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RESEARCH ARTICLE

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Suggested Model of IGS for Improving Quality as well as Production of Briquettes in Briquetting Plant

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ABSTRACT
Biomass Briquetting is a process which converts agro residue and saw dust materials with low bulk density into a uniform size and more convenient households or industrial fuel product. The major advantage offered by biomass is related handling improvement and increasing calorific value per unit volume. In general this process offers agro residues are directly fed into the briquetting press due to which the sand, stones, metals and other are not removed from the raw material. Also decrease the life of wear parts, ensures discontinuous operation of the plant, increase the downtime of the briquetting press that occurs due to feeding the raw material with stones, nut bolts and sands.
Therefore the objective of the project was study and analysis of the briquetting plant for removing the problem regarding to the quality as well as production of the briquettes in briquetting plant. This study and analysis involve the overall operational process regarding to the briquetting plant in detail. According to the selection of appropriate technology for feeding the raw material into the briquetting machine with Integrated Grinding System [IGS] has been chosen.

INTRODUCTION

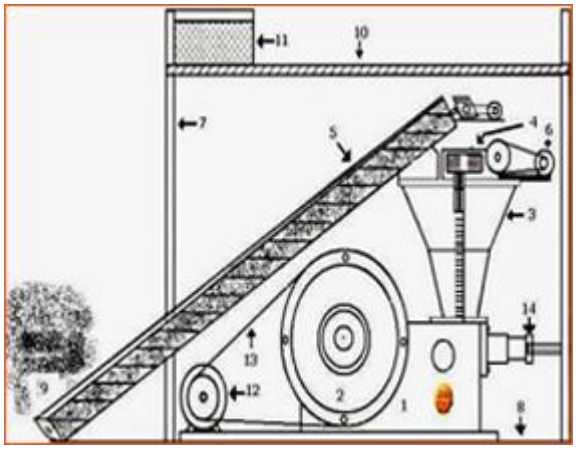
Briquetting is a process in which the material is compressed and density of material increases 10 times (1000 Kg/m^3). The densification depends upon two parameters: size of particles and pressure of machine. The equipment use for size reduction are thresher, hammer mill etc. The particle size reduce by thresher from 20 mm to 40 mm and whereas through hammer mill 10mm to 25mm the fine particles of biomass improve the quality, density of briquettes and the bendability of material. A briquetting plant used to produce the briquettes from crop residues essentially have grinder (hammer mill) consist of a rotating shaft with free-swinging hammers, which reduce the size of particle to a predetermined size.

The hammer mill have hammer like projection mounted on a shaft. The hammer revolves at high speed and grinds the materials mounted into pieces by beating. A hammer mill consist of a number of manganese (Mn-13%) steel alloy hammers which are radially and equally spaced on a high frequency steel shaft or rotor which rotates at a high speed rpm in a strong housing (usually made of thick steel sheets). One end of shaft coupled with blower to transfer the raw material to mill for proper grinding. The projection of hammer and side mounting of blower create uneven stresses results in failure of shaft. The latest development

had replaced normal shaft by high frequency shaft with more reliable operation and blower is driven by electric motors which further helps in drying moisture content of raw material.

In the Integrated Grinding System (IGS) system we are providing the stone separator which works on the principle that, as the weight of the stones, mud and other heavy material is greater compare to raw material (saw dust, soybean husk, etc..) it gets separated with the action of gravity and bower/fan provided. This helps in improving the densification of briquette, increases the calorific value. Also the stone separator provides a major role in avoiding the failure of ram of the briquette machine, which results in less maintenance, less power consumption. From the discussion it is clear that IGS is more important in improving productivity, maintainability, gets higher quality of briquettes having lees ash content about 5% which also helps in low maintenance of furnaces used in industries and the proper bonding of briquette material.

Basic Procedure



The Briquetting press is a ram type press designed for continuous heavy-duty operation with two load wheels. One of the load wheels acts as a pulley, and driven by the main motor through a flat belt forced lubrication is provided by oil lubrication system which gives a longer life to the press. Dry agro – forestry waste as a raw material is fed through the screw conveyor to Kupy by means of vertical screws, with its own-geared motor. It pre-compress and forces the material downward into the feeder box. From the feeder box the material is forced by the ram through taper die and due to high pressure & heat, raw material is converted into solid cylindrical briquettes. Finally finished briquettes come out from die holder and passes through natural cooling lines. During Process lignin content in the raw material is transformed into liquid form & acts as a natural binder. Therefore it is called the Binder less Technology.

Research methodology

This project is based on the findings of a personal visit to a Briquetting plant on the outskirts of KEWLANI INDUSTRIES, PUSAD, MAHARASHTRA, INDIA. Open ended extensive interviews were carried out with the owner and labourers of the unit. Visual Observation was also used to verify some of the statements. This study has also been complemented by several inputs from publicly available information, and analyses the issues concerning the manufacturing and problems regarding this briquetting plant.

A. **FINDINGS**

A visit to the unit near KEWLANI INDUSTRIES yielded a lot of information on the current status of briquette manufacturing. The major findings are:

1. Raw material used : Tur husk, soybeans husk, groundnut husk & other bio waste.
2. Technology used (type of machine): 5 year old technology: Briquetting machine without IGS.
3. Maintenance required and availability of spare parts: very high maintenance is required; spares are freely available and can be procured locally.
4. Marketing prospects - both local and exports: Problems creates in marketing because of low calorific value of briquettes.
5. Labour required: This is an SSI unit. 5 semi-skilled personnel are adequate. But since briquetting plants are located in rural areas, fluctuations in labour availability should hardly come as a surprise. On the job training was provided for the employees.
6. Storage space: ware house of min. 10000 sq ft. is required as raw material can be procured only after harvest and needs a large storage space due to its bulky nature.
7. Water requirement. : Can it be recycled and reused? The answer was in the affirmative.

8. Power: Substantial supply is available in industrial areas but not in rural areas where the supply is single phase.
9. Any other requirements: The owner agreed to the necessity to evolve better strategy, innovation, and improve on cost and technology.
10. Quality of Briquettes: Poor quality of briquettes.
11. Production of Briquettes in plant: low production of briquettes.
12. Operation of the briquetting machine: Discontinuous operation because delay time is more.

B. **DISCUSSION AND SUGGESTION**

After completed the visiting survey regarding the problems in briquetting plant, then all group members, project guide, co-guide discussed about it. Based on findings the problems obtained during the survey and personal interview with owner of the briquetting plants, the following issues have been highlighted in this sector.

1. Production of briquettes in briquetting plant is low because of downtime is more
2. Quality of briquettes is also poor due to direct feeding the raw material with sand, stones and other heavy's materials.
3. Delay time is more because when the raw material with sand, stones and other heavy's materials directly fed into the briquetting machine and gets contact with the parts of the machine.
4. Bonding of required briquette is improper due to stones and mud content in briquette.
5. Maintainability gests increase due to the stones comes in contact of the ram and the dies of the machine.
6. Due to over size of the raw material i.e., size more than 20mm results in the improper bonding of the briquettes
7. Due to stones the power consumption of machine gets increase.
8. The moisture content results in lower the calorific value.
9. Due to all above content the production cost of material gets increase.

According to these problems in kewlani industries, the current project group members and guide discussed and find out new procedure for briquetting plant. The name is given to this procedure is called Integrated Grinding System [IGS]. The following way to process the raw material fed into the briquetting machine.

Biomass(Agro-Forestry Waste)

⇩

Bio-mass Max. up to 20 mm Size & below 10% Moisture

[Crusher and stone separator called IGS]

⇩

Briquetting Plant Jumbo 90

⇩

Briquettes(90mm / Cylindrical Shape)

CONCLUSIONS

In this way we have to suggest the Integrated Grinding System [IGS] for briquetting plant and remove the problems regarding the briquetting machine. Also to increase the quality as well as production of the briquettes in briquetting machine.

Following advantages also takes place by using IGS:

1. Removes sand, stones, metals and other heavies from the raw material (optional)
2. Increases the bulk density of the material, resulting in nearly 25- 50% increase in output from the Briquetting and Pelletizing Press
3. Enables moisture reduction of up to 5% in the biomass being processed. (optional)
4. Increases the life of the wear parts by nearly 50% (in the briquetting and Pelletizing press) resulting in lower operating costs
5. Ensures continuous operation of the plant, which otherwise is not possible
6. Decreases the downtime of the briquetting and pelletizing press that occurs due to feeding contaminated (with stones, nut bolts and sand) raw material.

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