



## ACKNOWLEDGEMENT

### AERODYNAMICS OF MICRO AERIAL VEHICLE (MAV)

Alhamdulillah, with the blessing of Allah, we had succeeded in completing this final project course.

First and foremost, we would like to thank our advisor, En. Mohamad as our advisor for giving us guidance during the project. All of his efforts and moral supports in helping us will be appreciated and remembered. We would also like to thank the Diploma Student (DMM111), Nazri and Rozlan for helping us in building the aircraft and solved many problems.

A thesis submitted in partial fulfillment of the requirement for the award of Bachelor of Engineering (Hons) (Mechanical) and lab technicians, En. Karim and En. Abu. Thanks to them for spending their time in helping us doing some experiments and other things.

Last but not least, a special thanks to our dearest friends and beloved parents for giving supports and commitments in order to make this project come true.

**Faculty of Mechanical Engineering  
University Technology MARA (UiTM)**

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All the very best for those who have contributed tremendously towards the success of this final project especially Runaway 99 staffs and lab technicians, En. Karim and En. Abu. Thanks to them for spending their time in helping us doing some experiments and other things.

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## **ABSTRACT**

MICRO AERIAL VEHICLE (MAV)...a quite strange name for those who had never heard it. To be more specific, it is a small size aircraft, flying in low speed and having mass less than 100g. Based on that statement, our MAV design should follow the specifications but not totally at all. This project is attempted to make MAV and fly it. Based on that, we had design MAV, fabricate and test fly together with two groups of Diploma students. The dimension of MAV was 300 mm for span, 200 mm for chord. The weight was around 170g. After fabrication has been done, it was followed by test fly. The result was MAV failed to fly. Starting from there, the testing had been performed to find out the problems that cause the MAV couldn't fly. The results from the testing were used to make a new MAV. The purpose is to make sure that at this level the mission to fly MAV will be achieve. The dimension for the new design was 280 mm for span, 192 mm for root chord. The total weight is around 110g. The design velocity at level flight had been set at 10m/s as well as 0.4 for lift coefficient ( $C_L$ ). This project will be continued by the next students.

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## **CHAPTER I**

### **INTRODUCTION**

Micro aerial vehicle, in contrast, operate at significantly lower speeds and have smaller dimensions; their Reynolds numbers range is approximately 150,000 or lower. In the last five years, ongoing research has revealed the dominant flight mechanisms present at these Reynolds numbers but, the worse is the unavailability of complete analytical methods or theoretical procedure for predicting low Reynolds number aircraft performance is not yet discovered.

MAVs was first designed to fulfilled the needs of US military purposes which was to have an insect-size flying and crawling systems for the significant military advantage in the coming years. Some of the potential missions for MAVs are visual reconnaissance, situational awareness, damage assessment, surveillance, biological or chemical agent sensing, communications relay, search and rescue, border patrol, air sampling, police surveillance and field research. Nowadays, this new thing has created a challenge for those who have an interest in aeronautic field. Several universities have also involved in MAV research. Competitions have been held since 1997 at the University of Florida and Arizona State University.

The objective of our project was to design, fabricate and test an MAV. In order to fulfill the requirement, we had first study the basic principles in aircraft design by attending aerodynamic classes. That was very important to us in order to understand the behavior of something that flies in the air. We also had done preliminary study on several overseas university reports, which they had succeed in doing the Micro Aerial Vehicle (MAV). From their research, they had found several