

# Forming Roller Polishing Machine

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**Abstract-** Metal forming companies are confronted with increasing customer requirements and qualitative demands. In the course of tighter tolerances and use of harder materials the roll forming process need to be aligned optimally to the profile's specification. Especially in the case of complex cross-section the simulation of the forming process is valuable aid. One challenge of reliable simulation is the consideration of the interaction between sheet metals and tools. Due to their simplification e.g missing roll compliance, rigid body models cannot describe the profile-tool interaction sufficiently. This can lead to be differences between experimentally and numerically obtained loads and stresses. Since verification possibilities are unavailable, a consideration of mill compliance in simulation models has rarely been considered if at all. This paper shows option to respect in compliances of forming roller polishing machine.

**Key Words:** Roller Polishing machine, Case Hardening Of Shaft, Setup Fabrication of roller buffing , surface finishing etc.

## 1.INTRODUCTION

The structure of this machine is similar to lathe machine. This is new concept for manufacturing development. Roller polishing machine is used to polish roll forming roller. This forming roller is used to give final circular shape to disc. This disc are used in vehicle like piaggio, Honda wheel etc. before development of this machine the worker in the company polish the roller by hand. They rotate roller by hand and polish it but this process is required so much time and harmful to worker because the weight of the roller is about 80kg to 120kg. if roller is by chance slipped then it hazardous to the worker. We are developing the automatic rotary roller machine. This machine gives good surface finish to the roller and to improve the overall productivity. The roller is located on fixture and clamped with the help of nut. The shaft is mounted on the frame structure with the help of two plumber type Y-bearing. Material of shaft is 20MnCr5 and base is made up of cast iron. shaft is rotated with roller to transmit the power from motor to shaft with the help of belt drive. We are using belt drive because it's less cost and simple in design, safety, maintenance point of view.. The actual speed required to rotate the roller is 100rpm. In this project we are using 2Hp motor but actual power required to 1.15kw. Input speed of motor is 720rpm but rare reducing the speed in two stages with the help of belt drive. We are selecting the v-belt, it shape is trapezoidal and due to trapezoidal shape it will perfect fit in pulley. The motto of our project is to improve the efficiency of roller and polishing operation should be with least fatigue.

### 1.1 Component of roller polishing machine

- Shaft
- Motor
- Bearing
- Pulley
- Roller

## 2. DESIGN

### 2.1 Shaft Design

- A shaft is the mechanical device that transmits rotational motion and power.
- It is integral to any mechanical system in which power is transmitted from a prime mover, such as an electric motor or an engine, to other rotating parts of the system.
- Gears, belt sheaves, chain sprockets, and other elements typically carried by shafts exert forces on the shaft that cause bending moments.
- Determine the design of the power-transmitting components or other devices that will be mounted on the shaft, and specify the required location of each device
- Determine the rotational speed of the shaft.
- Determine the power or the torque to be transmitted by the shaft.



**Fig2.1**-design of shaft

- A shaft is the component of a mechanical device that transmits rotational motion and power. It is integral to any mechanical system in which power is transmitted from a prime mover, such as an electric motor or an engine, to other rotating parts of the system.
- There are many examples of mechanical systems incorporating rotating elements that transmit power: gear-type speed reducers, belt or chain drives, conveyors, pumps, fans, agitators, household appliances, lawn maintenance equipment, and parts of a car, power tools, machines around an office or workplace and many types of automation equipment.
- Visualize the forces, torques, and bending moments that are created in the shaft during operation. In the process of transmitting power at a given rotational speed, the shaft is inherently subjected to a torsional moment, or torque

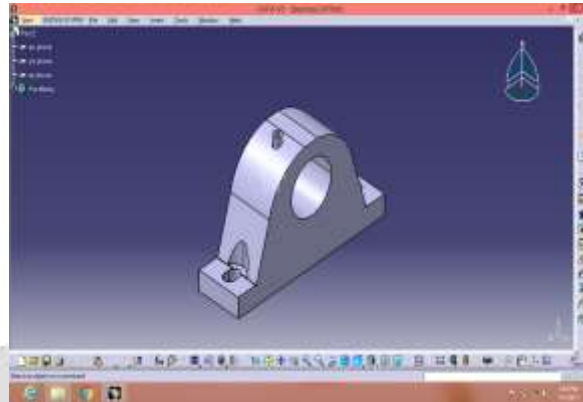
**Table -2.1:** Comparison of shaft material

Sr No	16MnCr5	20MnCr5	EN24
<b>Composition</b>	C 0.14-0.19 Si-0.40 Mn 1-1.30 P 0.025 S 0.035 Cr 0.05	C 0.17-0.22 Si-0.40 Mn 1-1.30 P 0.025 S 0.035 Cr0.05	C 0.36-0.44 Si 0.10-0.35 M 0.45-0.70 Ni1.30-1.70 Cr 1-1.40 S 0.35 P 0.040
<b>Tensile strength</b>	1030-1070 Mpa	1230-1570 Mpa	850-1000 Mpa
<b>Carburizing temp</b>	880-980 C	880-980 C	-
<b>Tempering temp</b>	200 C	200 C	450 C
<b>Hardness</b>	60.5 Rc	60.5 Rc	250 HB
<b>Density</b>	7.85 kg/m <sup>3</sup>	7.85 kg/m <sup>3</sup>	5.38 kg/m <sup>3</sup>

## 2.2 Bearing Design

- Plumber block assembly can- Take up large load, increase bearing life, be easily maintained.
- Plumber block bearing comes as a self-contained assembly, available in wide range of size. All we have to do is ensure availability of a flat and firm platform where two holes can be drill.

- The plumber block housing are the most popular SKF bearing housing on the market, developed to the first choice for design, quality and economy.
- This bearing is new generation with a number of new features and a strong material grade. Less maintenance cost.
- Plumber block housing enable the incorporated bearing to achieve maximum service life.



**Fig2.2**-design of bearing

**2.3 Motor force**

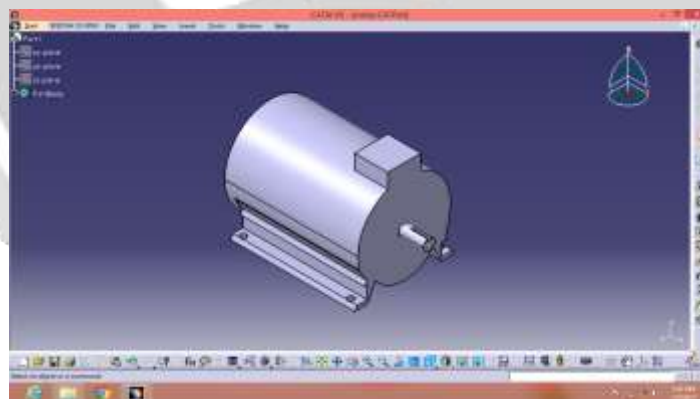
The actual power is required to this machine is 1.5kw. so we are selecting 2Hp motor. The values of the magnetic effects in the motor as well as torque and speed data during start are obtained from software handling motor calculations.

**Axial**

The axial force from skewed rotor bars is normally negligible compared to other forces.

**Radial**

The magnetic field surrounding the rotor in the motor produces a radial force if any eccentricity is present.



**Fig2.3**- design of motor

**Table -2.3:** Calculation required for design aspects are as follows

PARAMETER	VALUES
Speed( input pulley)	750rpm
Speed (output pulley)	100 rpm
Required torque	79.78N-m
Required power	1.3 hp
Reduction ratio	2.4:1 and 3.12:1
Static load on bearing	3500 N

### 2.4 Pulley

A pulley consists of a wheel turning on a fixed axle, with groove along the edges to guide a rope or cable. It is also known as a machine maid with rope, chain or belt wrapped around a groove wheel. A pulley modifies the direction of force, making it easier to lift things. It is a system of ropes and wheels that achieve the purpose of making an object easier to lift. A pulley makes work easier because it changes the direction of motion to work with gravity.



Fig2.4.Pulley

### 3. WORKING

Forming roller polishing machine is used to polish forming roller and this roller is used to give final circular shape to the rim which is used in Piaggio, Honda car, Maruti Suzuki etc. In this the forming roller is mounted on main shaft which can be rotated. This roller is lifted with help of chain pulley arrangement because weight of the roller is 100Kg to 150Kg. The roller is rotating with help of shaft and the shaft is rotating with the help of belt pulley arrangement through the motor transmission. The speed of motor is 750rpm but the actual speed required 100rpm so we are reducing the speed with the help of belt pulley reduction ratio. The motor is starting rotate then the roller also rotate. The roller is rotating the touch the polishing paper on the surface of roller and finish. The roller is polishing manually. After some time work is done then stop the machine.

### 3. CONCLUSIONS

Reduced fatigue and improvement in safety consideration. Cycle time is reduced of polishing operation. Hence overall productivity is improved by 30%. Surface finish is improved and hence rejection percentage is reduced. Finally operation cost is reduced per rim of vehicle and benefit to company in terms of profit.

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