greater than a manual one.

## INTRODUCTION

The history of the shoe polish was started before the year 1900 using the wax, ash and tallow.After1900 it was replaced by using the different liquids and suspended solids.

In 1945, the first hotel shoe shine machine was built and it went into series production soon after. Today, the production range is very broad ranging from a practical smaller shoe shine machine for domestic use up to exclusive models for hotels. The first impression is the most important one in corporate world. That's the reason, in many cases, it is still important to dress more professionally, regardless of the work environment. In this regard shoe polishing and good shoe shining plays an important role.

The draw back in manual shoe polishing is that it damages the surface of leather, there by decrease the life of the leather shoes. Also polishing consumes too much time and takes too much human effort. On other hand the draw backs in machines available in market do not produce a job equivalent to the results obtained by cleaning and polishing shoes by hand. In order to overcome these difficulties an ergonomically designed and cost-effective shoe polishing machine is essential for all ages in order to work effectively with high productivity and produce quality shoe polishing.

The automatic shoe polishing machine is used to polish your shoe within a short interval of time which reduces human strength hand effort. All faculty want that their shoes should give an attractive look and much better long lasting but forget to follow the steps that needed, therefore reminding all these difficulties we have developed this machine which gives your shoes desired look every day with very good shine.

The introduction of this machine helps in efficient work by combining the cleaning and polishing at one place. It reduces the human effort. This machine is portable and economically not only completes the need but also add a new lifestyle for the faculty who regularly uses the shoe. There are so many this type of machine exists but a developed method of making makes the users to use at the same time a wants of the users never ends. Still further modification can be done in this type.

## PROBLEM STATEMENT

The first shoe shine machine was built which was very complex to operate. In this corporate world dressing plays a regard very important role to look professional. For this regard good shoe polishing with shine gives more importance. By polishing the shoe manually may damage the surface of the leather. By this Life of the shoe will get reduces. More than this it will take much time and human effort polish. On the other hand the current automatic shoe polisher which is available in the market will not do recommended polish and also it will take more time to polish. In order to overcome all these difficulties an ergonomically designed and more effective shoe polishing machine is essential. To overcome all these difficulties the machine is incorporated with one top and two side brushes to cover the whole surface of the shoe portion and produces the quality shoe polish compared to the current shoe polishers in the market. And also it reduces the time consumption for shoe polishing. As the machine is using the polishing dispenser, so that it can over come the need for applying polish and manual effort.

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**Objectives:**

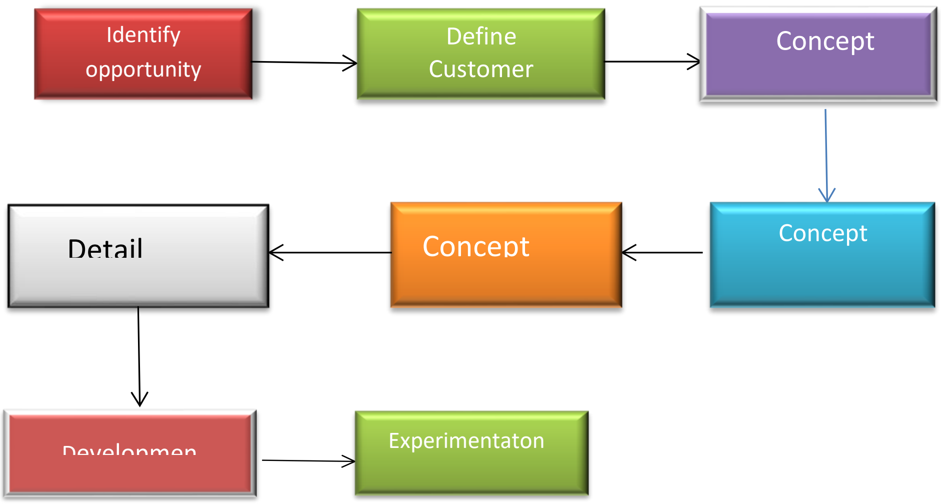
- Reduce human efforts.
- To improve the quality of polishing the shoe.
- To reduce the time of operation.
- To improve shining of the shoe.

**Scope:**

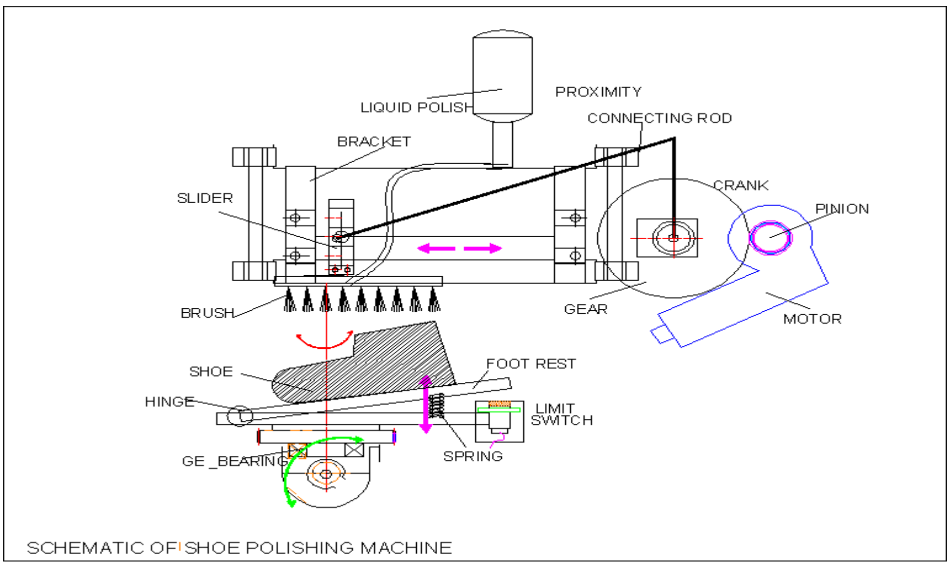
This machine can be used in following field:

- Hospital
- Hotel
- Hostel
- Office
- Home
- Airport etc

## METHODOLOGY




Fig, No. 1 Schematic of shoe polishing machine



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## MECHANICALDESIGN

Many preliminary alternatives are eliminated during this phase. Designer should have adequate knowledge above physical properties of material, loads stresses, deformation, and failure. Theories and wear analysis, He should identify the external and internal forces acting on the machine parts.
These forces may be classified as;

1. Dead weight forces
2. Friction forces
3. Inertia forces
4. Centrifugal forces
5. Forces generated during power transmission etc.

Estimate these forces very accurately by using design equations .If he does not have sufficient information to estimate them he should make certain practical assumptions based on similar conditions which will almost satisfy the functional needs. Assumptions must always be on the safer side.
Selection of factors of safety to find working or design stress is another important step in design of working dimensions of machine elements. The correction in the theoretical stress values are to be made according in the kind of loads, shape of parts & service requirements.
Selection of material made according to the condition of loading shapes of products environment conditions & desirable properties of material. Provision made to minimize nearly adopting proper lubrications methods.
In, mechanical design the components are listed down & stored on the basis of their procurementing two categories

- Design parts
- Parts to be purchased

For design parts a detailed design is done & designation thus obtain are compared to the next highest dimension which is ready available in market. This simplification the assembly as well as post production service work. The various tolerances on the work are specified. The processes charts are prepared & passed onto the work are specified.
The parts to be purchased directly are selected from various catalogues & specification so that anybody can purchase the same from the retail shop with the given specifications.

## MECAHNICAL DESIGN CALCULATIONS

**Motor selection for the forward and reverse motion:**

Assuming that the maximum weight of robot with all parts is not to exceed 6 kg the net load on all four wheels=6 x9.81 =58.9 N
Assuming that the maximum wheel diameter for the robot is to be 110 mm Coefficient of friction of rubber tire on metal =0.5

*Coefficient of friction for a range of material combinations*

| Combination | Static | | Dynamic | |
|---|---|---|---|---|
| | Dry | lubricated | dry | lubricated |
| steel-steel | 0.5...0.6 | 0.15 | 0.4...0.6 | 0.15 |
| copper-steel | - | - | 0.5...0.8 | 0.15 |
| steel-cast iron | 0.2 | 0.1 | 0.2 | 0.05 |
| Cast iron-cast iron | 0.25 | 0.15 | 0.2 | 0.15 |
| Friction material-steel | - | - | 0.5-0.6 | - |
| steel-ice | 0.03 | - | 0.015 | - |
| steel-wood | 0.5-0.6 | 0.1 | 0.2-0.5 | 0.05 |
| wood-wood | 0.4-0.6 | 0.15...0.2 | 0.2...0.4 | 0.15 |
| leather-metal | 0.6 | 0.2 | 0.2...0.25 | 0.12 |
| rubber-metal | 1 | - | 0.5 | |
| plastic-metal | 0.25...0.4 | - | 0.1...0.3 | 0.04...0.1 |

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| | | | | |
|---|---|---|---|---|
| plastic-plastic | 0.3-0.4 | - | 0.2...0.4 | 0.04...0.1 |

***Rollingresistance***

| | $C_r$[-] |
|---|---|
| Steel wheel on rail | 0.0002...0.0010 |
| Car tire on road | 0.010...0.035 |
| Car tire energy safe | 0.006...0.009 |
| Tube22mm, 8 bar | 0.002 |
| Racetyre23 mm, 7 bar | 0.003 |
| Touring32 mm,5 bar | 0.005 |
| Tyrewithleakprotection37 mm,5bar/3 bar | 0.007 / 0.01 |

The coefficient of friction between two materials in relative sliding may depend on contact pressure, surface roughness of the relative harder contact surface, temperature, sliding velocity and the type of lubricant whether the level of contamination. It's the reason that the data found in them any reference tables available may show a large variation.
Motor Torque
Traction torque (Torque required to roll the tire on pavement) is given by T=Cr * F *r---Where,

Cr- Coefficient of rolling resistance -= 0.5F=μ Rn =0.5 x58.9 =49.05 =29.45N
T=29.45 x55=1619 N-mm

=1.6N-mmT=3N-m
Thus selecting motor of following specifications:

Power=15watt

Speed =55 rpmb =10 m
Reduction ratio (I) = 55Gear speed = 92 rpm Material of gear Nylon- 66Tensile strength =55 N/mm$^2$Servicefactor (Cs) =1.5
Dg=55

Now;T =Ptx /dg2
We know that the stalling torque of the motor is 9N-m hence the failure load Net load on gear tooth will be
⇒Pt =9000/ (55/2) +(14 x1.7 /2) =225 N.

$\boxed{\text{Peff}=\mathbf{225}}$ -------------------------- (A)

Lewis Strength equation WT=Sbym
Where;

Y=0.484– 2.86
Z⇒yg=0.484-2.<u>.86</u>=0.43
⇒Syg=23.65
$W_T$=(Syp) xbxm
=23.65x10 mxm

$\boxed{W_T=236.5\ m^2}$ ---------------------------- (B)

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Equation (A) & (B) 236.5 $m^2$=225
⇒m=0.98
Selecting standard module=1mm

**GEARDATA**
No. of starts of worm=1Module=1 m
No. of teeth on gear=55

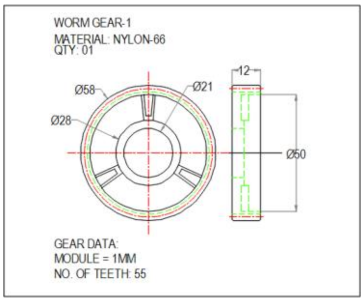


Fig. No.2Nylonwormgear

**DESIGN OF WORM GEAR BLANK – NYLON 66**

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

| DESIGNATION | ULTIMATE TENSILESTRENGTH $N/mm^2$ | YEILDSTRENGTH $N/mm^2$ |
|---|---|---|
| **NYLON-66** | 55 | 40 |

⇒Fs allowable=55/2=27.5$N/mm^2$
⇒T design=9Nm

**CHECK FOR TORSIONAL SHEAR FAILURE OF SHAFT**

$Td = \Pi/16 * fs_{act} * (D4-d^4) /D$

$$\Rightarrow fs_{act} = \frac{16xTd}{\Pi x(D^4-d^4) /D}$$

$$= \frac{16 x9x10^3x55}{\Pi x(55^4-21^4)}$$

$\Rightarrow fs_{act}=13N/mm^2$ --------------------------------------- $fs_{act} < fs_{all}$

⇒Pinion shafts safe under torsional load.

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**DESIGN OF WHEEL SHAFT**

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

| DESIGNATION | ULTIMATETENSILE STRENGTH $N/mm^2$ | YEILDSTRENGTH $N/mm^2$ |
|---|---|---|
| **EN24** | 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 from various relations.

$fs_{max}$=0.18 fult
=0.18 x800
=144N/$mm^2$
OR

$fs_{max}$=0.3fyt
=0.3x680
=204 N/$mm^2$
Considering minimum of the above values
⇒$fs_{max}$=144 N/$mm^2$
Shaft is provided with key way; this will reduce its strength.
Hence reducing above value of allowable stress by25%

⇒$fs_{max}$=108N/$mm^2$
This is the allowable valve of shear stress that can be induced in the shaft material for safe operation.
Assuming 100% efficiency of transmission

⇒Tdesign=9Nm

**CHECK FOR TORSIONAL SHEAR FAILURE OF SHAFT**

Torque is applied at the driven gear mounting point on the shaft which is tapered and 19 mm as minimum diameter

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

$\Rightarrow fs_{act}=\frac{16xTd}{\Pi x d^3}$

$=\frac{16 \text{ x}9 \text{ X}10^{3}}{\Pi x 12^3}$

$\Rightarrow fs_{act}= 26.52 N/mm^2$ ———————— $fs_{act}<fs_{all}$

⇒Wheel shaft is safe under torsional load.

**Selection of motor for reciprocation**

Assuming that the maximum weight of robot with all parts is not to exceed 2 kg the net load on all four wheels = 2 x9.81 =19.62N
Assuming that the maximum radius of crank = 90 mm
Coefficient of friction of steel on steel=0.15

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*Coefficient of friction for a range of material combinations*

| Combination | Static | | Dynamic | |
|---|---|---|---|---|
| | **Dry** | **Lubricated** | **Dry** | **lubricated** |
| steel-steel | 0.5...0.6 | 0.15 | 0.4...0.6 | 0.15 |
| copper-steel | - | - | 0.5...0.8 | 0.15 |
| steel-cast iron | 0.2 | 0.1 | 0.2 | 0.05 |
| Cast iron-cast iron | 0.25 | 0.15 | 0.2 | 0.15 |
| Friction material–steel | - | - | 0.5-0.6 | - |
| steel-ice | 0.03 | - | 0.015 | - |
| steel-wood | 0.5-0.6 | 0.1 | 0.2-0.5 | 0.05 |
| wood-wood | 0.4-0.6 | 0.15...0.2 | 0.2...0.4 | 0.15 |
| leather-metal | 0.6 | 0.2 | 0.2...0.25 | 0.12 |
| rubber-metal | 1 | - | 0.5 | |
| plastic-metal | 0.25...0.4 | - | 0.1...0.3 | 0.04...0.1 |
| plastic-plastic | 0.3-0.4 | - | 0.2...0.4 | 0.04...0.1 |

*Rolling resistance*

| | $C_r$[-] |
|---|---|
| Steel wheel on rail | 0.0002...0.0010 |
| Car tire on road | 0.010...0.035 |
| Car tire energy safe | 0.006...0.009 |
| Tube22mm, 8 bar | 0.002 |
| Racetyre23 mm, 7 bar | 0.003 |
| Touring32 mm,5 bar | 0.005 |
| Tyrewithleakprotection37 mm,5bar/3 bar | 0.007 / 0.01 |

The coefficient of friction between two materials in relative sliding may depend on contact pressure, surface roughness of the relative harder contact surface, temperature, sliding velocity and the type of lubricant whether the level of contamination. It's the reason that the data found in the many reference tables available may show a large variation.
Motor Torque

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Traction torque (Torque required to roll the tire on pavement) is given byT=Cr x F x r
Where,

Cr- Coefficient of rolling resistance

= 0.15F
=μ Rn
=0.15 x19.6
=2.94N
T=3x90 =270 N-mm =2.75 kg-cm

**Reciprocation MOTOR**

The drive motor is 12 VDC motor coupled to a planetary gear box.
Specifications of motor are as follows:

A) Power5watt
B) Speed=60rpm
C) TORQUE=5 Kg-cm torque=490N-mm =0.49 N-m

–OUTPUTSPEED –60 RPM

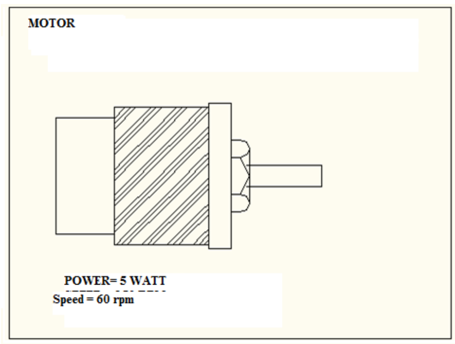


Fig. No.3Motor

**DESIGN OF SPUR GEAR PAIR FOR RECIPROCATING ARANGEMENT**

Drive has a pinion & GEAR arrangement Maximum torque=0.49N-m
No of teeth on gear =60
No of teeth o pinion = 36Module=1.25 mm
Radius of gear by geometry = 60*1.25/2 = 37.5mm
Maximum load =T/r=0.49 x$10^3$/37.5 =13 N
b =10 m

Material of spur gear and pinion = Nylon 6Sultpinion = Sult gear = 60N/$mm^2$ Service factor (Cs)=1.5
The gear and pinion arrangement where the pinion has 24 teeth and gear has 60 teeth share the entire tooth load
⇒Pt=(W x Cs)=19.6N.

Peff=19.6 N (as Cv =1dueto low speed of operation)

$\boxed{\text{Peff=19.6N}}$ ------------------------ (A)

Lewis Strength equation WT=Sb*y*m

Where;
Y=0.484– 2.86
⇒yp=0.484-2.86 /36

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$\Rightarrow$Syp =24.2

As$\Rightarrow$ pinion is weaker $W_T$=(Syp)*b *m=24.2x10mxm
$W_T=242m^2$.......................................................(B)

Equation (A) & (B)
$242m^2=19.6$
$\Rightarrow$m=0.28mm

Selecting standard module=1.25 mm----------------------for ease of construction as we go for single stage gearbox…making size compact…achieving maximum strength and proper mesh.

**DESIGNOFCRANKSHAFT**
MATERIALSELECTION:-Ref:-PSG (1.10&1.12)+(1.17)

| DESIGNATION | ULTIMATE TENSILESTRENGTH $N/mm^2$ | YEILDSTRENGTH $N/mm^2$ |
|---|---|---|
| **EN24** | 800 | 680 |

ASMECODEFORDESIGNOF 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 value of shear stress may be calculated from various relations=0.18 x800
$=144N/mm^2$
OR
$fs_{max}$=0.3fyt
=0.3x680
=204 N/mm
Considering minimum of the above values; $\Rightarrow fs_{max}=144\ N/mm^2$

Shaft is provided with dimples for locking; this will reduce its strength. Hence reducing above value of allowable stressby25%

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

This is the allowable value of shear stress that can be induced in the shaft material for safe operation.
Torque at motor shaft=0.49n-m
Reduction ratio of gear and pinionis60/36=1.67
$\Rightarrow$T d =0.49 x1.67 =0.818 N-m

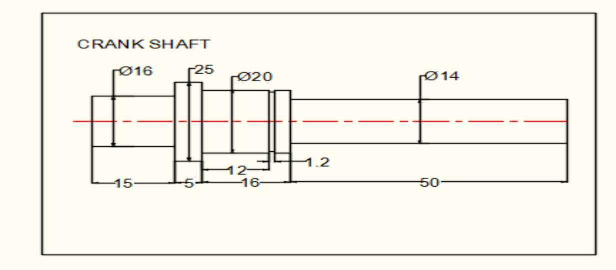

Fig.No.4Crankshaft

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**CHECKFORTORSIONALSHEAR FAILUREOFSHAFT-**

But as per manufacturing considerations we have an H6h7 fit between the carrier and shaft and to achieve this tolerance boring operation is to be done and minimum boring possible on the machine available is 14mm hence consider the minimum section on the shaft to be14mm
Assuming minimum section diameter on input shaft =14mm
d =14 mm
$Td=\Pi/16xfs_{act}xd^3$
$\Rightarrow fs_{act}=16xTd/\Pi xd^3$
$=16\ x0.818x10^3/[\Pi\ x(14)^3]$
$\Rightarrow fs_{act}=1.48N/mm^2$----------------------------------------- $fs_{act}<fs_{all}$

⇒Crank shaft is safe under torsional load

**DESIGNOFCRANKPIN-**
We know that T= force x radius
818=forcex60
⇒Force=818 /60
Force=13.6N
Assuming pin diameter =10mm

**MATERIALSELECTION**

| MATERIALDESIGNATION | TENSILESTRENGTH $N/mm^2$ | YEILDSTRENGTH $N/mm^2$ |
|---|---|---|
| EN36 | 800 | 680 |

Check for direct shear of crank pin Shear stress=Shear force
Shear area=$13.6/[\Pi/4x(d^2)]$
Shear stress = $0.03N/mm^2$
Shear stress = $0.03\ /mm^2 < 144\ N/mm^2$ Design of crank pin is safe.

**DESIGN (SELECTION) OFBALLBEARING**

In selection of ball bearing the main governing factor is the system design of the drive i.e.; 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 convenience of mounting the planetary pins and then we shall check for the actual life of ball bearing.

**BALLBEARINGSELECTION**
Series62

| BRG.NO. | D | $D_O$ | B | C | $C_O$ |
|---|---|---|---|---|---|
| 6004 | 20 | 42 | 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 FR=21.8N(……T / radius of gear = 818 /37.5)
Axial load ($F_a$)
$F_a$=0

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P=X * Fr=1x21.8 =21.8N

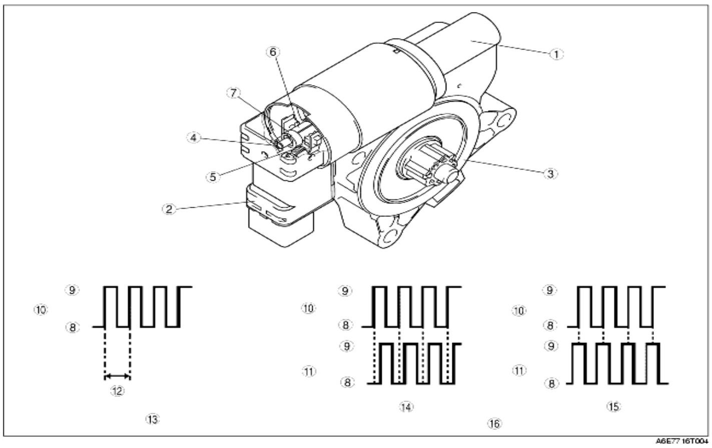
No of revolutions of bearing=60 x36 x4000
$10^6$
L=8.64mrev
⇒L=(C/p)$^p$
L=60 nLh=8.64mrev.
$10^6$

⇒8.64= $\left(\frac{C/21.8}{1}\right)$

⇒C=44.7
NAS; required dynamic of bearing is less than the rate dynamic capacity of bearing;
⇒Bearing is safe.

**EXPRIMENTAL VALIDATION**

- The power window motor consists of a motor, connector and gear.
- Two Hall Effect switches are set in the connector.
- The Hall Effect switch utilizes magnets set on a rotating axis to sense the power window motor rotation, and Outputs a synchronize pulse to the power window main switch.
- Hall Effect Switch No. 1 outputs one pulse cycle for each rotation of the power window motor axle. Accordingly, the power window main switch detects the rotational speed of the power window motor.
- The power window main switch detects the rotational direction of the power window motor by the difference Between high and low pulse points from Hall Effect switch No. 1and 2.



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| | |
|---|---|
| 1 | Motor |
| 2 | Connector |
| 3 | Gear |
| 4 | HalleffectswitchNo.1 |
| 5 | HalleffectswitchNo.2 |
| 6 | Shaft |
| 7 | Magnet |
| 8 | Low |
| 9 | High |
| 10 | Pulse(Hall effect switch No.1) |
| 11 | Pulse(Hall effect switch No.2) |
| 12 | One revolution of power window motor |
| 13 | Detection of window movement distance |
| 14 | Up |
| 15 | Down |
| 16 | Detection of window movement direction |

**Specifications of motor selected for study:**

**12V DC Universal Automotive Power Window Lift Motor Key Specifications/Special Features:**

- Six mounting-hole positions
- Various output-shaft shapes are available
- Motor with Japanese technology
- Working voltage: 12V DC
- No-loadspeed:55 rpm
- No-loadcurrent:1.30A
- Stall torque: 9Nm
- Stallcurrent:18A
- Water-resistant construction

**Schematic of the gear box layout:**

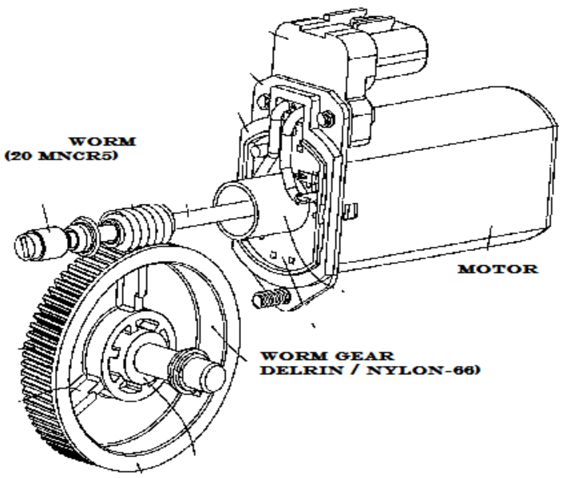


Fig.No.5Schematicofthegear box

Motor is 12 V Dc motor gear box ratio to be 1:55 reduction output of the gear box will be a direct shaft with dynamometer pulley arrangement to carry out the testing of the gear box under various load conditions.

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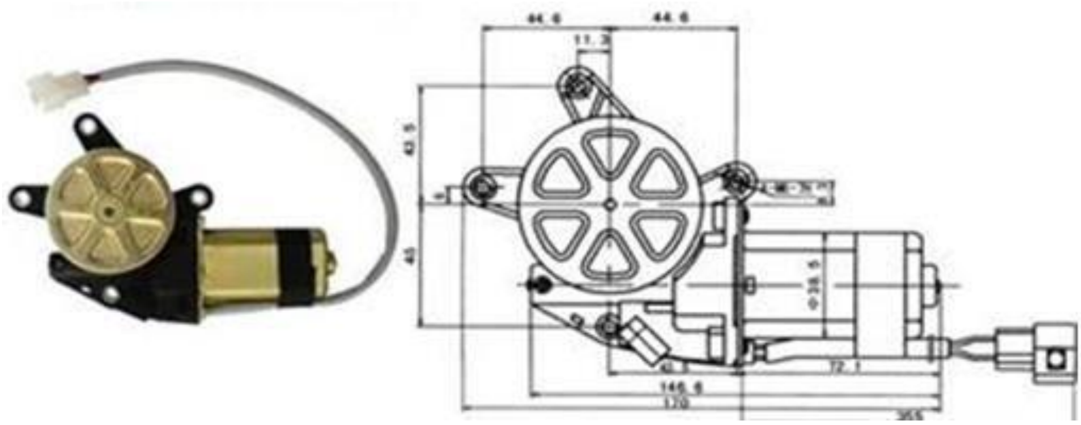

Fig. No. 6 12 VDC Motor

## CONCLUSION

Developed prototype found to be more ergonomic, cost effective and will polishes the whole surface of the shoe compared to the other products available in the market. Quality of shoe shining will improve as top and two side brushes are provided in the machine. Also the product will reduce the50%ofthe cost, weight and size compared to the currently available product in the market.

The machine will completely eliminates the need for applying polish by introducing shoe polishing dispenser. The other advantage is by adding the coin operated mechanism shoe polishing machine can be used for commercial purposes in places like super markets, airports, restaurants, educational institutions and hospitals as a vending machine.

## REFERENCES

[1] H.T., S., Gouda, S., —Design of Shoe Sole Cleaning with Polishing Machine‖, International Journal of Innovative Research in Science, Engineering and Technology 2(9), pp. 5022-5029, 2013.

[2] Liu, Wei, Chi Y., Li M., Tong H., —Research on control system of new type ceramic polishing machine‖, In Mechanic Automation and Control Engineering (MACE), 2011 Second International Conference, IEEE, Hohhot, pp. 1529-1532, 2017.

[3] R.S. KHURMI and J.K. GUPTA, "Theory of machine", S. Chand publications, Edition 16 reprint, pp.382-397.

[4] Mr. Srinivas H T, Mr. Shankar Gouda, Vol. 2, Issue 9, September 2014 "International Journal of Innovative Research in Science, Engineering and Technology"

[5] Microcontroller based speed control of induction motor using power line communication Technology Apoorva S Biradar1, Nagabhushan patil2 1P G scholar, 2Professor, 1,2EEE department, P.D.A College of engineering, Gulbarga, Karnataka, India.

[6] Sreenivas H T, Shankar Gouda, "Design of Shoe Sole Cleaning with Polishing Machine", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 2, Issue 9, September 2013

[7] Animesh Kujur, Amardeep Kumar, Digvijay Murmu, Ashok Kumar, Kunal, Anup Ojha, They have "Design a Coin Operated Shoe Polishing Machine", International Research Journal of Engineering and Technology, Volume: 03, Issue 4 April-2016.

[8] Narayanan Rajeev on "Design and Development of an Automatic Shoe Polishing Device Used in Offices" [PT-2009].

[9] D.Srihari, B.Ravi Kumar, K.Yuvaraj, "Development of Indian Coin based automatic shoe Polishing Machine using Raspberry pi with Open CV", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 1, Issue 3, September 2012.