

Value Proposition

Team: Rolling Timber II

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The University of Idaho Steam Plant produces steam for heating and campus buildings and sidewalks, as well as chilled water from a lithium bromide system. Steam is primarily produced in a boiler burning sawmill waste known as hog fuel. As of 2018, the woodchip boiler consumes approximately \$1,000,000 per year in fuel. This is a significant savings over alternative fuels (e.g. natural gas), but could be further improved by implementation of a feedback control system to more efficiently supply fuel and combustion air. Currently excess fuel is supplied to the firebox of the boiler, and combustion air is used to regulate the temperature.

The fundamental problem of UI Steam Power Plant is that it can only give a rough estimate for fuel moisture content and fuel mass flow rate. The plant also lacks a system to measure the mass flow rate of air in the furnace system. Currently samples are taken and manually tested for moisture content and the mass flow of wood chips into the furnace is monitored by an employee watching with a camera. With our control system employees won't have to spend time manually monitoring these functions. As for the fuel mass flow, with our system fuel can be conserved and dispensed only when needed. Our system will save money by saving employee time as well as controlling the use of wood fuel.

Our design intends to solve the client's problem by implementing mass flow and moisture sensors for the wood fuel as well as mass flow sensors for airflow. With a wood fuel moisture and mass flow sensor array fuel dispensing can be controlled by a computer algorithm. This will free up employees time to complete other tasks saving the plant in labor costs. This wood fuel usage can also be recorded and saved to predict future usage or compare to past usage.

This control system design could also be sold to other wood fire boilers in the world. According to our client, Mr. Scott Smith, there is no wood-fired boiler which comprehensively implemented feedback control system in the world so far. Hence, if we can achieve the feedback control system to record and measure the primary fuel variables, it will become the breakthrough technique and can be sold as UI brand in the future.