

Optimizing Design Parameters for Efficient Saturated Steam Production in Fire Tube Boilers: A Cost-Effective Approach

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Abstract : This research focuses on advancing fire tube boiler technology by systematically optimizing design parameters to achieve efficient saturated steam production. The main objective is to design a high-performance boiler with a production capacity of 2000kg/h at a 12-bar design pressure while minimizing costs. The methodology employs iterative analysis, utilizing relevant formulas, and considers material selection and production methods. The study successfully results in a boiler operating at 85.25% efficiency, with a fuel consumption rate of 140.37kg/hr and a heat output of 1610kW. Theoretical importance lies in balancing efficiency, safety considerations, and cost minimization. The research addresses key questions on parameter optimization, material choices, and safety-efficiency balance, contributing valuable insights to fire tube boiler design.

Keywords : safety consideration, efficiency, production methods, material selection

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