MAGNETIC BURR COLLECTOR WITH FLOOR CLEANER

Prof. Y.M. Raut ,Shubham Agarwal , AbhimanyuGaikwad, AkashBorade, ChandrakiranGhadge

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

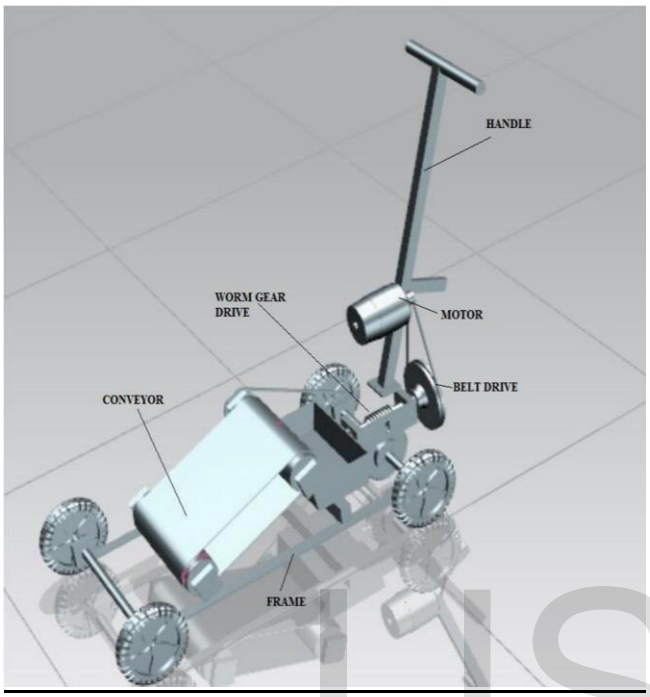
The scrap collecting machine is used for making scrap out of any place. We make a machine which collects the whole scrap into a place. This robot is 4 wheeled though this project may sometimes look simple in this project we will control this machine or vehicle with infrared sensor remote. We will control 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
4	Fabricating Materia	magnets metal sheets, Axle, wheels, Bearings, etc
2	MOTOR PULLEY	DIAMETER=20MM
3	INPUT SHAFT	Torque=0.475Nm

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

IsI 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 $F_a = 0$

$\therefore P = X F_r$

Where $F_r = Pt = 0.95 X10^3$ / (Radius of pinion) =

$0.25X10^3$ / (22x1.7/2) =13.36

As; $F_r < e$ $\therefore$ X =1

Max radial load = F_r =13.4 N.

$\therefore$ 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;$456 = (C)^3$

$C = \sqrt[3]{(13.4)^3}$

$\therefore$C= 103.1N

$\therefore$ 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= 2 Π N T

60

2 Π x 6000

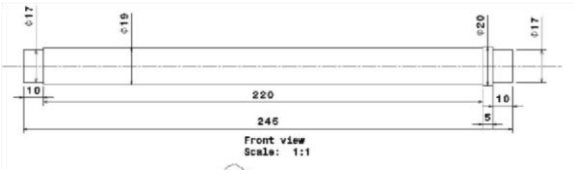
T = 0.095 N-m

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

Motor pulley diameter = 20 mm

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

DESIGN OF CONVEYOR SHAFT-1



input

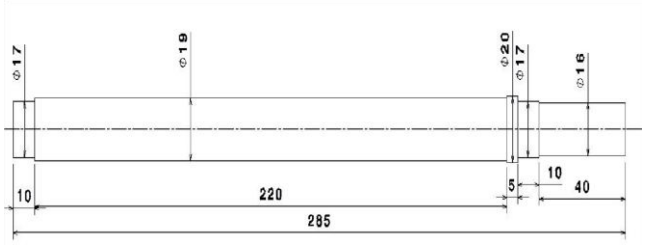
DESIGNATION	ULTIMATE TENSILE STRENGTH N/mm²	YEILD STRENGTH N/mm²
EN 24	800	680

IP_shaft speed = 6000/5 = 1200 rpm

Torque at IP_shaft = 5 x 0.095 = 0.475 Nm

T = 60 x 60

DESIGN AND ANALYSIS OF 2



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

σ_{fs} 2

max = uts/fos = 800/2 = 400 N/mm

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 = $\frac{fs}{}d^3$ $16fs_{act}$

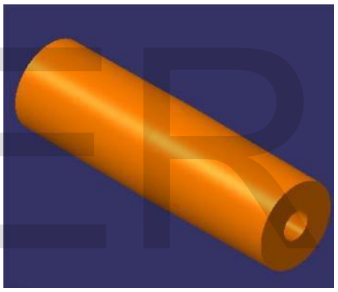
$=16 \times 0.475 \times 10^3 \times 16^3 fbact = 0.596$ N/mm2

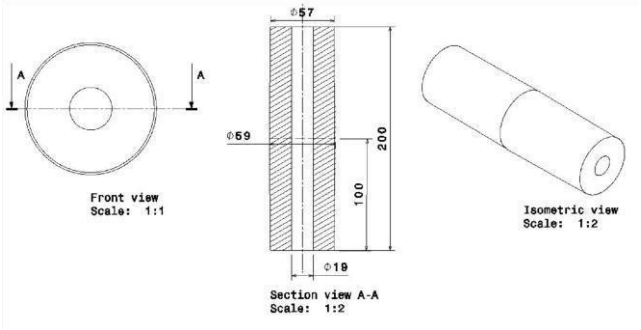
As; fsact<fsall

CONVEYOR SHAFT-1 is safe under torsional load.

DESIGNATION	ULTIMATE TENSILE STRENGTH N/mm²	YEILD STRENGTH N/mm²
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.

2

Designation	Ultimate Tensile strength N/mm²	Yield strength N/mm²
Nylon 66	200	160

□ □fs max = 100N/mm

Check for torsional shear failure:-

$T = \frac{\pi}{16} \times f_{s_{act}} \times \frac{D_o^4 - D_i^4}{D_o}$

$0.457 \times 10^3 = \square \times f_{s_{act}} \times \frac{57^4 - 19^4}{57}$

$\frac{\pi}{16} \times f_{s_{act}} =$ □ 0.012N/mm²

As; fsact<fsall

□ 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

We successfully analysied and calculated all parts used in machine ,we conclude that our device can clean up to **11.5** x**30 cm**area in a minuteand it can be used in smallworkshop and industries.

REFERANCES

1. Sirichai Watanasophon and Sarinee Ouitrakul,"Garbage Collection Robot on the Beach using Wireless Communication".2014 3rd International Conference on

2. S. Pradeep et al, "Electromagnetic Metal Collecting AGV", International research Journal of Advanced Engineering and Science ISSN(Online):2455-9024.

3. Rakshan C. Naik et al, "Design and Development of Magnetic Chip Collector Machine".

Informatics,Environment, Energy and Applications

IPCBEE vol.66(2014), IACSIT Press, Singapore

DOI: 10.7763/IPCBEE. 2014.V66.19
International Journal of Engineering Research in Mechanical and Civil Engineering (IJERMCE) Vol 2, Issue 5, May 2017.

4. Prof. RohidasWaykole et al, "Electromagnetic Scrap Collecting Machine with

Vacuum System". "International Research Journal of Engineering and Technology