COMBUSTION PERSPECTIVES OF PAKISTANI COALS WITH SPECIFIC EMPHASIS ON SALT RANGE AND TRANS INDUS RANGE COAL

*S. Rehman1,2, A. Naeem2, W. Nimmo1, H. Mughal2, M. Akram3

1Department of Mechanical Engineering, The University of Leeds, Leeds, LS2 9JT, UK
2Department of Mechanical Engineering, University of Engineering & Technology, Lahore, Pakistan
3Department of Mechanical Engineering, The University of Sheffield, Western Bank, Sheffield, S10 3AY

Abstract:
Reserves of petroleum, gas and high rank coal are limited as compared to low rank coal and insufficient to meet the energy requirement of the world. It is need of hour to develop efficient utilization technologies for low rank coal resources. Combustion efficiency, flexibility with respect to fuel quality and low emission of toxic pollutants into the atmosphere are three major criteria in the development and evaluation of a new combustion technology.

The situation of power production in Pakistan particularly and the world over generally, does not justify the usage of oil and gas and that, together with pollutants emission control, provides the driving force for the implementation of clean coal combustion technology. Fluidized Bed Combustion FBC could be a judicious choice for medium to large power generation capacities, better Sulfur retention and NOx control, low grade fuel or highly fluctuating fuel quality. Keeping in view the economic and power situation in Pakistan, FBC technology represents an optimal solution for using low grade coal such as sub-bituminous in Salt Range and Trans Indus Range Punjab, Pakistan.

In this study, coal samples were collected from 30 different coal mines of Eastern Salt Range (Chakwal), Central Salt Range (Khushab), and Trans Indus Range Makarwal (Mianwali) Punjab. Different coal analysis like Proximate analysis (including Moisture, Ash content, Volatile Matter, Fixed Carbon) and Elemental Analysis (including Sulphur, Total Carbon, Nitrogen and Hydrogen), calorific value, Ash composition and Ash Fusion Temperatures were made from SGS Pakistan and Laboratory of Changsha University of Science and Technology Changsha, Hunan China. Methodology of analysis is discussed. Results of both Labs were compared. This coal has higher Ash content ranging from 15-45% (average 33%) and high sulphur max 10% (avg 6%), moisture level is 3-10% (Avg 7%), volatile Matter is 25-45% (Avg 33%), CV is 4000 btu/lb to 10,000 btu/lb (Avg 7600 btu/lb), Fixed Carbon 31% avg and Total carbon 39% avg – Ash fusion temp is 1488 oC avg. Quality of the coal is ranked as sub bituminous with high Ash, high sulphur and low calorific value which is found suitable for power generation using Fluidized Bed Combustion Technology. FBC Technology uses limestone for desulphurization during combustion of coal and limestone is available in abundance in Salt range to serve the purpose. FGD may also be used to comply with the stringent environmental conditions.

Coal resources and reserves of Salt Range and Trans Indus Range are taken on the basis of latest report submitted by M/S Snowden (an Australian company) to Government of Punjab and their power potential is estimated keeping in view quality of coal, geographical considerations, mining capabilities, coal productions, transport facilities and infrastructure for coal fired power Plants and disbursement of power to national grid according to energy policy of Pakistan for developing the national economy.

*Corresponding Author: e-mail: shafiq89uet@gmail.com, Tel: 0044 7466325028