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MAGNETIC BURR COLLECTOR WITH FLOOR CLEANER

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ABSRTACT:

The intention of this mechanical engineering project is to fabricate a scrap collecting machine. Since complete automation is very complex and even research facilities haven't come up with one, you better design one that is operated via auto control. The automatic scrap collecting machine is designed to remove metal scraps from the work station to the disposal area with the help of Magnet and Photoelectric sensor. The use of this automated vehicle system reduces human efforts and the chances of hazard. The collecting work station consists of the work room, conveyors and iron shattering machine. The big iron scraps from the work area is collected by a conveyor and is brought to a iron shattering machine to reduce its size. This shattered iron scraps are brought away from the machine to the rail module through a conveyor for disposal.

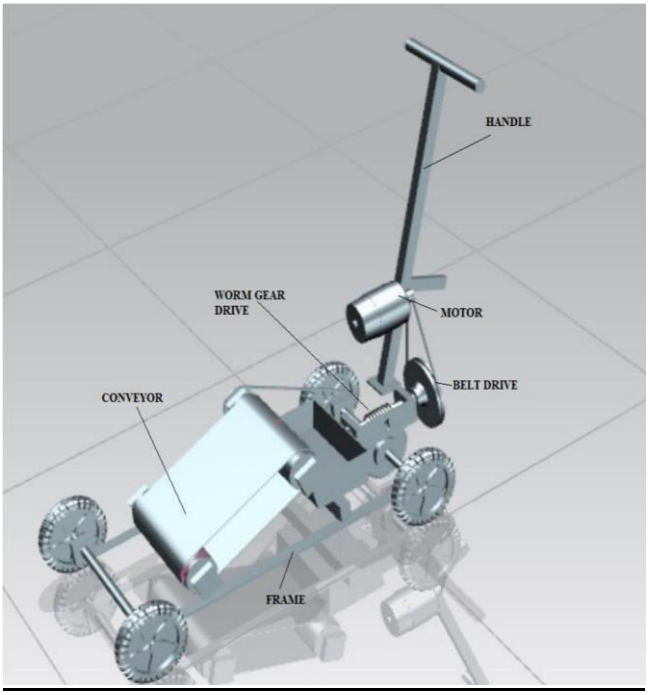
Key Words: Scrap, vacuum cleaner, conveyor belt, motor, battery.

INTRODUCTION

The scrap collecting machine is used for making scrap out of any place. We make a machine which collects the whole scrap into a place. This robot is 4 wheeled though this project may sometimes look simple in this project we will control this machine or vehicle with infrared sensor remote. We will control different functions of moving robot. As we know the value of robotics it

can be used in biomedical industry, domestic, food, leather, auto parts etc. In this project we will make remote which will have functions to control robot like forward, backward, right and left.

There will be six functions.



WORKING OPERATION

The main aim of "automatic electromagnetic scrap collector is to collect scrap automatic and conveyor based, easy to operate, easy construction, less space required. In this project we are collecting scrap in the machine by using bucket provided at front of it. The conveyor using dc motors (12 volt).one motor is used for connect to conveyor for guiding

scrap into machine. And another motor required to connect to the wheel to giving driving motion to scrap collector chassis. After the belt conveyor a sheet metal plate is

provided with magnets which separates magnetic scrap and non magnetic scrap and then to a storage container so we can recycle the scraps. This machines are some kind of heavy there for its difficult to handle manually and also we realized that automation is need of today's industrial world then we choose auto control operating for our machine. Most of the time it is difficult collect scrap from machines shop floor.

MATERIAL FUNCTION

Various types of electrical and mechanical components were used for making the magnetic burr collector. Some of them with average price are

mentioned below,

Sr no	Components	Specifications
1	SINGLE PHASE AC Motor	1/15hp=60 W SPEED 0-6000 RPM
2	MOTOR PULLEY	DIAMETER=20MM
3	INPUT SHAFT	Torque=0.475Nm

4	Fabricating Materia	magnets metal sheets, Axle, wheels, Bearings, etc

CALCULATIONS

INPUT SHAFT

SELECTION OF BEARING 6004 ZZ

The INPUT shaft is held in two ball bearings that equally share the radial load on the shaft . Selecting ; Single Row deep groove ball bearing as follows

Isl No	Bearing of basic design No (SKF)	d	D 1	D	D_2	B	Basic capacity	
2AC04	6004	20	23	42	36	12	4500	7350

Series 60

$P = X F_r + Y F_a$

Neglecting self weight of carrier and gear assembly

For our application F_a =0

$P = X F_r$

Where F_r=Pt = 0.95 $X10^3$ / (Radius of pinion) = $0.25X10^3$ / (22x1.7/2) =13.36

As; $F_r <$ e X =1

Max radial load = F_r =13.4 N.

P= 13.4 N

Calculation dynamic load capacity of brg

$L= (C/p)^p$, where p= 3 for ball bearings

For m/c used for eight hr of service per day;

L_H = 4000- 8000hr

But ; $L = \frac{60\, n\, L_H}{10^6}$

L= 60 x 1900 x 4000 /10^6mrev ....here speed of SHAFT is considered to be 1900 rpm L= 456

Now;$456 = (C)^3$

$\frac{}{(13.4)^3}$

C= 103.1N

As the required dynamic capacity of brg is less than the rated dynamic capacity of brg;

Single phase AC motor

Commutator motor

TEFC construction

Power = 1/15hp=60 watt

Speed= 0-6000 rpm (variable)

Motor Torque

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

$$\frac{2 \Pi \times 6000}{}$$

T = 0.095 N-m

Power is transmitted from the motor shaft to the input shaft of drive by means of an open belt drive,

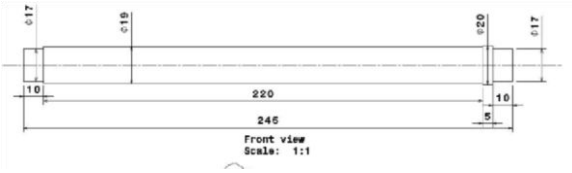
Motor pulley diameter = 20 mm

IP _ shaft pulley diameter = 110 mm Reduction ratio = 5

IP_shaft speed = 6000/5 = 1200 rpm

Torque at IP_shaft = 5 x 0.095 = 0.475 Nm

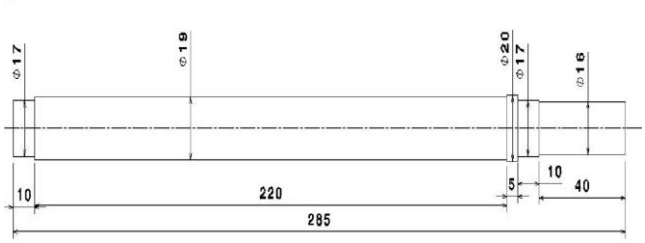
DESIGN OF CONVEYOR SHAFT-1



DESIGNATION	ULTIMATE TENSILE STRENGTH N/mm^2	YEILD STRENGTH N/mm^2
EN 24	800	680

T = 60 x 60

DESIGN AND ANALYSIS OF -2 CONVEYOR SHAFT



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

fs_{max} = uts/fos = 800/2 = 400 N/mm^2

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

Check for torsional shear failure of shaft Te = $\frac{fs}{d^3}$ 16

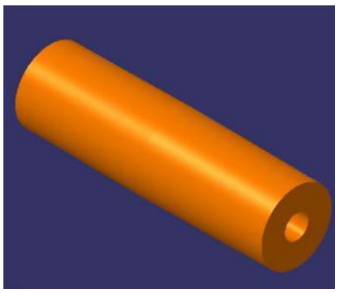
$fs_{act} = \frac{16 \times 0.475 \times 10^3}{\pi \times 16^3}$ fb_{act} = 0.596 N/mm2

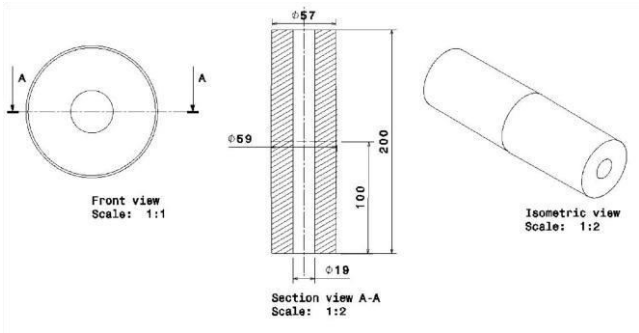
As; $fs_{act} < fs_{all}$

∴ CONVEYOR SHAFT-1 is safe under torsional load.

DESIGNATION	ULTIMATE TENSILE STRENGTH N/mm^2	YEILD STRENGTH N/mm^2
EN 24	800	680

DESIGN AND ANALYSIS OF CONVEYOR ROLLER





Roller 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
Nylon 66	200	160

∴ fs_{max} = 100N/mm^2

Check for torsional shear failure:-

$$T = \frac{\pi}{16} \times fs_{act} \times \left(\frac{Do^4 - Di^4}{Do} \right)$$

$$0.457 \times 10^3 = \frac{\pi}{16} \times fs_{act} \times \left(\frac{57^4 - 19^4}{57} \right)$$

$$fs_{act} = 0.012 N/mm^2$$

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

∴ Roller is safe under torsional load

ADVANTAGES

1. Easy to operate
2. No fuel required
3. Simple in construction
4. Occupies Less area
5. Limited labor and time allocation

APPLICATION

1. Basically it is used for collecting the scrap from any Industries
2. Small machining workshops
3. School/college workshops
4. On road
5. Urban cities

Shops and malls

CONCLUSION

The developed magnetic chip collector met the desired requirements that could pick the chips, in turn transfer on to the belt and collector, thus help to clean the floor area. Simple in construction, mechanically driven, ease to handle and discharge off chips, unskilled labor, low operating and maintenance cost are unique features of the developed magnetic chip collector.

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