

Mohammed Moumane  
T.A. Sharabura, research supervisor  
I.P. Nikitina, language advisor  
National Metallurgical Academy of Ukraine, Dnipropetrovsk

### **Project of Steam Boiler TP-35 Reconstruction when Operating on Generator Gas**

The application of coal-water fuel in the energy sector can afford to solve the main task - to reduce the high fuel costs in boilers, which burn expensive gas and fuel oil or when coal is burned inefficiently. One of the uses of coal-water fuel in the energy sector of Ukraine may be burning it in different energy units, including steam and hot water boiler units of various capacities. To determine the possibility of transferring boilers to hydrocarbon fuel it is necessary to investigate their thermal performance and parameters, and set the optimum mode when running on this fuel.

The calculations of the average power boiler TP-35 type were made. The boiler has U-shaped arrangement of the heating surface with the location of the convection heating surfaces in the flue drop "splitting". A boiler combustion chamber with the flame combustion, super heater, economizer and air heater are two staged. As a result of computational research it was determined that when operating at nominal conditions there are some technological malfunctions of the boiler.

Studies have found that the only way to ensure a steady technological regime is reducing the output of the boiler, while maintaining the nominal steam parameters (445 °C, 3.8 MPa). On the basis of the calculations, boiler map was developed for transferring it for the burning of coal-water fuel. It is found that when boiler TP-35 type was transferred to hydrocarbon fuel, its performance may vary from 60% to 100%. The achieved level of load reduction is close to the limits in terms of optimal and acceptable technical parameters of the boiler, while maintaining the parameters of superheated steam.

Further reduction in performance is undesirable to restrict the gas temperature at the outlet of the furnace. The combustion of the fuel exhaust gas temperature before the exhaust fan is 170-190 ° C. In this case the same boiler efficiency is 84,7-83,5%.

For the stable operation of the boiler at nominal operating conditions with the necessary steam parameters, as well as to improve the efficiency of the boiler it is proposed to combine coal-water fuel and natural gas. The performance of boiler TP-35 during the combustion of coal-water mixture fuel and natural gas was obtained. In this case, the work is carried out without steam generator heating surfaces modernization. The temperature of the gases at the outlet of the furnace is 1027 ° C, the flue gas temperature is 180 ° C. This mode of operation gives the 85.4% efficiency of the same boiler.