AN DESIGN OF PRESSING CHAMBER ON BRIQUET MACHINE

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Abstract

The goal of this contribution is to present the process of engineering design of briquetting machine pressing chamber. Presented construction of briquetting machine is not the new construction principle of briquetting machine. It's a design of experimental pressing stand. This equipment has one big advantage, provides the possibility to research the impact of structural and technological parameters changes.

Keyword- *Design, Machine , Learning*

Introduction:- Biomass presents huge amounts of unutilized waste. Solid biofuels production is convenient way how to energetically recover the waste. Before the waste becomes biofuel it has to be modified. Very interesting possibility is to compact the modified waste into the solid high-grade biofuels. This can be performed by compacting technologies, e.g. briquetting or pelleting. The final products of briquetting and pelleting are briquettes and pellets with various shapes and sizes. The feature of these both technologies is pressing of material (waste) under high pressure and temperature without any binding material. It is very important to produce briquettes with Standards given quality. Briquettes quality is evaluated mainly by briquette density and bulk density. Other important briquettes quality indicators are mechanical durability, strength and hardness. During the pressing process there are many parameters which influencing the final briquettes quality.

Literature Survey

- Many people have worked on this topic so as to depend on the renewable resourses.some people failed due to thelow efficiency and less output.
- Hereby, keeping in mind the past experience from the people who have contributed to this biomass briquettingtechnique.
- Vinay V. Ankolekar and Sourabh S. Kulkarni showedthe data of agricultural residue availability (kg) per tonne of grain produced and its alternative uses.Manjunath K S, Omprakash M, Niranjan Pangeni and Biradar Hanumant has made a briquetting machine which can be used for making briquettes of solid waste.
- Kishan B S, Kiran Kumar, Santhosh T J and Amith D Gangadhar stated that the agricultural residues are verydifficult to handle, transport and store. So, usually peopleopt for an easy way which is burning.
- Making of agrowaste briquette is always a typical job as it needs precise mixture of agrowaste and binding material, so as the agriwaste briquette wouldn't break after pressing in die. We are trying to make a mechanical operated device which can be improve productivity aids of making agrowaste briquette in less effort. So following literatures were studied for to designing of our project model. Agriculture wastes are the wastes from farming, forestry and other farm operations. There is a rapid increase in volume and types of agrowastes because of increase in population. These wastes are managed through the process of collection, storage and disposal in the form of biomass. Also from many years the farmers use some farm argowastes as a fodder for these animals or store some of it to use it as a fuel, but there is a lot of problem for storing it or they burn it out. To make the useful use of these agrowastes we have the concept of agrowaste briquette making machine. Because agrowastes briquettes means a biomass briquettes are a renewable source of energy and it also avoid adding fossil fuel carbon to the atmosphere. We are trying to make a manually operated device which can improve productivity aids of utilization of agrowastes.

- Sufficient literature is available related to Agrowaste Briquette making machine. Initially the available literature is reviewed for identifying the parameters responsible for the Design and Fabrication of Agrowaste Briquette making machine. The problems, advantages and present use of Agrowaste Briquette making machine is studied. Then the design of Agrowaste Briquette making machine is prepared using various theories. So following literatures were studied for designing of our project model.

Methodology

Briquet machine :

We know that the density of wet coal drug is 1901 kg/m^3.

By adding a dried bio mass of straw of density increases by by 20%.

∴ find density=2292 kg/m^3

For producing a briquet of coal during with 10% moisture content with density of 8947 g/m3.

i.e. 8.947 kg/m^3

the biomass has to be compressed from 2292 kg/m3 to 8.947 kg/m^3

for briquet formation using a screw

the screw used for briqueting of biomass is of circular shape and rotates at speed of about 50-80 rpm.

We have standard rotor of 1440 rpm to obtain a speed range of 50 to 80 rpm selecting a standard gearbox of reduction 1:20.

i.e. 1440/20 = 72 rpm.

Required briquette size is 50 mm dia.

Production rate is one briquette per revolution.

Let us consider the length of briquet is 50 mm.

∴ Volume of briquet $= \pi r^2 h$

$= \pi * 25^2 * 50$

= 98714.77 mm^3

i.e. m = 0.2356 kg

m = 235.6 gm

compression ratio = final density/initial density

= 8947/2292

= 3.903

≈ 4

Screw pitch :

Briquet size is 50*50 mm and production rate is 4 briquet per revolution.

∴ selecting a pitch of 50 mm and 4 starts on screw.

Motor selection:

Rpm = 1440

H.P. = ?

Weight of worm = 5kg.

Resistance of biomass = 0.5 kg per thread

= 0.5*4

= 2000 gm = 2 kg

Total resistance = 7 kg

Bearing resistance = 0.2 gm

= 7.2 kg

This is the resistance offered by the system to the motor = 70.63 N

Motor of 2 hrs

P = 1 hp = 745.7 W , N = 1440 rpm

w = (2ΠN/60), P = T*w

w =(2Π*1440/60)

= 150.8 rad/s

P = T*w

T = 745.7/150.8

= 4.94

= 5 N-m

Gearbox reduction is 1:20

i.e. speed = `1440/20

= 72 rpm

And torque = 5*20 = 100 N-m @ 72 rpm

100 N-m > 5 N-m

Hence, selecting a motor of 1 HP, 1440 rpm.

Hopper design :

Designing hopper on hour basis.

We know rpm = 72

In one revolution 4 briquet are produced.

i.e. No. of briquets = 72*4

= 288 per minute

= 288 * 60 = 17280 per hour

Mass of one briquet = 0.235 gm

Total weight = 4060.8gm

W= 4.06 kg ≈ 4 kg

Considering hopper radius = 150 mm

$$V = \pi r^2 \mathrm{h}/3$$

$$4000000 = \pi * 150^2 * \mathrm{h}/3$$

$\therefore$ h = 169.76 mm

Conclusion

This construction of experimental pressing (briquetting) equipment with horizontal pressing axis has more advantages. For example equipment will produce briquettes with dimensions as in real production, we will be able to measure acting pressures, deformations in dependence on input adjusted technological and structional parameters.

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