

**DEVELOPMENT AND PERFORMANCE EVALUATION OF A STREET  
SWEEPING MACHINE**

**By**

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DEPARTMENT OF MECHANICAL ENGINEERING, COLLEGE OF  
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**NOVEMBER, 2016**

**ACCEPTANCE**

- I. This is to attest that this dissertation is accepted in partial fulfillment of the requirements for the award of the degree of **Master of Engineering** in the Department of **Mechanical Engineering**, College of Engineering, Covenant University, Ota

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## **DECLARATION**

I, **ADEBESIN, Akeem Adekunle**, (14PCM00715), declare that this research was carried out by me under the supervision of **Prof. F.A. Oyawale** of the Department of Mechanical Engineering, Covenant University, Ota. I attest that the Dissertation as not been presented either wholly or partly for the award of any degree elsewhere. All sources of data and scholarly information used in this thesis are duly acknowledged.

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## CERTIFICATION

We certify that the thesis titled “Development and Performance Evaluation of a Street Sweeping Machine” is an original work carried out by ADEBESIN Akeem Adekunle, (14CM00715), in the Department of Mechanical Engineering, College of Science and Technology, Covenant University, Ota, Ogun State, Nigeria, under the supervision of Prof. F.A. Oyawale. We have examined and found the work acceptable for the award of a degree of Master of Engineering in Industrial/ Manufacturing Option.

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## **DEDICATION**

To the Everlasting God, my saviour, defender and provider. To Him alone be all the glory, praise and adoration.

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## ABSTRACT

Street sweeping using local brooms and parkers are laborious and time consuming and street sweepers are always under stresses and extreme body pains during and after work. This study therefore was aimed at creating a system for effective sweeping while minimizing associated bodily stress. A machine that simulates the traditional method of sweeping was developed and produced using locally sourced raw materials like bristles, teflon, mild steel; these materials were subjected to different common manufacturing processes and techniques. The sweeping action was achieved by principle of a portable gasoline petrol engine with shaft drive. As the rotational drive of the gasoline engine was converted to linear motion via the sprocket and chain arrangement which in turn rotates a secondary shaft with bearing attachment unto an attached portable gear box which converts the linear drive into rotary movement of the bristles dressed teflon drum for the required sweeping action. The results of the performance tests carried out showed that the machine sweeping efficiency increased with the increase in the energy input and speed thus its sweeping capacity was determined using Microsoft excel ®. The comparison between the developed mechanical street sweepers using gasoline engine (5.5h.p & 7.5h.p) and hand- held broom (common sweeping method) being carried out by men and women sweepers on street and major roads, depicts the variance in time taken, swept area output energy and their corresponding efficiencies. The results of this study were analyzed; we conclude that there was a significant difference in efficiencies of the machine developed and sweeping.

**Keywords:** machine speed, wastes, sweeper, sweeping efficiency,



## TABLE OF CONTENTS

Title page .....	i
Acceptance page .....	ii
Declaration.....	iii
Certification.....	iv
Dedication.....	v
Acknowledgements.....	vi
Table of contents.....	vii
List of tables.....	viii
List of figures.....	ix
List of plates .....	x
List of symbols .....	xi
List of appendices.....	xii
Abstract.....	xiii

### CHAPTER ONE

INTRODUCTION.....	1
1.0 Background Information.....	1
1.1 Statement of the Problem.....	10
1.2 Aim of the Study.....	10
1.3 Objectives of the Study.....	10
1.4 Scope of the Project.....	11
1.5 Delimitation.....	11

### CHAPTER TWO

2.0 LITERATURE REVIEW.....	12
2.1 Technological advancement.....	13
2.2 Classification of street wastes.....	21

2.3	Nigerian Road Network .....	21
2.3.1	Ergonomics and Functional Requirements.....	23
2.3.2	Bending/Tilting Position.....	24
2.3.3	Anthropometrics.....	26
2.3.4	Hand and Wrist Problems.....	26
2.3.5	The Risk Factors.....	29
2.3.6	Safety Design.....	29
2.3.7	The Sweeping Task.....	30
2.4	Street Sweeping Pickup Performance.....	32
2.4.1	Potential Constraints/ Problems.....	32
2.5	Focus of this Work.....	34
 <b>CHAPTER THREE</b>		
3.0	MATERIALS AND METHODS.....	35
3.1	Materials.....	35
3.2	Design Characteristics.....	36
3.2.1	Human factor.....	36
3.3	Design criteria.....	37
3.3.1	Design of machine components and analysis.....	38
3.3.2	Machine power requirements.....	38
3.3.3	The Chain Drive.....	39
3.3.4	Shaft diameter.....	39
3.3.5	Bearings and Lubrication.....	41
3.3.6	Torsional Effect.....	42
3.3.7	Power transmitted by the rotating shaft subassembly.....	43
3.3.8	Shaft Principal Dimension and simulation Program.....	47

3.3.9	Machine Description.....	47
3.4	Principal Dimensions/ Specifications.....	48
3.5	Design for Assembly and Dis- assembly.....	48
3.5.1	Sweeping Head.....	48
3.5.2	Waste bucket/Collector.....	49
3.5.3	Steering lever.....	49
3.5.4	The hand lever.....	50
3.5.5	Engine seat/ base.....	50
3.5.6	Wheels.....	51
3.5.7	Sweeping Brushes Assembly.....	51
3.6	Tephlon Drum Design And Indexing Calculations.....	51
3.7	Construction Procedure.....	52
3.8	Controlled Sweeper Pickup Performance Testing.....	53
3.9	General Information of the studied Institution.....	54
3.9.1	The Pilot Tests Survey.....	54
3.9.2	General Aspects.....	55
3.9.3	Timing and Methodology.....	56
3.9.4	Engineering Material.....	57

#### **CHAPTER FOUR**

4.0	RESULTS AND DISCUSSION.....	59
4.1	Simulated Results using Microsoft Excel.....	63
4.2	Discussion.....	67

#### **CHAPTER FIVE**

	CONCLUSION AND RECOMMENDATIONS.....	68
5.1	Conclusion.....	68

5.2	Recommendations.....	68
5.3	Contributions to knowledge.....	68
	References.....	70
	Appendix.....	73

## LIST OF TABLES

Table 1:	$K_b$ and $K_t$ values for rotating shafts.....	28
Table 2:	Construction Details of Machine Elements for Street Sweeping Machine .....	53
Table 3:	Bill of Engineering Materials and Evaluation .....	57
Table 4:	Values of 7.5h.P Gasoline Engine.....	59
Table 5:	Values of 5.5 HP gasoline engine.....	61

## LIST OF FIGURES

Fig 1:	Sweeping Machine Concept Flow Chart.....	3
Fig 2:	Chart from the Measure of Man.....	26
Fig 3:	User Centered Design: The sweeping machine, the user, and the task Characteristics.....	37
Fig 4:	Typical shaft loading deflection.....	41
Fig 5:	Shaft twisting effect.....	42
Fig 6:	Maximum Bending Moment on Shaft.....	43
Fig 7:	Bending Moment on Shaft.....	44
Fig 8:	Bending Moment on Shaft.....	44
Fig 9:	Share Force and Bending Moment .....	46
Fig 10:	Swept Area against Energy Consumed.....	63
Fig 11:	Swept Area against time taken.....	64
Fig 12:	Swept Area against Energy consumed .....	65
Fig 13:	Swept Area against Time taken.....	66

## LIST OF PLATES

Plate 1:	Newer Mechanical Street Sweeper in Ohio.....	9
Plate 2:	Walk behind street sweeper is used to clean a sidewalk alongside pedestrians.....	9
Plate 3:	Green Star Mechanical Sweeper Taipei Port 2012 .....	10
Plate 4:	Grader-style vehicle using sweeper.....	10
Plate 5:	Elgin Mega wind.....	11
Plate 6:	Vegetable oil powered vacuum cleaner truck - "leaf vacuum .....	11
Plate 7:	Ogun State Ministry of Environment Street Sweeper.....	12
Plate 8:	Picture taken along Sango/ Covenant University route.....	15
Plate 9:	Picture taken along Sango/ Covenant University route.....	17
Plate 10:	Shaft bracket arrangement .....	30
Plate 11:	Sweeping Head.....	36
Plate 12:	Waste Bucket/Collector.....	37
Plate 13:	Stirring Lever.....	37
Plate 14:	Engine seat/ base.....	38
Plate 15:	Indexed Tephlon Arrangement.....	39
Plate 16:	Sweeping Characteristics: Swept area, Time taken and Machine Efficiency Street Sweeping in Covenant University.....	42
Plate 17:	Determining the speed of the engine in rpm using tachometer.....	44
Plate 18:	CNC Programming.....	59
Plate 19:	Tachometer.....	60
Plate 20:	Indexed Machining Operation.....	61
Plate 21:	Indexed Teflon Material.....	61

## LIST OF SYMBOLS

t.....	time
P.....	Pressure
r.....	Radius
$\pi$ .....	phi
V.....	Volume
K.....	Load stress factor
$\Sigma$ .....	Summation
$\mu$ .....	Miu
P.....	Power
$\sigma$ .....	Stress
A.....	Area
m.....	Metre
$\tau$ .....	Torsional Shear stress
T.....	Torque
".....	Inches
N.....	Number of turns
$^{\circ}$ .....	Degree
$S_n$ .....	Endurance Strength
E.....	Efficiency
h.p.....	Horse power



## LIST OF APPENDICES

1	Detailed View of Machine Components.....	89
2	Isometric view of the street sweeping machine.....	89
3	Exploded view of street sweeping machine.....	89
4	Orthographic view of the street sweeping machine.....	90

