PROJECT PROPOSAL

1.1 Background of the Study

Industrial gas burners are essential components in many thermal processing systems such as heat treatment, drying, baking, and metal fabrication. These burners operate by mixing air with fuel (usually LPG or natural gas) to produce a high-temperature flame for industrial applications (Singh & Jain, 2018). Their design, combustion control, and fuel economy directly impact the efficiency of industrial operations.

A two-face burner configuration introduces flame outputs on opposite sides, enabling simultaneous heating from both directions. This results in faster heat penetration, uniform temperature distribution, and higher productivity in operations like surface drying, metalworking, and baking (Kumar et al., 2020).

In many developing countries, including Nigeria, most industrial burners are imported. These units are expensive and sometimes incompatible with local fuel supply systems and usage conditions (Olabode et al., 2022). There is a growing need to fabricate locally designed, efficient, and cost-effective burners that meet specific industrial heating demands.

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1.2 Problem Statement

Industries in Nigeria often rely on imported industrial gas burners, which are expensive to acquire, operate, and maintain. Furthermore, the predominant use of single-face burners in many workshops and small-scale industries results in uneven heat distribution, energy inefficiency, and increased production time (Adeyemi & Owolabi, 2019). The lack of accessible, dual-face burners fabricated with local materials hinders the development of indigenous thermal technologies. There is a clear need for a robust, efficient, and affordable gas burner system designed for local conditions.

1.3 Aim of the Study

The aim of this study is to design and fabricate a two-face industrial gas burner using locally available materials, ensuring enhanced thermal performance, cost-efficiency, and durability suitable for industrial applications.

1.4 Objectives of the Study

The specific objectives of this study are to:

1. Study the fundamental components and working principles of industrial gas burners.

2. Design a two-face burner system using appropriate CAD tools.

3. Fabricate the burner using locally sourced materials such as mild steel and ceramic insulation.

4. Test and evaluate the burner's performance in terms of flame stability, efficiency, and durability.

5. Compare the fabricated burner’s performance with conventional single-face burners.

1.5 Justification of the Study

This study is justified by the need to reduce reliance on imported industrial equipment and to provide an affordable, efficient alternative for local industries. A two-face burner offers better heat distribution and reduces production time, which is beneficial in metal fabrication, baking, and thermal drying processes. Fabricating this burner locally also promotes skill development, supports indigenous innovation, and stimulates industrial growth.

1.6 Scope of the Study

This project focuses on the design, fabrication, and performance analysis of a two-face industrial gas burner. The scope includes the mechanical structure, gas flow system, ignition and combustion analysis, and performance comparison with existing burner designs. The study does not cover automation or advanced control systems.

1.7 Significance of the Study

The outcome of this study will provide a locally fabricated, cost effective, and efficient gas burner that industries can adopt for enhanced productivity. It will also serve as a learning model for engineering students, promote technological self reliance, and foster innovation in thermal equipment design in developing economies.