

SIMULATION AND ANALYSIS DRAG AND LIFT COEFFICIENT BETWEEN  
SEDAN AND HATCHBACK CAR

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for the award of the degree of  
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**SUPERVISOR'S DECLARATION**

I hereby declare that I have checked this project and in my opinion, this project is adequate in terms of scope and quality for the award of the degree of Bachelor of Mechanical Engineering with Manufacturing Engineering.

Signature :  
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Date : 20 November 2009

**STUDENT'S DECLARATION**

I hereby declare that the work in this project is my own except for quotations and summaries which have been duly acknowledged. The project has not been accepted for any degree and is not concurrently submitted for award of other degree.

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**Dedicated to my beloved parents**

**Mr. Salleh Bin Ahmad**

**Mrs. Fatimah Binti Ahmad**

**And**

**All my sisters and brothers**

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## **ABSTRACT**

This thesis presents research about the difference coefficients barriers and lift coefficients for two basic design types of sedan and hatchback cars. The objective of

this thesis is to identify drag and lift coefficient.. Process simulation and analysis for both the model design was conducted with computer-aided drawing software and analyzed using software COSMOSFloworks. From the results of coefficients can be concluded that barriers and lift coefficients for both types of design is different. Restriction coefficient and lift coefficient for the hatchback design is much lower than the sedan design. This means that the hatchback design is more efficient and aerodynamics value is higher. This assessment and differences between the two designs is very meaningful for determining the design of more efficient designs in the car now. Results also able to enhance the security features on the car at once can reduce fuel consumption used. Results are also able to improve the design of the car in early development in the future.

## ABSTRAK

Tesis ini membentangkan penyelidikan berkenaan perbezaan pekali hambatan dan pekali angkat bagi dua jenis rekabentuk asas kereta iaitu sedan dan hatchback. Objektif tesis ini ialah mengenalpasti pekali hambatan dan pekali angkat. Proses simulasi dan analisis bagi kedua-dua model rekabentuk ini dijalankan dengan perisian lukisan bantuan komputer dan dianalisis menggunakan perisian COSMOSFloworks. Dari hasil keputusan dapat disimpulkan bahawa pekali hambatan dan pekali angkat bagi kedua-dua jenis rekabentuk ini adalah berbeza. Pekali hambatan dan pekali angkat bagi rekabentuk hatchback adalah lebih rendah berbanding rekabentuk sedan. Ini bermakna rekabentuk hatchback adalah lebih efisien dan nilai aerodinamiknya lebih tinggi. Keputusan penilaian dan perbezaan antara kedua-dua rekabentuk ini amat bermakna bagi menentukan rekaan yang lebih efisien dalam rekabentuk kereta sekarang. Keputusan juga berupaya meningkatkan lagi ciri-ciri keselamatan pada kereta sekaligus dapat mengurangkan penggunaan bahan api yang digunakan. Keputusan ini juga berupaya memperbaiki rekabentuk kereta tersebut di awal pembangunan pada masa hadapan.

## TABLE OF CONTENTS

	<b>Page</b>
<b>SUPERVISOR’S DECLARATION</b>	ii
<b>STUDENT’S DECLARATION</b>	iii
<b>DEDICATION</b>	iv
<b>ACKNOWLEDGEMENTS</b>	v
<b>ABSTRACT</b>	vi
<b>ABSTRAK</b>	vii
<b>TABLE OF CONTENTS</b>	viii
<b>LIST OF TABLES</b>	xi
<b>LIST OF FIGURES</b>	xiii
<b>LIST OF SYMBOLS</b>	xv
<b>LIST OF ABBREVIATIONS</b>	xvi
<b>CHAPTER 1 INTRODUCTION</b>	
1.1 Project Background	1
1.2 Project Problem Statement	1
1.3 Project Objective	1
1.4 Project Scope of Work	2
1.5 Summary	2
<b>CHAPTER 2 FUNDAMENTAL OF AERODYNAMICS</b>	
2.1 Theory of Aerodynamics	3
2.1.1 Bernoulli’s Equation	3
2.1.2 Pressure, Lift and Drag Coefficient	4
2.1.2.1 Pressure Coefficient	5



2.1.2.2	Drag Coefficient	6
2.1.2.3	Lift Coefficient	7
2.1.3	Boundary Layer	8
2.1.4	Separation Flow	9
2.1.5	Shape Dependence	10
2.2	Road Vehicles Aerodynamics	11
2.2.1	History of Road Vehicles	12
2.2.2	Relative of Aerodynamics on Passenger Car	15
2.2.3	Detailed Surface Flow on Car's Body	19
2.2.4	Pressure Distribution for Car's Body	20
2.3	Introduction of Computational Fluid Dynamics (CFD)	21
2.3.1	CFD as a Tool for Aerodynamics Simulation	21
2.3.2	Equation Solved by CFD	22
2.3.3	Basic Steps of CFD Computation	23
2.3.4	Surface Mesh Generation in CFD	24
2.3.4.1	Refinement of Thin Areas	24

### **CHAPTER 3 PROJECT METHODOLOGY**

3.1	Introduction	27
3.2	Methodology of Flow Chart	27
3.3	Literature Review	29
3.3	CAD Modelling	29
3.4	Analysis	30
3.4.1	Refinement	32
3.4.2	frontal Area Measuring	32
3.5	Presentation and Documentation	33
3.6	Summary	34

## **CHAPTER 4      RESULT AND DISCUSSION**

4.1	Data Collecting	35
	4.1.1      Data of Various Velocities and Drag Forces	35
	4.1.2      Value of Projected Area	39
4.2	Data Analysis	40
	4.2.1      Calculation of Drag and Lift Coefficient	40
	4.2.2      Sample Calculation for Drag and Lift Coefficient	41
	4.2.3      Average of Drag ad Lift Coefficient for Various of Velocity	42
4.3	Countour Plot of Velocity and Pressure	43
4.4	Trajectories Velocity Flow Analysis	48

## **CHAPTER 5      CONCLUSION AND FUTURE RECOMMENDATIONS**

5.1	Introduction	51
5.2	Conclusion	51
5.3	Future Recommendation	52

<b>REFERENCES</b>	53
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<b>APPENDICES</b>	54
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A	Gantt Chart
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**LIST OF TABLES**

<b>Table No.</b>	<b>Title</b>	<b>Page</b>
2.1	Typical Values of Pressure Coefficient, $C_p$	6
4.1	Table of Various Velocities, Drag forces, drag Coefficient, Lift Force and Lift Coefficient for Sedan car.	35
4.2	Table of Various Velocities, Drag forces, drag Coefficient, Lift Force and Lift Coefficient for Hatchback car.	36
4.3	Table of Average drag and lift coefficient for Sedan Car	42
4.4	Table of Average drag and lift coefficient for Hatchback Car	43

## LIST OF FIGURES

<b>Figure No.</b>	<b>Title</b>	<b>Page</b>
2.1	Drag and lift force due to pressure from velocity distribution	4
2.2	Pressure distributions on the surface of an automobile	8
2.3	Variation of boundary layer thickness along flat plate	9
2.4	Schematic of velocity profile around a rear end	9
2.5	The relationship frontal area on vehicle body against the normal flow of velocity	10
2.6	The influence of drag coefficients on velocity and spent power on road	11
2.7	The concept of car is influenced by many requirements of very difference nature	12
2.8	The early attempts to apply aerodynamic to road vehicle consisted of the direct transfer of shapes originating from aeronautical and marine practice	13
2.9	Klemperer recognized the flow over body revolution	14
2.10	The drag history of cars using a logarithmic scale for drag emphasizes how difficult it is achieve very low drag values	15
2.11	Breakdown of drag according to the locations of generation	16
2.12	Ahmed body view	17
2.13	Development of the flow for the 25° and 35° slant angle.	17
2.14	The relative velocity of air and pressure condition over the upper profile of a moving car	18
2.15	Flow around a car, and major of locations of flow separation	19
2.16	Pressure Coefficient Distribution over an automobile shape	20
2.17	The 3D-hybrid grid	24
2.18	Flow analysis after a design study (path lines)	24

2.19	Fluid cell refinements due to the Cell Mating rule	25
3.1	Flowchart of the Overall Methodology	28
3.2	The Sample of Sedan car dimension	30
3.3	The Sample of Hatchback car in Solidwork type.	30
3.4	The Sample of Hatchback car in Solidwork type	31
3.5	Boundary Condition of CFD analysis	32
3.6	The frontal area projected of CAD model	33
4.1	Frontal Area from the Simulation	40
4.2	The contour plot of velocity for the ranging velocity's analysis for sedan car.	44
4.3	The contour plot of pressure for the ranging pressure's analysis for sedan car.	45
4.4	The contour plot of velocity for the ranging velocity's analysis for hatchback car.	46
4.5	The contour plot of pressure for the ranging pressure's analysis for hatchback car.	47
4.6	The isometric view of trajectories pressure flow of 40 km/h for sedan car.	49
4.7	The isometric view of trajectories pressure flow of 40 km/h for hatchback car.	49

**LIST OF SYMBOLS**

$C_D$	Drag Coefficient
$C_L$	Lift Coefficient
$F_L$	Lift Force
$F_D$	Drag Force
$C_p$	Pressure Coefficient
$D_f$	Friction Drag
$b$	Width
$l$	Length

**LIST OF ABBREVIATIONS**

CAD	Computer-aided drafting
CAE	Computer-aided engineering
FE	Finite element
RANS	Reynolds-averaged Navier –Stokes equation
DNS	Direct numerical simulation

