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# POŚREDNIE WSPÓŁSPALANIE BIOMASY I ODPADÓW W KOTŁACH ENERGETYCZNYCH

Praca doktorska

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## ABSTRACT

The paper explores the results of industrial tests of an innovative technology called OTERM of alternative fuels such as municipal waste or biomass thermal degradation before co – firing in an energetic boiler. The OTERM uses exhaust gases with low oxygen concentration and high physical enthalpy from the combustion of conventional fuels as gasifying agents. Exhaust gases flow to the reactor and producer gas to the boiler is forced by a steam-powered jet fan.

Pilot installation testing with the maximum thermal load of $\dot{Q}_{OTR}^{max} = 2{,}0\ MW$ integrated with the multi-fuelled energetic boiler featuring the capacity of $\dot{m}_p = 50\ t/h$ of preheated steam confirmed the possibility of implementation of exhaust gases as gasifying agents. The producer gas of calorific value $Q_i = 6025\ kJ/m_N^3$ and temperature $t_{gp}$=700°C was received by thermal treatment of pellets from coniferous trees. The impact of variable co – firing conditions of the producer gas and fuel such as coal, lignite, natural gas and coke oven gas on the water dew point was analyzed.

An important disadvantage of low calorific value producer gas and conventional fuel co – firing is boiler efficiency reduction caused by the increase of exhaust gases stream and temperature. The efficiency reduction can be compensated by modernization causing the decrease of exhaust gases temperature. Acid dew point temperature ADT is the lower limit of exhaust gases temperature lowering. Energetic boilers equipped with rotating air pre-heaters may decrease their capacity due to condensation of exhaust gases which causes low temperature corrosion of "cold end" basket material and flow channels clogging.

In this paper primary and secondary anti - low corrosion protection methods of "cold end" of rotating air pre-heater were identified. An optimal solution is setting boiler parameters so that the temperature of "cold end" material is higher than ADT by constant safety surplus. For this purpose, knowledge of current "cold end" and ADT temperatures is essential. Therefore, in the second part of this paper two concepts of installation and results of industrial tests of diagnostic anticorrosion system of "cold end" fillings of rotating air pre-heater RAH+ were presented.

RAH+ system testing was carried out during different boiler loads and during its start-up. It was confirmed that continuous measurement of "cold end" temperature fillings along the rotor radius and its various heights is possible. The system allows diagnosing the risk of "cold end" corrosion, verifying incorrect work of soot blowers and comparing filling parameters.