

ANALYSIS OF FLAME IMAGES IN GAS-FIRED FURNACES

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ABSTRACT

A promising architecture is proposed in this research work for evaluating gas-fired furnace flame combustion quality. The quality assessment is based on information on its fuel and oxidizer flow rate level which are the main ingredient for the combustion reaction. The relative composition of the two determines the overall quality of the combustion and a proper balance is needed for optimum combustion in order to avoid wasting expensive fuel or producing hazardous emissions.

The proposed system utilizes a combination of image processing and machine learning techniques integrated with artificial intelligence techniques in providing combustion status that is derived directly from the captured color images of the furnace flame. The proposed system performs all of its functional capabilities on both fuel and oxidizer automatically and provides results in seconds or near real-time.