

Design and Development of Far Infrared Specialty Coffee Roaster

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Throughout human civilization, coffee has long been consumed as a beverage, brewed from roasted and ground coffee beans taken from an evergreen tropical plant. Due to the micronutrients present in coffee, there are beneficial effects associated with its consumption. Coffee roasting is an important step in developing the aromatic and gustatory qualities of coffee beans using high temperatures. Specialty coffee has recently emerged as a market segment in coffee trade. In this study, a specialty coffee roaster with a far infrared heat source was designed and developed for energy efficiency and better quality roasted coffee beans. The roasting drum and stand of the coffee roaster as well as the control box were designed and developed, with the capacity to roast batches of 200 g to 500 g of coffee beans. Automation was done using Arduino. The pulse width modulation (PWM) method was used with 100%, 85%, 65%, and 50% duty cycles for heating 2000 W infrared heaters. From the results, 65% duty cycle was selected as the most efficient. The first crack can be heard at about 8 ± 2 minutes and the optimum roasting can be achieved in about 15 minutes.

Keywords: Coffee, Coffee roasting, Far infrared, Specialty coffee, Temperature profile

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