

Design Review and Optimization of Twin Shaft Shredder Blades for Shredding of Paddy Straw

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Abstract: Agriculture plays a vital role in the Indian economy, over 70 percent of the rural households depend on agriculture. Agriculture is an important sector of the Indian Economy as it contributes about 17% of the total GDP and provides employment to over 60% of the population. In this process, a huge amount of agricultural residue materials is produced which has no commercial utilization. Agricultural residues such as Corn Cob, Paddy Straw, Cotton Stalk, Cane Trash, Soya Husk, Juliflora, etc. are left to rot or are burnt in the fields which results in excessive Air Pollution. Agri-residues in their loose as well as densified (Briquette / Pellet) form can be a wonderful source of energy that could fuel up the Nation's Economy in a much more efficient, eco-friendly, and sustainable way. Agro residues are required to be uniformly sized to make them suitable for processing and converting into Briquette / Pellet. A twin shaft shredder machine is useful equipment required to convert Paddy bales into the required size of $\leq 50\text{mm}$ so that they can be easily converted into Biomass Briquettes. This project is being carried out in a briquetting plant at "Punjab Renewable Energy Systems Pvt. Ltd" Aurangabad for utilization of Agro residues (Paddy Straw) as fuel in form of briquettes. Paddy Straw has high moisture as well as high silica content which results in high wear & tear by which Operational cost, as well as plant downtime, increases. Therefore, the design of the twin shaft shredder needs to be optimally designed such as Blade design, metallurgy, and cutting chamber design as per Paddy Bales is required to be optimized to make it suitable for processing of Paddy Straw.

Keywords: Cutting Blade design, Blade metallurgy, shredder cutting chamber.

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