

الآية

أَهُمْ يَقْسِمُونَ رَحْمَةَ رَبِّكَ نَحْنُ قَسَمْنَا بَيْنَهُمْ مَعِيشَتَهُمْ فِي الْحَيَاةِ الدُّنْيَا وَرَفَعْنَا
بَعْضَهُمْ فَوْقَ بَعْضٍ دَرَجَاتٍ لِيَتَّخِذَ بَعْضُهُمْ بَعْضًا سُخْرِيًّا وَرَحْمَةُ رَبِّكَ خَيْرٌ
مِمَّا يَجْمَعُونَ.

الزخرف (٣٢)

Dedication

This thesis dedicated with heartfelt condolences to our friend Nibrass Gedam who was quickly gone from our world, we ask Alla's mercy and forgiveness for him.

Acknowledgement

Foremost, I would like to express my sincere gratitude to Alla Bulk of his Majesty for the wisdom and perseverance that has been bestowed upon me during this research project, and indeed, throughout my life: "I can do everything through him because he gives me strength.

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Abstract

The efficiency of a heating appliance or application is dependent on the efficiency of the combustion process. Complete combustion with the appropriate flame is necessary to release the maximum amount of energy available. The efficiency of combustion is affected by the ratio of air to fuel, the degree of atomization of liquid fuels, the degree of air and fuel mixing that takes place in the combustion zone, the flame shape, temperature and speed. The setting of these variables requires skill and instrumentation.

The purpose of this study was to explore the effect of gas analyzer in Kenana boilers combustion efficiency to increase combustion efficiency reducing fuel consumption and improving boiler environment gases. In Kenana boilers all boilers running without gas analyzers in this case combustion control so difficult beside that is not possible to know boiler efficiency, so the study was showed Kenana combustion control and made new control depending upon gas analyzer. The result recommended installing gas analyzer for combustion control optimization.

المستخلص

كفاءة الأجهزة الحرارية تعتمد على كفاءة عملية الاحتراق. الاحتراق الكامل مع الشعلة المناسبة تمكن من الحصول على أعلى قدر من الطاقة المتاحة. تتأثر كفاءة الاحتراق بعدة عوامل منها نسبة الهواء إلى الوقود، درجة تدرية الوقود السائل، درجة الخلط بين الهواء والوقود في منطقة الاحتراق، شكل الهب، درجة الحرارة والسرعة. لتحديد هذه العوامل تتطلب مهارة وتحكم دقيق.

كان الغرض من هذه الدراسة هو استكشاف تأثير جهاز تحليل الغازات في كفاءة الاحتراق لمراجل شركة سكر كنانة لزيادة كفاءة الاحتراق، وتقليل استهلاك الوقود وتحسين البيئة لغازات المرجل. في مراجل كنانة كل المراجل تعمل دون محلل لغازات الاحتراق الأمر الذي يجعل عملية التحكم في الاحتراق صعبة وأيضاً لا يكمن معرفة كفاءة الاحتراق للمرجل ، لذلك أظهرت الدراسة مكونات التحكم في مراجل كنانة وعمل نظام تحكم جديد اعتماداً على جهاز تحليل الغازات. أوصت النتيجة بضرورة تركيب جهاز تحليل غازات العادم للحصول على تحكم امثل للاحتراق.

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List of Abbreviations

EPA	
TDLS	Tunable Diode Laser Gas Analyzer
SME	Society of Mechanical Engineers
EPA	Environmental Protection Agency
FBC	Fluidized bed combustion
LT	Level Transmitter
A.S	Air Supply
LIC	Level Indicating Controller
FD	Forced Draft
ID	Induced Drafr
PM	Particulate Matter
NO	Nitric Oxide
O3	Ozone
HNO3	dilute nitric acid
HCN	nitrogen cyanide
H2SO4	sulphuric acid
CaSO4	calcium sulfate
CaSO3	calcium sulfite
CuCl2	cuprous chloride
KOH	Potassium hydroxide
HCL	Hydrochloric Acid
USB	Universal Serial Bus
PC	Personal Computer
VFD	Variable Frequency Drive
I/O	Input/output
CPU	Core Processing Unit
RAM	Random Access Memory
NEMA	National Electrical Manufacturers Association
FGR	Flue Gas Recirculation
FPC	Federal Power Commission
MPPC	Metered Parallel Positioning Control
GHGMRR	Greenhouse Gas Mandatory Reporting Rule
PID	Proportional-Integral-Derivative

BTU	British Thermal Unit
BHP	Boiler Horsepower
ASME	American Society of Mechanical Engineers
PPM	Parts Per Million