Microcontroller Based Liquid Fuel Consumption Control

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By

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Abstract

This report describes a project on automation of fuel consumption control at a factory in Zimbabwe. The factory has six furnaces where it uses fuels such as coal tar, paraffin and industrial burning oil (IBO) in heating some of its products before they can be forged to various shapes. A burner is mounted on each of the brick-lined furnaces. Air and fuel are then mixed and ignited inside the burners and the flame blown into the furnaces. Airflow and fuel flow into the burner are each manually controlled by means of valves. The manual control of the valves often leads to unfavourable ratios of air to fuel thereby leading to non-optimal combustion. The aim of this project was to automate valve control in an attempt to maintain optimal combustion all the time. The control system was to be based on an 8031 microcontroller. The most logical starting point of the project was seen to be the collection of experimental data on various ratios of airflow and fuel flow that allow optimal combustion. This was achieved by comparing time taken to heat a given product to the right setpoint temperature for forging.

Having collected the necessary data, the hardware of the system was designed and constructed. The final part was the designing and developing of relevant software. At the beginning of the process, the operator would enter configuration data such as the set-point temperature and airflow rate. When running, the system reads the furnace temperature and then automatically controls the fuel flow rate depending on the temperature within optimal limits. An LCD displays the furnace temperature as well as other configuration data. The system was also designed in such a way that it can be connected to a personal computer and configuration data can be entered through the personal computer.

The results of the system so far show that, the temperature of the furnace can now be regulated and the temperature shown by the system is comparable to that from other thermometers. The most encouraging result is the fractional decrease in the fuel usage by the factory in question.