

Design of a Crushing and Propagation Screw Mechanism for Progressive Pelletising in Food Waste

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Abstract

A critical component of a sustainable food chain system is the diversion of food waste from landfills by adding value to it. Food waste management and recovery is the chain of activities where leftover food materials are collected, sorted, processed and converted into other materials and used in the production of new products. Food waste from canteens is having no other use except being dumped at refuse sites. This paper focused on the development of a screw mechanism for food waste pelletizing. Data was gathered through interviews with institutions' canteen personnel about the situation of food waste storage and disposal, in order to understand the complex situation from their perspective and further determine the possible willingness and chances of re-use and recycling of food waste. The principles of operation of screw mechanisms were carefully analysed for their applicability in food waste pelletisation and to come up with the best design parameters for waste food pelletisation. Possible solutions were generated using Computer-Aided Engineering softwares for mass property analysis, finite element analysis and other calculations and simulations prior to prototyping. The produced machine is electric powered, uses a belt drive system and an extruding screw for mixing, compression and conveyance of the dried food waste. The screw acts as a mixer and crusher for food waste and other additives such as sunflowers and beans for nutritional value. These are then conveyed into the pelletising chamber where it is compressed and extruded through the pelletizing die as pellets. Produced pellets can be used as feeds for chickens, turkeys and pigs.

Keywords:

Food waste value addition, Pelletizing, Sustainable food system, Waste Management, Screw mechanism