## Abstract

Fluidized bed technology is a very modern technology applied in many industries such as petrochemicals, pharmaceutical, food industry, agricultural industries. Fluidized bed dryers are also been used in many industries and laboratories as an alternative method of drying. So, in the present work an attempt has been made to develop a fluidized bed paddy dryer with proper attachment of a waste heat management unit. From the preliminary investigation it has been observed that the drying characteristics largely depend upon hydrodynamics and mass transfer behaviour of the material. The bed hydrodynamics for the designed fluidized bed set up have been studied using "Ergun Fluidization Software – CFB v.1.3c". The operating parameters like operating velocity, pressure drop, bed voidage, cyclone pressure drop and efficiency and heat transfer co-efficient have been studied using the software and their effect on the Fluidized bed drying system have been identified. The result obtained from the simulation is finally utilized for design of an efficient dryer for high quality yield. Based on the study of the necessary parameters and operating conditions, a design has been made to meet the requirements for paddy drying. The designed set up has been fabricated including the cyclone separator and the air heater and necessary instruments required for the experiments to perform have been attached to the setup. Finally, experiments have been performed by varying the operating parameters as like amount of inventory, air flow rate, air preheater temperature alongwith paddy at different moisture level. From the experiments, it has been observed that drying rate increases with increase in air temperature and air flow rate, but decreases with the increase in bed inventory. The rate of drying is higher at the initial stage but it deacreses gradually as the moisture level decreases within the particles. Finally, the results have been validated by comparing with the other experimental data obtained by other researcher.