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Planning of experimentation to model pneumatic conveying capability of dry ash

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Abstract:

Dry ash pneumatic conveying is becoming more demanding in various fly ash generating and as well as utilizing industries. Dry ash thus produced generally micro sized fine particles mainly comprising of aluminum silicates, possesses both ceramic and pozzolanic properties. A large number of technologies have been developed for gainful utilization and safe management of Dry ash under the concerted efforts made by Fly Ash Mission/Fly Ash Unit under Ministry of Science & Technology, Government of India since 1994. As a result, fly ash earlier considered to be "hazardous industrial waste" material, has now acquired the status of useful and saleable commodity. Due to recent development in hardware and software required for such system which requires minimum air for conveying in turn power, with reduced pressure and velocity, reduced pipe line configuration and wear rate which increased work place environmental friendly and due to increased workplace safety, this added advantages of Dry ash pneumatic conveying mostly used in power generating unit, cement manufacturing, ready mix concrete manufacturing, EPC Fly ash panel. Till date majority of dry ash producers are using hydraulic conveying systems due to non-availability of efficient and reliable pneumatic system for collection of dry fly ash. Attempts are being made to find practical uses for the dry ash on large scale & also to avoid ground & water contamination, land & water resource constraint, it necessary to avoid the disposal of ash in wet slurry form into ash bund.

The solution of this problem lies in developing improved model for a pneumatic conveying system which uses ecofriendly, energy efficient system which protects the potential dry ash properties for utilization on large scale. It is primary need for reliable design of a pneumatic conveying system, this paper reports the planning of classical plan experimentation and model the conveying capability of dry ash conveying system to generate the design data from experimentation.

KEYWORDS: Conveying capability, Loading ratio, Experimental modeling, ESP- Electrostatic Precipitator

Introduction Dry ash are produced around the world every year from the combustion of pulverized coal in thermal power stations, CEA New Delhi 2017 [1] In the report it was shown that the total no of thermal power in 18 states were of 155 and the generation of fly ash was in these stated during the year 2016-2017 was 169.2533 million tons. The table below will give the summary of fly ash generation and utilization during year 2016-2017.

Table No.1

Description		Year 2016-17
• Nos. of Thermal Power Stations from which data was received	:	**155**
• Installed capacity (MW)	:	**157377.00**
• Coal consumed (Million tons)	:	**509.46**
• Fly Ash Generation (Million tons)	:	**169.25**
• Fly Ash Utilization (Million tons)	:	**107.10**
• Percentage Utilization	:	**63.28**
• Percentage Average Ash Content (%)	:	**33.22**

Till date majority of ash producers are using hydraulic conveying systems due to non-availability of efficient dry ash pneumatic conveying system. Dry ash largely used in building material sector [2]. Attempts are