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FOREWORD BY THE CHAIRMAN

Assalamu'alaikum wrt. wbt, and Salam Sejahtera,

I would like to express warmest welcome to all participants to the Mechanical Engineering Research Day 2015 (MERD'15) held at Kampus Teknologi, Universiti Teknikal Malaysia Melaka (UTeM) - Melaka, Malaysia. Alhamdulillah, all praise to Allah, this is the second event after successful responds at the first event in 2011. The current event is jointly organized by the Faculty of Mechanical Engineering and Centre for Advanced Research on Energy (CARE), UTeM with the theme '*Pioneering Future Discovery*'.

The aim of MERD'15 is to foster a broad range of sustainable collaboration among researchers, expert, educators and participants, thus promoting new opportunities for research activities enhancement. This is in line with the increasing demand for innovative research ideas, design, optimizing, modeling, processing and solutions involving real engineering problems which advocate the provision of rigorous study among distinct communities.

Pioneering future discovery can gives big impact to the organization, human development and nation. Given '*Pioneering Future Discovery*' as a theme, MERD'15 is a perfect and excellent platform for academicians, engineers and researchers in broad ranges of sustainable collaborations to share their knowledge of innovation, creativity and latest approaches in various research activities.

I would like to take this opportunity to convey my special thanks to those who are involved in organizing MERD'15, especially from the Faculty staffs and CARE members for successfully organizing this event. Finally, I would like to express our deepest gratitude to the sponsors for the support given in ensuring the success of this event.

Thank you.

Associate Professor Dr. Noreffendy Bin Tamaldin

Chairman, MERD'15

Universiti Teknikal Malaysia Melaka, Malaysia.

FOREWORD BY THE DIRECTOR

Assalamu'alaikum wrt. wbt, and Salam Sejahtera,

Welcome to Mechanical Engineering Research Day 2015 (MERD'15)!

As the organizing director of MERD'15, it is my great pleasure to welcome all participants to the event, jointly organized by the Faculty of Mechanical Engineering (FKM) and Centre for Advanced Research on Energy (CARE) of Universiti Teknikal Malaysia Melaka (UTeM). This is much anticipated event which allows UTeM's researchers to share and promote their research as well as a chance to extend their network in the mechanical engineering field.

MERD'15 is aimed to be a platform for researchers, academicians and practitioners to seal advancement of engineering and finding through knowledge sharing and discussion related to current practices, innovations and trends. It is hoped that this event will catalyze and increase academic and research collaborations between other institutions and respective industries involved. I sincerely believe this will spur further advancement of scientific research and fruitful co-operation between organizations.

Last but not least, I would also like to take this opportunity to express my utmost appreciation and many thanks to all members of the organizing committee and all others who have either directly or indirectly contributed towards the success of MERD'15. I wish all the best to the participants and hopefully, this event will provide new heights of research accomplishment for UTeM's researchers.

Thank you.

Dr. Mohd Fadzli Bin Abdollah

Director, MERD'15

Universiti Teknikal Malaysia Melaka, Malaysia.

FOREWORD BY THE EDITOR-IN-CHIEF

This Open Access e-Proceeding contains 74 selected papers from the Mechanical Engineering Research Day 2015 (MERD'15) event, which is held in Kampus Teknologi, Universiti Teknikal Malaysia Melaka (UTeM) - Melaka, Malaysia, on 31 March 2015. The theme chosen for this event is '*Pioneering Future Discovery*'.

The response for MERD'15 is overwhelming as the technical committees have received more than 90 papers from various areas of mechanical engineering. From the total number of submissions, the technical committees have selected 74 papers to be included in this proceeding. The selected papers are grouped into 12 categories: Advanced Materials Processing; Automotive Engineering; Computational Modeling and Analysis & CAD/CAE; Energy Management & Fuels and Lubricants; Hydraulics and Pneumatics & Mechanical Control; Mechanical Design and Optimization; Noise, Vibration and Harshness; Non-Destructive Testing & Structural Mechanics; Surface Engineering and Coatings; Others Related Topic.

With the large number of submissions from the researchers in other faculties, the event has achieved its main objective which is to bring together educators, researchers and practitioners to share their findings and perhaps sustaining the research culture in the university. The topics of MERD'15 are based on a combination of advanced research methodologies, application technologies and review approaches.

As the editor-in-chief, we would like to express our gratitude to the editorial board members for their tireless effort in compiling and reviewing the selected papers for this proceeding. We would also like to extend our great appreciation to the members of the Publication Committee and Secretariat for their excellent cooperation in preparing the proceedings of MERD'15.

Thank you.

Dr. Mohd Zulkefli Bin Selamat

Dr. Reduan Bin Mat Dan

Editor-in-Chief

Universiti Teknikal Malaysia Melaka, Malaysia.