شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

جامعة عين شمس
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MONA MAGHRABY

Cairo University

MODELING AND TEMPERATURE CONTROL OF A FURNACE PRODUCING IRON REDUCTION GASES

By

Mohamed El-Sayed Hassanin Shaban

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
Electrical Power and Machines Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
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Title of Thesis:

MODELING AND TEMPERATURE CONTROL OF A FURNACE PRODUCING IRON REDUCTION GASES

Key Words:
Midrex Reformer Furnace; Reformer Furnace Modeling; Reformer Furnace Temperature Control; PID Control

Summary:

In this thesis, we introduced a black-box Model for Midrex reformer in Idle operation mode. Idle operation mode is one of two operation modes that the bottom-fired reformer-box works on, while the other mode is the Reforming mode where production is going on. Natural gas-fired auxiliary burners maintain the reformer box temperature during plant Idle condition to minimize both restart time and thermal cycling of the reformer tubes. Further models are introduced for sensors and actuators used in the loop of the temperature controller. Finally, PID controller is used as the temperature controller to get the best performance and fast response that commonly used with such industrial applications.

Disclaimer

I declare the thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Mohamed El-Sayed Hassanin Shaban Date: .../.../ 2021

Signature:

Dedication

To my mother, the first one to believe that I will be an Engineer, and to my wife, the partner of success

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Firstly, I thank God for the chance to do the thesis in parallel with my job as an Electrical & Automation Section Head in the field of Steel industry. More specifically, I want to thank my parents, brothers, and my wife for support during this time.

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