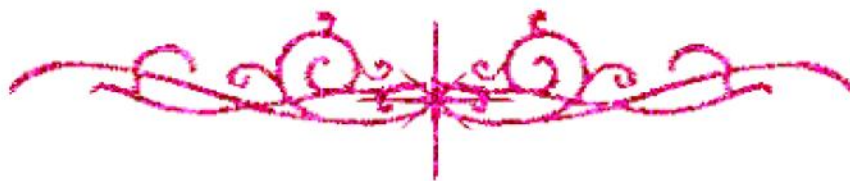


بسم الله الرحمن الرحيم





شبكة المعلومات الجامعية التوثيق الالكتروني والميكرو فيلم



جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

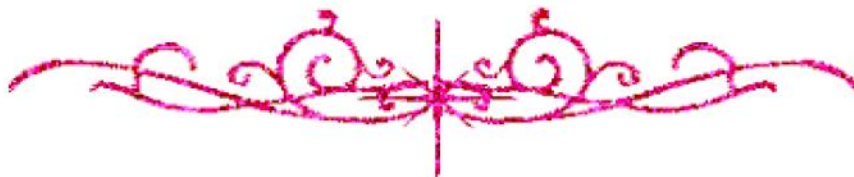
قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار





Ain Shams University
Faculty of Engineering
Mechanical Power Engineering Department

Improving the performance of rolling printing machine by monitoring and analyzing mechatronics systems

A Thesis Submitted in Partial Fulfillment for the Requirements
of the degree of master of science in mechanical Engineering

by

Haitham Abdel Monem Mostafa Badr
An engineer in the armed forces

Mohammed Abu Al-Aneen Al-Samnoudi
Professor
Mech. Power Engineering Dept.
Ain Shams University

Muhammad Ali Metwally
Assistant Professor
Mech. Power Engineering Dept.
the Military Technical College

Egypt , Cairo
2021

Curriculum Vitae

Name : Haitham Abdel Monem Mostafa Badr

Brith date : 29/4/1983

Degree :Bachelor's degree in Mechanical Engineering for
the year 2005 from the Military Technical College

Current job : An engineer in the armed forces

Statement

This thesis is submitted in fractional satisfaction for the degree of master of science in mechanical power engineering to the faculty of engineering ain shams university .

The work remembered for this postulation was completed by the creator primarily at the laboratories of the mechanical power department faculty of engineering ain shams university .

no piece of this thesis has been submitted for a degree or capability at some other college .

Signature

Haitham Abdel Monem Mostafa Badr

Date : / /

Board of supervisors

The undersigned certify that they have read and recommended to the faculty of engineering ain shams university for acceptance a thesis entitled (Improving the performance of rolling printing machine by monitoring and analyzing mechatronics systems) submitted by Haitham Abdel Monem Mostafa Badr in fractional satisfaction for the necessities of the degree of master of science in mechanical engineering.

Supervisory Board:

1-Prof / Muhammad Abu Al-Enin Mahmoud Al-Samnoudi
Department of power mechanical engineering
Engineering Faculty, The university of Aen Shams

2- Assistant Professor / Mohamed Ali Metwally
Department of power mechanical engineering
Military Technical College

Date \ \

Examiners committee

the undersigned certify that they have read and recommended to the faculty of engineering ain shams university for acceptance a thesis entitled (Improving the performance of rolling printing machine by monitoring and analyzing mechatronics systems)submitted by Haitham Abdel Monem Mostafa Badr in fractional satisfaction for the necessities of the degree of master of science in mechanical engineering .

Supervisory Board:

- | | |
|--|---------------------------------|
| 1-Prof / Ibrahim Saleh Mustafa | () |
| 2-Prof / George Nubar Simonyan | () |
| 3-Prof / Muhammad Abu Al-Enin Mahmoud Al-Samnoudi | () |
| 4-Assistant Professor / Mohamed Ali Metwally | () |

Date 3\ 3 \2021

ABSTRACT

The research is directed towards the work of modification and development of the poster printing machines that operate with Inkjet by increasing the speed of the poster printing machine without prejudice to the required print quality, which is the main factor in the market. Because the quality of printing is the basis for the customer's drive and speed is an important factor for the printing organization in order to save time and provide the largest quantity of production with the highest quality, and through it. it will return to the printing establishment by several factors, namely:

- 1- Save time by producing the largest quantity in the least time.
- 2- Providing manpower for the printing establishment.
- 3- Providing the additional requirements to save electricity and other factors.

The purpose of this analysis effect of pressure inside the ink tanks on increasing the print accuracy (print quality) with the printer head steady. , Also to find what is the permissible critical range for increasing the pressure that will increase the speed of printing with permissible accuracy this phenomenon will be validated by :

- 1-Mathematical Model (Droplet Formation Model - Nozzle Dynamics Model) .
- 2- Coupling of Nozzle Dynamics and Droplet Formation .
- 3- prediction by CFD modelling .
- 4- Influence Of Pressure And Media Speed On Printing Quality.

It is possible to increase the production process for banner printing by fixing the machine speed at 5 m/h and increasing the pressure with a maximum of 0.38 bar because after that there was a clear defect in the printing process .

It can save time and increase production without compromising the quality of the printed product.

The prediction by CFD modelling was adequately able to predict the formation and development of an ink droplet ejected from the printhead of an inkjet printer.

Relationship between the different effect of pressure and the variable speed of the print head and their relationship to the print quality.

And we also find that it is possible to reach the maximum degree of printing accuracy after controlling the pressure and speed of the print head.

keywords :

poster printing machines- Inkjet - print quality - Printing heads - Continuous inkjet - Drop-on-demand .

Acknowledgment

I might want to offer my thanks to my scholarly advisors Prof/ Muhammad Abu Al-Enin Mahmoud Al-Samnoudi and Assistant Professor/Mohamed Ali Metwally for their direction and inspiration during this examination .

I would like to thank all the members of the renewable energy system simulation lab , I would like to express the deepest appreciation to my committee members for their inspirational instruction and guidance supported by an engagement in comparative literature and modern technology without their guidance and persistent help I could not complete this dissertation.

Finally I sincerely thank my wife and my family and especially my parents deserve all the encouragement in carrying out this work.

CONTENTS

Curriculum Vitae	II
Statement	IV
Board of supervisors	V
Examiners committee	VI
Abstract	VII
Acknowledgment	VIII
contents	IX
List OF figures	XI
 CHAPTER 1.INTRODUCTION.....	 1
1-1:PRINTING INNOVATIONS.....	1
1-2:Meaning of the Most Significant Terms Connection to Printing Innovation.....	1
1-3:Print Quality (Shading/Shading Hypothesis).....	8
1-4:Color Picture Structure (Shading Generation).....	37
1-5:Color Partition.....	43
1-6 : The Shading Dark.....	53
1-7 : Halftone Screening.....	59
1-8 : Screening of Shading Divisions.....	62
1-9 : Speck Shapes.....	66
1-10 :Advanced Screening.....	73
 CHAPTER 2. LITERATURE REVIEW.....	 81
2.1 INTRODUCTION.....	83
2.2 The effect of ink pressure on printing units.....	84
2.3 The effect of ink pressure on printing units.....	84
2.4 Previous studies	85
2.5 The Thesis Objectives.....	95
 Chapter3. Numerical Analysis Of ink Droplet Formation...	 98
3.2 Mathematical Model.....	100
3.2.1 Droplet Formation Model.....	100
3.2.2 Nozzle Dynamics Model.....	102
3-2-3 : Dynamic model results and discussion.....	106
3.2.4 Coupling of Nozzle Dynamics and Droplet Formation.	106
3.2.5 : Numerical analysis results and discussion.....	109

3.3 Simulation of print head nozzle droplet.....	110
3-3-1:Introduction.....	110
3-3-2:computational domain set up.....	110
3-3-3 Drop ejection without effect of pressure.....	113
3-3-4 Drop ejection with effect of pressure.....	114
3-3-5: Fluid flow model result discussion.....	121
Chapter 4. Influence Of PressureAndMedia Speed On Printing Quality.....	123
4.1. Introduction.....	125
4.2:experiment work.....	129
4-2-1:The first experimnt.....	130
4-2-1:The second experience.....	132
4-2-3:The third experience.....	136
Chapter 5. Conclusions & Recommendations for Future Work...	143
5.1. Conclusions.....	147
5.2. Recommendations for Future Work.....	148
References.....	149
appendix (a)	161

LIST OF FIGURES

fig(1 . 1) Creation stream (work process), material and information stream for the creation of printed items	Statement	6
Fig.(1-2) Print innovations and creation stream for multicolored printed item.....		7
Fig (1.3) Synchronous complexity. Case of the visible view of a shading change in an indistinguishable dark tone because of the encompassing hue.....		10
Fig.(1.4) Added substance shading blending of the fundamental hues red, green, blue.....		12
Fig. (1.5) Square graph/model for shading observation and the colorimetric depiction of hues.....		13
Fig. (1.6) Noticeable range in the range of electromagnetic waves		
Fig. (1.7) Autotypical multicolor printing (infinitesimal photograph of a print image section).....		13
Fig. (1.8) Radiation dissemination of the perfect dark body.....		15
Fig. (1.9) Standard shading coordinating capacities.....		19
Fig.(1.12) CIE LUV shading space.....		19
Fig. (1.13) CIE LAB shading space (cross area of the shading		23
Fig. (1.14) CIE LAB shading circle.....		23
Fig. (1.15) CIE LAB shading strong		28
Fig. (1.16) CIE LAB shading circle with chromatic worth C^* and tone point h^*		28
Fig.(1.17) Otherworldly force conveyance as a "unique mark" on the case of two hues An and B (at the equivalent optical thickness		29
Fig. (1.18) Essential structure of a shading estimating gadget.....		29
Fig. (1.19) Estimation of shading thickness (optical thickness) by densitometry (estimation strategy).....		31
Fig. (1.20) Spectrometer principles for measuring spectral reflectance factors		36
Fig. (1.21) Photoelectric colorimeter; optical separating with tristimulus channels		36
Fig. (1.22) Shading extents in the CIE LAB framework for various propagation forms.		38
Fig. (1.23) Auto run of the mill multi color printing.....		44

Fig. (1.23) Shading detachments and overprinting for proliferation in four-shading counterbalance printing.....	45
Fig. (1.25) Unearthly circulation.....	48
Fig. (1-26) Shading areas of essential hues.....	48
Fig. (1.27) Phantom dispersion.....	52
Fig. (1.28) Commonplace instances of shading estimation patches	53
Fig. (1.29) Instances of deciding the shading division for dark.....	55
Fig. (1.30) Perceivability of streak assembly for the visible impression of natural eye in typical perception separation..	64
Fig. (1.31) Obstruction impact.....	65
Fig. (1.32) Rosette development in screened multi color print .	65
Fig. (1.33) Continuous-tone output.....	68
Fig.(1.34) Correlation of AM screening and FM.....	68
Fig. (1.35) Detail of a shading photo (contone).....	69
Fig.(1.36) Spatial tone esteem degree.....	69
Fig.(1.37) Crossover screening: a mix of AM and FM screening	71
Fig. (1.38) Speck structures for the propagation of tone esteems	72
Fig. (1.39) Optical thickness regulation by changing the ink film thickness.....	72
Fig. (1.40) Advanced spot structure.....	75
Fig. (1.41) Computerized screen structure.....	78
Fig. (1.42) Correlation of plentifulness adjusted (AM) screening with recurrence balanced (FM) screening.....	78
fig(1.43) Connection between's screen administering, addressability and dim qualities on account of computerized screening and picture structure.....	79
Fig. (3.1) uniform mesh of droplet formation.....	104
Fig. (3.2) Schematic of droplet breakup.....	105
Fig. (3.3) Relationship between point size and pressure.....	105
Fig. (3.4) Strategy of droplet combination.....	106
Fig. (3.5) Point shape during formation with different pressure	107
Fig. (3.6) The effect of the ink point shape with time	109