

ACKNOWLEDGEMENTS

I would like to express my deep gratitude to my advisor, Dr. Kaokanya Sudaprasert, who has been my advisor, mentor throughout guiding me through the dissertation. I particularly thank my supervisors for their lots of valuable suggestions and comments. Similarly, Dr. Sumittra Charojrochkul, Assoc. Prof. Sirichai Thepa, Dr. Roongrojana Songprakorp was an invaluable resource in helping this dissertation take shape. His careful review of work added a level of thoroughness that would not have been there otherwise. My thanks are also due to Assoc. Prof. Santi Wangnipparnto for serving as member of examining committee.

I would like to thank senior and younger generation in the energy technology, production and mechatronics engineering who helped with guidance, hard data, and advice. I am indebted to all the people whose knowledge and experience have been so valuable to the success of my work. Most of all, special thanks to Mr. Suthin Channarong in the mechatronics engineering and my friends in the ZEROLOSS Company for all his help, especially with the fabrication of the researching and explication.

I acknowledge the Higher Education Research Promotion and National Research University Project of Thailand, Office of the Higher Education Commission (NRU) and the Energy Policy and Planning Office (EPPO), under the contract no.EE7/52 and Graduate Scholarship, Ministry of University Affairs for their financial support to me.

Finally, I wish to record my deep sense of appreciation to my parents and my sister who are always encouraging, motivating, loving and supporting over time. Without their constant love, assistance, and encouragement, I would not have finished this thesis.