

**UNIVERSITI TEKNOLOGI MARA**

**AERODYNAMICS OF LOW ASPECT  
RATIO BLENDED WING-BODY  
AIRCRAFT**

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## **ABSTRACT**

Blended wing-body (BWB) is a concept with promising future. Many studies have been conducted on blended wing-body concept, each with different ideas and designs. The search of the perfect BWB design is still on going around the world with the hope of applying the design to the conventional aviation industries. This research work focuses on study and development a blended wing-body aircraft under the name of Baseline-IX. Baseline-IX BWB aircraft design is somewhere in the middle between a blended wing-body and a fixed-wing. The design is influenced of requirement of having a nose forward mounted mission camera and provision to carry large batteries in its fuselage with only a wingspan under 2.0 meters. Baseline-IX is designed to provide good longitudinal stability with high lift-to-drag ratio. Aerodynamic characteristics of Baseline-IX is investigated and validated through wind tunnel experiments and numerical computational. Experimental investigation with a scaled down model of Baseline-IX is conducted at 36m/s in LST-1 wind tunnel at FTTC laboratory. Simulations were done using VSPAERO software with a scaled down and prototype model of Baseline-IX. Aerodynamic characteristics between wind tunnel experiment and CFD simulations shows no significant difference between both results of lift coefficient, drag coefficient and drag polar that were plotted of scaled down 1:2.4 model of Baseline-IX. Maximum lift-to-drag ratio obtained through this study for Baseline-IX 1:2.4 scaled model and 1:1 prototype is 18.06 and 25.12 respectively. Baseline-IX BWB has good aerodynamic characteristics and longitudinal stability despite its basic design. Promising performance are predicted for Baseline-IX BWB throughout its improvement processes.

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To my two boys; Fattah and Affan,; Sky is not the limit. Reach beyond.

# TABLE OF CONTENTS

	<b>Page</b>
<b>CONFIRMATION BY PANEL OF EXAMINERS</b>	<b>ii</b>
<b>AUTHOR'S DECLARATION</b>	<b>iii</b>
<b>ABSTRACT</b>	<b>iv</b>
<b>ACKNOWLEDGEMENT</b>	<b>v</b>
<b>TABLE OF CONTENTS</b>	<b>vi</b>
<b>LIST OF TABLES</b>	<b>ix</b>
<b>LIST OF FIGURES</b>	<b>x</b>
<b>LIST OF PLATES</b>	<b>xiv</b>
<b>LIST OF SYMBOLS</b>	<b>xv</b>
<b>LIST OF ABBREVIATIONS</b>	<b>xvi</b>
<b>CHAPTER ONE : INTRODUCTION</b>	<b>1</b>
1.1 Research Background	1
1.2 Motivation	1
1.3 Problem Statement	2
1.4 Research Questions	3
1.5 Objectives	3
1.6 Scope of Work	3
1.7 Hypothesis	4
<b>CHAPTER TWO : LITERATURE REVIEW</b>	<b>6</b>
2.1 Preamble	6
2.2 Previous Studies on Blended Wing-Body	7
2.3 Baseline Evolution in Universiti Teknologi Mara	10
2.4 Wind Tunnel Experiment	15
2.5 Panel Method Numerical Computational	18
<b>CHAPTER THREE : RESEARCH METHODOLOGY</b>	<b>20</b>
3.1 Research Area	20

3.1.1	Research Methodology	20
3.1.1	Baseline-IX BWB Design Phase	22
3.1.2	Baseline-IX Numerical Computational Simulation using VSPAERO	25
3.1.3	Wind Tunnel Model Fabrication	35
3.1.4	Baseline-IX Wind Tunnel Experiment	40
3.1.5	Baseline-IX Tuft Visualization Experiment	45
3.2	Basic Aerodynamic Coefficients Numerical Analysis	47
3.2.1	Relationship between pitch moment coefficient and lift coefficient	49
<b>CHAPTER FOUR : RESULTS AND DISCUSSION</b>		<b>52</b>
4.1	Introduction	52
4.2	Baseline-IX BWB Wind Tunnel and VSPAERO results	52
4.2.1	Lift Coefficient versus Angle of Attack	56
4.2.2	Drag Coefficient versus Angle of Attack	59
4.2.3	Drag Coefficient versus Lift Coefficient	60
4.2.4	Pitch Moment Coefficient versus Lift Coefficient	63
4.2.5	Lift to Drag Ratio ( $C_L/C_D$ ) versus Angle of Attack ( $\alpha$ )	67
4.3	Wind Tunnel Accuracy	69
4.4	VSPAERO Simulation Pressure Contour Results	70
4.4.1	1:24 Scaled Down of Baseline-IX BWB Pressure Contour	70
4.4.2	Baseline-IX BWB Prototype Pressure Contour	75
4.5	Baseline-IX 1 :2.4 Scaled Model Wind Tunnel Tuft Visualization	79
<b>CHAPTER FIVE : CONCLUSION</b>		<b>84</b>
5.1	Baseline-IX Aerodynamic Coefficients	84
5.2	Baseline-IX versus Baseline-V	85
5.3	Recommendations	86