



Materials Science, Mechanical Structures and Engineering

Edited by
Salmah Husseinayah

TTP TRANS TECH PUBLICATIONS



9 783038 352983

ISBN-13: 978-3-03835-298-3

Applied Mechanics and Materials Vol. 680

Electronically available at <http://www.scientific.net>

**Materials Science, Mechanical
Structures and Engineering**

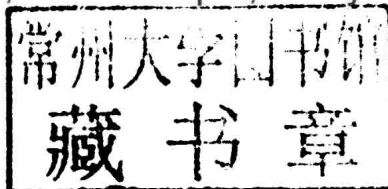
Salmah Hussein

Syahrul Husein



Materials Science, Mechanical Structures and Engineering

Selected, peer reviewed papers from the
2014 2nd International Conference on
Mechanical Structures and Smart Materials
(2nd ICMSSM 2014),
August 16-17, 2014, Kuala Lumpur, Malaysia



Edited by

Salmah Husseinsyah



Copyright © 2014 Trans Tech Publications Ltd, Switzerland

All rights reserved. No part of the contents of this publication may be reproduced or transmitted in any form or by any means without the written permission of the publisher.

Trans Tech Publications Ltd
Churerstrasse 20
CH-8808 Pfaffikon
Switzerland
<http://www.ttp.net>

Volume 680 of
Applied Mechanics and Materials
ISSN print 1660-9336
ISSN cd 1660-9336
ISSN web 1662-7482

Full text available online at <http://www.scientific.net>

Distributed worldwide by

Trans Tech Publications Ltd
Churerstrasse 20
CH-8808 Pfaffikon
Switzerland

Fax: +41 (44) 922 10 33
e-mail: sales@ttp.net

and in the Americas by

Trans Tech Publications Inc.
PO Box 699, May Street
Enfield, NH 03748
USA

Phone: +1 (603) 632-7377
Fax: +1 (603) 632-5611
e-mail: sales-usa@ttp.net

printed in Germany

Applied Mechanics and Materials

ISSN: 1660-9336, ISSN/ISO: Applied Mechanics and Materials

Editors:

Publishing Editor: **Thomas Wohlbier**, 105 Springdale Lane, Millersville,
PA 17551, USA, t.wohlbier@ttp.net

Xi Peng Xu, Huaqiao University, Ministry of Education Engineering Research Center for
Brittle Materials Machining, Xiamen, 361021, China, xpxu@hqu.edu.cn

Aims and Scope:

Applied Mechanics and Materials is a book series specialized in the rapid publication of proceedings of international conferences, workshops and symposia as well as state-of-the-art volumes on topics of current interest in all areas of mechanics and topics related to materials science.

Internet:

The periodical is available in full text via www.scientific.net

Subscription Information:

Irregular: approx. 80-100 volumes per year. First volume in 2014: Vol. 440

The subscription rate for web access is EUR 1089.00 per year.

Standing order price for print copies: 20% discount off list price plus postage charges.

ISSN print 1660-9336 ISSN cd 1660-9336 ISSN web 1662-7482

Trans Tech Publications Ltd

Churerstrasse 20 • 8808 Pfaffikon • Switzerland

Fax +41 (44) 922 10 33 • e-mail: ttp@ttp.net

<http://www.ttp.net>

<http://www.scientific.net>

Materials Science, Mechanical Structures and Engineering

Edited by
Salmah Husseinayah

Preface

Dear Distinguished Authors and Guests,

The Organizing Committee warmly welcomes you to the 2014 2nd International Conference on Mechanical Structures and Smart Materials (2nd ICMSSM 2014), held in Kuala Lumpur, Malaysia, August 16-17, 2014.

The topics of ICMSSM 2014 cover different areas of Mechanical Structures and Mechanical Engineering, Material Science and Engineering, Materials Manufacturing and Processing .The peer-reviewed, selected papers and additional lectures with breakthrough contributions enlighten the technical program. Apparently, the conference program is extremely rich, professional, and featured with high-impact. The aims of the conference therefore provide an excellent platform for participants to exchange and share new ideas and practical experiences, to establish business or research relations and to search global partners for future collaboration.

We earnestly hope that the conference proceeding can contribute and provide you for significant and improved knowledge in the contemporary scientific and material fields.

On behalf of the organizing committee, I would like to thank Anne, Tanja, Dorte and all the editors from Trans Tech Publications for their great support to ICMSSM 2014. Without their excellent editorial work, the proceedings of ICMSSM 2014 cannot be published so timely and successfully.

Finally we wish all the authors and attendees a unique, rewarding and enjoyable memory at the 2nd ICMSSM2014 in Kuala Lumpur, Malaysia. We look forward to your participation in the 3rd ICMSSM in 2015.

With our warmest regards,

Jenny Ji

Conference Organizing Chair

August 26, 2014

BOSI EDU

Committees and Sponsors

Editorial Chair

ASSOC. PROF. DR. SALMAH HUSSEINSYAH, Universiti Malaysia Perlis (UniMAP)

Conference Chair

Jenny Ji, BOSI Education & Consultancy, China

International Committee

Malaysia:

Dr.Chong Wen Tong, University of Malaya, Malaysia

Dr.Ching Yern Chee, University of Malaya, Malaysia

Dr.Nik Hisyamudin Muhd Nor, Universiti Tun Hussein Onn Malaysia, Malaysia

China:

Pak Kin WONG, University of Macau, Macau, China

Prof. Qingsong Xu, University of Macau, Macau, China

Prof. Ka-Veng YUEN, University of Macau, Macau, China

South Korea:

Prof. Sung-Hoon AHN, Seoul National University, South Korea

Canada:

Assistant Pro. Dr. M. Shahria Alam, The University of British Columbia, Canada

India:

Geetesh Goga, K.C. College of Engineering and I.T.Nawanshahr (Punajb), India

Table of Contents

Preface	v
Committees and Sponsors	vi

Chapter 1: Materials Science

The Fuzzy Comprehensive Evaluation of 18Cr2NiWA's Cutting Processing Performance	
M.L. Gong, Z.Y. Huo and H.Y. Liu	3
Experimental Investigation on Compression and Chemical Properties of Aluminium Nano Composite	
B. Vijaya Ramnath, C. Parswajinan, C. Elanchezhian, S.V. Pragadeesh, C. Kavin, P.R. Ramkishore and V. Sabarish	7
Tensile Properties of Semi-Solid Die Cast AC4C Aluminum Alloy	
K.R. Shi, S. Wisutmethangoon, J. Wannasin and T. Plookphol	11
Hot Compression Deformation Behavior of Mg-Gd-Y-Zn-Zr Alloy	
G. Lu, Z.P. Xie, Z.M. Zhang, Y.B. Yang and B.C. Li	15
Investigation on Compression and Hardness Properties of Abaca and Manila Hybrid Composite	
V.M. Manickavasagam, B. Vijaya Ramnath, C. Elanchezhian, V. Vignesh, V. Vijai Rahul, S.U. Sathya Narayanan and V. Tamilselvan	23
Analysis of Mechanical Properties between Sugarcane Bagasse/LDPE Composites versus Coconut Coir Wax/LDPE Hybrid Composites	
K. Rassiah, P. Balakrishnan and K. Haron	27
Interaction of Purple Sweet Potato Extract with Ascorbic Acid in FeCl₃ Solution	
Ayende, A. Rustandi, J.W. Soedarsono, D. Priadi, Sulistijono, D.N. Suprpta, G. Priyotomo and R. Bakri	32
Time-Temperature Effect for Preparation of SnO₂ Nanostructures Using Carbon Assisted	
D. Polsongkram, P. Chamninok, S. Changsakul, A. Sriputhorn and S. Pukird	38
The Glucose-Responsive Nanogel Based on Phenylboronic Acid	
L. Zhao, L.Y. Wang and G.Q. Gai	42
The Glucose-Sensitive Nanocarrier Based on Phenylboronic Acid	
L. Zhao, L.Y. Wang and G.Q. Gai	46
Fabrication and Evaluation of Tensile Properties of Kenaf-Flax Hybrid Composite	
V.S. Srinivasan, S. Rajendra Boopathy and B. Vijaya Ramnath	50
Physical Properties and Microstructure of the Fly Ash Based-Geopolymer/Granule Composites	
J.H. Won and S.G. Kang	54
Effects of Bi³⁺ Doping Amounts on the Magnetic Properties of FeSmO₃ Nanopowders	
X.W. Liu, H. Liu, Y. Zhang and X.W. Qi	61

Effect of La-Zn Doping on Magnetic Properties of $\text{SrFe}_{12}\text{O}_{19}$ X.W. Liu, X. Chen, W.D. He and X.W. Qi	66
A Brief Review and Framework towards Synthesising Silicone-Hydrogel Materials that Mimic Skin Deformation Behaviour N.N. Azmi, I.I. Shahrul Azhar and M. Jamaluddin	70

Chapter 2: Material Properties and Processing Technologies

Grain and Feature Size Effect on Material Behavior for Micro-Sheet-Forming M.A. Musa, A.R. Razali and N.I. Kasim	77
The Development of Prefabricated Concrete Structures S.B. Liu and L. Duan	81
Investigation of Filtration of Aliphatic Base Oil with Vibratory Shear Enhanced Process in Mechanical Actions R. Cheraghi Kootiani, A. Farokhi Nejad and M. Poursaghar Lafinejani.....	85
Bond Strength Comparison between Silicon and Glass Based Surface Using Anodic Bonding M.H.A. Aziz, Z. Sauli, V. Retnasamy, W.M. Wan Norhaimi, A.K.T. Yeow and H. Kamarudin	89
Contact Angle Analysis on Glass Based Surface M.H.A. Aziz, Z. Sauli, V. Retnasamy, W.M. Wan Norhaimi, S. Tanisellass and H. Kamarudin	93
Experimental Study on the Single-Sided Double-Point Resistance Welding of Bus Roof Skin H.B. Huang, J.C. Liu, X.L. Ke and X.H. Lin.....	97
Reflectance Analysis of Sputtered Indium Tin Oxide(ITO) Using UV Lambda Z. Sauli, V. Retnasamy, C.J. Keng, M. Palianysamy and H. Kamarudin.....	102
FPSO Underwater Mooring Line Breakage Analysis Based on Broken Wire Material Test Z. Xu and Y. Wang	106
Preliminary Study on Resistance of Non-Treated and Treated ITO Films Z. Sauli, V. Retnasamy, C.J. Keng, M. Palianysamy and H. Kamarudin.....	111
Research on Architecture Material Strength Measurement System Based on Ultrasonic Sensor Array R.F. Tao.....	115
Shape Memory Alloy Applications in Bone Fixation: State of the Art M.R. Hassan and Y.T. Haw	119
Experimental Cutting Force Properties on Interpenetrating Network Composites with Double Metal Phases N. Fan, Y. Yu and Y. Bai.....	123
Hydrophilicity Characterization on Cleaned Bonded Silicon Based Surface M.H.A. Aziz, Z. Sauli, V. Retnasamy, W.M. Wan Norhaimi, M. Mohamad Isa and H. Kamarudin.....	127
Surface Roughness and Grain Size Analysis of Treated Indium Tin Oxide(ITO)Film V. Retnasamy, Z. Sauli, S. Tanisellass, N. Ahmad, C.J. Keng and H. Kamarudin	131

Properties of Special Mortar Made with Raw Waste Material M.S.H. Mohd Sani, F. Muftah, M.I. Ismail and M. Ab. Rahman	135
Effects of Patch Geometrical Parameters on Mechanical Properties of Damaged Metallic Structure Repaired with Adhesively Bonded Composite Patch K. Zhou, D. Zhang and H.D. Wang	140
Watermelon Rind: A Potential Adsorbent for Zinc Removal N. Othman, Y.S. Kueh, F.H. Azizul-Rahman and R. Hamdan.....	146
Zinc Removal Using Honey Dew Rind N. Othman, A.S. Che-Azhar and A. Suhaimi	150
Numerical Simulation and Experiment of Traveling Wave Piezoelectric De-Icing Technique Q.Y. Li, T. Bai and C.L. Zhu	154
Failure Analysis of Composite Laminates under Biaxial Tension: A Review and Framework M.D. Muhamad Irwan, M.A. Zurri Adam and M. Jamaluddin	160

Chapter 3: Applied Mechanic and Engineering Design

Study on Shallow Embedded Column Foot of Reactive Powder Concrete Pole Mechanical Properties Y.Z. Jia and J.L. Xu	167
Large Span Double Truss Lateral Stability Analysis Y.Z. Jia and Y.X. Wang.....	171
The Pole Design of 500kV Centrifugal Concrete Filled Thin-Wall Steel Tubular Structures Y.Z. Jia and C.H. Zhang	175
Review of Studies on the Seismic Behavior of Composite Shear Walls with Double Steel Plates and Filled Concrete Y.J. Zhang, W.X. Liu and X.S. Shao	179
Analysis on the Couple Field of Fixed Tube-Sheet Heat Exchanger Y.L. Xu, W.Y. Chen and Q.W. Yang	182
Aspects of Alternative Dispute Creating Bolted Joint Technology Flowdrill J. Mascenik and S. Pavlenko.....	186
Ground Movements in Shield Tunneling and Impacts on Railway Culvert Y.Z. Jia and R. Li.....	190
Parallel Green Design of Machine Product B. Zhang, T.H. Jiang and C.H. Chen	194
Research on Rolling Element Bearing Fault Diagnosis Based on EEMD and Correlated Kurtosis X.L. Wang, W.H. Han, H. Gu, C. Hu and X.X. Han	198
Flexural Capacity of Plate Girders with Corrugated Webs Strengthened with Angles S.H. Lho, M.W. Park, Y.K. Ju and S.D. Kim	206

Influence of Deformation of the Wheel Disk-Type Body on the Tooth Load Distribution over the Facewidth in Helical Gears	
M. Krasiński	210
Natural Frequencies of Functionally Graded Beams by the Various Shear Deformation Theories	
J. Wu and S. Xiang	216
The Analysis of Finite Element about the Interaction between Seasonal Frozen Soil and Tower Pile Foundation	
F.L. Gan and D. Zhao	220
An Experimental Study on the Cutting Forces, Surface Roughness and the Hardness of Al 6061 in 1D and 2D Ultrasonic Assisted Turning	
R. Nosouhi, S. Behbahani, S. Amini and M.R. Khosrojerdi	224
Finite Element Analysis for Petiole's Fracture of Mine-Used Explosion-Proof Axial Fan	
Z.L. Song, D.C. Xie and L.Y. Ou-Yang	228
Calculation of Torsional Stiffness of Conductor and its Influence on the Stability of Motion	
Z.H. Cheng and C. Zhang	233
Effect of Pressing Pressure on Density and Hardness of Powder Miscanthus Reinforced Brake Pads	
M. Unaldi and R. Kus	237
Comparative Analysis of Bearing Capacity of Inclined and Vertical Excavated Foundation	
R. Chen, H.F. Liu, D.X. Hao and Z.Y. Wang	241
A Framework for Experimental-Numerical Analysis of Woven Laminates Failure	
M.Z. Mohd Zairil Hafizi, M.D. Muhamad Irwan, M.A. Zurri Adam and M. Jamaluddin	245
The Finite Element Analysis on the Compression Splicing Position of Strain Clamp in Guy Tower	
Z.Q. Wang, J. Li, W.G. Yang and Y.F. Cheng	249
Study on Impact Characteristics of CFRP Structural Member According to Stacking Conditions	
J.H. Choi, Y.J. Yang, C.S. Cha and I.Y. Yang	254
Study on Random Vibration Response Analysis for the Sphere Cylinder Assembly in Aerospace Vehicle	
D.L. Sun, Z. Zhao, K. He and R.D. Liao	258
Incremental Dynamic Analysis of Shape Memory Alloy Braced Steel Frames	
S. Moradi and M.S. Alam	263
Kinematics and Efficacy Analysis of the Seni Silat Cekak Malaysia (Kaedah A)	
G. Mustapha, W.R. Wan Sulaiman, A.P.P. Abdul Majeed, N.H. Mohd Yahya and M. Jamaluddin	267
Research on Piezoelectric Micropump of Combination of Active and Passive Valves	
J. Sun, P. Zeng and H.L. Lu	271
Theoretical Modeling of Pressure Force for CFRP Laminated Plate Interference-Fit Joining	
P. Liu, K.P. Du and W.L. Li	276

Preliminary Numerical Analysis of a Platform Structure A.K. Sohaimi, A.P.P. Abdul Majeed and M. Jamaluddin	280
A Trigonometric Shear Deformation Theory for Free Vibration Analysis of Functionally Graded Plates J. Wu and S. Xiang.....	284
Development of Droplets Penetrating Roots Performance Test Device and Tests Applied this Device in Ultrasonic Aeroponic System Y. Teng, J.M. Gao and C.J. Liu	288
Simulation and Experimental Investigation of Springback in Air V-Bending Process Using Finite Element Method (FEM) M.S. Buang, S.A. Abdullah and J. Saedon	292

Chapter 4: Mechanical Engineering and Control Systems

Kinematics Modelling and Simulation of Aero-Engine Fuel Piston Pump J.F. Fu, H.C. Li, J. Li and S.H. Wang.....	299
A Design Method of Aero Fuel Centrifugal Pump with Integrated Inducer and Impeller J. Li, H.C. Li, J.F. Fu and S.H. Wang.....	303
Takeoff Performance Analysis Based on Aeroengine EGT Trend Monitoring and Control F. Qiang and F. Ding.....	307
Positional Accuracy Based on a Load Identification Optimization on a Linear Motor Sheet Forming Feeder N.I. Kasim, A.R. Razali and M.A. Musa	311
Dynamic Analysis and Balance Design for a Constant Temperature Oscillator Based on ADAMS Q. Tao, Z.H. Feng, M. Lei and Z.M. Wang	315
Determining the Energy-Optimal Base Position of Industrial Robots by Means of the Modelica Multi-Physics Language M. Gadaleta, A. Genovesi and F. Balugani	320
The Analysis of Displacements and the Load Distribution between Elements in a Planetary Roller Screw F. Lisowski.....	326
Punching Automatic Line Served by a Portal Robot P.C. Patic, L. Pascale and G. Măntescu	330
Research on Fuzzy PID Controller for AC Permanent Magnet Synchronous Motor Servo System H. Hu and Y.X. Cui.....	334
Development of the Electronic Control System for Air-Powered Engine P.L. Chen, F.Z. Deng, J. Xu and M.H. Liu	338
Research on the Model of Pneumatic Servo Mechanism Controlled by Pulse Width Modulation D.X. Zhang, Z. Yang and Z. Yang.....	342

Research of Subway Electro-Pneumatic Brake Force Distribution Strategies M.L. Wu, L.Z. Wu, Y.F. Li and C. Tian	347
Method of Numerical Simulation of a Centrifugal Separator for Cleaning Petroleum Products N. Vatin, D. Nemova and N. Kharkov	354

Chapter 5: Researches of Transmission Line Construction

Estimation of Uplift Capacity of Excavated Foundation of Transmission Lines D.X. Hao, Y.C. Gao and R. Chen	361
Nonlinear Analysis of 220 kV Power Transmission Tower and Gradient Optimization X.Z. Zhang and X.W. Wang	365
Application of Cement Soil Mixing Pile for Transmission Line Q. Xiao, B. Yan and G.L. Du	370
Fine Damage Identification Method of Transmission Tower Based on Concurrent Multi-Scale Modeling C.C. Liu, S.Y. Hou, W.Q. Li and Z.W. He	374
Research Status and Prospect of Transmission Tower Structure Damage Identification W.X. Liu, L. Lu and Z.C. Li	379
Multi-Scale Analysis of the UHVDC Transmission Tower C.C. Liu, W.Q. Li, S.Y. Hou, Z.W. He and F. Gao	383
Dynamic Simulation Analysis of Transmission Line Tension Stringing W. Kong, Y.B. Zhang and W.L. Peng	387
The Transmission Tower with Angles Composed by the Variable Cross-Section is Studied Modal Analysis and Secondary Stress L. Qin and G.R. Yu	391
The Life Prediction of Transmission Tower Based on Multi-Scale Analysis C.C. Liu, Z.W. He, Y.J. Pan, W.Q. Li and S.Y. Hou	395
Seismic Responses of Multiple-Circuit Transmission Tower-Line System W. Kong, S.G. Men and Y.F. Tao	399
Analysis of a Fractured Lightning Rod on a Tower Structure at a Substation R. Li, H.Y. Yu, L. Wang, L.F. Wang, Q. Yuan, Q.Y. Chen, M. Qian, J. Hong, C.M. Tian and Y.H. Sheng	403
UHV KZ185 Crossing Tower Stress Analysis W. Kong and L. Wu	410
The Advantage Analysis of Applying Steel Tube Tower in Large Span Engineering J. Gong and L.N. Wang	414
Application of Large Size and High Strength Angle in UHV Transmission Line Tower F.L. Gan and X. Wang	418
Semi-Active Control for Vibration of Transmission Tower-Line with MRD W. Kong, Y.F. Tao and S.G. Men	422

The Influence of Geometry of Pedestal Piles in Silt on Uplift Behavior D.X. Hao, J.Z. Zhang and R. Chen	426
---	-----

Chapter 6: Civil Engineering and Information Technologies

Intrusion Detection for Universal Attack Mode Based on Linear Temporal Logic with Past Construct P.Z. Qiao, Y.R. Wang and Y.K. Zhao	433
Research on Green Machine Product Design Evaluate System Based on AHP L.T. Yang, B. Zhang and T.H. Jiang	437
A New Hybrid Algorithm of Trust Region Methods D.Q. Zhang, P.P. Zhou and Q.H. Zhou	442
Measurement System Analysis of VS Lite G. Mustapha, M.S.A. Shafie, N.H.M. Yahaya and M. Jamaluddin	447
A Novel Approach for Intrusion Detection Based on Model Checking Interval Temporal Logic with Past Construct P.Z. Qiao and W.J. Zhu	451
Semi-Parametric Statistical Model for Extreme Value Statistical Models and Application in Automatic Control Y. Han	455
Optimization of Microclimate in Residential Buildings D. Vuksanovic, V. Murgul, N. Vatin and V. Pukhkal	459
Exhibition Pavilions Car Showrooms Based on Translucent Structures: Providing Microclimatic Comfort for Clients V. Pukhkal, D. Stanojevic, V. Murgul and N. Vatin	467
Highly Compacted and Reinforced Soil Beds as an Efficient Method to Build Artificial Foundation Based on Weak Soils R. Usmanov, N. Vatin and V. Murgul	474
Uses of Glass in Architecture: Heat Losses of Buildings Based on Translucent Structures Y. Nikitin, V. Murgul, N. Vatin and V. Pukhkal	481
Autonomous Systems of Solar Energy Supply under the Weather Conditions of Montenegro V. Murgul, N. Vatin and E. Aronova	486
A Relation between Function and Architectural Form in the Observers Perception R. Alihodzic, V. Murgul and N. Vatin	494
Glazing Design for Exhibition Pavilions Based on Translucent Structures under Winter Conditions during Cold Periods D. Vuksanovic, Y. Nikitin, V. Murgul, N. Vatin and V. Pukhkal	499
Research on Industrial Exhibitions Architecture Y. Nikitin, V. Goryunov, V. Murgul and N. Vatin	504
The Method to Determine Sites and Facilities for Wind-Diesel Power Plants Construction P. Pilipets, N. Vatin and V. Murgul	510