

HIGHER TECHNICAL INSTITUTE

**MECHANICAL ENGINEERING
COURSE**

DIPLOMA PROJECT

OIL BURNER

M/981

**BY:
PANTELIS CHARALAMBOUS**

2004

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HIGHER TECHNICAL INSTITUTE	PROJECT NO
	3525

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PANTELI CHARALAMBOUS

PROJECT REPORT

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in

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Dedicated to my wife
Evi and to my little
three years old girl Niki

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SUMMARY

This project discusses the various types of burners. It includes four objectives, which are:

1. To carry out a survey of domestic and commercial oil burners
2. To prepare a test rig for an oil burner
3. To commission and test the oil burner rig
4. To prepare a set of experiments

The first objective is accomplished in chapter 2 to chapter 6. The second and third objectives were made in laboratory which I explain the procedure that has been done in chapter 7. Finally in chapter 8 I prepare a set of experiments which is the last objective.

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INTRODUCTION

OIL BURNER

INTRODUCCION

A burner's purpose is to produce combustion – fire. The general idea of the burner is to create combustion using fluids. According to the dictionary, combustion is the union of oxygen with a substance, producing light (flame) and heat. In other words, it means the process of burning, during which heat is liberated. It can be said that the first burner developed is the fire place where we put wood (solid fuels) so that to produce combustion – fire and warm ourselves or the “furnace” in steam machines where they used wood to produce fire and rise up the temperature to produce steam.

However, as the technology is developing, solid fuels are avoided due to the problems of residue and ash disposal. In our days the large scale use of liquid and gaseous fuels, especially diesel, kerosene and gas in domestic use, oil with low density-viscosity in industrial and oils with high density-viscosity (heavier) in heavy industrial use.

Categories of Burners

There are three categories of burners:

1. Heavy Industrial burners
2. Industrial burners and
3. Domestic burners

For the beginning of this project we are going to see heavy industrial burners of Monis Power Station. It will help us understand easier smaller types of burners. Industrial and domestic burners are almost the same. The major difference between them is the power they produce. A domestic burner can give power between 30KW to 200KW, an industrial burner can give power from 150KW to 1GW, and Monis Power Station produces 30GW for each furnace which may consider small burners in heavy industry. Another difference between domestic and industrial burners is the quality of fuel they use. Also another difference that maybe said is the number of nozzles used, usually in industrial burners there are number of nozzles and at domestic maximum of two. Monis Power Station used six and Vasiliko Power Station uses nine which produce 120GW for each furnace.

There are many types of domestic and industrial burners. Some of them, which take their characteristic name from the way they prepare fuel for combustion and the manner in which they deliver the required quantity of air which is necessary for combustion, some of them are:

1. High – Pressure Gun –Type Burner

The name “high – pressure gun type burner” is due to the pump used to pick the oil and deliver it at a constant operating pressure to the nozzle, which in turn sprays the fuel.

As it is mentioned above the main characteristics of this kind of burner are two: the pump and the nozzle. Although there are also motors, fans, transformers and ignition assemblies.

High pressure gun type oil burner is one of the most popular kinds of burner.

2. Low – Pressure Gun – Type Atomizing Burner

This type of burner is almost the same with the high pressure gun type burner, although the principle of operation is the same. There are few differences where they make it unique. These are:

- a) Oil and air meet prior to leave the nozzle than at entering the firebox.
- b) Operating pressure is 20 times less than the high pressure burner
- c) Requirement of special type of burners

3. Commercial Oil Burner

Commercial burners are mainly used in industries due to lower quality of oil used. It can be said that they operate as high and as low pressure gun type burners due to the variety of operating pressures they use. The operating pressure is being controlled by a controller of pressure and a thermostat.

4. Rotary Burners

Rotary burners are separated into two categories: (a) Horizontal and (b) Vertical. This type of burner can use all quality of oils.

Horizontal:

The burner receives its name from the fact that it enters the boiler in horizontal plane (in the same manner as the gun type burners) and prepares the oil combustion by centrifugal force spinning it off a cup rotation.

Vertical:

It gets its name from the fact that it stands vertically within the boiler itself and produces a blue – yellow flame that burns as a ring the inner wall of the boiler or furnace.

5. Vaporizing (plot – type) Burners

They divide in to two groups: (a) natural and (b) forced draft type. The natural draft type burner is most widely used in dwellings where there is no application of central heating. They depend upon manual ignition and must be igniter by hand wherever their used is required. The size of the flame and the amount of oil consumed are controlled by a hand adjustment that regulates the flow of oil through a needle – valve – controller orifice.