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# Transportation Engineering Technology – A Review, Part III

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**Abstract:** The paper presents the literature review from the papers of two special issues “Transportation Engineering Technology” of the International Journal of Mechanical Engineering and Applications (IJMEA). The results of the studies, introduced here by the authors, have helped to determine which research problems related to the Transportation Engineering Technology are interested in Vietnam.

**Keywords:** Transportation Engineering, Research and Technology, Review

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## 1. Introduction

Continuing the previous literature review in [1], which presented the papers published on the special issue “Transportation Engineering Technology” (TET) [2], this paper will review of the selected papers posted in the next two special issues TET in two parts [3] and [4].

Below, the articles will be referenced as [P-X-No], where:

“P-X” means Part-II or Part-III of these special issues and

“No” means the order number of the papers in its issue (see Table 1).

## 2. A Review of Current Research Interests

The first research trend of this special issue includes 04 studies relating to the engines and power generating machines. Prof. Nguyen Huu Huong, Nguyen Huynh Minh and Nguyen Le Duy Khai in [P-II-1] present the results of research, design and manufacture a new equipment for directly cleaning out fuel injectors of internal combustion engine, which can be used on electronic fuel injection of gasoline engines. The equipment combined with new proposed cleaning solution will shorten engine maintenance time without disassembling the injectors out of the engines, and no need to use brackets. This device is firstly manufactured in Vietnam, incorporates recent new advanced technologies in electrical - electronic engineering and

information technology, contributes to reduce pollution emissions, and can be applied to EURO 2 standard gasoline and diesel engines mounted on passenger cars. The research results can be applied immediately in manufacture with low cost, suit domestic technological capabilities, reduce maintenance time of fuel injection system for internal combustion engine.

Next, the effect of thickness of the symmetric NACA 4-digit airfoil series on self starting of a 1kW three blades H-type vertical axis wind turbine (VAWT) using computational fluid dynamic (CFD) analysis, is the main objective of the study of Nguyen Chi-Cong et al. [P-II-2]. A sliding interface technique was used to investigate two dimensional unsteady flow around VAWT model by solving the Reynolds Average Navier-Stokes equation with k-e Realizable turbulent model. By using the CFD-dynamic coupling model and by comparing the aerodynamic moment of the wind on the steady three blades to the static friction moment, the considered VAWT rotate at the starting wind velocity of 4 m/s, 3.5 m/s, 3m/s and 3 m/s for NACA 0012, 0015, 0018 and 0021 respectively. The VAWT has the lowest self starting capability with the configuration of NACA 0012 and has the highest capability with NACA 0021.

The two following papers are given by two research groups from the Ho Chi Minh city University of Technology and Education (HCMUTE). First, Ly Vinh Dat et al. presents a

design of novel valve train system for cylinder deactivation in SI engines (in [P-II-3]). The study proposes a design valve train, which is improved from the conventional valve train system in an inline SI engine with 4 cylinders, to control for deactivating cylinder. The proposed design, which differs to the existing valve train design, can deactivate one or two cylinders modes that depend on part load or medium load in vehicle. In addition, the novel design with simple structure and easy control can fully satisfy the controlling of cylinder deactivation strategies in SI engines. Next, *Van-Trang Nguyen and Pyung Hwang* (in [P-II-4]) present the dynamic analysis of rotor-ball bearing system of air conditioning motor of electric vehicle. The aim of this research is to develop a numerical model to investigate the structural dynamic response of the rigid rotor supported on deep groove ball bearings. The numerical model considers rotor imbalance that varies with speed, as well as sources of nonlinearity such as Hertzian contact force, ball clearance and varying compliance vibration. This is very important on the design point of view. The 4th order Runge-Kutta numerical integration technique has been applied. The results are presented in form of time displacement response, frequency spectra, and Poincaré map. The analysis demonstrates that the number of balls is one of the key factors affecting on the dynamic characteristics of rotor bearing system.

The second trend focuses on maritime industry which is presented in three papers from the researchers from the HCM city University of Transport (HUTrans). The research group lead by Prof. Vu Ngoc Bich [P-II-5] presents the perspective of environment-friendly materials in small boats manufactured in Vietnam using the new PPC plastic material. Next, *Nguyen Xuan Phuong and Vu Ngoc Bich* present “A statement of problems of the ship control in the head-on navigation” (in [P-II-6]) and then “Objectives of meeting movements - application for ship in maneuvering” (in [P-II-8]). Both last two papers reviewed the problems of marine navigation.

The study given by *Hung Anh Ly et al.* (in [P-II-7]) starts the presentations of the third trend of researches relating to the structural analysis. His research, provided in the HCMUT, continues the previous studies, focuses on analyzing the behavior of top-hat and double-hat thin-walled sections subjected to axial load. Due to limitations on the experimental conditions, this paper focuses on analyzing the behaviors of top-hat and double-hat thin-walled sections by theoretical analysis and finite element method. Two main objectives are setting up finite element models to simulate top-hat and double-hat thin-walled structures in order that the results are consistent with the theoretical predict; and using the results of these models to optimize a top-hat column subject to mean crushing force and sectional bending stiffness constraints by the “Two-step RSM-Enumeration” algorithm. Beside this paper, another interested study given by researchers from the Hanoi University of Science and Technology (HUST), *Le Thi Tuyet Nhung et al.* shows in [P-III-5] the integration of a multi-scale homogenization model into finite element software for predicting mechanical

properties of Bulk Moulding Compound (BMC) Composite. This paper introduces a method to build and integrate a new computational model into finite element software (ABAQUS). The chosen model is a multi-scale homogenization model, which helps to calculate mechanical properties of composite materials by using the properties of the components and orientation tensor.

In the special issue Part-III, the selected papers are more related to the operation management and maintenance decision in transportation.

First, *Tran Van Ta, Doan Minh Thien and Vo Trong Cang* (from the HCMUT) present the study on marine propulsion system reliability assessment by Fault Tree Analysis (FTA). The case study [P-III-1] reports a number of researches using FTA method to model the analysis, reliability assessment of marine propulsion system, which includes main engine, driving device, marine shaft and propeller. Beside this, other models are introduced, such as: a model of marine engine with its key parts as the cylinder liner-piston rings, the crankshaft, the injecting system and so on; a model of marine diesel generators with their sub-systems; and a jacket water cooling system model.

Second, from the Vietnam Aviation Academy (VAA), *Nguyen Hai Quang* presents the impact of working capital management to business efficiency of association of Asia Pacific Airlines, and then the contribution of total factor productivity in the air transport of Vietnam in the case of Vietnam Airlines (in [P-III-2] and [P-III-4] respectively)

Next, from the University Putra Malaysia (UPM), *Mehdi Askarizadeh et al.* (in [P-III-3]) present the literature review on the operating room planning and scheduling with mix integer programming and meta-heuristic method. Recent researches were collected based on some keywords including simulation optimization, and operating room by google scholar, Scopus, and Pubmed. The findings showed that, there are not much practical suggestion in this case and still there is a gap and needs to be discovered. Beside this, *Kamran Mohtasham, Faieza Abdul Aziz and Mohd Khairul Anuar Ariffin* (in [P-II-9]) present the vendor selection risk management framework in automotive industry.

The last, *Vo Trong Cang, Nguyen Duc Toan and Do Duc Tuan* in [P-III-6] present a MATLAB compiled program for computing the optimized repair cycle structure considering the repairing cost and the gamma-percent lifetime for the rolling stock components exploring in Vietnam National Railway. This research is conducted under the revision of Prof. Do Duc Tuan, from the University of Transport and Communications (UTC) in Hanoi, Viet Nam.

In addition, some studies related to Transportation Engineering Technology (TET) in the field of Experiments Researches in Aeronautical Engineering can be found in another special Issue of the International Journal of Transportation Engineering and Technology [5].

### 3. Discussion on the Future

Reviewing the results of these studies introduced here by

the authors, have helped to determine which research problems related to the transportation engineering and technology are interested in Vietnam. Believe that there will

be new partnerships between the affiliations to expand not only the application but also the implementation of our cooperative researches in the future.

**Table 1.** Table of contents of the special issues *Transportation Engineering Technology - Part II and III.*

<b>International Journal of Mechanical Engineering and Applications</b>		
<b>Special Issue: Transportation Engineering Technology - Part II. Vol. 3, No. 3-1, 2015,</b>		<b>pp.</b>
1	Nguyen Huu Huong, Nguyen Huynh Minh, Nguyen Le Duy Khai. An Equipment for Directly Cleaning Out Fuel Injectors of Internal Combustion Engine.	1-6
2	Chi-Cong Nguyen, Thi-Hong-Hieu Le, Phat-Tai Tran. A Numerical Study of Thickness Effect of the Symmetric NACA 4-Digit Airfoils on Self Starting Capability of a 1kW H-Type Vertical Axis Wind Turbine.	7-16
3	Ly Vinh Dat, Le Nam Anh, Tran Anh Tuan. A Design Of Novel Valve Train System For Cylinder Deactivation in SI Engines.	17-21
4	Van-Trang Nguyen, Pyung Hwang. Dynamic Analysis of Rotor-Ball Bearing System of Air Conditioning Motor of Electric Vehicle.	22-28
5	Vu Ngoc Bich, Nguyen Thi Ngoc Hoa, Nguyen Ngoc Tuan. Perspective of Environment-Friendly Materials in Small Boats Manufactured in Vietnam.	29-33
6	Nguyen Xuan Phuong, Vu Ngoc Bich. A Statement of Problems of the Ship Control in the Head-on Navigation.	34-39
7	Hung Anh Ly, Hiep Hung Nguyen, Thinh Thai-Quang. Geometrical Optimization of Top-Hat Structure Subject to Axial Low Velocity Impact Load Using Numerical Simulation.	40-48
8	Nguyen Xuan Phuong, Vu Ngoc Bich. Objectives of Meeting Movements - Application for Ship in Maneuvering.	49-56
9	Kamran Mohtasham, Faieza Abdul Aziz, Mohd Khairol Anuar B. Mohd Ariffin. Vendor Selection Risk Management Framework in Automotive Industry.	57-66
<b>Special Issue: Transportation Engineering Technology - Part III. Vol. 5, No. 4-1, 2017,</b>		<b>pp.</b>
1	Tran Van Ta, Doan Minh Thien, Vo Trong Cang. Marine Propulsion System Reliability Assesment by Fault Tree Analysis.	1-7
2	Nguyen Hai Quang. Impact of Working Capital Management to Business Efficiency of Association of Asia Pacific Airlines.	8-13
3	Mehdi Askarizadeh, Faieza Abdul Aziz, Mohd Khairol Anuar, Siti Azfanizam Binti Ahmad. Operating Rooms Planning and Scheduling with Mix Integer Programming and Meta-Heuristic Method.	14-19
4	Nguyen Hai Quang. The Contribution of Total Factor Productivity in the Air Transport of Vietnam: The Case of Vietnam Airlines.	20-25
5	Le Thi Tuyet Nhung, Vu Dinh Quy, Vu Quoc Huy, Phan Truc Dien. Integration of a Multi-scale Homogenization Model into Finite Element Software for Predicting Mechanical Properties of Bulk Moulding Compound (BMC) Composite.	26-32
6	Vo Trong Cang, Nguyen Duc Toan, Do Duc Tuan. Determining the Optimized Repair Cycle Structure Considering the Repairing Cost and the Gamma-Percent Lifetime.	33-40
7	Vo Trong Cang. Transportation Engineering Technology - A review. Part III.	41-44

## Acknowledgements

The special issue TET – Part II serves to mark the 25th anniversary of the department of Naval Architecture and Marine Engineering (NA&ME) and the ceremony of 15th anniversary of the Faculty of Transportation Engineering (FTE) of the Ho Chi Minh city University of Technology HCMUT (HCMUT) on 15th June 2015. Follow the 2<sup>nd</sup> issue,

the publishing The publishing of TET – Part III also serves for the ceremony of 60<sup>th</sup> anniversary of HCMUT on 27<sup>th</sup> Oct 2017.

The guest editors would like to thank all authors and reviewers who contributed to these special issues. We found it as rewarding to edit as a special issue in our own research specialities and many of the reviewers made similar comments. We trust that readers will share that experience.

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## Biography



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In 2015 he has joined with the Science Publishing Group as Lead Guest Editor of the special issue serie titled "Transportation Engineering Technology" of IJMEA, and now Editor in Chief of the International Journal of Transportation Engineering and Technology (IJTET).